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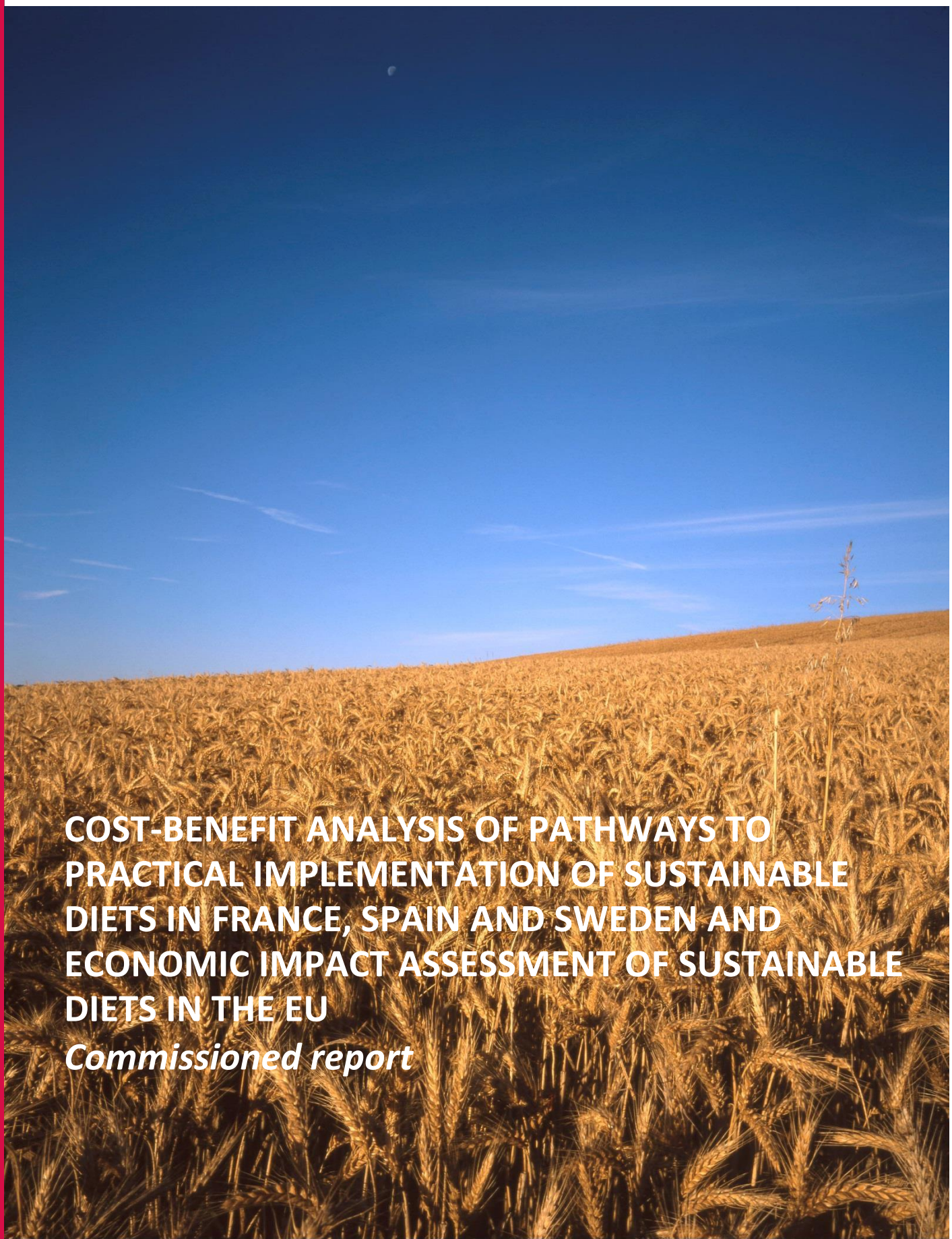

COST-BENEFIT ANALYSIS OF PATHWAYS TO PRACTICAL IMPLEMENTATION OF SUSTAINABLE DIETS IN FRANCE, SPAIN AND SWEDEN AND ECONOMIC IMPACT ASSESSMENT OF SUSTAINABLE DIETS IN THE EU

Commissioned report

LiveWell for Low Impact Food in Europe
(LiveWell for LIFE)

COST-BENEFIT ANALYSIS OF PATHWAYS TO PRACTICAL IMPLEMENTATION OF SUSTAINABLE DIETS IN FRANCE, SPAIN AND SWEDEN AND ECONOMIC IMPACT ASSESSMENT OF SUSTAINABLE DIETS IN THE EU

Final report

CIVIC CONSULTING

Title	Cost-benefit analysis of pathways to practical implementation of sustainable diets in France, Spain and Sweden and economic impact assessment of sustainable diets in the EU
Conducted for	LiveWell for Low Impact Food in Europe (LiveWell for LIFE)
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1 EXECUTIVE SUMMARY

Background of the study

In a context of increasing prevalence of obesity in the EU due to unhealthy diets, coupled with the unsustainable environmental impacts of such diets, WWF-UK, the WWF European Policy Office and *Friends of Europe* initiated the LiveWell for LIFE project (LiveWell for Low Impact Food in Europe) which introduces the concept of a healthy and sustainable diet; a diet which can bring significant health benefits to EU citizens and contribute towards the reduction of greenhouse gas emissions from food. Under the first steps of this project, low carbon and healthy diets (or 'LiveWell' diets) were developed in three pilot countries (France, Spain and Sweden) which were chosen due to the variety of dietary contexts they represent and their different levels of policy readiness for adopting the LiveWell Plate's recommendations.

As a second step, this study has been conducted to assess the economic potential of the adoption of sustainable diets (diets meeting the LiveWell Plate's recommendations) by 2020 according to various scenarios as well as the economic viability of policy options to encourage their adoption. The main methodological tools employed were in-depth desk research, country studies in the pilot countries of the LiveWell for LIFE project, interviews with key stakeholders and experts at EU and international level, modelling of the effects of a switch to healthier and more sustainable diets, and a cost-benefit analysis of selected policy options to meet the LiveWell Plate's recommendations.

Effects of the adoption of diets following the LiveWell Plate's recommendations

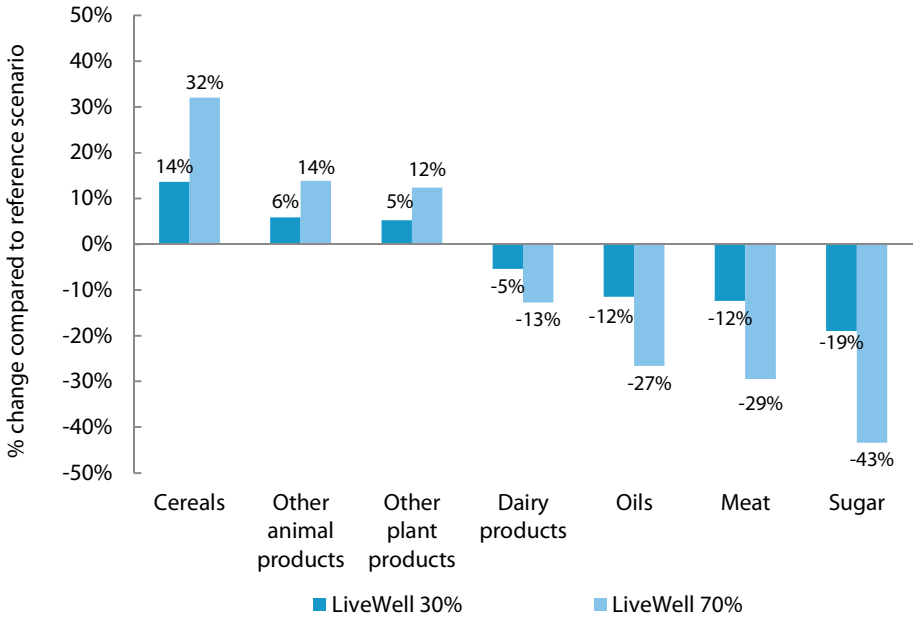
This study investigated the projected effects in 2020 of the adoption of the LiveWell Plate's recommendations by an additional 30% (LiveWell 30% scenario) and an additional 70% (LiveWell 70% scenario) of the EU population compared to the reference scenario, supported by the use of the CAPRI (Common Agricultural Policy Regionalised Impact) modelling framework. The effects that were modelled in CAPRI include (1) effects on consumption patterns; (2) effects on consumer prices; (3) market effects; (4) effects on economic welfare; and (5) effects on the environment. The effects were modelled for seven main food groups including 'cereals', 'other plant products', 'meat', 'other animal products', 'dairy products', 'oils', and 'sugar'. In addition to these, the effects of the adoption of diets meeting the LiveWell Plate's recommendations on public health were investigated.

Effects on consumption patterns and markets for specific food products

The adoption of diets meeting the LiveWell Plate's recommendations by EU consumers results in increased calorie intakes from the consumption of food from the groups 'cereals', 'other plant products', and 'other animal products' while calorie intakes from the consumption of 'dairy products', 'oils', 'meat', and 'sugar' are reduced under the two LiveWell scenarios, as shown in Figure 21 below.

Figure 1. *Effects on consumption (in kilocalorie /head) of main food groups in the EU under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



These consumer demand shifts cause changes in consumer prices of main food groups. In general, prices tend to decline if consumption is declining at the EU level but cross-price relationships and supply side responses, including feed demand, add complexity to the magnitude of price changes. In addition, consumer demand changes for food products in the EU trigger changes in consumer prices, but also in prices for EU producers and in quantities of food produced in the EU. Changes in EU consumers' demand also generate production changes in the rest of the world via changes in exports and imports (for more details, refer to Section 3.4.3).

Effects on economic welfare

Price and quantity changes imply changes in income and economic welfare of market participants.

The most important welfare effects under the LiveWell scenarios are losses in income for the agricultural sector and the processing industry, which exceed the welfare gains for consumers such that the net total welfare effect of the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers is negative for the EU as a whole (-€18.1 billion under the LiveWell 70% scenario).

Expressed in percentage of Gross Domestic Product (GDP), welfare losses relative to the reference scenario are very small because food expenditure is only a small fraction of total EU GDP and welfare effects are moderate (see table below).

Table 1. *Effects on welfare of EU market participants under LiveWell 30% and LiveWell 70% scenarios (change in € billion and % change against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30% (Change compared to the reference scenario)		LiveWell 70% (Change compared to the reference scenario)	
	In € billion	In % of GDP	In € billion	In % of GDP
Consumer welfare	+€7.8 bn	+0.051%	+€1.3 bn	+0.009%
Agricultural income	-€8.4 bn	-0.055%	-€10.1 bn	-0.066%
Income of processing industry	-€4.2 bn	-0.027%	-€8.7 bn	-0.056%
Income of other private agents	+€0.3 bn	+0.002%	+€0.6 bn	+0.004%
Public agricultural budget	-€0.5 bn	-0.003%	-€1.2 bn	-0.008%
Total	*-€5.0 bn*	*-0.033%*	*-€18.1 bn*	*-0.117%*

Nonetheless, it is important to note that public health effects and effects on the environment are not included in the standard welfare accounting of CAPRI. Some environmental effects have been estimated in physical units (see below), but they are not monetised and therefore not included in the welfare accounting presented in this study.

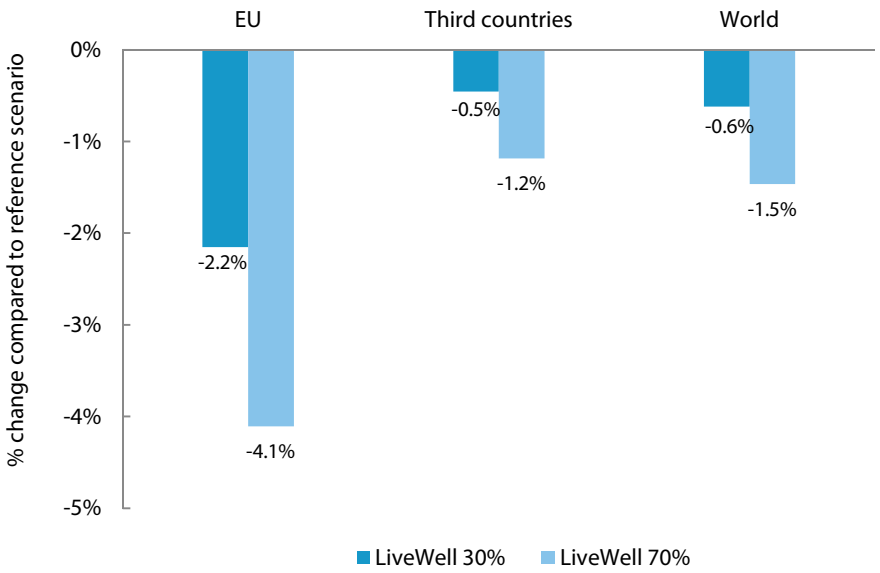
In addition, changes in revenues associated with the production of key raw agricultural products following the adoption of diets meeting the LiveWell Plate's recommendations by consumers in the EU can be observed. Agricultural revenues associated with the production of pulses, eggs, and vegetables, sharply increase under both LiveWell scenarios (+37.7%, +55.0% and +76.3% under the LiveWell 70% scenario, respectively). In contrast, agricultural revenues associated with the production of sugar, cow and buffalo milk and meat are expected to decrease significantly as a result of a switch to healthier and more sustainable diets (by -18.3%, -21.3% and -32.7% under the LiveWell 70% scenario, respectively).

Effects on the environment

Production changes in the EU as well as in third countries affect greenhouse gas emissions (GHGe) and the agricultural nitrogen balance. The adoption of diets meeting the LiveWell Plate's recommendations results in a decrease in agricultural GHGe from the EU by 4.1% under the LiveWell 70% scenario (see Figure 2 below), relative to the reference scenario (which assumes a continuation of current food consumption patterns until 2020).

Figure 2. *Effects on EU and global agricultural GHGe under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



This is primarily the result of the decrease in consumption of dairy products and meat by EU consumers who follow the LiveWell Plate's recommendations, which leads to a reduction in EU production of these products (up to -9% and -11% under LiveWell 70%, respectively), and thus a decline of GHGe related to animal production in the EU of up to 6.2% under the LiveWell 70% scenario.

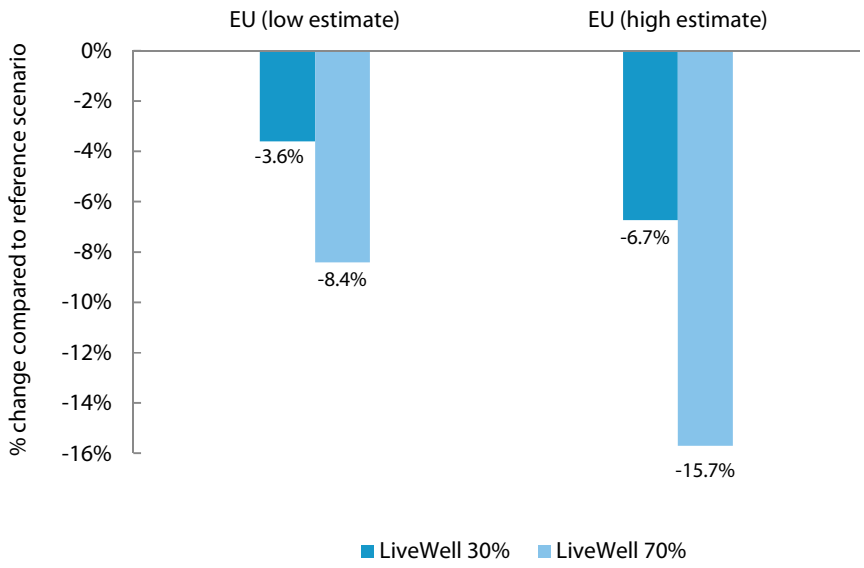
These decreases in GHGe are demand-driven and therefore are not counteracted by 'leakage' effects related to displacement of EU production to third countries. Instead, animal production is also reduced in third countries, which adds to the reduction in agricultural GHGe at the global level, resulting in a total reduction of *1.5% in global agricultural GHGe (under the LiveWell 70% scenario) from a change in food consumption only adopted by consumers in the EU*. The global estimates of agricultural GHGe reduction are conservative because the effects of changes in agricultural area use on the release of soil carbon (known as "Indirect Land Use Change") are still largely neglected in CAPRI. In addition, the overall nitrogen balance surplus declines by 3.0% under the LiveWell 70% scenario.

Effects on public health

Compared to the reference scenario, the prevalence of obesity in 2020 is expected to decrease by between 3.6% and 6.7% at EU level if an additional 30% of the EU population meet the LiveWell Plate's recommendations in this year (LiveWell 30% scenario), and to decrease by between 8.4% and 15.7% if an additional 70% of the EU population meet the LiveWell Plate's recommendations (LiveWell 70% scenario). This is shown in the figure below.

Figure 3. *Effects of adoption of LiveWell diet on prevalence of obesity under LiveWell 30% and LiveWell 70% at EU level (relative to reference scenario)*

Source: Civic Consulting.



It is estimated that the avoided costs of obesity and related diseases at EU level range between €6.5 billion and €13.8 billion under the LiveWell 30% scenario and between €15.2 billion and €32.1 billion under the LiveWell 70% scenario in 2020, relative to the reference scenario (see Table 2 below).

Table 2. *Effects of adoption of LiveWell diets on costs of obesity and related diseases in the EU in 2020 under LiveWell 30% and LiveWell 70% scenarios*

Source: Civic Consulting. Note: (a) See Section 3.4.6.3 and Table 20 on expected prevalence of obesity among adults in the EU in 2020. (b) Cost estimates based on data from three pilot countries France, Spain and Sweden.

	Expected annual costs of obesity and related diseases[b] (in € billion)			Expected annual avoided costs (relative to reference scenario; in € billion)	
	Reference scenario	LiveWell 30% scenario	LiveWell 70% scenario	LiveWell 30% scenario	LiveWell 70% scenario
Based on low estimate for prevalence of obesity in the EU in 2020 [a]	180.2	173.7	165.1	6.5 (3.6%)	15.2 (8.4 %)
Based on high estimate for prevalence of obesity in the EU in 2020 [a]	204.4	190.6	172.3	13.8 (6.7%)	32.1 (15.7%)

These figures are conservative estimates due to the assumptions on which they are based, as well as the exclusion of additional costs related to obesity that are difficult to assess quantitatively (related e.g. social stigmatisation, mental health problems and general physical impediments). Finally, in this study only the costs of obesity and

related diseases are considered; the increased medical costs of people who are overweight, but not obese, are not included, although previous studies indicate that these costs may also be considerable.[1]

Overview of scenario results

The table below summarises the effects of the adoption of the LiveWell diets under the LiveWell 30% scenario and the LiveWell 70% scenario, relative to the reference scenario.

It shows that despite significant increases in agricultural revenues related to the production of vegetables, eggs and pulses, these do not compensate losses for the meat and dairy sectors. As a result, the total agricultural and processing industry income decreases under the two LiveWell scenarios compared to the reference scenario.

However, losses for meat and dairy producers can be outweighed by the environmental and health benefits resulting from the adoption of LiveWell diets. Specifically, the adoption of these diets by EU consumers leads to significant reductions in both EU and global agricultural GHGe. The adoption of diets meeting the LiveWell Plate's recommendations results in a total reduction of 1.5% in global agricultural GHGe (corresponding to a decrease of 59.9 Mt CO_2 equivalent under the LiveWell 70% scenario relative to the reference scenario) from a change in food consumption only adopted by consumers in the EU. The LiveWell diets would lead to even stronger GHGe reduction if they were adopted at a global level. Under the modelling assumptions applied for this study, a shift to LiveWell diets occurs in the EU only. This causes a reduction in EU consumption of meat and dairy products, which is, however, partly compensated by increased exports of meat and dairy products from the EU to third countries. This increase in exports limits the reduction in GHGe achievable through a dietary shift in the EU.

Finally, a switch to healthier and more sustainable diets by EU consumers is expected to lead to a significant reduction in the expected prevalence of obesity in 2020 under the two LiveWell scenarios compared to the reference scenario. As a result, the avoided costs of obesity and related diseases at EU level in 2020 are expected to range between €6.5 billion and €13.8 billion under the LiveWell 30% scenario and between €15.2 billion and €32.1 billion under the LiveWell 70% scenario, relative to the reference scenario.

[1] The estimate of €2,183 per obese person in the EU in 2020 is likely to be conservative, in view of the costs of obesity estimated in the USA. For example, a report published in 2010 estimated that the overall, tangible, costs of being obese are US$4,879 for an obese woman and US$2,646 for an obese man in the USA per year (Dor et al., 2010). According to this report, adding the value of lost life to these costs further increases the total cost of obesity: US$8,365 for obese women and US$6,518 for obese men. Converting these costs in Euros and inflating them to obtain values for 2020, it is estimated that the cost of obesity will range between €4,489 and €7,696 per obese women and between €2,434 and €5,997 for obese men in 2020 in the USA, depending on whether the value of lost life is considered in the assessment.

Adding up the effects that have been monetised in the framework of this study (see table below) leads to a total net benefit ranging between €1.5 billion and €8.8 billion under the LiveWell 30% scenario relative to the reference scenario, depending on which estimate for the prevalence of obesity in the EU in 2020 is chosen as basis for the extrapolation. Under the LiveWell 70% scenario, the net effect ranges between a net cost of €2.9 billion (due to the fact that increased prices of vegetables caused by supply side bottlenecks lead to a more limited increase in consumer welfare under this scenario) and a net benefit of €14.0 billion. *However, these figures do not include the significant environmental and other health benefits which have not been monetised in this study.*

Table 3. *Effects of adoption of LiveWell diets by EU consumers under LiveWell 30% and LiveWell 70% scenarios (change against reference scenario)*

Source: Civic Consulting.
Note: (a) Includes income of other private agents.

Dimension	Effect	Cost or benefit?	Change compared to reference scenario		Comment
			LiveWell 30%	LiveWell 70%	
Economic welfare	Reduction of agricultural and processing industry income[(a)]	Cost	-€12.3 bn	-€18.2 bn	Agricultural and processing industry income decreases under both scenarios. Increased revenues related to the production of vegetables, eggs, pulses do not compensate losses for the meat and dairy sectors.
	Reduction of public agricultural budget	Cost	-€0.5 bn	-€1.2 bn	Under both LiveWell scenarios, the effects on the public agricultural budget are slightly negative due to changes in tariff revenues and CAP premiums.
	Increase in consumer welfare	Benefit	+€7.8 bn	+€1.3 bn	Under both LiveWell scenarios consumer welfare increases, but to a lesser extent under the LiveWell 70% scenario due to increased prices of vegetables caused by supply side bottlenecks.
Environ-ment	Reduction in agricultural GHGe (CO2 eq.)	Benefit	-25.3 Mt (not monetised)	-59.9 Mt (not monetised)	EU and global agricultural GHGe decrease significantly. Reduction in the producer prices for dairy products and meat also curbs animal production and related emissions in third countries.
	Reduction of agricultural nitrogen surplus	Benefit	-0.2 Mt (not monetised)	-0.3 Mt (not monetised)	Reduced animal production leads to a reduction in the use of manure as fertilizer. Reduced nitrogen surplus is associated with lower leaching below grounds and lower gaseous emissions mostly of ammonia.
Public health	Avoidance of costs of obesity and related diseases	Benefit	+€6.5 bn to +€13.8 bn	+€15.2 bn to +€32.1 bn	Switch to healthier and more sustainable diets by EU consumers leads to significant reduction of the costs of obesity and related diseases.
	Other benefits	Benefit	(not monetised)	(not monetised)	Reduction of obesity prevalence also reduces costs for affected individuals that are difficult to assess quantitatively, such as social stigmatisation, mental health problems and general physical impediments caused by obesity.

Costs and benefits of policy options

The adoption of diets meeting the LiveWell Plate recommendations by EU consumers could therefore lead to significant benefits in terms of a reduction of environmental impacts and improvements in public health.

In order to encourage the adoption of these diets, the costs and benefits of the following policy options were analysed:

- Policy option 1: Introduction of "Food, Nutrition and the Environment" education;
- Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products;
- Policy option 3: Taxation measures.
  - Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts;
  - Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts;
- Policy option 4: Development of a national sustainable food strategy.

In the following the key findings regarding costs and benefits of each of the policy options covered in this study and the associated recommendations are outlined. The order in which these are presented broadly reflect the feasibility of the policy options assessed and the extent to which the benefits can be considered to outweigh costs on the basis of the evidence collected in this study.

Development of a national sustainable food strategy

Stakeholders interviewed considered that national sustainable food strategies are important and needed. Several stakeholders were of the opinion that this policy option is the most important of the options considered as it would form the political basis for further actions on sustainable diets.

The development of a national sustainable food strategy is likely to induce mainly minor one-off costs for public authorities, related to consulting stakeholders, reviewing existing initiatives, analysing results of the consultation and drafting the strategy.

The benefits in terms of a reduction in environmental impacts of food production and consumption identified for consumers/society are likely to be minor to significant and materialise in the mid- to long term, as are benefits relating to raising awareness regarding sustainable diets among a wide range of stakeholders. The benefits for food producers/farmers are likely to be minor to significant, relating to identification and achievement of cost savings, and improvement of brand and corporate image in the immediate to mid-term, while benefits in terms competitive advantage through

involvement in the development of the strategy are likely to materialise in the mid- to long term.

These conclusions lead to the following recommendation:

Recommendation 1:

- EU Member States should first and foremost develop a national sustainable food strategy to take into account the cross-cutting policy background relating to healthy and sustainable diets. This study has shown that a combination of policy measures incorporated in the national strategy is needed. Key components of the strategy could therefore include a mix of the policy options and other measures considered in this study, such as education measures, or specific taxes, e.g. on advertising for unhealthy food/food with high environmental impacts, or regulation on portion size.
- The EU should act as catalyst or facilitator for exchange and sharing experiences between Member States. Resources should therefore be made available at EU level to support the development of a common framework for network and exchange of best practices among Member States. In addition, at EU level, the organisation of regular conferences on sustainable food could be envisaged to exchange national experiences and best-practices.
- A national strategy should incorporate regular stakeholder consultation and evaluation mechanisms to ensure the strategy is appropriately adapted to target specific outcomes and impacts.

Introduction of "Food, Nutrition and the Environment" education

A primary rationale for considering this policy option is the significant increase in childhood overweight and obesity in the EU - from one in four overweight or obese children in 2008 to one in three in 2010 - which suggests the need for food education in school to promote the adoption of healthier diets by children.

The introduction of "Food, Nutrition and the Environment" education is likely to induce minor recurring costs for food producers/farmers (related to visits for farms), and negligible to minor costs on balance for public authorities and consumers/society of a one-off or recurring nature, depending primarily on the costs of training teachers.

The benefits identified for consumers/society are likely to be significant on balance, materialising primarily in the immediate to mid-term with the adoption of healthier diets by children and the improvement of agricultural literacy of children, academic outcomes, social and other skills of children, while a reduction in negative environmental impacts of food production and consumption materialising only in the long term, even if education in schools can also have immediate indirect benefits on

consumption patterns adopted by parents. The benefits identified for food producers/farmers are likely to be minor to significant, materialising in the immediate to mid-term, relating to the improvement of image and increasing interest of children for the agricultural and food sector.

These conclusions lead to the following recommendation:

Recommendation 2:

Food, nutrition and environment education measures are key policy measures to encourage the adoption of healthy and sustainable diets, which should be incorporated within a national sustainable strategy. Education should primarily be targeted at pupils at primary school level, but also at secondary school level to a lesser extent, and should consist not only of lessons in classrooms, but also incorporate practical educational approaches, including visits to farms/food manufacturing plants and the use of school gardens, as well as complementary measures such as cooking classes, as the combination of measures increases overall effectiveness.

Introduction of an EU-wide mandatory environmental labelling of food products

A primary rationale for considering this policy option is recent EU-wide surveys: one Eurobarometer survey indicates that six out of ten EU citizens think that current product labels do not provide enough information about their environmental impact (59%), while a Flash Eurobarometer survey from 2009 on Europeans' attitudes towards the issue of sustainable consumption and production indicates that more than seven in ten (72%) EU citizens consider that a label indicating a product's carbon footprint should be mandatory in the future.

The introduction of an EU-wide mandatory environmental labelling of food products is likely to induce significant one-off costs complemented by minor recurring costs for public authorities, related to creating and maintaining a database of generic data on environmental impacts of food products, creating a harmonised labelling scheme for environmental impacts of food products at EU level, and controlling the accuracy of labelling information. Mandatory environmental labelling would be expected to only cause minor one-off costs for food producers, if labelling is supported with such a database of generic data provided by public authorities, and sufficient transition periods are provided. Food producer costs would relate to familiarisation with labelling requirements, using the database for labelling, and adding the labels on packages.

The benefits in terms of health and reduced environmental impacts identified for consumers/society are likely to materialise in the mid to long term on balance, the significance of which depending primarily on the extent to which consumers are

already environmentally conscious and willing to switch to more sustainable consumption patterns, despite immediate significant benefits resulting from food producers' product reformulation.

These conclusions lead to the following recommendation:

Recommendation 3:

In order to successfully introduce the environmental labelling for food products, it must be a mandatory requirement for all food producers, and must stem from an EU initiative. This would involve both a harmonised EU labelling scheme, as well as the provision of generic data via public databases at EU level on the environmental impacts of food products, determined using on a commonly agreed methodology for their assessment. Furthermore, the labelling should be as simply and clearly designed as possible to maximise consumer understanding. The labelling scheme could then be integrated into national sustainable food strategies, in which case it would need to be coupled with targeted and well developed consumer information and awareness campaigns.

Taxation measures

The study investigated the costs and benefits of introducing taxation measures to encourage the adoption of diets meeting the LiveWell Plate's recommendations. Two options were assessed: a higher tax rate on unhealthy food/food with high environmental impacts, or a reduced VAT rate on healthy food with low environmental impacts.

Introduction of a higher tax rate on unhealthy food/food with high environmental impacts

A tax on unhealthy food/food with high environmental impacts contributes to internalise (at least in part) external costs (including health and environmental costs) related to the consumption of these products.

The introduction of a higher tax rate on unhealthy food/food with high environmental impacts is likely to induce minor to significant recurring costs for food producers/farmers and for consumers/society, depending on the level of the tax rate, primarily due to loss of income/welfare, the political cost, and other factors. A minor recurring cost would be incurred by public authorities related to defining products to which the tax is applied and the appropriate tax rate.

The benefits in terms of reduced environmental impacts identified for consumers/society are likely to be immediate and significant, depending on the level of the tax rate, while health benefits are likely to materialise in the mid- to long term.

Benefits identified for public authorities are also likely to be significant and immediate, in the form of additional tax revenues, which could be employed to finance food education programmes, support development of sustainable food production and research on sustainable diets. In addition, benefits for producers of healthy food with low environmental impacts are also likely to significant and immediate, in the form of an increase in income.

The results of the modelling conducted in the framework of this study indicate that even a 25% tax on unhealthy food/food with high environmental impacts is likely to induce fewer health and environmental benefits than the adoption of diets meeting the LiveWell Plate's recommendations by an additional 30% of EU consumers (LiveWell 30% scenario), relative to the reference scenario. In other words, even a drastic measure such as a tax on relevant food products could only be part of the solution to reach more sustainable food consumption, but would fall short as a stand-alone measure.

Reduced VAT rate on healthy food with low environmental impacts

A primary rationale for considering this policy option is results of a Eurobarometer survey in which respondents agree that lower taxes on environmentally-friendly materials and products can play a role in reducing people's impact on the environment, with over eight out of ten respondents answering positively (83%).

The introduction of a reduced VAT rate on healthy food with low environmental impacts is likely to induce minor to significant recurring costs for public authorities, due to a decrease in tax revenues, and minor one-off costs relating to the definition of products to which the reduction in VAT rate applies, with possible additional minor to significant recurring costs for consumers/society.

The benefits identified for consumers/society are likely to be immediate and minor to significant, in the form of an increase in consumer welfare, while health benefits are likely to materialise in the mid- to long term. Benefits identified for food producers/farmers are likely to be immediate and significant, relating to an increase in demand for fruits and vegetables.

However, a reduction in the VAT rate applicable to healthy food products with low environmental impacts may only have limited effects in Member States which already apply a reduced VAT rate to foodstuffs, as small changes in price differences between healthy/unhealthy products or products with high/low carbon footprint may only have limited effects on consumption patterns. In addition, the decrease in revenue from a reduction of VAT may be difficult to justify politically in times of austerity, in which many EU governments are reducing expenditure and increasing taxation. In light of this, a reduced VAT rate healthy food with low environmental impacts may be best as a complementary tool to other taxes, as opposed to a stand-alone fiscal instrument.

These conclusions lead to the following recommendation:

Recommendation 4:

- In light of the difficulty in assessing the costs and benefits of taxation measures to encourage the adoption of healthy and sustainable diets at a general level, if such measures are desired, a comprehensive impact assessment would be needed to accurately estimate impacts of the specific measures planned, coupled with the appropriate labelling and education measures to raise consumer awareness and boost consumer acceptance, in order to safeguard its implementation at reasonable social and political cost.

- Nonetheless, other specific taxes could be considered such as a tax on advertising of unhealthy food/food with high environmental impacts. Revenue collected through this tax could be used to finance communication measures on healthy and sustainable food, or education measures, in the context of a national sustainable food strategy.

Further research

Stakeholders interviewed in this study noted that an important component of a national sustainable food strategy is supporting research to facilitate transition to healthier and more sustainable diets. A range of dynamic social, cultural, political, economic and environmental factors constitute the determinants of healthy and sustainable nutrition, and in order to promote behavioural shifts in EU consumers, understanding these determinants as well as the broader aspects of human behaviour is critical. This also includes the behaviour of food producers, as product development, advertising and marketing influence consumers strongly in the choice of products, which if unhealthy may impact on obesity, disease and life expectancy.

These conclusions lead to the following recommendation:

Recommendation 5:

Further research should be conducted regarding the key factors governing human decision-making in relation to food, nutrition and the environment. This relates to understanding the critical determinants of healthy and sustainable diets in consumers, but also the behaviour of food producers. Research results should then be used to inform and optimise behavioural policy measures, to be considered e.g. in the framework of a national strategy on sustainable food, such as 'nudging' or regulation of portion sizes, which should be subsequently coupled with relevant education and communication measures.

2 INTRODUCTION

WWF and Friends of Europe, under the LiveWell for LIFE project commissioned an economic impact assessment of the adoption of sustainable diets by 2020 according to various scenarios, as well as a cost-benefit analysis of public policy options to implement these, at both EU level and at the level of the three LiveWell pilot countries (France, Spain and Sweden) to Civic Consulting. This report presents the findings of this research.

Background

Obesity in EU consumers is becoming a serious public health problem. In 2010, more than half (50.1%) of the adult population in the European Union was overweight or obese. The prevalence of overweight and obesity among adults exceeded 50% in 15 of 28 EU countries. There is little difference in the average obesity rate of men and women in the EU (16.5% and 16.6%, respectively). The rate of obesity has more than doubled over the past two decades in most EU countries for which data are available. This increase occurred irrespective of obesity levels 20 years ago.[2] The groups causing greatest concern and for which the consequences may be particularly severe are children and adolescents. In 2010, around 1 in 3 children aged 6-9 years old in the EU were obese, associated with a dramatic rise in the incidence of type 2 diabetes in children and adolescents in recent years.[3,4] Furthermore, obesity is not only linked to diabetes, but also a broad spectrum of other chronic diseases such as cardiovascular disease and cancer. If these trends continue and no significant countervailing actions are taken from policymakers, obesity is likely to affect an increasingly larger share of the EU population in the next decades.

Furthermore, diets in the EU and other developed economies are predominantly meat-based,[5] which utilises large quantities of land and water resources. Pressure on resources is likely to considerably increase as the world population grows and emerging economies increasingly adapt Western diets. Indeed, though growth in demand over the next decades is expected to be slower than from the 1970s to now, a 60% increase in agricultural production by 2050 may be needed in order to cope with projected population increase and to raise average food consumption to the

[2] OECD, 2012.

[3] WHO European Childhood Obesity Surveillance Initiative (COSI), 2010.

[4] D'Amario and de Froidmont-Görtz, 2005.

[5] Notably, the average per-capita consumption of animal protein has increased by 50% between the early 1960s and 2010. The share of animal proteins in the total protein intake increased from 48% in 1961 to 59% in 2007 in Europe (PBL Netherlands Environmental Assessment Agency, 2011).

needed 3,070 kcal per person per day,[6] if consumers do not shift to more sustainable diets. Agriculture already occupied about 37% of the global land surface in 2007,[7] and while meat currently represents only 15% of the total global human diet, approximately 80% of the agricultural land is used for animal grazing or the production of feed and fodder for animals.[8] Tellingly, in the period 1963-2011 global meat consumption increased from about 72 to 297 million tonnes.[9]

Such diets have had sustained damaging effects on the environment and climate change. According to estimates in 2008, 24% of vegetated land on earth has undergone human-induced soil degradation, in particular through erosion,[10] while about 60% of the world's ecosystem goods and services have been degraded or used unsustainably.[11] Moreover, it is estimated that the livestock sector causes 14.5% of all human-induced GHG emissions.[12]

In light of the public health relevance of the obesity epidemic and the growing recognition of the food waste,[13] resource depletion and environmental damage to which diets currently prevailing in the EU contribute, initiatives at EU and Member State-level have been taken to encourage a switch to healthier and more sustainable diets.

In this context, WWF-UK, the WWF European Policy Office and *Friends of Europe* initiated the LiveWell for LIFE project (LiveWell for Low Impact Food in Europe) which introduces the concept of a healthy and sustainable diet; a diet which can bring significant health benefits to EU citizens and contribute towards the reduction of greenhouse gas emissions from food. Under the first steps of this project, low carbon and healthy diets (or 'LiveWell' diet) were developed in three pilot countries (France, Spain and Sweden) which were chosen due to the variety of dietary contexts they represent and their different levels of policy readiness for adopting the LiveWell Plate's recommendations.

The LiveWell Plates developed in these countries have shown that it is possible to develop a LiveWell diet for each country that:

- Decreases greenhouse gas emissions by 25% from the current average diet;
- Costs no more than the current dietary patterns;

6 Alexandratos and Bruinsma, 2012.

7 Food and Agriculture Organization of the United Nations (FAO), 2011.

8 The Government Office for Science, 2011.

9 Alexandratos and Bruinsma, 2012.

10 Bai et al., 2008.

11 Ibid.

12 Food and Agriculture Organization of the United Nations (FAO), 2013.

13 While the issue of food waste was out of the scope of this study, it is noteworthy that a switch to healthier and more sustainable diets could also lead to a reduction in food waste, e.g. if relevant information was included in education measures.

- Complies strictly with national nutritional requirements; and
- Closely resembles the current dietary patterns.

On the basis of the LiveWell Plate's recommendations developed in the three pilot countries, this report analyses the costs and benefits of the adoption of sustainable diets by 2020 according to several scenarios as well as the costs and benefits of policy options to encourage their adoption.

Objectives and scope of the study

The objective of the study is to assess the viability and the social and economic costs and benefits of the adoption of sustainable diets by 2020 according to several scenarios as well as the costs and benefits of policy options to encourage their adoption (both at EU level and at the level of the three LiveWell pilot countries, namely France, Spain and Sweden).

Methodology

The main methodological tools employed in this study are in-depth desk research, country studies in the pilot countries of the LiveWell for LIFE project (France, Spain and Sweden), interviews with key stakeholders and experts at EU and international level, modelling of the effects of a switch to healthier and more sustainable diets, and a cost-benefit analysis of selected policy options to meet the LiveWell Plate's recommendations (see Annex 2 for more details on the methodological approach employed). The research was conducted between November 2013 and March 2014.

Structure of the report

This report is structured as follows:

- *Section* 3 presents the effects of the adoption of diets meeting the LiveWell Plate's recommendations;
- *Section 4* analyses the costs and benefits associated with the implementation of selected policy options to meet the LiveWell Plate's recommendations;
- *Section 5* comprises the study's key conclusions and recommendations.

The following annexes are also provided:

- Annex 1 presents the detailed results of the country studies;
- Annex 2 details the methodological approach employed;
- Annex 3 describes the EU-wide economic modelling framework CAPRI used for the analysis (Common Agricultural Policy Regionalised Impact Modelling System);

- Annex 4 provides the detailed results of the CAPRI modelling of the effects of a switch to the LiveWell Plate's recommendations;
- Annexes 5 to 7 present the findings of relevant previous research conducted on the effects of food education, food labelling and taxation measures on food consumption patterns;
- Annex 8 provides information on the VAT rates applicable in the EU at the moment; and
- Annex 9 lists the literature reviewed.

Acknowledgements

Civic Consulting would like to express its gratitude to all supporters of this study. Special thanks are due to all stakeholders and experts who provided valuable input through in-depth interviews. We also thank WWF-UK, the WWF European Policy Office and *Friends of Europe* for the support they provided during the course of the study.

3 EFFECTS OF ADOPTION OF LIVEWELL DIETS

This section of the report presents the effects of the adoption of diets meeting the LiveWell Plate's recommendations. It describes the methodological approach followed for assessing these effects, specifies the scenarios under which they have been analysed, and discusses the effects observed under each scenario in 2020.

3.1 METHODOLOGY

3.1.1 Methodological approach

The effect of dietary changes on the food chain and related environmental impacts can be analysed with agro-economic modelling frameworks such as CAPRI (Common Agricultural Policy Regionalised Impact Modelling System). This EU-wide modelling framework is particularly suited to this task and has therefore been used for this study to model the effects of the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers on the food chain and the environment in 2020. CAPRI is a partial equilibrium model of the agro-food sector, which combines a representation of agricultural supply with a global trade model for agricultural commodities (covering more than 40 primary and processed agricultural products). CAPRI considers the effects of the Common Agricultural Policy (CAP) and agricultural trade policies (including Tariffs Rate Quotas – TRQs; see Section 3.2 below).[14] The CAPRI model also includes a quantification of selected environmental effects.

Specifically, the CAPRI model has been employed in this study to assess the following effects:

- Effects on consumption patterns;
- Effects on consumer prices;
- Market effects (including effects on producer prices, production, and trade in relevant markets);
- Effects on economic welfare (including effects on consumer welfare, incomes of the agricultural sector and the processing industry, and public agricultural budgets);
- Effects on the environment (including effects on GHG emission and the agricultural nitrogen balance).

[14] A tariff-rate quota (TRQ) is a trade policy tool used to protect a domestically-produced commodity or product from competitive imports. As for any other quotas, the owners of the respective rights benefit from a rent.

Concerning the effects on economic welfare, it is important to note that CAPRI is a partial equilibrium system and therefore does not cover the whole economy. CAPRI allows for the modelling of effects on incomes of producers and processors as well as public budgets as far as they are directly related to agriculture, but for most non-agricultural sectors, like the fertiliser industry, it is assumed that prices are not affected by changes in consumption patterns (see Section 3.4.4 for more details on the limitations of the CAPRI model concerning the assessment of welfare effects). CAPRI also models environmental effects in physical units, including effects on greenhouse gas emissions (GHGe) and on the nitrogen balance of agriculture (see Section 2.3.5), but these effects are not monetised and are therefore not included in the welfare accounting of CAPRI. Further description of the technical characteristics of the CAPRI model is provided in Annex 3.

The following sections present in more detail the methodology used for the modelling of the effects of the adoption of diets meeting the LiveWell Plate's recommendations on consumption patterns, consumer prices, markets, economic welfare and the environment. The effects on public health of a switch to the LiveWell Plate's recommendations cannot be assessed with CAPRI and have therefore been separately analysed (see Section 3.4.6 for more details).

3.1.2 Definition of baseline diets

An important methodological step in the preparation of the modelling of the effects of a switch to LiveWell diets was the definition of the baseline diets, as they serve as the basis for the modelling of the effects in CAPRI.

Baseline diets have already been defined in the three LiveWell pilot countries (France, Spain, and Sweden) in the framework of the activities previously conducted in the LiveWell for LIFE project.[15]

During the preparation of the modelling of the effects of the adoption of diets meeting the LiveWell Plate's recommendations, these baseline diets were reviewed and compared to those used in CAPRI. The review indicated that the food categories relevant for the definition of the baseline diets had been designed differently in the three LiveWell pilot countries. As expected, these categories are also different from those used in the CAPRI model, which focuses on primary food categories rather than specific food items.

As an initial step, therefore, a mapping exercise was conducted, with the aim of assigning each food item used in the three LiveWell pilot countries to a pre-defined category in CAPRI (for example, the LiveWell item 'gruyere cheese' for France is assigned to the CAPRI category 'cheese'). In case a LiveWell item had no direct equivalent in CAPRI, the item was assigned to the relevant CAPRI categories

[15] See the LiveWell for LIFE report "A balance of healthy and sustainable food choices for France, Spain and Sweden" (available at: http://livewellforlife.eu/livewell-plate/reports).

according to the main agricultural raw products by which the item is constituted.[16] Our approach for this mapping exercise is illustrated in the table below for the food categories listed under the 'dairy products' group as defined in CAPRI.

Table 4. *Mapping of LiveWell items to CAPRI categories (example for 'dairy products', as defined in CAPRI)*

CAPRI categories	LiveWell diet food items		
	France	**Spain**	**Sweden**
Butter	Unsalted butter		
Cheese	French cheese (Camembert)	Cheese	Cheese (around 28% fat)
	Cream cheese, 20% fat	Curd	
	Gruyere cheese		
Fresh milk products	Yogurt	Whole yogurt	Yoghurt (3% fat)
	Yogurt with fruit		Skimmed sour yoghurt (0.5% fat)
			Fruit yoghurt
Cream	Low-fat cream		
	High-fat cream		
Concentrated milk		Condensed milk	

3.1.3 Use of baseline diets in CAPRI

As the CAPRI model uses data from centralised and comparable data sources (Eurostat and Food and Agriculture Organization of the United Nations - FAO) on 'usable production', while the baseline diets in the three LiveWell pilot countries (France, Spain, and Sweden) are based on data collected through dietary surveys (which are based on different methodologies in each country), it was not considered appropriate to directly use average current consumption data from the three countries for the modelling. Rather, the relative changes between the average current consumption and the recommended consumption in the LiveWell diets for each category (as determined in the previous steps of the LiveWell for LIFE project)[17] were applied to the baseline data from CAPRI.

To apply this approach, for each pilot country, the percentage differences between the food quantities currently consumed per person and per day and the respective quantities recommended by the LiveWell diets for these countries were calculated. These differentials were computed for each CAPRI category, taking into account the results of the mapping exercise.

[16] For example, 'meat ravioli with tomato' was split according to the relevant CAPRI categories, i.e. beef, cereals, and tomatoes.

[17] See footnote 15.

The resulting adjustment factors were then applied to the relevant CAPRI baseline data for the modelling.[18] This allowed to focus the analysis on the effects of the changes in diets rather than on absolute values.

For France, Spain and Sweden, the country specific data on average current diets and recommended LiveWell diets have been used, whereas consumers in other EU countries were assumed to change their consumption according to the average relative change across the three pilot countries.

3.2 SCENARIOS

For the purposes of the study, the effects of the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers have been analysed according to the following scenarios in 2020:

- *Reference scenario:* This scenario assumes a continuation of current food consumption patterns until 2020;[19]
- *LiveWell 30% scenario:* This scenario assumes that an additional 30% of the population adopt diets meeting the LiveWell Plate's recommendations in 2020 (compared to the reference scenario); and
- *LiveWell 70% scenario:* This scenario assumes that an additional 70% of the population adopt diets meeting the LiveWell Plate's recommendations in 2020 (compared to the reference scenario).

These scenarios are described in more details below.

Reference scenario

The reference scenario assumes a continuation of the current food consumption patterns. In particular, it postulates that in 2020 consumers will have the same dietary intakes as today. This scenario also considers current policies and changes that have already been decided upon for the years until 2020. These include the 'Health Check' of the Common Agricultural Policy (CAP), including the abolition of obligatory set-aside and the expiry of milk quotas.[20] Recently some further CAP reform elements

[18] More precisely, the adjustment or 'final change' factors are intended to minimise the (summed) squared differences from the initial change factors derived from the mapping of the LiveWell recommendations into the CAPRI product list while complying with the aggregate relative change in calorie consumption from the LiveWell report. For example, in Spain the LiveWell diet originally implied an increase in calorie consumption, in comparison to the current average diet. However, for the purposes of the modelling, the overall calorie intake by consumers in Spain was held constant in the three scenarios, in line with the definitions of the LiveWell diet in France and Sweden (in both countries calorie intake is lower under the LiveWell diet).

[19] Estimates provided by experts and stakeholders interviewed indicate that between about 5% to up to 20% of the population could already follow the LiveWell Plate's recommendations at the moment.

[20] http://ec.europa.eu/agriculture/cap-history/health-check/index_en.htm. The aim of the set-aside scheme (that is to stop using land for any kind of agricultural production) was to curb production of arable crops in surplus and lower the level of public stocks.

have been decided upon,[21] including provisions of 'ecological set aside', but these are not yet included in the reference scenario as their implementation by Member States is yet unknown. Regarding World Trade Organisation (WTO) rules, it is assumed that the Uruguay rules still apply and a comprehensive Doha agreement is not yet effective in 2020. In terms of the market outlook, the medium term CAPRI baseline is aligned with projections from the 'AGLINK' model[22] for EU15 and EU12 markets (which are also used for the elaboration of the European Commission's medium-term prospects for agricultural markets and income in the EU).[23]

The main purpose of the reference scenario is to serve as a yardstick for the assessment of the effects under the two LiveWell scenarios. The effects modelled under the LiveWell 30% and LiveWell 70% scenarios are therefore presented in terms of differences relative to the reference scenario.

LiveWell 30% and LiveWell 70% scenarios

Two scenarios have been analysed that assume a moderate (LiveWell 30% scenario) to strong (LiveWell 70% scenario) adoption of diets meeting the LiveWell Plate's recommendations.

Consumption patterns of consumers who do not adopt a LiveWell diet are also taken into consideration by the CAPRI model. For example, if the overall demand for a product drops (such as demand for meat), this implies that there is an excess supply of this product on the market, triggering a decline in price with subsequent adjustments by all market participants. This decrease in consumer price also means that a small part of the initial demand reduction for the product is reversed such that the ultimate equilibrium involves a smaller demand reduction than the initial preference shift at given prices. These market effects of changes in consumption patterns including the endogenous price effects are reflected in the results of the CAPRI model presented in the following sections.

[21] http://ec.europa.eu/agriculture/cap-post-2013/index_en.htm.

[22] The AGLINK model is an economic model of world agriculture with very detailed agricultural sector representation of OECD countries as well as Argentina, Brazil, China and Russia (See: http://www.oecd.org/site/oecd-faoagriculturaloutlook/oecd-faoagriculturaloutlook-tools.htm).

[23] http://ec.europa.eu/agriculture/markets-and-prices/medium-term-outlook/prospects-agricultural-markets-and-income-2012_en.htm.

3.4 SCENARIO RESULTS

This section presents the results of the CAPRI modelling concerning the projected effects in 2020 of the adoption of diets meeting the LiveWell Plate's recommendations by an additional 30% (LiveWell 30% scenario) and an additional 70% (LiveWell 70% scenario) of the EU population compared to the reference scenario. Effects that have been modelled in CAPRI include (1) effects on consumption patterns; (2) effects on consumer prices; (3) market effects; (4) effects on economic welfare; and (5) effects on the environment.

These effects are analysed in the next sections for the following seven main food groups:[24]

- Cereals (including rice);
- Other plant products (including fruits, vegetables, potatoes, pulses, coffee, tea, cocoa, wine, and oilseeds[25]);
- Meat (including beef, pork, poultry and sheep and goat meat);
- Other animal products (including eggs, fish, and other aquatic food);
- Dairy products (including milk and milk products such as yoghurt, butter, cheese, cream);
- Oils (including sunflower seed, rape seed, olive, and palm oil); and
- Sugar.

In addition, the effects on public health of a switch to the LiveWell Plate's recommendations are investigated at the end of this section (see Section 3.4.6).

3.4.1 Effects on consumption patterns

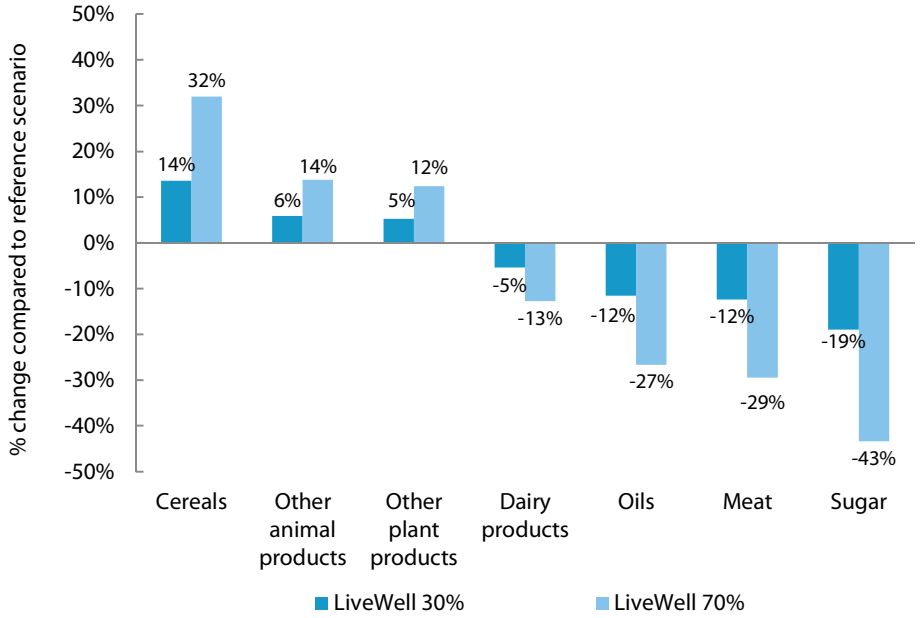
Figure 4 below depicts the effects on EU consumption (expressed in kilocalorie per head of population) of each food group under the LiveWell 30% and LiveWell 70% scenarios relative to the reference scenario.

[24] EU results are provided for the EU27. CAPRI is being updated to include Croatia in EU results but the updated version was not ready at the time of writing.

[25] Essentially seeds consumed e.g. as part of breakfast cereals (these correspond to negligible quantities).

Figure 4. *Effects on consumption (in kilocalorie/head) of main food groups in the EU under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



The figure above indicates that compared to the reference scenario, the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers results in increased calorie intakes from the consumption of food from the groups 'cereals', 'other plant products', and 'other animal products' while calorie intakes from the consumption of 'dairy products', 'oils', 'meat', and 'sugar' are reduced under the two LiveWell scenarios.

Calorie intake from cereals increases the most (up to +32% under LiveWell 70%) while supply of calories by the 'other animal products' and 'other plant products' food groups increases less strongly (up to +14% and +12% under LiveWell 70%, respectively). Energy obtained from the consumption of dairy products decreases moderately (up to -13% under LiveWell 70%) while the amount of calories provided by the consumption of oil, meat and sugar decreases sharply relative to the reference scenario (up to -27%, -29%, and -43% under LiveWell 70%, respectively).

Table 5 below provides an overview of the effects on consumption (in kilocalorie/head) of the main food groups in the three LiveWell pilot countries (France, Spain and Sweden) resulting from the adoption of diets meeting the country-specific LiveWell Plate's recommendations by consumers in these countries.[26] Differences derive from differences in the LiveWell diets recommended in each of these countries and the specificities of the national markets. For comparison purposes, the effect on overall EU consumption is also provided.

[26] For example, calorie intake from the consumption of vegetable oils including margarine in Sweden increases (category 'Oils' +15%) as consumption of butter is reduced under the LiveWell scenarios (category 'Dairy products' -8.2%), as suggested by the LiveWell Plate's recommendations for this country.

Table 5. *Effects on consumption (in kilocalorie/head) of main food groups in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

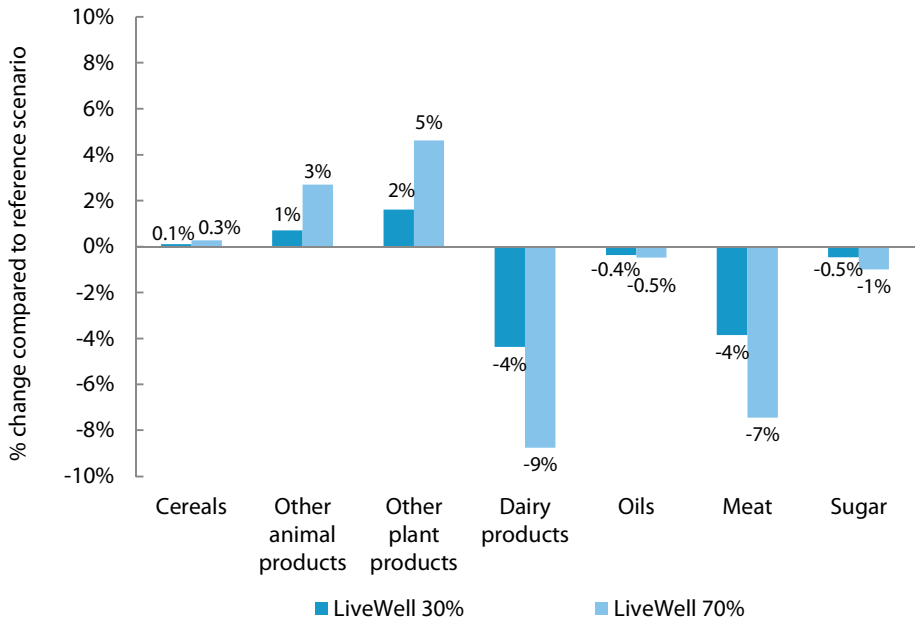
	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Cereals	+29.1%	+10.1%	+6.0%	+13.6%	+68.4%	+23.7%	+14.0%	+32.0%
Other animal products	-3.4%	-9.7%	+16.9%	+5.9%	-7.9%	-22.3%	+39.5%	+13.8%
Other plant products	+2.8%	-0.9%	+13.1%	+5.3%	+6.6%	-1.8%	+30.5%	+12.4%
Dairy products	-15.4%	+4.1%	-8.2%	-5.4%	-35.9%	+9.6%	-19.1%	-12.7%
Oils	-19.4%	-9.6%	+15.0%	-11.5%	-44.8%	-21.8%	+34.9%	-26.6%
Meat	-5.3%	-14.0%	-17.3%	-12.4%	-12.8%	-33.4%	-41.0%	-29.4%
Sugar	-24.4%	-15.3%	-17.1%	-18.9%	-56.2%	-34.9%	-39.4%	-43.4%

3.4.2 Effects on consumer prices

The consumer demand shifts described above cause changes in consumer prices of main food groups, as shown in Figure 5 below.

Figure 5. *Effects on consumer prices of main food groups in the EU under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



The comparison of Figure 4 (which depicts changes in consumption) and Figure 5 (which shows changes in consumer prices) reveals that price changes match in sign with the changes in quantity under the two LiveWell scenarios relative to the

reference scenario. However, the magnitude of relative price changes is usually smaller than the relative changes in quantity (note the different scaling of the axes of Figure 4 and Figure 5). In general, prices tend to decline if consumption is declining at the EU level but cross-price relationships and supply side responses, including feed demand, add complexity to the interpretation of the magnitude of price changes. Reasons which influence relative changes in consumer prices under the LiveWell 30% and LiveWell 70% scenarios are discussed for each food group in the following sections.

Effects of the adoption of diets meeting the country-specific LiveWell diets on consumer prices in pilot countries are presented in the table below.

Table 6. *Effects on consumer prices of main food groups in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Cereals	+0.3%	0.0%	-0.7%	+0.1%	+0.7%	0.0%	-1.5%	+0.3%
Other animal products	-0.1%	-1.9%	+3.9%	+0.7%	+1.1%	-4.3%	+8.9%	+2.7%
Other plant products	+5.0%	+2.0%	-0.3%	+1.6%	+11.1%	+4.6%	+0.3%	+4.6%
Dairy products	-6.4%	-0.3%	-9.3%	-4.4%	-14.4%	0.0%	-21.1%	-8.8%
Oils	+3.7%	+0.6%	+0.1%	-0.4%	+13.6%	+1.8%	+0.3%	-0.5%
Meat	-2.3%	-2.8%	-5.4%	-3.8%	-3.1%	-5.3%	-12.6%	-7.4%
Sugar	-0.5%	-0.5%	-0.5%	-0.5%	-1.0%	-1.0%	-1.0%	-1.0%

3.4.3 Market effects

Consumer demand changes for food products in the EU trigger changes in consumer prices, but also in prices for EU producers and in quantities of food produced in the EU. Changes in EU consumers' demand also generate production changes in the rest of the world via changes in exports and imports.

Effects of the adoption of diets meeting the LiveWell plate's recommendations on the relevant markets are analysed in the following sub-sections.

3.4.3.1 Effects on market for cereals

The comparison of Figure 4 and Figure 5 (see Sections 3.4.1 and 3.4.2 above) shows that despite a sharp increase in consumer demand for cereals (including rice),

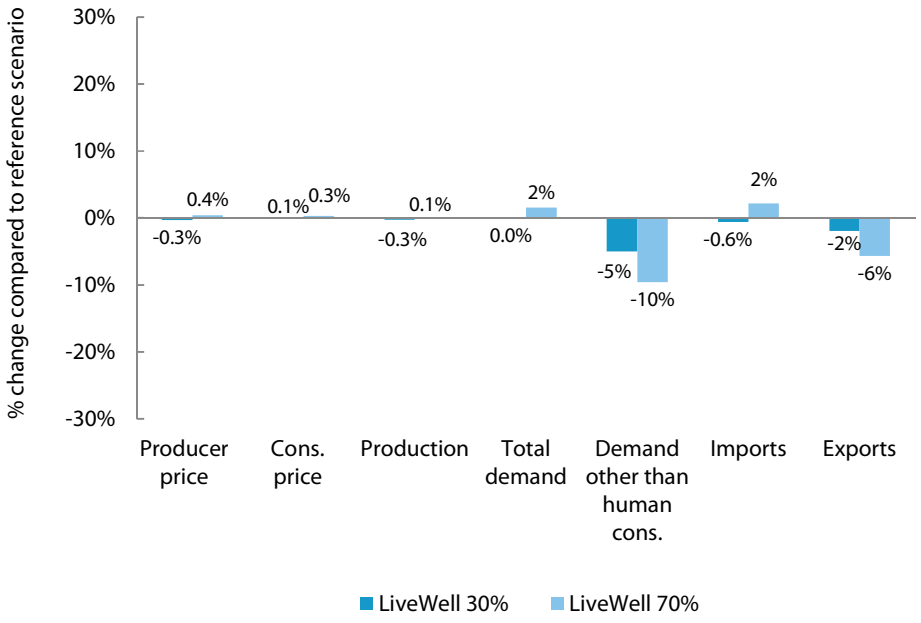
consumer prices almost remain constant in comparison to the reference scenario (+0.1% and +0.3% in the LiveWell 30% scenario and the LiveWell 70% scenario, respectively). This can be explained by declining consumer demand and producer prices for meat and dairy products under the two LiveWell scenarios (see Sections 3.4.3.6 and 3.4.3.4 below) which tend to curb the EU animal sector overall such that feed demand for cereals declines. In other words, the combination of an increase in human consumption of cereals with a decline in the use of cereals to feed animals (for meat and dairy products production) results in a zero net effect on the total EU demand for cereals under the LiveWell 30% scenario (no relative change compared to the reference scenario) and generates only a small increase in total EU demand for cereals, of about 2% under the LiveWell 70% scenario (see Figure 20 below).

As a result, the price received by EU producers of cereals[27] as well as the quantity of cereals produced in the EU are expected to remain stable under the two LiveWell scenarios, compared to the reference scenario.

Reflecting the increase in total EU demand for cereals by 2% under the LiveWell 70% scenario, exports of cereals are predicted to decrease by 6% and imports to increase by 2% in 2020 under this scenario.

Figure 6. *Effects on EU market for cereals under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



Effects of the adoption of the country-specific LiveWell diets on markets for cereals in France, Spain, and Sweden are presented in the table below.

[27] In general, producer prices are measured at the farm level in CAPRI. This also applies to meats, even though most animals are sold live to slaughter houses. However, some products like oils, oilcakes or sugar are not produced at all on farms but in the first stage processing industry. In these cases producer prices refer to the prices of this first stage processing industry (oil mills and sugar factories). The prices of the raw products of these (oilseeds and sugar beets), however, are measured at the farm level. They are at the same time the input prices for oil mills and sugar factories.

Table 7. *Effects on markets for cereals in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Producer price	-0.1%	-0.3%	-0.6%	-0.3%	+1.0%	+0.3%	-0.2%	+0.4%
Consumer price	+0.3%	0.0%	-0.7%	+0.1%	+0.7%	0.0%	-1.5%	+0.3%
Production	-0.4%	-0.3%	-0.5%	-0.3%	0.0%	-0.1%	-0.4%	+0.1%
Total demand	-1.4%	-0.7%	+1.2%	0.0%	-2.1%	-0.6%	+4.1%	+1.5%
Demand other than human consumption	-8.3%	-2.8%	-0.5%	-5.0%	-17.9%	-5.2%	+0.5%	-9.6%

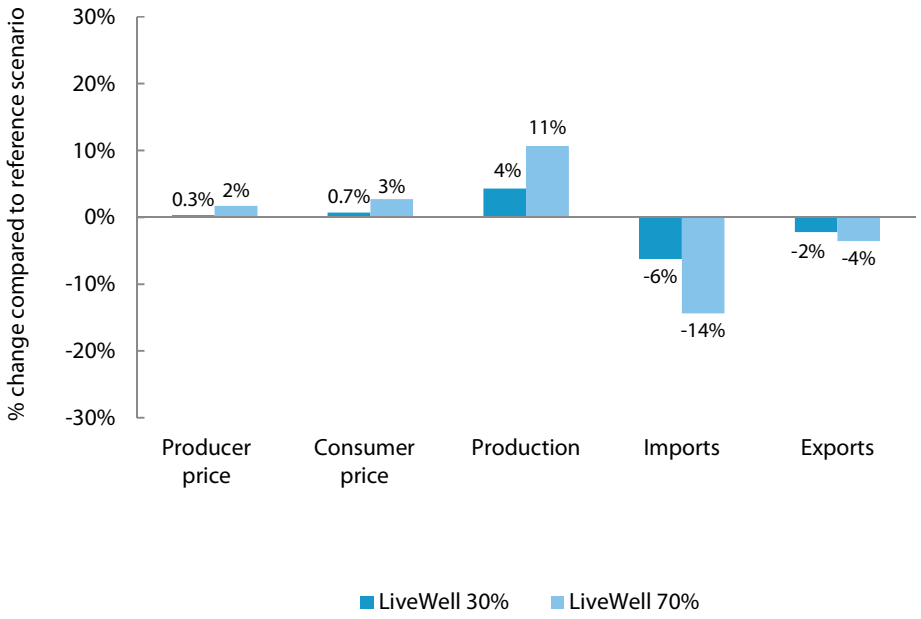
3.4.3.2 Effects on market for 'other animal products'

The adoption of diets meeting the LiveWell Plate's recommendations concerning the consumption of 'other animal products' results in an overall increase in the production and harvesting of these products (+4% under the LiveWell 30% scenario and +11% under the LiveWell 70% scenario), an increase in producer price (+0.3% under the LiveWell 30% scenario and +2% under the LiveWell 70% scenario) and an increase in consumer price (+0.7% under the LiveWell 30% scenario and +3% under the LiveWell 70% scenario) compared to the reference scenario.

However, the 'other animal products' group contains heterogeneous items including eggs, fish, and other aquatic food. The adoption of diets meeting the LiveWell Plate's recommendations affects the demand for these products in a different manner. In particular, consumption of eggs increases (12% under the LiveWell 30% scenario and +28% under the LiveWell 70% scenario) while consumption of fish decreases (-8% under the LiveWell 30% scenario and -19% under the LiveWell 70% scenario) relative to the reference scenario. The adoption of diets meeting the LiveWell Plate's recommendations induces an increase in the price of eggs for consumers (+3% under the LiveWell 30% scenario and +7% under the LiveWell 70% scenario) but a decrease in fish and other aquatic food (-3% under the LiveWell 30% scenario and -8% under the LiveWell 70% scenario), compared to the reference scenario.

Figure 7. *Effects on EU market for 'other animal products' under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



Effects of the adoption of the country-specific LiveWell diets on markets for 'other animal products' in France, Spain, and Sweden are presented in the table below.

Table 8. *Effects on markets for 'other animal products' in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Producer price	-0.5%	-0.8%	0.0%	+0.3%	-0.1%	-1.1%	+0.7%	+1.7%
Consumer price	-0.1%	-1.9%	+3.9%	+0.7%	+1.1%	-4.3%	+8.9%	+2.7%
Production	+4.5%	+3.8%	+3.0%	+4.3%	+11.2%	+9.5%	+7.4%	+10.7%

3.4.3.3 Effects on market for 'other plant products'

EU consumer demand for 'other plant products' (including fruits, vegetables, potatoes, pulses, coffee, tea, cocoa, wine, and oilseeds) increase under the two LiveWell scenarios relative to the reference scenario (see Section 3.4.1).

As vegetables are usually not traded in large quantities the greatest part of this demand shock has to be compensated by domestic supply growth. However, supply

elasticities are generally not very high for vegetables.[28] As shown in Figure 8 below, this results in a negligible increase in production of 'other plant products' in the EU in 2020 (+0.3% under the LiveWell 30% scenario and +1% under the LiveWell 70% scenario) but in a significant increase in the price received by producers of these products (+5% under the LiveWell 30% scenario and +14% under the LiveWell 70% scenario) compared to the reference scenario. As expected, increase in consumer demand combined with limited supply growth leads to an increase in the consumer price of food from the 'other plant products' group (+2% under the LiveWell 30% scenario and +5% under the LiveWell 70% scenario).

It can be observed that the increase in consumer price is lower than the increase in producer price. This difference is explained by high processing margins that reflect the processing and distribution costs in the food industry, which are assumed to be constant in the three scenarios.[29]

The trade effects for the food group 'other plant products' reflect the changes in demand for human consumption and other use of the different products constituting this group. Demand for 'other plant products' for human consumption generally increases (although not for all products in this food group) while demand for 'other plant products' for feeding farm animals declines (as it does for cereals, see Section 3.4.3.1).[30] Considering the aggregate quantity of 'other plant products' traded, results show that the feed demand effect dominates, which yields a small decline in total EU demand, and therefore a reduction in imports and an increase in exports from the perspective of the EU.

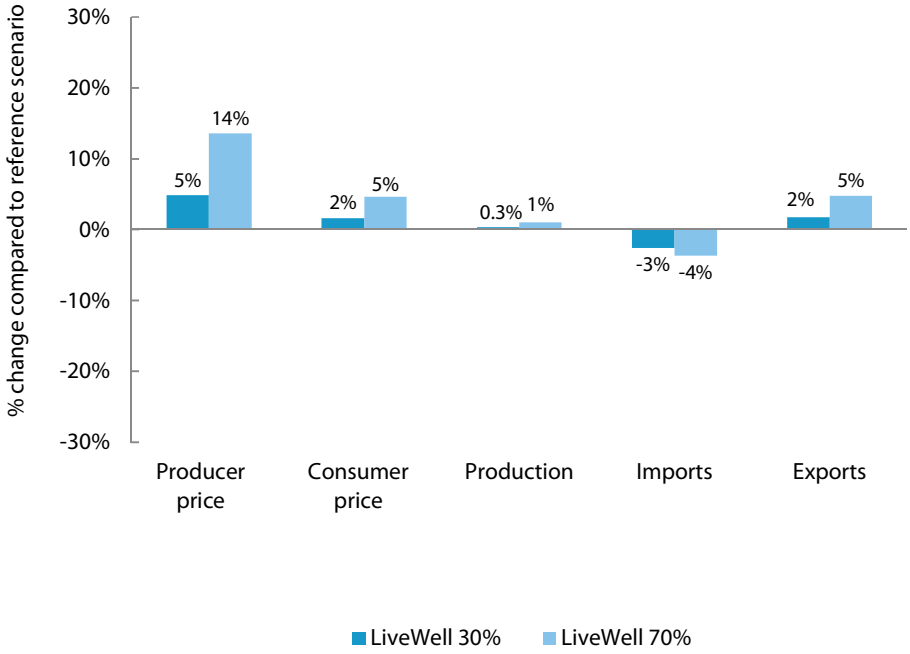
[28] Vegetable areas cannot be easily expanded in spite of strong price increases because production of vegetables occurs on specialised farms. These farms typically operate under favourable conditions in terms of climate and soil properties and vicinity to urban areas (as vegetables are more difficult to transport without loss in quality than cereals for example).

[29] Processing margins are defined as the difference between the consumer price and the average of domestic producer prices and import prices. Strategic price-setting behaviour (such as a reduction in the price received by farmers to limit the rise in the consumer price) is ignored in CAPRI by the assumption of fixed margins.

[30] Specifically, demand for oilseeds and oilcakes which are major feed items (but only used in tiny quantities for food) decreases significantly.

Figure 8. *Effects on EU market for 'other plant products' under LiveWell 30% and LiveWell 70% scenarios against reference scenario*

Source: Civic Consulting, CAPRI model.

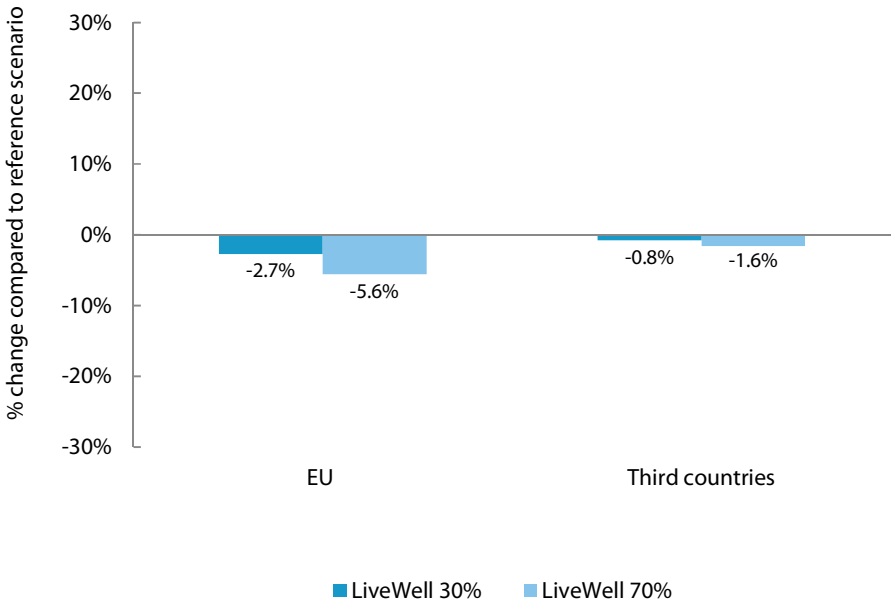


The following graph shows the effects of the adoption of diets meeting the LiveWell Plate's recommendations on the production of soya cakes, a major feed item, in the EU and third countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario). The graph indicates that the production of soya cake decreases under the two LiveWell scenarios (-5.6% in the EU and -1.6% in third countries under the LiveWell 70% scenario).[31]

[31] Similarly, the production of soya seed decreases in third countries and almost remains constant in the EU under the LiveWell scenarios. In the EU, production of soya seeds increases from 2.1 million tonnes under the reference scenario to 2.2 million tonnes under the LiveWell 70% scenario.

Figure 9. *Effects on production of soya cakes in the EU and third countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



Effects of the adoption of the country-specific LiveWell diets on markets for 'other plant products' in France, Spain, and Sweden are presented in the table below.

Table 9. *Effects on markets for 'other plant products' in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Producer price	+5.9%	+0.9%	+6.6%	+4.9%	+15.4%	+3.0%	+17.4%	+13.6%
Consumer price	+5.0%	+2.0%	-0.3%	+1.6%	+11.1%	+4.6%	+0.3%	+4.6%
Production	+0.4%	+0.2%	+0.3%	+0.3%	+1.1%	+0.6%	+1.1%	+1.0%

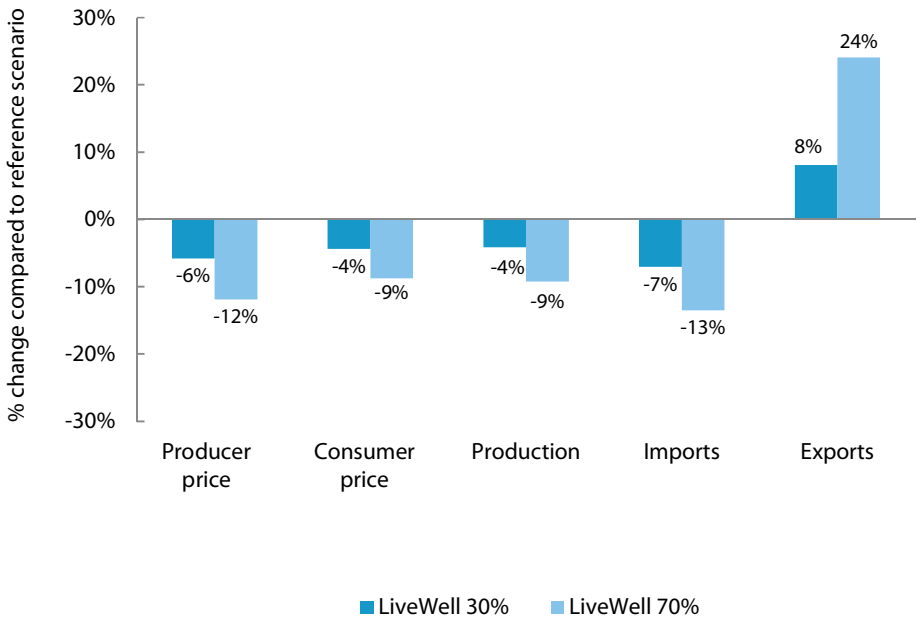
3.4.3.4 Effects on market for dairy products

The decrease in consumption of dairy products following the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers results in a decrease in production, producer price and consumer price in the two LiveWell scenarios. The drop EU consumers' demand for dairy products creates a decrease in imports (-7% in the LiveWell 30% scenario and -13% in the LiveWell 70% scenario) and an increase in

exports (+8% in the LiveWell 30% scenario and +24% in the LiveWell 70% scenario) of these products compared to the reference scenario.

Figure 10. *Effects on EU market for dairy products under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



Effects of the adoption of the country-specific LiveWell diets on markets for dairy products in France, Spain, and Sweden are presented in the table below.

Table 10. *Effects on markets for dairy products in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

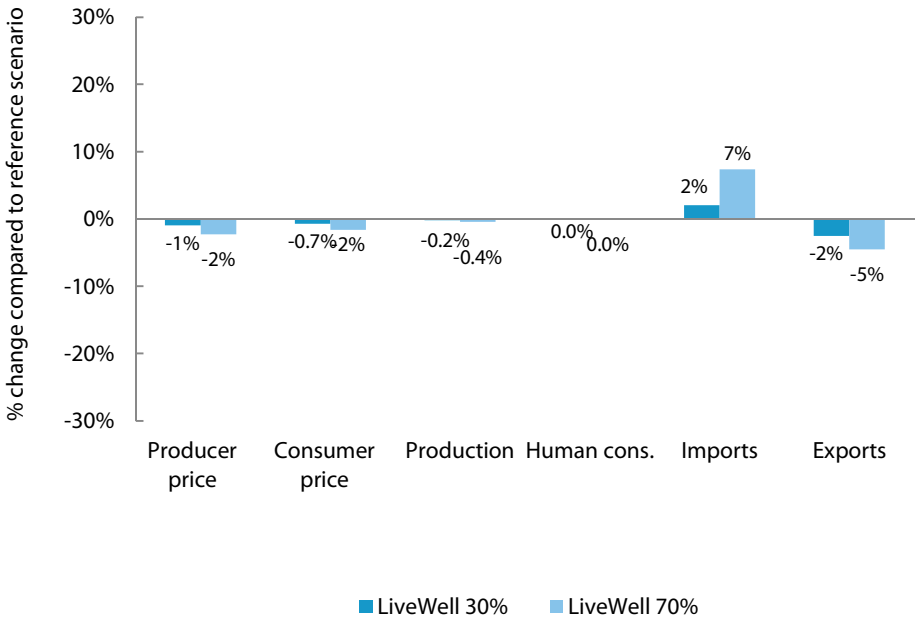
Source: Civic Consulting, CAPRI model.

	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Producer price	-4.3%	-5.2%	-6.8%	-5.8%	-9.3%	-10.7%	-14.0%	-11.9%
Consumer price	-6.4%	-0.3%	-9.3%	-4.4%	-14.4%	0.0%	-21.1%	-8.8%
Production	-5.5%	-4.6%	-4.4%	-4.1%	-11.8%	-10.2%	-9.7%	-9.2%

Decreasing EU producer prices also generate a small reduction in the production of dairy products in third countries (-0.2% under the LiveWell 30% scenario and -0.4% under the LiveWell 70% scenario) compared to the reference scenario. This decline in dairy production in third countries is nonetheless important for the assessment of the environmental effects of the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers (see Section 3.3.5).

Figure 11. *Effects on market for dairy products in third countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



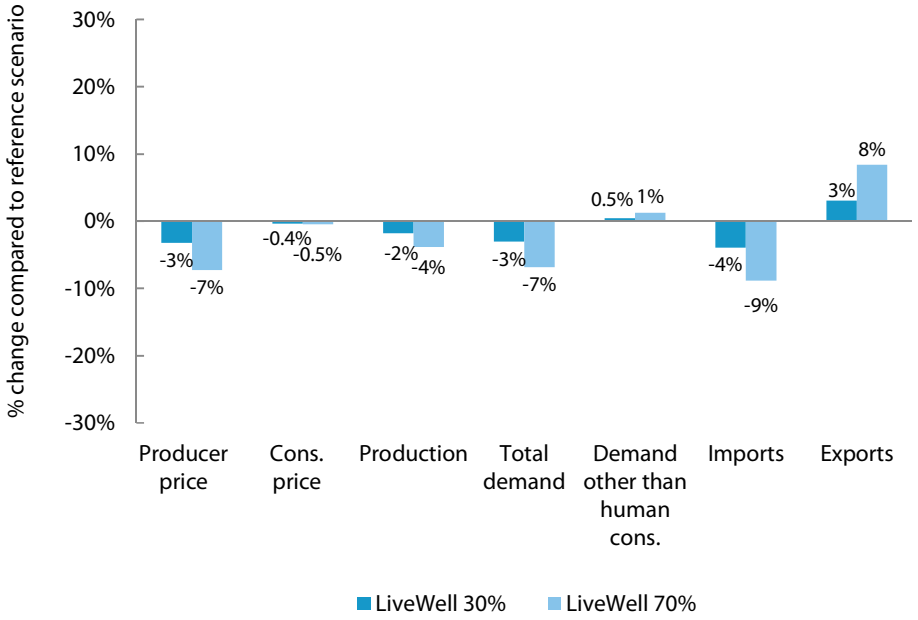
3.4.3.5 *Effects on market for oils*

Under the two LiveWell scenarios, EU consumers significantly reduce their consumption of oils (up to a reduction of 27% of calories intake from oil consumption under the LiveWell 70% scenario) compared to the reference scenario (see Section 3.4.1). In contrast, consumer prices under the two alternative scenarios remain very close to those of the reference scenario (-0.4% under the LiveWell 30% scenario and -0.5% under the LiveWell 70% scenario). The drop in human consumption of oils is partly compensated by an increase in demand for oil seeds by the non-food industry, notably by the biofuel processing industry, which in this model becomes an important alternative demand component in 2020 (+0.5% under the LiveWell 30% scenario, and +1% under the LiveWell 70% scenario).[32]

[32] For rape oil (the vegetable oil the most used in the biofuel industry), about 70% of total EU demand for this product in 2020 is expected to be for processing to biofuels.

Figure 12. *Effects on EU market for oils under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



The following table indicates the effects on the market for palm oil of the adoption of diets meeting the LiveWell Plate's recommendations by consumers in the EU. This table shows that total EU demand for palm oil decreases by 1.1% under the LiveWell 30% scenario and by 2.6% under the LiveWell 70% scenario. This decrease in EU demand for palm oil results in a reduction in EU imports of nearly the same size in absolute terms which reduces producer price globally and leads to a decline in global production of palm oil under the two LiveWell scenarios.[33]

Table 11. *Effects on market for palm oil in the EU and third countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30%		LiveWell 70%	
	EU	**Third countries**	**EU**	**Third countries**
Total demand	-1.1%	0.0%	-2.6%	0.0%
Producer price	-0.3%	-0.2%	-0.8%	-0.4%
Consumer price	-0.1%	-0.1%	-0.1%	-0.3%
Production	n.a.	-0.1%	n.a.	-0.3%
Imports	-1.2%	0.0%	-2.9%	+0.1%
Exports	0.0%	-0.2%	-0.1%	-0.4%

[33] Under the reference and the two LiveWell scenarios, most palm oil is produced in third countries, but small quantities of palm oil are produced in the EU based on imported palm kernels.

Effects of the adoption of the country-specific LiveWell diets on markets for oils in France, Spain, and Sweden are presented in the table below.

Table 12. *Effects on markets for oils in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Producer price	-5.1%	-2.5%	-1.4%	-3.2%	-11.3%	-5.9%	-3.3%	-7.3%
Consumer price	+3.7%	+0.6%	0.1%	-0.4%	+13.6%	+1.8%	+0.3%	-0.5%
Production	-2.5%	-2.8%	-1.7%	-1.8%	-5.5%	-6.2%	-3.7%	-3.8%

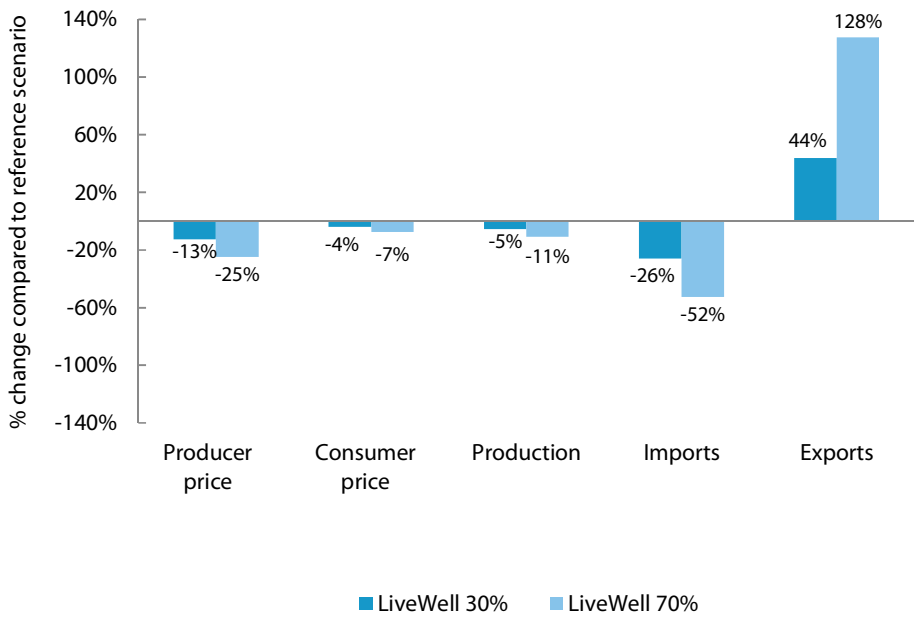
3.4.3.6 Effects on meat market

The decrease in consumption of meat products following the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers results in a decrease in production, producer price and consumer price in 2020 under the two LiveWell scenarios. The drop in demand of EU consumers for meat creates a significant decrease in imports (-26% under the LiveWell 30% scenario and -52% under the LiveWell 70% scenario) and a strong increase in exports (+44% under the LiveWell 30% scenario and +128% under the LiveWell 70% scenario) of these products compared to the reference scenario.

As already observed above for the market for 'other plant products' the relative decline of producer prices is much stronger than the changes in consumer prices under the LiveWell scenarios compared to the reference scenario. For example, the producer price is reduced by 25% while the consumer price decreases by 7% in the LiveWell 70% scenario. Again, this is explained by high processing margins (processing and distribution costs) in the meat industry.

Figure 13. *Effects on EU meat market under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



Effects of the adoption of the country-specific LiveWell diets on meat markets in France, Spain, and Sweden are presented in the table below.

Table 13. *Effects on meat markets in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

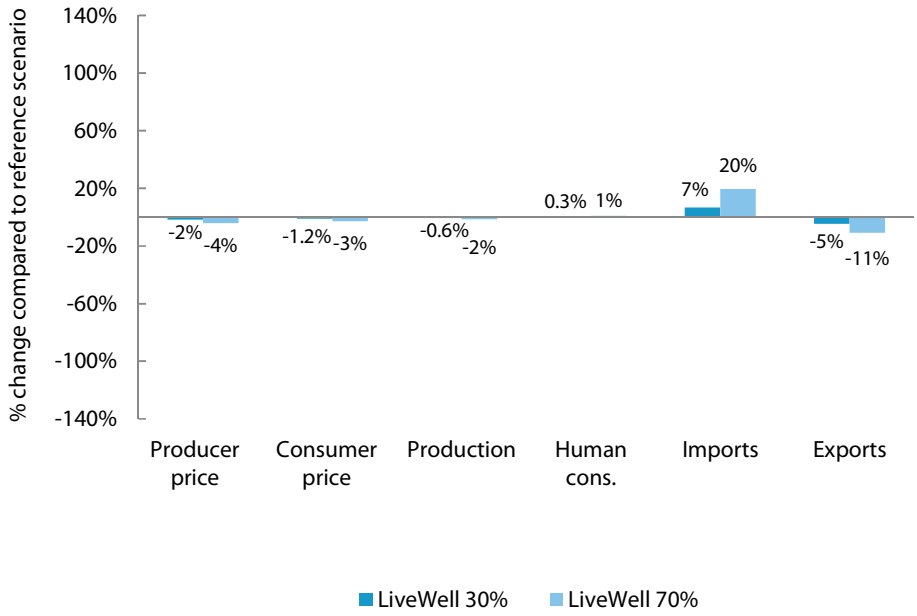
	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Producer price	-12.1%	-14.3%	-13.2%	-12.7%	-23.2%	-28.1%	-26.1%	-24.8%
Consumer price	-2.3%	-2.8%	-5.4%	-3.8%	-3.1%	-5.3%	-12.6%	-7.4%
Production	-6.0%	-5.1%	-5.0%	-5.5%	-11.9%	-10.0%	-10.0%	-10.9%

Declining prices for meat producers in the EU also trigger some decline in production of meat in third countries, which may appear to be small (-0.6% under the LiveWell 30% scenario and -2% under the LiveWell 70% scenario, see Figure 14 below), but are crucial for the global climate effects (see Section 3.4.5 on the effects on the environmental below). The very small increase in demand for meat intended for human consumption in third countries (+0.3% under the LiveWell 30% scenario and +1% under the LiveWell 70% scenario)[34] matches with an increase in imports and a decrease in exports of meat by third countries.

[34] The increase in demand for meat in third countries relates to the decrease in the consumer price of meat in these countries.

Figure 14. *Effects on meat market in third countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



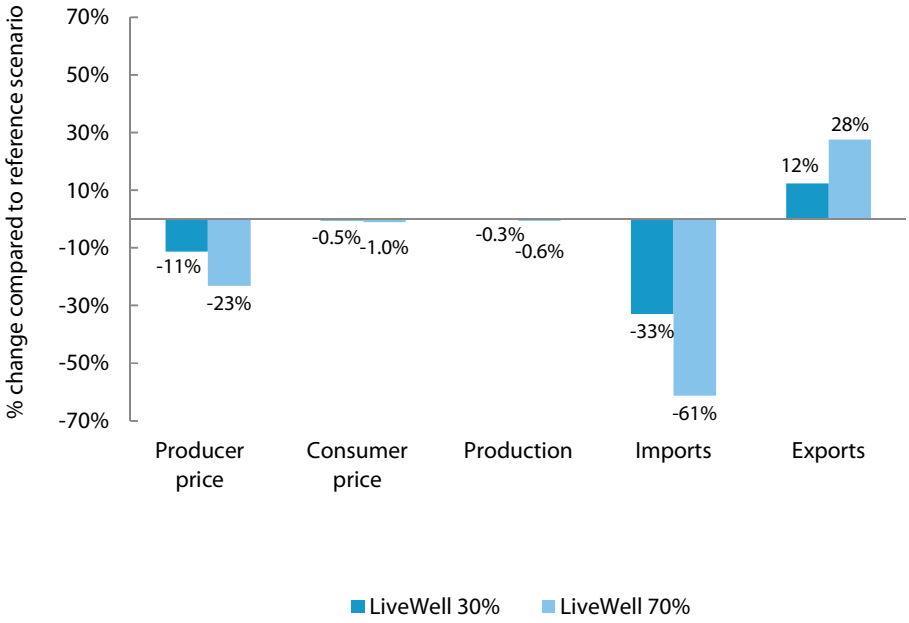
3.4.3.7 Effects on sugar market

Effects of the adoption of diets meeting the LiveWell Plate's recommendations on the EU market for sugar are similar to those observed for the market for vegetable oils. The decrease in human consumption of sugar in 2020 under the LiveWell scenarios (-19% under the LiveWell 30% scenario and -43% under the LiveWell 70% scenario) is partially compensated by an increase in demand from the industry for sugar beet for ethanol production (+4% under the LiveWell 30% scenario and +31% under the LiveWell 70% scenario), resulting in an EU total demand reduction of sugar of 11% and 22% under the LiveWell 30% and LiveWell 70% scenarios, respectively. The decrease in total demand for sugar results in a decrease in imports and an increase in exports of this product in 2020, relative to the reference scenario. It can also be observed that EU production of sugar remains stable, while the producer price for this product decreases (by -11% under the LiveWell 30% scenario and -23% under the LiveWell 70% scenario). This is explained by the decreasing share of sugar produced for human consumption (associated with a higher producer price) relative to the share of sugar beet produced for the biodiesel processing industry (associated with lower producer price) in total sugar production.[35]

[35] The "sugar production change" is the sum of "real" sugar production and ethanol beet production multiplied with a sugar processing yield (the revenues from sales to the food sector are much higher than those to the ethanol industry).

Figure 15. *Effects on EU sugar market under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



Effects of the adoption of the country-specific LiveWell diets on sugar markets in France, Spain, and Sweden are presented in the table below.

Table 14. *Effects on the sugar markets in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Producer price	-11.2%	-11.2%	-11.2%	-11.3%	-23.1%	-23.1%	-23.1%	-23.3%
Consumer price	-0.5%	-0.5%	-0.5%	-0.5%	-1.0%	-1.0%	-1.0%	-1.0%
Production	0.1%	-0.2%	-0.2%	-0.3%	+0.4%	-0.5%	-0.3%	-0.6%

3.4.4 Effects on economic welfare

Price and quantity changes as discussed in the previous section imply changes in income and economic welfare of market participants.

The following characteristics of the modelling carried out should be taken into account when considering the effects of the adoption of diets meeting the LiveWell Plate's recommendations on economic welfare:

1. CAPRI is a partial equilibrium system and therefore does not cover the whole economy. For most non-agricultural sectors, like the fertiliser industry, it is assumed that prices are not affected. However, CAPRI allows for the modelling of effects on income and budgets as far as they are directly related to agriculture.
2. The immediate welfare effect of changing preferences when all quantities and prices are still at the level of the reference situation cannot be estimated and is therefore ignored in CAPRI. However, changes in consumer preferences have demand effects, price effects; and the subsequent final price effects are included in the welfare accounting.[36]
3. Public health effects and effects on the environment are not included in the standard welfare accounting of CAPRI. Some environmental effects have been estimated in physical units (see Section 3.4.5), but they are not monetised and therefore not included in the welfare accounting presented in this section.

Table 15 below summarises the effects on consumer welfare, incomes of the agricultural sector, the processing industry and other private agents as well as on the public agricultural budget resulting from the adoption of diets meeting the LiveWell Plate's recommendations by an additional 30% of the EU population in 2020 (LiveWell 30% scenario) and by an additional 70% of the EU population in 2020 (LiveWell 70% scenario) compared to the reference scenario.

[36] It is assumed that the utility of consumers with shifted preferences would be equal to the utility in the reference situation with the original preferences, before any changes in behaviour materialise. As consumer prices tend to drop in general, consumers gain in the CAPRI welfare accounting, but, to reiterate, this accounting ignores the immediate preference shift.

Table 15. *Effects on welfare of EU market participants under LiveWell 30% and LiveWell 70% scenarios (change in € billion and % change against reference scenario)*

Source: Civic Consulting, CAPRI model.
Note: *Including EU financing and national co-financing of market policies, direct payments, agri-environmental and rural development measures.

	LiveWell 30% (Change compared to the reference scenario)		LiveWell 70% (Change compared to the reference scenario)	
	In € billion	% of GDP	In € billion	% of GDP
Consumer welfare	+7.8	+0.051%	+1.3	+0.009%
Agricultural income	-8.4	-0.055%	-10.1	-0.066%
Income of processing industry	-4.2	-0.027%	-8.7	-0.056%
Income of other private agents	+0.3	+0.002%	+0.6	+0.004%
Public agricultural budget*	-0.5	-0.003%	-1.2	-0.008%
Total	*-5.0*	*-0.033%*	*-18.1*	*-0.117%*

As shown in the table above, the largest welfare effects under the LiveWell scenarios are losses in income for the agricultural sector and the processing industry, which exceed the welfare gains for consumers such that the net total welfare effect (not including health and environmental benefits) of the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers is negative for the EU as a whole (-€5.0 billion under the LiveWell 30% scenario and -€18.1 billion under the LiveWell 70% scenario).

Expressed in percentage of Gross Domestic Product (GDP), welfare losses relative to the reference scenario are very small because food expenditure is only a small fraction of total EU GDP. However, when measured against agricultural income under the reference scenario, losses in agricultural income attain 5% and 6% under the LiveWell 30% scenario and the LiveWell 70% scenario, respectively.

However, effects on producers' income vary depending on the types of agricultural products that they produce. The following table shows changes in revenues associated with the production of key raw agricultural products following the adoption of diets meeting the LiveWell Plate's recommendations by consumers in the EU. It indicates that agricultural revenues associated with the production of sugar, cow and buffalo milk and meat are expected to decrease significantly as a result of a switch to healthier and more sustainable diets (by -18.3%, -21.3% and -32.7% under the LiveWell 70% scenario, respectively). However, agricultural revenues associated with the production of pulses, eggs and vegetables sharply increase under both LiveWell scenarios (+37.7%, +55.0% and +76.3% under the LiveWell 70% scenario, respectively).

Table 16. *Effects on revenues associated with the production of raw agricultural products in the EU under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.
Note: *Not including rice.

Food items	LiveWell 30%	LiveWell 70%
Vegetables (excl. tomatoes)	+29.0%	+76.3%
Eggs	+20.7%	+55.0%
Pulses	+16.2%	+37.7%
Tomatoes	+1.1%	+2.6%
Cereals*	-0.6%	+0.4%
Oilseeds	-3.7%	-7.8%
Sheep and goat milk	-6.5%	-12.5%
Sugar beet	-8.8%	-18.3%
Cow and buffalo milk	-10.3%	-21.3%
Meat	-17.3%	-32.7%

EU consumer welfare increases under the two LiveWell scenarios (+€7.8 billion under the LiveWell 30% scenario and +€1.3 billion under the LiveWell 70% scenario). It may be surprising to see that consumer welfare does not increase monotonically when moving from the LiveWell 30% scenario to the LiveWell 70% scenario. This is due to supply side bottlenecks for "other vegetables",[37] i.e. strong increases in consumer prices for these products in limited supply as their demand increasingly intensifies due to a larger proportion of the EU population adopting diets meeting the LiveWell Plate's recommendations.[38] This negative effect on consumer price increasingly offsets the consumer welfare gains obtained from declining prices of other food items under the two LiveWell scenarios.

The adoption of diets meeting the LiveWell Plate's recommendations by EU consumers results in declining incomes for the processing industry (-€4.2 billion under the LiveWell 30% scenario and -€8.7 billion under the LiveWell 70% scenario). The processing industry[39] includes in particular dairies, the oil crushing sector, and the biofuel industry. For dairies and the oil crushing sector the LiveWell scenarios generate declining output prices (including decreased in price of dairy products,

[37] The CAPRI category "other vegetables" includes cauliflower and broccoli, Brussels sprouts, cabbage (white), other brassicas, celery, leeks, lettuces, endives, spinach, asparagus, chicory, artichokes, other leafy or stalked vegetables, cucumbers, gherkins, eggplants, gourds, marrows, courgettes, pumpkins, red pepper, capsicum, kohlrabi, turnips, carrots, garlic, onions, shallots, beetroot, celeriac, radishes. It does not include tomatoes (which is a separate category in CAPRI).

[38] The full demand shift (at 100% adoption) would be 4% for tomatoes and +30% for other vegetables.

[39] The processing industry combines all domestic agents buying directly from agriculture except the food industry. The purchases of the food industry are those quantities classified by Eurostat as "human consumption" in the market balance information for agricultural products.

vegetable oils and oil cakes). These output price reductions also affect the input prices (raw milk and oilseeds), but the output price effect is closer to the source of the economic demand 'shock' and therefore dominates. By contrast, the biofuel processing industry benefits from reductions in its main input price (oilseeds) under the LiveWell scenarios, but the other two components of the processing sector (dairies and the oil crushing sector) are quantitatively more important, such that the overall income for the processing industry declines under the two LiveWell scenarios.

Other private agents affected by the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers are owners of Tariffs Rate Quotas (TRQ) rents[40] and land owners. As EU land use slightly declines as a result of the reduction in meat production, the released land can be used for other profitable activities (like forestry) and generates some additional income under the two LiveWell scenarios (+€0.3 billion under the LiveWell 30% scenario and +€0.6 billion under the LiveWell 70% scenario).[41]

Public budgets may be affected in several ways by the adoption of diets meeting the LiveWell Plate's recommendation by EU consumers. Two effects analysed by CAPRI are effects on tariff revenues from changes in agricultural trade and indirect effects on the Common Agricultural Policy (CAP) premiums. The effects on public budgets assessed in CAPRI relate to the agricultural sector only and do not consider the effects of the adoption of diets meeting the LiveWell Plate's recommendations on public health expenditures and public spending to address environmental deterioration. The results of the modelling indicate that aggregated public agricultural budgets of EU countries decrease in the two LiveWell scenarios (-€0.5 billion under the LiveWell 30% scenario and -€1.2 billion under the LiveWell 70% scenario).

Table 17 below provides an overview of welfare changes in the three LiveWell pilot countries (France, Spain and Sweden) resulting from the adoption of diets meeting the country specific LiveWell Plate's recommendations by consumers in these countries. This table indicates for example that losses in tariff revenues under the LiveWell 30% (net effect of less imports of meat, more of other plant products, etc.) in France are counterbalanced with small savings in budget expenditure on CAP premiums to give a zero effect.

[40] See footnote 14.

[41] The release of agricultural land in the EU would amount to 449,020 hectares under the LiveWell 30% scenario and 860,210 hectares under the LiveWell 70% scenario (-0.24% and -0.47% compared to the reference scenario, respectively). Most of the land released in the EU would be pasture land (357,290 hectares under the LiveWell 30% scenario and 781,210 hectares under the LiveWell 70% scenario; or -0.62% and -1.36% compared to the reference scenario, respectively) in line with the stronger production decline for meat and dairy products compared to other products. The rest of the land released corresponds to a reduction in arable land in the LiveWell scenarios (-0.07% under the LiveWell 30% scenario and -0.06% under the LiveWell 70% scenario compared to the reference scenario).

Table 17. *Effects on welfare of market participants in pilot countries under LiveWell 30% and LiveWell 70% scenarios (change in € billion against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Consumer welfare	+0.8	+1.9	+0.2	+7.8	+1.0	+3.0	0.0	+1.3
Agricultural income	-1.0	-1.5	-0.1	-8.4	-1.2	-2.3	-0.2	-10.1
Income of processing industry	-0.4	-0.9	-0.1	-4.2	-0.7	-1.9	-0.1	-8.7
Income of other private agents	+0.0	+0.1	0.0	+0.3	+0.1	+0.1	0.0	+0.6
Public agricultural budgets	-0.2	0.0	0.0	-0.5	-0.4	-0.1	0.0	-1.2
Total	*-0.7*	*-0.4*	*0.0*	*-5.0*	*-1.3*	*-1.1*	*-0.3*	*-18.1*

3.4.5 Effects on the environment

Production changes in the EU as well as in third countries affect greenhouse gas emissions (GHGe) and the agricultural nitrogen balance. These effects are presented in the following sections.

3.4.5.1 Effects on greenhouse gas emissions (GHGe)

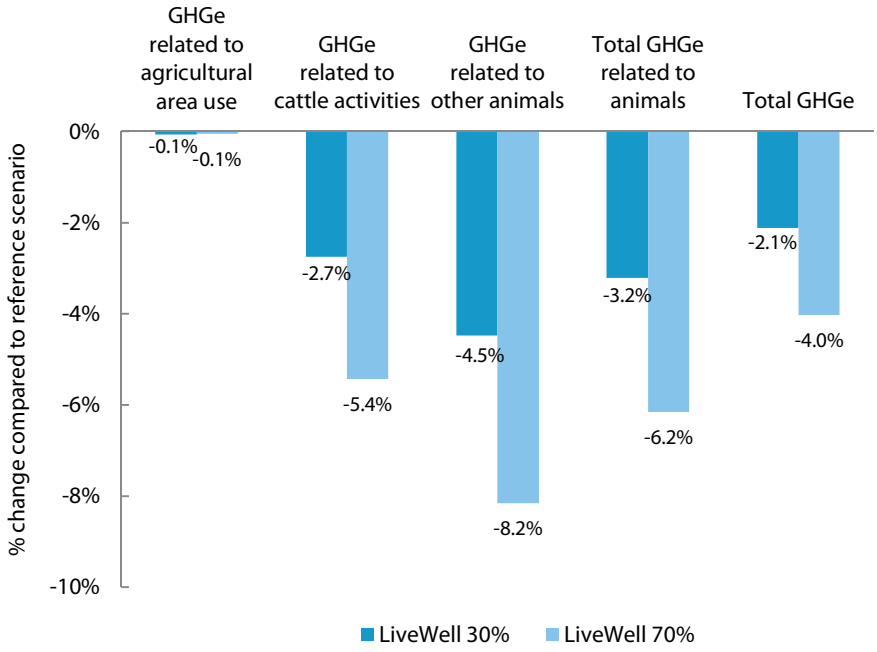
Figure 16 below shows that the adoption of diets meeting the LiveWell Plate's recommendations by an additional 30% of the EU population in 2020 (LiveWell 30% scenario) compared to the reference scenario leads to a total reduction in agricultural GHGe[42] from the EU of 2.1%. The adoption of diets meeting the LiveWell Plate's recommendations by an additional 70% of the EU population in 2020 (LiveWell 70% scenario) compared to the reference scenario decreases agricultural GHGe from the EU by 4.0% from the reference scenario (i.e. the continuation of the current food consumption patterns until 2020).

The decrease in consumption of dairy products and meat by EU consumers who adopt diets meeting the LiveWell Plates' recommendations (see Section 3.4.1) leads to a reduction in EU production of these products (up to -9% and -11% under LiveWell 70%, respectively; see Sections 3.4.3.4 and 3.4.3.6). This results in a decline of GHGe related to animal production in the EU of up to 6.2% under the LiveWell 70% scenario (see figure below).

[42] The GHGe impacts are quantified in CAPRI according to the methodology described in Leip et al. (2010) and Perez-Dominguez et al. (2012).

Figure 16. *Effects on agricultural GHGe from the EU under LiveWell 30% and LiveWell 70% scenarios by main agricultural activity (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



Contributions to agricultural GHGe reduction vary among Member States depending on the effects of the LiveWell scenarios on production in each country. This is highlighted in the table below which shows the reduction in agricultural GHGe from the three LiveWell pilot countries (France, Spain and Sweden) resulting from the adoption of diets meeting the country-specific LiveWell Plate's recommendations by consumers in these countries, and compares them to the EU values.

Table 18. *Effects on agricultural GHGe from pilot countries under LiveWell 30% and LiveWell 70 % scenarios by main agricultural activity (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

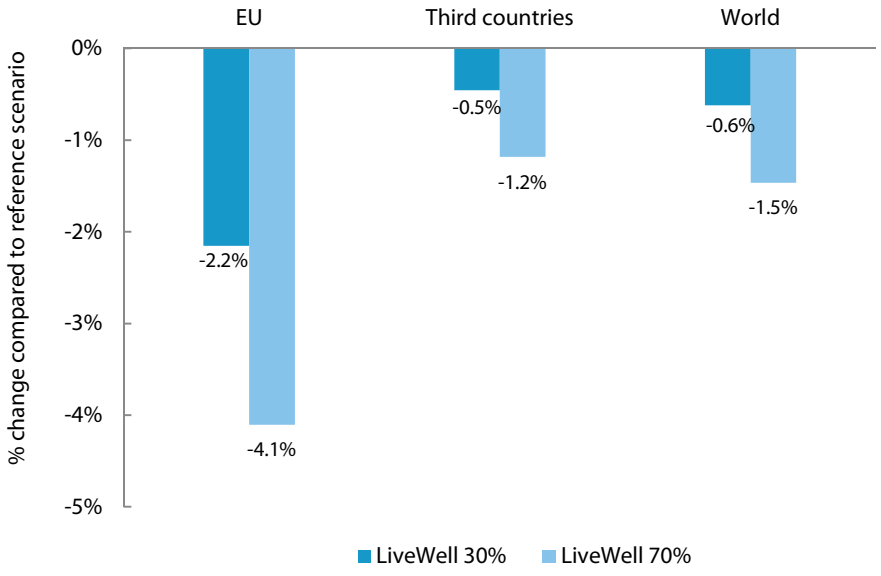
	LiveWell 30%				LiveWell 70%			
	ES	**FR**	**SE**	**EU**	**ES**	**FR**	**SE**	**EU**
GHGe related to agricultural area use	+0.4%	-0.1%	-0.1%	-0.1%	+0.9%	-0.1%	-0.2%	-0.1%
GHGe related to cattle activities	-4.3%	-2.7%	-1.6%	-2.7%	-8.4%	-5.3%	-3.4%	-5.4%
GHGe related to other animals	-4.7%	-4.3%	-4.3%	-4.5%	-8.5%	-7.9%	-8.0%	-8.2%
Total GHGe related to animals	-4.5%	-2.9%	-2.0%	-3.2%	-8.5%	-5.7%	-4.0%	-6.2%
Total agricultural GHGe	*-3.1%*	*-1.9%*	*-1.4%*	-2.1%	*-5.9%*	*-3.5%*	*-2.8%*	-4.0%

The reductions in agricultural GHGe depicted above may appear as moderate achievements but as these decreases in GHGe are demand-driven they are not counteracted by so called 'leakage' effects, which could occur if EU production is displaced to third countries. Instead, as already seen above, reduction in the producer prices for dairy products and meat also curbs animal production in third countries (see Sections 3.4.3.4 and 3.4.3.6) which therefore adds to the reduction in agricultural GHGe at the global level.[43] The LiveWell scenarios thus involve 'negative leakage', which can be estimated in CAPRI using a 'product-based' emission accounting.

The product-based accounting of agricultural GHGe allows for the assessment of the global effects of the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers. Agricultural GHGe are reduced less in third countries (by up to 1.2% under the LiveWell 70% scenario) than in the EU, in line with the smaller production reductions in these countries discussed above (see Sections 3.4.3.4 and 3.4.3.6). Nonetheless, this contribution of third countries is essential to achieve *a total reduction of 1.5% in global agricultural GHGe (under the LiveWell 70% scenario) from a change in food consumption only adopted by consumers in the EU*.

Figure 17. *Effects on EU and global agricultural GHGe under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



The global estimates of agricultural GHGe reduction (-0.6% under the LiveWell 30% scenario and -1.5% under the LiveWell 70% scenario)[44] are conservative because the effects of changes in agricultural area use on the release of soil carbon (known as

[43] See Perez-Dominguez et al., 2012.

[44] The small differences between the results obtained for the EU under the activity based accounting and the product based accounting (-2.1% vs -2.2% under LiveWell 30% and -4.0% vs -4.1% under LiveWell 70%; see Figure 16 and Figure 17) is mainly due to difficulties of correctly allocating young animal trade in CAPRI.

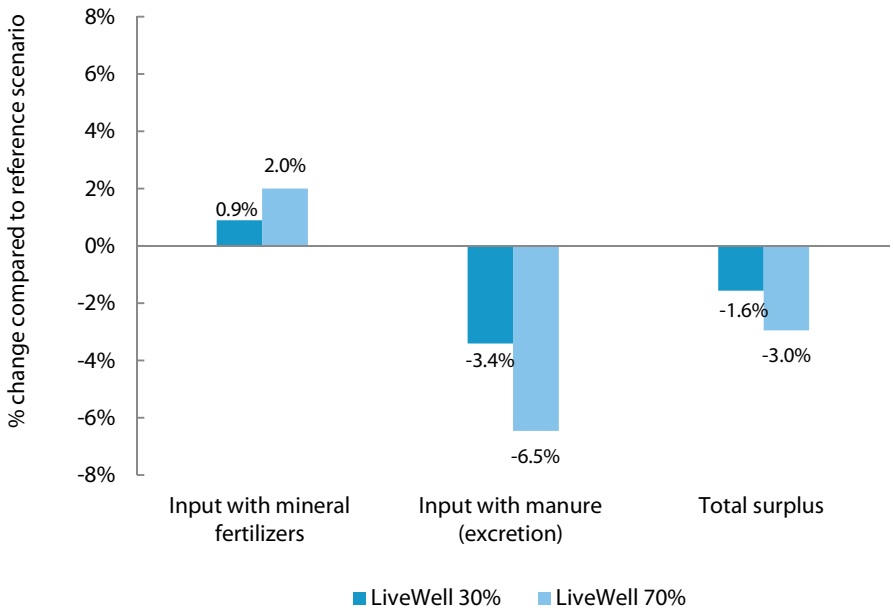
"Indirect Land Use Change" or ILUC effects) are still largely neglected in CAPRI. Specifically, a lower demand for land in third countries means a lower conversion of carbon-rich natural lands to agriculture and prevents high one-time releases of carbon into the atmosphere.[45]

3.4.5.2 Effects on the nitrogen balance of agriculture

Another relevant environmental indicator affected by the LiveWell scenarios is the overall nitrogen balance of agriculture. In fact, the application of mineral fertilizers is expected to moderately increase under the LiveWell scenarios, as farmers partly compensate for stronger reductions in the availability of manure. Nonetheless the overall nitrogen balance surplus[46] declines by 1.6% under the LiveWell 30% scenario and by 3.0% under the LiveWell 70% scenario. Reduced overall surplus of the nitrogen balance is associated with lower leaching below ground and lower gaseous emissions, mostly of ammonia.

Figure 18. *Effects on EU agricultural nitrogen balance under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



Reductions in the overall surplus of the nitrogen balance under the LiveWell scenarios are higher in countries with an important animal sector such as Spain, as illustrated in the table below.

[45] GHGe related to ILUC effects are not modelled by CAPRI at the moment. Including the GHGe related to these effects in the model would likely result in a significant improvement of the global GHG balance under the two LiveWell scenarios (see for example Searchinger et al., 2008 on the issue of GHGe from land-use change).

[46] Surplus = input from mineral fertiliser + manure + atmospheric deposition + bio-fixation + crop residues - Nitrogen export with harvested material.

Table 19. *Effects on agricultural nitrogen balance in pilot countries under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

	LiveWell 30%				LiveWell 70%			
	ES	FR	SE	EU	ES	FR	SE	EU
Input with mineral fertilizers	+2.0%	+0.7%	+0.8%	+0.9%	+4.0%	+1.6%	+1.9%	+2.0%
Input with manure (excretion)	-4.5%	-3.2%	-2.3%	-3.4%	-8.4%	-6.0%	-4.4%	-6.5%
Total surplus	*-2.0%*	*-1.3%*	*-1.2%*	*-1.6%*	*-3.8%*	*-2.5%*	*-2.2%*	*-3.0%*

In addition, previous research has shown that a change to diets consisting of a lower intake of sugar, crop oils, animals fats and meat, and a higher intake of vegetables and fruit, result in a lower EU water footprint of consumption.[47]

3.4.6 Effects on public health

This section presents the effects of the adoption of diets meeting the LiveWell Plate's recommendations in the three pilot countries and in the EU on public health. Specifically, it indicates the expected percentage changes in the prevalence of obesity among adults in 2020 and in the cost of obesity and related diseases in this year under the LiveWell 30% and LiveWell 70% scenarios, relative to the reference scenario.

3.4.6.1 Methodological approach for assessing effects on public health

The figures presented in this section have been established using a methodological approach specifically developed for the purposes of the study. The effects of the adoption of diets meeting the LiveWell Plate's recommendations on public health have been assessed according to the following methodological steps:

1. Collecting data on the prevalence of obesity in the three pilot countries and at EU level;
2. Extrapolating the data collected to estimate the prevalence of obesity in 2020 under the reference scenario, and comparing them with the estimated prevalence of obesity in 2020 under the two LiveWell scenarios;
3. Collecting data on the cost of obesity and related diseases per obese person in the LiveWell pilot countries, and estimating the total cost of obesity and related diseases in 2020 under the reference and the two LiveWell scenarios.

[47] Vanham et al., 2013.

These results of the assessment are presented in the following sub-sections.

3.4.6.2 Current prevalence of obesity

The latest figures available on the prevalence of obesity in the pilot countries show that the proportion of obese people in the adult population varied between 11.8% (in Sweden) to 17.0% (in Spain) in 2012 (see Table 20 below).[48]

Table 20. *Prevalence of obesity in pilot countries and the EU*

Country	2006	2008	2009	2011	2012
France[(a)]	12.4%	n.a.	14.5%	n.a.	15.0%
Spain[(a)]	15.0%	n.a.	n.a.	n.a.	17.0%
Sweden[(b)]	n.a.	n.a.	10.4%	11.2%	11.8%
EU[(c)]	*n.a.*	*15.5%*	*n.a.*	*16.6%*	*(17.0%)*[(d)]

Sources: See country studies, OECD, 2012 and OECD, 2010.
Notes: (a) Prevalence of obesity among people aged 18 or over; (b) Prevalence of obesity among people aged 16 or over; (c) Prevalence of obesity among people aged 15 or over; (d) Extrapolated on the basis of OECD data for the years 2008 and 2010.

3.4.6.3 Expected prevalence of obesity in 2020

The data on the prevalence of obesity collected in the LiveWell pilot countries can be extrapolated to provide estimations for 2020, assuming that growth in the prevalence of obesity would continue to develop following the national trends observed in the past. The resulting figures on the expected prevalence of obesity in 2020 are therefore implicitly based on the assumption that the factors that have determined the evolution of obesity rates observed in recent years, including medical technologies, nutritional research, and government policies, will continue to exert the same effects on future trends. The projected figures assume an arithmetic growth of the prevalence of obesity until 2020.[49] *This linear extrapolation of recent trends in obesity rates is a simplified prognosis done for the purpose of the assessment of the effects of the adoption of diets meeting the LiveWell Plate's recommendations on the costs of obesity and related diseases in 2020 and does not constitute a trend analysis based on medical or nutritional research.*

[48] No data on the prevalence of obesity in 2012 could be identified at EU level. However, the OECD provides this data for the years 2008 and 2010 (15.5% and 16.6%, respectively, see OECD, 2010 and OECD, 2012). Assuming an arithmetic growth of the prevalence of obesity of 0.55% per year, as suggested by the quoted OECD data, the extrapolated prevalence of obesity in the EU is 17% for 2012.

[49] An arithmetic growth of the prevalence of obesity of 0.17% in France, 0.33% in Spain, and 0.30% in Sweden per year until 2020 is assumed, as suggested by the data provided by the two most recent national health surveys conducted in France (2009 and 2010) and Spain (2006 and 2012) and the data provided by Statistics Sweden for the years 2010-2011 and 2012.

The results of the extrapolation conducted are presented in Table 21 below. It shows that the proportion of obese people in the population of each of the pilot countries is expected to rise to 13.9% in Sweden, 16.2% in France and 19.3% in Spain under the reference scenario. This extrapolation assumes a continuation of current trends, and is based on data dating from 2006 to 2012.

In the EU, obesity could affect 21% of the EU population in 2020, based on a linear extrapolation of the trends in the prevalence of obesity observed between 2008 and 2010 (the latest year for which data is available). However, the more recent data collected in the LiveWell pilot countries suggest that the progression of obesity has slowed in recent years. For example, the prevalence of obesity in France is estimated to have increased from 14.5% to 15.0% during the period 2009-2012 whereas obesity increased from 12.4% to 14.5% during the period 2006-2009 (see Table 20 above).[50] Assuming that the growth of the prevalence of obesity in the EU corresponds to the average arithmetic growth per year in the three LiveWell pilot countries, the proportion of obese people in the EU population in 2020 would be lower, at 18.5%. These two estimates of the expected prevalence of obesity in the EU in 2020 in the reference scenario (18.5% and 20.5%) are considered in the calculations of the cost of obesity and related diseases at the EU level in the following sections.

The expected prevalence of obesity under each LiveWell scenario was calculated by assuming that while the adoption of diets meeting the recommendations of the LiveWell Plate will typically prevent non-obese people from becoming obese, the adoption of these diets by people who are already obese today is not likely to have any significant effects on their obesity levels by 2020.[51] It was therefore assumed that the health benefits of the adoption of diets meeting the LiveWell Plate's recommendations mainly consist of stabilising obesity rates at current levels, as the health benefits of the adoption of these diets only apply to those who are not obese today but would have become obese by 2020 under the reference scenario. Figures regarding the expected changes in the prevalence of obesity among adults in 2020 under the LiveWell scenarios can therefore be considered conservative estimates.

Table 21 below indicates that the prevalence of obesity in 2020 at EU level is expected to be between 18.3% and 20.1% if an additional 30% of the EU population meet the LiveWell Plate's recommendations in this year (LiveWell 30% scenario), and to be between 17.4% and 18.2% if an additional 70% of the EU population meet the LiveWell Plate's recommendations (LiveWell 70% scenario). These figures are significantly lower than the prevalence of obesity expected at EU level under the reference scenario (between 19.0% and 21.6%).

[50] According to the results of the ObEpi surveys (see: http://www.roche.fr/content/dam/corporate/roche_fr/doc/obepi_2012.pdf).

[51] This assumption was discussed and validated by several experts interviewed.

Table 21. *Expected prevalence of obesity under the reference and the LiveWell scenarios in 2020*

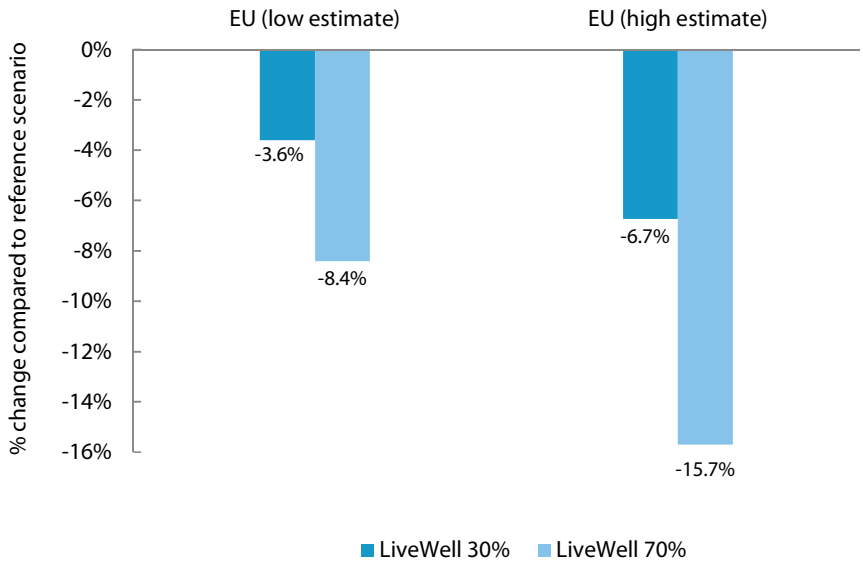
Source: Civic Consulting.

	Reference scenario	LiveWell 30% scenario	LiveWell 70% scenario
France	16.2%	15.6%	14.9%
Spain	19.3%	18.5%	17.4%
Sweden	13.9%	13.2%	12.4%
EU (low estimate)	*19.0%*	*18.3%*	*17.4%*
EU (high estimate)	*21.6%*	*20.1%*	*18.2%*

Figure 20 below indicates that compared to the reference scenario, the prevalence of obesity in 2020 is expected to decrease by between 3.6% and 6.7% at EU level if an additional 30% of the EU population meet the LiveWell Plate's recommendations in this year (LiveWell 30% scenario), and to decrease by between 8.4% and 15.7% if an additional 70% of the EU population meet the LiveWell Plate's recommendations (LiveWell 70% scenario).

Figure 19. *Effects of adoption of LiveWell diet on prevalence of obesity under LiveWell 30% and LiveWell 70% at EU level (relative to reference scenario)*

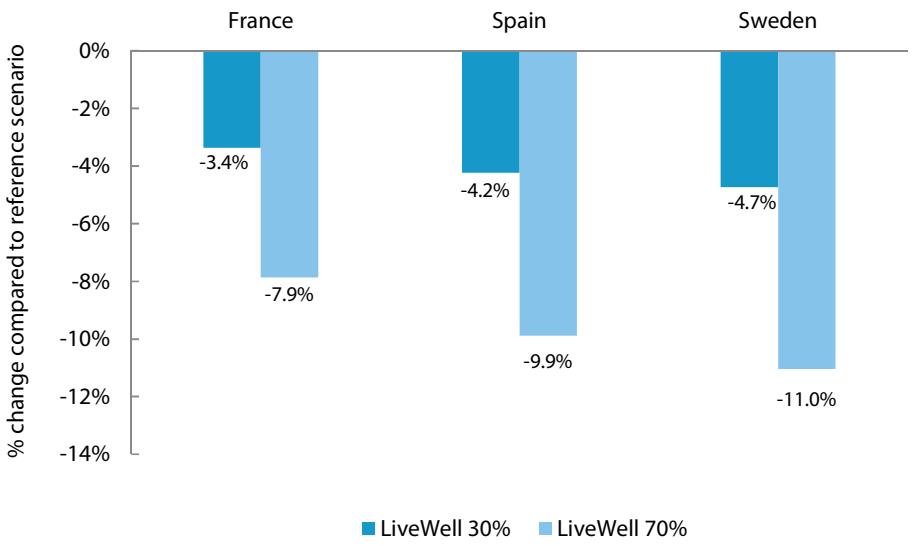
Source: Civic Consulting.



A switch to healthier and more sustainable diets is also expected to lead to significant reductions in the prevalence of obesity in the three LiveWell pilot countries, as shown in the figure below.

Figure 20. *Effects of adoption of LiveWell diet on prevalence of obesity under LiveWell 30% and LiveWell 70% in pilot countries (relative to reference scenario)*

Source: Civic Consulting.



3.4.6.4 Costs of obesity and related diseases

In the framework of this study, we reviewed existing research on costs of obesity and related diseases in the three LiveWell pilot countries. The data collected indicates that the annual costs of obesity and related diseases (such as hypertension, type 2 diabetes, and myocardial infarction) amounted to €596 per obese person in Spain[52] and to €780 per obese person in France[53] in 2002 and up to €2,806 per obese person in Sweden in 2003.[54] These figures are not directly comparable as they include different cost items (see Table 22 below). However, they reflect a range of different estimates and are therefore considered a suitable basis for estimating the costs of obesity and related diseases at EU level.

[52] A previous study estimated the costs of obesity and related diseases to amount to €2,507 million in 2002 in Spain (Vázquez and López, 2002; see also: http://www.fecyt.es/especiales/obesidad/6.htm). In this year, the prevalence of obesity among those aged 20 or over in Spain was 12.9% (Quiles et al., 2008). On the basis of this data, it is estimated that the cost of obesity and related diseases was €596 per obese person in Spain in 2002.

[53] Emery et al., 2007 (costs are provided for obese persons aged 18 and over).

[54] Data provided by Prof. Ulf Persson of the Swedish Institute for Health Economics (IHE). Costs are provided for obese persons aged 16-84.

Table 22. *Data on the costs of obesity in LiveWell pilot countries*

Source: Civic Consulting.

Country	Cost per obese person	Based on data from (year)	Description of cost	Source
France	€780	2002	Cost per obese or overweight adult person in 2002 with additional cardiovascular risk factors: hypertension, dyslipidemia, type 2 diabetes, myocardial infarction (present or history), transient ischemic attack, intermittent claudication or sleep apnea. The cost includes extra medical costs and the costs associated to sick leaves for the public health insurance system (compared to an individual of normal weight).	Emery et al., 2007.
Spain	€596	2002	Costs of obesity and associated diseases (including diabetes, cardiovascular diseases, dyslipidemia, and musculoskeletal diseases) in 2002 related to medical costs and costs of sick leaves and premature mortality.	Own calculations based on Vázquez and López, 2002 and Quiles et al., 2008
Sweden	€2,806	2003	Cost per obese person in 2003, including health care costs and loss of production due to short term illness, long term illness and premature mortality (prior to age of 65).	Prof. Ulf Persson of the Swedish Institute for Health Economics (IHE)

As cost data identified relates to the years 2002 and 2003, these figures were inflated to reflect 2020 prices.[55] Applying 2020 cost data to the expected number of obese people in 2020, we predict the annual costs of obesity and related diseases to amount to €9.2 billion in France, €6.5 billion in Spain, and €4.0 billion in Sweden in 2020, assuming a continuation of the current trend (reference scenario) as shown in the table below.

[55] Prices were inflated using inflation index data of the International Monetary Fund (IMF), World Economic Outlook Database, October 2013. The cost of obesity and related diseases per obese person is expected to amount to €1,069 in France, €857 in Spain, and to €3,701 in Sweden in 2020.

Table 23. *Effects of adoption of LiveWell diets on costs of obesity and related diseases in the LiveWell pilot countries in 2020 under LiveWell 30% and LiveWell 70% scenarios*

Source: Civic Consulting. Notes: (a) Costs relate to obese people aged 18 or over; (b) Costs relate to obese people aged 16 or over.

	Expected annual costs of obesity and related diseases (in € billion)			Expected changes in costs (relative to reference scenario; in € billion)	
Country	**Reference scenario**	**LiveWell 30% scenario**	**LiveWell 70% scenario**	**LiveWell 30% scenario**	**LiveWell 70% scenario**
France[(a)]	9.2	8.9	8.5	-0.3 (-3.4%)	-0.7 (-7.9%)
Spain[(a)]	6.5	6.2	5.9	-0.3 (-4.2%)	-0.6 (-9.9%)
Sweden[(b)]	4.0	3.8	3.6	-0.2 (-4.7%)	-0.4 (-11.0%)

Using the expected prevalence of obesity in the EU in 2020 (see Table 20 above) and the average of the cost estimates from the three LiveWell pilot countries (average cost of €2,183 per obese person at EU level in 2020),[56] the annual costs of obesity and related diseases can be estimated for the EU. Under the reference scenario, which assumes a continuation of current trends, these costs are expected to range between €180.2 billion and €204.4 billion (see Table 24 below), depending on whether the lower or the higher estimates of EU obesity levels in 2020 are used. On the basis of this data, it is estimated that the annual avoided costs of obesity and related diseases at EU level range between €6.5 billion and €13.8 billion under the LiveWell 30% scenario and between €15.2 billion and €32.1 billion under the LiveWell 70% scenario, relative to the reference scenario.

[56] The estimate of €2,183 per obese person in the EU in 2020 is likely to be conservative, in view of the costs of obesity estimated in the USA. For example, a report published in 2010 estimated that the overall, tangible, costs of being obese are US$4,879 for an obese woman and US$2,646 for an obese man in the USA per year (Dor et al., 2010). According to this report, adding the value of lost life to these costs further increases the total cost of obesity: US$8,365 for obese women and US$6,518 for obese men. Converting these costs in Euros and inflating them to obtain values for 2020, it is estimated that the cost of obesity will range between €4,489 and €7,696 per obese women and between €2,434 and €5,997 for obese men in 2020 in the USA, depending on whether the value of lost life is considered in the assessment.

Table 24. *Effects of adoption of LiveWell diets on costs of obesity and related diseases in the EU in 2020 under LiveWell 30% and LiveWell 70% scenarios*

Source: Civic Consulting. Note: (a) See Section 3.4.6.3 and Table 20 above on expected prevalence of obesity among adults in the EU in 2020. (b) Cost estimates based on data from three pilot countries France, Spain and Sweden; see text.

	Expected annual costs of obesity and related diseases[(b)] (in € billion)			Expected annual avoided costs (relative to reference scenario; in € billion)	
	Reference scenario	LiveWell 30% scenario	LiveWell 70% scenario	LiveWell 30% scenario	LiveWell 70% scenario
Based on low estimate for prevalence of obesity in the EU in 2020 [(a)]	180.2	173.7	165.1	6.5 (3.6%)	15.2 (8.4 %)
Based on high estimate for prevalence of obesity in the EU in 2020 [(a)]	204.4	190.6	172.3	13.8 (6.7%)	32.1 (15.7%)

As reductions in costs are assumed to be proportional to reductions in the prevalence of obesity, a switch to healthier and more sustainable diets by EU consumers could lead to an identical proportional reduction of the costs of obesity and related diseases in 2020, i.e. of between 3.6% and 6.7% under the LiveWell 30% scenario, and of between 8.4% and 15.7% under the LiveWell 70% scenario, compared to the reference scenario.

It has to be emphasised that the estimate for the EU is based on the data on costs of obesity and related diseases from three pilot countries only, which do not necessarily reflect the situation in other EU countries to a full extent. This has to be considered when interpreting the figures, and indicates the need for further research on this issue in an EU perspective. In addition, as already mentioned above, the estimates of expected costs of obesity and related diseases in 2020 under the LiveWell scenarios are to be considered conservative in nature due to the assumptions on which these estimates are based (see Section 3.4.6.3 above).

Furthermore, obesity also induces costs that are difficult to assess quantitatively. For example, obese people may suffer from social stigmatisation and mental health problems.[57] They may be discriminated against (in terms of employment and career opportunities) and may experience psychological and psychosocial difficulties.[58] Other costs of obesity which are usually not assessed quantitatively include for instance costs related to back pain, physical suffering, loss of quality of life, and

[57] European Commission, 2014a.

[58] Assemblée Nationale. 2008. This report underlines that this question is complex to address as these difficulties may be either the consequence or the origin of people being overweight and obese.

intangible social costs such as poor academic performance.[59] Moreover, additional costs may be incurred by hospitals for treating obese people.[60]

Finally, in this study only the costs of obesity and related diseases are considered. The increased medical costs of people who are overweight, but not obese, are not included. Previous studies[61] indicate that the related costs may also be considerable.[62] The adoption of diets meeting the recommendations of the LiveWell Plate, which is in line with national dietary recommendations, may also lead to health benefits for the non-obese and non-overweight population, which are difficult to quantify, but are regularly referred to in dietary studies. For example, there is growing evidence of a link between high consumption of meat and poor health outcomes.[63] Specifically, recent large meta-analyses have found significant increases in risk of coronary heart diseases, type 2 diabetes and colorectal cancer with increased intake of processed meat. A significant increase in colorectal cancer risk has also been shown with increased intake of red meat.[64]

[59] See footnote 58.

[60] For example, it may not be possible to use standard scanners for obese people; and additional beds and stretchers adapted to the weight of obese people may also need to be purchased by hospitals (see: http://www.sante.gouv.fr/IMG/pdf/Rapport_A_Basdevant.pdf).

[61] See for example The Government Office for Science, 2007.

[62] It has to be noted that this study considers the cost of obesity and related diseases as they result for the health system *in a given year*. It does not consider lifetime costs of obese persons compared to lifetime costs of non-obese persons. As the former may not live as long, the overall health costs per obese person decrease. A similar argument has been made for smokers vs. non-smokers. It is, however, undisputable, that obesity and related diseases lead to specific costs for a health system, which have been the focus of this study.

[63] Scarborough, 2012.

[64] Aston et al., 2012.

4 POLICY OPTIONS

This section of the report analyses the costs and benefits associated with the implementation of selected policy options to meet the LiveWell Plate's recommendations.

4.1 INTRODUCTION

In coordination with WWF, the following policy options were selected for submission to a cost-benefit analysis:

- Policy option 1: Introduction of "Food, Nutrition and the Environment" education;
- Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products;
- Policy option 3: Taxation measures:
  - Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts;
  - Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts; and
- Policy option 4: Development of a national sustainable food strategy.

The following sections present the costs and benefits identified for each option, on the basis of the information collected through desk research and interviews with experts and stakeholders in the three LiveWell pilot countries and at EU/international level.

4.2 POLICY OPTION 1: "FOOD, NUTRITION AND THE ENVIRONMENT" EDUCATION

Policy option 1 concerns the *introduction of education measures to ensure that school children understand the impact of food consumption on the environment*. The following sub-sections first explore the rationale of this policy option, before separately considering the costs and benefits accruing to food producers, public authorities and consumers/society if this option were implemented.

4.2.1 Rationale of policy option 1

According to estimates from the WHO's Childhood Obesity Surveillance Initiative (COSI), around 1 in 3 children in the EU aged 6-9 years old was overweight or obese in 2010. This is a significant increase compared to 2008, when 1 in 4 children was obese.[65] This suggests the need for food education to promote the adoption of healthier diets by children, a goal which is also emphasised in the recent EU Action Plan on Childhood Obesity that aims to halt the rise in overweight and obesity in children and young people (0-18 years) by 2020. Specifically, this Action Plan designates the education of children in relation to nutrition and healthy lifestyles (including on sustainable diet and food waste reduction) as one of the actions under the objective of improving education on healthier food choices.[66]

Several stakeholders interviewed in the case study countries (France, Spain and Sweden) suggested that relevant education measures should primarily be targeted at pupils in primary schools as children are considered most receptive to food education at this school level.[67] This view is confirmed by findings of scientific research which found that sensory preferences are constructed during the first years of life and are then difficult to change.[68] In addition, by learning and adopting healthy habits at a young age, the chance that such habits will be sustained into adulthood is greatly increased.[69] Moreover, stakeholders also emphasised that "food, nutrition and the environment" education in schools may not only have direct benefits for children (see Table 28) but can also have positive indirect effects on consumption patterns adopted by their parents.

[65] European Commission, 2014a.

[66] European Commission, 2014a.

[67] However, it was emphasized during the country interviews that education on sustainable and healthy diets could also be included in the curriculum of students in secondary schools. The French government indicates that it is essential to ensure that sustainable development concepts are spread throughout the curriculum regardless of the programme followed by students. French Government. 2013. La conférence environnementale, les 20 et 21 septembre 2013, Palais d'Iéna – Paris, Table ronde n°5, Éducation À l'environnement et au développement durable, Document de travail. Available at: http://www.developpement-durable.gouv.fr/IMG/pdf/Conf_envi_2013_Fiche_Table-Ronde_No5.pdf.

[68] INRA, 2010.

[69] European Commission, 2014a.

Benefits of introducing "food, nutrition and the environment" in the curriculum identified in the scientific literature include:

- Educational programmes (*in-class lessons*) can be effective in stimulating the adoption of a healthy diet among children;[70]
- Experience of *school gardens* increases agricultural literacy and knowledge of the food chain, and has positive impacts on academic outcomes and environmental attitudes (i.e. active involvement with the environment and concern about the environment). It also contributes to the social development of children (see Table 28 and Annex 5 below).

A number of scientific studies indicated that combining several education measures increases their effectiveness:

- In the EU a subscription or distribution programme for fruit and vegetables combined with an educational component increased the consumption of fruit and vegetables in children;[71]
- US students exposed to two or more education measures (including in-class lessons, incorporation of locally grown vegetables into standard school lunch menus, farmer visits, taste-testing, after-school programme including gardening, cooking, and field trip to farms) had a higher fruits and vegetables intake and lower preference for unhealthy foods than students exposed to fewer than two education measures;[72]
- Incorporating gardening along with food preparation, nutrition and physical activity education is also seen as an effective way to improve children's reported vegetable intake and physical activity.[73]

[70] Van Cauwenberghe et al., 2010.

[71] Van Cauwenberghe et al., 2010. Such programmes have been promoted by the European Commission through the "School Fruit Scheme" which provides school children with fruit and vegetables and requires participating Member States to set up strategies including educational and awareness-raising initiatives. See http://ec.europa.eu/agriculture/sfs/ and Commission Regulation (EC) No 288/2009 of 7 April 2009 laying down detailed rules for applying Council Regulation (EC) No 1234/2007 as regards Community aid for supplying fruit and vegetables, processed fruit and vegetables and banana products to children in educational establishments, in the framework of a School Fruit Scheme. Educational and awareness-raising initiatives include for example farm visits, market visits, school gardens, tree planting, pedagogical kits for teachers and pupils, leaflets, seminars, training sessions for teachers, publication in schools newspapers, creation of websites, interactive games on health and nutrition, photo competitions, exhibitions, rewarding gadgets, cartoons, and video clips (see: http://ec.europa.eu/agriculture/sfs/documents/presentation-jacquin-03-2013_en.pdf). So far accompanying measures were not eligible for EU co-financing, but with CAP 2020 they will be eligible (starting as of 1 August 2014 when school year 2014/2015 begins).

[72] Evans et al., 2012.

[73] Hermann, 2005.

Policy option 1 therefore assumes that a bundle of education measures would be introduced at schools to promote the adoption of healthier and more sustainable diets among children, namely:

1. Lessons in the classroom;
2. Visits to farms/food manufacturing plants; and
3. The use of school gardens.

These three sub-options are the focus of the following analysis.

Interviewed stakeholders also identified other, complementary education measures, such as cooking classes and the use of school lunches as teaching tools. They emphasised that school lunches could be an opportunity for children to taste fruits and vegetables which they may not eat at home, or to eat more of them, and also to show them the appropriate amounts that should be eaten from the different food groups (including the adequate amount of meat and vegetables on a plate). However, it was also underlined that catering staff/cooks in schools may not eat a lot of fruit and vegetables themselves and may therefore not think about serving more (and a wider variety) of these products to children (especially relative to the amount of meat served); other practical considerations include additional preparation steps and potential costs (depending on the type of vegetable and the season). Raising awareness of sustainable diets among catering staff/cooks in schools was therefore also seen as important. Both measures were discussed with stakeholders in the case study countries. Raising awareness of sustainable diets among catering staff/cooks in schools was not seen as particularly costly by stakeholders interviewed and may mainly consist of providing better information/training to catering staff/cooks in schools. However, cooking classes were found to be a much more costly measure due to the investment necessary to set up the adequate cooking facilities in schools (where not already existing) and because of the need to involve specialised professionals to teach cooking classes. As no comprehensive data was available at country level with respect to the current system of provision of school lunches, and the existing infrastructure in schools, these options could not be considered in detail in the framework of this study.

4.2.2 Costs of policy option 1

This section describes the costs of policy option 1 "Food, Nutrition and the Environment" education in schools, distinguishing between the costs of three above mentioned measures mentioned above, namely in-class lessons on "Food, Nutrition and the Environment", school gardens, and visits to farms/food manufacturing plants. The costs resulting from these education measures would mainly accrue to public authorities and parents of pupils. Costs identified in the course of our research relate to:

1. Costs of in-class lessons on "Food, Nutrition and the Environment" (education measure 1):
   - Costs of training teachers in relation to this topic (public authorities);[74]
   - Costs of teaching in-class lessons on "Food, Nutrition and the Environment" (public authorities); and
   - Costs of relevant additional education resources (public authorities/parents of pupils).
2. Costs of school gardens (education measure 2):
   - Costs of training teachers to develop/integrate school garden in curriculum (public authorities);
   - Costs of purchasing equipment including garden tools (public authorities/parents of pupils);
   - Costs of purchasing consumables including seeds and plants (public authorities/parents of pupils); and
   - Costs of additional educational resources (public authorities/parents of pupils).
3. Costs of visits to farms/food manufacturing plants (education measure 3):
   - Transport costs to the farm/food manufacturing plant (public authorities/parents of pupils); and
   - Financial compensation of farmers for the time they allocate to visits of school children (public authorities/parents of pupils, if farmers' time is reimbursed).

No direct costs for food producers were identified for this option. The significance of these costs varies with respect to several factors, which are presented in the following tables, together with a detailed description of the cost type and relevant information collected through the country studies and additional desk-based research.

[74] As school systems are mostly public in the study countries, we have not considered here the specific situation of private schools, which would likely pass through any increased costs for in-class lessons to parents of pupils.

Table 25. *Costs identified for education measure 1: In-class lessons on "Food, Nutrition and the Environment"*

Cost type	Description	Factors influencing costs	Cost accruing to	Significance of cost [a]	One-off /recurring cost
Costs of training teachers	Teachers need to be specifically trained on the subject "Food, Nutrition and the Environment", as they are generally not very well prepared to teach on the topic of environmental impacts of food consumption and determinants of a healthy diet, as was emphasised by stakeholders interviewed. Teachers can either receive training via (1) off-site training during school hours; (2) on-site training during school hours; (3) on-site or off-site training out of school hours; (4) distance training. Option (1) creates transport costs and costs for replacing teachers; option (2) avoids transport costs and limits replacement costs; option (3) creates transport costs but avoids replacement costs; and option (4) avoids both transport and replacement costs, as indicated by a report published by the Ministry of Education in France.[b] Option (1) is the training option the most often used in France at the moment. However, training of teachers on the subject "Food, Nutrition and the Environment" through option 4 (distance training) could lead to significant cost savings through the training a large number of teachers at the same time. This option would also allow teachers to easily access lesson plans and teaching ideas (see below).[b] Depending on the option used, the costs of training teachers on "Food, Nutrition and the Environment" can also be fully or partially covered by the budget that is allocated every year for the continuous training of teachers.[b]	- Availability of training on "Food, Nutrition and the Environ-ment" for teachers - Training option selected - Budget allocated to continuous training of teachers - Personal interest and knowledge of teachers in the subject	Public authorities	Minor to significant (€€ to €€€) (depending on training method used)	Recurring (regular training with updated knowledge and training of new teachers)
Costs of teaching	Including the topic "food, nutrition and the environment" in the curriculum of subjects already taught in schools (including for example biology and geography) would not create additional teaching costs, assuming that teachers would integrate lessons on healthy and sustainable diets in their courses (and that the total number of teaching hours remains unchanged). However, including "food, nutrition and the environment" in the curriculum of students of secondary schools as a separate and additional subject could generate significant additional labour costs.	- Integration in existing curriculum /introduction of subject as a separate class in secondary schools	Public authorities	Negligible (€) (if included in subjects already taught in schools)	Recurring cost

Costs of additional education resources	Information on food production, the environment, and diets in geography and biology textbooks was considered to be scarce by stakeholders interviewed in pilot countries. To deliver lessons and activities on "Food, Nutrition and the Environment" teachers therefore need to be supported with up-to-date and scientifically sound teaching materials. Assuming that "Food, Nutrition and the Environment" is integrated in the curriculum of subjects already taught in schools (including for example biology and geography), adding relevant information regarding "Food, Nutrition and the Environment" in textbooks would not create additional costs, as textbooks are renewed and updated regularly.(d) Education resources for teachers are already available online on EU-funded websites.(c) These resources could be enriched with additional teaching materials on healthy and sustainable diets. The use of these tools by teachers in the EU could also be further encouraged.	- Duration of transition period for purchasing relevant textbooks - Level of awareness by teachers of existing education resources (including online) on sustainable diets	Public autho-rities /parents of pupils	Negligible (€) (if adequate transition period provided)	One-off

Source: Civic Consulting (stakeholder interviews and desk-based research).

Notes: (a) The significance of the costs identified may vary depending on the indicated factors; (b) Inspection générale de l'Éducation nationale. 2013. Actualisation du bilan de la formation continue des enseignants. Rapport - n° 2013-009. Available at: http://www.ladocumentationfrancaise.fr/var/storage/rapports-publics/134000486/0000.pdf; (c) The Consumer Classroom website could be a useful tool in this context. This website is an EU funded portal site which provides teachers across the EU with resources for teaching consumer education. Themes covered by this portal include "sustainable consumption" and "health and nutritional education". The Consumer Classroom database could be enriched with additional teaching materials on healthy and sustainable diets and the use of these resources could be further promoted among teachers in the EU. It could also be envisaged to add the theme "Food, Nutrition and the Environment" which could regroup resources currently found under the themes "sustainable consumption" and "health and nutritional education" and include sub-themes such as "in-class lessons on food, nutrition and the environment", "school gardening", "cooking classes", etc. to the list of themes already offered by the Consumer Classroom database. Sharing and accessing teaching materials related to "Food, Nutrition and the Environment" through the Consumer Classroom website would not create additional costs as this would be make use of an already existing tools. (d) For example, according to French law, textbooks must be replaced approximately every 4 years for students in secondary schools (See: http://eduscol.education.fr/numerique/dossier/lectures/manuel/cadre-reglementaire).

Table 26. *Costs identified for education measure 2: School garden*

Cost type	Description	Factors influencing costs	Cost accruing to	Significance of cost [a]	One-off /recurring cost
Costs of training teachers to develop /integrate school garden in curriculum	Similarly to education measure 1 (in-class lessons on "Food, Nutrition and the Environment"), the development and use of a school garden with children typically necessitates prior training of teachers. For example, data collected in the United Kingdom indicates that the cost of a one-day school gardening training course for teachers in primary schools amounts to about €115 per person.[a]	- Availability/accessibility of training in relation to developing and using a school garden - Budget allocated to continuous training of teachers - Personal interest and knowledge of teachers in the subject	Public authorities	Minor to significant (€€ to €€€) (depending on training method used)	Recurring
Costs of equipment	The development and use of a school garden requires the purchase of equipment, such as hoes, watering cans, garden boxes, spades, hoses, etc. For example, information collected in France indicates that the cost of this equipment amounts to about €500.[d] Given that this equipment can be depreciated over a period of 10 years,[e] the yearly cost of the equipment for a school garden is therefore estimated to be €50 (equivalent to no more than €0.70 per pupil per year).[f] Schools can generally access and use outdoor space to develop a garden for free (on school grounds or in its close vicinity). The purchase of a piece of land for development of the school garden is therefore not expected to be required, as suggested by the information collected in the pilot countries.	- Size/type of garden and type of equipment purchased - Availability/accessibility of a piece of land on school grounds or in its close vicinity for free - Number of children using the garden	Public authorities /parents of pupils	Minor (€€)	Recurring (regular replace-ment of equip-ment)
Costs of consumables	The development and use of a school garden requires the purchase of consumables (such as packets of seeds of vegetables and flowers, and plants). For example, information collected in France indicates that the cost of these consumables amounts to about €100 (equivalent to no more than €1.41 per pupil per year).[f, g]	- Size/type of garden and type of consumables purchased - Number of children using the garden	Public authorities /parents of pupils	Minor (€€)	Recurring

Costs of additional education resources	To use a school garden as a teaching tool, teachers would need to be supported with teaching materials. Teachers may for example purchase a book on this topic or search for teaching ideas online. Relevant training material concerning the development and use of a school garden as a teaching tool could be made easily accessible online on EU funded websites.[(b)]	- Level of awareness by teachers of existing education resources (including online) on school gardening	Public authorities /parents of pupils	Minor (€€)	One-off

Source: Civic Consulting (stakeholder interviews and desk-based research).

Notes: (a) The significance of the costs identified may vary depending on the indicated factors; (b) For example, the Royal Horticulture Society in the United Kingdom offers School Gardening Training Courses for £95 per person (£170 for two courses or two persons on one course). For example the "Edible school garden" course provides teachers the skills to confidently grow and manage a simple productive garden throughout the year and to ensure that produce is used in tasting, cooking and enterprise activities. (http://apps.rhs.org.uk/schoolgardening/teachershome/teachertraining/default.aspa); (c) Information on how to develop a school garden and integrate its use in the school curriculum has already been made available by several organisations on their websites. For example, in the United Kingdom, the Royal Horticulture Society provides resources to help teachers get started in setting up and using a garden in their schools (http://apps.rhs.org.uk/schoolgardening/teachershome/resources/default.aspa) and the Fruit-full schools website (http://www.fruitfullschools.org/) provides "growing tips and curriculum ideas to inspire teachers with learning opportunities that can be provided by school orchards and their fruit." In Spain, the Generalitat of Catalonia provides resources on school gardening on its website. At the international level, the Food and Agricultural Organisation (FAO) also provides information on school gardens on its website (http://www.fao.org/schoolgarden/; http://www.fao.org/docrep/009/a0218e/a0218e00.htm). This type of information could be made available in EU languages on a relevant EU online platform such as the Consumer Classroom website. This would not create additional costs as this would make use of an already existing tool. (d) An investment of €500 can cover the purchase of 20 hoes, 5 watering cans, a 20-metre hose and its connectors, a spade, 10 garden boxes, etc. (see: http://www.ariena.org/jardin/Media/jardin.pdf); (e) http://www.bea.gov/scb/account_articles/national/wlth2594/tableC.htm; (f) It is assumed that the school garden (corresponding to an investment of €500) is used by about 71 pupils (i.e. the estimated average number of primary school years in the EU - 7 years - multiplied by the average number of pupils per class - 14.3 - as provided by Eurostat); (g) http://www.ariena.org/jardin/Media/jardin.pdf.

Table 27. *Costs identified for education measure 3: Visits to farms/food manufacturing plants*

Cost type	Description	Factors influencing costs	Cost accruing to	Significance of cost [(a)]	One-off /recurring cost
Transport costs	Visit of farms/food manufacturing plants induce transport costs which may accrue to schools/local authorities/parents of pupils. Assuming that pupils in primary schools visit a farm or a food manufacturing plant that can be reached within a one-day trip with a bus, the cost per pupil of renting a bus for this trip is expected to be minor.[(b)]	- Location of farm/food manufacturing plant - Availability of a network of farms/food manufacturing plants which offer visits of their premises for school children	Public authorities /parents of pupils	Minor (€€)	Recurring cost
Financial compensation of farmers for the time they allocate to visits of school children	Food manufacturing plants may show their factories to pupils for free as part of their Corporate Social Responsibility (CSR) policy. However, financial compensation of farmers may be envisaged for the time they allocate to visits of pupils, as currently practiced in Sweden. In this country, the Federation of Swedish Farmers (LRF) has developed a "school contact programme" which offers a nationwide network of farms for school visits and grants a financial compensation to farmers who make themselves available for visits of school children. The average financial compensation received by farmers through this programme amounts to SEK 500 per visit (€57) according to the information collected.[(c)]	- Extent to which farmers can afford to allocate time to show their farm to school children - Level of financial compensation granted to farmers, if this approach is envisaged	Public authorities /parents of pupils	Minor (€€)	Recurring cost

Source: Civic Consulting (stakeholder interviews and desk-based research).

Notes: (a) The significance of the costs identified may vary depending on the indicated factors; (b) According to the Belgian Federation of Bus and Coach Operators and Tour Operators, the cost of the driver amounts to at least €200 per day, depreciation costs of single-deck bus to €190 per day, and costs per kilometre (including fuel, tires, maintenance, and insurance) to €0.85 per kilometre (see: http://www.voyagescolairesecurite.org/economie.php). It is assumed that the average distance from the school to the farm/food manufacturing plant is about 30 kilometres. It is assumed that these costs correspond to a bus that has enough seats for 50 pupils plus teachers and additional support staff, if applicable. This corresponds to a total cost of €8.31 per pupil. (c) See country study (Annex 1).

4.2.3 Benefits of policy option 1

The benefits of "Food, Nutrition and the Environment" education would mainly accrue to children and more generally to the society. Benefits identified in the course of our research relate to:

- Adoption of healthier diets by children (children/society);
- Reduction in negative environmental impacts of food production and consumption (society);
- Improvement of agricultural literacy; academic outcomes, and social and life skills of children (children/society); and
- Improvement of image of agricultural and food sector and increased interest of children in this sector (food producers/society).

The significance of these benefits varies with respect to several factors, which are presented in the following table, together with a detailed description of the benefit type.

Table 28. *Benefits identified for policy option 1: Education measures*

Benefit type	Description	Factors influencing benefit	Benefit accruing to	Significance of benefit[a]	Time-frame[b]
Adoption of healthier diets by children	Previous research found that educational programmes can solely be effective in stimulating a healthy diet among children and adolescents.[c] For example, the experience of school gardens can result in increased consumption of fruits and vegetables as well as increased vitamin A, vitamin C, and fibre intake among children.[d] Previous research has also shown that the experience of school gardens increases the willingness to taste vegetables and the variety of vegetables eaten.[e]	- Number of children benefiting from "food, nutrition and the environment" education - Financial resources available for "food, nutrition and the environment" education - Interest in subject by teachers/heads of schools/parents of pupils/public authorities	Children /society	Significant (+++)	Immediate to mid-term
Reduction in negative environmental impacts of food production and consumption	As suggested by stakeholders interviewed, children who receive "food, nutrition and the environment" education are more aware of the negative environmental impacts of food production and consumption. They may adopt food purchasing patterns that limit these impacts in adulthood.	As above	Society	Minor to significant (++ to +++)	Long term
Improvement of agricultural literacy of children	An increasing number of studies show that school gardens increase agricultural literacy and knowledge of the food chain.[f] Previous research also revealed that school gardening has positive impacts on environmental attitudes (defined as "active involvement with the environment and concern about the environment").[g]	As above	Children /society	Significant (+++)	Immediate to mid-term
Improvement of academic outcomes	School gardening is found to have positive impacts on academic outcomes (including in mathematics and languages). [h]	As above	Children /society	Significant (+++)	Mid- to long term
Improvement of social and life skills of children	School gardening contributes to the social development of children[h] including the development of life skills such as team working and self-esteem.[I,j]	As above	Children /society	Significant (+++)	Immediate to mid-term

Improvement of image of agricultural and food sector and increased interest of children in this sector	Education on "Food, Nutrition and the Environment" can contribute to improving the image of the food industry, the agricultural sector and the catering business.	As above	Food producers /society	Minor to significant (++ to +++)	Immediate to mid-term

Source: Civic Consulting (stakeholder interviews and desk-based research; see Annex 5).
Notes: (a) The significance of the benefits identified may vary depending on the indicated factors; (b) Refers to the duration necessary for the benefit to materialise; (c) Van Cauwenberghe, 2010; (d) McAleese and Rankin, 2007; (e) Ratcliffe at al., 2009; (f) Sigman, 2012; (g) Skelly and Zajicek, 1998; (h) Williams and Dixon, 2013; (i) Robinson et al., 2005; (j) Waliczek et al., 2000.

4.3 POLICY OPTION 2: MANDATORY ENVIRONMENTAL LABELLING OF FOOD PRODUCTS

Policy option 2 originally focused on the *introduction of an EU-wide mandatory labelling scheme of the carbon footprint of food products*.[75] However, stakeholders interviewed in the three pilot countries emphasised that carbon footprint labelling would be too narrow and a multi-criteria environmental labelling (which considers several environmental criteria, such as water use and biodiversity, in addition to carbon footprint) would be preferred. For example, while grazing-based beef and lamb production result in more GHGe than intensive based meat production systems, it also plays an important role in biodiversity conservation.[76] In addition, grazing-based meat production systems enable carbon sequestration in pastureland, natural grassland and in trees in pastures, which compensates part of the increase.[77] In the course of the study, it was therefore decided to reformulate the policy option as follows:

Policy option 2 concerns the introduction of an EU-wide mandatory environmental labelling of food products.

4.3.1 Rationale of policy option 2

Results of a recent Eurobarometer survey on attitudes of Europeans towards building the single market for green products[78] show that 44% of EU citizens know little or know nothing about the environmental impact of the products they buy and use. On average, Europeans see environmental impact as about as important as price. They are generally willing to pay somewhat more for products if they are confident that they are environmentally-friendly (77%). However, the same Eurobarometer survey also indicates that six out of ten EU citizens think that current product labels do not provide enough information about their environmental impact (59%), with half who think the labels are not clear (48%) and one in ten do not know about the existence of product labels that provide information on environmental impact (11%).

Results of a Flash Eurobarometer survey from 2009 on Europeans' attitudes towards the issue of sustainable consumption and production[79] indicate that more than 7 in 10 (72%) EU citizens consider that a label indicating a product's carbon footprint should be mandatory in the future.

[75] In this context "Food products" refer to processed food products and where relevant drinks.

[76] See for example, Swedish Environmental Protection Agency, 2011.

[77] Previous research indicates that carbon sequestration by pastures could compensate between 25% and more than 50% of the GHGe of grazing-based beef production (Peyraud, 2013).

[78] Flash Eurobarometer 367. 2013. Attitudes of Europeans towards building the single market for green products.

[79] Flash Eurobarometer 256. 2009. Europeans' attitudes towards the issue of sustainable consumption and production.

The information collected in France confirms the expectations of consumers at EU level. For example, 91% of respondents to a survey conducted in the framework of an experiment of environmental labelling in France (see country study, Annex 1) stated that they are "very concerned about the environmental impact of products."[80] Another survey conducted in this country in 2011 showed that 66% of consumers in France want information on the environmental impact of their purchases.[81] However, 62% of people in this country consider that "sustainable" products are not easily/quickly identifiable[82] and 54% would like to have a wider choice of products that are environmentally friendly.[83]

Although these consumer surveys did consider products in general and not specifically environmental labelling of food, their results suggest a strong need and demand of consumers for more information on the environmental impacts of the products they purchase, and this, of course, includes food products.

Concerning the effects of labelling of environmental impacts of food products on food purchasing patterns, previous scientific research has shown that this type of labelling can lead to a decrease in consumption of food with high environmental impacts. For example, an experiment conducted in supermarkets in Australia has shown a decrease in consumption of food labelled as having high environmental impacts as a result of carbon labelling.[84] Research conducted in France has revealed that environmental information on products can encourage consumers to choose those that are the most environmentally friendly.[85]

However, environmental labelling of food products may only be effective in changing food-purchasing patterns of those who are already environmentally conscious, as suggested by previous scientific research.[86] This was also emphasised by several stakeholders interviewed who were of the view that most consumers do not pay attention to the labelling information on the food products that they buy.

Similar effects on consumption patterns have been observed in the field of nutritional labelling. For example, previous research is this field has revealed that nutritional labelling is mainly used by educated or sensitized populations.[87] In addition, a scientific review of past assessments of the impact of nutritional labelling on food intake in the general population did not point to conclusive results in terms of

[80] Ministère de l'Écologie, du Développement durable et de l'Énergie, 2013.

[81] Ethicity, 2011.

[82] See footnote 81.

[83] Hoibian, 2010.

[84] Vanclay et al, 2011.

[85] Bertrandias, 2012.

[86] Bertrandias, 2012.

[87] INRA, 2010.

healthier purchasing choices. Studies reviewed found either a positive or neutral impact of nutritional labelling on dietary intakes.[88]

The introduction of an EU-wide mandatory environmental labelling of food products would induce costs and benefits accruing to food producers, public authorities and the consumers/society. The following sub-sections separately consider these costs and benefits if this option were implemented.

4.3.2 Costs of policy option 2

The costs resulting from the introduction of an EU-wide mandatory environmental labelling of food products would mainly accrue to food producers and public authorities. Costs identified in the course of our research relate to:

- Costs for familiarisation with and understanding of labelling requirements (food producers);
- Costs of collecting data and modelling impacts of labelled products (food producers, and public authorities, if they support this process through provision of centralised data);
- Costs of communicating information on environmental impacts to consumers (food producers, public authorities); and
- Costs of control of accuracy of environmental information provided to consumers (public authorities).

No direct costs for consumers were identified for this option. The significance of these costs varies with respect to several factors, which are presented in the following table, together with a detailed description of the cost type and relevant information collected through the country studies and additional desk-based research.

[88] Capacci et al., 2012

Table 29. *Costs identified for policy option 2: EU-wide mandatory environmental labelling of food products*

Cost type	Description	Factors influencing cost	Cost accruing to	Cost item	Significance of cost [a]	One-off /recurring cost
Costs for familiarisation with and understanding of labelling requirements	Businesses need to become familiar with the new information obligation if environmental labelling becomes mandatory. Previous research in the UK found that costs attributed to familiarisation and understanding of food regulations have been estimated to account for 13% of all administrative costs accruing to businesses in this country as a result of these regulations.[b] In Denmark, these costs have been estimated to contribute to 5% of the total administrative burden associated with the food regulations.[c]	- Prior involvement of businesses in environmental labelling initiatives	Food producers	Time spent on getting familiarised and understanding labelling requirements	Minor (€€)	One-off
Costs of collecting data and modelling impacts of labelled products	Costs for businesses of collecting relevant data and modelling environmental impacts of food products vary significantly depending on whether they receive technical support from public authorities. The results of an environmental labelling experiment carried out in France (including in the food sector) suggest that costs of environmental labelling vary between tens of euros (with technical support from public authorities) to hundreds of euros per product (without technical support from public authorities), assuming that more than 50 products are labelled. Provision of generic data via public databases significantly reduces data collection efforts and costs for businesses. If such databases are available, time spent on collecting data to determine relevant environmental impacts is reduced to about 20 minutes per product, according to the results of the experiment of environmental labelling in France.[d, e] The existence of several methods to measure environmental impacts can lead to additional costs for	- Provision of technical tools by public authorities - Availability of commonly agreed methodology at EU level	Public authorities	Developing database with generic data on environmental impacts	Significant (€€€) (only accrue if database provided)	One-off
				Updating database	Minor (€€) (only accrue if database provided)	Recurring
			Food producers	Using database for labelling environmental impacts of food products	Minor (€€) (if database with generic data on environmental impacts provided by authorities)	One-off (per product)

	companies trading across borders as they might need to measure their performance according to diverging methods. A commonly agreed methodology to measure the environmental impacts of food products at EU level can prevent these costs to materialise.					
Costs of communicating information on environmental impacts to consumers (cost of labelling)	Costs of communicating information on environmental impacts to consumers vary depending on the means of communication used. Adding an environmental label on the product's package creates higher costs than providing information on a remote medium (e.g. on websites, for example via QR codes and barcodes, or on the shelves in stores), as highlighted in the evaluation report of the results of the experiment of environmental labelling in France.[(d)] If information is added on the package, allowing an adequate transition period for the introduction of the new environmental label significantly decreases costs for businesses. For example, over a 3-year period, 80% of businesses introduce labelling changes as part of their normal business operation, as indicated in the impact assessment report of the European Commission on general food labelling issues.[(c, f)] The provision by public authorities of a template for the presentation of environmental impacts can further reduce costs for businesses, as suggested by the results of the experiment on environmental labelling in France.[(d)] Varying national requirements for the content and presentation of environmental information create additional costs for businesses trading across borders. Harmonisation of the Community approach to environmental labelling can decrease costs for businesses trading across borders as they do not need to accommodate their labelling to different approaches at Member State level.	- Means used to convey information to consumers - Duration of transition period for introduction of new environmental label - Provision by public authorities of a template for presentation of environmental impacts - Frequency of product composition changes that affect environmental impacts	Food producers	Adding environmental label on package	Minor (€€) (if transition period provided)	One-off (per product)
			Public authorities	Creating harmonised labelling scheme for environmental impacts of food products at EU level	Significant (€€€)	One-off

Costs of control of accuracy of environmental information provided to consumers	Control of information provided to consumers on environmental impacts of food products ensures credibility of the labelling and a level playing field between businesses. If environmental labelling is mandatory, it is likely that its implementation is controlled by public authorities. In the case of mandatory nutritional labelling, none of the bodies interviewed in the framework of an impact assessment of the introduction of mandatory nutritional labelling in the EU expressed concern at the potential burden on control authorities of moving to mandatory nutritional labelling.[(g)] Due to the importance of corporate and brand images for businesses, cases of intended deceptive or misleading labelling are likely to remain rare. However, incorrect environmental labelling could relate to calculation errors or application of unsuitable calculation methods. In this context, provision of tools by public authorities to calculate environmental impacts of food products can prevent errors and facilitate controls. The availability of central database also allows for the comparison of results between businesses, according to the conclusion of the evaluation report on the experiment on environmental labelling in France. [(d)] A commonly agreed methodology to measure the environmental impacts of food products at EU level would facilitate control of the environmental labelling information provided by businesses.	- Provision of technical tools by public authorities - Availability of central database - Number of data inputs	Public authorities	Controlling accuracy of labelling information	Minor (€€) (if database with generic information on impacts available)	Recurring

Source: Civic Consulting (stakeholder interviews and desk-based research).

Notes: (a) The significance of the costs identified may vary depending on the indicated factors; (b) Foods Standards Agency, 2006; (c) European Commission, 2008; (d) Ministère de l'Écologie, du Développement durable et de l'Énergie, 2013; (e) Figures include cost of communicating information on environmental impacts to consumers. If only one product is labelled costs vary between €1,000 per product (with technical support) to up to €20,000 (without technical support). Collecting data can take a day for the first product labelled but time spent on this task decreases rapidly once environmental labelling has been established for several products and users are familiar with the technical tools (Ministère de l'Écologie, du Développement durable et de l'Énergie. 2013); (f) Reasons for label change include changes in regulation, marketing reasons, product reformulation and recipe changes, and adding voluntary inclusion of new information, life cycles of a label may range from a few months for branded products with a high turnover such as cereals or soft drinks, or they might be a few years for niche products and commodity products such as sugar, salt or flour; (g) See European Advisory Services EAS, 2004. The European Commission has commissioned a study untitled "Investigating options for different compliance systems for Product Environmental Footprint (PEF) and Organisation Environmental Footprint (OEF) declarations" which will define and characterise various options for compliance systems/mechanisms and assess the estimated average costs of selected options. However, the results of the study were not available at the time of writing.

4.3.3 Benefits of policy option 2

The benefits resulting from the introduction of an EU-wide mandatory environmental labelling of food products would mainly accrue to food producers, consumers and more generally to society. Benefits identified in the course of our research relate to:

- Decrease in consumption of food with high environmental impacts (consumers/society);
- Health benefits (consumers/society);
- Identification and achievement of cost savings (food producers);
- Reduction in environmental impacts of food (consumers/society, food producers);
- Better understanding of environmental impacts of food products (food producers); and
- Source of competitive advantage (food producers).

The significance of these benefits varies with respect to several factors, which are presented in the following table, together with a detailed description of the benefit type and relevant information collected through the country studies and additional desk-based research.

Table 30. *Benefits identified for policy option 2: EU-wide mandatory environmental labelling of food products*

Benefit type	Description	Factors influencing benefit	Benefit accruing to	Significance of benefit[(a)]	Time-frame[(b)]
Decrease in consumption of food with high environmental impacts	EU-wide mandatory environmental labelling of food products may only be effective in changing food-purchasing patterns of those who are already environmentally conscious, as suggested by the scientific literature.[(c)]	- Design, size and place of environmental label on product and information provided - Extent to which consumers are aware of the label and understand it - Extent to which consumers switch to food with lower environmental impacts	Consumers /society	Negligible to significant (+ to +++) (depending on extent to which consumers change consumption patterns in response to labelling)	Mid- to long term
Health benefits	Environmental labelling of food products can encourage environmentally conscious consumers to switch to more environmentally sustainable diets. Academic research has shown that climate change and public health dietary goals are aligned. For example, a more sustainable diet could delay or avert a significant number of deaths in the UK.[(d)] Reduction of consumption of red and processed meat decreases the risk of coronary heart diseases, diabetes mellitus and colorectal cancer.[(e)]	As above	Consumers /society	Negligible to significant (+ to +++) (depending on extent to which consumers change consumption patterns in response to labelling)	Long term
Identification and achievement of cost savings	The value of environmental labelling of food products also lies in identifying potential economic savings for food producers. The means to lower environmental impacts of products are often identical to those that allow producers to reduce production costs: reducing packaging, reducing the use of raw materials and energy, and optimizing logistics (transport, distribution, cold chain), as highlighted by the experiences of businesses who participated in the experiment of environmental labelling in France.[(f)] Benefits of environmental labelling are therefore likely to be incurred also upstream via businesses looking for cost savings.	- Level of analysis of environmental impacts conducted by businesses /required by methodological approach employed	Food producers	Minor to significant (++ to +++) (depending on production systems already in place)	Immediate

Reduction in environmental impacts of food (product reformulation)	Environmental labelling of food products encourages producers to reduce the environmental impacts of their products, which may be seen as negative by consumers. In addition, environmental labelling also stimulates producers to decrease the environmental impacts of their products to stand out from their competitors, according to the conclusion of the evaluation report on the experiment of environmental labelling in France. [f, g]	- Extent to which consumers consider environmental impacts of food products in their food purchasing decisions	Consumers /society, food producers	Significant (+++)	Immediate
Better understanding of environmental impacts of food products	Environmental labelling allows businesses to better understand the environmental performance of their entire supply chain, as revealed by the results of the experiment concerning environmental labelling in France.[f, h]	- Level of analysis of environmental impacts conducted by businesses /required by methodological approach employed	Food producers	Significant (+++)	Immediate
Source of competitive advantage	According to the conclusion of the evaluation report on the experiment concerning environmental labelling in France, labelling of environmental impacts of food products is a source of innovation, having the potential to generate productivity gains, generate savings, improve brand and corporate image. [f,i]	- Level of analysis of environmental impacts conducted by businesses /required by methodological approach employed	Food producers	Significant (+++)	Immediate

Source: Civic Consulting (stakeholder interviews and desk-based research).

Notes: (a) The significance of the benefits identified may vary depending on the indicated factors; (b) Refers to the duration necessary for the benefit to materialise; (c) Bertrandias, 2012; (d) Scarborough et al. (2012) found that a more sustainable diet (characterised by a reduction in consumption of meat and dairy products and increase in consumption of fruits, vegetables, and cereals) could delay or avert up to 36,910 death per year in the UK; (e) Aston et al., 2012; (f) Ministère de l'Écologie, du Développement durable et de l'Énergie, 2013; (g) 50% of respondents who participated in the experiment of environmental labelling in France indicated that labelling the environment impacts of their products allowed them to reduce these impacts. 59% of respondents stated that the experiment has already been positive for the brand and corporate image, and 78% consider that labelling will have these positive impacts in the future; (h) 78% of businesses that participated in the French experiment indicated that labelling was a way to better understand the environmental performance of their entire supply chain; (i) 73% of respondents who participated in the French experiment believe that this labelling represents a potential source of competitiveness.

4.4 POLICY OPTION 3: TAXATION MEASURES

Food purchasing patterns can be influenced via changes in taxation applied to specific foods, either through an excise tax or changes in the Value Added Tax (VAT).

This section presents the effects of the application of a higher tax rate on unhealthy food/food with high environmental impacts (policy option 3a) and the effects of a reduction of the VAT rate on healthy food with low environmental impacts (policy option 3b).

4.4.1 Costs and benefits of higher tax rate on unhealthy food/food with high environmental impacts (policy option 3a)

Policy option 3a concerns the *introduction of a tax on unhealthy food/food with high environmental impacts*. The following sub-sections first explore the rationale of this policy option, before separately considering the costs and benefits accruing to food producers/retailers, public authorities and the consumers/society if this option were implemented.

4.4.1.1 Rationale of policy option 3a

A tax on unhealthy food/food with high environmental impacts contributes to internalise (at least in part) external costs related to the consumption of these products. Such a tax is known as a 'Pigovian tax', which is applied to correct the social cost of an activity (such as the over-consumption of unhealthy food/food with high environmental impacts) generating negative externalities including health and environmental costs.[89]

The introduction of a Pigovian tax on unhealthy food/food with high environmental impacts can lead to a reduction in the consumption of these products and generate both health and environmental benefits, as revealed by previous scientific research and the results of our modelling of the effects of a tax on unhealthy food/food with high environmental impacts (see below). Notably, the scientific literature suggests that a tax on unhealthy food/food with high environmental impacts is likely to reduce the number of premature deaths[90] and the prevalence of obesity[91]. This tax can also lead to an increase in the incomes of producers of healthy food with low environmental impacts, as showed by the results of our modelling exercise. Finally, a tax on unhealthy food/food with high environmental impacts would also create additional tax revenues, which could be employed to finance food education programmes, support the development of sustainable food production and conduct

[89] Baumol, 1972.

[90] Briggs, 2013b; Marshall, 2000.

[91] Briggs, 2013a.

research on sustainable diets, as suggested by stakeholders interviewed in the LiveWell pilot countries.

Experiences with taxing unhealthy food exist in several EU countries, including Hungary, France, and Denmark.

Hungary introduced a tax on foods high in sugar, fat, salt and sugary drinks in September 2012. The anticipated tax revenue of €70 million per year is intended to be used to finance the health care system.[92]

In France, a tax on soft drinks of €0.07/litre was introduced in January 2012.[93] A study published in March 2012 predicted that this tax would result in an increase in retail prices of 11%, leading to a decrease in consumption of soft drinks of approximately 3.4 litres per person per year.[94] According to information reported in the press, up to 2012 consumption of cola drinks had a yearly increase of 2% but in 2012 consumption decreased by 2%.[95] However, stakeholders interviewed in this country emphasised that this small reduction in the consumption of soft drinks in France, resulting from the limited increases in the consumer prices of these products, is expected to have only modest effects on health and obesity levels.

In Denmark, a tax on saturated fat was introduced in October 2011. According to scientific research conducted in this country, this tax was predicted to lead to a decrease in consumption of the product categories most significantly affected by the tax (including butter, butter-blends, margarine and oils) by 10 %-20%.[96] However, the tax was only in force for a short period and was abolished in January 2013.[97] Notably, this tax proved to be particularly challenging to justify politically, as it was found to lead to higher food prices and an increase in the number of consumers shopping for food in neighboring countries, as well as putting Danish jobs at risk. [98] As highlighted by the Danish experience, a tax on unhealthy food/food with high environmental impacts is likely to be unpopular and politically difficult to implement. This was also emphasised by stakeholders interviewed in the three LiveWell pilot countries.

In addition, academic research suggests that a tax on unhealthy food and drinks would need to be at least at the level of 20% to have a significant effect on population health;[99] otherwise the behavioural and health impacts of a nutritional tax

[92] IEEP, 2013 and Holt, 2011.

[93] http://circulaire.legifrance.gouv.fr/pdf/2012/01/cir_34494.pdf.

[94] Bonnet et al., 2012.

[95] Le Figaro, 13 December 2012.

[96] Jensen and Smed, 2012.

[97] IEEP, 2013.

[98] http://www.bbc.com/news/world-europe-20280863.

[99] Mytton et al., 2012.

are expected to be low.[100] In the United Kingdom, a study predicted that a 20% tax on sweetened drinks would lead to a reduction in the prevalence of obesity in this country of 1.3% (around 180,000 people).[101] The Academy of Medical Royal Colleges also suggested that "for an initial one year, a duty should be piloted on all sugary soft drinks, increasing the price by at least 20%".[102]

4.4.1.2 Approach for modelling of policy option 3a

In the framework of this study, the effects of a tax on unhealthy food/food with high environmental impacts on consumption patterns, agricultural incomes and the environment were modelled using the CAPRI economic model (see Section 3.1 and Annex 3 on this model). For this aim, we assumed a simplified tax which reflects experiences with relevant taxes in selected countries (notably Denmark where a tax on saturated fat was introduced in 2011 but abolished since then), as well as the CAPRI product categories. A tax rate of 25% was applied to all products of the CAPRI categories 'meat', 'oils', 'sugar' and the products 'butter', 'cheese', 'cream' and 'concentrated milk' of the CAPRI category 'dairy products'.[103] In line with the approach followed in Denmark for the tax on saturated fat, drinking milk was exempted from taxation in our modelling.[104] The rate of 25% was selected on the basis of the review of academic literature and the experts consulted; a key consideration was that the tax rate be high enough to induce behavioural change, while avoiding extreme level of taxation. Of course, if introduced in practice, food products or categories that are considered to be unhealthy/have high environmental impacts would need to be identified with a transparent categorisation system (see below), and the categorisation system used in CAPRI is unlikely to be sufficiently detailed for this purpose. However, the aim of the modelling exercise was not to create a practical template for introducing such a tax, but rather to better understand the effects that a broadly defined tax on such food items could have.

The results of the modelling of the effects of a tax of 25% on unhealthy food/food with high environmental impacts are presented in the tables below, together with the information on the costs and benefits of introducing this tax collected through the stakeholder interviews in the LiveWell pilot countries (France, Spain, and Sweden) and the review of academic literature.

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[100] Etile, 2012.

[101] Briggs et al., 2013b.

[102] Academy of Medical Royal Colleges. 2013. "Measuring Up, The medical profession's prescription for the nation's obesity crisis".

[103] For this simplified modelling, we have taken the assumption that a tax of 25% would be applied to all products of the listed categories . However, the specific health and environmental effects of the products in these categories would need to be considered in more detail before such a tax is introduced in practice. This might lead to a lower product coverage in each category, as some products would likely be considered to be less unhealthy or induce relatively lower environmental impacts than others.

[104] This was the approach followed in Denmark concerning the tax on saturated fat (Jensen and Smed, 2012).

4.4.1.3 Costs of policy option 3a

The costs resulting from the introduction of a higher tax rate on unhealthy food/food with high environmental impacts (policy option 3a) would accrue to food producers/retailers, public authorities, consumers, and more generally society. Costs identified in the course of the research relate to:

- Definition of list of food products to which the tax is applied and definition of appropriate tax level (public authorities);
- Consumption of cheaper unhealthy food/food with high environmental impacts (food producers/retailers);
- Shift of food shopping to countries where tax is not applied (food producers/retailers, society);
- Possible lower quality of processed food (consumers/society);
- Reduction in consumer welfare (consumers);
- Overall decrease in agricultural income (food producers); and
- Political cost (society).

The significance of each cost type varies depending on several factors, which are presented in the following table, together with a detailed description of the cost type and relevant information collected through the country studies, supplemented with the results of the CAPRI modelling of the introduction of a tax of 25% on unhealthy food/food with high environmental impacts as defined above.

Table 31. *Costs identified for policy option 3a: Introduction a higher tax rate on unhealthy food/food with high environmental impacts*

Cost type	Description	Factors influencing cost	Cost accruing to	Significance of cost[(a)]	One-off /recurring cost
Definition of a list of food products to which the tax is applied and definition of appropriate tax level	The introduction a higher tax rate on unhealthy food/food with high environmental impacts necessitates the establishment of a list of food products by public authorities to which the tax increase is applied as well as the appropriate magnitude of this increase in view of health and environmental objectives. The definition of the relevant food products could be facilitated by the on-going work at EU level on methodologies to establish environmental impacts of food products (Product Environmental Footprint, PEF). Once these are established, the appropriate tax level could be defined through the use of modelling tools.[(b)]	- Availability of agreed methodology to define environmental impacts of food products - Availability of modelling tools to assess effects of tax on the environment and health	Public authorities	Minor (€) (if technical tools are available)	Recurring (regular updating of the list)
Consumption of cheaper unhealthy food/food with high environmental impacts	A tax on unhealthy food/food with high environmental impacts can produce adverse incentives: consumers may switch to cheaper food products rather than change the quantity of unhealthy food/food with high environmental impacts purchased. For example, a tax on meat may result in an increase in consumer demand for cheaper meat of worse quality.	- Extent to which consumers change their food purchasing patterns - Consumer awareness of environmental impacts of food products purchased	Food producers /retailers	Minor to significant (€€ to €€€) (depending on extent to which consumers change consumption patterns in response to the tax)	Recurring

	This could raise concerns in terms of animal welfare and health, notably by favouring intensive production systems in the view of a stakeholder interviewed. An econometric analysis of the tax on saturated fat in Demark found shifts in demand from high-price supermarkets towards low-price discount stores.[(c)]		Society	Minor to significant (€€ to €€€) (depending on extent to which consumers change food purchasing patterns in response to the tax)	Recurring
Shift of food shopping to countries where tax is not applied	The introduction of a tax on unhealthy food/food with high environmental impacts in some Member States but not in others can lead consumers near borders to shop for food in countries where the tax is not applied, as observed in Denmark following the introduction of a tax on saturated fat in 2011 (but abolished since then).[(d)] Harmonisation of this tax at the EU level could ensure fair competition between businesses across Member States, although in this case a shift of food shopping to neighbouring non-EU countries may occur.	- Level of harmonisation of the tax in the EU	Food producers /retailers	Minor to significant (€€ to €€€) (depending on extent to which consumers near borders shop their food in other countries in response to the tax)	Recurring
Possible lower quality of processed food	The introduction of a tax on unhealthy food products may lead to the use of lower quality raw materials by some food producers to limit the price increase for consumers, as suggested by stakeholders interviewed.	- Extent to which producers change the formulation of their products as response to the tax - Extent to which consumers change food consumption patterns - Consumers' awareness of health impacts of processed food products purchased	Consumers /society	Minor to significant (€€ to €€€) (depending on extent to which producers change product formulation and consumers their consumption patterns)	Recurring

Reduction in consumer welfare	According to the results of the CAPRI modelling, the introduction of tax of 25% on selected unhealthy food/food with high environmental impacts (see above) would result in a loss in consumer welfare of €115 billion compared to the reference scenario (as the decline in consumption of taxed items is only compensated by additional consumption of untaxed food – such as cereals, other plant products, other animal products – to a moderate degree). A tax on unhealthy food/food with high environmental impacts would impact the households with the lowest income the greatest, as low-income households spend a greater proportion of their income on food than wealthier households (i.e. the tax is economically regressive).[(c, e)]	- Extent to which low-income households change their food purchasing patterns - Redistribution of tax revenues (e.g. through programmes promoting healthy and sustainable diets)	Society (low income households)	Significant (€€€) (assuming a tax of 25% on unhealthy food/food with high environmental impacts; losses in consumer welfare could be reduced through use of tax revenues)	Recurring
Overall decrease in agricultural income	The results of the CAPRI modelling indicate that EU agricultural income would decrease by €7 billion in total if a tax of 25% on unhealthy food/food with high environmental impacts is introduced, compared to the expected value of agricultural income under the reference scenario in 2020 (which assumes a continuation of the current food consumption patterns). For example, agricultural revenues associated with the production of sugar, cow and buffalo milk and meat are expected to decrease as a result of a switch to healthier and more sustainable diets (by -2.5%, -3.1% and -8.9%, relative to the reference scenario, respectively).[(f)] CAPRI results also show that consumer prices rise less than the full amount of the tax. This is explained by the fact that a small part of the tax burden is shifted to producers. This effect of the tax on incomes of producers was also emphasised by stakeholders interviewed who noted that retailers/processors may reduce the price paid to livestock farmers to limit the rise in the consumer price of meat resulting from the tax.	- Extent to which a switch from intensive production systems to extensive production systems occurs - Use of tax revenues (e.g. through programmes promoting the development of agricultural sector, e.g. making production systems more extensive than intensive)	Food producers	Significant (€€€) (assuming a tax of 25% on unhealthy food/food with high environmental impacts)	Recurring

Political cost	A tax on unhealthy food/food with high environmental impacts can be politically difficult to implement in the current economic context, as emphasised by stakeholders interviewed.	- Extent to which consumers accept to pay higher prices for unhealthy food /food with high environmental impacts - Consumer awareness of environmental /health impacts of food products purchased	Society	Minor to significant (€€ to €€€) (depending on level of consumer acceptance for the tax when introduced)	One-off

Source: Civic Consulting (stakeholder interviews and desk-based research; see Annex 7).

Notes: (a) The significance of the costs identified may vary depending on the indicated factors; (b) A three-year testing period started in November 2013 to develop Environmental Footprint (EF) product- and sector-specific rules through a multi-stakeholder process based on a number of pilots. The Commission has recently issued an open call for volunteers to undertake pilots related to food, feed, drinks, packaging for food, fertilisers, and catering services. The pilots will start working by 1st June 2014 and the work is expected to be completed by 31 December 2016. The objectives of the EF pilot phase are: (1) To set up and validate the process of the development of product group-specific rules (Product Environmental Footprint Category Rules – PEFCRs), including the development of performance benchmarks; (2) To test different compliance and verification systems, in order to set up and validate proportionate, effective and efficient compliance and verification systems; and (3) To test different business-to-business and business-to-consumer communication vehicles for Product Environmental Footprint information in collaboration with stakeholders. The PEF/OEF methods aim at measuring multiple environmental impacts beyond carbon footprint (see http://ec.europa.eu/environment/eussd/smgp/product_footprint.htm); (c) Jensen and Smed, 2012; (d) The introduction of the tax on saturated fat in Demark led consumers near borders to shop food in Sweden and Germany (see: The Economist. Denmark's food taxes. A fat chance. The Danish government rescinds its unwieldy fat tax. November17 2012); (e) For example, budget for food represents up to 50% of the total budget of households with the lowest income, whereas it only accounts for 15% of the average budget of households in France (INRA, 2010); (f) According to the results of the CAPRI modelling, fat rich products experience declining producer prices whereas producer prices of other dairy products increase as a result of the introduction of the tax. Consequently, production of dairy products shifts away from the production of items rich in fat towards the production of less fat dairy products. Even though the producer prices of less fat dairy products (fresh milk products) are increasing (due to the higher demand for these products), they are still lower per ton of product weight than those for fat rich items (cheese, butter). The average producer price of dairy products in the EU therefore declines, but not only because of the producer price drop for fat rich food items, but also because of the higher proportion of cheaper dairy products (fresh milk products) in the total amount of dairy products produced in the EU.

4.4.1.4 Benefits of policy option 3a

The table below provides an overview of the benefits of introducing a tax on unhealthy food/food with high environmental impacts, based on the information provided by stakeholders interviewed and findings of previous research. Benefit types identified in the course of our research include:

- Reduction in consumption of unhealthy food/food with high environmental impacts (consumers/society);
- Health benefits (consumers/society);
- Reduction of agricultural GHGe (society);
- Reduction in overall surplus of the nitrogen balance (society); and
- Additional tax revenues (public authorities).

The significance of each benefit type varies depending on several factors, which are presented in the following table, together with a detailed description of the benefit type and relevant information collected through the country studies and desk-based research.

Table 32. *Benefits identified for policy option 3a: Introduction a higher tax rate on unhealthy food /food with high environmental impacts*

Benefit type	Description	Factors influencing benefit	Benefit accruing to	Significance of benefit[(a)]	Time-frame[(b)]
Reduction in consum-ption of unhealthy food/food with high environmen tal impacts	The CAPRI modelling of the effects of the introduction of a tax of 25% on unhealthy food/food with high environmental impacts shows that calorie intakes from the consumption of fat dairy products (butter, cheese, cream and concentrated milk), oils, sugar and meat are reduced by -4.4%, -4.8%, -5.2% and -6.3%, relative to the reference scenario (which assumes a continuation of the current food consumption patterns until 2020), respectively.[(c)]	- Level of tax - Extent to which consumers reduce their consumption of unhealthy food/food with high environmental impacts - Consumer awareness of environmental impacts of food purchased	Consumers /society	Significant (+++) (assuming a tax of 25% on unhealthy food/food with high environmental impacts)	Immediate
Health benefits	A tax on unhealthy food/food with high environmental impacts is likely to reduce the number of premature deaths[(d)] and the prevalence of obesity, as indicated by the scientific literature.[(e)] Low-income households suffer from a greater prevalence of obesity, as revealed by health surveys conducted in the LiveWell pilot countries.[(f)] Low-income households are also more likely to be sensitive to price changes as they spend a greater proportion of their income on food. The benefits of a tax on unhealthy food/food with high environmental impacts are therefore likely to be progressive in nature.[(g)]	- Level of tax - Extent to which consumers reduce their consumption of unhealthy food - Consumer awareness of health impacts of food consumed	Consumers /society	Minor to significant (++ to +++) (depending on extent to which consumers change their food purchasing patterns in response to the tax)	Mid- to long term
Reduction of agricultural GHGe	According to the results of the CAPRI modelling, the introduction of a tax of 25% on unhealthy food/food with high environmental impacts leads to a total reduction in agricultural GHGe from the EU of 1.1%, relative to the reference scenario. The introduction of this tax also results in a decrease in agricultural GHGe from third countries (-0.1%), leading to a total reduction of 0.2% in global agricultural GHGe (compared to the reference scenario).	- Level of tax - Extent to which consumers reduce their consumption of food with high environmental impacts - Consumer awareness of environmental impacts of food purchased	Society	Significant (+++) (assuming a tax of 25% on unhealthy food/food with high environmental impacts)	Immediate

Increase in income for producers of healthy food with low environmental impacts	The results of the CAPRI modelling of the effects of the introduction of a tax of 25% on unhealthy food/food with high environmental impacts indicate that agricultural revenues associated with the production of some untaxed products, including tomatoes, other vegetables and eggs increase as a result of the introduction of the tax (+0.2%, +2.7%, and +4.7% relative to the reference scenario, respectively).	- Level of tax - Extent to which consumers reduce their consumption of food with high environmental impacts - Consumer awareness of environmental impacts of food purchased	Some food producers (e.g. producers of vegetables)	Significant (+++) (assuming a tax of 25% on unhealthy food/food with high environmental impacts)	
Additional tax revenues	The introduction of a tax on unhealthy food/food with high environmental impacts creates additional tax revenues. The results of the CAPRI modelling indicate that the public agricultural budget would increase by €118 billion as a result of the introduction of a tax of 25% on unhealthy food/food with high environmental impacts. These additional revenues more than compensate the loss in consumer welfare of €115 billion resulting from the tax.(h) Stakeholders interviewed suggested that revenues of the tax could be invested in GHGe mitigation measures in the agricultural sector (including support for the development of sustainable food production) and initiatives promoting the adoption of healthier diets. The additional revenues could also be used to finance research in the field of sustainable and healthy diets and education programmes to encourage the adoption of these diets by children. Finally, tax revenues could be employed to offset the regressive character of the tax (as it would impact the low income households the greatest; see Table 31).	- Level of tax - Number of food products affected by the tax - Extent to which the tax changes food purchasing patterns	Public authorities	Significant (+++) (assuming a tax of 25% on unhealthy food/food with high environmental impacts)	Immediate

Source: Civic Consulting (stakeholder interviews and desk-based research; see Annex 7).
Notes: (a) The significance of the benefits identified may vary depending on the identified factors; (b) Refers to the duration necessary for the benefit to materialise;
(c) However, for dairy as a whole the shift in consumption from fat rich dairy products (butter, cheese, cream and concentrated milk) to other dairy products is such that the overall change in food energy from dairy is nearly zero, according to the results of the CAPRI modelling. (d) For example, incorporating the societal cost of GHGe into the price of foods could save 7,770 lives in the UK each year (Briggs et al., 2013b). Marshall (2000) has shown that by extending VAT (i.e. from 0% to 17.5%, the standard VAT rate in the UK at the time of this research) to the main sources of dietary saturated fat in the UK (whole milk, butter, and cheese), between 900 and 1,000 premature deaths a year might be avoided in this country; (e) For example, research conducted in the United Kingdom has shown that a 20% tax on sweetened drinks would lead to a reduction in the prevalence of obesity of 1.3% (around 180,000 people) in this country (Briggs et al., 2013a); (f) See country studies (Annex 1); (g) Marshall, T. Exploring a fiscal food policy: the case of diet and ischaemic heart disease. BMJ. 2000 January 29; 320(7230): 301–305; (h) In Denmark, the anticipated tax revenue from the tax on saturated fat (introduced in 2011 but abolished since then) was 200 million/year (IIEP, 2013).

4.4.2 Costs and benefits of reducing VAT rate on healthy food with low environmental impacts (policy option 3b)

Policy option 3b concerns the *reduction of the VAT rate applicable to healthy food with low environmental impacts.*[105] The following sub-sections first explore the rationale of this policy option, before separately considering the costs and benefits which would accrue to food producers, public authorities and the consumers/society if this option was implemented.

4.4.2.1 Rationale of policy option 3b

According to the results of a representative EU-wide survey on attitudes of Europeans towards building the single market for green products,[106] European citizens agree that lower taxes on environmentally-friendly materials and products can play a role in reducing people's impact on the environment, with over eight out of ten respondents answering positively (83%).[107]

Intake of fruit and especially vegetables is well below the WHO's recommendation of 400 grams per day for children and young people in almost all Member States.[108] Price is one important factor limiting the consumption of these products. A report published by the National Institute of Agronomic Research in France (INRA) indicates that the most calorie-dense foods are also the cheapest (for example, 1 kilocalorie of tomato is 7 times more expensive than a kilocalorie of vegetable oil).[109]

In this respect, VAT differentiation is one possible instrument to decrease the relative prices of healthy food with low environmental impacts and encourage higher consumption of these products.[110] Notably, an experimental economic study conducted in France showed that a decline in prices of fruits and vegetables improves the nutritional quality of food choices.[111] Health benefits are expected to be stronger if the VAT rate on healthy food with low environmental impacts is combined with a tax on unhealthy food/food with high environmental impacts (see policy option 3a above), as suggested by previous research. For example, a study which analysed the effects of changes in taxation in Denmark using an economic model found that combinations of tax reductions on fibres or fruits and vegetables on the

[105] It could also be considered to increase the VAT rate on unhealthy food/food with high environmental impacts. The effects of this fiscal measure would be similar to those described in Section 4.4.1 on the introduction of a tax on unhealthy food/food with high environmental impacts.

[106] Flash Eurobarometer 367. 2013. Attitudes of Europeans towards building the single market for green products.

[107] 83% of respondents answered 'Yes' to the question "Do you think that lower taxes on environmentally-friendly raw materials and products can play a role in reducing our impact on the environment in (OUR COUNTRY)?

[108] European Commission, 2014a.

[109] INRA, 2010.

[110] It is expected that a VAT change is fully passed through to the consumer (see IVM et al, 2008).

[111] INRA, 2010.

one hand, and increased taxes on the most unhealthy fats on the other hand, have positive effects on the intake of fruits and vegetables while at the same time reducing the intake of fats and sugar.[112] Similarly, another modelling study based on household data from the expenditure and food survey in the United Kingdom highlighted that a tax on saturated fat combined with a subsidy on fruits and vegetables is effective in moving intakes of fruits and vegetables to within the recommended ´five-a-day' region.[113] Empirical simulations based on food intake surveys in the US indicate that a 1% decrease in the average price of all fruits and vegetables could prevent 6,733 cases of coronary heart disease and 2,946 ischemic strokes in this country (for a total of 9,680 prevented cases of disease).[114]

However, a reduction in the price of healthy food with low environmental impacts alone might not be sufficient to move dietary patterns towards healthier and more sustainable diets. Practical considerations were highlighted in the country interviews as having a major influence on consumer choice of food. Consumers might prefer to cook meat or re-heat ready meals rather than cook vegetables, as this is often considered to be easier and less time-consuming. In addition, consuming/cooking healthy products with low environmental impacts (including fruits and vegetables) may be unfamiliar for some consumers. In this respect, an interviewee in France pointed to the experience of food banks which suggests that even if food aid recipients are encouraged to choose food baskets which correspond to a balanced diet, they tend not to select many fruits and vegetables.

Foodstuffs are among the goods and services listed under Annex III of the VAT Directive 2006/112/EC which may be subject to reduced rates of VAT.[115] As a result, food is subject to a wide range of VAT rates in different EU countries. Table 33 below presents the information collected on standard VAT rates, the VAT rates applicable to foodstuffs, and the VAT rates applicable to fruits and vegetables in the Member States at the moment. The analysis of these rates indicates the following:

- The countries applying a standard VAT rate on all or almost all food products are Bulgaria, Estonia, Slovakia, Latvia, Romania, Lithuania, Croatia and Denmark (from 20% in Bulgaria, Estonia, and Slovakia to 25% in Croatia and Denmark);
- The other countries apply a reduced VAT rate on some or all food products (between 0% in Ireland, Malta, and the United Kingdom and 18% in Hungary); and
- Several countries apply more than one reduced rate on food.

[112] Jensen and Smed, 2007.

[113] Tiffin and Arnoult; 2011.

[114] Cash, 2005.

[115] Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax.

The table also shows that half of the EU countries apply VAT rates on fruits and vegetables of 12% or higher. A VAT rate on fruits and vegetables of 20% or more applies in eight of these Member States (Slovakia, Estonia, Bulgaria, Latvia, Lithuania, Romania, Croatia, and Denmark). This suggests that a reduction in the VAT rate applicable to healthy food products with low environmental impacts could have significant effects on the food purchasing patterns adopted by consumers in these countries. In contrast, effects are likely to be more limited in the other half of the Member States which apply a VAT rate of 10% or less on fruits and vegetables (and as low as 0% in Ireland, Malta, and the United Kingdom), as the potential for price reduction through reducing VAT is lower.

Table 33. *VAT rates applied in EU countries*

Source: European Commission. VAT Rates Applied in the Member States of the European Union, Situation at 13th January 2014 (see Annex 8).

MS	Standard VAT rate	VAT rates applicable to foodstuffs	VAT rate applicable to fruits and vegetables
DK	25%	25%	25%
HR	25%	5%, 13%, 25%	25%
RO	24%	9%, 24%	24%
LT	21%	21%	21%
LV	21%	21%, 12%	21%
BG	20%	20%	20%
EE	20%	20%	20%
SK	20%	20%, 10%	20%
HU	27%	18%, 27%	18%
CY	19%	15%	15%
CZ	21%	15%	15%
FI	24%	14%	14%
EL	23%	13%	13%
SE	25%	12%, 25%	12%
AT	20%	10%	10%
SI	22%	9.5%	9.5%
DE	19%	7%, 19%	7%
BE	21%	6%, 12%, 21%	6%
NL	21%	6%	6%
PT	23%	6%, 13%, 23%	6%
FR	20%	5.5%, 10%, 20%	5.5%
PL	23%	5%, 8%, 23%	5%
IT	22%	4%, 10%	4%
ES	21%	4%, 10%	4%
LU	15%	3%	3%
IE	23%	0%, 4.8%, 13.5%, 23%	0%
MT	18%	0%	0%
UK	20%	0%, 20%	0%

A reduction of the VAT rate applicable to healthy food with low environmental impacts would induce costs and benefits accruing to food producers, public authorities and the consumers/society. The following sub-sections separately consider these costs and benefits if this option was implemented.

4.4.2.2 Costs policy option 3b

The costs resulting from a reduction of the VAT rate applicable to healthy food with low environmental impacts would mainly accrue to public authorities and society. Costs identified in the course of the research relate to:

- Definition of list of food products to which reduction in VAT rate applies;
- Decrease in tax revenues for governments; and
- Possible increase in consumption of unhealthy food/food with high environmental impacts.

No direct costs for consumers were identified for this option. The significance of these costs varies with respect to several factors, which are presented in the following table, together with a detailed description of the cost type and relevant information collected through the country studies and complementary desk-based research.

Table 34. *Costs identified for policy option 3b: Reduction in VAT rate on healthy food products with low environmental impacts*

Cost type	Description	Factors influencing cost	Cost accruing to	Significance of cost [a]	One-off /recurring cost
Definition of list of food products to which reduction in VAT rate applies	The introduction of a reduced VAT rate on healthy food with low environmental impacts necessitates the establishment of a list of eligible food products by public authorities. This could be straightforward for certain food products, such as products certified according to agreed sustainability criteria.[b] In other cases, results of ongoing work on Product Environmental Footprint (PEF) at EU level could facilitate the establishment of this list, which could be common to all Member States.[c]	- Availability of agreed methodology to define environmental impacts of food products	Public authorities	Minor (€) (if technical tools are available)	One-off
Decrease in tax revenues	A reduction in VAT rates applicable to food decreases government revenues, which was believed by stakeholders interviewed to be politically difficult to implement in the current economic context.	- Magnitude of VAT reduction - Extent to which consumers change food purchasing patterns	Public authorities	Minor to significant (€€ to €€€) (depending on extent to which consumers change food purchasing patterns)	Recurring
Possible increase in consumption of unhealthy food/food with high environmental impacts	A reduction in the VAT rate applicable to healthy food with low environmental impacts may lead to an increase in consumption of unhealthy food/food with high environmental impacts. In other words, the money saved thanks to the reduction in VAT on healthy food with low environmental impacts may be used to purchase more unhealthy food /food with high environmental impacts, as emphasised by stakeholders interviewed. In economics, this is defined as the "income effect", i.e. a change in consumption resulting from a change in real income.[e]	- Magnitude of VAT reduction - Extent to which consumers change their food purchasing patterns	Consumers /society	Minor to significant (€€ to €€€) (depending on extent to which consumers change food purchasing patterns in response to VAT reduction)	Recurring

Source: Civic Consulting (stakeholder interviews and desk-based research; see Annex 7).

Notes: (a) The significance of the costs identified may vary depending on the indicated factors; (b) IIEP. 2013. EU policy options to encourage more sustainable food choices; (c) See note (b) of Table 31; (e) See for example Capacci et al., 2012.

4.4.2.3 Benefits of policy option 3b

The benefits resulting from a reduction of the VAT rate applicable to healthy food with low environmental impacts would mainly accrue to some food producers, public authorities and consumers/society. Benefits identified in the course of our research relate to:

- Increase in consumption of fruits and vegetables (food producers);
- Health benefits (consumers/society); and
- Increase in consumer welfare (consumers).

The significance of these benefits varies with respect to several factors, which are presented in the following table, together with a detailed description of the benefit type and relevant information collected through the country studies.

Table 35. *Benefits identified for policy option 3b: Reduction in VAT rate on healthy food products with low environmental impacts*

Benefit type	Description	Variables influencing benefit	Benefit accruing to	Significance of benefit[a]	Time-frame[b]
Increase in demand of fruits and vegetables	A reduction in the price of fruits and vegetables is likely to result in an increase in their consumption. Research conducted in Denmark[c] has shown that subsidies for fruits and vegetables (e.g. in terms of reduced VAT from 25% to 12.5%) induce an increase in the consumption of these foods. Moreover, the increase in demand for fruits and vegetables would lead to an increase of the revenues of producers of these products (see Section 3.4.4). However, the influence of price reduction of fruit and vegetables on consumer purchasing patterns may be limited by practical considerations, considered to be a major influence on consumer choice of food, as emphasised by the country interviews. Consumers might prefer to cook meat or re-heat ready meals rather than cook vegetables, as this is often considered to be easier and less time consuming. Consuming/cooking healthy products with low environmental impacts (including fruits and vegetables) may be unfamiliar to some consumers.	- Magnitude of VAT reduction - Extent to which consumers change their food purchasing patterns in response to VAT reduction	Food producers (producers of fruits and vegetables)	Negligible to significant (+ to +++) (depending on effects of VAT reduction on changes in food consumption patterns)	Immediate
Health benefits	A decrease in the price of fruits and vegetables can lead to significant health benefits. For example, an experimental economic study conducted in France showed that a decline in prices of fruits and vegetables improves the nutritional quality of food choices.[d] Empirical simulations based on food intake surveys in the US indicate that a 1% decrease in the average price of all fruits and vegetables could prevent 6,733 cases of coronary heart disease and 2,946 ischemic strokes in this country (for a total of 9,680 prevented cases of disease).[e] Lower income consumers eat fewer fruits and vegetables on average. They are therefore more responsive to slight changes in their diets than individuals who consume more fruit and vegetables, because of the diminishing marginal health benefits of produce consumption.[e]	- Magnitude of VAT reduction - Extent to which consumers change their food consumption patterns in response to VAT reduction	Consumers /society	Negligible to significant (+ to +++) (depending on effects of VAT reduction on changes in food consumption patterns)	Mid- to long term

Increase in consumer welfare	As prices of fruits and vegetables decrease consumer welfare increases (assuming that the price of other food products remain the same).	- Magnitude of VAT reduction - Diet followed before the VAT reduction	Consumers	Negligible to significant (+ to +++) (depending on diet followed before the VAT reduction and magnitude of VAT reduction)	Immediate

Source: Civic Consulting (stakeholder interviews and desk-based research; see Annex 7).
Notes: (a) The significance of the benefits identified may vary depending on the indicated factors; (b) Refers to the duration necessary for the benefit to materialise; (c) Jensen and Smed, 2007; (d) INRA, 2010; (e) Cash, 2005.

4.5 POLICY OPTION 4: DEVELOPMENT OF SUSTAINABLE FOOD STRATEGIES

Policy option 4 concerns the *development of national sustainable food strategies*. The following sub-sections first explore the rationale of this policy option, before separately considering the costs and benefits if this option were implemented.

4.5.1 Rationale of policy option 4

According to the information collected, France is the only of the three LiveWell pilot countries in which a national programme for food exists ("Programme national pour l'alimentation - PNA"). This programme was launched in 2011 and considers food sustainability under the priority 'high-quality food supply'.[116]

Stakeholders emphasised in our interviews that the development of national sustainable food strategies are important and needed. Some were of the opinion that this policy option is the most important of the five options outlined in Section 4 as it forms the political basis for further actions on sustainable diets. Notably, several interviewees suggested that a common strategy on sustainable and healthy diets should be established between the relevant ministries.

Stakeholders interviewed emphasised that one important benefit of establishing a national sustainable food strategy is the learning process involved in its development. Specifically, the development of the strategy can help raise awareness of the issues related to sustainable diets among a wide range of stakeholders (including industry, environmental NGOs and ministries for health, the environment, and agriculture). National sustainable food strategies are also expected to help reduce negative environmental impacts of food production and consumption in the mid to long term. Finally, the involvement of food producers in the development of the national sustainable food strategy can help them to identify strategies for future markets in which the sustainability of food products may become increasingly relevant for consumers, but also allow them to improve their brand and corporate image and achieve cost savings.

4.5.2 Content of national sustainable food strategies

The table below presents the views of stakeholders interviewed in the three LiveWell pilot countries and at EU/international level regarding the possible content of a

[116] See: http://alimentation.gouv.fr/IMG/pdf/PNA-09022011.pdf, http://alimentation.gouv.fr/pna-signature-accords-collectifs. An evaluation of the national programme for food was conducted in 2013 (this report is not public yet). This national programme will be updated, and stakeholders are being consulted on the content of the new programme. As a result of the evaluation of the programme and the consultation of stakeholders, the priorities for action in the framework of the national programme for food will be re-defined. And thereafter the issues of sustainable development and education should take more importance. However, one stakeholder interviewed was of the opinion that sustainability of food is unlikely be taken into account as a separate subject after this revision.

national sustainable food strategy. This table suggests components that could be discussed among stakeholders in Member States during the preparation of the national strategy on sustainable food (including the three other policy options described in Sections 4.2 to 4.4 above).

These components address the various aspects of healthy and sustainable diets, such as definition of 'sustainable diet', definition of key targets, definition of key indicators to be monitored, education, labelling, taxation, introduction of a specific taxes on advertising of unhealthy food/food with high environmental impacts (e.g. television commercials), definition of use of tax revenues (if a tax is incorporated in the strategy), supporting research, recycling of nutrients, or regulation of portion size. As emphasised by stakeholders interviewed, a combination of policy measures is optimal to encourage the adoption of healthy and sustainable diets.

Table 36. *Possible content of national food strategies (as suggested by stakeholders interviewed)*

Component of strategy	Description of component
Definition of 'sustainable diet'	Strategies should include a definition of 'sustainable diet' agreed by all stakeholders (the definition could refer not only to environmental issues but also take social and economic aspects of sustainable food into account).
Definition of key targets	The strategy could define the following targets: - Target for reduction of GHGe from food (including GHGe from third countries as a consequence of imports of food products/raw materials); - Target for sustainable diets in public procurement (food supplied in public restaurants including in schools and public hospitals); - Target for the use of renewable sources of energy for food production; and - Target for food waste reduction.[(a)] National targets could be reflected in EU level targets but also translate into regional and local targets (as for example, procurements for hospitals and schools are made at the local level). Regular reports on the attainment of these targets could be helpful to monitor progress towards the adoption of more sustainable diets.
Definition of key indicators to be monitored	The definition of key indicators helps to set up policy objectives and monitor them at country/EU level. Examples of indicators suggested include meat consumption, production and trade. More generally, data on environmental impacts (both negative and positive) of food produced domestically or imported could be collected in a systematic manner. In particular health and environmental impacts of food could be analysed jointly.
Education	Education measures to ensure that school children understand the impact of food consumption on the environment (policy option 1, see Section 4.2 above) could be defined in the national strategies on food. Specifically, a bundle of measures could be considered in the strategy, including relevant lessons in the classroom, visits to farms/food manufacturing plants, the use of school gardens, cooking classes and school lunches as teaching tools.
Environmental labelling of food products	Mandatory environmental labelling of food products (Policy option 2, see Section 4.3 above) is another policy measure that could be integrated into national sustainable food strategies. Specifically, a multi-criteria environmental labelling which considers several environmental criteria, such as water use and biodiversity in addition to the carbon footprint of food products, could be considered.
Taxation	Policy option 3 (taxation measures) described in Section 4.4 above could be discussed among stakeholders during the preparation of the national food strategy. Specifically, a tax on unhealthy food/food with high environmental impacts (policy option 3a) and a reduction of the VAT rate applicable to healthy food with low environmental impacts (policy option 3b) could be considered.

Tax on advertising for unhealthy food/food with high environmental impacts	A tax on advertising (e.g. television commercials) for unhealthy food/food with high environmental impacts could be envisaged. The revenues collected through this tax could be used to finance a large scale communication campaign on healthy and sustainable food.
Definition of use of tax revenues (if option 3a is selected)	The strategy could define the use of the revenues of a higher tax rate on unhealthy food /food with high environmental impacts if policy option 3a is selected (see Section 4.4.1). For example, the additional tax revenue can be invested in GHGe mitigation measures in the agricultural sector (including for supporting the development of sustainable food production) and initiatives promoting the adoption of healthier diets. They can also be used to finance research in the field of sustainable and healthy diets and education programmes to encourage the adoption of these diets by children. Revenues of the tax could also be used to compensate for the regressive nature of the tax (as the tax would impact low-income households the greatest).
Supporting research	Supporting research to facilitate transition to healthier and more sustainable diets.
Recycling of nutrients	Strategies concerning the recycling of nutrients could be developed.
Regulation of portion sizes and formulation of ready/take-away meals	Research shows that quantities proposed to the consumer at the place of purchase can be perceived more or less consciously as an indication of the 'normal' amount to eat per meal. Therefore, an increase in portion sizes/the size of the packaging increases consumption.[(b)] Portion sizes could be reduced and ready/take-away meals could be reformulated to reduce their meat content in favour of vegetables.

Source: Civic Consulting (stakeholder interviews).

Notes: (a) Food waste reduction targets have already been defined in some countries. For example, in France, A national pact against food waste ("Pacte national de lutte contre le gaspillage alimentaire") has been launched in June 2013 in France. The aim is to halve food waste by 2025. A communication campaign on the topic was launched in December 2013 (See: http://alimentation.gouv.fr/pacte-national-lutte-antigaspillage, http://alimentation.gouv.fr/manger-c-est-bien-jeter-ca-craint; http://alimentation.gouv.fr/gaspillage-alimentaire-campagne). In Sweden, the Swedish Environmental Protection Agency proposed in December 2013 that food waste should be reduced by at least 20% by 2020 compared with 2010 level (for the entire food chain, excluding primary production; see http://www.naturvardsverket.se/Miljoarbete-i-samhallet/Miljoarbete-i-Sverige/Regeringsuppdrag/Redovisade-2013/Fem-nya-etappmal/Minskad-mangd-matavfall/). At EU level, the Roadmap to a resource-efficient Europe identified food as a key sector where resource efficiency should be improved. It announced that it will further assess how best to limit food waste throughout the food supply chain and that it will seek incentives to halve the disposal of edible food waste in the EU by 2020. The Commission is analysing in close cooperation with stakeholders, experts and EU Member States how to reduce food waste, including through the Working Group on Food Waste. The Commission has also launched an awareness raising information campaign which includes: a viral clip on food waste, "10 tips to reduce food waste" in all EU languages, and a clarification of "best before" and "use by" labels in all EU languages (see: http://ec.europa.eu/food/food/sustainability/eu_actions_en.htm). (b) See for example: http://www.bhf.org.uk/about-us/our-policies/preventing-heart-disease/portion-sizes.aspx. See also: Macdiarmid, 2013.

4.5.3 Costs of policy option 4

The costs resulting from the development of national sustainable food strategies would mainly accrue to public authorities and individual organisations (such as food producers, farmers), stakeholder organisations/citizens. Costs identified in the course of our research relate to:

- Drafting the strategy (public authorities);
- Consulting stakeholders (public authorities);
- Analysing results of consultation (public authorities); and
- Contributing to consultation (individual organisations, stakeholder organisations, and citizens).

The significance of these costs varies with respect to several factors, which are presented in the following table, together with a detailed description of the cost type and relevant information collected through the country studies.

Table 37. *Costs identified for policy option 4: Development of national sustainable food strategies*

Cost type	Description	Factors influencing cost	Cost accruing to	Significance of cost [a]	One-off /recurring cost
Drafting the strategy	Public authorities would incur costs for drafting the national sustainable food strategy. In this respect, a common EU framework for sustainable food would facilitate the development of national sustainable food strategies in the Member States.[b] In addition, regular conferences on sustainable and healthy food could be envisaged at EU level to facilitate exchange and sharing of experiences between Member States.	- Availability of a common EU framework for sustainable food - Exchange of experiences between MS	Public authorities	Minor (€€)	Recurring (regular exchanges of information)
Consulting stakeholders	The consultation of stakeholders in the framework of the national sustainable food strategy would help to identify relevant existing initiatives from which conclusions could be drawn and support the drafting of the national sustainable food strategy by public authorities. Stakeholders may be consulted for example via online questionnaires, workshops and public meetings.	- Tools used to consult stakeholders	Public authorities	Minor (€€)	One off
Analysing results of consultation	The results of the consultation on sustainable food would need to be collated and analysed. The analysis of the contributions of stakeholders would enable relevant experiences and positions of the different stakeholder groups to be identified.	- Tools used to consult stakeholders /degree of stakeholders' participation	Public authorities	Minor (€€)	One-off
Contributing to consultation	The consultation process creates costs for contributors (including for example representatives of the food industry, farmers organisations, consumer organisations, environmental organisations, experts, and citizens) in terms of time spent in answering the consultation questionnaire, attending meetings, etc.	- Tools used to consult stakeholders	Individual organisations (such as food producers, farmers)/stakeholder organisations /citizens	Minor (€€)	One off

Source: Civic Consulting (stakeholder interviews and desk-based research).

Notes: (a) The significance of the costs identified may vary depending on the indicated factors; (b) In this context, the European Commission consulted stakeholders on the issue of the "Sustainability of the Food System" (in July to October 2013). The results of this consultation were not available at the time of writing.

4.5.4 Benefits of policy option 4

The benefits resulting from the development of national sustainable food strategies would accrue to society/consumers, public authorities, and food producers. Benefits identified in the course of our research relate to:

- Raising awareness of the impacts of food consumption on the environment (consumers/society);
- Reduction in negative environmental impacts of food production and consumption (consumers/society);
- Source of competitive advantage (food producers);
- Improvement of brand and corporate image (food producers); and
- Increased efficiency of public sector activities in the area of sustainable food (public authorities).

The significance of these benefits varies with respect to several factors, which are presented in the following table, together with a detailed description of the benefit type and relevant information collected through the country.

Table 38. *Benefits identified for policy option 4: Development of national sustainable food strategies*

Benefit type	Description	Factors influencing benefit	Benefit accruing to	Significance of benefit[(a)]	Time-frame[(b)]
Raising awareness of the impacts of food consumption on the environment	The development of a national sustainable food strategy is expected to raise awareness of the impacts of food consumption on the environment among a wide range of stakeholders (notably through the consultation process), as highlighted by stakeholders interviewed in the pilot countries.	- Extent to which public authorities involve stakeholders/citizens in strategy development - Extent to which stakeholder organisations involve their members in the consultation process/work on strategy	Consumers /society	Minor to significant (€€ to €€€)	Immediate to mid-term
Reduction in negative environmental impacts of food production and consumption	The increased awareness of stakeholders of the issue of sustainable food (as a result of work on the development of national sustainable food strategies) is expected to lead to a reduction in the negative environmental impacts of food production and consumption.	As above	Consumers /society	Minor to significant (€€ to €€€)	Mid- to long term
Source of competitive advantage	Through their involvement in the development of the national sustainable food strategy, food producers may identify strategies for future markets where sustainability of food products could become more relevant for consumers.	- Extent to which food producers participate in the development of the strategy	Food producers	Minor to significant (€€ to €€€)	Mid- to long term
Improvement of brand and corporate image	The active participation of food producers in the development of the national food strategy can contribute to improving their brand and corporate image.	- Extent to which the development of the strategy is effective in raising awareness of the negative impacts of food consumption on the environment among citizens	Food producers	Minor to significant (€€ to €€€)	Immediate to mid-term
Increased efficiency of public sector activities	A strategy on sustainable food would set out the framework needed to address the challenges identified during its preparation and outline the main objectives and actions in this area. As such, it would improve the efficiency of public sector activities in the field of sustainable food.	- Extent to which the strategy is implemented	Public authorities	Minor to significant (€€ to €€€)	Immediate to mid-term

Source: Civic Consulting (stakeholder interviews and desk-based research).
Notes: (a) The significance of the benefits identified may vary depending on the indicated factors.

5 CONCLUSIONS AND RECOMMENDATIONS

This section of the report summarises our assessment of the economic viability of the adoption of sustainable diets by 2020 according to several scenarios as well as the analysis of costs and benefits of related policy options.

5.1 BACKGROUND OF THE STUDY

In a context of increasing prevalence of obesity in the EU due to unhealthy diets, coupled with the unsustainable environmental impacts of such diets, WWF-UK, the WWF European Policy Office and *Friends of Europe* initiated the LiveWell for LIFE project (LiveWell for Low Impact Food in Europe) which introduces the concept of a healthy and sustainable diet; a diet which can bring significant health benefits to EU citizens and contribute towards the reduction of greenhouse gas emissions from food. Under the first steps of this project, low carbon and healthy diets (or 'LiveWell' diets) were developed in three pilot countries (France, Spain and Sweden) which were chosen due to the variety of dietary contexts they represent and their different levels of policy readiness for adopting the LiveWell Plate's recommendations.

As a second step, this study has been conducted to assess the economic potential of the adoption of sustainable diets (diets meeting the LiveWell Plate's recommendations) by 2020 according to various scenarios as well as the economic viability of policy options to encourage their adoption (both at EU level and at the level of three specific LiveWell pilot countries, namely France, Spain and Sweden). The main methodological tools employed were in-depth desk research, country studies in the pilot countries of the LiveWell for LIFE project, interviews with key stakeholders and experts at EU and international level, modelling of the effects of a switch to healthier and more sustainable diets, and a cost-benefit analysis of selected policy options to meet the LiveWell Plate's recommendations (see Annex 2 for more details on the methodological approach employed). The key findings of this study are presented in line with the main sections of the report, i.e. we focus first on the effect of adopting diets meeting the LiveWell Plate's recommendations, followed by conclusions and recommendations of the cost-benefit analysis of the policy options proposed to encourage their adoption.

5.2 EFFECTS OF THE ADOPTION OF LIVE WELL DIETS

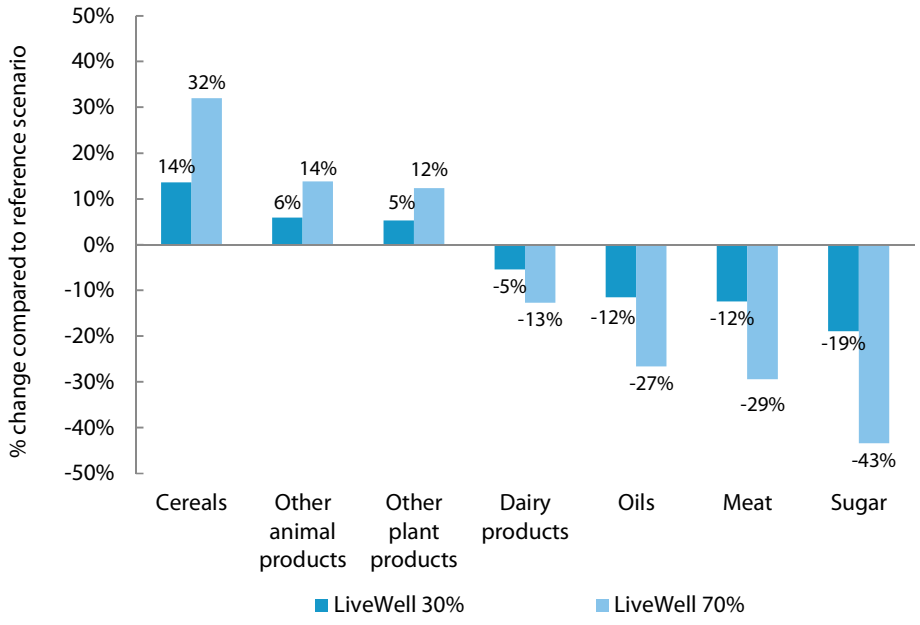
This study investigated the projected effects in 2020 of the adoption of the LiveWell Plate's recommendations by an additional 30% (LiveWell 30% scenario) and an additional 70% (LiveWell 70% scenario) of the EU population compared to the reference scenario, supported by the use of the CAPRI modelling framework. The effects that were modelled in CAPRI include (1) effects on consumption patterns; (2) effects on consumer prices; (3) market effects; (4) effects on economic welfare; and (5) effects on the environment. The effects were modelled for seven main food groups: cereals (including rice); other plant products (including fruits, vegetables, potatoes, pulses, coffee, tea, cocoa, wine, and oilseeds); meat (including beef, pork, poultry and sheep and goat meat); other animal products (including eggs, fish, and other aquatic food); dairy products (including milk and milk products such as yoghurt, butter, cheese, cream); oils (including sunflower seed, rape seed, olive, and palm oil); and sugar. In addition to these, the effects of the adoption of diets meeting the LiveWell Plate's recommendations on public health were investigated.

5.2.1 Effects on consumption patterns and markets for specific food products

Figure 21 below depicts the effects on overall EU consumption (expressed in kilocalorie per head of population) of each food group under the LiveWell 30% and LiveWell 70% scenarios relative to the reference scenario.

Figure 21. *Effects on consumption (in kilocalorie/head) of main food groups in the EU under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.

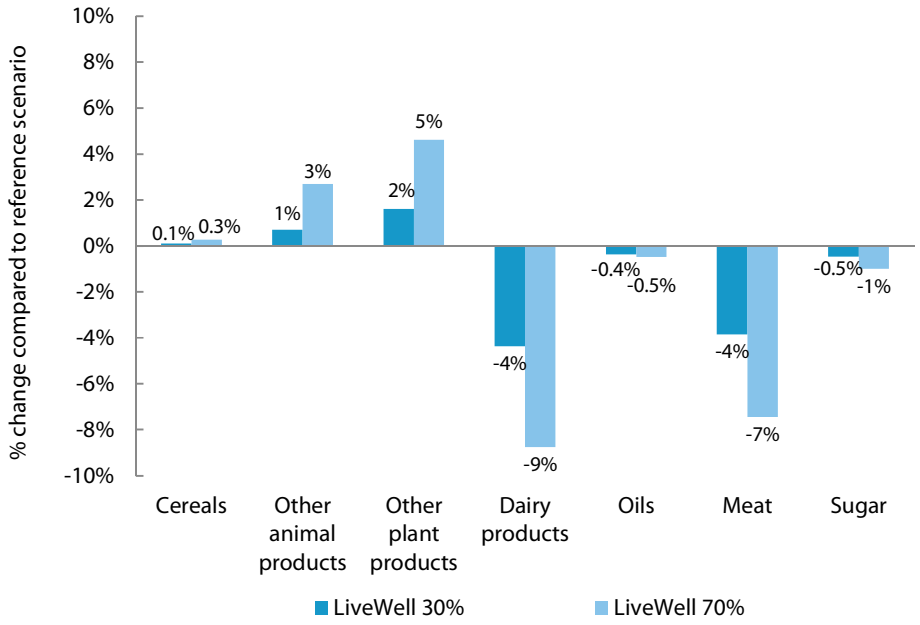


The figure above indicates that compared to the reference scenario, the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers results in increased calorie intakes from the consumption of food from the groups 'cereals',

'other plant products', and 'other animal products' while calorie intakes from the consumption of 'dairy products', 'oils', 'meat', and 'sugar' are reduced under the two LiveWell scenarios. The consumer demand shifts described above cause changes in consumer prices of main food groups, as shown in Figure 5 below.

Figure 22. *Effects on consumer prices of main food groups in the EU under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



The comparison of Figure 21 (which depicts changes in consumption) and Figure 22 (which reveals changes in consumer prices) shows that price changes match in sign with the changes in quantity under the two LiveWell scenarios relative to the reference scenario. However, the magnitude of relative price changes is usually smaller than the relative changes in quantity (note the different scaling of the axes of Figure 4 and Figure 5). In general, prices tend to decline if consumption is declining at the EU level but cross-price relationships and supply side responses, including feed demand, add complexity to the magnitude of price changes. In addition, consumer demand changes for food products in the EU trigger changes in consumer prices, but also in prices for EU producers and in quantities of food produced in the EU. Changes in EU consumers' demand also generate production changes in the rest of the world via changes in exports and imports. In the following we describe key changes in demand for each of the food products and related market effects.

- *Cereals:* Despite a sharp increase in consumer demand for cereals (including rice), consumer prices almost remain constant in comparison to the reference scenario (+0.3% in the LiveWell 70% scenario). This can be explained by declining consumer demand and producer prices for meat and dairy products under the two LiveWell scenarios which tend to curb the EU animal sector overall such that feed demand for cereals declines.

- *Meat:* The decrease in consumption of meat products following the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers results in a decrease in consumer price in 2020 under the two LiveWell scenarios. The drop in demand of EU consumers for meat also creates a significant decrease in imports (-52% under the LiveWell 70% scenario) and a strong increase in exports (+128% under the LiveWell 70% scenario) of these products compared to the reference scenario. Declining prices for meat producers in the EU also trigger some decline in production of meat in third countries (-2% under the LiveWell 70% scenario), but is crucial for the global climate effects (see Section 4.2.3 on the effects on the environment below).
- *Dairy products:* Similarly to meat, the decrease in consumption of dairy products following the adoption of diets meeting the LiveWell Plate's recommendations by EU consumers results in a decrease in consumer price in the two LiveWell scenarios. The drop in demand of EU consumers for dairy products creates a decrease in imports (-13% in the LiveWell 70% scenario) and an increase in exports (+24% in the LiveWell 70% scenario) of these products compared to the reference scenario. Declining prices for dairy product producers in the EU also trigger some decline in production of dairy products in third countries (-0.4% under the LiveWell 70% scenario), but is crucial for the global climate effects (see Section 4.2.3 on the effects on the environment below).
- *Other animal products:* Increasing demand for 'other animal products' following the adoption of diets meeting the LiveWell Plate's recommendations results in an increase in their consumer price (+3% under the LiveWell 70% scenario) compared to the reference scenario. The average increase predominantly relates to an increase in egg consumption (+28% under the LiveWell 70% scenario) and prices of eggs for consumers (+7% under the LiveWell 70% scenario), as there is a decrease in fish consumption (-19% under the LiveWell 70% scenario) and fish prices (-8% under the LiveWell 70% scenario).
- *Other plant products:* EU consumer demand for 'other plant products'[117] also increases under the two LiveWell scenarios relative to the reference scenario (see Section 3.4.1). As vegetables are usually not traded in large quantities the greatest part of this demand shock has to be compensated by domestic supply growth. However, supply elasticities are generally not very high for vegetables, which results in a negligible increase in production of 'other plant products' in the EU in 2020 (+1% under the LiveWell 70% scenario). The increase in consumer demand combined with limited supply growth leads to an *increase* in the consumer price of food from the 'other plant products' group (+5% under the LiveWell 70% scenario).

[117] Including fruits, vegetables, potatoes, pulses, coffee, tea, cocoa, wine, and oilseeds.

- *Oils:* EU consumers significantly reduce their consumption of oils under the two LiveWell scenarios (up to a reduction of 27% of calories intake from oil consumption under the LiveWell 70% scenario) compared to the reference scenario. In contrast, consumer prices remain very close to those of the reference scenario (-0.5% under the LiveWell 70% scenario). The drop in human consumption of oils is partly compensated by an increase in demand for oil seeds by the non-food industry, notably by the biofuel processing industry which becomes an important alternative demand component in 2020 (+1% under the LiveWell 70% scenario).
- *Sugar:* Similarly to oils, the decrease in human consumption of sugar in 2020 under the LiveWell scenarios (-43% under the LiveWell 70% scenario) is partially compensated by an increase in demand from the industry for sugar beet for ethanol production (+31% under the LiveWell 70% scenario), resulting in an EU total demand reduction of sugar of 22% under the LiveWell 70% scenario. It can also be observed that EU production of sugar remains stable while producer price for this product decreases (by -23% under the LiveWell 70% scenario). This is explained by the decreasing share of sugar produced for human consumption (associated with a higher producer price) relative to the share of sugar beet produced for the biodiesel processing industry (associated with lower producer price) in total sugar production.

5.2.2 Effects on economic welfare

Price and quantity changes as discussed in the previous section imply changes in income and economic welfare of market participants. Table 39 below summarises the effects on consumer welfare, incomes of the agricultural sector, the processing industry and other private agents as well as on the public agricultural budget resulting from the adoption of diets meeting the LiveWell Plate's recommendations by an additional 30% of the EU population in 2020 (LiveWell 30% scenario) and by an additional 70% of the EU population in 2020 (LiveWell 70% scenario) compared to the reference scenario.[118]

[118] The effects on economic welfare of the adoption of the LiveWell Plate's recommendations should be analysed taking several characteristics of the modelling carried out into consideration:

1. CAPRI is a partial equilibrium system and therefore does not cover the whole economy. For most non-agricultural sectors, like the fertiliser industry, it is assumed that their prices are not affected. However, CAPRI allows to model effects on income and budgets as far as they are directly related to agriculture.
2. The immediate welfare effect of changing preferences when all quantities and prices are still at the level of the reference situation cannot be estimated and is therefore ignored in CAPRI. However, changes in consumer preferences have demand effects, price effects and so forth; the subsequent final price effects are included in the welfare accounting.
3. Public health effects and effects on the environment are not included in the standard welfare accounting of CAPRI. Some environmental effects have been estimated in physical units (see Section 2.3.5), but they are not monetised and therefore not included in the welfare accounting presented in this section

Table 39. *Effects on welfare of EU market participants under LiveWell 30% and LiveWell 70% scenarios (change in € billion and % change against reference scenario)*

Source: Civic Consulting, CAPRI model.
Note: Including EU financing and national co-financing of market policies, direct payments, agri-environmental and rural development measures.

	LiveWell 30% (Change compared to the reference scenario)		LiveWell 70% (Change compared to the reference scenario)	
	In € billion	In % of GDP	In € billion	In % of GDP
Consumer welfare	+7.8	+0.051%	+1.3	+0.009%
Agricultural income	-8.4	-0.055%	-10.1	-0.066%
Income of processing industry	-4.2	-0.027%	-8.7	-0.056%
Income of other private agents	+0.3	+0.002%	+0.6	+0.004%
Public agricultural budget	-0.5	-0.003%	-1.2	-0.008%
Total	*-5.0*	*-0.033%*	*-18.1*	*-0.117%*

As shown in the table above, EU consumer welfare increases under the two LiveWell scenarios (+€7.8 billion under the LiveWell 30% scenario and +€1.3 billion under the LiveWell 70% scenario). Consumer welfare does not increase monotonically when moving from the LiveWell 30% scenario to the LiveWell 70% scenario, owing to the supply side bottlenecks for 'other vegetables':[119] strong increases in consumer prices for these products in limited supply as their demand increasingly intensifies due to a larger proportion of the EU population adopt the LiveWell Plate's recommendations.[120] This negative effect on consumer price increasingly offsets the consumer welfare gains obtained from declining prices of other food items under the two LiveWell scenarios.

Public agricultural budgets may be affected in several ways by the adoption of diets meeting the LiveWell Plate's recommendation by EU consumers. Two effects analysed by CAPRI are effects on tariff revenues from changes in agricultural trade and indirect effects on the Common Agricultural Policy (CAP) premiums. The results of the modelling indicate that aggregated public agricultural budgets of EU countries decrease in the two LiveWell scenarios (-€1.2 billion under the LiveWell 70% scenario).

However, the most important welfare effects under the LiveWell scenarios are losses in income for the agricultural sector and the processing industry, which exceed the welfare gains for consumers such that the net total welfare effect (not including health and environmental benefits) of the adoption of diets meeting the LiveWell

[119] The CAPRI category "other vegetables" includes cauliflower and broccoli, Brussels sprouts, cabbage (white), other brassicas, celery, leeks, lettuces, endives, spinach, asparagus, chicory, artichokes, other leafy or stalked vegetables, cucumbers, gherkins, eggplants, gourds, marrows, courgettes, pumpkins, red pepper, capsicum, kohlrabi, turnips, carrots, garlic, onions, shallots, beetroot, celeriac, radishes. It does not include tomatoes (which is a separate category in CAPRI).

[120] The full demand shift (at 100% adoption) would be +30% for other vegetables, but only +4% for tomatoes.

Plate's recommendations by EU consumers is negative for the EU as a whole (-€18.1 billion under the LiveWell 70% scenario).

Expressed in percentage of Gross Domestic Product (GDP), welfare losses relative to the reference scenario are very small because food expenditure is only a small fraction of total EU GDP and welfare effects are moderate. However, when measured against agricultural income under the reference scenario, losses in agricultural income attain 5% and 6% under the LiveWell 30% scenario and the LiveWell 70% scenario, respectively.

Nonetheless, it is important to note that public health effects and effects on the environment are not included in the standard welfare accounting of CAPRI. Some environmental effects have been estimated in physical units (see Section 2.3.5), but they are not monetised and therefore not included in the welfare accounting presented in this study.

In addition, changes in revenues associated with the production of key raw agricultural products following the adoption of diets meeting the LiveWell Plate's recommendations by consumers in the EU can be observed. Agricultural revenues associated with the production of pulses, eggs, and vegetables, sharply increase under both LiveWell scenarios (+37.7%, +55.0% and +76.3% under the LiveWell 70% scenario, respectively). In contrast, agricultural revenues associated with the production of sugar, cow and buffalo milk and meat are expected to decrease significantly as a result of a switch to healthier and more sustainable diets (by -18.3%, -21.3% and -32.7% under the LiveWell 70% scenario, respectively).

5.2.3 Effects on the environment

Production changes in the EU as well as in third countries affect greenhouse gas emissions (GHGe) and the agricultural nitrogen balance. The adoption of diets meeting the LiveWell Plate's recommendations by an additional 30% of the EU population in 2020 (LiveWell 30% scenario) compared to the reference scenario leads to a total reduction in agricultural GHGe from the EU of 2.2%. The adoption of diets meeting the LiveWell Plate's recommendations by an additional 70% of the EU population in 2020 (LiveWell 70% scenario) results in a decrease in agricultural GHGe from the EU by 4.1% from the reference scenario. This is primarily the result of the decrease in consumption of dairy products and meat by EU consumers who follow the LiveWell Plate's recommendations, which leads to a reduction in EU production of these products (up to -9% and -11% under LiveWell 70%, respectively), and thus a decline of GHGe related to animal production in the EU of up to 6.2% under the LiveWell 70% scenario.

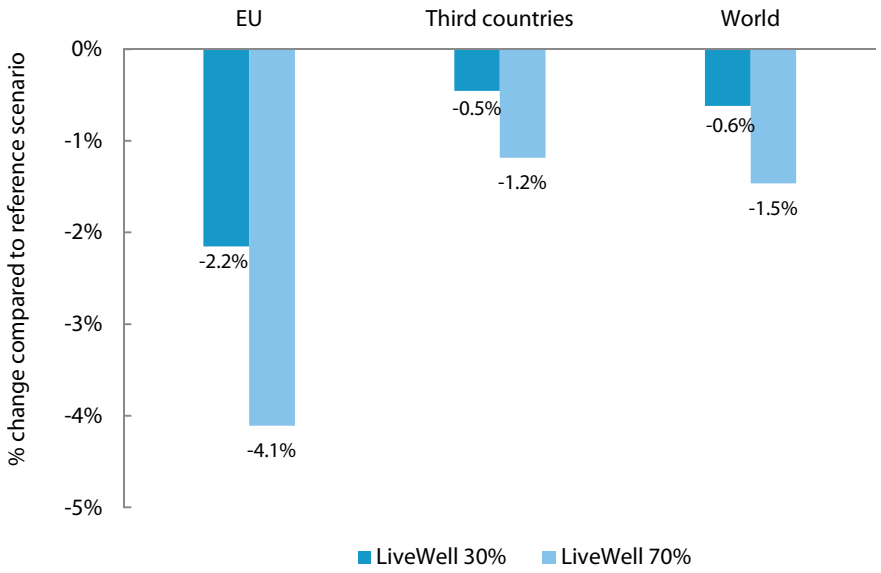
The reductions in agricultural GHGe estimated may appear as moderate achievements but as these decreases in GHGe are demand-driven they are not counteracted by so called 'leakage' effects, which could occur if EU production is

displaced to third countries. Instead, as already seen above, reduction in the producer prices for dairy products and meat also curbs animal production in third countries which therefore adds additional reduction in agricultural GHGe at the global level. The LiveWell scenarios thus involve 'negative leakage'.

Agricultural GHGe are reduced less in third countries (by up to 1.2% under the LiveWell 70% scenario) than in the EU, in line with the smaller production reductions in these countries discussed above (see Sections 3.4.3.4 and 3.4.3.6). Nonetheless, this contribution of third countries is essential to achieve *a total reduction of 1.5% in global agricultural GHGe (under the LiveWell 70% scenario) from a change in food consumption only adopted by consumers in the EU.*

Figure 23. *Effects on EU and global agricultural GHGe under LiveWell 30% and LiveWell 70% scenarios (% change against reference scenario)*

Source: Civic Consulting, CAPRI model.



The global estimates of agricultural GHGe reduction (-1.5% under the LiveWell 70% scenario) are conservative because the effects of changes in agricultural area use on the release of soil carbon (known as "Indirect Land Use Change" or ILUC effects) are still largely neglected in CAPRI. Specifically, a lower demand for land in third countries means a lower conversion of carbon-rich natural lands to agriculture and prevents high one-time releases of carbon into the atmosphere.[121]

In addition, another relevant environmental indicator affected by the LiveWell scenarios is the overall nitrogen balance of agriculture. The overall nitrogen balance surplus declines by 3.0% under the LiveWell 70% scenario. Reduced overall surplus of

[121] GHGe related to ILUC effects are not modelled by CAPRI at the moment. Including the GHGe related to these effects in the model would likely result in a significant improvement of the global GHG balance under the two LiveWell scenarios (see for example Searchinger et al., 2008 on the issue of GHGe from land-use change).

the nitrogen balance is associated with lower leaching below ground and lower gaseous emissions, mostly of ammonia.

Finally, these results can be combined with other research showing that a change to diets consisting of a lower intake of sugar, crop oils, animals fats and meat, and a higher intake of vegetables and fruit, result in a lower EU water footprint of consumption.[122]

5.2.4 Effects on public health

The latest figures available on the prevalence of obesity in the pilot countries show that the proportion of obese people in the adult population varied between 11.8% (in Sweden), 15.0% (in France) to 17.0% (in Spain) in 2012. The data on the prevalence of obesity collected in the LiveWell pilot countries was extrapolated to provide estimations for 2020, assuming that growth in the prevalence of obesity would continue to develop following the national trends observed in the past. The results of the extrapolation show that the proportion of obese people in the population of each of the pilot countries is expected to rise to 13.9% in Sweden, 16.2% in France and 19.3% in Spain and to either 19% or 21.6% under the reference scenario, depending on the extrapolation methodology.

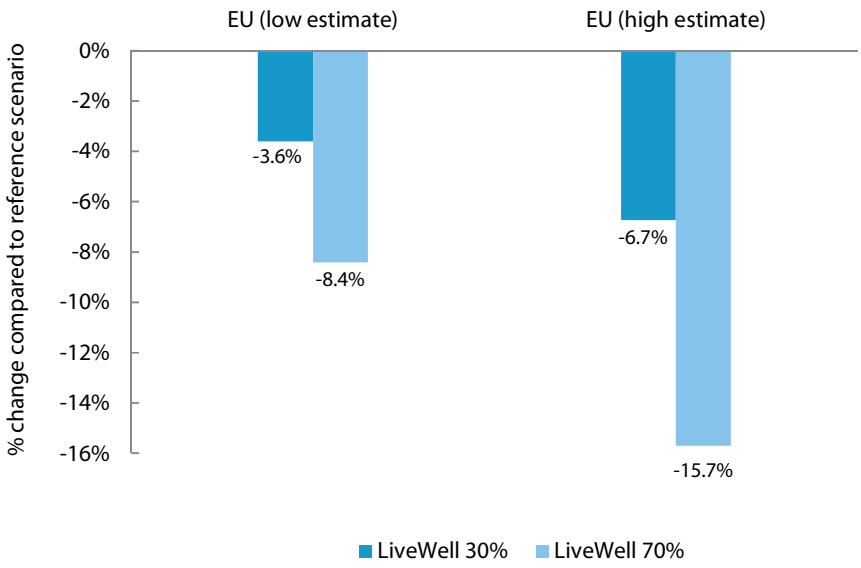
Compared to the reference scenario, the prevalence of obesity in 2020 is expected to decrease by between 3.6% (low estimate) and 6.7% (high estimate) at EU level if an additional 30% of the EU population meet the LiveWell Plate's recommendations in this year (LiveWell 30% scenario), and to decrease by between 8.4% (low estimate) and 15.7% (high estimate) if an additional 70% of the EU population meet the LiveWell Plate's recommendations (LiveWell 70% scenario).[123] This is shown in the figure below.

[122] Vanham et al., 2013.

[123] The expected prevalence of obesity under each LiveWell scenario was calculated by assuming that while the adoption of the recommendations of the LiveWell Plate will typically prevent non-obese people from becoming obese, the adoption of these recommendations by people who are already obese today is not likely to have any significant effects on their obesity levels by 2020. It was therefore assumed that the health benefits of the adoption of the LiveWell Plate mainly consist of stabilising obesity rates at current levels, as the health benefits of the adoption of the LiveWell Plate's recommendations only apply to those who are not obese today but would have become obese by 2020 under the reference scenario. Figures regarding the expected changes in the prevalence of obesity among adults in 2020 under the LiveWell scenarios can therefore be considered conservative estimates.

Figure 24. *Effects of adoption of LiveWell diet on prevalence of obesity under LiveWell 30% and LiveWell 70% at EU level (relative to reference scenario)*

Source: Civic Consulting.



In the framework of this study, we reviewed existing research on costs of obesity and related diseases in the three LiveWell pilot countries. The data collected indicates that the costs of obesity and related diseases (such as hypertension, type 2 diabetes, and myocardial infarction) amounted to €596 per obese person in Spain and to €780 per obese person in France in 2002 and up to €2,806 per obese person in Sweden in 2003. These figures are not directly comparable as they include different cost items; however, they reflect a range of different estimates and are therefore considered a suitable basis for estimating the costs of obesity and related diseases at EU level.

As cost data identified relates to the years 2002 and 2003, these figures were inflated to reflect 2020 prices. Applying 2020 cost data to the expected number of obese people in 2020, we predict the costs of obesity and related diseases to amount to €9.2 billion in France, €6.5 billion in Spain, and €4.0 billion in Sweden in 2020, assuming a continuation of the current trend (reference scenario) as shown in the table below.

Table 40. *Effects of adoption of LiveWell diets on costs of obesity and related diseases in the LiveWell pilot countries in 2020 under LiveWell 30% and LiveWell 70% scenarios*

Source: Civic Consulting. Notes: (a) Costs relate to obese people aged 18 or over; (b) Costs relate to obese people aged 16 or over.

	Expected annual costs of obesity and related diseases (in € billion)			Expected changes in costs (relative to reference scenario; in € billion)	
Country	**Reference scenario**	**LiveWell 30% scenario**	**LiveWell 70% scenario**	**LiveWell 30% scenario**	**LiveWell 70% scenario**
France[(a)]	9.2	8.9	8.5	-0.3 (-3.4%)	-0.7 (-7.9%)
Spain[(a)]	6.5	6.2	5.9	-0.3 (-4.2%)	-0.6 (-9.9%)
Sweden[(b)]	4.0	3.8	3.6	-0.2 (-4.7%)	-0.4 (-11.0%)

Using the expected prevalence of obesity in the EU in 2020 (see Table 20 above) and the average of the cost estimates from the three LiveWell pilot countries (average cost of €2,183 per obese person at EU level in 2020),[124] the annual costs of obesity and related diseases can be estimated for the EU. Under the reference scenario, which assumes a continuation of current trends, these costs are expected to range between €180.2 billion and €204.4 billion (see Table 41 below), depending on whether the lower or the higher estimates of EU obesity levels in 2020 are used.. On the basis of this data, it is estimated that the annual avoided costs of obesity and related diseases at EU level range between €6.5 billion and €13.8 billion under the LiveWell 30% scenario and between €15.2 billion and €32.1 billion under the LiveWell 70% scenario, relative to the reference scenario.

[124] The estimate of €2,183 per obese person in the EU in 2020 is likely to be conservative, in view of the costs of obesity estimated in the USA. For example, a report published in 2010 estimated that the overall, tangible, costs of being obese are US$4,879 for an obese woman and US$2,646 for an obese man in the USA per year (Dor et al., 2010). According to this report, adding the value of lost life to these costs further increases the total cost of obesity: US$8,365 for obese women and US$6,518 for obese men. Converting these costs in Euros and inflating them to obtain values for 2020, it is estimated that the cost of obesity will range between €4,489 and €7,696 per obese women and between €2,434 and €5,997 for obese men in 2020 in the USA, depending on whether the value of lost life is considered in the assessment.

Table 41. *Effects of adoption of LiveWell diets on costs of obesity and related diseases in the EU in 2020 under LiveWell 30% and LiveWell 70% scenarios*

Source: Civic Consulting. Note: (a) See Section 3.4.6.3 and Table 20 above on expected prevalence of obesity among adults in the EU in 2020. (b) Cost estimates based on data from three pilot countries France, Spain and Sweden; see text.

	Expected annual costs of obesity and related diseases[(b)] (in € billion)			Expected annual avoided costs (relative to reference scenario; in € billion)	
	Reference scenario	LiveWell 30% scenario	LiveWell 70% scenario	LiveWell 30% scenario	LiveWell 70% scenario
Based on low estimate for prevalence of obesity in the EU in 2020 [(a)]	180.2	173.7	165.1	6.5 (3.6%)	15.2 (8.4 %)
Based on high estimate for prevalence of obesity in the EU in 2020 [(a)]	204.4	190.6	172.3	13.8 (6.7%)	32.1 (15.7%)

As reductions in costs are assumed to be proportional to reductions in the prevalence of obesity, a switch to healthier and more sustainable diets by EU consumers could lead to an identical proportional reduction of the costs of obesity and related diseases in 2020, i.e. of between 3.6% and 6.7% under the LiveWell 30% scenario, and of between 8.4% and 15.7% under the LiveWell 70% scenario, compared to the reference scenario.

It has to be emphasised that the estimate for the EU is based on the data on costs of obesity and related diseases from three pilot countries only, which do not necessarily reflect the situation in other EU countries to a full extent. In addition, the estimates of expected costs of obesity and related diseases in 2020 under the LiveWell scenarios are to be considered conservative in nature due to the assumptions on which these estimates are based (see Section 2.3.6 above). Furthermore, obesity also induces costs that are difficult to assess quantitatively, related to e.g. social stigmatisation, mental health problems and general physical impediments, which have therefore not been considered in this study. Finally, in this study only the costs of obesity and related diseases are considered; the increased medical costs of people who are overweight, but not obese, are not included, although previous studies indicate that these costs may also be considerable.[125]

[125] It has to be noted that this study considers the cost of obesity and related diseases as they result for the health system *in a given year*. It does not consider lifetime costs of obese persons compared to lifetime costs of non-obese persons. As the former may not live as long, the overall health costs per obese person decrease. A similar argument has been made for smokers vs. non-smokers. It is, however, undisputable, that obesity and related diseases lead to specific costs for a health system, which have been the focus of this study.

5.2.5 Overview of scenario results

The table below summarises the effects of the adoption of the LiveWell diets under the LiveWell 30% scenario and the LiveWell 70% scenario, relative to the reference scenario.

It shows that despite significant increases in agricultural revenues related to the production of vegetables, eggs and pulses, these do not compensate losses for the meat and dairy sectors. As a result, the total agricultural and processing industry income decreases under the two LiveWell scenarios compared to the reference scenario.

However, losses for meat and dairy producers can be outweighed by the environmental and health benefits resulting from the adoption of LiveWell diets. Specifically, the adoption of these diets by EU consumers leads to significant reductions in both EU and global agricultural GHGe. The adoption of diets meeting the LiveWell Plate's recommendations results in a total reduction of 1.5% in global agricultural GHGe (corresponding to a decrease of 59.9 Mt CO_2 equivalent under the LiveWell 70% scenario relative to the reference scenario) from a change in food consumption only adopted by consumers in the EU. The LiveWell diets would lead to even stronger GHGe reduction if they were adopted at a global level. Under the modelling assumptions applied for this study, a shift to LiveWell diets occurs in the EU only. This causes a reduction in EU consumption of meat and dairy products, which is, however, partly compensated by increased exports of meat and dairy products from the EU to third countries. This increase in exports limits the reduction in GHGe achievable through a dietary shift in the EU.

Finally, a switch to healthier and more sustainable diets by EU consumers is expected to lead to a significant reduction in the expected prevalence of obesity in 2020 under the two LiveWell scenarios compared to the reference scenario. As a result, the avoided costs of obesity and related diseases at EU level in 2020 are expected to range between €6.5 billion and €13.8 billion under the LiveWell 30% scenario and between €15.2 billion and €32.1 billion under the LiveWell 70% scenario, relative to the reference scenario.

Adding up the effects that have been monetised in the framework of this study (see table below) leads to a total net benefit ranging between €1.5 billion and €8.8 billion under the LiveWell 30% scenario relative to the reference scenario, depending on which estimate for the prevalence of obesity in the EU in 2020 is chosen as basis for the extrapolation. Under the LiveWell 70% scenario, the net effect ranges between a net cost of €2.9 billion (due to the fact that increased prices of vegetables caused by supply side bottlenecks lead to a more limited increase in consumer welfare under this scenario) and a net benefit of €14.0 billion. *However, these figures do not include the significant environmental and other health benefits which have not been monetised in this study.*

Table 42. *Effects of adoption of LiveWell diets by EU consumers under LiveWell 30% and LiveWell 70% scenarios (change against reference scenario)*

Source: Civic Consulting.
Note: (a) Includes income of other private agents.

Dimension	Effect	Cost or benefit?	Change compared to reference scenario		Comment
			LiveWell 30%	LiveWell 70%	
Economic welfare	Reduction of agricultural and processing industry income[(a)]	Cost	-€12.3 bn	-€18.2 bn	Agricultural and processing industry income decreases under both scenarios. Increased revenues related to the production of vegetables, eggs, pulses do not compensate losses for the meat and dairy sectors.
	Reduction of public agricultural budget	Cost	-€0.5 bn	-€1.2 bn	Under both LiveWell scenarios, the effects on the public agricultural budget are slightly negative due to changes in tariff revenues and CAP premiums.
	Increase in consumer welfare	Benefit	+€7.8 bn	+€1.3 bn	Under both LiveWell scenarios consumer welfare increases, but to a lesser extent under the LiveWell 70% scenario due to increased prices of vegetables caused by supply side bottlenecks.
Environ-ment	Reduction in agricultural GHGe (CO2 eq.)	Benefit	-25.3 Mt (not monetised)	-59.9 Mt (not monetised)	EU and global agricultural GHGe decrease significantly. Reduction in the producer prices for dairy products and meat also curbs animal production and related emissions in third countries.
	Reduction of agricultural nitrogen surplus	Benefit	-0.2 Mt (not monetised)	-0.3 Mt (not monetised)	Reduced animal production leads to a reduction in the use of manure as fertilizer. Reduced nitrogen surplus is associated with lower leaching below grounds and lower gaseous emissions mostly of ammonia.
Public health	Avoidance of costs of obesity and related diseases	Benefit	+€6.5 bn to +€13.8 bn	+€15.2 bn to +€32.1 bn	Switch to healthier and more sustainable diets by EU consumers leads to significant reduction of the costs of obesity and related diseases.
	Other benefits	Benefit	(not monetised)	(not monetised)	Reduction of obesity prevalence also reduces costs for affected individuals that are difficult to assess quantitatively, such as social stigmatisation, mental health problems and general physical impediments caused by obesity.

5.4 COSTS AND BENEFITS OF POLICY OPTIONS

In the framework of this study, the costs and benefits of the following policy options were analysed:

- Policy option 1: Introduction of "Food, Nutrition and the Environment" education;
- Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products;
- Policy option 3: Taxation measures.
  - Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts;
  - Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts;
- Policy option 4: Development of a national sustainable food strategy.

A range of different types of costs and benefits, accruing to food producers/farmers, public authorities, and society/consumers, and spanning from negligible to significant in importance, can be identified for these policy options. In addition, costs can be differentiated in terms of frequency (one- off or recurring), while benefits can be differentiated in terms of timeframe (immediate to long-term). These have been presented in detail in Sections 3.2 to 3.5 of this study.

In the following we outline the key findings regarding costs and benefits of each of the policy options covered in this study, followed by associated recommendations. The order in which these are presented broadly reflect the feasibility of the policy options assessed and the extent to which the benefits can be considered to outweigh costs on the basis of the evidence collected in this study.

5.4.1 Development of a national sustainable food strategy

The study investigated the costs and benefits of developing a national sustainable food strategy to encourage the adoption of diets meeting the LiveWell Plate's recommendations. Relevant findings include:

- Stakeholders interviewed considered that national sustainable food strategies are important and needed. Several stakeholders were of the opinion that this policy option is the most important of the options considered as it would form the political basis for further actions on sustainable diets.
- The development of a national sustainable food strategy is likely to induce mainly minor one-off costs for public authorities, related to consulting stakeholders, reviewing existing initiatives, analysing results of the consultation and drafting the strategy.

- The benefits in terms of a reduction in environmental impacts of food production and consumption identified for consumers/society are likely to be minor to significant and materialise in the mid- to long term, as are benefits relating to raising awareness regarding sustainable diets among a wide range of stakeholders. The benefits for food producers/farmers are likely to be minor to significant, relating to identification and achievement of cost savings, and improvement of brand and corporate image in the immediate to mid-term, while benefits in terms of competitive advantage through involvement in the development of the strategy are likely to materialise in the mid- to long term.
- Several key components could be discussed when developing a national strategy on sustainable food, such as the definition of "sustainable diet", the definition of key targets, the definition of key indicators to be monitored, education measures, environmental labelling of food, supporting research, recycling of nutrients, regulation of portion sizes or specific taxes such as a tax on unhealthy food/food with high environmental impacts or on advertising for such food.

As most of the possible components of a strategy on sustainable food depend on national, rather than EU competencies, there is likely to be considerable variations in terms of emphasis, scope and approach between Member States. This means there is a need for exchange and sharing of experiences between Member States, both positive and negative, for which the EU has an important role to play as a catalyst or facilitator. This entails the need for national strategies to be embedded within a common EU framework, and that resources should be made available at EU level to support this framework. In addition, of particular interest should be how relevant food, nutrition and environment policy measures in the context of national strategies have been found to interact with one another at national level, and whether key synergies have been established, such that Member States developing similar strategies and policies can anticipate these and adapt based on the experiences of others. At EU level, the organisation of regular conferences on sustainable food could therefore be envisaged to exchange national experiences and best-practices. Action at EU level should also be coordinated with ongoing efforts and consultation in the area of sustainable food policy in general, in particular in view of the upcoming Communication on Sustainable Food.[126]

Stakeholder consultation at the national level is also crucial in ensuring that policy measures complement each other within the context of the Member State in question. Once defined, the national strategy should be supported through provision of information to the general public and also via targeted information to specific stakeholder groups.

[126] Yet to be published at the time of writing.

Finally, evaluating the impacts of the national strategy and related policy measures is an important tool in policymaking with regard to healthy and sustainable diets. If evaluation mechanisms are built in to the national strategy, this will allow for the strategy to be adapted where appropriate to better target specific outcomes and impacts.

These conclusions lead to the following recommendation:

Recommendation 1:

- EU Member States should first and foremost develop a national sustainable food strategy to take into account the cross-cutting policy background relating to healthy and sustainable diets. This study has shown that a combination of policy measures incorporated in the national strategy is needed. Key components of the strategy could therefore include a mix of the policy options and other measures considered in this study, such as education measures, or specific taxes, e.g. on advertising for unhealthy food/food with high environmental impacts, or regulation on portion size.

- The EU should act as catalyst or facilitator for exchange and sharing experiences between Member States. Resources should therefore be made available at EU level to support the development of a common framework for network and exchange of best practices among Member States. In addition, at EU level, the organisation of regular conferences on sustainable food could be envisaged to exchange national experiences and best-practices.

- A national strategy should incorporate regular stakeholder consultation and evaluation mechanisms to ensure the strategy is appropriately adapted to target specific outcomes and impacts.

5.4.2 Introduction of "Food, Nutrition and the Environment" education

The study investigated the costs and benefits of introducing "Food, Nutrition and the Environment" education to encourage the adoption of diets meeting the LiveWell Plate's recommendations. Relevant findings include:

- A primary rationale for considering this policy option is the significant increase in childhood overweight and obesity in the EU - from one in four overweight or obese children in 2008 to one in three in 2010 - which suggests the need for food education in school to promote the adoption of healthier diets by children.
- The introduction of "Food, Nutrition and the Environment" education is likely to induce minor recurring costs for food producers/farmers (related to visits to farms), and negligible to minor costs on balance for public authorities and consumers/society of a one-off or recurring nature, depending primarily on the costs of training teachers.

- The benefits identified for consumers/society are likely to be significant on balance, materialising primarily in the immediate to mid-term with the adoption of healthier diets by children and the improvement of agricultural literacy of children, academic outcomes, social and other skills of children, while a reduction in negative environmental impacts of food production and consumption materialising only in the long term, even if education in schools can also have immediate indirect benefits on consumption patterns adopted by parents. The benefits identified for food producers/farmers are likely to be minor to significant, materialising in the immediate to mid-term, relating to the improvement of image and increasing interest of children for the agricultural and food sector.
- Education should primarily be targeted at primary school level, but also at secondary school level to a lesser extent, and should consist not only of lessons in classrooms, but also incorporate practical educational approaches, including visits to farms/food manufacturing plants, the use of school gardens, as well as complementary measures such as cooking classes, as the combination of measures increases overall effectiveness.

This study has shown that education measures in relation to food, nutrition and the environment constitute a key policy option to encourage the adoption of healthy and sustainable diets. Compared to other policy options, the costs incurred are likely to be relatively lower, even if most benefits materialise in the mid- to long term. Education measures can also play a central role in any national sustainable food strategy, as indicated above.

These conclusions lead to the following recommendation:

Recommendation 2:

Food, nutrition and environment education measures are key policy measures to encourage the adoption of healthy and sustainable diets, which should be incorporated within a national sustainable strategy. Education should primarily be targeted at pupils at primary school level, but also at secondary school level to a lesser extent, and should consist not only of lessons in classrooms, but also incorporate practical educational approaches, including visits to farms/food manufacturing plants and the use of school gardens, as well as complementary measures such as cooking classes, as the combination of measures increases overall effectiveness.

5.4.3 Introduction of an EU-wide mandatory environmental labelling of food products

The study investigated the costs and benefits of introducing EU-wide mandatory environmental labelling of food products to encourage the adoption of diets meeting the LiveWell Plate's recommendations. Relevant findings include:

- A primary rationale for considering this policy option is recent EU-wide surveys: one Eurobarometer survey indicates that six out of ten EU citizens think that current product labels do not provide enough information about their environmental impact (59%),[127] while a Flash Eurobarometer survey from 2009 on Europeans' attitudes towards the issue of sustainable consumption and production indicates that more than seven in ten (72%) EU citizens consider that a label indicating a product's carbon footprint should be mandatory in the future.[128]
- The introduction of an EU-wide mandatory environmental labelling of food products is likely to induce significant one-off costs complemented by minor recurring costs for public authorities, related to creating and maintaining a database of generic data on environmental impacts of food products, creating a harmonised labelling scheme for environmental impacts of food products at EU level, and controlling the accuracy of labelling information. Mandatory environmental labelling would be expected to only cause minor one-off costs for food producers, if labelling is supported with such a database of generic data provided by public authorities, and sufficient transition periods are provided. Food producer costs would relate to familiarisation with labelling requirements, using the database for labelling, and adding the labels on packages.
- The benefits in terms of health and reduced environmental impacts identified for consumers/society are likely to materialise in the mid to long term on balance, the significance of which depending primarily on the extent to which consumers are already environmentally conscious and willing to switch to more sustainable consumption patterns, despite immediate significant benefits resulting from food producers' product reformulation.
- In order for this policy option to be truly effective, therefore, a precondition is that the label is sufficiently well designed to be clearly understandable, and that consumers are sufficiently aware of the labelling.

Labelling schemes that relate to environmental impacts have been successfully implemented for some time in other goods markets, e.g. the EU Energy label, which provides information on the energy efficiency of relevant products, such as washing

[127] Flash Eurobarometer 367. 2013. Attitudes of Europeans towards building the single market for green products.

[128] Flash Eurobarometer 256. 2009. Europeans' attitudes towards the issue of sustainable consumption and production.

machines.[129] It is a key policy measure that could be integrated into a national sustainable food strategy, as emphasised by stakeholders in this study. However, findings of this study indicate that much depends on the way in which the labelling is introduced in order to be effective.

The first condition is that that a harmonised labelling scheme is applied at EU level. If environmental labelling schemes were pursued at national level, this would constitute not only a serious impediment to cross-border food sales, but would also imply the development of separate methodologies for assessing the environmental impacts of foods, thereby creating confusion and considerable administrative costs for cross-border food producers. An EU-wide labelling scheme reduces administrative costs, and could be linked to a common framework for the assessment of environmental impacts of foods.

Second, in support of this, there should be a publicly maintained database at EU level with generic data on the environmental impacts of food products, to assist businesses in determining the environmental impacts of products. Relevant research has shown that costs for businesses of collecting data and modelling environmental impacts of food products vary significantly depending on whether they receive technical support and data from public authorities. The provision of generic data based on a commonly agreed methodology via public databases at EU level could therefore significantly reduce data collection efforts and costs for businesses across the EU.

Third, a key requirement is that the labelling scheme is mandatory. If the labelling is implemented on an opt-in basis for food companies, some are likely to apply the labelling for competitive advantage, but others may choose not to join the scheme, in the event that their products are assessed to cause significant environmental impacts. Consumers may then lack the information necessary to make informed decisions regarding the environmental impacts of foods, as in many cases they might only be sure of the environmental impacts of those foods for which the impacts are assessed to be minor.

Finally, and perhaps most importantly, the environmental labelling needs to be designed and communicated to consumers in a way that maximises its effectiveness. This study has shown that in order for this policy option to be truly effective, a precondition is that consumers are sufficiently aware of and understand the label. This means that a) the label would need to be simple and clearly designed to be understood by most consumers; and b) an awareness campaign would need to integrated into the national sustainable food strategy in which the labelling scheme is incorporated, to raise awareness of the label. Stakeholders consulted noted the EU

[129] Energy Labelling Directive 2010/30/EU establishes a legal framework for the Commission to set mandatory energy labelling requirements for energy-related products (except vehicles) placed on the EU market.

Energy label as an example of best practice in which the criteria outlined herein had been satisfied for successful implementation of the labelling.

These conclusions lead to the following recommendation:

Recommendation 3:

In order to successfully introduce the environmental labelling for food products, it must be a mandatory requirement for all food producers, and must stem from an EU initiative. This would involve both a harmonised EU labelling scheme, as well as the provision of generic data via public databases at EU level on the environmental impacts of food products, determined using on a commonly agreed methodology for their assessment. Furthermore, the labelling should be as simply and clearly designed as possible to maximise consumer understanding. The labelling scheme could then be integrated into national sustainable food strategies, in which case it would need to be coupled with targeted and well developed consumer information and awareness campaigns.

5.4.4 Introduction of a higher tax rate on unhealthy food/food with high environmental impacts, or a reduced VAT rate on healthy food with low environmental impacts

The study investigated the costs and benefits of introducing taxation measures to encourage the adoption of diets meeting the LiveWell Plate's recommendations. Two options were assessed: a higher tax rate on unhealthy food/food with high environmental impacts, or a reduced VAT rate on healthy food with low environmental impacts.

Relevant findings regarding a higher tax rate on unhealthy food/food with high environmental impacts include:

- The rationale for considering an excise tax as a policy option is multifaceted. A tax on unhealthy food/food with high environmental impacts contributes to internalise (at least in part) external costs (including health and environmental costs) related to the consumption of these products.
- The introduction of a higher tax rate on unhealthy food/food with high environmental impacts is likely to induce minor to significant recurring costs for food producers/farmers and for consumers/society, depending on the level of the tax rate, primarily due to loss of income/welfare, the political cost, and other factors. A minor recurring cost would be incurred by public authorities related to defining products to which the tax is applied and the appropriate tax rate.

- The benefits in terms of reduced environmental impacts identified for consumers/society are likely to be immediate and significant, depending on the level of the tax rate, while health benefits are likely to materialise in the mid- to long term. Benefits identified for public authorities are also likely to be significant and immediate, in the form of additional tax revenues, which could be employed to finance food education programmes, support development of sustainable food production and research on sustainable diets. In addition, benefits for producers of healthy food with low environmental impacts are also likely to significant and immediate, in the form of an increase in income.
- Literature reviewed in this study suggests that the level of a tax on unhealthy food and drinks would need to be at least 20% to have a significant effect on population health, otherwise the behavioural and health impacts of a nutritional tax are expected to be low. A tax of 25% on unhealthy food/food with high environmental impacts was selected to model its effects on consumption patterns, agricultural incomes and the environment using the CAPRI modelling framework (see Section 3.1 and Annex 3 on this model). The tax rate of 25% was applied to all products of the CAPRI categories 'meat', 'oils', 'sugar' and the products 'butter', 'cheese', 'cream' and 'concentrated milk' of the CAPRI category 'dairy products'. All kinds of drinking milk were exempted from taxation. Results of the modelling show that the introduction of the tax would in particular lead to the following costs:
  - A loss in consumer welfare of €115 billion.
  - A decrease in EU agricultural income of €7 billion in total, compared to the expected value of agricultural income under the reference scenario in 2020.

  Similarly, results of the modelling show that the introduction of the tax would in particular lead to following benefits:

  - A reduction of calorie intakes from the consumption of fat dairy products (butter, cheese, cream and concentrated milk), oils, sugar and meat of 4% to 6%, relative to the reference scenario;
  - A total reduction in agricultural greenhouse gas emissions (GHGe) from the EU of 1.1%, relative to the reference scenario. The introduction of this tax also results in a decrease in agricultural GHGe from third countries (of 0.1%), leading to a total reduction of 0.2% in global agricultural GHGe (compared to the reference scenario);
  - An increase in agricultural revenues associated with the production of some untaxed products, including tomatoes, other vegetables and eggs increase as a result of the introduction of the tax (by 0.2%, 2.7%, and 4.7% relative to the reference scenario, respectively);

- An increase in public agricultural budget of €118 billion. These additional revenues more than compensate the loss in consumer welfare of €115 billion resulting from the tax.

However, these results show that even a 25% tax on unhealthy food/food with high environmental impacts is likely to induce fewer health and environmental benefits than the adoption of diets meeting the LiveWell Plate's recommendations by an additional 30% of EU consumers (LiveWell 30% scenario), relative to the reference scenario. In other words, even a drastic measure such as a tax of 25% on relevant food products could only be part of the solution to reach more sustainable food consumption, but would fall short as a stand-alone measure.

Relevant findings regarding a reduced VAT rate on healthy food with low environmental impacts include:

- A primary rationale for considering this policy option is results of a Eurobarometer survey in which respondents agree that lower taxes on environmentally-friendly materials and products can play a role in reducing people's impact on the environment, with over eight out of ten respondents answering positively (83%).
- The introduction of a reduced VAT rate on healthy food with low environmental impacts is likely to induce minor to significant recurring costs for public authorities, due to a decrease in tax revenues, and minor one-off costs relating to the definition of products to which the reduction in VAT rate applies, with possible additional minor to significant recurring costs for consumers/society.
- The benefits identified for consumers/society are likely to be immediate and minor to significant, in the form an increase in consumer welfare, while health benefits are likely to materialise in the mid- to long term. Benefits identified for food producers/farmers are likely to be immediate and significant, relating to an increase in demand for fruits and vegetables.
- However, a reduction in the VAT rate applicable to healthy food products with low environmental impacts may only have limited effects in Member States which already apply a reduced VAT rate to foodstuffs, as small changes in price differences between healthy/unhealthy products or products with high/low carbon footprint may only have limited effects on consumption patterns. In addition, the decrease in revenue from a reduction of VAT may be difficult to justify politically in times of austerity, in which many EU governments are reducing expenditure and increasing taxation. In light of this, a reduced VAT rate healthy food with low environmental impacts may be best as a complementary tool to other taxes, as opposed to a stand-alone fiscal instrument.

Overall, in light of the above results, there is no simple answer to the question whether the benefits of such taxation measures outweigh the costs, be it a higher excise tax rate on unhealthy food/food with high environmental impacts, or a reduced VAT rate on healthy food with low environmental impacts. Stakeholders have in particular emphasised that such measures would be the least popular of the options considered both socially and politically. In addition, the required level of the tax rate needed on unhealthy food/food with high environmental impacts, would need to be much higher, relative to other foods, in order to be effective. The potential adverse incentives as well as specific undesirable impacts created by an excise tax, such as the regressive effects on low-income households, compound the difficulty in assessing the costs and benefits. As a consequence, if an excise tax or reduced VAT rate on specific foods is desired, a comprehensive impact assessment would be needed on the specific measure planned (including the tax rate and products covered, also considering potential benefits of measures financed by the additional tax revenue or transfers of such revenue to consumers) to accurately estimate its impacts, coupled with the appropriate labelling and education measures to raise consumer awareness and boost consumer acceptance, in order to safeguard its implementation at reasonable social and political cost. In addition, a reduced VAT rate on healthy food with low environmental impacts may be best as a complementary tool to other taxes, as opposed to a stand-alone fiscal instrument.

However, these findings do not preclude the potential for more specific taxes with beneficial effects, at relatively lower costs. For instance, rather than banning the advertising of unhealthy food/food with high environmental impacts, a tax could be applied to advertisements for such food products (e.g. television commercials, or other advertising through other means). Revenue collected through this tax could be used to finance communication measures on healthy and sustainable food, or education measures, in the context of a national sustainable food strategy. These conclusions lead to the following recommendation:

Recommendation 4:

- In light of the difficulty in assessing the costs and benefits of taxation measures to encourage the adoption of healthy and sustainable diets at a general level, if such measures are desired, a comprehensive impact assessment would be needed to accurately estimate impacts of the specific measures planned, coupled with the appropriate labelling and education measures to raise consumer awareness and boost consumer acceptance, in order to safeguard its implementation at reasonable social and political cost.

- Nonetheless, other specific taxes could be considered such as a tax on advertising of unhealthy food/food with high environmental impacts. Revenue collected through this tax could be used to finance communication measures on healthy and sustainable food, or education measures, in the context of a national sustainable food strategy.

5.4.5 Further research

Stakeholders interviewed in this study noted that an important component of a national sustainable food strategy is supporting research to facilitate transition to healthier and more sustainable diets. Indeed, the critical determinants of healthy and sustainable diets remain to be clearly identified, which is confirmed by this study, in light of the uncertainty as to which policy measure fits best to encourage a behavioural shift in EU consumers' diets. A range of dynamic social, cultural, political, economic and environmental factors constitute the determinants of healthy and sustainable nutrition, and in order to promote behavioural shifts in EU consumers, understanding these determinants as well as the broader aspects of human behaviour is critical. This also includes the behaviour of food producers, as product development, advertising and marketing influence consumers strongly in the choice of products, which if unhealthy may impact on obesity, disease and life expectancy. Results of the research could then be used to improve the effectiveness of key behavioural policy measures incorporated in the national strategy, such as 'nudging' or the regulation of portion sizes, which can subsequently complemented by relevant education and communication measures.

These conclusions lead to the following recommendation:

Recommendation 5:

Further research should be conducted regarding the key factors governing human decision-making in relation to food, nutrition and the environment. This relates to understanding the critical determinants of healthy and sustainable diets in consumers, but also the behaviour of food producers. Research results should then be used to inform and optimise behavioural policy measures, to be considered e.g. in the framework of a national strategy on sustainable food, such as 'nudging' or regulation of portion sizes, which should be subsequently coupled with relevant education and communication measures.

ANNEX 1: COUNTRY STUDIES

This annex provides the country studies for France, Spain, and Sweden. Each country study presents the results of the CAPRI modelling and the country interviews with experts and stakeholders.

The following country studies provide the results of the CAPRI modelling of the effects of the adoption of diets meeting the country-specific LiveWell Plate's recommendations by consumers in the three LiveWell for LIFE pilot countries (France, Spain, and Sweden).

They also present the information gathered in these countries through interviews with experts and stakeholders (including from competent authorities, national stakeholder associations, university/research organisations, and the industry), and additional desk-based research.

In total, 21 interviews have been conducted with the following experts and stakeholders in the three pilot countries:

- In France: Ministère de l'Écologie, du Développement durable et de l'Énergie, Ministère de l'Agriculture, de l'Agroalimentaire et de la Forêt, Institut National de la Recherche Agronomique (INRA), École nationale supérieure agronomique de Montpellier (SupAgro), Groupe Casino, Danone, and WWF France;
- In Spain: Cooperativas Agro-alimentarias, Confederación de Consumidores y Usuarios (CECU), Sociedad Española de Agricultura Ecológica (SEAE), Fundación Española de Dietistas-Nutricionistas, Universitat Politècnica de València, and WWF Spain; and
- In Sweden: The National Food Agency, Swedish Environmental Protection Agency, Federation of Swedish Farmers, Vi Konsumenter, Örebro University, Swedish University of Agricultural Sciences, and WWF Sweden.

The country- specific results of the CAPRI modelling and the information collected via the interviews and desk-based research are presented below.

France

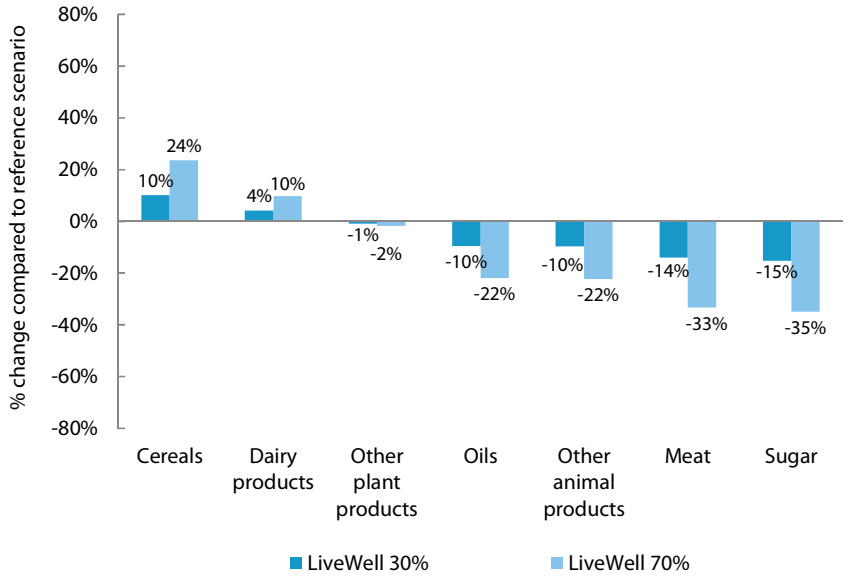
I. Effects of a switch to diets meeting the LiveWell Plate's recommendations

1. Effects on consumption patterns[a]

The figure below depicts the results of the CAPRI modelling of the effects of the adoption of the LiveWell Plate's recommendations for France on consumption for 2020. It shows consumption of seven main food groups[b] by consumers (expressed in kilocalories per head of population).

Effects are modelled assuming that (1) an additional 30% of the population meet the LiveWell Plate's recommendations in 2020 (LiveWell 30% scenario), or (2) an additional 70% of the population meet the LiveWell Plate's recommendations in 2020 (LiveWell 70% scenario). Effects are presented as percentage change compared to a scenario in which current consumption patterns remain as they are until 2020 (the reference scenario).

The figure indicates that compared to the reference scenario, the adoption of the LiveWell Plate's recommendations by consumers in France results in increased calorie intakes from the consumption of food from the groups 'cereals' and 'dairy products' while calorie intakes from the consumption of 'oils', 'other animal products', 'meat', and 'sugar' are significantly reduced under the two LiveWell scenarios.



2. Effects on public health

According to the results of a national survey conducted in 2012, the proportion of the adult population (18 years of age or older) in France which is obese is 15.0%.[c] This national survey shows that there is an inverse relationship between level of household income and obesity (this result has been seen in all surveys conducted since 1997).

The survey report also provides the following statistics on the impacts of obesity on health:

- 2.7 times more people report being treated for dyslipidemia (i.e. abnormal amount of lipids such as cholesterol and/or fat in the blood) if they are obese (compared to normal weight subjects);
- Nearly 7 times more people report cases of diabetes (treated or under diet alone) if they are obese (compared to normal weight subjects);
- The risk of being treated for high blood pressure is multiplied by 3.6 in obese subjects compared to those with a BMI of less than 25kg/m^2.

Extrapolating the data provided by the two last national surveys on the prevalence of obesity in France (14.5% in 2009 and 15.0% in 2012) to 2020, the proportion of obese people in the adult population in France in this year is estimated in this study to be 16.2% in the reference scenario.[(d)]

Compared to a prevalence of obesity of 16.2% under reference scenario, the prevalence of obesity in 2020 is expected to be 15.6% under the LiveWell 30% scenario and 14.9% under the LiveWell 70% scenario.[(e)]

A previous study estimated the cost of obesity and related diseases to amount to €780 per obese person in France in 2002.[(f)] Inflating this cost to reflect 2020 prices (€1,069 per obese person), the costs of obesity and related diseases is predicted in this study to amount to €9.2 billion in 2020 in France, assuming a continuation of the current trend (reference scenario).[(g)]

The above presented decrease in obesity levels with the adoption of the LiveWell Plate's recommendations by consumers in France could therefore lead to reduction of €0.3 billion of the costs of obesity and related diseases in 2020 under the LiveWell 30% scenario and of €0.7 billion of the costs of obesity and related diseases under the LiveWell 70% scenario, compared to the reference scenario.

Figures regarding the expected changes in the prevalence of obesity among adults and the cost of obesity and related diseases in 2020 under the LiveWell scenarios are likely to be conservative estimates as it is assumed that while the adoption of the recommendations of the LiveWell Plate will typically prevent non-obese people from becoming obese, it is also assumed that the adoption of these recommendations by people who are already obese today will have no significant effects on their obesity levels by 2020. It is therefore assumed that the health benefits of the adoption of the LiveWell Plate mainly consist of stabilizing obesity rates at current levels as the health benefits of the adoption of the LiveWell Plate recommendations only apply to those who are not obese today but would have become obese by 2020 under the reference scenario.

Furthermore, a report on the prevention of obesity in France presented to the French National Assembly in 2008 suggests that obesity also induces additional costs that are difficult to assess quantitatively. For example, obese people may be discriminated against (in terms of employment and career) or may suffer from psychological and psychosocial difficulties.

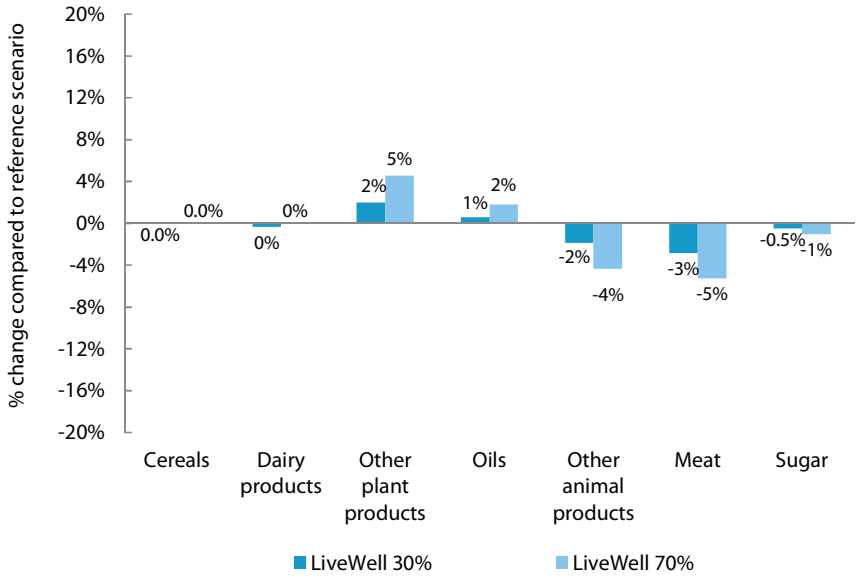
However, the report underlines that this question is complex to address as these difficulties may be either the consequence or the origin of people being overweight and obese. Other costs of obesity which are usually not assessed quantitatively include for instance costs related to back pain, physical suffering, loss of quality of life, and intangible social costs such as poor academic performance.[(h)] Moreover, additional costs may be incurred by hospitals for treating obese people. For example, it may not be possible to use standard scanners for obese people; and additional beds and stretchers adapted to the weight of obese people may also need to be purchased by hospitals.[(i)] Finally, in this study we only consider the costs of obesity and related diseases. Not considered are increased medical costs of people who are overweight, but not obese. Previous studies [(j)] indicate that the related costs may also be considerable.[(k)]

	Reference scenario	LiveWell 30%	LiveWell 70%
Expected prevalence of obesity	16.2%	15.6%	14.9%
Expected costs of obesity and related diseases	€9.2bn	€8.9 bn	€8.5 bn

3. Effects on consumer prices[(a)]

The consumer demand shifts described above in Section 1 (effects on consumption patterns) cause price changes for consumers in France. The expected consumer price changes in 2020 as modelled by CAPRI under the two LiveWell scenarios are shown in the figure below.

This figure indicates that the adoption of the LiveWell Plate's recommendations by consumers in France results in an increase in the consumer price of 'other plant products' for consumers in this country (up to +5% under the LiveWell 70% scenario) while consumer prices of 'other animal products' and meat decrease by a similar proportion (up to -4% and -5% under the LiveWell 70% scenario, respectively).

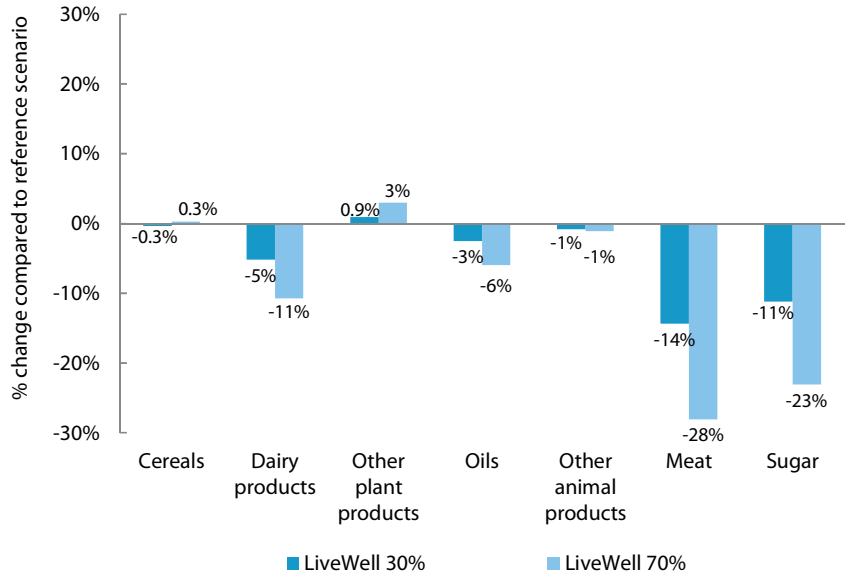


4. Market effects[(a)]

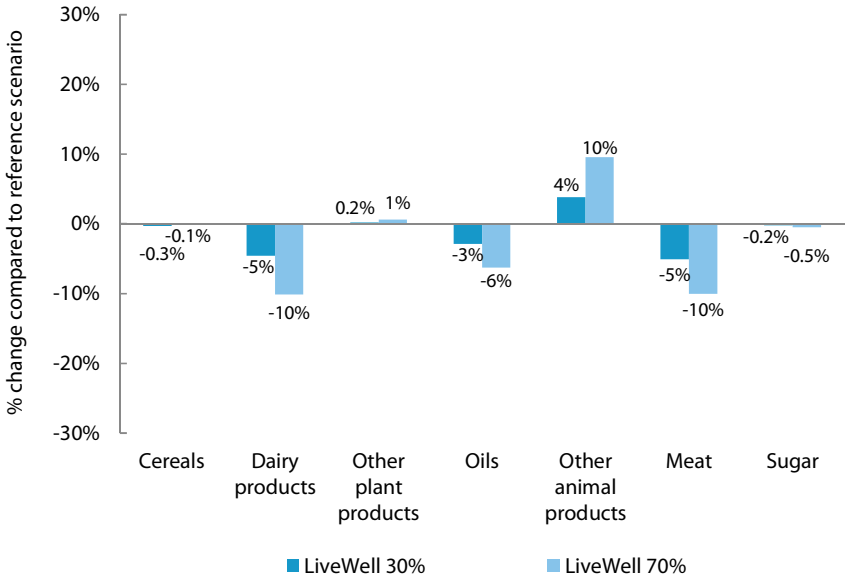
Changes in consumer demand for food products in France trigger changes in consumer prices but also affect prices for producers and quantities of food produced in this country.

The results of the CAPRI modelling concerning the effects of the adoption of the LiveWell Plate's recommendations on producer prices and production on the markets for cereals, 'other plant products', meat, 'other animal products', dairy products, oils and sugar in France are presented in the figures below. Specifically, these figures show that the adoption of the LiveWell Plate's recommendations by consumers in France results in a reduction in producer prices and production of meat in this country (up to -28% and -10% under the LiveWell 70% scenario, respectively) and in a slight increase in producer prices and production of 'other plant products' (up to 3% and 1% under the LiveWell 70% scenario, respectively).

Effects on producer prices



Effects on production



In line with the results of the CAPRI modelling, stakeholders interviewed emphasised that a switch to a LiveWell diet (involving a reduction in meat consumption) could have significant economic consequences for those involved in the meat production chain. Several interviewees were therefore of the opinion that livestock producers should be supported by public authorities to switch to another type of agricultural production or change their professional activity. Stakeholders underlined that in some areas (specifically in mountainous areas) farmers may not be able to start an alternative agricultural production to livestock breeding. In addition to livestock farmers, a reduction in meat consumption could also impact others involved in the meat supply chain, including slaughterhouses. However, interviews conducted in France also highlighted that the effects of the adoption of the LiveWell Plate's recommendations on agricultural markets in 2020 would depend on the prevailing food production systems in France at that time.

For example, one interviewee expects that if the dominant production system remains the intensive agri-food system, a switch to a LiveWell diet (involving a reduction in consumption of meat and dairy products) could lead to a reduction in jobs related to animal production. However, this negative effect on jobs could be counterbalanced by shifting animal production to more extensive approaches which are more intensive in terms of jobs, something emphasised by stakeholders interviewed. It was suggested that this could happen as a result of consumers reducing their meat consumption but demanding meat of better quality, including meat produced with more extensive approaches.

5. Welfare effects[(a)]

Price and quantity changes as presented in the figures above imply changes in the income and economic welfare of market participants in France.

The table below summarises the outcomes of the CAPRI modelling regarding the effects on consumer welfare, incomes of the agricultural sector, the processing industry and other private agents as well as on the public budget resulting from the adoption of the LiveWell Plate's recommendations (1) by an additional 30% of the population in France in 2020 (LiveWell 30% scenario) compared to the reference scenario or (2) by an additional 70% of the population in France in 2020 (LiveWell 70% scenario) compared to the reference scenario.

It shows that while consumer welfare increases considerably under both scenarios (a benefit of €1.9 billion under the LiveWell 30% scenario and a benefit of €3.0 billion under the LiveWell 70% scenario), the total net effect is negative due to reduction in agricultural income and in the income of the processing industry (in total, welfare effects are -€0.4 billion under the LiveWell 30% scenario and -€1.1 billion under the LiveWell 70% scenario).

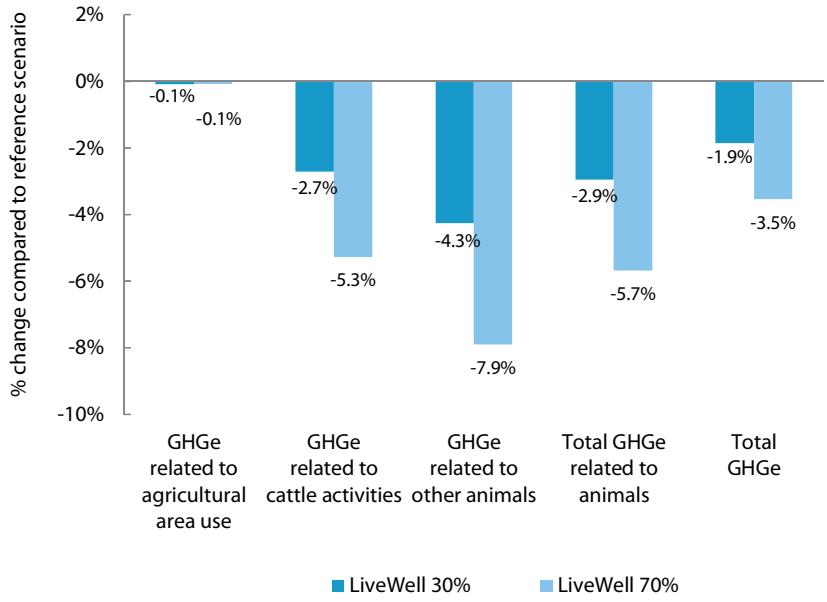
	LiveWell 30%		LiveWell 70%	
	Change in € billion compared to reference scenario	Change in % of GDP compared to reference scenario	Change in € billion compared to reference scenario	Change in % of GDP compared to reference scenario
Consumer welfare	+1.9	0.080%	+3.0	0.127%
Agricultural income	-1.5	-0.061%	-2.3	-0.095%
Income of processing industry	-0.9	-0.038%	-1.9	-0.079%
Income of other private agents	+0.1	0.002%	+0.1	0.005%
Public budget	0.0	0.000%	-0.1	-0.004%
Total	*-0.4*	*-0.016%*	*-1.1*	*-0.046%*

6. Environmental effects[(a)]

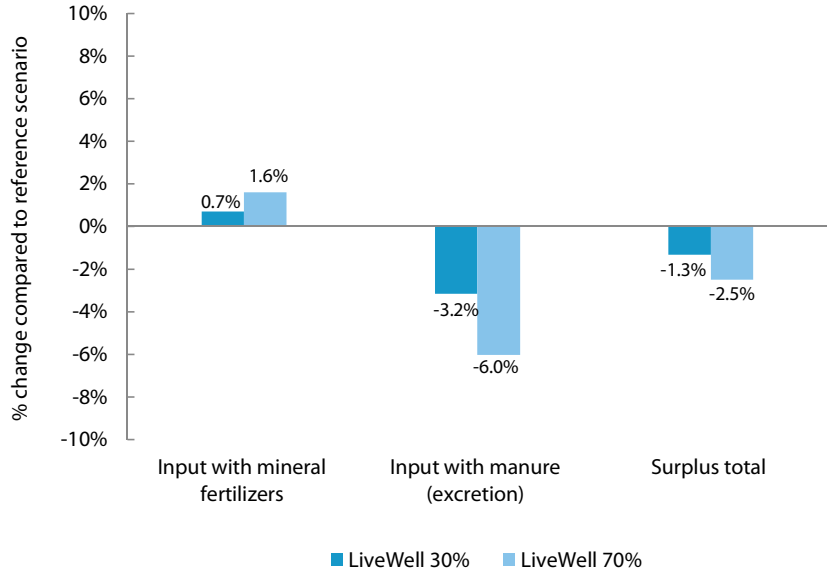
Production changes in France affect agricultural greenhouse gas emissions (GHGe) as well as the French agricultural nitrogen balance. The results of the CAPRI modelling concerning these environmental effects are presented in the figures below.

These figures show that the adoption of the LiveWell Plate's recommendations by consumers in France can lead to a total reduction in agricultural GHGe of up to 3.5% and to a reduction of the French overall nitrogen balance surplus of up to 2.5% (under the LiveWell 70% scenario).

Effects on agricultural greenhouse gas emissions (GHGe)



Effects on the nitrogen balance of agriculture



7. Other environmental/social effects

Stakeholders interviewed emphasised that grasslands used for cattle breeding in extensive production systems have important environmental attributes. For example, they contribute to carbon sequestration, water protection and biodiversity. Previous research indicates that carbon sequestration by pastures could compensate between 25% and more than 50% of the GHGe of grazing-based beef production.[l] Other benefits of grazing-based production systems indicated by interviewees include their contribution to diverse and open landscapes, and their cultural heritage value which attracts tourism. In areas characterised by limited agricultural potential and difficult climatic and topographic conditions, cattle breeding (together with the use of forests) may represent one of the few means to create economic value in these areas, as highlighted by stakeholders interviewed. Finally, pastures were seen as a means to reduce the risk of avalanches in mountainous areas.

II. Policy options to meet LiveWell Plate's recommendations

The following policy options were discussed during interviews with stakeholders in France, including:

- Policy option 1: Introduction of "Food, Nutrition and the Environment" education;
- Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products;
- Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts;
- Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts;
- Policy option 4: Development of a national sustainable food strategy.

Relevant experiences and views of stakeholders interviewed on these options are presented below.

Policy option 1: Introduction of "Food, Nutrition and the Environment" education

Stakeholders interviewed in France generally considered the introduction of education measures to ensure that children understand the impact of food consumption on the environment to be one of the most effective policy options to meet the LiveWell Plate's recommendations.

Projects related to environmental and sustainable education already exist in some schools in France, including agricultural colleges, but they often rely on volunteer teachers and/or heads of schools.[m]

Stakeholders interviewed were of the opinion that food education should consist of lectures in classrooms, but also stressed the importance of experimentation (including cooking classes, visits to farms and food manufacturing plants). Interviewees were generally of the view that relevant educational measures should be primarily targeted at pupils in primary schools as it was believed that children are the most receptive to messages on healthy and sustainable diets at this education level. This is also suggested by academic research which indicates that sensory preferences are constructed during the first years of life and are then difficult to change.[n] Previous research has also highlighted that the effectiveness of nutritional education is greater if the learning environment is formal and theoretical and persists throughout the childhood.[n]

Interviews conducted with stakeholders suggest that "Food, Nutrition and the Environment" should ideally be taught in both primary and secondary schools and as a separate subject, or if not possible, be integrated in the curriculum of subjects already taught in schools (including for example biology and geography). In this context, a working document prepared by the French government for an environmental conference which took place in France in September 2013 suggests that it is essential to ensure that sustainable development concepts are spread throughout the curriculum regardless of the programme followed by students. This document also identified the training of trainers on environmental issues and sustainable development as an essential tool.(m)

Main barriers preventing greater use of visits to farms and "green classes" as education tools include the costs of these activities and related legal issues, as indicated by stakeholders interviewed. Legal issues related to the organisation of "green classes" were also highlighted in the conclusions of the round table on environmental and sustainable development education (which took place in the framework of the above-mentioned environmental conference) which pointed out that "if a genuine right to green classes is claimed, their legal framework and responsibilities must be clearly defined, so that everyone, students, teachers or facilitators, and parents endorse their responsibilities, which will avoid deadlocks or negative societal anxieties".(m)

Regarding the benefits of in-class lessons on "food, nutrition and the environment", interviewees believed that they can influence adoption of healthy diets among children and improve dietary patterns in the long-term. This is confirmed by research on dietary behaviours which underlines that nutritional prevention programmes can have a lasting effect 40 years after their implementation.(n) Cooking classes were found to be particularly important by several interviewees as they expose pupils to new flavours that they may not know. It was further indicated that children may in turn influence what their parents cook at home. Finally, food education in schools was also believed to have the potential to improve the image of the food industry, the agricultural sector and the catering business in which many job positions remain unfilled.

Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products

A nationwide trial of environmental labelling of one year was launched in July 2011 in France, following a call by the Ministry of Ecology, Sustainable Development, and Energy. 168 businesses participated in this experiment, and environmental labelling was tested for about 1,000 products in all main sectors of the French economy (including the food sector).

These businesses committed to provide environmental information to consumers through multi-criteria environmental labelling covering the entire life-cycle of products and packaging. In addition to noting greenhouse gas emissions from the manufacture, distribution, use and end-of-life of both the products and their packaging, the environmental "ID card" also shows the products' impacts on the natural environment (water, biodiversity, air, etc.) and/or their consumption of natural resources.

To prepare for the rollout of this system, the French Environment and Energy Management Agency (Agence de l'environnement et de la maîtrise de l'énergie, ADEME) and the French national organisation for standardisation (Association Française de Normalisation, AFNOR) compiled a reference method that defines the general standards of environmental labelling (BPX 30-323) and the first guidelines by product category.

The trial was designed to test how to calculate products' ecological costs, to identify the possible challenges in data collection and other aspects of undertaking credible simplified Life-Cycle Assessments (LCAs) of products, and how businesses may display the environmental impacts of their products.(o)

At the end of this trial, the Government submitted in September 2013 an evaluation report to the French Parliament to inform future discussions on an extension of the trial.[p] This report indicates that 76% of companies that participated in the experiment consider a generalisation of environmental labelling to all their products feasible, but only in the medium- or long-term. Specifically, the report states that technical work will probably require at least two to three more years to reach a solid methodological base. The evaluation report indicates that mandatory environmental labelling at EU level could be considered, following a voluntary period.

The results of the experiment of environmental labelling conduced in France reveal that the costs of environmental labelling vary between tens of euros (with technical support from public authorities) to hundreds of euros per product (without technical support from public authorities), assuming than more than 50 products are labelled. Provision of generic data via public databases can therefore significantly reduce costs for businesses by limiting their data collection efforts. In particular, if such databases are available, time spent by businesses on collecting data to determine relevant environmental impacts of their products is expected to be reduced to about 20 minutes per product.[p]

Regarding the benefits of environmental labelling, environmental information on products can encourage consumers to choose those that are the most environmentally friendly.[m] However, several stakeholders interviewed were of the opinion that the introduction of an EU-wide mandatory environmental labelling of food products might not be an effective means to changing food-purchasing patterns as most consumers do not pay attention to the labelling information on the food products that they buy. This is also suggested by the findings of academic research which revealed that environmental labelling is more effective for consumers who are already environmentally conscious.[q] In this context, stakeholders interviewed emphasised the importance of food education (see option 1) to maximise the impacts of environmental labelling on food products.

The value of environmental labelling of food products also lies in identifying potential economic savings for businesses. For example, the process of calculating the carbon footprint can reveal an opportunity to save energy and therefore to reduce costs.

Means to lower environmental impacts of products are often the same as those that allow producers to reduce production costs: reducing packaging, reducing the use of raw materials and energy, and optimizing logistics (transport, distribution, cold chain), as highlighted by the experiences of businesses who participated in the experiment of environmental labelling in France.[p] This experiment also showed that environmental labelling allows businesses to better understand the environmental performance of their entire supply chain [p, r] and encourages them to reduce the environmental impacts of their products which may be seen as negative by consumers. In addition, providing environmental information to consumers can stimulate businesses to decrease the environmental impacts of their products in order to stand out from their competitors.[p, s] Labelling of environmental impacts of food products is therefore a source of innovation, having the potential to generate productivity gains, generate savings, improve brand and corporate image, as revealed by the experiences and views of businesses who participated in the experiment of environmental labelling in France.[p, t]

Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts

In France, a tax on soft drinks of €0.07/litre was introduced in January 2012.[u] A study published in March 2012 projected that this tax would result in an increase in retail prices of 11% leading to a decrease in consumption of soft drinks of approximately 3.4 litres per person per year.[v] According to information reported in the press, consumption of cola drinks should have grown by 2% in France in 2012 as in previous years but consumption decreased by 2% in the year.[w]

However, stakeholders interviewed in this country emphasised that this small reduction in the consumption of soft drinks in France, resulting from the limited increases in the consumer prices of these products, is expected to have only modest effects on health and obesity.

Stakeholders interviewed in France did not consider the introduction of a significant tax on unhealthy food/food with high environmental impacts to be politically feasible in the current economic context. They were of the opinion that this policy option would be likely to be met with stiff opposition from different industrial interest groups.

Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts

Current VAT rates applicable to food in France are 5.5% (for most food products), 10% (for confectionery, vegetable fats - margarines, caviar, chocolate and products containing cocoa or chocolate) and 20% (for raw chocolate, family milk chocolate, chocolate candies, cocoa beans and cocoa butter).[x]

As most food is already applied a reduced VAT of 5.5% at the moment in France, a further reduction in the VAT rate applicable to this type of food may translate in limited price reductions of these products for consumers and consequently limited consumption shifts, as emphasised by one stakeholder interviewed. It was also believed that it may be difficult in practical and political terms to reach agreement on a list of healthy food products with low environmental impacts.

In addition, stakeholders interviewed suggested that consumers may not buy more sustainable/healthy food if it becomes less expensive and highlighted the importance of practicality as one of the key factors (together with price and taste) which influences consumer choice of food products. For example, it was believed that many consumers prefer to cook meat or re-heat ready meals, as this is often considered to be easier and less time-consuming than cooking vegetables. In this respect, an interviewee pointed to the experience of food banks which suggests that even if food aid recipients are encouraged to choose food baskets which correspond to a balanced diet, they tend to not select a lot of fruits and vegetables.

Against this background, the introduction of a higher tax rate on unhealthy food/food with high environmental impacts (policy option 3a) could be more effective than reducing the VAT rate applicable to healthy food with low environmental impacts (policy option 3b), as suggested by several interviewees. In the context of food nutrition policy, energy intake from food snacking is more correlated with the prevalence of obesity than consumption of fruits and vegetables and intensity of physical activity. Targeting a reduction in consumption of energy-dense foods like snacking could therefore have a greater impact than a strategy aimed at increasing the consumption of fruits and vegetables.[n]

More generally, policy options 3a and 3b were seen as complementary fiscal instruments which could increase the price difference between unhealthy food/food with high environmental impacts and healthy food with low environmental impacts, and therefore could lead to the adoption of more sustainable diets by consumers.

Policy option 4: Development of a national sustainable food strategy

A national programme for food ("Programme national pour l'alimentation - PNA") was launched in 2011 in France. The PNA is organised around four complementary priorities with 86 actions:[y]

- To facilitate the access to quality food for all;
- To develop a high-quality food supply;
- To foster knowledge and information about food; and
- To promote French food and culinary heritage.

Sustainability is considered under the priority "high-quality food supply". The programme covers the production level (including environmental certifications of farms, organic farming, use of phytosanitary products) and addresses food wastage.[z]

An evaluation of the national programme for food was conducted in 2013 (this report is not public yet). This national programme will be updated, and stakeholders are being consulted on the content of the new programme. As a result of the evaluation of the programme and the consultation of stakeholders, the priorities for action in the framework of the national programme for food will be re-defined. According to the information collected, the issues of sustainable development and education should take more importance. However, one stakeholder interviewed was of the opinion that sustainability of food is unlikely be taken into account as a separate subject after this revision.

Notes: Stakeholders interviewed in France include representatives of Ministère de l'Écologie, du Développement durable et de l'Énergie, Ministère de l'Agriculture, de l'Agroalimentaire et de la Forêt, Institut National de la Recherche Agronomique (INRA), École nationale supérieure agronomique de Montpellier (SupAgro), Groupe Casino, Danone, and WWF France.

(a) Results of CAPRI modelling (see Section 3 and Annex 3 for information on this model). Effects on consumption patterns are assessed in terms of changes in calorie intakes (kilocalorie/head/day). Relationships between the different effects of the adoption of the LiveWell Plate's recommendations are explained in Section 3 of the report.

(b) Food groups are defined as follows: cereals (including rice), other plant products (including fruits, vegetables, potatoes, pulses, coffee, tea, cocoa, wine, and oilseeds); meat (including beef, pork, poultry and sheep and goat meat), other animal products (including eggs, fish, and other aquatic food), dairy products (including milk and milk products such as yoghurt, butter, cheese, cream), oils (including sunflower seed, rape seed, olive, and palm oil); and sugar.

(c) Inserm, Kantar Health, Roche. 2012. Enquête nationale sur l'obésité et le surpoids http://www.roche.fr/home/recherche/domaines_therapeutiques/cardio_metabolisme/enquete_nationale_obepi_2012.html.

(d) An arithmetic growth of the prevalence of obesity of 0.17% per year until 2020 is assumed, as suggested by the data provided by the two last national surveys conducted in France. This linear extrapolation of recent trends in obesity rates is a simplified prognosis done for the purpose of the assessment of the effects of the adoption of the LiveWell Plate's recommendations on the costs of obesity and related diseases in 2020 and does not constitute a trend analysis based on medical or nutritional research.

(e) For the purpose of this economic assessment, the reduction of obesity in the LiveWell scenarios has been calculated as the difference between the expected prevalence of obesity in 2020 under the reference scenario and the expected prevalence of obesity under each LiveWell scenario.

(f) Emery, C., Dinet, J., Lafuma, A., Sermet, C. Khoshnood, B., Fagnani, F. 2007. "Évaluation du coût associé à l'obésité en France." La Presse Médicale, n° 6 June 2007, pp. 832-840. Emery et al. also concluded that the annual total cost of obesity amounted to €6.2 billion for the public health insurance system, accounting for 4.6% of total public health expenditures in France in 2002 (including daily allowances paid by the public health insurance system in case of sickness), considering a prevalence of obesity of 10.7% in 2002 in France. On the basis of these figures, an information report on the prevention of obesity in France presented to the French national assembly in 2008 estimated that the cost of obesity for the public health insurance system in France could be close to 7% to 8% of public health expenditures, considering a prevalence of obesity of 16.9% (see Assemblée Nationale. 2008. Rapport d'information deposé en application de l'article 145 du Règlement par la Commission des Affaires Culturelles, Familiales et Sociales, en conclusion des travaux de la mission sur la prévention de l'obésité, et présenté par Mme Valérie Boyer, depute. Available at: http://www.assemblee-nationale.fr/13/rap-info/i1131.asp).

(g) Price was inflated using inflation index data of the International Monetary Fund (IMF), World Economic Outlook Database, October 2013. The estimated cost of obesity and related diseases of €1,069 per obese person in 2020 does not consider changes in medical technologies that may increase or decrease costs of treatment.

(h) Assemblée Nationale, 2008 (see note f above).

(i) See http://www.sante.gouv.fr/IMG/pdf/Rapport_A_Basdevant.pdf.

(j) See for example, UK Government Office for Science. 2007. Foresight - Tackling Obesities: Future Choices.

(k) It has to be noted that this study considers the cost of obesity and related diseases as they result for the health system *in a given year*. It does not consider lifetime costs of obese persons compared to lifetime costs of non-obese persons. As the former may not live as long, the overall health costs per obese person decrease. A similar argument has been made for smokers vs. non-smokers. It is, however, undisputable, that obesity and related diseases lead to specific costs for a health system, which have been the focus of this study.

(l) Peyraud, 2013. Atouts et limites de la production de protéines animals. Porceedings of the conference "Quelles protéines pour une alimentation saine et durable?" 25 February 2013. Available at: http://inra.dam.front.pad.brainsonic.com/ressources/afile/228894-37686-resource-resumes-quelles-proteines-pour-une-alimentation-saine-et-durable-o.html.

(m) French Government. 2013. La conférence environnementale, les 20 et 21 septembre 2013, Palais d'Iéna – Paris, Table ronde n°5, Éducation À l'environnement et au développement durable, Document de travail. Available at: http://www.developpement-durable.gouv.fr/IMG/pdf/Conf_envi_2013_Fiche_Table-Ronde_No5.pdf.

(n) INRA. 2010.

(o) Ministère de l'Écologie, du Développement durable et de l'Énergie. 2013. Bilan au parlement de l'exprimentation nationale, Affichage environmental des produits de grande consummation. See also: http://www.indice-environnemental.fr/; http://ademe-et-vous.ademe.fr/international-newsletter-no-18-focus-environmental-labelling-summer-trials.

(p) Ministère de l'Écologie, du Développement durable et de l'Énergie. 2013. Bilan au parlement de l'expérimentation nationale, Affichage environnemental des produits de grande consommation;

(q) Bertrandias, L. 2012. Are consumers really decided to make green choices? Explaining the perceived environmental harmfulness/behaviour consistency. The results of the experiment in France do not allow to draw conclusions on the effects of environmental labelling on purchasing decisions of consumers. The trial did not permit the quantifying of possible shifts in consumption for several reasons: the process was little known to the general public, it concerned only very few products per store department/section. These limitations of the trial were also confirmed by a representative of a supermarket chain interviewed in France which provides environmental labelling on the products of its own brand.

(r) 78% of businesses that participated in the experiment of environmental labelling in France indicated that labelling was a way to better understand the environmental performance of their entire supply chain.

(s) 50% of respondents who participated in the experiment of environmental labelling in France indicated that labelling the environment impacts of their products allowed them to reduce these impacts. Indeed, the analysis of the life-cycle of products raises awareness of the production steps which have the most important impacts on the environment and allows producers to prioritize efforts for improvement. In addition, 59% of respondents stated that the experiment has already been positive for the brand and corporate image, and 78% considered that labelling will have these positive impacts in the future.

(t) 73% of respondents who participated in the experiment of environmental labelling in France believe that this labelling represents a potential source of competitiveness.

(u) http://circulaire.legifrance.gouv.fr/pdf/2012/01/cir_34494.pdf.

(v) Bonnet et al., 2012.

(w) Le Figaro, 13 December 2012.

(x) http://vosdroits.service-public.fr/professionnels-entreprises/F23567.xhtml.

(y) http://www.ambafrance-us.org/spip.php?article2990.

(z) http://alimentation.gouv.fr/IMG/pdf/PNA-09022011.pdf, http://alimentation.gouv.fr/pna-signature-accords-collectifs.

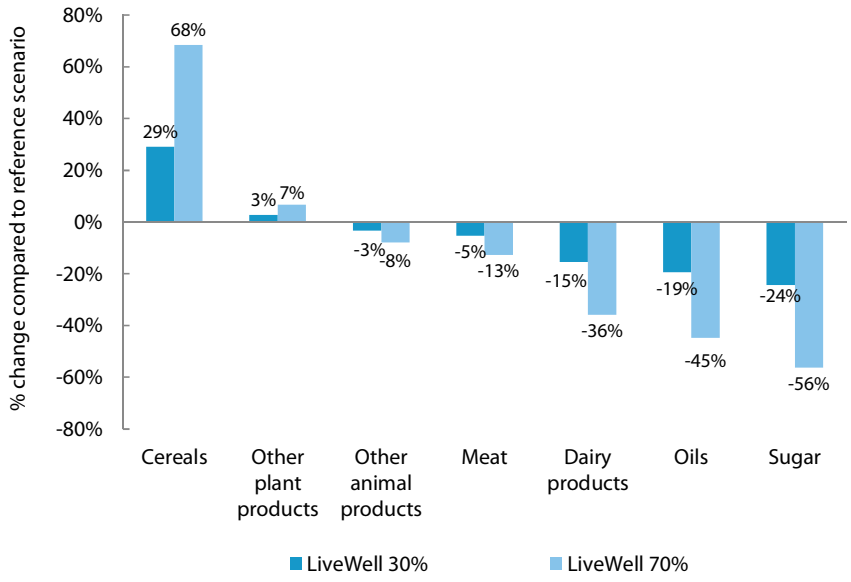
Spain

I. Effects of a switch to diets meeting the LiveWell Plate's recommendations

1. Effects on consumption patterns[a]

The figure below depicts the results of the CAPRI modelling of the effects of the adoption of the LiveWell Plate's recommendations for Spain on consumption for 2020. It shows consumption of seven main food groups[b] by consumers (expressed in kilocalories per head of population). Effects are modelled assuming that (1) an additional 30% of the population meet the LiveWell Plate's recommendations in 2020 (LiveWell 30% scenario), or (2) an additional 70% of the population meet the LiveWell Plate's recommendations in 2020 (LiveWell 70% scenario). Effects are presented as percentage change compared to a scenario in which current consumption patterns remain as they are until 2020 (the reference scenario).

The figure indicates that compared to the reference scenario, the adoption of the LiveWell Plate's recommendations by consumers in Spain results in increased calorie intakes from the consumption of food from the groups 'cereals' and 'other plant products' while calorie intakes from the consumption of 'other animal products', 'meat', 'dairy products', 'oils' and 'sugar' are reduced under the two LiveWell scenarios.



2. Effects on public health

Since the first National Health Survey in 1987, obesity has followed an upward trend in Spain (from 7.4% in 1987 to 17% of the population aged 18 and over in 2012) in both sexes, but has been more marked in men than in women (18% of men and 16% of women were obese in 2012).[c] Extrapolating the data provided by the two last national surveys on the prevalence of obesity in Spain (15% in 2006 and 17% in 2012) to 2020, the proportion of obese people persons in the adult population in Spain in this year is estimated in this study to be 19.3% in the reference scenario.[d]

Compared to the reference scenario, the prevalence of obesity in 2020 is expected to be 18.5% under the LiveWell 30% scenario and 17.4% under the LiveWell 70% scenario.[e]

A previous study estimated the costs of obesity and related diseases to amount to €2.5 billion in 2002 in Spain.[f] In this year, the prevalence of obesity was 12.9% in Spain.[g] On the basis of this data, it is estimated that the cost of obesity and related diseases was €596 per obese person in 2002. Inflating this cost to reflect 2020 prices (€857 per obese person), the costs of obesity and related diseases is predicted in this study to amount to €6.5 billion in 2020 in Spain, assuming a continuation of the current trend (reference scenario).[h]

The above presented decrease in obesity levels with the adoption of the LiveWell Plate's recommendations by consumers in Spain could therefore lead to reduction of €0.3 billion of the costs of obesity and related diseases in 2020 under the LiveWell 30% scenario and of €0.6 billion of the costs of obesity and related diseases under the LiveWell 70% scenario, compared to the reference scenario.

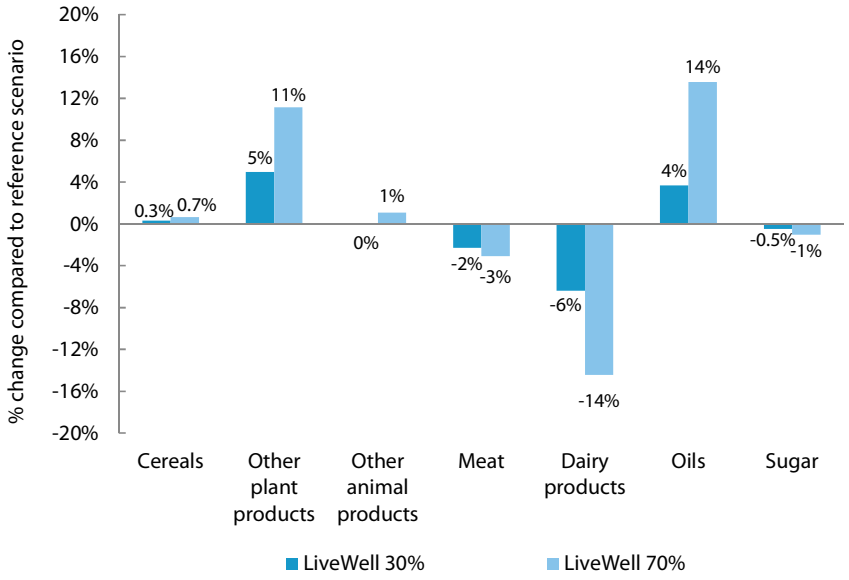
Figures regarding the expected changes in the prevalence of obesity among adults and the cost of obesity and related diseases in 2020 under the LiveWell scenarios are likely to be conservative estimates as it is assumed that while the adoption of the recommendations of the LiveWell Plate will typically prevent non-obese people from becoming obese, it is also assumed that the adoption of these recommendations by people who are already obese today will have no significant effects on their obesity levels by 2020. It is therefore assumed that the health benefits of the adoption of the LiveWell Plate mainly consist of stabilizing obesity rates at current levels as the health benefits of the adoption of the LiveWell Plate recommendations only apply to those who are not obese today but would have become obese by 2020 under the reference scenario. In addition, in this study we only consider the costs of obesity and related diseases. Not considered are increased medical costs of people who are overweight, but not obese. Previous studies[i] indicate that the related costs may also be considerable.[j]

	Reference scenario	LiveWell 30%	LiveWell 70%
Expected prevalence of obesity	19.3%	18.5%	17.4%
Expected costs of obesity and related diseases	€6.5 bn	€6.2 bn	€5.9 bn

3. Effects on consumer prices[a]

The consumer demand shifts described above in Section 1 (effects on consumption patterns) cause price changes for consumers in Spain. The expected consumer price changes in 2020 as modelled by CAPRI under the two LiveWell scenarios are shown in the figure below.

This figure indicates that the adoption of the LiveWell Plate's recommendations by consumers in Spain results in an increase in the consumer prices of 'other plant products' and oils in this country (up to +11% and + 14% under the LiveWell 70% scenario, respectively) while consumer prices of meat and dairy products decrease (up to -3% and -14% under the LiveWell 70% scenario, respectively).



4. Market effects[(a)]

Changes in consumer demand for food products in Spain trigger changes in consumer prices but also affect prices for producers and quantities of food produced in this country. Changes in consumers' demand also affect Spanish exports and imports.

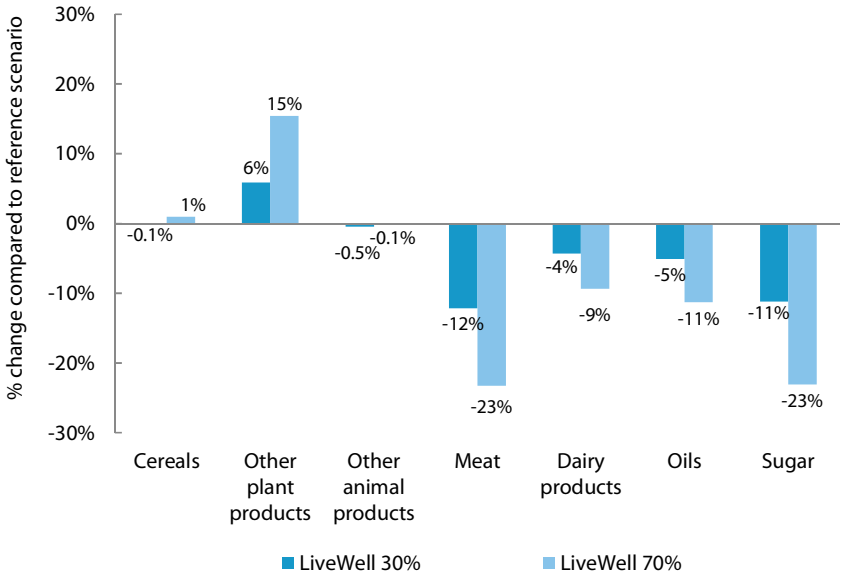
The results of the CAPRI modelling concerning the effects of the adoption of the LiveWell Plate's recommendations on producer prices, production, imports and exports on the markets for cereals, 'other plant products', meat, 'other animal products', dairy products, oils and sugar in Spain are presented in the figures below.

Specifically, these figures show that the adoption of the LiveWell Plate's recommendations by consumers in Spain results in a reduction in producer prices and production of meat, dairy products and oil in this country. The producer price of 'other plant products' increases significantly (up to 15% under the LiveWell 70% scenario) while production of these products increases only slightly (up to +1% under the LiveWell 70% scenario).

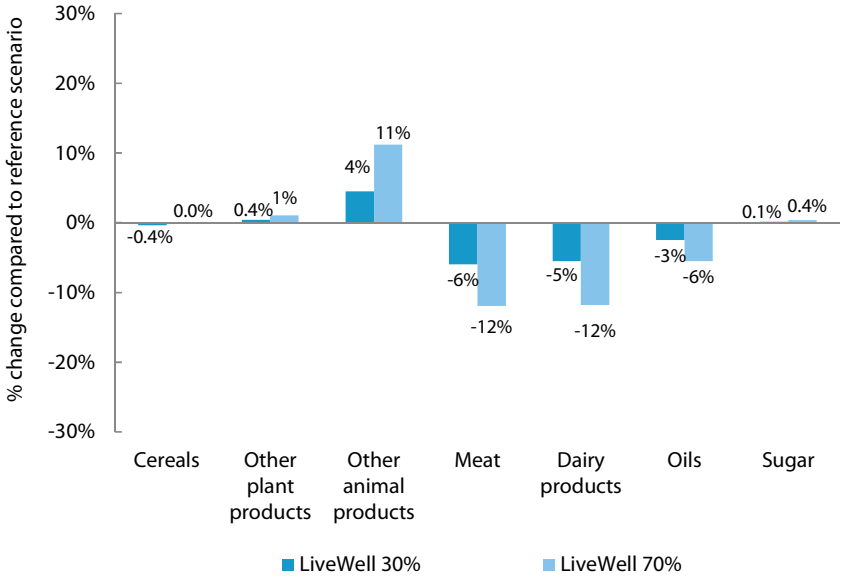
In line with the results of the CAPRI modelling, stakeholders interviewed emphasised that a switch to a LiveWell diet (involving a reduction in meat consumption) could have significant economic consequences for livestock farmers in Spain. However, the adoption of the LiveWell diet may encourage people in this country to consume less but better quality (and more expensive) meat, as presumed by stakeholders interviewed. In other words, demand for meat produced with intensive approaches would decrease to the benefit of extensive farming.

The adoption of the Live Well Plate's recommendations may therefore result in job creation in the agricultural sector as extensive-based production is more intensive in labour, as highlighted by stakeholders during the interviews. One interviewee was of the opinion that an increase in demand for fruits and vegetables could be largely covered by a reduction in waste of these products.

Effects on producer prices



Effects on production



5. Welfare effects [a]

Price and quantity changes as presented in the figures above imply changes in the income and economic welfare of market participants in Spain. The table below summarises the outcomes of the CAPRI modelling regarding the effects on consumer welfare, incomes of the agricultural sector, the processing industry and other private agents as well as on the public budget

resulting from the adoption of the LiveWell Plate's recommendations (1) by an additional 30% of the population in Spain in 2020 (LiveWell 30% scenario) compared to the reference scenario or (2) by an additional 70% of the population in Spain in 2020 (LiveWell 70% scenario) compared to the reference scenario.

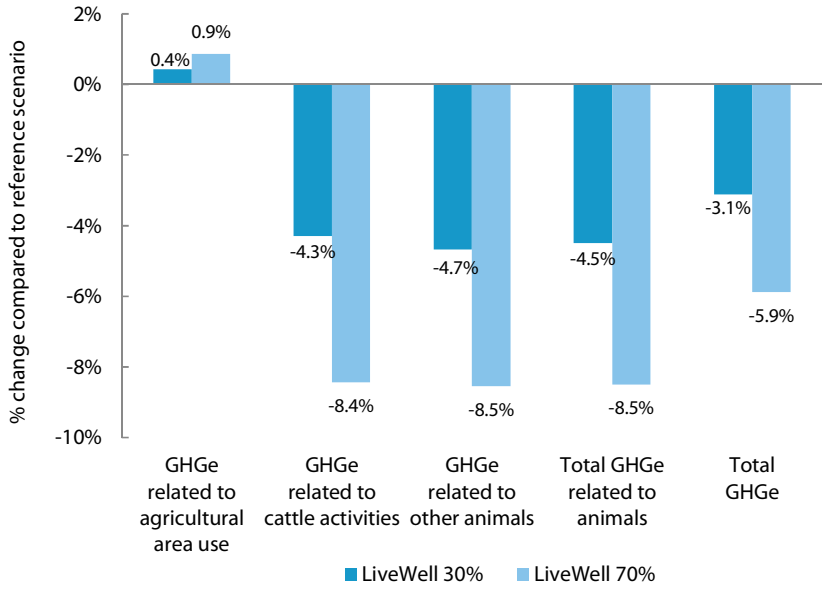
It shows that while consumer welfare increases considerably under both scenarios (a benefit of €0.8 billion under the LiveWell 30% scenario and a benefit of €1.0 billion under the LiveWell 70% scenario), the total net effect is negative due to reduction in agricultural income and in the income of the processing industry (in total, welfare effects are -€0.7 billion under the LiveWell 30% scenario and -€1.3 billion under the LiveWell 70% scenario).

	LiveWell 30%		LiveWell 70%	
	Change in € billion compared to reference scenario	Change in % of GDP compared to reference scenario	Change in € billion compared to reference scenario	Change in % of GDP compared to reference scenario
Consumer welfare	+€0.8 bn	+0.074%	+€1.0 bn	+0.088%
Agricultural income	-€1.0 bn	-0.093%	-€1.2 bn	-0.105%
Income of processing industry	-€0.4 bn	-0.032%	-€0.7 bn	-0.066%
Income of other private agents	+€0.0 bn	+0.002%	+€0.1 bn	+0.005%
Public budget	-€0.2 bn	-0.014%	-€0.4 bn	-0.034%
Total	*-€0.7 bn*	-0.063%	*-€1.3 bn*	-0.113%

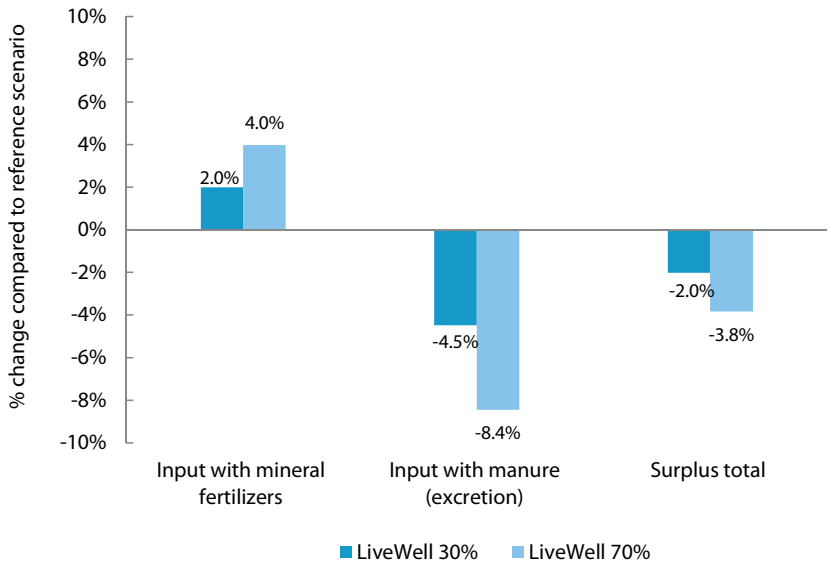
6. Environmental effects [a]

Production changes in Spain affect agricultural greenhouse gas emissions (GHGe) as well as the Spanish agricultural nitrogen balance. The results of the CAPRI modelling concerning these environmental effects are presented in the figures below. These figures show that the adoption of the LiveWell Plate's recommendations by consumers in Spain can lead to a total reduction in agricultural GHGe of up to 5.9% and to a reduction of the Spanish overall nitrogen balance surplus of up to 3.8% (under the LiveWell 70% scenario).

Effects on agricultural greenhouse gas emissions (GHGe)



Effects on the nitrogen balance of agriculture



7. Other environmental/social effects

Stakeholders emphasised in the country interviews that the adoption of the LiveWell diet could result in a consumption shift towards meat produced with less intensive approaches such as organic farming (see Section 4 above). They suggested that a shift to less intensive farming would result in more jobs created in rural areas and slow the movement of population to cities, hence decreasing environmental problems in urban areas resulting from pressures such as overcrowding, pollution and traffic. Interviewees also highlighted the environmental benefits extensive farming can create. For example, the positive impacts on biodiversity of grazing-based beef production was referred to, as was the aesthetic value of landscapes.

II. Policy options to meet LiveWell Plate's recommendations

The following policy options were discussed during interviews with stakeholders in Spain, including:

- Policy option 1: Introduction of "Food, Nutrition and the Environment" education;
- Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products;
- Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts;
- Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts;
- Policy option 4: Development of a national sustainable food strategy.

Policy option 1: Introduction of "Food, Nutrition and the Environment" education

Policy option 1 was seen as necessary by stakeholders as education can change behaviour in the long term. However, education related to "Food, Nutrition and the Environment" in schools in Spain is very limited at the moment according to the information provided by stakeholders interviewed. It was also indicated that textbooks used in schools have little or no information on sustainable food. School gardening activities were seen as being a good way to help children learn about agro-ecological concepts and the origin of food. However, the use of gardens as teaching tools remains rare in Spain at the moment.

Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products

Concerning policy option 2, several stakeholders interviewed emphasised that in their experience consumers do not tend to look at labels on food products. In this context, it was suggested that an environmental labelling initiative should be accompanied by a consumer awareness raising campaign on the issue of sustainable diets.

Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts

The introduction of a higher tax rate on unhealthy food/food with high environmental impacts was not seen as politically feasible in Spain at the moment by the stakeholders interviewed.

It was also considered that retailers/processors may reduce the price paid to farmers to limit the rise in the consumer price of meat resulting from the introduction of a tax on unhealthy food/food with high environmental impacts.

Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts

As a reduction in the VAT applicable to food would decrease government revenues, option 3b was thought to be difficult to implement in the current economic context, while only slightly reducing prices for consumers. Indeed, the VAT rate applicable to food is 4% or 10% in Spain at the moment, depending on the food product considered.[(k)] A further reduction in the VAT rate applicable to this type of food will result in limited price reductions of these products for consumers and consequently limited consumption changes, as emphasised during the interviews.

Policy option 4: Development of a national sustainable food strategy

Finally, stakeholders interviewed generally considered that policy option 4 (development of a sustainable food strategy) would be very useful. Interviewees suggested that the national sustainable food strategy should aim at developing a definition of "sustainable diet" that would be agreed by all stakeholders. In this respect, it was considered that this definition should not only refer to environmental issues but also take social and economic aspects of sustainable food into account. Other components of the national sustainable food strategy proposed by stakeholders interviewed include:

- Education measures to encourage the adoption of sustainable diets; and
- Support for research on the health impacts of sustainable diets.

Notes: Stakeholders interviewed in Spain include representatives of Cooperativas Agro-alimentarias, Confederación de Consumidores y Usuarios (CECU), Sociedad Española de Agricultura Ecológica (SEAE), Fundación Española de Dietistas-Nutricionistas, Universitat Politècnica de València, and WWF Spain.

(a) Results of CAPRI modelling (see Section 3 and Annex 3 for information on this model). Effects on consumption patterns are assessed in terms of changes in calorie intakes (kilocalorie/head/day). Relationships between the different effects of the adoption of the LiveWell Plate's recommendations are explained in Section 3 of the report.

(b) Food groups are defined as follows: cereals (including rice), other plant products (including fruits, vegetables, potatoes, pulses, coffee, tea, cocoa, wine, and oilseeds); meat (including beef, pork, poultry and sheep and goat meat), other animal products (including eggs, fish, and other aquatic food), dairy products (including milk and milk products such as yoghurt, butter, cheese, cream), oils (including sunflower seed, rape seed, olive, and palm oil); and sugar.

(c) Press release of 14 March 2013 by the National Institute of Statistics, Ministry of Health, Social Services and Equality on the National Health Survey 2011 – 2012, available at: http://www.ine.es/prensa/np770.pdf.

(d) An arithmetic growth of the prevalence of obesity of 0.33% per year until 2020 is assumed, as suggested by the data provided by the two last national surveys conducted in Spain. This linear extrapolation of recent trends in obesity rates is a simplified prognosis done for the purpose of the assessment of the effects of the adoption of the LiveWell Plate's recommendations on the costs of obesity and related diseases in 2020 and does not constitute a trend analysis based on medical or nutritional research.

(e) For the purpose of this economic assessment, the reduction of obesity in the LiveWell scenarios has been calculated as the difference between the expected prevalence of obesity in 2020 under the reference scenario and the expected prevalence of obesity under each LiveWell scenario.

(f) http://www.economiadelasalud.com/Ediciones/03/PDF/03Analisis_Costes.pdf.

(g) Prevalence of obesity among those aged 20 and over (http://www.fesnad.org/publicaciones/pdf/renc_senc.pdf).

(h) Price was inflated using inflation index data of the International Monetary Fund (IMF), World Economic Outlook Database, October 2013.

(i) See for example, UK Government Office for Science. 2007. Foresight - Tackling Obesities: Future Choices.

(j) It has to be noted that this study considers the cost of obesity and related diseases as they result for the health system *in a given year*. It does not consider lifetime costs of obese persons compared to lifetime costs of non-obese persons. As the former may not live as long, the overall health costs per obese person decrease. A similar argument has been made for smokers vs. non-smokers. It is, however, undisputable, that obesity and related diseases lead to specific costs for a health system, which have been the focus of this study.

(k) VAT rate applicable to food in Spain is either 4% (on basic food products including eggs, milk, fruits, vegetables, cheese, bread) or 10% (for example on meat, fish, processed canned food).

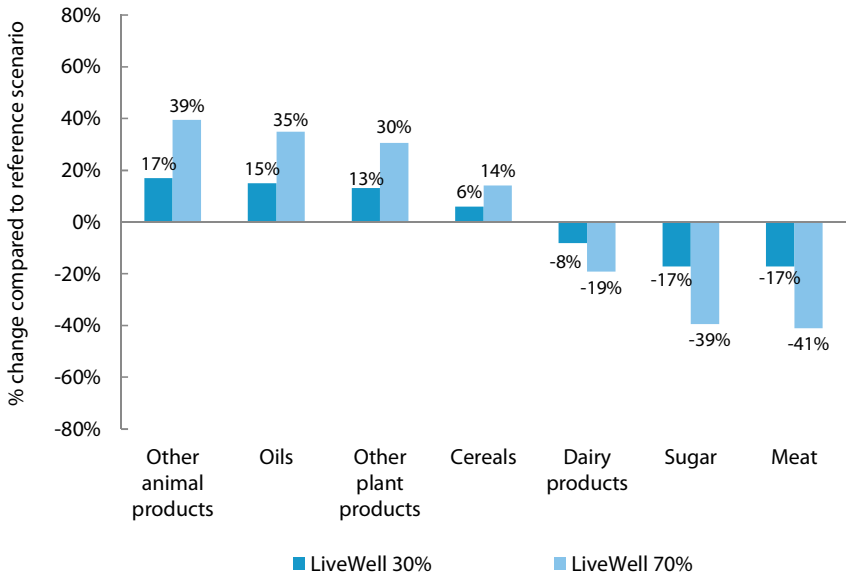
Sweden

I. Effects of a switch to diets meeting the LiveWell Plate's recommendations

1. Effects on consumption patterns[a]

The figure below depicts the results of the CAPRI modelling of the effects of the adoption of the LiveWell Plate's recommendations for Sweden on consumption for 2020. It shows consumption of seven main food groups[b] by consumers (expressed in kilocalories per head of population). Effects are modelled assuming that (1) an additional 30% of the population meet the LiveWell Plate's recommendations in 2020 (LiveWell 30% scenario), or (2) an additional 70% of the population meet the LiveWell Plate's recommendations in 2020 (LiveWell 70% scenario). Effects are presented as percentage change compared to a scenario in which current consumption patterns remain as they are until 2020 (the reference scenario).

The figure indicates that compared to the reference scenario, the adoption of the LiveWell Plate's recommendations by consumers in Sweden results in increased calorie intakes from the consumption of food from the groups 'other animal products', 'oils', 'other plant products' and 'cereals' while calorie intakes from the consumption of 'dairy products', 'sugar', and 'meat' are reduced under the two LiveWell scenarios.



2. Effects on public health

According to Statistics Sweden, the prevalence of obesity among people aged 16 or over in this country was 11.8% in 2012.[c] A joint monitoring study of diet, physical activity and overweight commissioned by the Nordic Council of Ministers, a geo-political inter-parliamentary forum for co-operation between the Nordic countries found that more participants living at the countryside than in the capital were overweight and obese, and that the Body Mass Index (BMI) tended to be higher in participants with a basic education.

Extrapolating the data provided by Statistics Sweden on the prevalence of obesity in Sweden (11.2% in 2010-2011 and 11.8% in 2012) to 2020, the proportion of obese people in the adult population in Sweden in this year is estimated in this study to be 13.9% in the reference scenario.[e]

Compared to the reference scenario, the prevalence of obesity in 2020 is expected to be 13.2% under the LiveWell 30% scenario and 12.4% under the LiveWell 70% scenario.[f]

According to the data collected in Sweden, the cost of obesity and related diseases amounted to €2,806 per obese person in this country in 2003.[g] Inflating this cost to reflect 2020 prices (€3,701 per obese person), the costs of obesity and related diseases is predicted in this study to amount to €4.0 billion in 2020 in Sweden, assuming a continuation of the current trend (reference scenario).[g]

The above presented decrease in obesity levels with the adoption of the LiveWell Plate's recommendations by consumers in Sweden could therefore lead to reduction of €0.2 billion of the costs of obesity and related diseases in 2020 under the LiveWell 30% scenario and of €0.4 billion of the costs of obesity and related diseases under the LiveWell 70% scenario, compared to the reference scenario.

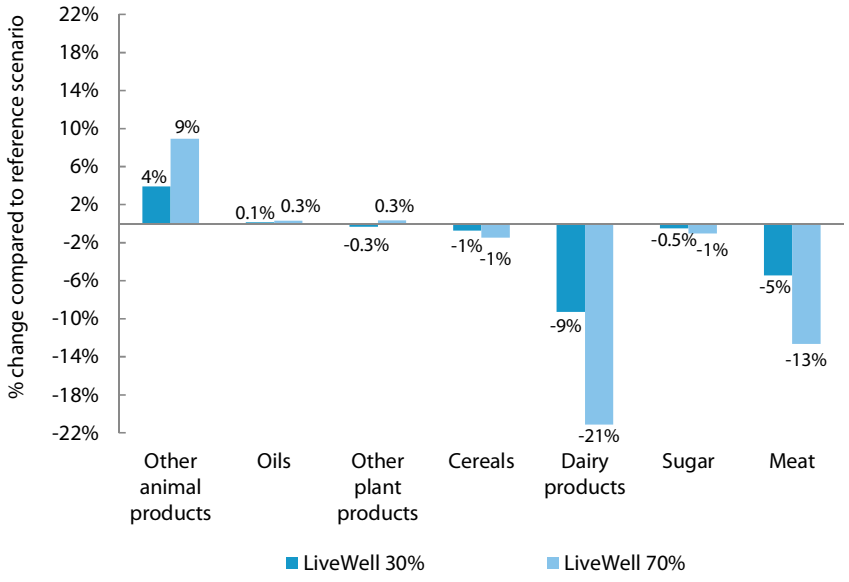
Figures regarding the expected changes in the prevalence of obesity among adults and the cost of obesity and related diseases in 2020 under the LiveWell scenarios are likely to be conservative estimates as it is assumed that while the adoption of the recommendations of the LiveWell Plate will typically prevent non-obese people from becoming obese, it is also assumed that the adoption of these recommendations by people who are already obese today will have no significant effects on their obesity levels by 2020. It is therefore assumed that the health benefits of the adoption of the LiveWell Plate mainly consist of stabilizing obesity rates at current levels as the health benefits of the adoption of the LiveWell Plate recommendations only apply to those who are not obese today but would have become obese by 2020 under the reference scenario. In addition, in this study we only consider the costs of obesity and related diseases. Not considered are increased medical costs of people who are overweight, but not obese. Previous studies[h] indicate that the related costs may also be considerable.[i]

	Reference scenario	LiveWell 30%	LiveWell 70%
Expected prevalence of obesity	13.9%	13.2%	12.4%
Expected costs of obesity and related diseases	€4.0 bn	€3.8 bn	€3.6 bn

3. Effects on consumer prices[a]

The consumer demand shifts described above in Section 1 (effects on consumption patterns) cause price changes for consumers in Sweden. The expected consumer price changes in 2020 as modelled by CAPRI under the two LiveWell scenarios are shown in the figure below.

This figure indicates that the adoption of the LiveWell Plate's recommendations by consumers in Sweden results in an increase in the consumer price of 'other animal products' in this country (up to +9% under the LiveWell 70% scenario) while consumer prices of dairy products and meat decrease by a greater proportion (up to -21% and -13% under the LiveWell 70% scenario, respectively).



4. Market effects[(a)]

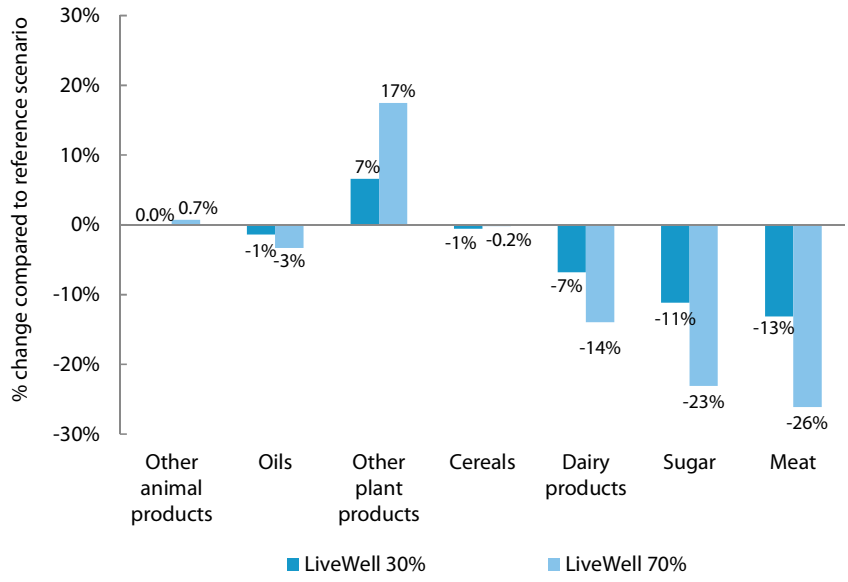
Changes in consumer demand for food products in Sweden trigger changes in consumer prices but also affect prices for producers and quantities of food produced in this country. Changes in consumers' demand also affect Swedish exports and imports.

The results of the CAPRI modelling concerning the effects of the adoption of the LiveWell Plate's recommendations on producer prices, production, imports and exports on the markets for cereals, 'other plant products', meat, 'other animal products', dairy products, oils and sugar in Sweden are presented in the figures below.

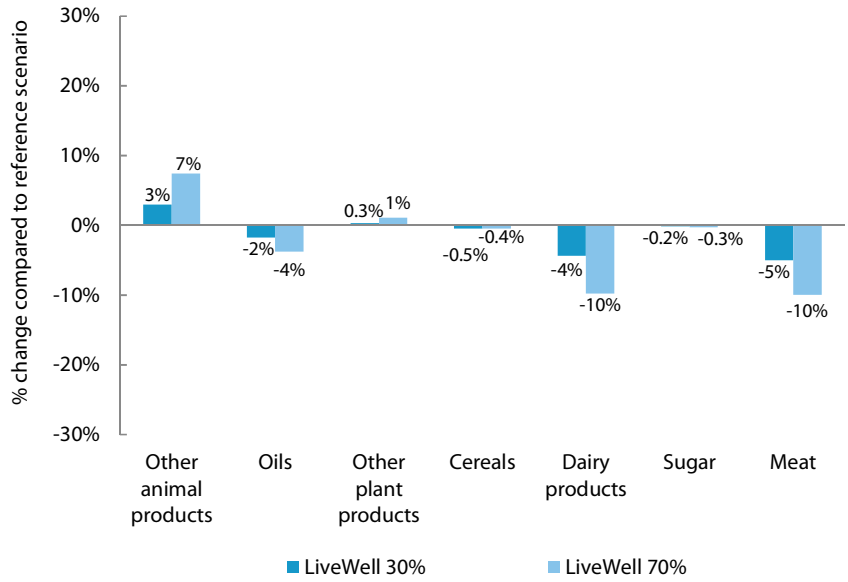
Specifically, these figures show that the adoption of the LiveWell Plate's recommendations by consumers in Sweden results in a reduction in producer prices and production of dairy products and meat in this country (up to -14% and -10% for dairy products and up -26% and -10% for meat under the LiveWell 70% scenario, respectively). The producer price of 'other plant products' increases significantly (up to 17% under the LiveWell 70% scenario) while production of these products increases only slightly (up to +1% under the LiveWell 70% scenario).

In line with the results of the CAPRI modelling, stakeholders interviewed were of the opinion that the adoption of the LiveWell Plate's recommendations (which involves a reduction in meat consumption) by consumers in Sweden could generate economic difficulties for livestock farmers in this country (a sector in which profitability is already not high, as emphasised by interviewees). However, it was suggested that consumers who adopt a LiveWell diet may purchase less meat but be willing to spend more for meat of better quality (such as meat produced in Sweden with less intensive approaches and with better environmental and animal welfare standards, in comparison to imported meat).

Effects on producer prices



Effects on producer prices



5. Welfare effects[(a)]

Price and quantity changes as presented in the figures above imply changes in the income and economic welfare of market participants in Sweden.

The table below summarises the outcomes of the CAPRI modelling regarding the effects on consumer welfare, incomes of the agricultural sector, the processing industry and other private agents as well as on the public budget resulting from the adoption of the LiveWell Plate's recommendations (1) by an additional 30% of the population in Sweden in 2020 (LiveWell 30% scenario) compared to the reference scenario or (2) by an additional 70% of the population in Sweden in 2020 (LiveWell 70% scenario) compared to the reference scenario.

It shows that consumer welfare increases under the LiveWell 30% scenario (benefit of €0.2 billion) but that no change in consumer welfare is expected under the LiveWell 70% scenario. This results in a zero net effect under the LiveWell 30% scenario and in a negative net effect under the LiveWell 70% scenario due to reduction in agricultural income and in the income of the processing industry (in total, welfare effects are -€0.3 billion under the LiveWell 70% scenario).

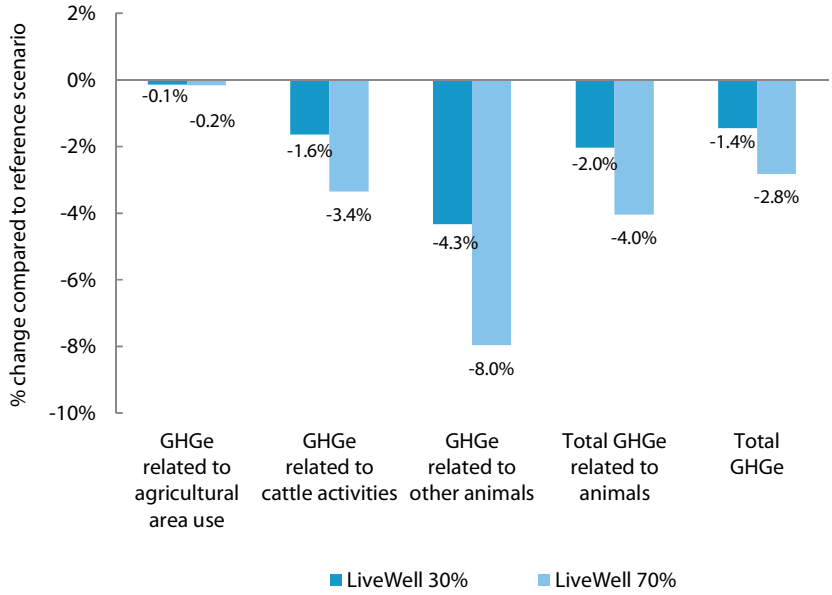
	LiveWell 30%		LiveWell 70%	
	Change in € billion compared to reference scenario	Change in % of GDP compared to reference scenario	Change in € billion compared to reference scenario	Change in % of GDP compared to reference scenario
Consumer welfare	+€0.2 bn	0.043%	€0.0 bn	0.009%
Agricultural income	-€0.1 bn	-0.029%	-€0.2 bn	-0.048%
Income of processing industry	-€0.1 bn	-0.014%	-€0.1 bn	-0.029%
Income of other private agents	€0.0 bn	0.004%	€0.0 bn	0.007%
Public budget	€0.0 bn	0.002%	€0.0 bn	0.006%
Total	*€0.0 bn*	*0.007%*	*-€0.3 bn*	*-0.055%*

6. Environmental effects[(a)]

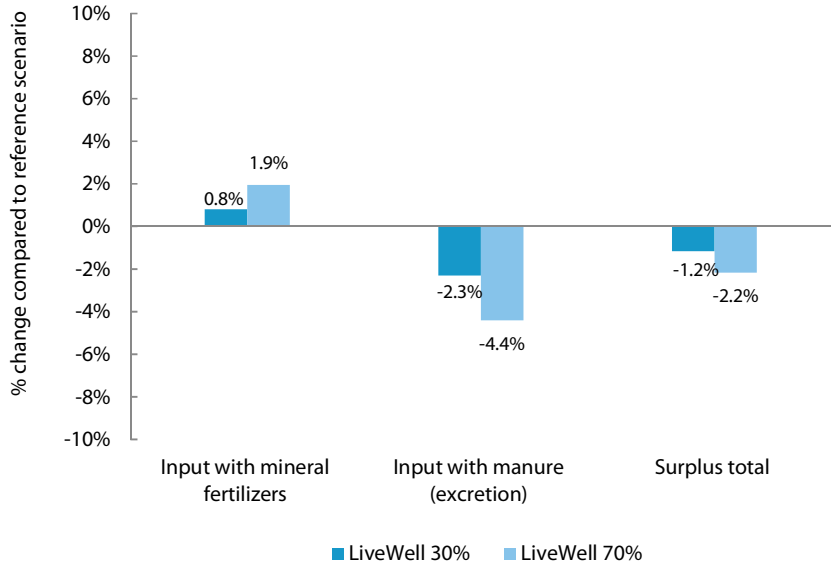
Production changes in Sweden affect agricultural greenhouse gas emissions (GHGe) as well as the Swedish agricultural nitrogen balance. The results of the CAPRI modelling concerning these environmental effects are presented in the figures below.

These figures show that the adoption of the LiveWell Plate's recommendations by consumers in Sweden can lead to a total reduction in agricultural GHGe of up to 2.8% and to a reduction of the Swedish overall nitrogen balance surplus of up to 2.2% (under the LiveWell 70% scenario).

Effects on agricultural greenhouse gas emissions (GHGe)



Effects on the nitrogen balance of agriculture



7. Other environmental/social effects

As highlighted by the comments of stakeholders on the market effects of a switch to more sustainable diets (see Section 4 above), the adoption of the LiveWell Plate's recommendations may result in a consumption shift towards meat produced with more extensive approaches. Stakeholders interviewed emphasized the positive effects of grazing based livestock production for carbon sequestration, biodiversity, landscapes and attractiveness of living in rural areas, as well as creation of rural jobs.

Moreover, interviewees pointed to the importance of preserving pastures as grazing-based beef and lamb production plays an important role in biodiversity conservation. In addition, grazing-based meat production systems enable carbon sequestration in pastureland, natural grassland and in trees in pastures, which would entirely or partially compensate for the emissions of GHGe of these production systems.[j] Interviewed stakeholders emphasised that more extensive production approaches are more animal welfare friendly, which in turn contributes to good animal health. Healthy animals also require less use of antibiotics, which reduces the risk of antibiotic resistance, as emphasized during the interviews. Nonetheless, farm animals which do not graze, such as pigs and chickens, were seen as having no specific role to play in environmental preservation by stakeholders. Taking the example of chickens, more intensive production systems for poultry meat reduce GHGe, but it was also emphasised that these production approaches are also less animal welfare friendly.

Interviewees also stressed the importance of considering health and environmental impacts of food production in countries from which food is imported. This was regarded as especially relevant for Sweden because almost half of agricultural commodities and food consumed in this country are imported.[k] At the same time, stakeholders emphasised that the use of pesticides in countries from which fruits and vegetables are imported is generally higher than in Sweden.[l] Finally, Swedish farming was seen to be more efficient than farming in countries from which Sweden imports food. Specifically, greater efficiency and fewer animals in farms in Sweden have reduced emissions by 1.2 million tonnes of CO_2 equivalent from the Swedish agricultural production during the period 1990–2005.[j]

II. Policy options to meet LiveWell Plate's recommendations

The following policy options were discussed during interviews with stakeholders in Sweden, including:

- Policy option 1: Introduction of "Food, Nutrition and the Environment" education;
- Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products;
- Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts;
- Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts;
- Policy option 4: Development of a national sustainable food strategy.

Relevant experiences and views of stakeholders interviewed on these options are presented below.

Policy option 1: Introduction of "Food, Nutrition and the Environment" education

The introduction of education measures to ensure that school children understand the impact of food consumption on the environment was considered to be very important by stakeholders interviewed. Education was seen as a key tool to change dietary patterns. They indicated that "Food, Nutrition and the Environment" education should be started at an early stage (as it was thought to be easier to influence dietary behaviour of younger children) and be taught in both primary and secondary schools. Benefits of "Food, Nutrition and the Environment" education were considered to be much higher than their costs, although they may only be realised in the long-term. Specifically, several tools to ensure that children understand the impacts of food on the environment were discussed with stakeholders during the interviews, including in-class lessons on "Food, Nutrition and the Environment", visits to farms, and school lunches. Relevant experiences and views of stakeholders on these tools are summarised below.

In-class lessons on "Food, Nutrition and the Environment":

According to the information collected, food education is taught as part of the topic "home and consumer knowledge" in primary schools (about 1-2 hours a week for a duration of 3 years). However, stakeholders interviewed emphasized that much more could be done concerning food education in schools in Sweden. Specifically, it was believed that school teachers are not very well informed about the environmental impacts of food. Knowledge of teachers on this topic was considered not to be up-to-date or science-based. Information on food production, the environment, and diets in geography and biology textbooks was also considered to be scarce. As a result, information provided to school children in Sweden on healthy and sustainable diets was considered to highly depend on the personal knowledge and interest of teachers. To address these issues, interviewees suggested that teachers could be supported with up-to-date and scientifically sound teaching materials and didactic tools on sustainable food production and diets.

Visits to farms

The Federation of Swedish Farmers (LRF) has developed a "school contact programme" which offers a nationwide network of farms for school visits and provides teaching materials in the form of brochures, posters and books. Through this programme, farmers can obtain financial compensation for the time they allocate to visits of school children. The financial compensation varies from SEK 0-1200 (€0-135€) per class. It is estimated that the average compensation received by farmers for each school visit is SEK 500 (€57).

However, the use of this programme remains limited. According to the information collected, about 13% of the target group (children aged 10-13 years) met a farmer in 2012 within the framework of the "school contact programme".[(m)] Several reasons were mentioned during the interviews to explain the limited number of children who benefited from the programme. On one side, farmers in Sweden have a heavy workload and therefore may not be able to dedicate time to show their farms to pupils. On the other side, visits of farms are based on the initiative of school teachers, who may also not have the time to organise this type of visit or who may simply not have thought themselves about the importance of teaching children about food production and the environment.

School lunches

In Sweden, school lunches are provided for free. Interviewees were of the opinion that the use of these lunches as teaching tools could have a large potential for moving dietary behaviours of children towards healthier and more sustainable diets, without creating additional costs.[(n)] For example, they suggested that free lunches provided at school could be used as an opportunity to invite children to taste fruits and vegetables which they may not eat at home, eat more of them, and also to show them the appropriate amounts of food that should be eaten from the different food groups (including the adequate amount of meat and vegetables on a plate). As parents can be influenced by the demands of their children, 'LiveWell' free school lunches were seen as a tool that can also encourage the adoption of more sustainable diets by the whole family. However, it was also underlined that catering staff/cooks in schools may not eat a lot of fruit and vegetables themselves and may therefore not think about serving more (and a wider variety) of these products to children (especially relative to the amount of meat served). Raising awareness of sustainable diets among catering staff/cooks in schools was therefore seen as important.

Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products

Stakeholders interviewed generally considered that environmental labelling may not be effective in changing the dietary patterns of consumers in Sweden.

Interviewees emphasized that environmental labelling of food products would only have an effect on the food purchasing behaviour of the small part of the population that reads labels, and especially those who are already aware of environmental issues related to food.

However, environmental labelling was seen as an important precondition to introducing a tax on unhealthy food/food with high environmental impact (see option 3a below). In particular, it would provide information on the background for its application and therefore contribute to building consumer acceptance for the tax, as emphasised by interviewees.

Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts

The introduction of a tax on unhealthy food/food with high environmental impacts was considered to be a politically difficult option by stakeholders interviewed. This is illustrated by the reactions to a report published by the Swedish Board of Agriculture in 2013 which suggested the introduction of a tax aimed at reducing the environmental impact of meat production.[o] However, following the publication of this report, such a meat tax was ruled out by the Swedish Finance Minister, and the Board of Agriculture also clarified that it was not actually proposing a carbon tax on meat.[p]

Other factors identified by stakeholders which could prevent the implementation of a tax on unhealthy food/food with high environmental impacts related to concerns about the financial situation of farmers in Sweden and the possible technical difficulties in establishing the tax.

Specifically, several interviewees indicated that farming in Sweden is characterised by low profitability and there is a fear that such a tax will negatively impact revenues of farmers and lead to a reduction in jobs in rural areas. The complexity of setting up a tax on meat products which is considered to be fair by all stakeholders was also highlighted. For example, it was considered that the tax should vary depending on the GHGe of the specific products (in this context, it was indicated that imported beef has generally higher GHGe than beef produced in Sweden; and these differences should be taken into consideration). It was also mentioned that a tax on meat might produce adverse incentives: it could result in an increase in consumer demand for the cheapest meat of the worst quality.

In this context, education and consumer information (policy options 1 and 2) were seen as key tools to mitigate the possible negative effects of the introduction of a tax on unhealthy food/food with high environmental impacts, while also contributing to the development of consumer acceptance for this tax (if it were to be introduced).

The tax would also generate tax revenues which could be used to finance programmes to encourage the development of sustainable food production in Sweden, as suggested by stakeholders, or to finance research and development in the field of sustainable and healthy diets,[q] and education programmes to promote the adoption of more sustainable and healthier diets among children.

Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts

VAT applicable to food is usually 12% in Sweden. A VAT of 25% applies on some drinks such as spirits and wine.[r]

Stakeholders interviewed highlighted that reducing prices of vegetables might not by itself change consumption patterns. Indeed, the budget saved on healthy food with low environmental impacts (such as fruits and vegetables) may be used to purchase more unhealthy food/food with high environmental impacts. Consumers may for example increase their meat consumption. It was therefore suggested that this policy option should be combined with education measures (policy option 1) and information on environmental impacts of food products (policy option 2). Interviewees noted that it would be easier to introduce a reduced VAT rate on healthy food products with low environmental impacts (policy option 3b) than a higher tax rate on unhealthy food/food with high environmental impacts (policy option 3a), as the VAT system already exists (while the system for applying a tax on unhealthy food/food with high environmental impacts would need to be developed by public authorities). However, policy option 3b was generally considered to be a good complement to the introduction of a tax on unhealthy food/food with high environmental impacts (policy option 3a), rather than a stand-alone solution.

Policy option 4: Development of a national sustainable food strategy

Stakeholders interviewed in Sweden considered that a national sustainable food strategy is important and needed. Several stakeholders were of the opinion that this policy option is the most important of the five options outlined in this table as it forms the political basis for further actions on sustainable diets. They considered that once defined, the national strategy should be supported through provision of information to the general public and also via targeted information to specific stakeholder groups. Stakeholders were of the view that the all policy options described above should be discussed within the framework of the preparation of a national sustainable food strategy. It was proposed that a common strategy between the relevant ministries (including ministries for health and agriculture) should be established. In addition, interviewees suggested that the following targets could be defined in the national strategy:

- Target for reduction of GHGe from food (including GHGe that arise in third countries as a consequence of imports of food products/raw materials);
- Target for sustainable diets in public procurement (food supplied in public restaurants including in schools and public hospitals);
- Target for the use of renewable sources of energy for food production; and
- Target for food waste reduction.(s)

Interviewees emphasised that national targets should be reflected in EU level targets but also translate into regional and local targets (as for example, procurements for hospitals and schools are made at the local level). Regular reports on the attainment of these targets could be helpful to monitor progress towards the adoption of more sustainable diets. They also suggested other aspects to be discussed during the preparation of the national sustainable food strategy, including:

- Collection of data on environmental impacts (both negative and positive) of food production in Sweden and in the countries from which Sweden imports foodstuffs (in particular it was suggested that health and environmental impacts of food should be analysed jointly);
- Strategy to provide information to consumers (including environmental labelling, option 3a) so they understand the need for implementing certain policy options;
- Strategy concerning the recycling of nutrients in food production;
- Support of research to facilitate transition to more sustainable diets; and
- Growth and social aspects of sustainable diets (including urban and rural development).

Notes: Stakeholders interviewed in Sweden include representatives of The National Food Agency, Swedish Environmental Protection Agency, Federation of Swedish Farmers, Vi Konsumenter, Örebro University, Swedish University of Agricultural Sciences, and WWF Sweden.

(a) Results of CAPRI modelling (see Section 3 and Annex 3 for information on this model). Effects on consumption patterns are assessed in terms of changes in calorie intakes (kilocalorie/head/day). Relationships between the different effects of the adoption of the LiveWell Plate's recommendations are explained in Section 3 of the report.

(b) Food groups are defined as follows: cereals (including rice), other plant products (including fruits, vegetables, potatoes, pulses, coffee, tea, cocoa, wine, and oilseeds); meat (including beef, pork, poultry and sheep and goat meat), other animal products (including eggs, fish, and other aquatic food), dairy products (including milk and milk products such as yoghurt, butter, cheese, cream), oils (including sunflower seed, rape seed, olive, and palm oil); and sugar.

(c) http://www.scb.se/en.

(d) Norden. 2012. Nordic monitoring of diet, physical activity and overweight. First collection of data in all Nordic Countries 2011. Participants were recruited through telephone interviews performed in simple random samples.

(e) An arithmetic growth of the prevalence of obesity of 0.30% per year until 2020 is assumed, as suggested by the data provided by Statistics Sweden for the years 2010-2011 and 2012. This linear extrapolation of recent trends in obesity rates is a simplified prognosis done for the purpose of the assessment of the effects of the adoption of the LiveWell Plate's recommendations on the costs of obesity and related diseases in 2020 and does not constitute a trend analysis based on medical or nutritional research.

(f) For the purpose of this economic assessment, the reduction of obesity in the LiveWell scenarios has been calculated as the difference between the expected prevalence of obesity in 2020 under the reference scenario and the expected prevalence of obesity under each LiveWell scenario.

(g) Data provided by Prof. Ulf Persson of the Swedish Institute for Health Economics (IHE).

(h) See for example, UK Government Office for Science. 2007. Foresight - Tackling Obesities: Future Choices.

(i) It has to be noted that this study considers the cost of obesity and related diseases as they result for the health system in a given year. It does not consider lifetime costs of obese persons compared to lifetime costs of non-obese persons. As the former may not live as long, the overall health costs per obese person decrease. A similar argument has been made for smokers vs. non-smokers. It is, however, undisputable, that obesity and related diseases lead to specific costs for a health system, which have been the focus of this study.

(j) Swedish Environmental Protection Agency. 2011. Köttkonsumtionens klimatpåverkan Drivkrafter och styrmedel.

(k) According to data published by Statistics Sweden, Sweden imports almost twice as much agricultural commodities and food as it exports: the net trade gap between imports and exports for these products amounted to 43% in 2012. Agricultural commodities and food which were most imported in 2012 include fish, crustaceans and molluscs (24% of the value of imported agricultural commodities and food in 2012), fruits and vegetables (17%), and meat and meat products (11%). In particular, the value of imports of meat and meat products has increased by 39% compared to 2007 (Statistics Sweden. 2013. Yearbook of agricultural statistics 2013 including food statistics).

(l) The information collected indicates that Sweden is one of the EU countries where the lowest amount of pesticides is used (in terms of kilogramme of active substance per hectare of agricultural land; see LRF. 2013. Mat på lika villkor. Konkurrenskraft och politiska villkor för svenskt jordbruk).

(m) http://www.lrf.se/In-English/Activities/; http://www.lrf.se/Medlem/Mitt-LRF/Skolkontakten/. The target group for the school activities offered by the LRF are children aged 10-13 years (about 300,000 pupils).

(n) There is currently a government target of 25% of organic food in public restaurants (including in school canteens).

(o) Swedish Board of Agriculture (2013). Hållbar köttkonsumtion Vad är det? Hur når vi dit?

(p) http://www.thelocal.se/20130122/45746.

(q) For example, farmers in Sweden using mineral fertilizers used to pay a small tax per kilogramme of fertilizer used, and the tax was recirculated to research and development measures for agriculture (Richert, A. 2013. Mapping and Analysis – Sustainable Food for All. Discussion paper, WWF Sweden).

(r) http://www.skatteverket.se/foretag/moms/vadarmoms/2512eller6procentsmoms/12procent.4.58d555751259e4d66168000348.html.

(s) In December 2013, the Swedish Environmental Protection Agency proposed that food waste should be reduced by at least 20% by 2020 compared with the 2010 level (for the entire food chain, excluding primary production; see http://www.naturvardsverket.se/Miljoarbete-i-samhallet/Miljoarbete-i-Sverige/Regeringsuppdrag/Redovisade-2013/Fem-nya-etappmal/Minskad-mangd-matavfall/).

ANNEX 2. METHODOLOGY OF RESEARCH

This annex presents the methodology of research employed for the study.

The main methodological tools employed in the study are:

- In-depth desk research;
- Exploratory interviews with key stakeholders and experts;
- Country studies in the pilot countries of the LiveWell for LIFE project (France, Spain and Sweden);
- Complementary interviews with key stakeholders and experts at EU and international level;
- CAPRI modelling of the effects of a switch to healthier and more sustainable diets;
- Analysis of the effects on public health of the adoption of diets meeting the LiveWell Plate's recommendations in the three pilot countries and in the EU; and
- Cost-benefit analysis of selected policy options to meet the LiveWell Plate's recommendations.

Desk research and exploratory interviews

We reviewed key documentation, including existing studies, reports, websites and policy documents to collect information relevant for the development of methodological tools (see list of literature reviewed in Annex 9). We have also conducted several interviews with key experts during the inception phase of the study (see table below).

***Table 43.** Stakeholders consulted during the inception phase*

Organisation	Date of interview
University of Aix-Marseille	28 November 2013
Institute for Food and Resource Economics (ILR) of the University of Bonn	29 November 2013
Reading University	29 November 2013
Rowett Institute of Nutrition and Health, University of Aberdeen	11 December 2013

The interviews were guided by a pre-defined set of questions. They allowed us to clarify conceptual questions that have arisen for specific tasks during the review of relevant documents, and to collect the additional data needed to refine the table of

relevant cost/benefit types for the study, and the methodology for the cost-benefit analysis (including the modelling exercise).

Country studies in pilot countries

Three country studies were conducted in the pilot countries of the LiveWell for LIFE project (France, Spain and Sweden) to gather relevant information at the country level.

Country studies involved interviews with relevant experts and stakeholders, including, competent authorities, national stakeholder associations, university/research organisations, or independent experts. A total of 21 interviews were conducted in the three countries. The list of stakeholders interviewed in the study countries is presented in the table below.

Table 44. *Stakeholders interviewed in study countries*

Country	Organisation	Date of interview
France	Ministère de l'Écologie, du Développement durable et de l'Énergie	12 December 2013
	Ministère de l'Agriculture, de l'Agroalimentaire et de la Forêt	13 December 2013
	Institut National de la Recherche Agronomique (INRA)	13 December 2013
	Danone	13 December 2013
	École nationale supérieure agronomique de Montpellier (SupAgro)	16 December 2013
	Groupe Casino	19 December 2013
	WWF France	16 January 2014
Sweden	Örebro University	17 December 2013
	Swedish University of Agricultural Sciences	18 December 2013
	Swedish University of Agricultural Sciences	18 December 2013
	The National Food Agency	18 December 2013
	Vi Konsumenter	19 December 2013
	Swedish Environmental Protection Agency	19 December 2013
	Federation of Swedish Farmers	9 January 2014
	WWF Sweden	17 January 2014
Spain	Universitat Politècnica de València	9 January 2014
	Cooperativas Agro-alimentarias	10 January 2014
	Sociedad Española de Agricultura Ecológica (SEAE)	14 January 2014
	Fundación Española de Dietistas-Nutricionistas	17 January 2014
	Confederación de Consumidores y Usuarios (CECU)	27 January 2014
	WWF Spain	30 January 2014

The information collected through the interviews is provided in the country studies in Annex 1.

Complementary interviews with stakeholders at EU and international level

In addition to the country interviews, four interviews have been conducted with representatives of EU/international organisations (in addition to the other expert interviews conducted during the inception phase). The organisations interviewed are listed in the table below. Additional stakeholders were contacted but declined the interview invitation.

Table 45. *Stakeholders interviewed at EU/international level*

Organisation	Date of interview
European Commission, DG Climate Action	23 January 2014
European Commission, DG Agriculture and Rural Development	23 January 2014
United Nations Environment Programme (UNEP)	28 January 2014
European Commission, DG for Education and Culture	29 January 2014
Organisation for Economic Co-operation and Development (OECD)	6 March 2014

The information collected through these interviewees was especially helpful specifically for the analysis of the policy options (see Section 4).

CAPRI modelling of the effects of a switch to healthier and more sustainable diets

The modelling of the effects of the adoption of diets meeting the LiveWell Plate's recommendations by consumers in the three pilot countries of the LiveWell for LIFE project (France, Spain, and Sweden) and at EU level consisted of the following tasks:

1. Determining the optimal approach to integrate the key assumptions concerning diets under the three scenarios (reference scenario, LiveWell 30% scenario; and LiveWell 70% scenario) into the CAPRI model;
2. Running the CAPRI model for each of the three scenarios; and
3. Analysing the outcomes of the model.

The methodological approach used, the scenarios considered, and the results of the model are presented in Section 3.

Analysis of the effects on public health

The effects on public health of the adoption of diets meeting the LiveWell Plate's recommendations in the three pilot countries and in the EU have been established using a methodological approach specifically developed for the purposes of the study. The methodology for the assessment of the effects of the adoption of diets

meeting the LiveWell Plate's recommendations on public health is structured according to the following steps:

1. Collecting data on the prevalence of obesity in the three pilot countries and at EU level;
2. Extrapolating the data collected to estimate the prevalence of obesity in 2020 under the reference scenario;
3. Estimating the prevalence of obesity in 2020 under the two LiveWell scenarios;
4. Comparing the expected prevalence of obesity in 2020 under the two LiveWell scenarios to the expected prevalence of obesity under the reference scenario;
5. Collecting data on the cost of obesity and related diseases per obese person in pilot countries;
6. Inflating cost of obesity and related diseases per obese person to reflect 2020 prices;
7. Estimating the total cost of obesity and related diseases in 2020 under the reference and the two LiveWell scenarios; and
8. Comparing the expected cost of obesity and related diseases in 2020 under the two LiveWell scenarios to the expected cost of obesity and related diseases under the reference scenario.

These results of the work undertaken under these steps are presented in Section 3.4.6.

Cost-benefit analysis of selected policy options

In coordination with WWF, the following policy options were selected for cost-benefit analysis:

- Policy option 1: Introduction of "Food, Nutrition and the Environment" education;
- Policy option 2: Introduction of an EU-wide mandatory environmental labelling of food products;
- Policy option 3a: Introduction of a higher tax rate on unhealthy food/food with high environmental impacts;
- Policy option 3b: Introduction of a reduced VAT rate on healthy food with low environmental impacts;
- Policy option 4: Development of a national sustainable food strategy.

The costs and benefits of these policy options were analysed on the basis of the information collected through desk research and interviews with experts and stakeholders.

ANNEX 3. DESCRIPTION OF CAPRI MODEL

This annex describes the EU-wide economic modelling framework CAPRI (Common Agricultural Policy Regionalised Impact Modelling System).

The Common Agricultural Policy Regionalised Impact (CAPRI) model is an agricultural sector model with a focus on Europe (disaggregation into 280 NUTS2 regions, detailed activity data and coverage of the Common Agricultural Policy), but embedded in a global market model to represent bilateral trade between 44 trade regions (countries or country aggregates).

The characteristics of CAPRI are as follows:[130]

- Global multi commodity model covering about 60 agricultural and processed products and 80 world regions, aggregated to 44 trade regions;
- Supply modelling in Europe occurs in more detail in nonlinear programming models. Both the behavioural function of the global market model as well as the nonlinearities in the European programming models ensure smooth responses to changes in economic incentives;
- Partial equilibrium model (non-agricultural sectors are excluded);
- European agricultural land use is represented completely (including fruits, vegetables, etc.), but some globally relevant crops (e.g. peanuts) and forestry are not modelled;
- The livestock sector is represented in great detail including feed requirements (energy, protein, fibre etc.) and young animal herd constraints;
- CAPRI has a detailed coverage of CAP and agricultural trade policies (including TRQs), relying on the Armington approach for two way international trade;
- It is based on comparative statics, and currently not suitable for very long scenario runs (>2050).

The CAPRI global market module breaks down the world into 44 country aggregates or trading partners, each one (and sometimes regional components within these) featuring systems of supply, human consumption, feed and processing functions. The parameters of these functions are derived from elasticities borrowed from other studies[131] and modelling systems and calibrated to projected quantities and prices in the simulation year. Regularity is ensured through the choice of the functional form (a normalised quadratic function for feed and supply and a generalised Leontief

[130] Full documentation is online at http://www.capri-model.org/docs/capri_documentation_2012.pdf.

[131] On the demand side a key source is Seale, Regmi, Bernstein 2003, http://www.ers.usda.gov/publications/tb-technical-bulletin/tb1904.aspx.

expenditure function for human consumption) and some further restrictions (homogeneity of degree zero in prices, symmetry and correct curvature). Accordingly, the demand system allows for the calculation of welfare changes for consumers, processing industry and public sector. Policy instruments in the market module include bilateral tariffs and tariff rate quotas (TRQs), intervention purchases and subsidised exports for the EU.

For European regions the supply side behavioural function in the global market module approximate the behaviour of country aggregates of regional nonlinear programming models. In these models regional agricultural supply of annual crops and animal outputs are given as solutions to a profit maximisation under a limited number of constraints: the land supply curve, policy restrictions such as sales quotas and set aside obligations and feeding restrictions based on requirement functions. Fertiliser needs of crops have to be met by either organic nutrients found in manure (output from animals) or in purchased fertiliser (traded good). A nonlinear cost function covers the effect of all factors not explicitly handled by restrictions or the accounting costs – such as additional binding resources or risk.

The equilibrium in CAPRI is obtained by letting the regional supply and global market modules iterate with each other. In the first iteration, the regional aggregate programming models are solved with prices taken from the baseline. The market module is then solved, yielding new equilibrium producer prices for all regions, including European countries. These prices are then passed back to the supply models for the following iteration.

The CAPRI model outputs are classified into market results, farm information and environmental indicators, as follows:

- Market results include the market balances of all trade regions, their bilateral trade, prices, endogenous policy elements (e.g. Tariff Rate Quotas - TRQ - fill rates) and income effects for market participants (farmers, related industry, consumers, public agricultural budgets, economic welfare as an aggregate);
- Farm information covers the activity levels (areas, animal herds), the feed mix as well as nutrient balances for crops and animals; and
- Environmental indicators are elements of the crop nutrient balance (surplus to the soil, leaching), gaseous emissions of GHGs and Ammonia.

ANNEX 4. RESULTS OF CAPRI MODELLING

This annex provides the detailed results of the CAPRI modelling of the effects of a switch to the LiveWell Plate's recommendations in the EU.

Table A1: *Consumption and consumer prices in the EU under the reference scenarios and the LiveWell 30% and LiveWell 70% scenarios*

	REF	REF	LW30	LW30	LW70	LW70
	Energy [kcal/hd/day]	Consumer price [€/t]	Energy [kcal/hd/day]	Consumer price [€/t]	Energy [kcal/hd/day]	Consumer price [€/t]
Rye and meslin	42.25	2856.37	43.52	2854.64	45.21	2854.28
Barley	9.96	2940.53	10.21	2935.26	10.53	2930.32
Oats	11.44	3280.41	14.67	3278.70	18.98	3278.28
Grain maize	83.94	3131.06	90.01	3125.02	98.11	3119.52
Other cereals	17.18	2830.91	23.15	2827.16	31.11	2825.55
Rape seed	9.52	380.61	8.73	371.18	7.67	360.79
Sunflower seed	6.46	2792.43	7.20	2779.48	8.16	2763.79
Soya seed	2.97	4149.69	3.59	4134.63	4.42	4120.51
Pulses	17.01	4040.77	38.83	4078.11	67.03	4125.42
Potatoes	120.92	1254.28	121.18	1251.87	121.57	1249.00
Tomatoes	7.48	2878.19	7.87	2879.63	8.38	2881.60
Other vegetables	65.50	1215.64	70.57	1385.71	78.20	1644.77
Apples pears and peaches	34.78	2754.13	33.10	2732.25	30.92	2700.45
Other fruits	32.28	2324.23	29.33	2279.38	25.44	2217.68
Citrus fruits	27.38	3145.32	29.01	3175.94	31.22	3212.58
Table grapes	10.94	4444.45	9.50	4415.23	7.73	4374.28
Table olives	4.10	3936.91	4.01	3898.54	3.90	3847.80
Table wine	42.88	5691.42	42.47	5684.14	41.92	5674.63
Cereals	993.25	3226.27	1118.90	3226.40	1287.05	3228.48
Oilseeds	18.95	1965.39	19.52	2135.59	20.25	2343.19
soft and durum wheat	828.49	3264.75	937.34	3264.78	1083.09	3266.82
Beef	57.65	8190.15	52.18	7620.92	43.68	7080.04
Pork meat	225.93	6258.14	200.09	6102.17	165.50	5920.53
Sheep and goat meat	13.31	9259.19	10.21	8102.93	5.61	7419.92
Eggs	50.81	4180.30	56.78	4294.80	64.83	4465.59
Poultry meat	87.92	3823.41	74.68	3682.39	56.88	3547.65
Whey powder	3.05	734.52	2.95	754.49	2.91	758.52
Casein and caseinates	2.18	7617.98	2.14	7754.40	2.11	7786.33
Whole milk powder only	10.01	3154.46	9.23	3035.36	8.19	2892.19
Butter	69.38	4206.80	58.38	3470.27	41.97	2881.10
Skimmed milk powder	9.13	2704.02	8.27	2755.24	7.26	2745.99
Cheese	168.70	5583.61	165.68	5450.05	162.28	5267.72
Fresh milk products	330.53	1106.77	312.47	1046.31	289.11	972.53
Cream	24.41	2724.85	22.62	2334.37	20.08	1949.98
Concentrated milk	8.69	2130.03	10.33	2209.84	12.52	2321.18
Rice milled	56.00	3977.29	72.75	3952.73	97.71	3926.05
Processed sugar	255.26	8971.59	206.94	8929.49	144.46	8881.33
Rape seed oil	114.47	4055.31	103.50	4060.62	89.01	4073.21
Sunflower seed oil	135.10	4414.65	113.91	4386.13	86.62	4356.50
Soya oil	76.29	3693.70	64.76	3698.24	49.57	3710.68
Olive oil	82.73	9423.08	76.65	9213.42	68.57	8970.44
Palm oil	5.03	2643.99	4.99	2642.54	4.95	2640.31
Other oil	48.42	1483.41	44.99	1477.74	40.39	1470.43
Rape seed cake	0.18	280.60	0.19	253.13	0.20	224.62
Sunflowe seed cake	0.52	286.19	0.53	262.66	0.54	238.82
Soya cake	7.57	1933.47	7.36	1910.53	7.09	1885.85
Other arable field crops	137.93	1328.85	160.01	1418.43	188.59	1528.85
Vegetables and Permanent crops	225.33	2516.16	225.86	2541.35	227.70	2600.69
Coffee, Coco and tea	15.25	3277.66	13.70	3325.67	11.63	3400.35
Meat	384.80	5991.50	337.17	5761.03	271.67	5545.62
All Other Animal products	50.81	4180.30	56.78	4294.80	64.83	4465.59
Fish and other acquatic products	44.48	3275.05	40.76	3166.69	35.85	3011.17
Milk products	626.09	1939.02	592.09	1854.26	546.44	1769.28
Oils	462.03	4791.30	408.80	4773.50	339.11	4767.95
Oil cakes	8.27	1779.84	8.07	1750.34	7.82	1717.12
Secondary products	311.26	8118.95	279.69	7694.84	242.17	6957.27
Coffee, dry equivalent		4409.76		4405.24		4399.95
Tea, dry equivalent		2143.61		2140.18		2136.96
Cocoa beans, dry equivalent	15.25	1414.41	13.70	1383.19	11.63	1345.91
Fresh water fish	7.05	2560.98	6.45	2541.64	5.64	2515.19
Salt water fish	25.21	2766.58	24.72	2757.13	24.06	2744.53
Other acquatic products	12.23	4735.08	9.60	4640.93	6.14	4511.94
Cereals incl rice	1049.25	3255.39	1191.65	3258.70	1384.76	3264.42
Oils	462.03	4791.30	408.80	4773.50	339.11	4767.95
Sugar	255.26	8971.59	206.94	8929.49	144.46	8881.33
Other plant products	405.73	2263.38	427.16	2300.00	455.99	2367.90
Fat rich dairy	271.19	4715.01	257.02	4483.32	236.85	4288.23
Other dairy	354.90	1151.72	335.07	1092.17	309.59	1018.61
Dairy products	626.09	1939.02	592.09	1854.26	546.44	1769.28
Meat	384.80	5991.50	337.17	5761.03	271.67	5545.62
Other animal products incl fish	83.07	3602.87	87.94	3628.18	94.54	3699.71

Table A2: *Consumption and consumer prices in Spain under the reference scenarios and the LiveWell 30% and LiveWell 70% scenarios*

	REF Energy [kcal/hd/day]	REF Consumer price [€/t]	LW30 Energy [kcal/hd/day]	LW30 Consumer price [€/t]	LW70 Energy [kcal/hd/day]	LW70 Consumer price [€/t]
Rye and meslin	7.33	3427.53	7.69	3425.32	8.18	3424.47
Barley	0.11	3367.68	0.12	3365.05	0.13	3363.45
Oats	1.24	3374.29	1.82	3372.67	2.59	3372.34
Grain maize	9.04	3429.42	11.16	3426.82	13.99	3425.22
Other cereals	0.39	3393.16	0.66	3392.52	1.01	3392.30
Rape seed		351.91		351.91		351.91
Sunflower seed	5.96	3209.99	7.81	3197.67	10.22	3183.22
Soya seed	0.30	3691.13	0.48	3688.56	0.72	3685.67
Pulses	46.28	4133.73	75.36	4164.08	113.53	4205.45
Potatoes	85.87	1171.33	94.04	1170.78	104.93	1170.40
Tomatoes	12.03	2779.66	12.84	2782.43	13.91	2786.09
Other vegetables	75.02	1121.49	60.04	1253.61	41.17	1440.02
Apples pears and peaches	19.82	2563.00	17.93	2541.71	15.43	2510.28
Other fruits	14.51	2308.84	11.48	2271.46	7.37	2216.11
Citrus fruits	17.87	2763.07	15.89	2771.80	13.30	2783.11
Table grapes	5.71	3973.25	3.89	3935.90	1.62	3880.33
Table olives	29.46	3231.02	28.76	3186.69	27.85	3127.56
Table wine	31.26	4997.91	30.58	4990.23	29.66	4980.08
Cereals	753.14	3410.44	934.79	3410.91	1177.69	3413.47
Oilseeds	6.26	3344.34	8.28	3356.40	10.93	3361.49
soft and durum wheat	735.02	3410.24	913.34	3410.82	1151.80	3413.51
Beef	39.84	7346.95	31.90	6742.11	20.48	6139.09
Pork meat	343.70	5925.45	351.24	5795.56	360.63	5660.74
Sheep and goat meat	16.16	8842.91	12.73	7619.99	7.71	6911.81
Eggs	73.74	3835.82	80.70	3943.89	90.13	4105.04
Poultry meat	109.49	3471.75	86.32	3324.45	55.26	3180.29
Whey powder	1.07	736.84	1.04	756.83	1.03	760.98
Casein and caseinates	1.31	7526.44	1.29	7663.18	1.28	7692.82
Whole milk powder only	1.10	3147.38	0.78	3030.81	0.35	2891.34
Butter	12.03	3957.12	9.11	3225.37	4.97	2639.82
Skimmed milk powder	1.29	2752.81	0.89	2806.75	0.37	2799.48
Cheese	75.70	5773.63	61.12	5628.97	41.84	5431.40
Fresh milk products	251.84	1107.16	215.62	1045.76	167.88	969.97
Cream	14.76	2603.11	10.91	2218.71	5.70	1844.50
Concentrated milk	3.63	2070.60	6.03	2150.51	9.18	2261.77
Rice milled	56.99	3710.42	110.96	3731.09	186.84	3755.64
Processed sugar	161.64	9718.77	122.26	9671.79	70.75	9619.18
Rape seed oil	5.40	3526.28	3.78	3515.49	1.61	3499.54
Sunflower seed oil	250.62	4201.82	176.43	4158.45	80.58	4099.46
Soya oil	93.56	3273.37	65.18	3265.83	27.69	3253.48
Olive oil	242.58	9245.61	228.21	9028.93	209.03	8774.01
Palm oil		599.86		599.86		599.86
Other oil	19.61	1507.37	19.29	1501.34	18.87	1493.46
Rape seed cake		347.69		347.69		347.69
Sunflowe seed cake	2.10	301.80	2.12	276.98	2.16	251.95
Soya cake	55.07	1949.78	53.24	1927.10	50.85	1902.83
Other arable field crops	132.16	1440.33	169.40	1557.79	218.47	1677.28
Vegetables and Permanent crops	205.69	2145.78	181.39	2272.38	150.31	2462.76
Coffee, Coco and tea	16.97	3236.43	15.35	3289.84	13.18	3374.01
Meat	509.18	5449.16	482.19	5324.55	444.08	5282.36
All Other Animal products	73.74	3835.82	80.70	3943.89	90.13	4105.04
Fish and other acquatic products	76.44	3513.51	64.32	3411.62	48.26	3240.59
Milk products	362.73	1635.90	306.79	1531.23	232.60	1399.84
Oils	611.76	5977.33	492.88	6197.49	337.78	6788.08
Oil cakes	57.17	1882.89	55.36	1857.16	53.00	1828.70
Secondary products	218.63	8223.12	233.22	6936.73	257.59	5439.30
Coffee, dry equivalent		4436.44		4431.88		4426.55
Tea, dry equivalent		2155.23		2151.71		2148.52
Cocoa beans, dry equivalent	16.97	1449.39	15.35	1417.09	13.18	1377.87
Fresh water fish	7.76	2577.94	7.68	2558.95	7.57	2532.89
Salt water fish	39.61	2798.58	34.12	2790.10	26.78	2778.83
Other acquatic products	29.07	4737.55	22.53	4643.66	13.91	4515.22
Cereals incl rice	810.13	3425.88	1045.75	3436.02	1364.53	3448.40
Oils	611.76	5977.33	492.88	6197.49	337.78	6788.08
Sugar	161.64	9718.77	122.26	9671.79	70.75	9619.18
Other plant products	418.25	2034.34	429.78	2135.07	445.89	2260.96
Fat rich dairy	106.12	4723.42	87.16	4423.08	61.70	4089.85
Other dairy	256.61	1123.89	219.62	1063.94	170.90	990.27
Dairy products	362.73	1635.90	306.79	1531.23	232.60	1399.84
Meat	509.18	5449.16	482.19	5324.55	444.08	5282.36
Other animal products incl fish	150.18	3617.96	145.02	3616.06	138.39	3656.77

Table A3: *Consumption and consumer prices in France under the reference scenarios and the LiveWell 30% and LiveWell 70% scenarios*

	REF Energy [kcal/hd/day]	REF Consumer price [€/t]	LW30 Energy [kcal/hd/day]	LW30 Consumer price [€/t]	LW70 Energy [kcal/hd/day]	LW70 Consumer price [€/t]
Rye and meslin	2.61	3427.53	2.61	3425.32	2.61	3424.47
Barley	2.22	3508.78	2.22	3506.14	2.22	3504.54
Oats	0.75	3451.03	0.75	3449.41	0.75	3449.08
Grain maize	26.15	3757.80	26.07	3755.20	25.97	3753.59
Other cereals	2.00	3635.40	2.00	3634.76	1.99	3634.54
Rape seed	9.36	379.04	9.41	370.09	9.46	360.34
Sunflower seed	3.16	3885.31	3.13	3872.99	3.10	3858.54
Soya seed	0.50	4490.50	0.49	4487.93	0.49	4485.04
Pulses	1.43	4935.61	6.11	4965.96	12.21	5007.33
Potatoes	76.77	1392.38	75.86	1391.83	74.70	1391.45
Tomatoes	6.44	3325.09	6.31	3327.85	6.14	3331.52
Other vegetables	70.00	1287.95	67.14	1420.07	64.14	1606.48
Apples pears and peaches	30.69	3008.49	28.37	2987.21	25.34	2955.77
Other fruits	15.35	2510.88	16.34	2473.50	17.81	2418.15
Citrus fruits	25.06	3287.61	22.84	3296.35	19.98	3307.65
Table grapes	6.80	4610.30	6.58	4572.94	6.32	4517.38
Table olives	0.23	3657.39	0.23	3613.06	0.23	3553.93
Table wine	69.61	5862.94	69.37	5855.26	69.09	5845.12
Cereals	884.04	3864.37	980.04	3865.97	1108.98	3869.76
Oilseeds	13.01	1807.62	13.03	1790.87	13.05	1771.46
soft and durum wheat	850.31	3876.74	946.39	3877.33	1075.43	3880.02
Beef	89.75	8956.52	94.13	8351.69	97.84	7748.67
Pork meat	175.93	6945.89	136.80	6816.01	85.59	6681.18
Sheep and goat meat	17.93	9868.68	14.65	8645.76	8.76	7937.58
Eggs	52.26	4484.07	49.46	4592.15	45.90	4753.30
Poultry meat	85.65	3962.24	71.98	3814.95	53.78	3670.78
Whey powder	6.61	738.60	6.34	758.59	6.22	762.74
Casein and caseinates	1.75	7548.37	1.70	7685.12	1.68	7714.76
Whole milk powder only	4.42	3156.27	4.50	3039.69	4.62	2900.22
Butter	143.29	4249.68	115.07	3517.93	73.99	2932.38
Skimmed milk powder	13.21	2777.59	12.89	2831.53	12.80	2824.26
Cheese	233.66	5961.29	285.96	5816.64	357.10	5619.06
Fresh milk products	303.53	1169.99	307.45	1108.60	314.23	1032.80
Cream	34.61	2603.11	38.29	2218.71	42.93	1844.50
Concentrated milk	4.43	2116.10	4.17	2196.01	3.87	2307.26
Rice milled	74.36	4496.76	75.10	4517.44	76.65	4541.98
Processed sugar	197.84	9718.77	167.65	9671.79	128.70	9619.18
Rape seed oil	52.00	4118.29	35.58	4107.50	14.06	4091.55
Sunflower seed oil	140.25	4790.69	131.78	4747.33	121.57	4688.33
Soya oil	30.95	3851.43	21.07	3843.89	8.23	3831.54
Olive oil	51.81	10618.32	52.80	10401.63	54.40	10146.72
Palm oil	11.59	2602.43	11.38	2601.29	11.17	2599.58
Other oil	67.16	1507.37	67.12	1501.34	67.05	1493.46
Rape seed cake		347.69		347.69		347.69
Sunflowe seed cake		302.26		302.26		302.26
Soya cake		1327.03		1327.03		1327.03
Other arable field crops	78.20	1407.17	81.97	1455.49	86.91	1519.80
Vegetables and Permanent crops	224.18	2743.77	217.19	2809.97	209.05	2895.35
Coffee, Coco and tea	22.46	3178.31	22.54	3159.12	22.65	3135.96
Meat	369.26	6790.20	317.56	6596.93	245.97	6433.31
All Other Animal products	52.26	4484.07	49.46	4592.15	45.90	4753.30
Fish and other acquatic products	63.65	3478.32	55.23	3302.22	44.14	3013.18
Milk products	745.52	2363.05	776.38	2355.12	817.42	2363.40
Oils	353.75	4792.98	319.73	4820.23	276.48	4879.68
Secondary products	272.20	8355.87	242.75	8144.95	205.35	7797.34
Coffee, dry equivalent		4436.44		4431.88		4426.55
Tea, dry equivalent		2155.23		2151.71		2148.52
Cocoa beans, dry equivalent	22.46	1449.39	22.54	1417.09	22.65	1377.87
Fresh water fish	7.90	2577.94	7.89	2558.95	7.88	2532.89
Salt water fish	32.54	2798.58	31.10	2790.10	29.18	2778.83
Other acquatic products	23.21	4737.55	16.24	4643.66	7.07	4515.22
Cereals incl rice	958.40	3900.30	1055.14	3899.87	1185.63	3901.48
Oils	353.75	4792.98	319.73	4820.23	276.48	4879.68
Sugar	197.84	9718.77	167.65	9671.79	128.70	9619.18
Other plant products	337.85	2594.01	334.74	2645.71	331.67	2712.14
Fat rich dairy	415.98	4986.04	443.49	4834.71	477.89	4739.12
Other dairy	329.53	1211.33	332.89	1151.25	339.53	1075.91
Dairy products	745.52	2363.05	776.38	2355.12	817.42	2363.40
Meat	369.26	6790.20	317.56	6596.93	245.97	6433.31
Other animal products incl fish	115.91	3769.82	104.68	3699.54	90.04	3606.12

Table A4: *Consumption and consumer prices in Sweden under the reference scenarios and the LiveWell 30% and LiveWell 30% scenarios*

	REF Energy [kcal/hd/day]	REF Consumer price [€/t]	LW30 Energy [kcal/hd/day]	LW30 Consumer price [€/t]	LW70 Energy [kcal/hd/day]	LW70 Consumer price [€/t]
Rye and meslin	82.03	3427.53	85.35	3425.32	89.74	3424.47
Barley	5.31	3508.78	5.29	3506.14	5.27	3504.54
Oats	15.61	3451.03	21.55	3449.41	29.47	3449.08
Grain maize	22.11	3757.80	21.95	3755.20	21.74	3753.59
Other cereals	106.65	3635.40	146.12	3634.76	198.84	3634.54
Rape seed	4.59	391.20	3.24	382.25	1.43	372.50
Sunflower seed	0.37	4822.79	0.37	4810.47	0.37	4796.02
Soya seed	0.46	4647.86	0.46	4645.29	0.46	4642.40
Pulses	3.16	6048.79	5.12	6079.14	7.70	6120.51
Potatoes	127.35	1699.25	116.07	1698.70	101.05	1698.32
Tomatoes	5.34	4082.26	6.01	4085.03	6.91	4088.69
Other vegetables	33.43	1375.11	57.50	1507.23	89.53	1693.64
Apples pears and peaches	27.22	3626.93	28.48	3605.65	30.24	3574.21
Other fruits	17.30	2791.36	15.18	2753.97	12.35	2698.63
Citrus fruits	101.48	4015.79	142.41	4024.53	196.57	4035.83
Table grapes	9.91	5494.66	9.57	5457.31	9.15	5401.75
Table olives		2644.46		2644.46		2644.46
Table wine	41.36	7551.43	41.09	7543.75	40.72	7533.61
Cereals	709.31	3767.64	762.96	3757.09	834.63	3746.63
Oilseeds	5.42	1201.56	4.07	1444.22	2.25	2201.97
soft and durum wheat	477.61	3876.74	482.70	3877.33	489.58	3880.02
Beef	79.72	9572.73	64.58	8967.90	42.65	8364.88
Pork meat	151.67	8362.50	120.89	8232.61	79.75	8097.79
Sheep and goat meat	6.78	10864.57	5.02	9641.66	2.46	8933.47
Eggs	35.11	5384.00	49.38	5492.07	68.39	5653.23
Poultry meat	56.22	4643.16	53.09	4495.87	48.86	4351.70
Whey powder	0.82	741.05	0.81	761.04	0.80	765.19
Casein and caseinates	0.37	7578.82	0.37	7715.57	0.37	7745.21
Whole milk powder only	37.44	3168.59	37.43	3052.02	37.39	2912.55
Butter	52.86	4655.82	49.26	3924.07	43.46	3338.52
Skimmed milk powder	19.86	2811.99	19.56	2865.93	19.36	2858.66
Cheese	131.48	6422.50	101.48	6277.84	61.62	6080.27
Fresh milk products	464.93	1257.22	443.80	1195.83	416.06	1120.03
Cream	59.87	2603.11	52.06	2218.71	41.28	1844.50
Concentrated milk	3.27	2179.26	3.20	2259.16	3.12	2370.42
Rice milled	69.46	5588.38	62.63	5609.06	53.55	5633.60
Processed sugar	283.12	9718.77	234.57	9671.79	171.57	9619.18
Rape seed oil	263.67	4940.14	343.26	4929.35	449.46	4913.40
Sunflower seed oil	38.89	5608.19	36.15	5564.82	32.59	5505.82
Soya oil	24.54	4653.92	30.59	4646.38	38.57	4634.02
Olive oil	22.24	12523.94	17.12	12307.25	10.25	12052.34
Palm oil		599.86		599.86		599.86
Other oil	65.86	1507.37	50.22	1501.34	29.24	1493.46
Rape seed cake		347.69		347.69		347.69
Sunflowe seed cake		302.26		302.26		302.26
Soya cake		1327.03		1327.03		1327.03
Other arable field crops	130.51	1722.77	121.20	1740.65	108.75	1770.94
Vegetables and Permanent crops	236.03	3754.85	300.24	3599.44	385.47	3518.39
Coffee, Coco and tea	11.15	3851.57	7.87	3965.14	3.49	4142.79
Meat	294.39	7928.88	243.57	7497.26	173.73	6926.82
All Other Animal products	35.11	5384.00	49.38	5492.07	68.39	5653.23
Fish and other acquatic products	54.45	3290.93	55.34	3262.65	56.52	3227.67
Milk products	770.91	1886.92	707.96	1711.87	623.46	1488.17
Oils	415.19	4871.24	477.32	4878.15	560.11	4886.60
Secondary products	352.58	8938.04	297.20	8849.79	225.12	8707.75
Coffee, dry equivalent		4436.44		4431.88		4426.55
Tea, dry equivalent		2155.23		2151.71		2148.52
Cocoa beans, dry equivalent	11.15	1449.39	7.87	1417.09	3.49	1377.87
Fresh water fish	14.14	2577.94	9.92	2558.95	4.30	2532.89
Salt water fish	24.87	2798.58	30.07	2790.10	37.00	2778.83
Other acquatic products	15.44	4737.55	15.35	4643.66	15.22	4515.22
Cereals incl rice	778.78	3887.52	825.59	3860.35	888.18	3829.80
Oils	415.19	4871.24	477.32	4878.15	560.11	4886.60
Sugar	283.12	9718.77	234.57	9671.79	171.57	9619.18
Other plant products	383.11	3338.33	433.38	3328.05	499.96	3349.88
Fat rich dairy	247.48	4615.66	206.00	4204.17	149.49	3632.39
Other dairy	523.43	1319.65	501.96	1261.44	473.98	1189.34
Dairy products	770.91	1886.92	707.96	1711.87	623.46	1488.17
Meat	294.39	7928.88	243.57	7497.26	173.73	6926.82
Other animal products incl fish	89.56	3799.00	104.72	3947.65	124.91	4138.63

Table A5: *Consumption and consumer prices in third countries under the reference scenarios and the LiveWell 30% and LiveWell 70% scenarios*

	REF	REF	LW30	LW30	LW70	LW70
	Energy [kcal/hd/day]	Consumer price [€/t]	Energy [kcal/hd/day]	Consumer price [€/t]	Energy [kcal/hd/day]	Consumer price [€/t]
Rye and meslin	6.88	1045.03	6.87	1043.62	6.86	1041.80
Barley	12.99	971.31	12.98	970.04	12.99	968.70
Oats	3.49	1483.29	3.49	1482.08	3.50	1481.81
Grain maize	216.49	753.53	216.46	752.76	216.37	751.96
Other cereals	77.54	502.94	77.54	502.45	77.56	501.95
Rape seed	3.36	294.06	3.36	291.78	3.37	289.07
Sunflower seed	2.22	1244.29	2.23	1240.79	2.23	1236.62
Soya seed	20.20	1098.46	20.22	1095.33	20.22	1091.83
Pulses	68.29	1136.67	68.21	1139.94	68.08	1146.58
Potatoes	46.15	511.17	46.11	510.64	46.04	509.87
Tomatoes	10.20	1200.94	10.19	1200.33	10.17	1199.51
Other vegetables	89.95	873.83	89.84	873.98	89.66	874.19
Apples pears and peaches	8.25	1299.61	8.26	1292.16	8.26	1282.28
Other fruits	47.04	1109.47	47.06	1105.72	47.08	1100.67
Citrus fruits	10.35	1099.38	10.32	1101.99	10.29	1105.47
Table grapes	6.27	1695.92	6.26	1689.59	6.26	1681.17
Table olives	0.80	2085.46	0.80	2078.30	0.80	2069.36
Table wine	2.53	3820.94	2.54	3814.86	2.54	3806.87
Cereals	593.85	815.99	593.63	815.50	593.20	815.33
Oilseeds	25.79	1032.25	25.81	1029.08	25.82	1025.47
soft and durum wheat	276.46	931.67	276.28	931.54	275.92	932.21
Beef	37.57	3918.22	37.66	3877.37	37.81	3815.87
Pork meat	77.88	2906.68	78.31	2872.63	79.07	2822.04
Sheep and goat meat	14.87	3415.52	14.83	3353.89	14.82	3266.35
Eggs	41.98	1734.64	41.98	1728.02	41.98	1716.88
Poultry meat	55.94	1980.83	56.09	1959.22	56.39	1927.37
Whey powder	0.58	1213.03	0.56	1233.24	0.55	1240.17
Casein and caseinates	0.23	8671.26	0.23	8819.07	0.23	8875.60
Whole milk powder only	5.82	3172.72	5.86	3121.03	5.92	3051.30
Butter	30.30	3368.56	30.88	3187.94	31.92	2970.37
Skimmed milk powder	3.87	2744.92	3.81	2819.27	3.77	2850.14
Cheese	18.39	4893.66	18.41	4848.13	18.45	4785.00
Fresh milk products	247.25	589.22	247.14	587.22	246.93	584.46
Cream	0.75	3674.61	0.78	3484.47	0.83	3236.32
Concentrated milk	2.82	2539.44	2.80	2548.11	2.77	2555.52
Rice milled	954.39	753.57	953.71	753.71	952.62	753.83
Processed sugar	159.90	2806.15	159.65	2804.65	159.36	2802.91
Rape seed oil	32.41	1514.74	32.42	1509.40	32.42	1502.44
Sunflower seed oil	44.47	1239.20	44.51	1227.07	44.55	1211.04
Soya oil	70.77	1832.28	70.68	1831.42	70.57	1828.95
Olive oil	22.08	3960.89	22.20	3906.81	22.36	3837.04
Palm oil	70.42	787.85	70.36	786.85	70.28	785.32
Other oil	41.53	1101.27	41.56	1097.95	41.60	1093.65
Rape seed cake	0.00	237.52	0.00	216.22	0.00	194.21
Sunflowe seed cake	0.00	353.95	0.00	330.51	0.00	305.69
Soya cake	0.02	1375.21	0.02	1363.47	0.02	1350.39
Other arable field crops	114.44	651.51	114.32	651.80	114.13	652.64
Vegetables and Permanent crops	175.39	1014.10	175.26	1013.24	175.05	1012.10
Coffee, Coco and tea	2.64	3014.03	2.66	3002.61	2.68	2988.62
All other crops		2769.02		2767.68		2765.65
Meat	186.26	2841.85	186.88	2808.91	188.09	2759.99
All Other Animal products	41.98	1734.64	41.98	1728.02	41.98	1716.88
Fish and other acquatic products	30.96	3046.01	31.01	3023.65	31.09	2994.19
Milk products	310.01	803.07	310.46	797.35	311.37	790.10
Oils	281.68	1507.69	281.73	1500.88	281.78	1491.65
Oil cakes	0.02	1196.04	0.02	1177.25	0.02	1155.94
Secondary products	1114.29	1064.50	1113.36	1064.17	1111.98	1063.82
Coffee, dry equivalent		4438.70		4434.80		4430.15
Tea, dry equivalent		2087.83		2085.01		2081.51
Cocoa beans, dry equivalent	2.64	1436.96	2.66	1406.97	2.68	1370.66
Fresh water fish	11.15	2285.37	11.16	2279.66	11.17	2272.11
Salt water fish	11.45	2905.75	11.46	2897.24	11.48	2885.96
Other acquatic products	8.36	4253.04	8.39	4185.81	8.44	4097.65
Cereals incl rice	1548.24	782.74	1547.34	782.59	1545.82	782.58
Oils	281.68	1507.69	281.73	1500.88	281.78	1491.65
Sugar	159.90	2806.15	159.65	2804.65	159.36	2802.91
Other plant products	318.28	981.70	318.07	980.92	317.71	979.97
Fat rich dairy	52.25	3986.97	52.87	3887.87	53.98	3758.55
Other dairy	257.76	619.81	257.60	617.81	257.40	614.92
Dairy products	310.01	803.07	310.46	797.35	311.37	790.10
Meat	186.26	2841.85	186.88	2808.91	188.09	2759.99
Other animal products incl fish	72.93	2518.04	72.99	2502.57	73.07	2481.17

Table A6: *Market results for EU under the reference scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	141.5	2830.2	313.1	1030.4	3905.2	7452.8	6735.4
Barley	156.0	702.6	738.5	6458.3	45535.1	51957.5	46237.7
Oats	144.2	907.3	58.4	1045.1	9886.1	11780.2	10793.5
Grain maize	173.4	6154.7	19186.4	10532.3	66051.9	63552.4	72206.6
Other cereals	153.6	1211.3	8378.7	1761.9	16072.3	10666.8	17283.6
Rape seed	367.1	503.4	5611.3	2504.1	24476.0	21872.2	24979.4
Sunflower seed	355.3	341.9	3624.5	3660.4	8771.5	9149.3	9113.4
Soya seed	339.0	235.8	16793.6	193.4	18513.8	2149.3	18749.5
Pulses	253.8	981.5	819.9	242.1	1899.8	2303.5	2881.3
Potatoes	205.0	35693.5	3414.5	3001.0	12344.7	47624.8	48038.3
Tomatoes	425.2	7467.9	1230.1	519.3	10260.3	17017.3	17728.2
Other vegetables	607.5	47192.3	3288.0	2082.3	1472.6	47459.3	48664.9
Apples pears and peaches	539.6	16555.8	4185.2	2539.4	711.9	15621.8	17267.7
Other fruits	1003.6	14875.8	7389.7	1689.1	766.1	9941.3	15641.9
Citrus fruits	426.8	18829.2	10043.9	1739.8	145.1	10670.2	18974.2
Table grapes	1517.7	3085.2	1703.0	525.4	25.6	1933.2	3110.8
Table olives	2677.8	812.1	94.2	94.5	0.0	812.4	812.2
Table wine	1135.5	12168.0	1256.2	1792.4	2338.6	15042.9	14506.6
Cereals	166.9	70628.7	37653.2	54063.5	196630.5	283669.5	267259.2
Oilseeds	362.0	1081.0	26029.4	6357.9	51761.3	33170.8	52842.3
Soft and durum wheat	172.3	58822.5	8978.2	33235.5	55180.0	138259.8	114002.5
Beef	3224.8	8103.1	649.9	390.1	0.1	7843.5	8103.3
Pork meat	1487.5	21665.5	849.6	3113.9	0.0	23929.8	21665.5
Sheep and goat meat	5144.6	1125.9	251.9	78.8	0.0	952.9	1125.9
Eggs	1023.3	6965.9	194.8	492.4	96.2	7359.6	7062.1
Poultry meat	1298.6	12578.7	740.6	1461.8	0.0	13299.9	12578.7
Whey powder	714.9	163.3	130.0	941.1	323.2	1297.7	486.6
Casein and caseinates	8412.8	116.9	38.6	49.1	26.3	153.7	143.3
Whole milk powder only	3417.6	378.9	20.5	244.9	2.6	605.9	381.5
Butter	3312.8	1856.0	97.5	299.5	39.3	2097.3	1895.3
Skimmed milk powder	2751.4	489.5	85.5	586.9	397.7	1388.6	887.2
Cheese	4185.8	9122.9	433.0	1128.3	348.9	10167.1	9471.8
Fresh milk products	918.6	49085.0	465.2	577.1	24.3	49221.3	49109.3
Cream	2745.2	2464.9	48.4	91.5	0.5	2508.5	2465.4
Concentrated milk	1895.4	803.1	33.3	225.2	0.5	995.5	803.7
Rice milled	280.2	2850.0	1733.9	588.7	266.9	1971.7	3116.9
Processed sugar	312.3	13843.6	5665.6	3488.6	6900.5	18567.1	20744.1
Rape seed oil	877.3	2532.9	1847.4	210.4	9017.3	9913.2	11550.2
Sunflower seed oil	1625.3	2966.2	1575.2	233.2	2314.8	3939.0	5281.0
Soya oil	642.8	1652.8	2212.0	568.3	3335.3	3344.3	4988.1
Olive oil	2759.8	1816.3	231.2	340.0	85.0	2010.1	1901.3
Palm oil	745.5	106.4	7317.7	563.2	7955.9	1307.8	8062.3
Other oil	888.6	1024.4	2026.5	439.7	1871.5	1309.1	2895.9
Rape seed cake	286.7	10.7	1078.0	4128.9	11801.1	14862.7	11811.8
Sunflowe seed cake	285.2	31.2	1875.5	673.1	5995.1	4823.9	6026.3
Soya cake	221.7	408.1	18311.8	1349.0	31463.9	14909.2	31872.0
Other arable field crops	207.2	36675.1	4234.4	3243.1	14244.5	49928.2	50919.6
Vegetables and Permanent crops	685.4	120986.2	29190.2	10982.1	15720.2	118498.4	136706.4
Coffee, Coco and tea		4171.2	4208.7		37.5		4208.7
All other crops	650.2		1543.0	272.0	2308.0	1037.0	2308.0
Meat	1804.7	43473.3	2492.0	5044.6	0.1	46026.0	43473.4
All Other animal products incl fish	414.58	6965.87	194.84	492.41	147124.79	154388.23	154090.66
Fish and other acquatic products	3303.1	12268.4	15028.0	6129.5	2781.3	6151.2	15049.7
Milk products	1630.8	64480.6	1352.0	4143.6	1163.4	68435.6	65644.0
Oils	1142.5	10098.9	15210.0	2354.8	24579.9	21823.6	34678.8
Oil cakes	258.5	450.0	21265.3	6151.0	49260.1	34595.7	49710.1
Secondary products	309.23	16693.58	7399.45	4077.26	7167.44	20538.83	23861.02
Coffee, dry equivalent		2502.8	2504.9		2.1		2504.9
Tea, dry equivalent		377.5	377.5		0.0		377.5
Cocoa beans, dry equivalent		1290.9	1326.4		35.4		1326.4
Fresh water fish	2343.5	1944.8	1982.7	550.1	58.9	571.1	2003.7
Salt water fish	2950.4	6951.5	9662.5	4295.1	2711.3	4295.5	9662.8
Other acquatic products	4909.0	3372.1	3382.9	1284.2	11.1	1284.6	3383.2
Cereals incl rice	167.7	73478.7	39387.1	54652.2	196897.4	285641.3	270376.1
Oils	1142.5	10098.9	15210.0	2354.8	24579.9	21823.6	34678.8
Sugar	312.3	13843.6	5665.6	3488.6	6900.5	18567.1	20744.1
Other plant products	476.4	163363.5	84928.1	26734.1	131023.6	236193.1	294387.1
Fat rich dairy	3695.9	14246.9	612.2	1744.5	389.3	15768.5	14636.2
Other dairy	1012.6	50233.8	739.9	2399.1	774.1	52667.1	51007.9
Dairy products	1630.8	64480.6	1352.0	4143.6	1163.4	68435.6	65644.0
Meat	1804.7	43473.3	2492.0	5044.6	0.1	46026.0	43473.4
Other animal products incl fish	2061.2	19234.3	15222.8	6621.9	2877.5	13510.8	22111.7

Table A7: *Market results for EU under the LiveWell 30% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	139.7	2915.7	311.2	1028.3	3798.8	7431.5	6714.4
Barley	153.6	719.8	718.9	6512.3	44723.2	51236.4	45443.0
Oats	142.3	1164.0	59.2	1032.9	9523.3	11661.0	10687.3
Grain maize	170.8	6600.1	18539.2	10247.6	64320.4	62628.8	70920.4
Other cereals	152.5	1632.8	8084.9	1751.3	15364.3	10663.6	16997.1
Rape seed	357.0	461.8	5500.0	2622.5	24163.4	21747.7	24625.2
Sunflower seed	342.7	380.6	3442.0	3681.1	8365.1	8984.8	8745.7
Soya seed	333.3	285.0	16266.7	199.5	17935.2	2152.9	18220.1
Pulses	276.6	2240.3	1308.5	172.9	1340.6	2445.2	3580.8
Potatoes	204.0	35771.5	3369.2	2979.9	12009.5	47391.7	47781.0
Tomatoes	429.4	7850.2	1325.5	523.4	9994.4	17042.5	17844.6
Other vegetables	752.5	50846.4	4435.2	1906.5	1101.9	49419.6	51948.3
Apples pears and peaches	518.0	15754.3	3586.4	2649.4	762.1	15579.3	16516.4
Other fruits	942.8	13519.4	6364.9	1810.7	934.9	9900.1	14454.3
Citrus fruits	438.0	19950.0	11175.0	1781.7	132.7	10689.4	20082.7
Table grapes	1455.4	2680.7	1336.9	558.3	25.6	1927.7	2706.4
Table olives	2630.4	795.5	84.3	100.3	0.0	811.5	795.5
Table wine	1127.7	12051.5	1226.4	1809.0	2402.9	15037.1	14454.4
Cereals	166.1	79583.0	36763.1	53103.7	186916.6	282840.2	266499.5
Oilseeds	351.5	1127.4	25208.8	6503.1	50463.7	32885.4	51591.0
Soft and durum wheat	172.9	66550.6	9049.6	32531.3	49186.7	139218.9	115737.3
Beef	2623.8	7334.7	356.9	538.8	36.9	7553.6	7371.6
Pork meat	1358.0	19187.3	674.2	4210.0	0.0	22723.1	19187.3
Sheep and goat meat	3983.9	864.3	243.7	274.2	0.0	894.9	864.3
Eggs	1138.9	7783.2	262.2	379.8	72.0	7972.9	7855.2
Poultry meat	1159.2	10685.5	574.4	2229.8	0.0	12341.0	10685.5
Whey powder	736.8	158.4	127.4	912.8	300.8	1244.6	459.2
Casein and caseinates	8570.6	114.7	38.0	48.3	25.0	150.0	139.7
Whole milk powder only	3285.8	349.4	17.5	282.0	2.5	616.4	351.9
Butter	2398.8	1561.7	63.8	526.2	56.3	2080.4	1618.0
Skimmed milk powder	2807.4	443.7	79.7	591.2	370.9	1326.1	814.6
Cheese	4036.4	8959.7	419.2	1167.6	375.7	10083.8	9335.4
Fresh milk products	845.0	46403.4	426.4	625.8	24.1	46626.9	46427.5
Cream	2335.9	2284.2	40.1	131.5	0.6	2376.2	2284.8
Concentrated milk	1979.7	954.5	44.8	193.2	0.5	1103.4	955.0
Rice milled	318.6	3702.8	2387.7	493.5	172.1	1980.7	3874.9
Processed sugar	277.2	11222.7	3799.9	3917.7	7178.8	18519.3	18401.5
Rape seed oil	865.3	2290.3	1798.2	216.3	9090.6	9799.0	11380.9
Sunflower seed oil	1570.6	2500.9	1391.8	251.9	2425.2	3786.2	4926.1
Soya oil	635.0	1403.1	2031.2	573.8	3308.3	3254.0	4711.4
Olive oil	2570.0	1682.9	180.9	379.8	98.5	1980.4	1781.5
Palm oil	742.9	105.6	7229.4	563.1	7870.4	1309.6	7975.9
Other oil	883.1	951.8	1984.0	442.4	1900.6	1310.8	2852.4
Rape seed cake	259.8	11.1	1020.6	4384.5	11316.0	14691.0	11327.1
Sunflowe seed cake	260.8	31.6	1661.3	693.9	5572.1	4636.3	5603.7
Soya cake	202.9	396.8	16557.1	1325.2	29343.8	14508.8	29740.7
Other arable field crops	207.6	38011.8	4677.7	3152.8	13350.1	49836.9	51361.9
Vegetables and Permanent crops	734.9	123448.0	29534.6	11139.4	15354.5	120407.3	138802.5
Coffee, Coco and tea		4039.6	4079.3		39.7		4079.3
All other crops	649.8		1545.5	272.0	2310.9	1037.4	2310.9
Meat	1575.4	38071.9	1849.1	7252.9	36.9	43512.5	38108.8
All Other animal products incl fish	396.16	7783.22	262.16	379.81	143460.27	151361.14	151243.49
Fish and other acquatic products	3277.5	11242.2	14004.6	6095.7	2783.1	6116.3	14025.3
Milk products	1536.1	61229.6	1257.0	4478.6	1156.3	65607.6	62385.9
Oils	1106.0	8934.6	14615.4	2427.2	24693.5	21439.9	33628.2
Oil cakes	235.6	439.5	19239.0	6403.6	46231.9	33836.0	46671.4
Secondary products	281.17	14925.48	6187.56	4411.16	7350.88	20499.96	22276.36
Coffee, dry equivalent		2501.9	2504.0		2.1		2504.0
Tea, dry equivalent		377.7	377.7		0.0		377.7
Cocoa beans, dry equivalent		1160.0	1197.6		37.6		1197.6
Fresh water fish	2325.4	1778.1	1817.0	546.8	59.0	566.8	1837.1
Salt water fish	2941.3	6816.5	9528.9	4282.3	2712.7	4282.6	9529.2
Other acquatic products	4839.9	2647.6	2658.8	1266.6	11.4	1266.9	2659.0
Cereals incl rice	167.1	83285.7	39150.7	53597.2	187088.7	284820.9	270374.4
Oils	1106.0	8934.6	14615.4	2427.2	24693.5	21439.9	33628.2
Sugar	277.2	11222.7	3799.9	3917.7	7178.8	18519.3	18401.5
Other plant products	499.5	167066.2	82739.4	27198.9	125439.9	236965.6	292506.1
Fat rich dairy	3415.3	13760.0	567.9	2018.5	433.1	15643.7	14193.1
Other dairy	947.7	47469.6	689.0	2460.1	723.3	49963.9	48192.8
Dairy products	1536.1	61229.6	1257.0	4478.6	1156.3	65607.6	62385.9
Meat	1575.4	38071.9	1849.1	7252.9	36.9	43512.5	38108.8
Other animal products incl fish	2067.3	19025.4	14266.8	6475.5	2855.1	14089.2	21880.5

Table A8: *Market results for EU under the LiveWell 70% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	139.2	3029.1	308.0	1009.7	3652.4	7383.2	6681.5
Barley	152.2	742.7	708.8	6363.0	44229.4	50626.2	44972.0
Oats	141.6	1506.1	61.3	969.8	9179.8	11594.4	10685.9
Grain maize	169.3	7194.4	18095.2	10001.6	62978.5	62079.3	70173.0
Other cereals	152.6	2193.8	8089.0	1785.1	14814.3	10704.2	17008.1
Rape seed	345.9	405.8	5386.5	2773.7	23814.5	21607.5	24220.3
Sunflower seed	328.0	431.6	3226.5	3717.5	7865.2	8787.8	8296.8
Soya seed	327.0	350.5	15722.0	206.4	17320.6	2155.6	17671.1
Pulses	305.2	3867.5	2271.1	122.3	901.6	2620.3	4769.0
Potatoes	203.1	35884.5	3322.2	2942.5	11653.0	47157.7	47537.5
Tomatoes	434.8	8361.2	1458.3	522.8	9649.4	17075.0	18010.6
Other vegetables	970.3	56344.3	6422.5	1804.4	668.7	52394.9	57013.0
Apples pears and peaches	486.9	14717.7	2861.0	2820.8	840.8	15518.3	15558.6
Other fruits	862.7	11724.4	5083.8	2029.5	1176.0	9846.1	12900.4
Citrus fruits	452.6	21465.5	12715.8	1844.7	120.0	10714.4	21585.5
Table grapes	1367.8	2180.1	916.1	630.4	25.7	1920.0	2205.7
Table olives	2567.3	774.1	72.3	108.5	0.0	810.3	774.1
Table wine	1117.5	11895.8	1187.4	1831.2	2489.2	15028.7	14385.0
Cereals	166.9	91565.1	36756.1	51168.6	177898.5	283876.1	269463.6
Oilseeds	339.8	1188.0	24334.9	6697.5	49000.3	32550.9	50188.2
Soft and durum wheat	175.7	76899.0	9494.0	31039.6	43044.2	141488.8	119943.1
Beef	2042.6	6139.7	131.7	1174.4	98.2	7280.7	6237.9
Pork meat	1222.4	15870.6	458.0	6010.1	0.0	21422.7	15870.6
Sheep and goat meat	3348.2	474.4	198.9	595.1	0.0	870.6	474.4
Eggs	1311.7	8887.5	379.0	335.7	37.0	8881.3	8924.5
Poultry meat	1024.4	8138.3	398.2	3697.7	0.0	11437.9	8138.3
Whey powder	741.7	156.2	124.4	902.3	285.2	1219.2	441.4
Casein and caseinates	8600.1	113.4	37.0	48.7	24.1	149.1	137.4
Whole milk powder only	3127.6	309.9	14.6	330.2	2.4	628.0	312.3
Butter	1671.6	1122.7	32.8	931.7	70.0	2091.6	1192.7
Skimmed milk powder	2796.5	389.5	72.2	620.1	352.0	1289.4	741.5
Cheese	3831.6	8775.7	405.1	1231.8	412.4	10014.7	9188.0
Fresh milk products	756.1	42933.4	387.0	709.3	24.3	43279.9	42957.7
Cream	1936.6	2027.6	32.2	211.1	0.7	2207.2	2028.3
Concentrated milk	2097.7	1156.8	64.5	156.3	0.4	1249.0	1157.2
Rice milled	370.3	4973.0	3484.3	390.2	113.5	1992.5	5086.5
Processed sugar	239.7	7834.6	2192.0	4449.7	8367.7	18460.1	16202.3
Rape seed oil	848.2	1969.6	1729.5	224.3	9202.8	9667.1	11172.4
Sunflower seed oil	1496.6	1901.8	1173.5	279.2	2587.1	3594.6	4488.8
Soya oil	622.6	1074.1	1804.0	587.1	3299.2	3156.3	4373.2
Olive oil	2348.5	1505.5	127.6	453.1	114.6	1945.6	1620.1
Palm oil	739.3	104.7	7107.0	562.5	7750.2	1310.4	7854.9
Other oil	875.9	854.5	1927.6	446.0	1939.1	1312.0	2793.6
Rape seed cake	232.1	11.5	965.4	4655.9	10790.9	14492.9	10802.3
Sunflowe seed cake	236.1	32.1	1442.5	713.4	5098.1	4401.1	5130.2
Soya cake	183.1	382.3	14829.2	1276.5	27246.1	14075.6	27628.3
Other arable field crops	208.4	39751.9	5593.3	3064.8	12554.5	49778.0	52306.5
Vegetables and Permanent crops	816.4	127463.1	30717.4	11592.2	14969.9	123307.8	142433.0
Coffee, Coco and tea		3863.3	3905.6		42.3		3905.6
All other crops	649.5		1548.5	272.0	2314.2	1037.6	2314.2
Meat	1357.9	30623.0	1186.8	11477.4	98.2	41011.9	30721.3
All Other animal products incl fish	381.00	8887.54	378.96	335.70	139606.25	148450.53	148493.79
Fish and other acquatic products	3244.0	9885.8	12652.3	6050.9	2785.5	6069.9	12671.4
Milk products	1436.5	56985.1	1169.7	5141.3	1171.4	62128.2	58156.5
Oils	1059.3	7410.1	13869.1	2552.2	24892.9	20986.1	32303.0
Oil cakes	211.7	425.8	17237.1	6645.8	43135.1	32969.6	43560.9
Secondary products	252.40	12807.65	5676.29	4839.94	8481.22	20452.52	21288.87
Coffee, dry equivalent		2500.9	2503.0		2.1		2503.0
Tea, dry equivalent		377.9	377.9		0.0		377.9
Cocoa beans, dry equivalent		984.5	1024.7		40.2		1024.7
Fresh water fish	2300.8	1556.5	1597.2	542.4	59.2	560.9	1615.7
Salt water fish	2929.3	6635.9	9350.0	4265.2	2714.5	4265.5	9350.4
Other acquatic products	4748.7	1693.4	1705.1	1243.4	11.9	1243.5	1705.3
Cereals incl rice	168.3	96538.1	40240.4	51558.8	178012.0	285868.6	274550.1
Oils	1059.3	7410.1	13869.1	2552.2	24892.9	20986.1	32303.0
Sugar	239.7	7834.6	2192.0	4449.7	8367.7	18460.1	16202.3
Other plant products	541.0	172692.1	81788.2	28000.2	119702.1	238606.2	292394.2
Fat rich dairy	3133.3	13082.7	534.5	2530.8	483.5	15562.5	13566.2
Other dairy	869.4	43902.4	635.2	2610.6	687.9	46565.7	44590.3
Dairy products	1436.5	56985.1	1169.7	5141.3	1171.4	62128.2	58156.5
Meat	1357.9	30623.0	1186.8	11477.4	98.2	41011.9	30721.3
Other animal products incl fish	2096.2	18773.4	13031.3	6386.6	2822.5	14951.2	21595.9

Table A9: *Market results for Spain under the reference scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	180.69	49.82	38.83	9.91	446.22	467.12	496.04
Barley	170.53	18.77	162.78	159.89	7808.80	7824.68	7827.57
Oats	167.71	12.31	76.65	5.68	1590.57	1531.91	1602.88
Grain maize	200.29	81.89	9481.29	11.24	12013.74	2625.58	12095.63
Other cereals	210.61	4.98	2246.97	474.18	1884.42	116.61	1889.40
Rape seed	530.03			42.86	88.72	131.58	88.72
Sunflower seed	428.89	31.80	714.88	23.62	1705.95	1046.49	1737.75
Soya seed	409.15	12.32	2574.73	0.49	2740.73	178.81	2753.05
Pulses	135.34	269.25	486.02	4.68	540.04	327.95	809.29
Potatoes	261.03	2695.88	1459.43	66.53	349.17	1652.15	3045.05
Tomatoes	464.70	1766.65		910.45	2041.42	4718.52	3808.07
Other vegetables	881.64	6192.58	446.60	74.77	337.59	6158.34	6530.17
Apples pears and peaches	654.17	1133.59		558.09	86.80	1778.48	1220.39
Other fruits	1080.61	1631.99		364.67	147.86	2144.52	1779.85
Citrus fruits	435.46	1386.75		3799.63	28.83	5215.21	1415.58
Table grapes	3066.17	201.06	13.82	34.65	0.00	221.89	201.06
Table olives	2588.44	587.91		0.11	0.00	588.02	587.91
Table wine	352.86	919.54		1605.25	934.47	3459.26	1854.01
Cereals	186.20	5424.03	12006.53	660.90	24191.54	18269.94	29615.57
Oilseeds	436.10	44.12	3289.61	66.96	4535.41	1356.88	4579.53
soft and durum wheat	206.12	5256.27			447.76	5704.03	5704.03
Beef	3418.59	564.57		25.74	0.01	590.32	564.58
Pork meat	1442.44	3320.12		782.38	0.00	4102.50	3320.12
Sheep and goat meat	6289.66	137.70		18.51	0.00	156.21	137.70
Eggs	934.43	1019.22		158.36	3.01	1180.59	1022.23
Poultry meat	1431.12	1577.85	114.96	6.99	0.01	1469.89	1577.86
Whey powder	665.92	5.75	11.73	9.87	16.92	20.81	22.67
Casein and caseinates	8370.61	7.05	7.26	0.20	0.01		7.06
Whole milk powder only	3723.24	4.21	3.33	6.10	0.30	7.28	4.51
Butter	2771.93	32.40		6.14	0.01	38.55	32.41
Skimmed milk powder	2723.27	6.99		2.08	7.45	16.52	14.44
Cheese	5850.50	412.30	78.69	12.61	28.89	375.11	441.19
Fresh milk products	955.42	3766.81		851.97	0.00	4618.78	3766.81
Cream	2909.31	150.15	57.26		0.01	92.90	150.16
Concentrated milk	1996.86	33.80		23.36	0.01	57.17	33.81
Rice milled	280.21	292.35		317.67	25.45	635.47	317.80
Processed sugar	308.77	882.08	507.52	84.62	1270.52	1729.70	2152.60
Rape seed oil	967.89	12.02	58.44		83.64	37.22	95.66
Sunflower seed oil	1940.57	554.05	245.13	4.07	418.23	731.22	972.28
Soya oil	664.45	203.96	45.85	96.24	227.97	482.32	431.93
Olive oil	2759.75	535.90		504.45	0.34	1040.69	536.24
Palm oil	731.91		785.92	16.29	769.63		769.63
Other oil	888.59	41.79	85.18		118.54	75.15	160.33
Rape seed cake	329.21		47.47	6.11	97.20	55.84	97.20
Sunflowe seed cake	311.09	12.67	2.53	2.67	873.56	886.37	886.23
Soya cake	241.14	299.47	3487.33	26.47	5305.03	2143.64	5604.50
Other arable field crops	240.21	2965.13	1945.46	71.21	889.22	1980.10	3854.35
Vegetables and Permanent crops	691.68	13820.06	460.41	7347.63	3576.96	24284.24	17397.02
Coffee, Coco and tea		377.77	377.77		0.00		377.77
All other crops	514.44		113.16	19.84	185.31	91.99	185.31
Meat	1744.25	5600.24	114.96	833.63	0.01	6318.92	5600.25
All Other animal products incl fish	551.17	1019.22		158.36	7486.35	8663.93	8505.57
Fish and other acquatic products	3456.86	2123.38	1404.56	0.00	240.28	959.10	2363.66
Milk products	1374.51	4419.48	158.27	912.33	53.57	5227.11	4473.05
Oils	1992.02	1347.71	1220.52	621.05	1618.37	2366.61	2966.08
Oil cakes	262.83	312.14	3537.33	35.25	6275.79	3085.85	6587.93
Secondary products	301.10	1174.43	507.52	402.28	1295.98	2365.17	2470.41
Coffee, dry equivalent	3991.16	223.82	223.82		0.00		223.82
Tea, dry equivalent	1931.38	9.24	9.24		0.00		9.24
Cocoa beans, dry equivalent	1052.52	144.71	144.71		0.00		144.71
Fresh water fish	2343.52	215.57	188.54		0.00	27.03	215.57
Salt water fish	2950.37	1100.36	664.96	0.00	240.28	675.68	1340.64
Other acquatic products	4909.02	807.45	551.06		0.00	256.39	807.45
Cereals incl rice	189.36	5716.38	12006.53	978.57	24216.99	18905.41	29933.37
Oils	1992.02	1347.71	1220.52	621.05	1618.37	2366.61	2966.08
Sugar	308.77	882.08	507.52	84.62	1270.52	1729.70	2152.60
Other plant products	608.18	17519.23	9610.58	7521.04	15277.38	30707.07	32796.61
Fat rich dairy	4764.47	628.65	135.95	42.11	28.92	563.73	657.57
Other dairy	964.71	3790.81	22.32	870.22	24.68	4663.39	3815.49
Dairy products	1374.51	4419.48	158.27	912.33	53.57	5227.11	4473.05
Meat	1744.25	5600.24	114.96	833.63	0.01	6318.92	5600.25
Other animal products incl fish	2065.09	3142.60	1404.56	158.36	243.29	2139.69	3385.89

Table A10: *Market results for Spain under the LiveWell 30% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	178.23	52.30	20.83	10.04	426.13	467.64	478.43
Barley	167.82	20.39	3.75	163.26	7548.58	7728.48	7568.97
Oats	166.05	17.99		31.91	1483.85	1533.75	1501.84
Grain maize	197.19	101.09	9137.29	11.55	11592.17	2567.52	11693.26
Other cereals	209.09	8.36	2243.08	470.85	1882.42	118.55	1890.78
Rape seed	515.66			40.18	87.31	127.49	87.31
Sunflower seed	409.37	41.62	661.31	26.25	1615.81	1022.37	1657.43
Soya seed	402.85	19.89	2508.84	0.49	2665.71	177.25	2685.60
Pulses	143.78	438.38	497.80	3.42	391.08	335.08	829.46
Potatoes	260.31	2952.25	1686.60	65.92	317.21	1648.78	3269.46
Tomatoes	468.18	1884.69		831.34	2008.45	4724.48	3893.14
Other vegetables	1079.01	4956.06		1181.70	251.12	6388.88	5207.18
Apples pears and peaches	628.82	1025.51		656.38	91.93	1773.82	1117.44
Other fruits	1023.25	1290.53		708.75	137.42	2136.70	1427.95
Citrus fruits	446.90	1232.65		3965.70	26.51	5224.86	1259.16
Table grapes	2939.71	136.82		84.46	0.00	221.28	136.82
Table olives	2542.65	573.89		13.40	0.00	587.29	573.89
Table wine	350.48	899.54		1584.56	974.20	3458.30	1873.74
Cereals	184.72	6731.56	11404.95	687.61	22182.50	18196.72	28914.06
Oilseeds	418.71	61.51	3170.15	66.91	4368.84	1327.11	4430.35
soft and durum wheat	206.76	6531.43			0.00	5780.77	5780.77
Beef	2775.05	452.13		108.76	3.08	563.97	455.21
Pork meat	1316.99	3392.95		492.60	0.00	3885.55	3392.95
Sheep and goat meat	4840.29	108.51		38.62	0.00	147.13	108.51
Eggs	1035.06	1115.40		164.78	2.32	1282.50	1117.72
Poultry meat	1274.00	1244.00		102.22	0.00	1346.22	1244.00
Whey powder	685.89	5.63	10.81	9.57	16.07	20.46	21.70
Casein and caseinates	8370.61	6.95	7.16	0.20	0.01		6.96
Whole milk powder only	3582.20	2.97	3.05	7.02	0.30	7.24	3.27
Butter	2011.40	24.53		13.13	0.00	37.66	24.53
Skimmed milk powder	2779.61	4.83		4.20	7.15	16.18	11.98
Cheese	5648.55	332.90		18.66	30.32	381.88	363.22
Fresh milk products	884.50	3225.00		1097.58	0.00	4322.58	3225.00
Cream	2478.54	110.99	21.97		0.00	89.01	110.98
Concentrated milk	2084.65	56.08	0.95	9.76	0.00	64.89	56.08
Rice milled	318.59	569.22	34.30	82.11	22.05	639.08	591.27
Processed sugar	274.22	667.16	395.22	110.30	1350.04	1732.28	2017.20
Rape seed oil	956.63	8.40	54.72	0.00	82.94	36.62	91.34
Sunflower seed oil	1886.99	390.03	145.12	4.15	450.65	699.71	840.68
Soya oil	656.31	142.09		106.03	223.94	472.06	366.03
Olive oil	2570.01	504.15		519.05	0.40	1023.60	504.55
Palm oil	731.91		778.40	16.28	762.12		762.12
Other oil	883.10	41.11	86.15		120.44	75.40	161.55
Rape seed cake	299.55		46.46	6.66	94.73	54.93	94.73
Sunflowe seed cake	285.23	12.81		2.91	832.46	848.18	845.27
Soya cake	220.60	289.47	3270.59	26.03	5053.14	2098.05	5342.61
Other arable field crops	240.63	3390.63	2184.40	69.34	708.29	1983.86	4098.92
Vegetables and Permanent crops	738.23	11999.70		9026.29	3489.63	24515.62	15489.33
Coffee, Coco and tea		364.04	364.04		0.00		364.04
All other crops	514.23		113.15	19.85	185.45	92.15	185.45
Meat	1532.85	5197.59		742.20	3.09	5942.88	5200.68
All Other animal products incl fish	549.55	1115.40		164.78	7273.37	8553.55	8388.77
Fish and other acquatic products	3427.92	1786.69	1073.59	0.00	240.34	953.44	2027.03
Milk products	1315.21	3769.88	43.95	1160.10	53.88	4939.91	3823.76
Oils	1890.64	1085.79	1064.40	645.52	1640.48	2307.39	2726.27
Oil cakes	240.31	302.28	3317.05	35.60	5980.33	3001.16	6282.61
Secondary products	286.18	1236.38	429.51	192.41	1372.09	2371.37	2608.47
Coffee, dry equivalent	3991.16	223.88	223.88		0.00		223.88
Tea, dry equivalent	1931.38	9.25	9.25		0.00		9.25
Cocoa beans, dry equivalent	1052.52	130.91	130.91		0.00		130.91
Fresh water fish	2329.45	213.32	186.45		0.00	26.87	213.32
Salt water fish	2941.40	947.66	514.33	0.00	240.34	673.67	1188.00
Other acquatic products	4840.64	625.70	372.80		0.00	252.90	625.70
Cereals incl rice	189.26	7300.78	11439.25	769.72	22204.55	18835.80	29505.33
Oils	1890.64	1085.79	1064.40	645.52	1640.48	2307.39	2726.27
Sugar	274.22	667.16	395.22	110.30	1350.04	1732.28	2017.20
Other plant products	643.98	16118.15	9035.64	9198.14	14547.09	30827.74	30665.24
Fat rich dairy	4514.34	524.50	22.92	41.55	30.32	573.44	554.81
Other dairy	895.06	3245.38	21.02	1118.57	23.53	4366.46	3268.91
Dairy products	1315.21	3769.88	43.95	1160.10	53.88	4939.91	3823.76
Meat	1532.85	5197.59	0.00	742.20	3.09	5942.88	5200.68
Other animal products incl fish	2055.42	2902.08	1073.58	164.78	242.66	2235.94	3144.74

Table A11: *Market results for Spain under the LiveWell 70% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	177.27	55.60		13.77	397.85	467.22	453.45
Barley	166.18	22.55		345.39	7293.17	7661.11	7315.72
Oats	165.73	25.56		145.82	1368.57	1539.95	1394.13
Grain maize	195.25	126.70	8819.39	11.54	11215.24	2534.09	11341.94
Other cereals	208.78	12.88	2250.34	481.65	1876.22	120.41	1889.10
Rape seed	500.04			37.29	85.70	122.99	85.70
Sunflower seed	386.47	54.48	595.71	29.90	1505.86	994.53	1560.34
Soya seed	395.97	29.96	2444.17	0.48	2588.06	174.33	2618.02
Pulses	156.19	660.47	589.14	2.35	269.35	343.03	929.82
Potatoes	259.83	3294.19	1998.77	64.89	286.66	1646.97	3580.85
Tomatoes	472.79	2041.79		723.92	1966.63	4732.34	4008.42
Other vegetables	1366.30	3398.22		3181.49	144.59	6724.30	3542.81
Apples pears and peaches	592.28	882.76		784.32	100.01	1767.09	982.77
Other fruits	943.51	828.57		1167.98	129.17	2125.72	957.74
Citrus fruits	461.84	1032.00		4181.25	24.14	5237.39	1056.14
Table grapes	2761.00	57.02		163.41	0.00	220.42	57.01
Table olives	2481.90	555.78		30.53	0.00	586.31	555.78
Table wine	347.35	872.69		1556.27	1027.77	3456.73	1900.46
Cereals	184.93	8479.98	11069.73	998.18	19854.61	18263.04	28334.59
Oilseeds	398.57	84.44	3039.88	67.67	4179.62	1291.85	4264.06
soft and durum wheat	209.81	8236.68			0.00	5940.27	5940.27
Beef	2144.50	290.27		239.88	8.19	538.34	298.46
Pork meat	1186.68	3483.67	350.47	521.90	0.00	3655.09	3483.66
Sheep and goat meat	4065.75	65.74		77.42	0.01	143.17	65.75
Eggs	1185.52	1245.72		186.02	1.29	1433.03	1247.01
Poultry meat	1120.26	796.33		431.07	0.00	1227.40	796.33
Whey powder	690.39	5.55	10.69	9.47	15.71	20.04	21.26
Casein and caseinates	8370.61	6.88	7.08	0.20	0.00		6.88
Whole milk powder only	3414.28	1.32	2.60	8.18	0.30	7.20	1.62
Butter	1404.58	13.39		23.28	0.00	36.67	13.39
Skimmed milk powder	2771.58	2.01		6.94	7.06	16.01	9.07
Cheese	5372.92	227.90		130.30	32.31	390.51	260.21
Fresh milk products	797.11	2510.91		1471.33	0.00	3982.24	2510.91
Cream	2060.14	57.98		26.79	0.00	84.77	57.98
Concentrated milk	2207.83	85.43	18.11	7.85	0.00	75.17	85.43
Rice milled	370.49	958.46	397.27	64.65	18.02	643.86	976.48
Processed sugar	237.53	386.07	340.35	145.88	1544.27	1735.87	1930.34
Rape seed oil	939.91	3.59	49.51	0.00	81.86	35.94	85.45
Sunflower seed oil	1814.30	178.14	16.01	4.32	493.25	659.70	671.39
Soya oil	643.26	60.36		181.34	219.46	461.16	279.82
Olive oil	2348.50	461.77		541.36	0.46	1003.59	462.23
Palm oil	731.91		767.91	16.26	751.65		751.65
Other oil	875.97	40.21	87.44	0.00	122.93	75.70	163.14
Rape seed cake	268.87		45.80	7.21	92.50	53.91	92.50
Sunflowe seed cake	259.26	13.00	4.77	2.90	788.56	799.69	801.56
Soya cake	198.82	276.49	3084.67	25.09	4832.70	2049.61	5109.19
Other arable field crops	241.96	3954.66	2587.91	67.23	556.01	1989.99	4510.67
Vegetables and Permanent crops	811.27	9668.81		11789.17	3392.32	24850.30	13061.13
Coffee, Coco and tea		345.58	345.58		0.00		345.58
All other crops	513.98		113.18	19.84	185.62	92.28	185.62
Meat	1338.78	4636.02	350.47	1270.27	8.18	5564.00	4644.20
All Other animal products incl fish	556.44	1245.72		186.02	7038.20	8469.94	8283.92
Fish and other acquatic products	3389.91	1340.45	634.93	0.00	240.42	945.94	1580.87
Milk products	1246.00	2911.39	38.49	1684.33	55.37	4612.60	2966.76
Oils	1766.73	744.08	920.87	743.27	1669.61	2236.09	2413.69
Oil cakes	216.77	289.49	3135.24	35.21	5713.74	2903.20	6003.23
Secondary products	273.50	1344.53	737.62	210.53	1562.29	2379.73	2906.82
Coffee, dry equivalent	3991.16	223.93	223.93		0.00		223.93
Tea, dry equivalent	1931.38	9.25	9.25		0.00		9.25
Cocoa beans, dry equivalent	1052.52	112.39	112.39		0.00		112.39
Fresh water fish	2310.33	210.38	183.72		0.00	26.66	210.38
Salt water fish	2929.46	743.81	313.23	0.00	240.42	671.00	984.23
Other acquatic products	4750.24	386.26	137.98		0.00	248.28	386.26
Cereals incl rice	191.25	9438.44	11467.00	1062.83	19872.63	18906.90	29311.07
Oils	1766.73	744.08	920.87	743.27	1669.61	2236.09	2413.69
Sugar	237.53	386.07	340.35	145.88	1544.27	1735.87	1930.34
Other plant products	701.98	14342.99	9108.60	11959.29	13841.68	31035.35	28184.66
Fat rich dairy	4241.53	384.70	18.11	188.22	32.31	587.12	417.01
Other dairy	809.11	2526.67	20.37	1496.12	23.07	4025.49	2549.74
Dairy products	1246.00	2911.39	38.49	1684.33	55.37	4612.60	2966.76
Meat	1338.78	4636.02	350.47	1270.27	8.18	5564.00	4644.20
Other animal products incl fish	2062.04	2586.17	634.93	186.02	241.71	2378.97	2827.88

Table A12: *Market results for France under the reference scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	170.3	23.8		17.7	49.0	90.5	72.8
Barley	148.6	108.2		5651.8	4535.8	10295.8	4644.0
Oats	108.9	9.5	29.1	1.2	556.5	538.1	566.0
Grain maize	163.8	372.9		6914.3	8483.4	15770.6	8856.4
Other cereals	144.3	24.4		137.9	2136.5	2298.8	2161.0
Rape seed	360.1	65.0		838.5	4635.1	5538.7	4700.2
Sunflower seed	378.5	21.9		251.9	2190.4	2464.2	2212.3
Soya seed	363.6	17.7	206.5	0.2	1034.1	845.4	1051.8
Pulses	201.2	17.8		346.8	56.4	421.0	74.2
Potatoes	213.6	4257.2		1229.7	1581.6	7068.4	5838.7
Tomatoes	820.2	954.1	395.7	48.1	174.7	781.1	1128.8
Other vegetables	416.4	7465.0	1083.8	162.2	4.0	6547.4	7469.1
Apples pears and peaches	648.8	2079.1	338.9	94.5	3.6	1838.3	2082.7
Other fruits	2496.2	996.8	450.3	80.4	3.5	630.4	1000.3
Citrus fruits	850.6	2469.4	2498.5	66.5	2.1	39.5	2471.5
Table grapes	1711.2	265.3	234.9	3.4	0.0	33.8	265.3
Table olives	12696.9	5.9	0.0		0.0	5.9	5.9
Table wine	2260.5	2613.3		944.9	916.0	4474.2	3529.3
Cereals	165.7	8468.0	29.1	12722.9	46675.3	67837.1	55143.3
Oilseeds	365.6	104.6	206.5	1090.5	7859.7	8848.3	7964.3
soft and durum wheat	173.1	7929.2			30914.1	38843.3	38843.3
Beef	3659.7	1658.6		24.6	0.0	1683.3	1658.6
Pork meat	1412.1	2215.9	64.7	238.6	0.0	2389.8	2215.9
Sheep and goat meat	6271.8	199.3	100.7	5.1	0.0	103.7	199.3
Eggs	857.4	945.2	66.0	23.1	7.5	909.9	952.8
Poultry meat	1555.9	1609.5		287.6	0.0	1897.1	1609.5
Whey powder	713.3	46.5		365.3	75.5	487.2	122.0
Casein and caseinates	8516.7	12.3		37.4	1.2	50.9	13.5
Whole milk powder only	3352.4	22.0		120.4	0.0	142.4	22.0
Butter	4020.2	503.4	130.4	14.3	0.0	387.4	503.4
Skimmed milk powder	2858.7	93.1		169.3	2.6	265.0	95.7
Cheese	4896.5	1659.6		152.5	43.3	1855.4	1702.9
Fresh milk products	1084.7	5920.0		812.4	0.0	6732.4	5920.0
Cream	2674.7	459.0	13.1	7.8	0.0	453.7	459.0
Concentrated milk	1866.6	53.7		2.2	0.0	55.9	53.7
Rice milled	280.2	497.2	580.9	26.7	143.3	86.3	640.5
Processed sugar	308.8	1407.8		964.2	1693.8	4065.8	3101.6
Rape seed oil	858.8	151.0	1019.9	0.0	2711.1	1842.2	2862.0
Sunflower seed oil	1814.7	404.3		140.7	463.5	1008.5	867.9
Soya oil	647.4	88.0	515.7	3.5	619.2	195.0	707.2
Olive oil	2759.8	149.2	137.1	1.3	6.2	19.6	155.5
Palm oil	745.7	32.2	376.7	0.8	492.9	149.3	525.1
Other oil	888.6	186.6	158.1	0.0	122.8	151.4	309.4
Rape seed cake	316.6		101.9	196.1	2669.1	2763.2	2669.1
Sunflowe seed cake	305.3			72.5	1160.2	1232.6	1160.2
Soya cake	229.0		3020.5	18.2	3869.2	866.8	3869.2
Other arable field crops	212.9	4275.0		1576.5	1637.9	7489.4	5912.9
Vegetables and Permanent crops	1143.8	16848.8	5002.2	1399.9	1104.0	14350.5	17952.8
Coffee, Coco and tea		643.1	643.1		0.0		643.1
All other crops	276.3		143.4	25.3	569.1	451.0	569.1
Meat	2162.8	5683.3	165.4	555.9	0.0	6073.8	5683.4
All Other animal products incl fish	391.05	945.21	65.95	23.07	23935.94	24838.27	24881.15
Fish and other acquatic products	3735.8	2305.5	1622.5	0.0	12.6	695.6	2318.1
Milk products	2040.1	8769.5	143.5	1681.5	122.6	10430.2	8892.1
Oils	1140.4	1011.3	2207.4	146.3	4415.7	3366.0	5427.1
Oil cakes	298.1		3122.4	286.7	7698.5	4862.7	7698.5
Secondary products	308.18	1904.98	580.86	990.87	1837.08	4152.07	3742.06
Coffee, dry equivalent	3991.2	365.7	365.7		0.0		365.7
Tea, dry equivalent	1931.4	27.7	27.7		0.0		27.7
Cocoa beans, dry equivalent	1052.5	249.7	249.7		0.0		249.7
Fresh water fish	2343.5	286.1	246.6		0.0	39.5	286.1
Salt water fish	2950.4	1178.6	826.3	0.0	12.6	365.0	1191.2
Other acquatic products	4909.0	840.8	549.6		0.0	291.2	840.8
Cereals incl rice	165.9	8965.2	610.0	12749.5	46818.6	67923.4	55783.8
Oils	1140.4	1011.3	2207.4	146.3	4415.7	3366.0	5427.1
Sugar	308.8	1407.8	0.0	964.2	1693.8	4065.8	3101.6
Other plant products	638.3	21871.6	8974.3	4353.6	18300.1	35550.9	40171.6
Fat rich dairy	4345.5	2675.7	143.5	176.7	43.3	2752.3	2719.0
Other dairy	1213.7	6093.8	0.0	1504.8	79.3	7677.9	6173.1
Dairy products	2040.1	8769.5	143.5	1681.5	122.6	10430.2	8892.1
Meat	2162.8	5683.3	165.4	555.9	0.0	6073.8	5683.4
Other animal products incl fish	2104.5	3250.7	1688.4	23.1	20.1	1605.5	3270.8

Table A13: *Market results for France under the LiveWell 30% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	168.0	23.8		20.9	47.0	91.7	70.8
Barley	146.2	108.2		5621.1	4424.9	10154.2	4533.1
Oats	107.9	9.5		2.4	522.6	534.6	532.1
Grain maize	161.3	371.9		6902.7	8301.9	15576.4	8673.8
Other cereals	143.2	24.4		287.0	1995.4	2306.8	2019.7
Rape seed	350.4	65.3		934.6	4526.0	5525.9	4591.3
Sunflower seed	361.3	21.8		334.0	2063.4	2419.1	2085.1
Soya seed	358.0	17.6	169.9	0.2	1002.5	850.4	1020.2
Pulses	213.7	76.3		360.6	39.8	476.7	116.1
Potatoes	213.0	4206.6		1292.5	1543.4	7042.4	5749.9
Tomatoes	826.4	934.7	374.4	48.7	173.1	782.0	1107.7
Other vegetables	509.6	7160.1	526.5	152.4	3.4	6789.4	7163.5
Apples pears and peaches	623.6	1921.6	192.1	100.1	3.9	1833.5	1925.5
Other fruits	2363.7	1061.1	522.6	85.9	3.7	628.1	1064.8
Citrus fruits	872.9	2250.9	2281.7	68.3	2.1	39.6	2252.9
Table grapes	1640.6	257.0	226.9	3.6	0.0	33.7	257.0
Table olives	12472.3	5.9		0.0	0.0	5.9	5.9
Table wine	2245.3	2604.6		944.0	923.6	4472.2	3528.2
Cereals	165.1	9362.8		12834.1	45433.4	67630.3	54796.2
Oilseeds	354.1	104.7	169.9	1268.8	7591.8	8795.5	7696.6
soft and durum wheat	173.6	8825.1			30141.6	38966.7	38966.7
Beef	2970.7	1739.5	143.3	26.2	8.9	1631.3	1748.4
Pork meat	1289.2	1723.1		559.2	0.0	2282.2	1723.1
Sheep and goat meat	4826.5	162.8	86.3	19.4	0.0	95.8	162.8
Eggs	949.7	894.5		76.2	5.6	976.3	900.1
Poultry meat	1385.1	1352.8		404.3	0.0	1757.1	1352.8
Whey powder	734.7	44.5		350.9	70.4	465.9	115.0
Casein and caseinates	8677.3	12.0		36.0	1.2	49.1	13.1
Whole milk powder only	3225.4	22.4		123.2	0.0	145.6	22.4
Butter	2917.2	404.3	53.3	27.0	0.0	377.9	404.3
Skimmed milk powder	2917.8	90.8		159.5	2.4	252.7	93.3
Cheese	4727.5	2031.1	351.0	114.2	45.9	1840.2	2076.9
Fresh milk products	1004.2	5996.4		322.7	0.0	6319.1	5996.4
Cream	2278.7	507.7	80.5	13.0	0.0	440.2	507.7
Concentrated milk	1948.7	50.6		12.0	0.0	62.7	50.6
Rice milled	318.6	502.1	523.9	22.3	86.0	86.5	588.1
Processed sugar	274.2	1193.0		1160.3	1705.1	4058.3	2898.1
Rape seed oil	848.8	103.3	1038.0	0.0	2736.8	1802.2	2840.1
Sunflower seed oil	1764.6	379.9		103.2	474.3	957.4	854.2
Soya oil	639.4	59.9	477.5	3.6	603.5	189.4	663.4
Olive oil	2570.0	152.1	141.4	1.5	7.2	19.4	159.3
Palm oil	743.1	31.6	355.2	0.8	472.7	150.0	504.3
Other oil	883.1	186.5	159.3		124.8	151.9	311.3
Rape seed cake	288.1		48.8	213.7	2538.3	2703.3	2538.3
Sunflowe seed cake	279.9			91.4	1078.8	1170.2	1078.8
Soya cake	209.5		2772.2	17.9	3596.0	841.7	3596.0
Other arable field crops	213.1	4282.9		1653.1	1583.2	7519.1	5866.0
Vegetables and Permanent crops	1161.5	16195.8	4124.1	1403.1	1109.6	14584.4	17305.4
Coffee, Coco and tea		643.5	643.5		0.0		643.5
All other crops	276.3		144.0	25.3	569.9	451.1	569.9
Meat	1852.9	4978.1	229.6	1009.0	8.9	5766.4	4987.0
All Other animal products incl fish	368.73	894.50		76.21	23315.06	24285.77	24209.56
Fish and other acquatic products	3696.7	2000.5	1322.8	0.0	12.6	690.4	2013.1
Milk products	1933.8	9159.8	484.9	1158.4	119.9	9953.3	9279.8
Oils	1111.8	913.3	2171.4	109.0	4419.2	3270.2	5332.6
Oil cakes	272.0		2820.9	322.9	7213.1	4715.1	7213.1
Secondary products	275.15	1695.06	523.91	1182.57	1791.06	4144.78	3486.12
Coffee, dry equivalent	3991.2	365.1	365.1		0.0		365.1
Tea, dry equivalent	1931.4	27.7	27.7		0.0		27.7
Cocoa beans, dry equivalent	1052.5	250.7	250.7		0.0		250.7
Fresh water fish	2329.5	285.7	246.5		0.0	39.3	285.7
Salt water fish	2941.4	1126.4	775.1	0.0	12.6	363.9	1139.0
Other acquatic products	4840.6	588.4	301.2		0.0	287.2	588.4
Cereals incl rice	165.3	9865.0	523.9	12856.4	45519.3	67716.8	55384.3
Oils	1111.8	913.3	2171.4	109.0	4419.2	3270.2	5332.6
Sugar	274.2	1193.0	0.0	1160.3	1705.1	4058.3	2898.1
Other plant products	644.1	21226.9	7758.5	4647.9	17497.8	35614.1	38724.7
Fat rich dairy	4015.9	2993.7	484.9	166.2	45.9	2720.9	3039.6
Other dairy	1150.5	6166.1	0.0	992.2	74.0	7232.3	6240.2
Dairy products	1933.8	9159.8	484.9	1158.4	119.9	9953.3	9279.8
Meat	1852.9	4978.1	229.6	1009.0	8.9	5766.4	4987.0
Other animal products incl fish	2087.5	2895.0	1322.8	76.2	18.2	1666.7	2913.2

Table A14: *Market results for France under the LiveWell 70% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	167.07	23.81		21.93	44.96	90.70	68.77
Barley	144.78	108.14		5565.05	4352.80	10025.99	4460.94
Oats	107.66	9.51		23.18	490.00	522.69	499.51
Grain maize	159.69	370.44		6891.76	8190.13	15452.33	8560.57
Other cereals	143.03	24.35		388.48	1905.56	2318.39	1929.91
Rape seed	339.77	65.71		1041.34	4406.16	5513.21	4471.87
Sunflower seed	341.06	21.54		437.68	1906.09	2365.31	1927.63
Soya seed	351.87	17.60	129.97	0.18	968.51	856.32	986.11
Pulses	232.16	152.44		374.45	26.49	553.38	178.93
Potatoes	212.64	4142.16		1371.34	1504.71	7018.21	5646.87
Tomatoes	834.52	909.63	346.07	48.80	170.93	783.29	1080.56
Other vegetables	645.28	6840.02		298.07	2.78	7140.87	6842.80
Apples pears and peaches	587.39	1716.04	3.74	109.96	4.25	1826.51	1720.29
Other fruits	2179.46	1156.52	630.97	95.49	3.91	624.95	1160.43
Citrus fruits	902.08	1969.00	2002.28	70.93	1.99	39.64	1970.99
Table grapes	1540.85	246.69	217.18	4.08	0.00	33.58	246.68
Table olives	12174.28	5.91		0.01	0.00	5.92	5.91
Table wine	2225.20	2593.96		941.78	933.68	4469.42	3527.64
Cereals	166.10	10564.66		12890.41	44310.02	67765.09	54874.68
Oilseeds	341.30	104.85	129.97	1479.19	7280.76	8734.83	7385.61
soft and durum wheat	176.19	10028.41			29326.58	39354.99	39354.99
Beef	2295.72	1808.09	360.11	110.81	24.01	1582.80	1832.10
Pork meat	1161.67	1078.09		1089.31	0.00	2167.40	1078.09
Sheep and goat meat	4054.18	97.32	48.42	43.28	0.00	92.18	97.32
Eggs	1087.74	830.16		242.27	2.83	1075.26	832.99
Poultry meat	1217.91	1010.64		612.28	0.00	1622.92	1010.64
Whey powder	739.48	43.64		349.74	66.75	460.13	110.39
Casein and caseinates	8705.72	11.78		35.91	1.13	48.82	12.91
Whole milk powder only	3074.22	22.96		125.94	0.00	148.90	22.96
Butter	2037.12	259.93		116.59	0.00	376.52	259.93
Skimmed milk powder	2909.40	90.14		152.89	2.33	245.36	92.47
Cheese	4496.81	2536.39	880.32	117.81	49.41	1823.29	2585.80
Fresh milk products	904.94	6128.48	428.89	81.04	0.00	5780.63	6128.48
Cream	1894.04	569.36	175.75	22.78	0.00	416.39	569.36
Concentrated milk	2063.85	46.92		24.20	0.00	71.12	46.92
Rice milled	370.49	512.51	495.70	17.56	52.34	86.71	564.85
Processed sugar	237.53	915.78		1224.68	1905.63	4046.09	2821.41
Rape seed oil	833.98	40.82	1055.17	0.01	2771.56	1757.22	2812.38
Sunflower seed oil	1696.66	350.47		48.34	494.38	893.19	844.85
Soya oil	626.72	23.40	434.00	3.64	590.23	183.27	613.63
Olive oil	2348.50	156.72	147.74	1.75	8.38	19.11	165.10
Palm oil	739.42	31.04	325.00	0.82	443.98	150.84	475.02
Other oil	875.97	186.32	161.04	0.00	127.34	152.62	313.66
Rape seed cake	258.56			241.83	2394.00	2635.83	2394.00
Sunflowe seed cake	254.41			104.64	987.04	1091.68	987.04
Soya cake	188.81		2524.59	17.22	3321.92	814.55	3321.92
Other arable field crops	214.07	4294.60		1745.78	1531.21	7571.59	5825.81
Vegetables and Permanent crops	1192.79	15437.76	3200.24	1569.12	1117.55	14924.19	16555.31
Coffee, Coco and tea		644.07	644.07		0.00		644.07
All other crops	276.25		144.85	25.26	570.76	451.17	570.76
Meat	1555.59	3994.14	408.54	1855.69	24.00	5465.29	4018.14
All Other animal products incl fish	347.70	830.16		242.27	22680.16	23752.59	23510.32
Fish and other acquatic products	3645.46	1598.74	953.75	25.78	12.58	683.35	1611.32
Milk products	1821.49	9709.62	1484.96	1026.90	119.60	9371.16	9829.22
Oils	1072.76	788.77	2122.95	54.57	4435.86	3156.25	5224.63
Oil cakes	245.05		2524.59	363.69	6702.96	4542.06	6702.96
Secondary products	240.32	1428.29	495.70	1242.24	1957.97	4132.80	3386.26
Coffee, dry equivalent	3991.16	364.41	364.41		0.00		364.41
Tea, dry equivalent	1931.38	27.73	27.73		0.00		27.73
Cocoa beans, dry equivalent	1052.52	251.93	251.93		0.00		251.93
Fresh water fish	2310.33	285.42	246.47		0.00	38.95	285.42
Salt water fish	2929.46	1057.13	707.29	0.00	12.59	362.43	1069.72
Other acquatic products	4750.24	256.19		25.78	0.00	281.97	256.19
Cereals incl rice	166.36	11077.17	495.70	12907.97	44362.36	67851.80	55439.53
Oils	1072.76	788.77	2122.95	54.57	4435.86	3156.25	5224.63
Sugar	237.53	915.78	0.00	1224.68	1905.63	4046.09	2821.41
Other plant products	657.39	20481.29	6498.87	5157.79	16632.46	35772.66	37113.74
Fat rich dairy	3684.51	3412.60	1056.07	281.38	49.41	2687.32	3462.01
Other dairy	1072.44	6297.00	428.89	745.52	70.21	6683.84	6367.21
Dairy products	1821.49	9709.62	1484.96	1026.90	119.60	9371.16	9829.22
Meat	1555.59	3994.14	408.54	1855.69	24.00	5465.29	4018.14
Other animal products incl fish	2081.61	2428.90	953.76	268.05	15.42	1758.61	2444.32

Table A15: *Market results for Sweden under the reference scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	140.32	114.48		23.58	14.81	152.87	129.29
Barley	146.86	21.90		668.85	767.22	1457.97	789.12
Oats	141.05	27.18		352.44	322.01	701.63	349.19
Grain maize	175.27	32.04	102.51	0.74	81.78	12.05	113.82
Other cereals	147.03	148.63	907.28	7.75	913.62	162.72	1062.25
Rape seed	332.32	4.80	18.95	14.86	232.67	233.38	237.47
Sunflower seed	376.61	0.39	17.19	0.96	15.84		16.23
Soya seed	307.52	0.72	7.56	0.00	6.84		7.56
Pulses	208.41	4.28		7.40	65.80	77.48	70.08
Potatoes	231.36	786.70	350.50	10.77	353.58	800.55	1140.28
Tomatoes	1401.87	113.25	101.40	0.03	0.00	11.87	113.24
Other vegetables	428.15	489.48	1.91	5.35	0.01	492.93	489.49
Apples pears and peaches	723.16	277.54	253.89	0.40	0.00	24.05	277.54
Other fruits	3360.15	181.36	173.11	10.49	0.01	18.75	181.37
Citrus fruits	388.10	1380.51	1388.07	7.56	0.00		1380.51
Table grapes	1808.10	55.31	56.55	1.24	0.00		55.31
Table olives	2377.29				0.00		0.00
Table wine	1255.62	232.19	233.16	0.97	0.00		232.19
Cereals	151.67	1015.05	1009.79	1053.35	3269.24	4327.85	4284.29
Oilseeds	332.32	5.91	43.70	15.82	255.35	233.38	261.26
soft and durum wheat	160.72	670.80			1169.80	1840.60	1840.60
Beef	2474.88	221.88	88.48	0.12	0.01	133.53	221.89
Pork meat	1509.36	287.71	66.57	8.79	0.00	229.93	287.71
Sheep and goat meat	3769.74	11.35	5.60	0.02	0.01	5.78	11.36
Eggs	1148.53	100.68	3.63	2.46	18.02	117.53	118.70
Poultry meat	1062.83	159.12	33.61	1.81	0.00	127.32	159.12
Whey powder	668.70	0.87		1.78	1.44	4.09	2.31
Casein and caseinates	7951.40	0.39	0.33	0.04	0.10	0.20	0.49
Whole milk powder only	3465.57	28.18	14.74	0.05	0.26	13.75	28.44
Butter	3331.25	28.12		8.51	0.00	36.63	28.12
Skimmed milk powder	2364.10	21.07		21.84	0.00	42.91	21.07
Cheese	4004.16	140.66	27.33	4.28	0.00	117.61	140.66
Fresh milk products	825.93	1365.82	74.88	0.33	0.00	1291.26	1365.81
Cream	2846.44	119.60	12.73		0.00	106.87	119.60
Concentrated milk	1883.49	5.97		1.54	0.00	7.51	5.97
Rice milled	280.21	70.72	72.05	1.38	0.10	0.15	70.82
Processed sugar	308.77	303.43	62.10	33.68	53.38	328.39	356.81
Rape seed oil	922.36	116.91	123.02	1.71	88.45	84.05	205.36
Sunflower seed oil	1824.45	17.02	11.19	0.20	0.82	6.85	17.84
Soya oil	610.21	12.49	32.16	18.32	2.63	1.28	15.12
Olive oil	3100.86	9.78	9.87	0.09	0.00		9.78
Palm oil	745.66			7.25	23.89	31.14	23.89
Other oil	888.59	27.56	98.29		77.29	6.56	104.85
Rape seed cake	323.93		113.94	34.50	205.51	126.07	205.51
Sunflowe seed cake	305.73		22.94	0.02	31.89	8.97	31.89
Soya cake	212.75		326.11	0.07	331.70	5.66	331.70
Other arable field crops	229.34	790.97	350.50	18.17	419.39	878.03	1210.36
Vegetables and Permanent crops	562.59	2729.65	2208.10	26.05	0.00	547.60	2729.65
Coffee, Coco and tea		113.94	113.94		0.00		113.94
All other crops			16.35	0.37	15.98		15.98
Meat	1680.83	680.07	194.26	10.74	0.00	496.55	680.07
All Other animal products incl fish	428.57	100.68	3.63	2.46	3071.93	3171.44	3172.61
Fish and other acquatic products	2983.23	297.05	235.50	0.00	154.89	216.44	451.94
Milk products	1314.89	1710.67	130.01	38.36	1.81	1620.83	1712.48
Oils	922.80	183.76	274.52	27.56	193.08	129.88	376.84
Oil cakes	318.30		462.99	34.59	569.10	140.70	569.10
Secondary products	308.76	374.16	134.16	35.06	53.48	328.54	427.64
Coffee, dry equivalent	3991.16	90.50	90.50		0.00		90.50
Tea, dry equivalent	1931.38	4.77	4.77		0.00		4.77
Cocoa beans, dry equivalent	1052.52	18.67	18.67		0.00		18.67
Fresh water fish	2343.52	77.15	104.51	0.00	35.00	7.64	112.15
Salt water fish	2950.37	135.69	52.78	0.00	119.89	202.80	255.58
Other acquatic products	4909.02	84.21	78.21		0.00	6.00	84.21
Cereals incl rice	151.67	1085.77	1081.84	1054.73	3269.34	4328.00	4355.11
Oils	922.80	183.76	274.52	27.56	193.08	129.88	376.84
Sugar	308.77	303.43	62.10	33.68	53.38	328.39	356.81
Other plant products	351.05	3640.47	3179.22	94.62	1243.85	1799.71	4884.31
Fat rich dairy	3392.51	294.35	40.06	14.33	0.00	268.62	294.35
Other dairy	902.16	1416.33	89.95	24.04	1.80	1352.21	1418.12
Dairy products	1314.89	1710.67	130.01	38.36	1.81	1620.83	1712.48
Meat	1680.83	680.07	194.26	10.74	0.00	496.55	680.07
Other animal products incl fish	2337.58	397.73	239.13	2.46	172.91	333.97	570.64

Table A16: *Market results for Sweden under the LiveWell 30% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	138.41	119.11		12.67	14.95	146.73	134.06
Barley	144.53	21.84		637.23	782.53	1441.60	804.37
Oats	139.67	37.53		339.85	317.86	695.24	355.39
Grain maize	172.55	31.81	104.70	0.76	84.08	11.95	115.89
Other cereals	145.98	203.65	932.75	7.70	883.93	162.53	1087.58
Rape seed	323.30	3.39	16.79	16.99	225.63	229.22	229.02
Sunflower seed	376.61	0.39	16.42	1.07	14.96		15.35
Soya seed	307.52	0.72	7.33	0.00	6.61		7.33
Pulses	221.40	6.93		23.06	47.73	77.72	54.66
Potatoes	230.73	717.03	283.77	10.67	351.27	795.20	1068.30
Tomatoes	1412.36	127.65	115.80	0.03	0.01	11.89	127.66
Other vegetables	524.00	842.09	335.86	5.03	0.00	511.26	842.09
Apples pears and peaches	695.14	290.34	266.77	0.42	0.00	23.99	290.34
Other fruits	3181.79	159.14	151.68	11.21	0.01	18.68	159.15
Citrus fruits	388.10	1937.34	1945.09	7.76	0.00		1937.33
Table grapes	1808.10	53.41	54.73	1.32	0.00		53.41
Table olives	2377.29				0.00		0.00
Table wine	1255.62	230.67	231.65	0.98	0.00		230.67
Cereals	150.83	1091.89	1037.44	998.20	3253.72	4306.37	4345.61
Oilseeds	323.30	4.49	40.53	18.06	247.20	229.22	251.69
soft and durum wheat	161.22	677.96			1170.36	1848.32	1848.32
Beef	2008.99	179.74	51.53	0.44	0.70	129.35	180.44
Pork meat	1378.08	229.33	22.81	11.86	0.00	218.37	229.32
Sheep and goat meat	2901.05	8.40	3.13	0.09	0.00	5.36	8.40
Eggs	1272.21	141.58	29.49	1.54	14.63	128.26	156.21
Poultry meat	946.15	150.25	34.76	3.17	0.00	118.66	150.25
Whey powder	688.75	0.86		1.71	1.37	3.94	2.23
Casein and caseinates	8101.31	0.39	0.34	0.04	0.10	0.19	0.49
Whole milk powder only	3334.29	28.16	14.56	0.05	0.27	13.92	28.43
Butter	2417.26	26.20		9.45	0.00	35.65	26.20
Skimmed milk powder	2413.01	20.75		18.66	0.01	39.42	20.76
Cheese	3865.95	108.56		11.90	0.00	120.46	108.56
Fresh milk products	764.62	1303.72	78.33	0.35	0.00	1225.74	1303.72
Cream	2424.99	103.99	1.48		0.00	102.50	103.98
Concentrated milk	1966.29	5.85		2.25	0.00	8.10	5.85
Rice milled	318.59	63.77	64.85	1.15	0.08	0.15	63.85
Processed sugar	274.22	251.40	21.30	43.90	53.86	327.86	305.26
Rape seed oil	911.63	152.21	158.33	1.70	86.53	82.11	238.74
Sunflower seed oil	1774.07	15.82	10.32	0.20	0.82	6.52	16.64
Soya oil	602.73	15.56	35.08	18.50	2.26	1.24	17.82
Olive oil	3100.86	7.53	7.62	0.10	0.00		7.52
Palm oil	743.06			7.49	23.70	31.19	23.70
Other oil	883.10	21.02	92.96		78.52	6.58	99.54
Rape seed cake	294.75		115.03	37.60	200.60	123.17	200.60
Sunflowe seed cake	280.32		21.92	0.02	30.44	8.54	30.44
Soya cake	194.63		310.99	0.07	316.40	5.48	316.40
Other arable field crops	229.90	723.97	283.77	33.74	398.97	872.91	1122.94
Vegetables and Permanent crops	637.65	3640.63	3101.57	26.76	0.00	565.82	3640.63
Coffee, Coco and tea		108.49	108.49		0.00		108.49
All other crops			16.35	0.37	15.98		15.98
Meat	1459.75	567.71	112.23	15.56	0.71	471.75	568.42
All Other animal products incl fish	403.01	141.58	29.49	1.54	2990.91	3104.54	3132.49
Fish and other acquatic products	2971.95	301.90	241.09	0.00	154.90	215.71	456.80
Milk products	1225.48	1598.49	94.71	44.42	1.73	1549.93	1600.22
Oils	910.05	212.13	304.31	28.00	191.82	127.64	403.95
Oil cakes	289.85		447.94	37.70	547.42	137.18	547.42
Secondary products	274.24	315.17	86.14	45.05	53.94	328.02	369.11
Coffee, dry equivalent	3991.16	90.53	90.53		0.00		90.53
Tea, dry equivalent	1931.38	4.77	4.77		0.00		4.77
Cocoa beans, dry equivalent	1052.52	13.19	13.19		0.00		13.19
Fresh water fish	2329.45	54.12	81.51	0.00	34.99	7.60	89.11
Salt water fish	2941.40	164.06	81.78		119.91	202.19	283.97
Other acquatic products	4840.64	83.72	77.80		0.00	5.92	83.72
Cereals incl rice	150.84	1155.66	1102.29	999.35	3253.80	4306.52	4409.46
Oils	910.05	212.13	304.31	28.00	191.82	127.64	403.95
Sugar	274.22	251.40	21.30	43.90	53.86	327.86	305.26
Other plant products	374.13	4477.58	3982.31	116.24	1193.64	1805.14	5671.21
Fat rich dairy	3060.84	244.60	1.48	23.60	0.00	266.71	244.59
Other dairy	843.99	1353.88	93.23	20.81	1.75	1283.21	1355.63
Dairy products	1225.48	1598.49	94.71	44.42	1.73	1549.93	1600.22
Meat	1459.75	567.71	112.23	15.56	0.71	471.75	568.42
Other animal products incl fish	2338.16	443.48	270.58	1.54	169.53	343.97	613.01

Table A17: *Market results for Sweden under the LiveWell 70% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	137.66	125.24	9.04	11.30	15.09	142.59	140.33
Barley	143.12	21.75		598.65	808.31	1428.71	830.06
Oats	139.39	51.31		324.96	315.66	691.93	366.97
Grain maize	170.85	31.50	106.03	0.76	85.63	11.86	117.13
Other cereals	145.76	277.12	1000.20	7.87	877.53	162.32	1154.65
Rape seed	313.52	1.50	14.67	19.56	218.90	225.29	220.40
Sunflower seed	376.61	0.38	15.48	1.22	13.88		14.26
Soya seed	307.52	0.72	7.08	0.00	6.36		7.08
Pulses	240.51	10.42		35.45	32.35	78.22	42.77
Potatoes	230.30	624.20	193.38	10.51	349.69	791.02	973.89
Tomatoes	1426.28	146.78	134.90	0.03	0.00	11.91	146.78
Other vegetables	663.51	1311.08	778.09	4.94	0.00	537.93	1311.08
Apples pears and peaches	654.75	308.28	284.85	0.46	0.01	23.90	308.29
Other fruits	2933.84	129.49	123.37	12.46	0.00	18.58	129.49
Citrus fruits	388.10	2674.16	2682.21	8.06	0.00		2674.15
Table grapes	1808.10	51.05	52.54	1.49	0.00		51.05
Table olives	2377.29				0.00		0.00
Table wine	1255.62	228.58	229.57	0.99	0.00		228.58
Cereals	151.41	1194.54	1115.26	943.53	3286.64	4309.45	4481.18
Oilseeds	313.52	2.59	37.22	20.78	239.14	225.29	241.73
soft and durum wheat	163.60	687.62			1184.42	1872.04	1872.04
Beef	1552.51	118.71		4.76	1.91	125.38	120.62
Pork meat	1241.73	151.29		54.79	0.00	206.08	151.29
Sheep and goat meat	2436.82	4.13		1.08	0.00	5.21	4.13
Eggs	1457.15	196.10	62.78	1.15	9.60	144.07	205.70
Poultry meat	831.97	138.31	33.53	5.66	0.00	110.44	138.31
Whey powder	693.27	0.85		1.70	1.29	3.84	2.14
Casein and caseinates	8127.85	0.39	0.34	0.04	0.09	0.18	0.48
Whole milk powder only	3177.99	28.14	14.34	0.06	0.26	14.12	28.40
Butter	1688.00	23.12		12.16	0.00	35.28	23.12
Skimmed milk powder	2406.04	20.54		16.35	0.00	36.89	20.54
Cheese	3677.30	65.92		57.60	0.00	123.52	65.92
Fresh milk products	689.07	1222.24	80.40	0.40	0.00	1142.24	1222.24
Cream	2015.63	82.46		15.33	0.01	97.80	82.47
Concentrated milk	2082.48	5.70		3.27	0.00	8.97	5.70
Rice milled	370.49	54.52	55.33	0.91	0.06	0.16	54.58
Processed sugar	237.53	183.88		74.35	69.21	327.44	253.09
Rape seed oil	895.70	199.30	206.14	1.71	85.03	79.90	284.33
Sunflower seed oil	1705.73	14.26	9.19	0.21	0.83	6.11	15.09
Soya oil	590.75	19.63	39.26	18.93	1.89	1.19	21.52
Olive oil	3100.86	4.51	4.62	0.12	0.00		4.50
Palm oil	739.42			7.80	23.42	31.22	23.42
Other oil	875.97	12.24	85.79	0.00	80.14	6.59	92.38
Rape seed cake	264.56		113.60	40.69	192.76	119.85	192.76
Sunflowe seed cake	254.79		20.39	0.02	28.37	8.00	28.37
Soya cake	175.42		292.59	0.07	297.80	5.28	297.80
Other arable field crops	231.22	634.62	193.38	45.96	382.03	869.23	1016.65
Vegetables and Permanent crops	749.72	4849.41	4285.53	28.43	0.01	592.32	4849.42
Coffee, Coco and tea		101.17	101.17		0.00		101.17
All other crops			16.35	0.37	15.98		15.98
Meat	1241.59	412.43	33.53	66.28	1.92	447.10	414.35
All Other animal products incl fish	381.31	196.10	62.78	1.15	2903.52	3037.99	3099.62
Fish and other acquatic products	2956.99	308.35	248.54	0.00	154.93	214.74	463.28
Milk products	1130.98	1449.36	95.07	106.91	1.64	1462.84	1451.00
Oils	892.32	249.93	345.00	28.76	191.32	125.01	441.25
Oil cakes	260.44		426.58	40.78	518.93	133.13	518.93
Secondary products	237.59	238.40	55.33	75.26	69.28	327.61	307.68
Coffee, dry equivalent	3991.16	90.55	90.55		0.00		90.55
Tea, dry equivalent	1931.38	4.77	4.77		0.00		4.77
Cocoa beans, dry equivalent	1052.52	5.85	5.85		0.00		5.85
Fresh water fish	2310.33	23.45	50.89	0.00	34.97	7.53	58.42
Salt water fish	2929.46	201.87	120.43	0.00	119.95	201.39	321.82
Other acquatic products	4750.24	83.03	77.22		0.00	5.81	83.03
Cereals incl rice	151.42	1249.06	1170.59	944.44	3286.70	4309.61	4535.76
Oils	892.32	249.93	345.00	28.76	191.32	125.01	441.25
Sugar	237.53	183.88	0.00	74.35	69.21	327.44	253.09
Other plant products	412.29	5587.80	5043.88	135.95	1140.12	1819.98	6727.91
Fat rich dairy	2747.23	177.20	0.00	88.36	0.01	265.57	177.21
Other dairy	772.46	1272.16	95.08	18.55	1.64	1197.27	1273.80
Dairy products	1130.98	1449.36	95.07	106.91	1.64	1462.84	1451.00
Meat	1241.59	412.43	33.53	66.28	1.92	447.10	414.35
Other animal products incl fish	2354.77	504.45	311.32	1.15	164.52	358.80	668.97

Table A18: *Market results for third countries under the reference scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	85.4	6241.4	811.1	120.1	6560.9	12111.2	12802.2
Barley	111.0	12395.1	39918.9	34205.0	100110.1	106791.3	112505.2
Oats	78.3	3748.0	3101.3	2120.8	17143.1	19910.6	20891.1
Grain maize	116.1	214863.5	67886.4	76796.3	676476.4	900249.8	891340.0
Other cereals	111.6	74009.8	6200.2	13277.1	73136.2	154223.0	147146.0
Rape seed	276.0	2403.4	14786.1	17894.6	47627.9	53139.8	50031.2
Sunflower seed	244.5	1592.4	5365.8	5406.9	42468.6	44102.0	44060.9
Soya seed	225.2	21696.4	76540.8	93154.8	220139.6	258450.0	241836.1
Pulses	499.3	53333.7	9655.2	10247.4	9993.4	63919.3	63327.1
Potatoes	251.7	184372.7	6567.2	7114.3	44392.0	229311.8	228764.7
Tomatoes	529.3	137793.9	7465.7	8486.6	2275.2	141090.0	140069.1
Other vegetables	784.8	877223.4	21338.2	22960.6	42184.3	921030.1	919407.8
Apples pears and peaches	571.4	53181.5	10712.6	12527.2	6348.6	61344.6	59530.1
Other fruits	905.0	293443.8	25595.9	31433.7	13311.5	312593.2	306755.3
Citrus fruits	390.5	96302.1	11549.1	20126.2	100.7	104980.0	96402.8
Table grapes	893.2	23928.5	3870.5	5148.7	18382.3	43589.1	42310.8
Table olives	2348.6	2151.0	303.9	310.9	3725.6	5883.7	5876.7
Table wine	2075.1	9728.0	2645.8	2135.6	1766.2	10984.1	11494.2
Cereals	118.0	576935.8	244914.2	229258.4	928559.0	1489839.0	1505494.8
Oilseeds	235.2	25692.2	96692.7	116456.3	310236.1	355691.8	335928.2
soft and durum wheat	133.5	265678.0	126996.3	102739.2	55132.3	296553.2	320810.3
Beef	2365.0	71486.0	6515.1	6779.4	182.9	71933.2	71668.9
Pork meat	1650.0	101085.5	6830.6	4871.5	418.6	99545.0	101504.1
Sheep and goat meat	2592.8	17031.9	812.8	991.0	108.4	17318.4	17140.2
Eggs	1040.9	77884.7	928.0	639.9	944.9	78541.5	78829.6
Poultry meat	1190.1	108324.2	11843.9	11125.6	1296.0	108901.8	109620.1
Whey powder	959.4	422.7	1190.9	478.9	888.6	599.3	1311.3
Casein and caseinates	9253.6	169.8	93.3	82.8	22.0	181.3	191.7
Whole milk powder only	3082.9	2980.4	1678.1	1454.0	5.5	2761.9	2985.9
Butter	3452.9	10969.5	813.4	616.6	0.3	10773.0	10969.8
Skimmed milk powder	2713.7	2808.8	1665.5	1165.3	261.3	2569.9	3070.1
Cheese	4381.2	13456.4	1833.1	1161.7	0.0	12764.7	13436.1
Fresh milk products	515.5	496979.8	2838.3	2805.7	61760.0	558707.1	558739.7
Cream	3959.4	1028.2	140.0	98.2	0.0	985.1	1026.8
Concentrated milk	2859.2	3520.2	665.5	480.7	86.0	3421.3	3606.1
Rice milled	206.1	657460.1	33730.0	35545.0	91140.4	750415.5	748600.5
Processed sugar	324.1	117376.6	21740.7	23923.2	101050.0	220609.0	218426.5
Rape seed oil	776.7	9706.8	1764.3	3403.1	7071.5	18417.0	16778.2
Sunflower seed oil	544.3	13214.4	7767.3	9167.4	4224.4	18838.8	17438.8
Soya oil	628.0	20754.7	6382.0	8150.3	17831.0	40354.0	38585.7
Olive oil	2721.7	6559.8	550.2	467.2	1289.3	7766.1	7849.1
Palm oil	534.4	20166.3	35196.3	42119.0	31050.1	58139.2	51216.4
Other oil	1054.5	11892.3	2081.4	3704.4	6920.0	20435.3	18812.4
Rape seed cake	194.8	0.6	7347.4	4318.0	28903.7	25875.0	28904.4
Sunflowe seed cake	208.7	1.9	2655.6	3858.3	19861.9	21066.6	19863.8
Soya cake	220.8	12.5	37742.9	55539.9	152272.5	170081.9	152284.9
Other arable field crops	305.6	237706.4	16222.3	17361.7	54385.4	293231.1	292091.8
Vegetables and Permanent crops	769.2	1493752.1	83481.6	103129.4	88094.7	1601494.6	1581846.8
Coffee, Coco and tea	2805.0	14162.4	6218.8	10552.0	392.9	18888.5	14555.3
All other crops	1485.4	3145.9	4320.3	5598.4	29429.3	33853.2	32575.1
Meat	1709.4	297927.5	26002.4	23767.5	2005.8	297698.4	299933.3
All Other animal products incl fish	317.45	77884.66	927.95	640.17	683074.06	760670.94	760958.72
Fish and other acquatic products	2913.3	115561.7	29709.5	39151.0	23589.4	148592.6	139151.2
Milk products	696.0	532335.6	10918.1	8343.9	63002.1	592763.5	595337.7
Oils	754.3	82294.2	53741.5	67011.4	68386.3	163950.4	150680.5
Oil cakes	216.5	15.0	47745.9	63716.2	201038.1	217023.4	201053.1
Secondary products	232.88	774836.69	55470.66	59468.14	192190.33	971024.50	967027.02
Coffee, dry equivalent	4096.8	6418.6	3069.4	5640.1	40.7	9030.1	6459.3
Tea, dry equivalent	1979.4	4713.8	1124.8	1516.7	35.3	5141.0	4749.2
Cocoa beans, dry equivalent	1232.0	3030.0	2024.6	3395.2	316.8	4717.4	3346.8
Fresh water fish	2252.8	41628.4	2201.8	3655.7	3602.2	46684.4	45230.5
Salt water fish	2761.9	42734.8	21341.6	27116.1	19178.1	67687.4	61912.8
Other acquatic products	4113.6	31198.6	6166.1	8379.1	809.2	34220.8	32007.8
Cereals incl rice	147.5	1234395.8	278644.2	264803.4	1019699.5	2240254.5	2254095.3
Oils	754.3	82294.2	53741.5	67011.4	68386.3	163950.4	150680.5
Sugar	324.1	117376.6	21740.7	23923.2	101050.0	220609.0	218426.5
Other plant products	605.4	1771328.2	250361.4	311215.6	654147.0	2486329.4	2425475.2
Fat rich dairy	3822.1	28974.2	3452.1	2357.1	86.3	27944.0	29038.9
Other dairy	541.3	503361.4	7466.0	5986.8	62937.4	564819.5	566298.8
Dairy products	696.0	532335.6	10918.1	8343.9	63002.1	592763.5	595337.7
Meat	1709.4	297927.5	26002.4	23767.5	2005.8	297698.4	299933.3
Other animal products incl fish	2265.8	193446.4	30637.5	39790.8	24534.4	227134.1	217980.8

Table A19: *Market results for third countries under the LiveWell 30% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	84.1	6233.3	810.8	120.1	6548.0	12090.5	12781.2
Barley	109.7	12393.5	39835.1	34047.3	99762.9	106368.7	112156.4
Oats	76.9	3749.9	3088.4	2120.7	17095.6	19877.8	20845.5
Grain maize	115.4	214830.3	67851.0	76396.7	675250.0	898626.0	890080.3
Other cereals	110.8	74013.6	6278.1	13066.0	73125.5	153927.1	147139.2
Rape seed	273.2	2408.2	14836.4	17715.2	47567.3	52854.3	49975.5
Sunflower seed	241.2	1593.3	5376.9	5215.0	42294.1	43725.5	43887.4
Soya seed	222.8	21710.2	76297.6	92377.9	218564.0	256354.5	240274.2
Pulses	502.9	53272.9	9584.9	10734.3	9893.2	64315.6	63166.1
Potatoes	251.0	184218.0	6549.4	7072.3	44165.8	228906.7	228383.8
Tomatoes	528.6	137632.1	7459.3	8571.4	2223.0	140967.1	139855.0
Other vegetables	784.7	876155.1	21069.8	24018.1	41902.7	921005.9	918057.7
Apples pears and peaches	565.2	53205.6	10817.7	11926.8	6475.6	60790.3	59681.2
Other fruits	901.7	293557.3	25660.4	30353.8	13370.3	311621.0	306927.6
Citrus fruits	393.1	96063.8	11416.7	21077.8	103.7	105828.5	96167.4
Table grapes	886.1	23917.5	3904.0	4790.8	18571.8	43376.1	42489.2
Table olives	2343.1	2147.9	302.3	294.0	3735.4	5875.1	5883.3
Table wine	2070.0	9742.6	2664.5	2107.9	1775.3	10961.3	11517.9
Cereals	117.3	576724.1	244515.8	228921.8	926515.1	1487645.1	1503239.1
Oilseeds	232.6	25711.6	96511.0	115308.1	308425.5	352934.3	334137.1
soft and durum wheat	133.2	265503.4	126652.5	103171.0	54733.1	296755.1	320236.5
Beef	2326.3	71650.7	6627.3	6449.6	191.9	71664.9	71842.6
Pork meat	1620.0	101635.6	7747.9	4535.7	431.3	98854.8	102066.9
Sheep and goat meat	2540.6	16987.7	957.5	931.8	116.3	17078.4	17104.1
Eggs	1033.9	77888.1	800.6	690.8	953.0	78731.4	78841.1
Poultry meat	1171.2	108614.9	12406.4	10753.7	1330.2	108292.3	109945.1
Whey powder	992.0	408.9	1157.4	469.0	866.7	587.3	1275.6
Casein and caseinates	9417.7	167.6	92.5	82.2	21.5	178.8	189.1
Whole milk powder only	3032.1	3001.4	1699.3	1435.2	5.6	2742.9	3007.0
Butter	3282.5	11180.3	1003.8	545.4	2.5	10724.4	11182.9
Skimmed milk powder	2796.1	2764.0	1634.2	1123.9	255.7	2509.4	3019.7
Cheese	4338.0	13474.8	1871.7	1147.3	0.0	12730.1	13454.5
Fresh milk products	513.1	496745.2	2863.6	2743.2	61263.1	557887.9	558008.3
Cream	3787.6	1066.5	176.6	86.7	0.0	975.0	1064.9
Concentrated milk	2859.8	3495.3	645.6	504.1	84.0	3437.7	3579.2
Rice milled	206.0	656992.7	33309.3	35877.1	91026.2	750586.6	748018.9
Processed sugar	322.0	117191.9	21383.6	21276.3	102246.9	219331.5	219438.8
Rape seed oil	771.7	9709.7	1775.2	3358.9	7123.9	18417.2	16833.5
Sunflower seed oil	535.1	13228.0	7861.6	9061.7	4325.5	18753.6	17553.5
Soya oil	626.7	20727.1	6420.7	8003.1	17790.1	40099.6	38517.2
Olive oil	2674.8	6596.1	600.6	428.1	1308.2	7731.8	7904.4
Palm oil	533.6	20148.0	35205.3	42039.9	31073.1	58055.6	51221.1
Other oil	1051.3	11901.4	2096.9	3675.0	6951.9	20431.3	18853.2
Rape seed cake	189.0	0.7	7627.9	4290.2	29202.3	25865.3	29202.9
Sunflowe seed cake	197.7	2.0	2770.0	3737.8	19986.7	20956.5	19988.7
Soya cake	208.7	12.5	37841.8	53916.2	152710.0	168796.8	152722.4
Other arable field crops	306.3	237490.9	16134.3	17806.6	54059.0	293222.3	291549.9
Vegetables and Permanent crops	767.9	1492421.8	83294.7	103140.6	88157.6	1600425.3	1580579.3
Coffee, Coco and tea	2802.2	14185.2	6235.2	10439.9	411.4	18801.2	14596.6
All other crops	1484.6	3146.3	4321.8	5602.4	29451.0	33877.9	32597.3
Meat	1680.0	298888.9	27739.0	22670.8	2069.6	295890.3	300958.6
All Other animal products incl fish	314.08	77888.08	800.59	691.12	681090.95	758869.56	758979.03
Fish and other acquatic products	2887.8	115769.2	29795.5	38247.1	23498.2	147719.0	139267.4
Milk products	689.1	532303.9	11144.6	8136.8	62477.4	591773.5	594781.2
Oils	749.4	82310.2	53960.3	66566.7	68572.7	163489.2	150882.8
Oil cakes	205.3	15.1	48239.6	61944.2	201898.9	215618.6	201914.0
Secondary products	232.20	774184.56	54692.94	57153.39	193273.11	969918.12	967457.67
Coffee, dry equivalent	4093.0	6419.4	3069.6	5639.5	41.1	9030.5	6460.6
Tea, dry equivalent	1976.6	4715.7	1124.9	1517.0	35.4	5143.3	4751.2
Cocoa beans, dry equivalent	1201.1	3050.0	2040.7	3283.3	334.8	4627.5	3384.8
Fresh water fish	2246.7	41662.1	2222.6	3514.4	3613.0	46566.9	45275.1
Salt water fish	2753.6	42782.1	21312.9	26965.5	19054.5	67489.1	61836.6
Other acquatic products	4043.7	31325.0	6259.9	7767.2	830.7	33663.0	32155.7
Cereals incl rice	147.0	1233716.8	277825.1	264798.8	1017541.3	2238231.7	2251258.0
Oils	749.4	82310.2	53960.3	66566.7	68572.7	163489.2	150882.8
Sugar	322.0	117191.9	21383.6	21276.3	102246.9	219331.5	219438.8
Other plant products	603.7	1769824.6	250414.8	308639.3	652952.5	2481001.6	2422777.1
Fat rich dairy	3730.2	29216.8	3697.6	2283.4	86.5	27867.3	29281.5
Other dairy	538.8	503087.1	7446.9	5853.5	62412.6	563906.2	565499.7
Dairy products	689.1	532303.9	11144.6	8136.8	62477.4	591773.5	594781.2
Meat	1680.0	298888.9	27739.0	22670.8	2069.6	295890.3	300958.6
Other animal products incl fish	2243.2	193657.3	30596.1	38937.9	24451.2	226450.4	218108.5

Table A20: *Market results for third countries under the LiveWell 70% scenario*

	Producer price [€/t]	Human consumption [1000t]	Imports [1000t]	Exports [1000t]	Demand other than human cons. [1000t]	Production [1000t]	Total demand [1000t]
Rye and meslin	82.0	6220.3	799.3	123.9	6506.8	12051.8	12727.1
Barley	108.3	12399.3	39664.6	34015.8	99215.7	105966.2	111615.1
Oats	75.1	3758.9	3044.5	2141.8	16994.5	19850.6	20753.3
Grain maize	114.5	214743.2	67765.9	76113.5	673697.3	896788.1	888440.5
Other cereals	109.9	74030.7	6335.3	13085.2	72843.7	153624.3	146874.4
Rape seed	269.9	2414.0	14888.6	17502.6	47469.8	52497.7	49883.7
Sunflower seed	237.2	1593.9	5397.6	4984.2	42092.8	43273.2	43686.6
Soya seed	220.1	21716.3	75962.5	91490.3	216779.1	254023.1	238495.3
Pulses	510.3	53171.1	9513.2	11674.9	9742.5	65075.3	62913.5
Potatoes	250.0	183961.2	6517.1	7030.4	43823.7	228298.2	227784.9
Tomatoes	527.6	137385.7	7453.4	8699.1	2152.5	140783.8	139538.2
Other vegetables	784.7	874447.9	20784.3	25829.5	41505.6	920998.7	915953.5
Apples pears and peaches	556.9	53198.0	10972.5	11190.0	6641.2	60056.7	59839.2
Other fruits	897.3	293698.8	25768.3	28966.1	13449.9	310346.5	307148.7
Citrus fruits	396.5	95738.2	11249.7	22382.0	107.4	106977.9	95845.6
Table grapes	877.2	23886.8	3947.2	4352.3	18808.8	43100.8	42695.6
Table olives	2336.4	2143.9	300.5	272.8	3747.9	5864.1	5891.9
Table wine	2063.2	9761.7	2689.4	2071.9	1787.2	10931.3	11548.9
Cereals	116.6	576307.4	243479.0	229804.2	923222.7	1485855.3	1499530.1
Oilseeds	229.7	25724.1	96248.7	113977.1	306341.6	349794.1	332065.7
soft and durum wheat	133.5	265154.9	125869.4	104324.0	53964.7	297574.2	319119.6
Beef	2271.0	71940.9	7059.0	6020.2	207.6	71109.7	72148.5
Pork meat	1576.3	102629.7	9333.6	4131.7	451.6	97879.4	103081.2
Sheep and goat meat	2466.9	16971.2	1249.7	858.0	127.2	16706.7	17098.3
Eggs	1022.5	77891.1	734.1	784.4	973.4	78914.9	78864.5
Poultry meat	1144.0	109199.5	13461.3	10164.3	1376.7	107279.1	110576.1
Whey powder	1007.0	402.3	1137.9	455.5	852.3	572.2	1254.6
Casein and caseinates	9498.8	166.0	92.1	80.4	21.0	175.3	187.0
Whole milk powder only	2964.0	3030.5	1729.0	1413.9	5.9	2721.2	3036.4
Butter	3091.2	11557.5	1424.8	530.0	3.5	10666.1	11560.9
Skimmed milk powder	2836.7	2738.4	1619.7	1073.0	250.0	2441.6	2988.4
Cheese	4280.5	13506.5	1927.6	1125.3	0.0	12683.7	13485.9
Fresh milk products	509.8	496325.2	2916.1	2672.6	60611.4	556693.1	556936.6
Cream	3576.5	1133.9	254.1	76.9	0.0	955.0	1132.2
Concentrated milk	2857.9	3465.2	624.1	539.0	81.3	3461.4	3546.5
Rice milled	205.8	656243.3	32656.0	36423.3	90849.0	750859.6	747092.3
Processed sugar	320.0	116974.5	21267.8	19032.7	103448.5	218187.8	220423.0
Rape seed oil	764.9	9709.3	1790.3	3297.4	7192.7	18409.0	16901.9
Sunflower seed oil	522.8	13237.9	7984.4	8941.6	4458.1	18653.2	17696.0
Soya oil	623.6	20694.8	6488.8	7832.0	17775.8	39813.7	38470.6
Olive oil	2616.8	6645.2	689.5	391.1	1338.9	7685.7	7984.1
Palm oil	532.2	20125.1	35226.0	41938.6	31107.3	57944.9	51232.3
Other oil	1047.3	11913.2	2117.4	3635.8	6993.3	20424.8	18906.4
Rape seed cake	181.9	0.7	7916.6	4257.9	29499.0	25841.0	29499.7
Sunflowe seed cake	185.5	2.1	2913.9	3643.6	20096.2	20828.0	20098.2
Soya cake	195.4	12.5	37917.5	52323.4	152930.3	167348.6	152942.8
Other arable field crops	307.8	237132.2	16030.2	18705.3	53566.2	293373.4	290698.4
Vegetables and Permanent crops	766.3	1490261.1	83165.3	103763.6	88200.4	1599059.9	1578461.5
Coffee, Coco and tea	2800.7	14213.8	6255.5	10287.3	433.8	18679.4	14647.6
All other crops	1483.3	3146.9	4323.0	5606.6	29487.4	33917.9	32634.2
Meat	1637.4	300741.2	31103.5	21174.2	2163.0	292974.9	302904.2
All Other animal products incl fish	309.27	77891.09	734.05	784.74	678553.84	756495.62	756444.93
Fish and other acquatic products	2854.8	116050.8	29931.7	37076.2	23377.2	146572.6	139428.1
Milk products	680.3	532325.6	11725.5	7966.5	61803.1	590369.6	594128.7
Oils	742.7	82325.4	54296.6	66036.5	68866.0	162931.4	151191.4
Oil cakes	192.8	15.2	48748.0	60224.9	202525.4	214017.6	202540.7
Secondary products	231.54	773217.81	53923.78	55456.00	194297.47	969047.50	967515.28
Coffee, dry equivalent	4088.4	6420.5	3069.9	5638.8	41.5	9030.9	6462.0
Tea, dry equivalent	1973.2	4718.1	1124.7	1516.9	35.6	5145.9	4753.7
Cocoa beans, dry equivalent	1163.9	3075.2	2060.9	3131.6	356.7	4502.6	3431.9
Fresh water fish	2238.6	41709.2	2254.6	3331.3	3626.7	46412.6	45335.9
Salt water fish	2742.6	42846.1	21273.9	26763.3	18890.5	67226.0	61736.6
Other acquatic products	3952.2	31495.6	6403.2	6981.6	860.0	32934.1	32355.6
Cereals incl rice	146.6	1232550.7	276135.0	266227.5	1014071.6	2236714.9	2246622.3
Oils	742.7	82325.4	54296.6	66036.5	68866.0	162931.4	151191.4
Sugar	320.0	116974.5	21267.8	19032.7	103448.5	218187.8	220423.0
Other plant products	601.9	1767346.5	250447.7	306958.2	651067.4	2474924.4	2418413.8
Fat rich dairy	3622.1	29663.1	4230.6	2271.2	84.8	27766.2	29725.6
Other dairy	535.1	502662.4	7494.9	5695.3	61740.6	562603.4	564403.0
Dairy products	680.3	532325.6	11725.5	7966.5	61803.1	590369.6	594128.7
Meat	1637.4	300741.2	31103.5	21174.2	2163.0	292974.9	302904.2
Other animal products incl fish	2213.5	193941.9	30665.7	37860.7	24350.7	225487.6	218292.6

ANNEX 5. PREVIOUS RESEARCH ON FOOD EDUCATION

This annex presents the findings of previous research on education measures to ensure that pupils/students understand the impact of food consumption on the environment.

Table 46. *Benefits of relevant education measures as provided in the literature reviewed*

Type of education measure	Main benefits identified	Summary of research project and findings	Country	Methodology	Source
Multiple education measures (in-class lessons, fruit and vegetable distribution programme)	Multicomponent interventions increase fruit and vegetable intakes in children, educational programmes are likely to be effective to promote healthy nutrition in adolescents	The objective of the review was to summarise the existing European published and 'grey' literature on the effectiveness of school-based interventions to promote a healthy diet in children (6-12 years old) and adolescents (13-18 years old). In children, it appears that a subscription or distribution programme for fruit and vegetables combined with an educational component is likely to be effective to stimulate the consumption of fruit and vegetables. Educational programmes solely can also be effective in stimulating a healthy diet among children. In adolescents, an educational programme is likely to be effective to promote healthy nutrition. Additionally, evidence was also found for programmes that adapted school lunches or increased the availability of healthy food and combined this with a nutritional curriculum on food intake.	European Union	Literature review. Studies were included if they were published between 1 January 1990 and 31 December 2007 and reported effects on dietary behaviour or on anthropometrics. 42 studies met the inclusion criteria: 29 in children and 13 in adolescents.	Van Cauwenberghe et al., 2010.
Multiple education measures (in-class lessons, lunch menus, farmer visits, taste-testing, after-school programmes)	Significant changes in behaviour and psychosocial variables if students are exposed to two or more education measures	Compared with students who were exposed to less than two intervention components, students who were exposed to two or more components scored significantly higher on fruits and vegetables intake, self-efficacy for eating fruits and vegetables, and knowledge and lower on preference for unhealthy foods ($p < .05$). Although the results failed to reach statistical significance, possible effective components to increase fruits and vegetables behaviour include interactive presentations by "authority figures" (i.e. a farmer), taste testing to expose students to different fruits and vegetables, and making more locally grown foods available in the cafeteria.	USA	Experiment. Five schools were included in this study, four interventions and one control. The study was planned as a pre-test/post-test non-equivalent group design. Complete baseline (January 2009) and post-test (May 2009) data were collected from 214 sixth and seventh-grade students.	Evans et al, 2012.
Multiple education measures (in-class lessons, school garden, cooking)	Increase in consumption of vegetables	Incorporating gardening along with food preparation, nutrition and physical activity education was an effective way to improve children's reported vegetable intake and physical activity in an after-school setting. The school principal reported he observed use of the school's salad bar doubled following incorporation of the after-school gardening and education program. Gardening activities included planting, watering, weeding, fertilizing, mulching and harvesting. Produce grown in the garden included corn, beans, squash, onions, peppers, tomatoes, carrots, okra, zucchini, cucumbers, lettuce and spinach. Children received education on the pyramid food groups, portions,	USA	Pre-post survey. The after-school education and gardening program was evaluated using two pre/post questions "I eat vegetables every day" and "I am physically active every day" with a three category "yes," "sometimes," and "no" response scale. 43 children completed the pre and post evaluation questions.	Hermann et al., 2005.

		snacks, breakfast, eating-out, food labels, hand washing, food safety and physical activity. Children also participated in food preparation activities emphasizing garden produce including soups, cornbread, roasted potatoes, salads, vegetable casseroles, zucchini bread, carrot salad, and salsa.			
Multiple education measures (in-class lessons and gardening)	Increase in consumption of fruits and vegetables	The project assessed the influence of a garden programme, with a newly developed nutrition curriculum, on youth's eating and gardening behaviour. Because youth in the garden programme consumed more fruit and vegetables at post-survey compared to pre-survey, the study concludes that garden programmes may be a viable way to assist youth in making healthy lifestyle changes.	USA	Pre-post survey. Youth (age 8-15 years) involved in a garden program in Minneapolis/St. Paul, Minnesota completed a pre- (n=96) and a post-survey (n=66).	Lautenschlager, 2007.
Multiple education measures (in-class lessons and gardening)	Increase in consumption of fruits and vegetables	The purpose of the study was to investigate the effects of garden-based nutrition education on adolescents' fruit and vegetable consumption. Sixth-grade students at three different elementary schools made up a control and two treatment groups. Students in the treatment groups participated in a 12-week nutrition education program, and one treatment group also participated in garden-based activities. Adolescents who participated in the garden-based nutrition intervention increased their servings of fruits and vegetables more than students in the two other groups. Significant increases were also found in vitamin A, vitamin C, and fibre intake.	USA	Experiment. Sixth-grade students (n=99) at three different elementary schools made up a control and two treatment groups. Students in all three groups completed three 24-hour food-recall workbooks before and after the intervention.	McAleese et al., 2007.
Multiple education measures	Increase in nutritional knowledge	67% of students involved in an Italian nutrition education action stated that their nutritional knowledge about the importance of fruit and vegetables consumption was improved.	Italy	Focus groups (34 teachers and 240 students) and survey (1004 students in school where intervention was performed, 480 students in 'control' schools)	Zappala, 2008; Quoted in Capacci et al., 2012.
School gardening	Increase in consumption of vegetables	This study describes the effects of garden-based education on children's vegetable consumption. Results indicate that school gardening may affect children's vegetable consumption, including improved recognition of, attitudes toward, preferences for, and willingness to taste vegetables. Gardening also increases the variety of vegetables eaten.	USA	Pre-post panel study. 236 students completed the Garden Vegetable Frequency Questionnaire and 161 completed a taste test.	Ratcliffe et al., 2009.
School gardening	Increase in overall life skills scores	The goal of the study was to assess changes in the life skill development of elementary school students participating in a 1-year school garden program. The Life Skills Inventory included statements for six constructs of life skills including teamwork, self-understanding, leadership, decision making skills, communication skills, and volunteerism. Students in the control group had significantly higher overall life skills scores on the pre-test compared to students participating in the garden programme but the scores were no longer	USA	Experiment. The students were divided into two treatment groups, an experimental group that participated in the garden program and a control group that did not participate in the school garden program.	Robinson and Zajicek, 2005.

		significantly different between the groups on the post-test scores at the end of the programme. In addition, there were no significant differences in the control group's pre-test scores compared to their post-test scores. The students in the experimental group did significantly increase their overall life skills scores by 1.5 points after participating in the garden programme. Two internal life skill scales were positively influenced by the garden programme; "working with groups" and "self-understanding."			
School gardening	Increase in positive environmental attitudes	Project GREEN (Garden Resources for Environmental Education Now) is a garden programme designed to help teachers integrate environmental education into their classroom using the garden. Students participating in the Project GREEN garden programme had more positive environmental attitude scores than those students who did not participate. Second-grade students in the experimental and control groups had more positive environmental attitudes than fourth-grade students. In addition, this research found a significant correlation between the number of outdoor related activities students had experienced and their environmental attitudes (i.e. statements indicating active involvement with the environment and concern about the environment).	USA	Experiment.	Skelly and Zajicek,1998.
School gardening	Positive impacts on academic outcomes and social development	A literature review showed a preponderance of positive impacts of garden-based learning on direct academic outcomes with the highest positive impact for science followed by math and languages. Indirect academic outcomes were also measured with social development surfacing most frequently and positively. These results were consistent across programs, student samples, and school types and within the disparate research methodologies used.	USA	Literature review: Findings across 152 articles (1990–2010) were analysed resulting in 48 studies that met the inclusion criteria for this synthesis. A review template with operational coding framework was developed.	Williams and Dixon, 2013.
School gardening	Improvement in self-esteem and reduction in stress levels	The goal was to investigate adults who are actively involved in gardening with children in school, community or home gardens on their perceptions of the benefits of children participating in gardening. Adults gardening with children reported benefits to children's self-esteem and reduction in stress levels.	USA	Survey targeting adults working with youth in garden situations. Three hundred-twenty completed surveys were returned via e-mail during a period of 9 months. Results of the study cover 128,836 children (youth under 18 years old) involved in gardening, primarily with teachers in school gardens. The children involved were generally 12 years of age or under and were growing food crops.	Waliczek et al., 2000.

Source: Civic Consulting.

ANNEX 6. PREVIOUS RESEARCH ON FOOD LABELLING

This annex presents the findings of previous research on food labelling, including labelling of environmental impacts of food and nutritional labelling.

Table 47. *Effects of food labelling as provided in the literature reviewed*

Type of food labelling	Main effects identified	Summary of research project and findings	Country	Methodology employed	Source
Carbon footprint labelling	Decrease in consumption of food labelled as having high environmental impacts	An experiment conducted in supermarkets in Australia has shown changes in consumption patterns as a result of carbon labelling. In this experiment, 37 products (from five product lines including milk, spreadable butter, canned tomatoes, bottled water, and non-perishable pet foods) were labelled to indicate embodied carbon emissions and sales were recorded over a 3-month period. Green (below average), yellow (near average) and black (above average) footprints indicated carbon emissions embodied in groceries. Black-labelled sales decreased by 6%, and green-labelled sales increased 4% after labelling. Switch in consumption is therefore more important from "bad" to "average" products that from "average" to "good" products. This experiment also found significantly higher switch in consumption (about 20%) when the products with the lowest footprint is also the cheapest. These results illustrate the potential of carbon footprint labelling and would suggest that this type of labelling could complement other types of policy options acting on price.	Australia	Experiment in store	Vanclay et al., 2011
Environ-mental labelling	Consumers tend to choose food labelled as being most environmentally friendly	Based on quasi-experimental design, the research tested effects of environmental labelling on participants' choice between a store brand and a national brand, in two different product categories (including yoghurt). The results of this research indicate that when consumers perceive substantial discrepancies between brands regarding their environmental impact, they tend to choose the most environmentally friendly product. Influence of these labels is more effective for consumers who are already environmentally conscious.	France	Experiment in store	Bertrandias, 2012
Nutritional labelling	No conclusive results of nutritional labelling	Existing assessments of the impact of labelling on food intake do not show conclusive results in terms of healthier purchasing choices.	Mainly Europe	Review of a representative selection of policy actions based on scientific papers, policy documents, grey literature, government websites, other policy reviews, and interviews with policy-makers (129 policy interventions, 121 of which were in Europe)	Capacci et al, 2012
Nutritional labelling	No discernable effects of nutritional labelling	In the United Kingdom, a study which monitored the sales in the 4 weeks after the introduction of a system of traffic-light nutrition labels had no discernable effects on the relative healthiness of consumer purchases.	United Kingdom	Analysis of sales data from a major UK retailer in 2007. Two categories of products were analysed: 'ready meals' and sandwiches	Sacks et al., 2009

Source: Civic Consulting.

ANNEX 7. PREVIOUS RESEARCH ON EFFECTS OF TAXATION

This annex presents the findings of previous research on taxation of unhealthy food/food with high environmental impacts.

Table 48. *Effects of relevant fiscal measures as provided in the literature reviewed*

Food covered	Summary of research project and findings	Country covered	Methodology used	Source of information
Main foods	The study found that subsidies to the consumption of fruits and vegetables, e.g. in terms of reduced VAT (scenario 1) will induce an increase in the consumption of these foods, at the cost of a range of other foods, including dairy products, eggs and fish. A subsidy to the content of fibres in the foods (scenario 2) leads to an increase in the consumption of fibre-rich foods: flour/bread, potatoes, fruit and vegetables, mainly at the cost of dairy products, eggs and fats. A tax on all fats in the foods (scenario 3) leads to a reduction in the consumption of all food categories of animal origin, except eggs. The tax induces a relatively strong reduction in the consumption of fats (butter, margarine, oils etc.) and cheese, and to some extent also the consumption of meats, and these foods are replaced by fish, fruits and vegetables, bread and especially sugar. Thus, although the tax on fats has some desired effects on the consumption of fats, it also has some undesired effects in terms of the consumption of sugar. If a fat tax is only directed towards the foods' contents of saturated fats (scenario 4), the picture changes slightly, compared with scenario 3. The reducing effect on the consumption of fats and cheese (which have a high content of saturated fats) is 10%-15% stronger. In contrast to taxes on fats, a tax on sugar (scenario 5) only reduces the consumption of sugar, but induces increases in the consumption of other food categories, including the intake of fats. The estimated effects on the consumption of individual types of foods in the tax scenarios (3–5) are presumably over-estimated due to consumers' option of changing towards e.g. more low-fat varieties of the individual foods. Combinations of tax reductions on fibres or fruits and vegetables on the one hand, and increased taxes on the most unhealthy fats on the other hand (scenarios 6 and 7) are seen to have desirable effects on the intake of fruit and vegetables, and thus the amount of fibres, while at the same time reducing the intake of fats and sugar.	Denmark	Economic model of the following subsidy scenarios (1-2), tax scenarios (3-5) and revenue neutral combinations of taxes and subsidies (6-7): (1) VAT on fruits, vegetables and potatoes halved (from 25 to 12.5%); (2) Subsidy on fibres (approximately 76.40 DKK per kg fibre); (3) Tax on all fats (approximately 8.00 DKK per kg. fat); (4) Tax on saturated fats (approximately 14.00 DKK per kg. saturated fat); (5)Tax on sugar (approximately 5.60 DKK per kg sugar); (6) Subsidy on fibres and tax on saturated fats and sugar; and (7) Halved VAT on fruits and vegetables and tax on fats and sugar	Jensen and Smed, 2007.
Main foods	The study models the impact on chronic disease of a tax on UK food and drink that internalises the wider costs to society of greenhouse gas (GHG) emissions and to estimate the potential revenue. Two tax scenarios are modelled: (A) a tax of £2.72/tonne carbon dioxide equivalents (tCO2e)/100 g product applied to all food and drink groups with above average GHG emissions. (B) As with scenario (A) but food groups with emissions below average are subsidised to create a tax neutral scenario. The revenue neutral scenario (B) demonstrates that sustainability and health goals are not always aligned. Scenario (A) results in 7770 (95% credible intervals 7150 to 8390) deaths averted and a reduction in GHG emissions of 18 683 (14 665to 22 889) ktCO2e/year. Estimated annual revenue is £2.02 (£1.98 to £2.06) billion. Scenario (B) results in 2685 (1966 to 3402) extra deaths and a reduction in GHG emissions of 15 228 (11 245to 19 492) ktCO2e/year. Incorporating the societal cost of GHG into the price of foods could save 7770 lives in the UK each year, reduce food-related GHG emissions and generate substantial tax revenue.	United Kingdom	Econometric and comparative risk assessment modelling study	Briggs et al., 2013b.

Unhealthy food	The behavioural and health impact of a nutritional tax should be low, at least at conventional levels of taxation (between 5 and 20%). A fiscal food policy remains however a good means of collecting revenues. The latter should ideally be earmarked to fund specific programs of promotion of nutritional health in order to get people's support.	France	Literature review	Etile, 2012.
Unhealthy food (fat)	By extending value added tax (at 17.5%, the standard VAT rate in the UK at the time of research) to the main sources of dietary saturated fat in the UK (whole milk, butter, and cheese), between 900 and 1000 premature deaths a year might be avoided. The additional tax revenue could finance compensatory measures to raise income for low income groups.	United Kingdom	Modelling study	Marshall, 2000.
Unhealthy food (fat) (and subsidy on fruits and vegetables)	The fiscal scheme analysed is based on the saturated fat content of individual food items. The price of fatty foods is increased by 1% for every percent of saturated fats they contain; for instance, milk which contains 1.72% of saturated fats will see its price increasing by 1.72%. A ceiling of 15% is put on the price increase. To offset this tax burden and to encourage the consumption of fruit and vegetables, a subsidy on fruit and vegetables is set up, so as to exactly cancel the costs of the fat tax paid by consumers. A policy that is based on a tax on saturated fats coupled with a subsidy will be effective in moving diets in the UK in a direction consistent with improvements in diet related health. In particular a subsidy approaching 15% of the price of fruit and vegetables has been shown to be effective in moving the intakes to within the recommended ´five-a-day' region.	United Kingdom	Modelling study (based on household data from the expenditure and food survey).	Tiffin and Arnoult, 2011.
Unhealthy food (fat)	A 'fat tax' defined as an increase in the VAT rates leading to a 10% increase in price of ready meals, cheese/butter/cream, and fatty and sugary products results in a decrease of 3.4% in purchases of calories for wealthy households and 3.6% for low-income households, when applied simultaneously to the three product groups. The tax on ready meals has the most important impact on purchases of calories for both wealthy households and low-income households. The application of the tax on three product groups would lead to a weight loss of 136 g after one month, 1.3 kg after one year and 2.7 kg after 9 years for a 30-60 years old man, weighting 70 kg, and practicing a light physical activity, and belonging to a wealthy household. The 'fat tax' would generate a significant increase in tax revenues: + 9.26% of tax revenues for ready meals, 16.3% of tax revenues for the cheese/butter/cream products group, and +16.6% for fatty and sugary products.	France	Modelling study (based on TNS Worldpanel data which surveys annually food purchases of 5,000 households in France)	Allais et al., 2010.
Unhealthy food (fat)	The tax on saturated fat introduced in 2011 in Denmark (which has been abolished since then) was predicted to decrease consumption of product categories most significantly affected by the tax (namely fats such as butter, butter-blends, margarine and oils) by 10 %-20%. The study indicates that due to the relatively short data period with the tax being active at the time of writing, interpretation of these findings from a long-run perspective should be done with considerable care. The fat tax was a tax paid on the weight of saturated fat in foods, if the content of saturated fat exceeds 2.3 grams per 100 grams. The threshold of 2.3 grams saturated fat per 100 gram implied that all kinds of drinking milk are exempt from taxation. The tax was levied on food manufacturers and food importers, but was expected to be transmitted to the consumer prices. Foods determined for exports or animal fodder were exempted from the tax. The tax was set at 16 DKK (2.15 €) per kg saturated fat, which was topped up by 25% VAT. Fatty products, such as butter and margarine, were the food commodities for which prices were most affected by the fat tax, due to their high content of saturated fat.	Denmark	Modelling study (econometric analysis of weekly food purchase data from the household panel dataset GfK ConsumerTracking Scandinavia 2009 - December 2011).	Jensen and Smed, 2012.

Unhealthy food and drinks	A tax would need to be at least 20% to have a significant effect on population health.	Various countries	Literature review	Mytton et al., 2012.
Sugar sweetened drinks	A study published in March 2012 (two months after a tax on soft drinks of €0.07/L was introduced in France) projected that the tax on soft drinks would result in an increase in retail prices of 11% leading to a decrease in consumption of approximately 3.4 L/person per year.	France	Modelling study	Bonnet et al., 2012.
Sugar sweetened drinks	According to information reported in the press, consumption of cola drinks should have grown by 2% in 2012 as in previous years but consumption would have actually decreased by 2% in the year the tax on soft drinks was introduced in France.	France	Results of market research (Symphony Iri) reported in the press	Le Figaro, 2012.
Sugar sweetened drinks	A 20% tax on sweetened drinks would lead to a reduction in the prevalence of obesity in the UK of 1.3% (around 180,000 people).	United Kingdom	Econometric and comparative risk assessment modelling study	Briggs et al., 2013a.
Sugar sweetened drinks	A 10% increase in the price of sugar sweetened drinks could potentially result in a decrease of 7.5 ml/capita per day in consumption of these products.	United Kingdom	Modelling study (using surveys of individual dietary intake data and household food expenditure surveys from 1986 to 2009)	Ng et al., 2012.
Sugar sweetened drinks	A 35% tax on sugar sweetened drinks in a hospital cafeteria led to a 26% decline in sales.	United States	Experiment in a hospital cafeteria	Block et al., 2010.
Sugar sweetened drinks	A 20% and 40% tax on carbonated sugar sweetened beverage (SSBs) would reduce beverage purchases by a mean (SE) of 4.2 (1.6) and 7.8 (2.8) kcal/d per person, respectively. Extending the tax to all SSBs generates mean (SE) reductions of 7.0 (1.9) and 12.4 (3.4) kcal/d per person, respectively. Estimated mean (SE) weight losses resulting from a 20% and 40% tax on all SSBs are 0.32 (0.09) and 0.59 (0.16) kg/y per person, respectively. The 40% tax on SSBs, which costs a mean (SE) of $28.48 ($0.87) per household per year, would generate $2.5 billion ($77.5 million) in tax revenue, with the largest share coming from high-income households.	United States	Modelling study (multivariate and regression models using 2006 data from Nielsen Homescan Panel - i.e. sample of households that scan and transmit their store bought food and beverage purchases weekly for a 12-month period).	Finkelstein et al., 2010.
Sugar sweetened drinks	The reduction in the body weight as a result of a 20% tax on sugar sweetened drinks is estimated to be between 1.54 lb and 2.55 lb (0.70 kg to 1.16 kg per year).	United States	Modelling study (using Nielsen Homescan Panel data for 1998 -2003)	Dharmasena and Capps, 2012.
Sugar sweetened drinks	The study estimate the changes in energy, fat and sodium purchases resulting from a tax that increases the price of sugar-sweetened beverages (SSBs) by 20% and the effect of such a tax on body weight. In addition to substitutions that may arise with other beverages, the study accounts for substitutions between SSBs and 12 major food categories. The main findings are that the tax would result in a decrease in store-bought energy of 24.3 kcal per day per person, which would translate into an average weight loss of 1.6 pounds (0.73 kg) during the first year and a cumulated weight loss of 2.9 pounds (1.31 kg) in the long run. The study does not find evidence of	United States	Modelling study (using the 2006 Homescan panel)	Finkelstein et al., 2013.

	substitution to sugary foods and shows that complementary foods could contribute to decreasing energy purchases. Despite their significantly lower price elasticity, the tax has a similar effect on calories for the largest purchasers of SSBs.			
Fruits and vegetables	With a 1% decrease in the average price of all fruits and vegetables, the simulations indicate a mean decrease of 6,733 cases of coronary heart disease and 2,946 ischemic strokes, for a total of 9,680 prevented cases of disease. The CSFII surveys indicate that on average, lower income consumers eat fewer fruits and vegetables. They are therefore more responsive to slight changes in their diets than individuals who consume more fruit and vegetables, because of the diminishing marginal health benefits of produce consumption.	United States	Empirical simulations, based on data from the Continuing Study of Food Intake (CSFI) by Individuals in the United States	Cash et al., 2005.

Source: Civic Consulting.

ANNEX 8. VAT APPLICABLE IN MEMBER STATES

This annex presents the sources of information concerning the VAT rates applicable to fruits and vegetables in the Member States.

Table 49. *VAT rates applied to fruits and vegetables in Member States*

MS	VAT rate applicable to fruits and vegetables	Source of information
DK	25%	European Commission. VAT Rates Applied in the Member States of the European Union, Situation at 13th January 2014.
HR	25%	5% applies to: all types of bread and milk (pasteurized, homogenized and condensed milk excluding chocolate milk and milk products) and substitute for mother`s milk. 13 % VAT rate is applicable to the edible animal or vegetable fats and oils, to the white, crystal sugar made of sugar beet and sugar cane, and to food for infants and processed cereal-based food for infants and young children (European Commission, 2014b)
RO	24%	9% on bread, otherwise 24% (http://www.finantistii.ro/stiri/reducere+TVA+alimente)
LT	21%	European Commission, 2014b
LV	21%	VAT rate of 12% applies to products for infants (European Commission, 2014)
BG	20%	European Commission, 2014b
EE	20%	European Commission, 2014b
SK	20%	http://www.kpmg.com/global/en/issuesandinsights/articlespublications/vat-gst-essentials/pages/slovakia.aspx
HU	18%	As of 1 July 2009 a reduced rate of 18% applies to: milk and milk products; dairy products; flavoured milk; and products containing cereals, flour, starch, or milk (European Commission, 2014b)
CY	15%	European Commission, 2014b
CZ	15%	European Commission, 2014b
FI	14%	European Commission, 2014b
EL	13%	European Commission, 2014b
SE	12%	http://www.skatteverket.se/foretag/moms/vadarmoms/2512eller6procentsmoms/12procent.4.58d555751259e4d66168000348.html
AT	10%	European Commission, 2014b
SI	9.5%	European Commission, 2014b
DE	7%	http://www.gesetze-im-internet.de/ustg_1980/anlage_2_83.html
BE	6%	http://www.belgium.be/fr/impots/tva/taux/
NL	6%	European Commission, 2014b
PT	6%	http://www.kpmg.com/global/en/issuesandinsights/articlespublications/vat-gst-essentials/pages/portugal.aspx (l) 9% on bread, otherwise 24%, http://www.finantistii.ro/stiri/reducere+TVA+alimente
FR	5.5%	http://www.economie.gouv.fr/cedef/taux-tva-france-et-union-europeenne

PL	5%	VAT rate of 12% applies to products for infants, (j) VAT rate on unprocessed food, http://www.kpmg.com/global/en/issuesandinsights/articlespublications/vat-gst-essentials/pages/poland.aspx,
IT	4%	http://www.intrage.it/rubriche/fisco/deduzioni_detrazioni_fiscali/aliquote_iva/index.shtml
ES	4%	VAT on food is either 4% (on basic food products including eggs, milk, fruits, vegetables, cheese, bread) or 10% (for example on meat, fish, processed canned food) http://www.agenciatributaria.es/static_files/AEAT/Contenidos_Comunes/La_Agencia_Tributaria/Segmentos_Usuarios/Empresas_y_profesionales/Empresario_individuales_y_profesionales/I.V.A./Manual_IVA_2013.pdf
LU	3%	European Commission, 2014b
IE	0%	http://www.revenue.ie/en/tax/vat/leaflets/food-and-drink.html
MT	0%	European Commission, 2014b
UK	0%	http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageLibrary_PublicNoticesAndInfoSheets&propertyType=document&columns=1&id=HMCE_CL_000118#P59_3468

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