



News report no. 2

March 2017

Sustainability?

Consumer's choice!

Rethinking sustainable food and nutrition policies

It is a shared responsibility among farmers, companies, consumers and government in the EU: to make sure that food consumed and produced delivers better on health and environmental protection. In this issue of the SUSFANS newsletter we zoom in on the complex role of the consumer. More specifically we look at consumer choice in relation to a balanced diet and the long-term availability of food. It's obvious that the attitudes towards food choice differ in the EU, and this is no different when it comes to sustainable food consumption. Still, these perceptions are consistent in their mix ideas of production systems (e.g. organic farming) with choices for seasonal products, portion size and waste reduction. The good news is that several attitudes are in line with the indicative EU-wide food-based dietary guidelines that the SUSFANS nutritional team is developing (see page 12 of this newsletter). In terms of animal source food, the guidelines include an upper limit to meat intake, and a lower limit for intake of fish and dairy, and various suggestions for replacement of unhealthy animal source food.

The novel data suggests that the recommended shifts from one animal source food to the other will be more easily adopted by consumers across all countries and age groups than a replacement with plant-based products. In the coming months SUSFANS will explore the implications of these strategies for the sustainability of the EU food system at large, and even for meeting global climate goals, using integrated assessment tools. We will keep you posted.

- Thom Achterbosch

CONTENT

Sustainability? Consumer's choice!	1
What do European consumers think about sustainable food?	2
Can information beef up the demand for meat alternatives?	4
Livestock production in the EU	6
Can we bank on seafood for a healthier food consumption?	8
Analyzing EU crop production	10
Modelling healthy diets for Europe	12
Understanding the interaction of food price volatility	14
Goodbye 2016, hello 2017	16
SUSFANS researchers update	18

What do European consumers think about sustainable food?

What do European consumers think about the sustainability of their own food behavior? What are their perceptions of sustainability? Can we measure determinants of sustainable food behavior or find similarities across European countries?

Identifying determinants is important. With that knowledge, we can anticipate which behavior consumers are willing to change under which conditions, and translate this information into metrics and models for generating a sustainable and healthy diet.

To get to know what is at stake in European consumers' minds, a team of Dutch SUSFANS researchers conducted a web-survey among 5043 respondents from five countries, namely the Netherlands, Denmark, the Czech Republic, France and Italy. The goal was to quantify per country which aspects of sustainability are important to consumers, how often certain sustainable behavior is reported and what the psychological drivers of this behavior are.

VIEW OF SUSTAINABLE FOOD CONSUMPTION

Four aspects of sustainable food consumption were often mentioned in all countries:

- Seasonal fruits and vegetables
- Reducing food waste,
- Water use and
- Use of natural resources.

However, perceptions differ per country: Seasonal fruits and vegetables were particularly often mentioned by the respondents from France (49 percent) and food waste by the participants from Denmark (41,3 percent). In addition, in the Netherlands air and water pollution is often perceived as an aspect of sustainability. In Denmark, organic food consumption and animal welfare are often

mentioned. In the Czech Republic, healthy food and land use stand out. In France, local and regional food as well as transportation distance of food play a big role. Finally, in Italy, food safety is raised more often and considered important for consumers.

SUSTAINABLE FOOD BEHAVIOR AND WILLINGNESS TO PAY

When asked about their sustainable food intake, most respondents mentioned consuming seasonal or local food. This is followed by free-range products/products with a sustainability logo/smaller portions, followed by organic/fair trade products. Least mentioned by consumers was the intake of vegetarian products.

Choices and ranking are quite varying between countries. For example in the Netherlands, sustainable food behavior is relatively low, especially with regard to seasonal or local products. In Denmark more intake of organic or fair trade and free range products or products with a sustainability logo and smaller portions were reported. Read the paper for a complete ranking on different themes.

Results show that consumers are in general not particularly willing to pay extra for a sustainable product. Noticeably, Italians are most willing to pay extra.

MEAT REPLACEMENT

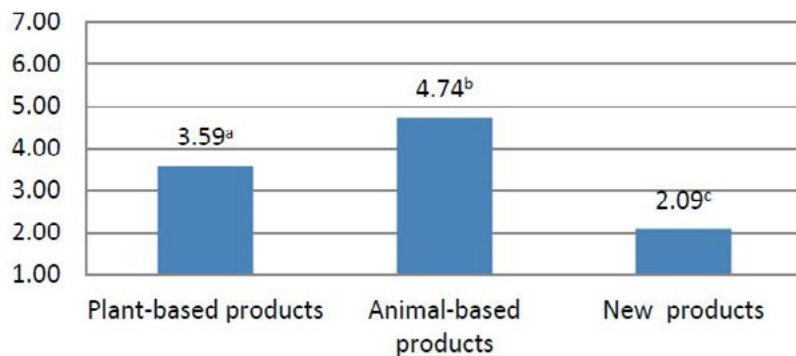
When the survey participants were asked about openness to replacers of meat, they are mostly open to animal-based products like fish, cheese and eggs.

Their second alternative was plant-based products. But they did not really like it: On average, the respondents were not so open to this. Ranked last are new products like insects or in-vitro meat.



Consumers are thus most open for the alternative that has the least benefits in terms of environmental sustainability. For a replacement of meat by plant-based alternatives there seems to be a longer way to go and for new products consumers are generally not open.

Openness to different types of products to replace meat



DIFFERENCES BETWEEN COUNTRIES

Results show that respondents from the Czech Republic are more open to animal-based products instead of meat than in France. France and Italy are more open than those in The Netherlands and Denmark. Nevertheless it was considered the best alternative in all countries.

Regarding plant-based alternatives, results show that respondents in Italy and France are more open than in the other countries. Also Denmark is less open to plant-based alternatives than the other countries.

Finally, France is more open to new types of products as alternatives for meat than all the other countries except the Netherlands. The Netherlands is more open to new types of alternatives than Denmark and the Czech Republic. Czech Republic consumers are less open to new alternatives.

UNKNOWN: SUSTAINABLE CONSUMPTION

Consumers are on average not really conscious about sustainable consumption. Consumers are most conscious about sustainable consumption from an economic viewpoint, caring for long-term economic and personal well-being, followed by a social viewpoint which entails a maximum beneficial impact on society. Consumers are least aware of environmental aspects of sustainable consumption such as recycling and energy.

DRIVERS OF SUSTAINABLE BEHAVIOR

Country, demographics, consumer characteristics and food choice motives are important drivers of sustainable behavior, openness to meat alternatives and willingness to pay for sustainable products.

For example, the social norm (the extent to which one believes that people around them are eating sustainably), interest in sustainable food consumption and high sustainability food motives predicts consumption of sustainable products.

Although consumers do report to be somewhat negative that they can effectively influence sustainable food consumption as an individual.

EUROPEANS TEND TO REDUCE ENVIRONMENTAL IMPACTS

Across all countries, reduced environmental impact is the sustainability domain that is ranked most often as most important, followed by viable and socially balanced agri-food businesses. Balanced and sufficient diets scores on the third place and global food and nutrition security on the last place. Interestingly, the countries differ to a large extent in terms of ranking the sustainability goals. In Denmark, for example, global food and nutrition security scores highest whereas overall, this aspect ranks lowest.

Consumers' knowledge about the determinants for a sustainable diet
 Emily Bouwman, Muriel Verain, and Harriette Snoek
 (Wageningen Economic Research)

Read more: susfans.eu/portfolio/deliverable-21-consumers%E2%80%99-knowledge-about-determinants-sustainable-diet

SUSFANS
 DELIVERABLES

Consumers' knowledge about the determinants for a sustainable diet
 Deliverable No. 2.1

Billy Bouwman, Muriel Verain, and Harriette Snoek (Wageningen Economic Research)

The deliverable of report No. 2.1, created in the context of the project, will address the requirements of necessary labor and capital. This is the main objective for the project.

Can information beef up the demand for meat alternatives?

In many European countries passionate discussions about the future of meat production and its impact on the environment and public health have started.

DOWNSIDERS OF MEAT PRODUCTION

Breeding cattle requires large amounts of land and leads to high greenhouse gas emission levels. The production of animal-based foods causes higher greenhouse gas emissions than production of plant-based foods. Excess of meat consumption is a major contributor to unhealthy diets characterized by relatively high intakes of fats, saturated fatty acids and salt, and by relatively low intakes of dietary fiber, vitamins and micronutrients. These unhealthy diets ultimately increase risks of both cancer mortality and cardiovascular disease mortality. Recently, the WHO pointed out that there is a link between the excess of meat consumption and some types of cancer diseases.

However, consumers' intentions to reduce meat consumption are often thwarted by entrenched habits to favor meat consumption in regular diets. Routines explain the overconsumption of animal-based proteins

in many industrial countries, while health and environmental benefits coming from plant-based proteins are generally overlooked by consumers.

BEEF UP MEAT ALTERNATIVES THROUGH INFORMATION

Can information about Health and Environment Beef Up the Demand for Meat Alternatives? SUSFANS researchers of the INRA-Institute in France tackled this question in a lab experiment. They evaluated the impact of explanatory messages about health and environment on consumers' willingness-to-pay (WTP) for meat and plant-based substitutes. This lab experiment focused on consumers' choices between beef burger meat and soy burger meat, because of

- a similar "burger" appearance making potential substitutions easier,
- beef is one of products with the lowest protein efficiency per greenhouse gas emissions, whereas soybeans has one of the highest efficiency.
- several soy burgers were introduced on the market before and after the time of the experiment.



READ ALSO:



Deliverable 2.4: Preliminary report on Task 2.4: Lab experiment on consumers' choice by Stéphan Marette and Guy Millet (INRA)

susfans.eu/portfolio/deliverable-24-preliminary-report-task-24-lab-experiment-consumers-choice



EXPERIMENT'S SET-UP

124 participants were interviewed about their willingness-to-pay in different rounds, each round with new explanatory messages about the impact of beef and soybean on health and environment. The order of messages varied across different sessions attended by different participants. The set of messages underlined the relative benefits of increasing consumption of soy meat compared to beef.

SURPRISING OUTCOMES

The following outcome of this lab experiment was surprising:

There is only a limited impact of the explanatory messages on participants' preferences. The willingness to pay for beef was statistically not affected by the different rounds of messages, though the chosen quantities of beef and soy changed weakly. Conversely, explanatory messages do significantly increase the WTP for soy meat, even if this effect is relatively weak, with only 6,1 percent between the first and fifth round.

In the last round, a high-quality beef was introduced which led to a statistically significant increase in the WTP for beef. The selected quantities between beef and soy almost return to the initial quantities cho-

sen, before the messages revealed. This reversal of chosen quantities towards more beef compared to soy underlines the participants' sensitivity to the quality of beef.

By showing that participants' preferences are only weakly affected by messages, the researchers could confirm some previous results underlining a relatively strong attachment towards meat that hinders a shift towards a more plant-based diet. However, unlike previous papers, our experiment was realized after the widely broadcast report, released in October 2015 by the WHO, showing a link between the excess of meat consumption and some types of cancer diseases. 71,7 percent of the participants attending our experiment heard about this press release.

The new study did not find an impact of higher education or higher socio-economic status among the participants on the variations of WTP for beef and soy, which is the opposite of significant influences of socio-demographic variables on attitudes to cut meat purchases shown in studies before.

The study underlines a reversal of preferences coming from the introduction of a high-quality beef inducing an increase in the chosen quantities of beef, and reversing a previous decrease in the chosen quantities.

Can Information about Health and Environment Beef Up the Demand for Meat Alternatives?

Stéphan Marette, Guy Millet (INRA)

Read more: susfans.eu/portfolio/can-information-about-health-and-environment-beef-demand-meat-alternatives



Livestock production in the European Union

LESS CONSUMPTION OF ANIMAL SOURCE FOOD: REDUCING EMISSIONS AND CONTRIBUTING TO HEALTH

Over the last decades, demand for animal-source food has increased in Europe. This food consumption pattern leads to health issues. Given current high consumption levels of animal-source food in Europe, two main strategies are suggested to come to healthy and sustainable diets:

1. reducing the impact of livestock production per kg of output. This can be achieved by sustainable intensification of food production.
2. improving human health and the environment by changing dietary patterns.

TOO MUCH ANIMAL-SOURCE PROTEIN INTAKE

In Europe, the demand for animal-source food increased from 42 g of protein per person per day in 1961 to 61 g of protein per person per day in 2010. The current intake of protein exceeds the daily recommended intake of protein of approximately 57 g per person per day by far. Moreover, the recommendations say that only one third of daily human protein need should come from animal sources. Exceeding this recommended amount leads to health issues.

The main reason for increased protein intake is increased meat consumption. Although there are large differences in income between and within European countries, overall, people are and will continue to become richer. And getting richer has shown to go along with increased consumption of animal-source food.





In response, the number of livestock as well as animal productivity have increased, due to science and technological developments. The livestock sector in Europe is responsible for about 15 percent of the total anthropogenic emissions of greenhouse gases. Moreover, it competes for scarce resources such as land, water, and fossil energy. Food consumed in Europe is responsible for about 31 percent of the total European anthropogenic greenhouse gas emissions.

Science and technology played an important role in this intensification process. However, we can see a current trend of stagnating demand for animal-source food in Europe. In some European countries, this demand is even decreasing due to socio-economic factors like environmental concerns, human health concerns, and changing socio-cultural values like animal welfare.

REDUCING EMISSIONS AND INCREASING EFFICIENCY CONTRIBUTE TO HEALTH

The dual challenge of the livestock sector is to contribute to healthy diets for a growing and more prosperous population, while at the same time reduce its emissions and increase its resource use efficiency.

Given current high consumption levels of animal-source food in Europe, two main strategies can be followed to come to healthy and sustainable diets: reducing the impact of livestock production per kg of output by sustainable intensification, or improve human health and the environment by changing dietary patterns.

The drivers of livestock production in the EU
 Hannah van Zanten, Ollie van Hal, and Imke de Boer
 Animal Production Systems group, Wageningen University & Research

Read more: susfans.eu/portfolio/deliverable-41-drivers-livestock-production-eu

SUSFANS
 DELIVERABLES

The drivers of livestock production in the EU
 Deliverable No. 4.1

Hannah van Zanten, Ollie van Hal, and Imke de Boer

Animal Production Systems group,
 Wageningen University & Research

In the last decades the demand for animal source food... (text is small and partially obscured)

Can we bank on seafood for a healthier food consumption?

IN-DEPTH ANALYSIS OF THE EUROPEAN FISHING SECTOR

Seafood is generally a healthy protein alternative in a diet. Official dietary advices often recommend to eating more seafood and vegetables and less beef. At present, seafood accounts for around 17 percent of the global population's intake of animal protein and nearly 7 percent of all protein consumed. Seafood also serves as an important source of minerals, contains all essential amino acids, and provides essential fats and vitamins. However, some species from certain fishing areas may cause health risks due to contaminants. Furthermore, there are sustainability challenges remaining for a range of production systems that still need to be resolved.

With over 2,500 species being fished for and over 600 species being farmed, the seafood sector is truly diverse which could contribute to resilience of the seafood system. However, European consumers tend to choose mainly wild-caught seafood (such as tuna and cod) and low diversity of farmed fish (mainly salmon). From a positive side, these systems are generally in the lower range in terms of energy use and greenhouse gas emissions compared to land-based animal production systems; other top-consumed seafood products for the EU, like tropical shrimps, contribute to

much more emissions. However, tuna- and cod fisheries and farming of salmon represent seafood systems with a diversity of practice, and thus improvement potentials.

EATING MORE FISH MAY CAUSE PROBLEMS

Seafood from capture fisheries may be a good alternative to produce food with less impacts and resource use than many land-based protein production systems, as fisheries do not require inputs like feeds, fertilizers or pesticides. However, there are some problems when seafood from capture fisheries is to play an increasing role in global food security for year 2050:

- There are limits to natural production, many stocks are overexploited. Even if all fisheries would be exploited optimally in terms of yield, estimates show that yield could potentially increase with 20% – and this figure is strongly affected by emerging challenges such as climate change.
- The global fisheries resource is highly skewed towards utilization by a limited number of countries. The full effect on food security for countries with undernourished citizens is currently debated.





- Consumers in the EU and other more wealthy regions prefer to eat seafood species at the top of the food web, which has lower production capacity.
- The full effects of fisheries on marine ecosystems are still largely unknown.

Seafood production from aquaculture is on the other hand playing an increasingly important role in the food system, exhibiting a remarkable increase in production volume since the 1980s. For aquaculture to increasingly contribute to meet the projected demand, this requires technological innovations and changing consumer demand related to:

- Reduced dependence on feed inputs based on meal and oil from capture fisheries. Salmon and tropical shrimp farming are systems that require a higher level of marine based ingredients. Furthermore, right policy actions are needed to solve emerging competition between different uses of crops.
- For aquaculture growth in the EU, conflicts about multiple uses of the coastal zone must be solved.
- Increased farming of non-fed species and species with low feed demand (in particular comprising marine protein) and oil calls for change in EU consumer preferences.

Overall, seafood both from fisheries and aquaculture has a major potential to contribute to sustainable Food and Nutrition Security (FNS). This depends on the path chosen by policy-makers, producers and

consumers. In fact, it has been argued that, from a global perspective, feeding 9 billion people is likely to require a decrease in seafood consumption per capita and year. To achieve continued stability of supply and sustainable demand for seafood, there are several options ahead:

Case studies related to innovations of seafood systems. For example: What happens when we minimize competition of feed resources through use of side-streams, identify and make use of the best available farming technology for popular consumption species such as salmon and cod, or when we increase production of the most efficient feed-converters and those not requiring feed at all or with low marine protein/oil content?

- Target the consumption side and evaluate effects from altered consumption patterns such as smaller sizes of fish fillets produced from aquaculture, increased awareness about what characterizes more sustainable seafood, produce less waste and other.
- How could sustainable policies be formulated, targeting at identifying and spreading “brave” food dietary advice can assist consumers to make better choices both in terms of health and sustainability?

In the SUSFANS deliverable 4.2 on “The drivers of fisheries and aquaculture production in the EU”, Sara Hornborg, Kristina Bergman and Friederike Ziegler provide a detailed analysis the European seafood sector.



The drivers of fisheries and aquaculture production in the EU
 Sara Hornborg, Kristina Bergman and Friederike Ziegler (SP Technical Research Institute of Sweden)
 Read more: susfans.eu/portfolio/deliverable-42-drivers-fisheries-and-aquaculture-production-eu

Analyzing EU crop production

FINDING THE MOST IMPORTANT DRIVERS

Crop production is the most crucial primary agricultural production activity for both food and nutrition security. In 2011, around 70 percent of the calories per capita and per day came from plant-based products. Besides, its importance for the direct human consumption, crop production is also crucial for producing feed for livestock and, increasingly, for aquaculture. Most generally, crop production is primarily determined by the interplay of land use and crop yields. Both land use and crop yields are affected by various drivers.

In their Deliverable 4.4 "Preliminary report on T4.4: drivers of crop production", SUSFANS researchers Andrea Zimmermann and Catharina Latka of the Institute for Food and Resource Economics of the University of Bonn provide a qualitative assessment of drivers of crop production

and preliminary work for a quantitative analysis of crop production in the EU. The paper's focus is on the most important crops in Europe in terms of production amount, i.e. cereals, potatoes, sugar beet and important crops for nutrition security and the SUSFANS case study, vegetables and fruits.

CROP PRODUCTION IN THE EU

Cereal production in the European Union accounted for about one third of total utilized agricultural area in 2013, whereas grassland, i.e. for pasture, meadow or grazing covered 34.1 percent.

From the total EU cereal production, almost 45 percent are wheat, followed by grain maize (23.4 percent) and barley (18.2 percent). Triticale and rye and maslin have production shares below 5 percent (Figure 1). Among the main fruits and vegetables produced in the EU are tomatoes, carrots, onions, apples, peaches and citrus fruits.

At EU-28 total, the fruits and vegetables with the highest quantitative production are tomatoes, followed by apples and citrus fruits.

The researchers identified the important direct and indirect drivers for crop producers. Animal-based food production is an example of an indirect driver. "A higher economic growth is correlated with higher consumption of animal products. This leads



to an increased crop production. This is currently seen as one of the two challenges to future crop production”, explains Andrea Zimmermann of the University of Bonn. Nearly as relevant is the global population growth. “Since taking more land into production is not an alternative for meeting increasing global food demand, it is often argued for the ‘sustainable intensification’ of crop production in the meaning of yield increases without harming the environment. But how this can be achieved and what it means for European agriculture is still very open.” But, regulation, prices and technology play a key role too.

WHICH DRIVERS HAVE THE MOST IMPACT?

“A hierarchy of their impacts on crop production is almost impossible to identify”, explains Zimmermann. Quantitative assessments considering all the drivers are currently not available. However, some of these drivers are frequently taken into account in integrated assessments of the agricultural sector. The drivers usually considered are technology, population developments, global GDP growth, climate change and, partly, agricultural and trade policies.

In particular, technical progress and its potential impact on crop production is very difficult to assess and is usually only addressed in a very stylized manner in economic agricultural sector models.

However, due to its severe impact on the sector, research particularly dedicated to technical progress and its effects is ongoing. Currently, also progress is being made in explicitly considering agricultural and policy changes and other adaptations to climate change in models.

Prices and, partly, management, are usually endogenous in large-scale integrated assessments of the agricultural sector which emphasizes their importance in the modelling work and the sector itself. Natural resource availability is the most crucial and basic factor for crop production. It is usually only considered indirectly. Culture and lifestyle changes are sometimes considered in terms of demand scenarios. They can impact the sector, but their impacts are usually smaller than those of other global drivers like climate change or population.

Contract opportunities and vertical integration are usually not considered in integrated assessments and likely less important regarding their effects on production per se. Producer and farm characteristics can severely affect production on individual farms.

However, they are difficult to cover in large-scale assessment and might cancel out on average. Management has recently received a lot of attention in the context of climate change adaptation and modelling work is in progress.

Preliminary report on Task 4.4: drivers of crop production
 Andrea Zimmermann, Catharina Latka (Institute for Food and Resource Economics, University of Bonn)
 Read more: susfans.eu/portfolio/deliverable-44-preliminary-report-task-44-drivers-crop-production



Modelling healthy diets for Europe

SUSFANS FOOD-BASED BASIC DIETARY GUIDELINES

Modelling healthy diets is not an easy task. To do this, you first have to define the required consumer-based dietary intake data. This is one of the objectives of the SUSFANS project in Work package 2. In focus of this Work package are four European countries, namely Denmark, Czech Republic, Italy and France.

What kind of nutrition data are needed for a coherent modelling of Food and Nutrition Security diets? Not only do we have to look at the energy intake, but also at the adequate intake of specific nutrients, which are relevant for human health. Key nutrients have to be chosen and food groups defined, underpinned by dietary reference values.

This definition is needed in the research of SUSFANS. The outcomes will be applied to nutritional survey databases in four EU regions in WP7, which is needed for modelling of FNS diets, in particular with the SHARP (Sustainable, Healthy, Affordable, Reliable and Preferred) diets of WP7.

HEALTHY DIETS

Healthy diets are based on nutrient recommendations and food-based guidelines for some product categories, such as fruits and vegetables, red meat and fish intake. Food-based dietary guidelines can be a holistic approach. They provide advice on foods, food groups and dietary patterns to the public to inform about required nutrients, to promote overall health and prevent chronic diseases. The guidelines give an indication of what a person should be eating

in terms of foods rather than nutrients.

Although those food-based dietary guidelines cover a wide range of nutrients, in specific subgroups of the population (different age, sex, socioeconomic status and anthropometric factors), some nutrients might become "of concern". They are maybe essential/critical nutrients that are not clearly reflected in the food-based dietary guidelines.

The aim of this work is to define nutritional adequacy of diets and food consumption patterns in EU countries in two steps:

- First, include a set of food-based dietary guidelines
- Second, include a set of nutrients that are of concern in various regions of the EU.

By using this approach, the prevalence of inadequate intakes of some foods, food groups and nutrients in the European population can be investigated.

CRITERIA FOR NUTRITIONAL ADEQUACY

- Foods and nutrients that are important for the prevention of major chronic diseases,
- Foods and nutrients that are important for growth and development throughout the life cycle,
- Nutrients for which intake may become critical when shifting towards a more sustainable diet.

Food safety and allergies are not addressed, as they go beyond the scope of the SUSFANS project.



Protocol for defining the nutritional adequacy of total diets and foods consumed in EU countries

Elly Mertens, Anneleen Kuijsten, Marianne Geleijnse, Pieter van 't Veer (WUR) with contributions from Ellen Trolle and Inge Tetens (DTU, Denmark), Marcela Dofková (SZU, Czech Republic), Lorenza Mistura, Laura D'Addezio, and Marika Ferrari (CRA, Italy), and Carine Dubuisson and Sandra Favret (ANSES, France).

Read more: susfans.eu/portfolio/deliverable-22-protocol-defining-nutritional-adequacy-total-diets-and-foods-consumed-eu

COMBINED GUIDELINES

Because food-based dietary guidelines are defined at the national level, differences exist across Europe. In SUSFANS, researchers constructed one common set of food-based dietary guidelines to enable comparison of nutritional adequacy between the four countries mentioned above: Denmark, Czech Republic, Italy and France. They defined nutritional adequacy by setting minimum intake levels for foods that are beneficial and maximum levels for foods that are not beneficial. For most foods and nutrients, actual dietary intake levels large-

ly deviate from recommended intake levels among European citizens. They loosened boundaries for these foods (i.e., deviation from national guidelines) to be able to examine differences in nutritional adequacy across countries.

SET OF FOOD-BASED DIETARY GUIDELINES

The cut-off points of the food-based dietary guidelines are presented in grams per day with the aim to increase the comparability of food intake between the countries, as serving sizes are country-specific. For some foods, qualitative guidelines like 'replace with' are given.

SUSFANS FOOD-BASED BASIC DIETARY GUIDELINES

- Preferably **replace white grains** (products) by whole grains (products).
- Eat at least **200 g** of vegetables a day.
- Eat at least one serving of **legumes** a week; equivalent to 135 g per week \approx 19 g/d.
- Eat at least 15 g of **unsalted nuts** or seeds a day.
- Eat at least 200 g of **fruit** a day.
- Eat at most 500 g of **red and/or processed meat** a week; equivalent to 71 g/d (prepared weight, not raw weight).
- Preferably **choose lean meat**, lean cold meat and/or poultry instead of fat and/or red meat.
- Eat at least one serving of **fish** a week; equivalent to 150 g a week \approx 21 g/d.
- Eat at least 300 g of **dairy products** a day; dairy products include milk, yoghurt, fresh cheese, quark, custard, milk puddings, etc., excluding cheese and butter.
- Preferably **choose low-fat dairy** instead of full-fat dairy.
- Eat at most 150 g of **hard cheese** a week; equivalent to 21 g/d.
- **Replace butter**, hard margarines and/or hard cooking fats by soft margarines, liquid cooking fats and/or vegetable oils.
- Drink at most 500 mL of **sugar-sweetened beverages** a week; sugar-sweetened beverages include fruit and vegetable juices, fruit and vegetable nectars and soft drinks, etc.; equivalent to 71 mL/d.
- Preferably **replace sugar-sweetened beverages** by water.
- Drink at most one serving of **alcohol** a day; equivalent to 10 g/13 mL ethanol a day.
- **Limit the salt intake** to 6 g/d.



Understand the interaction of Food Price Volatility

BRAZIL'S COFFEE MARKET AS AN EXAMPLE

Volatile food prices have considerable impact on food security, sparking riots and contributing to political instability, as past shows. Research so far has shown that volatility is caused by a combination of factors like trade restrictions, financial speculations or even an expanding population, biofuel policies and weather effects.

However, little work has been done to quantify and understand the interaction of these drivers. Furthermore, no distinction has been made between long-run pressure variables and short-run shocks. This paper provides a first quantified assessment of a comprehensive set of drivers for price formation on the global coffee market.

EXAMPLE: VOLATILE COFFEE PRICES

SUSFANS-researchers have taken coffee as an example, because it is one of the most traded agricultural commodities in the world, with an estimated total consumption value of some 174 billion dollars in 2012. The largest producer and exporter in 2015 was Brazil, followed by Vietnam, Colombia, Indonesia and Ethiopia.

After the global price regulation ended in 1989, the relatively high price level dropped significantly between 1990 to 1993 and 1999 to 2004. The latter sub-period (known as the coffee crisis period) was the longest period of low prices ever recorded with severe negative consequences on the economies of exporting countries. Prices recovered strongly after 2004, reaching a 34-year high in mid-2011. However, there has subsequently been a severe deterioration in prices while costs of coffee production inputs, particularly fertilizers and labor, continued to rise. These price increases were in part driven by higher expenditures for pesticides to combat emerging large-scale diseases attacking coffee plantations and increasing fertilizer prices both squeezing the margins for labor inputs.

LOOKING INTO BRAZIL'S COFFEE - TAKING FUTURE MARKETS INTO ACCOUNT

During the regulated market period the highest volatility was recorded in years following severe climate shocks recorded in exporting countries, notably in Brazil in 1975 and 1985. During the free market high volatility was recorded in 1994 and 1997 where in 1994 a climate shock was recorded in Brazil.

Prices in the futures markets have been significantly more volatile than the yearly price indicator recorded by the International Coffee Organization. Futures prices contain additional information beyond the fundamentals of the market like production figures, trade, stocks and consumption.

The impact of macroeconomic and financial variables is typically underestimated or entirely ignored by producers and traders, who are focusing on fundamentals, and even the academic literature on this topic seems to be void of appropriate methods and analyses.





Here, the study applies a large set of models to coffee market data including fundamental, macroeconomic, financial and climatic explanatory variables. The aim is to arrive at a better understanding of drivers' contributions to coffee price phenomena. The researchers assess the role played by different theoretical driving factors of coffee prices as predictors of their dynamics. The study uses data from April 1990 until March 2016 for Arabica coffee.

OUTCOME

The research results indicate that variables related to global macroeconomic and financial developments contain valuable information to explain the historical pattern of coffee price developments, as well as to improve out-of-sample predictions of coffee prices.

The minimal importance of the fundamental variable in terms of explaining historical variation in coffee prices shows that the percentage of price variance explained by changes in the production of Arabica coffee in Brazil does not reach more than 2.5% at any prediction horizon. A similar conclusion applies to the group of purely financial variables, whose variation is able to explain a maximum of about 3.5% of the variance of coffee prices in the two-year ahead horizon.

CONCLUSIONS

In the free market period since the end of the global price regulation in 1989, small-holder farmers in many countries have been

more exposed to fluctuations in coffee prices. This increased rural poverty as it became difficult for small producers to plan their resource allocations efficiently.

However, price trends and volatility are a major concern for all stakeholders in the world coffee market. In importing countries, price volatility makes it difficult for roasters to control processing costs. In addition, it affects profit margins along the supply chain.

As a result, risk management strategies are becoming increasingly recommended to producers in developing countries. However, the scope and applicability of these instruments can vary significantly, depending on the nature of the underlying and direct drivers of price trends and volatility.

"Improvements in market information and the application of financial risk management contributed to a decreasing role of market fundamentals driving coffee prices. Our results suggest that macro-economic and financial market variables are more important to understand and predict coffee prices. This has important implications for how individual producers, including small-holder coffee producers and producer countries, should manage the consequences of commodity price risks", states Jesus Crespo Cuaresma, SUSFANS-Researcher from the IIASA-institute "Predictive tools appear to be key for the implementation of such risk management systems."

The decomposition of agricultural commodity markets volatility between fundamentals and market speculation

Jesus Crespo Cuaresma, Jaroslava Hlouskova, and Michael Obersteiner (IIASA)
Read more: susfans.eu/portfolio/deliverable-81-decomposition-agricultural-commodity-markets-volatility-between



Goodby 2016, hello 2017

OUTLOOK BY PROJECT LEADER THOM ACHTERBOSCH

The vision of the SUSFANS research team, supporters and stakeholders is to jointly work towards EU food systems that support health, environment and enterprise. The challenges are major. For example, in 2015, around 25 million children, or 26.9 percent of the population aged 0 to 17, in the European Union (EU) were at risk of poverty or social exclusion (Eurostat). This includes a group of materially deprived children, whose nutrition and health status is also likely to be fragile. Can we think of ways to make the food system work better for nutrition, equality and inclusion?



SUSFANS MISSION

Our mission in SUSFANS is to deliver high-quality research to support evidence-based policies and innovation strategies for a sustainable as well as food and nutrition secure EU. We ask how we can improve the food system of the EU, especially from the perspective of social, environmental and economic sustainability? How can we balance and encompass different views on balanced consumer diets and food and nutrition security in the EU?

PROVIDE AN INFORMATION BASIS

The very many achievements of the consortium in 2016 provide a basis for informing these questions. For example, the publication of our position paper in *Agricultural Systems* (<http://dx.doi.org/10.1016/j.agry.2016.10.014>), the successful stakeholder workshop and over a dozen deliverables and reports. Thank you all for your contributions, commitment and fun!

SCIENTIFIC REVIEW

The year was concluded with a panel of scientific reviewers called upon by the project officer. The panel encouraged us to invest even more effort in the collaboration across research teams and in frequent interaction with stakeholders, using the framework paper and a set of metrics as cornerstone to guide us towards a truly shared project result.



HELLO 2017

In 2017, we've got some challenging research work ahead of us, including developing and using models to quantify a final set of sustainability metrics, and exploring innovations in case studies along with foresight. We're planning two stakeholder meetings and a plenary project meeting at INRA in Paris, kindly organised by Louis Georges and Stephan.

The preliminary schedule of meetings:

- Between June 19 and July 2, 2017, Vienna, Austria: 3rd workshop of Stakeholder core group, focus: livestock and fish
- September/October, Netherlands: 3rd workshop of Stakeholder core group, focus: fruit and vegetables
- 11-12 October, Paris, France: 3rd plenary project meeting (at INRA)

In 2017 we'll strive towards an impact on policy debates in Europe. An interesting paper by Balarajan and Reich argues that a "mindshift" is required in the nutrition community to build greater awareness of the broader political economy factors shaping the global nutrition landscape.

These factors are also at play in Europe and in other dossiers, e.g. around the agricultural policy (CAP) reform or disease prevention policies. And in fact, a climate

policy may be a more compelling driver of changes in habitual consumer diets than all nutrition awareness campaigns combined. Hence, we expect that a SUSFANS paper that addresses the contribution of adapted consumer diets and agriculture-based climate mitigation to achieving the Paris goals on climate stabilisation will be a welcome addition to the policy debate.

In addition, we intend to feed our observations on the importance of social and technological innovation for a sustainable food system into the EU science policy framework. Last year the European Commission launched the FOOD2030 agenda for future research and innovation on sustainable nutrition security in the EU. On behalf of you I am representing SUSFANS in a consortium of leading organisations in the agri-food-nutrition domain that will jointly put in a bid for creating the FOOD2030 platform (under H2020 call SFS-18). Our project was specifically invited as one of two projects that represent novel concepts and networks in food systems science. And it is already a sign of recognition from the community of the quality of our work.

I trust that you will continue your outstanding collaborative efforts to make SUSFANS a success. Looking forward to it!

- Thom Achterbosch



Researchers update

Prof. Jo Swinnen (Senior Research Fellow, CEPS and Professor, KU Leuven) gave the keynote speech on "Agri- Food Value Chains. Some Economic and Political Issues" at the CAES Conference in Ottawa, Canada, on January 12, 2017.

Dr. Adrian Leip (EC-JRC) gave a presentation on "The Food-Nitrogen-Environment nexus" at the workshop on "Environmental implications of food and nutrition policies" organized by the WHO Regional Office for Europe and EUPHA Section on Food and Nutrition at the 9th European Public Health Conference, Vienna, November 2016.

Dr. Adrian Leip (EC-JRC) gave a presentation on "N-footprint calculation on the basis of LCA in CAPRI" at the 6th International Nitrogen Footprint Workshop, Melbourne, 02/12/2016

Thom Achterbosch gave a presentation before the Scientific Advisory Board of JPI FACCE on modelling inequality in EU food systems, 30 November 2016, JPI FACCE, Berlin in which he combined perspectives from SUSFANS and FOODSECURE on inequities in the EU related to nutritional status and food access.

Marijke Kuiper participated in the 'Agrodebat', an annual event organized by Wageningen Economic Research for its relations in the public and private sector at the start the new year (<http://www.wur.nl/nl/Expertises-Dienstverlening/Onderzoeksinstituten/Economic-Research/show/Agrodebat-2017.htm>).

This year's theme was the circular economy. Marijke debated with the spokesperson of the Dutch meat sector (with lively participation of the audience) about the need to impose a tax on meat consumption to steer towards a more sustainable and healthy diet. A consensus was reached that we should adjust the price of all products, including meat, to reflect their true price in terms of health and the environmental costs. So the ongoing SUSFANS work is very timely.

SUSFANS project and 2nd Stakeholder Meeting

Researchers of 16 institutes met in Brussels between October 26-28, 2016 to discuss metrics, models and foresight for sustainable food and nutrition security in Europe. "We have a real dense program", states Thom Achterbosch. "As researchers, we are not a on the steering wheel, but we can deliver an evidence base." In the meeting, SUSFANS reviewed the work progress of the first 18 months, fostered collaboration across teams and tasks and got ready to deliver the final metrics in March 2017.

The 2nd Stakeholder meeting started im-

mediately after the project meeting. More than 100 stakeholders from European NGOs, institutes and companies brought in their ideas and thoughts on the future of European sustainable food and nutrition security.

