



Finnish agri- food sector outlook 2021

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Summary

Finland's economic decline gentler than expected

Finland's economy survived the first year of the coronavirus fairly well compared with many other countries. In 2020, the economy decreased by less than 3%, which was significantly less than was estimated in the spring of 2020. Keeping the epidemic well under control in Finland had the highest impact on the positive performance. Economic recovery, both in Finland and globally, ultimately depends on the rapid progress of vaccinations and the successful suppression of the coronavirus pandemic. National recovery measures and the upcoming EU recovery package support economic growth. Recovery is especially expected to come from growing demand for services, as households' pent-up desire to consume starts to unwind after the epidemic. This would also help the foodservice industry, restaurants and the out-of-home sector, which were struck hardest by the coronavirus epidemic, to get back on their feet.

The coronavirus year affected food purchasing and consumption behaviour

The coronavirus year increased cooking and baking at home. Households purchased more food from grocery stores. Sales of food and non-alcoholic beverages increased by 7%, while sales of certain food products grew by more than 15%. The increase in sales in euros can mainly be explained by the increase in volumes, as the increase in food prices was only 1.7%. Based on the preliminary data of the Balance Sheet for Food Commodities published by the Natural Resources Institute Finland (Luke), changes in the total consumption of food were moderate in 2020, as in previous years. Consumption is expected to become polarised, because demand is high for both basic low-cost foodstuffs and value-added products. More cooking experiences are sought especially from spicy food. Last year, sales of organic products increased by nearly 10%, but they still only account for 3% of total sales.

Trade deficit decreased

The value of Finland's food exports increased slightly in 2020. The value of food exports from Finland totalled EUR 1,739 million, up by 1.3% from the previous year. Correspondingly, the value of food imports to Finland was EUR 5,295 million, practically the 2019 level, with growth only less than 0.1%. Following the years of high growth at the beginning of the millennium, growth in imports started to slow in 2013 and has nearly halted after 2017.

Common Agricultural Policy to be reformed

The European Council's agreement on the EU's multiannual financial framework (MFF) in July 2020 propelled negotiations on the reform of the Common Agricultural Policy (CAP) a crucial step forward. However, the new policy will not be implemented in the EU states until 2023. In 2021–2022, the agricultural policy for the previous 2014–2020 period will be followed, while funding will be drawn from the CAP's budget allocation for 2021–27. Funding provided for agriculture in Finland will increase during the new funding period as a result of the July 2020 budget agreement. The national strategy plan for the agricultural policy is prepared during 2021. The European Commission is expected to handle and confirm the plan in 2022.

Winter wheat accounting for a growing part of the cultivation area

Cereal production is stable in Finland, exceeding domestic needs. Barley and oats continue to be clearly the largest crops measured by production volume. Their cultivation areas are not expected to change significantly during the upcoming harvest season. The proportion of winter wheat from the total wheat area is increasing. Rye is increasingly being produced on the basis of production agreements. Imports of oats are growing steeply, both in the form of grains and milled industry products.

Self-sufficiency in proteins to be increased

In recent years, the cultivation of peas has especially increased. Instead, the general interest in the cultivation of turnip rape and rapeseed, as well as broad beans, has decreased due to increased uncertainties concerning cultivation and lower yields. Although the total self-sufficiency rate in plant protein is high in Finland, the self-sufficiency rate in the complementary proteins required for livestock was lower than ever before in 2020. Improving self-sufficiency is a common goal in the crop and livestock sectors. Oil and protein crops also provide farmers with significant benefits through crop rotation and profitability.

Poultry and pork production increasing

In Finland, meat production is increasing, driven especially by the growing production of poultry meat and pork. Poultry production is sped up by domestic markets, and pork production by Chinese export markets. The significant positive increase in the pork trade balance is one of the most notable phenomena. The meat self-sufficiency rate increased significantly in 2020 as a result of growing production, and it is also expected to increase slightly this year, approaching 100%. However, the self-sufficiency rate shows considerable differences by type of meat. Total meat consumption per capita has evened out in recent years to 79–80 kilograms.

Milk exports increased; imports decreased

Demand for domestic dairy products was high in 2020. Supermarket sales of dairy products increased during every quarter, driven by the coronavirus restrictions, compared with corresponding periods in the previous year. However, demand for dairy products consumed in food services decreased due to the coronavirus restrictions. The milk trade balance increased as a result of increased exports and decreased imports. The average producer price increased slightly from the previous year, at a little more than 39 cents per litre. Total milk production increased by 1.4% to 2,293 million litres. The structural change continued to be rapid, with 7% of farms discontinuing

their production operations during the year. At the end of the year, milk was produced on 5,566 farms, 139 of which were organic. Valio Group's transition to contractual milk production at the beginning of 2021 will hold back the total volume of milk production. During the first quarter of 2021, the total production volume was 3% lower than in the previous year. According to the Finnish Food Authority, this was already reflected in the investment subsidy applications of dairy farms at the end of 2020, after which applications have mainly concerned renovations, with larger projects awaiting the granting of agreements in the future.

Proportion of free-range and organic eggs increasing

In 2020, the consumption of eggs reached a new record during the 2000s, at 12.5 kilograms per consumer. This increase can be explained by consumers spending more time and cooking more at home. Currently, the consumption and production of eggs are well balanced, as a result of which producer prices of eggs have been fairly stable. Producer prices of eggs produced in enriched battery cages and barn henhouses increased by a few per cent, while those of free-range and organic eggs decreased slightly. The number of farms and production in enriched battery cages continue to decrease, while the average farm size is increasing.

The horticultural sector overcame disruptions caused by the availability of workforce

From the horticultural sector's perspective, the 2020 season and the coronavirus epidemic revealed how much Finland's horticultural production depended on foreign seasonal workers. Market chains for horticultural products also had to make rapid changes, as they needed to find new market channels for production intended for restaurants and workplace cafeterias. Yet households purchased more vegetables at retail shops, preferring Finnish production. On the basis of horticultural statistics, there was no slump in total production volumes and areas, even though some farms experienced problems and crops remained unharvested.

Farms specialising, the number of farms decreasing, production remaining unchanged

In 2020, there were approximately 45,400 agricultural and horticultural enterprises in Finland, which was 1,400 fewer than in the previous year. However, the decrease in the number of farms had no significant impact on production volumes. The agricultural land of discontinued farms transferred to new farms that continued previous operations. In addition, unit sizes increased on livestock farms. Farms have also become specialised and increased their production. For example, meat production has increased during the 2000s, although the number of livestock farms has decreased. Similarly, milk production has only decreased by a few per cent, even though the number of dairy farms has nearly halved from the situation ten years ago, and the number of dairy cows has decreased by more than a quarter during the 2000s. The proportion of combination farms has decreased in all livestock production lines.

Increases in costs reduces the profitability of agriculture

Luke's profitability study indicates that enterprises do not, on average, produce added value for the capital invested in them. The total return on investment has been lower than interest on long-term state loans throughout the 2000s. In recent years, agricultural entrepreneurs have received a salary of EUR 7 per working hour, with net interest income from equity having been 1.6%. The decreased profitability also affects the loan servicing ability. During the 2000s, the relative indebtedness of farms has increased to nearly 90%. This is an alarming trend, as growing unit sizes take up more and more loan capital. At the same time, producer prices are only increasing slowly, while increased costs reduce profits and preconditions for profitability. Farm expenses are fairly high relative to income. Entrepreneurial income reacts strongly to changes in costs. If all costs increase by 1%, the average entrepreneurial income of farms will decrease by nearly 9%. Cereal and beef farms are the most sensitive primary production lines to changes in costs.

Intensively searching for replacements for peat

As the use of peat as energy is decreasing, there will be changes in the energy and bedding material use on farms and the impacts are reflected not only in agriculture but also in horticulture and particularly in greenhouse cultivation. However, a strong decrease in the share of peat in energy consumption will not probably weaken the operating conditions of agriculture and horticulture in Finland. The price of peat used as a growing medium in horticulture will increase similarly to the pressure to find replacement solutions for peat as a growing medium. Peat also has several good qualities as bedding and enrichment material for animals which are difficult to replace by other alternatives. Animal rearing is searching for possible replacements for peat particularly from the side streams of agriculture and forestry.

Significance of animal welfare increasing

Farm animal welfare is an important part of the sustainability of animal production alongside economic and environmental sustainability. Packing labels can effectively inform consumers about food quality and sustainability. Animal welfare has become more important in food marketing and it is an issue that interests both consumers and companies. Even though welfare is increasingly emphasised in the marketing of food of animal origin, there is no comprehensive farm animal welfare label in the Finnish market. It is important for the success of an animal welfare label that consumers are interested in and aware of the welfare label, actors along the value chain are engaged in quality work extensively enough and the industry is willing to be transparent.

Operating environment in agriculture and food sector



General economic development

Jari Viitanen and Jyrki Niemi

Finland's economy survived the first coronavirus year fairly well compared with many other countries. In 2020, the economy shrank by less than 3%, which was significantly less than was feared in the spring of 2020. Keeping the epidemic well under control in Finland had the highest impact on the positive performance. Economic recovery, both in Finland and globally, depends ultimately on the rapid progress of vaccinations and the successful suppression of the coronavirus pandemic. National recovery measures and the upcoming EU recovery package support economic growth. Recovery is especially expected to come from growing demand for services, as households' dammed-up desire to consume starts to burst after the epidemic. This would also help the foodservice industry, restaurants and the out-of-home sector, which were struck the hardest by the coronavirus epidemic, to get back on their feet.

The global economy has already started to recover

The coronavirus pandemic and the resulting uncertainties and massive restrictions reduced the global economy by 3.3% in 2020. This represented the largest drop since the final year of the Second World War, with gross domestic product decreasing in all key industrial countries apart from China from the previous year. Service-driven economies such as Italy, France and Spain were struck the hardest, with the restrictions imposed on travel, gatherings and restaurants having the highest impact. The

increase in industrial production that had already started last summer, has accelerated the recovery of the economy in Germany, the United States and Asia, among others. The decrease of nearly 10% in the GDP of the UK can be explained not only by the coronavirus pandemic, but also by Brexit at the end of January 2020, and the resulting increase in bureaucracy and other trade obstacles.

According to the April forecast of the International Monetary Fund (IMF), the global economy will grow by 6% this year, and world trade, which had already started its strong recovery at the end of last year, by as much as 8.4% compared to the previous year. Although the pandemic is expected to be fairly well under control this year, the speed of recovery will vary greatly due to different business structures, vaccination rates and the effectiveness of the monetary and financial policy in different countries. During the first part of 2021, vaccinations have proceeded more slowly than expected in Europe due to production and delivery difficulties, and restrictions may continue in many countries until the autumn. This will decelerate the rate of recovery in the entire eurozone, and economic growth is expected to shift to the late autumn and next year. The USA and the UK are among the countries in which the pandemic has been the most severe, but they will also recover quickly driven by the good progress of their national vaccination programmes. The spread of the pandemic has also been curbed effectively in China and other parts of Asia, with economies already starting to recover last year. In 2022, global economic growth is expected to continue, albeit more slowly than during the current year.

Financial and monetary policy continues to drive the recovery

To mitigate the economic impact of the pandemic, several countries and economic areas have customised large-scale financial support packages, and central banks have maintained an unusually light monetary policy. Last summer, the EU decided on a recovery fund of a total of EUR 750 billion, with EUR 390 billion allocated as direct support to the Member States, and EUR 360 million as loan-based support. However, the recovery measures will focus on the upcoming years, and their short-term impact is expected to be low in Europe. In the USA, recovery measures will have a more rapid impact. In addition to the 900-billion recovery programme approved in December 2020, Congress approved additional support of USD 1.9 trillion for allocation especially to households. In addition, the USA is planning an even larger support package for climate change mitigation and for improving the infrastructure.

Recovery is also expected to come from increased consumption, as savings by households increased significantly during the pandemic. As a result of the lifted restrictions on travel and gatherings, and the elimination of uncertainty, the pent-up desire to consume is expected to unwind, increasing demand for services and travel especially. This is also supported by the consumer trust indicators, which improved across the globe during the first part of the year.

The European Central Bank (ECB) announced that it would continue its pandemic emergency purchase programme (PEPP), started in the spring of 2020, until the end of March 2022 to protect liquidity in financial markets. It is likely that PEPP will also continue after this to some extent. Despite the slightly accelerated inflation rate, Europe's monetary policy will remain light, and interest rates will

continue to be low. The US Federal Reserve System (Fed) reduced its reference rate to zero last spring in conjunction with the start-up of its extensive securities purchase programme. Although the Fed has announced that it will keep reference rates at zero until full employment is achieved, and the average inflation rate is roughly 2%, monetary policy may already be tightened in stages during the end of the year if the economy recovers more quickly than expected.

As the global economy is recovering, prices of oil and raw materials are also rising. The global market prices of agricultural products also started to increase in the middle of 2020, and according to the Food Price Index of Food and Agriculture Organization (FAO) of the United Nations, were higher in March 2021 than in more than six years. Prices are also expected to increase this year. Combined with massive recovery packages and recovering economies, there have been signs of accelerating inflation rates, especially in the USA. During the first part of the year, this materialised in increased interest on long-term state loans in the USA and the decreased exchange rate of the euro relative to the US dollar. The faster economic growth in the USA and expectations of the quicker tightening of monetary policy than in Europe will continue to place pressure on lowering the rate of the euro during the end of the year.

Uncertainties remain

Currently, the most significant risks associated with the development of the global economy are delays in vaccinations or the mutation of the coronavirus resulting in the current vaccines becoming ineffective. This would require the development of new vaccines, the maintenance of different economic restrictions and a delay of up to 1-2

years in the recovery of the global economy. When the pandemic can finally be controlled, it will be replaced by more conventional uncertainties such as the trade policy disputes between the USA and China, which it is feared will again escalate. The ratification of the investment agreement negotiated between the EU and China in December 2020 has been suspended for the time being due to poorer relations. Uncertainties over Russian measures will remain. In addition, there are several global geopolitical tensions that may be reflected in global trade and transport if they escalate.

Since the beginning of this year, trade between the EU and the UK has been based on an agreement which was approved after last-minute negotiations in December 2020. Although trade in agricultural products and foodstuffs between the EU and the UK was saved from third-party quotas and customs duties, bureaucracy has increased following Brexit. For example, various customs clearances and VAT payments, as well as export certificates and border controls resulting from animal and plant health requirements, are creating more work and costs for companies. Later, Brexit may also bring changes to standards as the UK starts to comply with its own regulations.

Finland's economic decline was gentler than expected

Based on preliminary data, Finland's economy decreased by 2.8% in 2020. This was less than expected after the economy already started its slow recovery last autumn. Recovery was supported by the Government's massive support packages that helped to keep the increase in the number of the unemployed fairly moderate in the service and transport sectors, which were otherwise struck hardest by the imposed restrictions. New orders

also helped industry to recover quickly, and the increase in goods exports was driven by growing demand in global trade.

Economic forecasts predict an increase of 2.5-3% for this year, supported especially by exports and private consumption. According to the most recent forecasts, the majority of the restrictions imposed due to the pandemic can already be lifted in Finland during the summer, which will especially increase demand for services and travel. In addition, increased savings during the pandemic are expected to accelerate private consumption, supported by the slowly improving employment rate and growing purchasing power. The quickly increased indebtedness in the national economy is on the flip side of the positive economic development, and it will probably mean an expanded tax base, higher taxes and cost cuts in the public economy in the near future.

The impact of the coronavirus epidemic on the food sector has been twofold. The foodservice sector, including restaurants, lunch providers and cafeterias, have been in distress during the coronavirus epidemic of more than a year. The Government's restrictions struck this sector unusually hard. Driven by the significant increase in grocery trade, food retail is among the winners of the coronavirus situation. Agriculture and the food sector also came out of the coronavirus slump with relatively dry feet compared with many other sectors. Furthermore, food sector companies have faced few problems in exports, which have continued to grow. The coronavirus pandemic strengthened the valuation of domestic products and services even further, as well as general interest in the security of supply regarding the food system.

Food consumption and consumer prices

Terhi Latvala and Erja Mikkola

The coronavirus year increased cooking and baking at home. More cooking experiences were sought, especially from spicy food. Last year, sales of organic products increased by nearly 10% (to EUR 409 million), even though they only accounted for 3% of total sales. The coronavirus pandemic has reduced the financial situation of households. As a result, food consumption is expected to become polarised, as demand is high for both basic low-cost foodstuffs and value-added products. The coronavirus epidemic is especially testing the food services sector. In grocery trade, sales of food and non-alcoholic beverages increased by 7%, while sales of certain food products grew by more than 15%. Based on the preliminary data of Luke's Balance Sheet for Food Commodities, changes in the consumption of food were moderate, as in previous years.

Total consumption of meat decreasing

According to Luke's Balance Sheet for Food Commodities, the total consumption of meat has decreased by more than 2% during the last five years. During 2016-2020, consumption has decreased by nearly two kilograms per capita. According to preliminary calculations, the total consumption of meat is expected to have been roughly 79.4 kilograms per capita in 2020 when game and offal are also taken into account. In 2016-2020, the consumption of beef decreased by 3%, and that of pork by 14%, while

poultry meat consumption continued to grow. Its consumption has increased by approximately 17% during the last five years. According to preliminary calculations, the total consumption of poultry meat was roughly 27.5 kilograms per capita in 2020, up by one kilogram from the previous year. Last year, the consumption of pork was slightly lower than in the year before, amounting to slightly less than 30 kilograms per capita. According to the Finnish Grocery Trade Association (PTY), purchases of beef by households increased most out of all meat products during the coronavirus year. According to the preliminary calculations of the Balance Sheet for Food Commodities, the consumption of beef remained nearly at the previous year's level in 2020, at roughly 18.6 kilograms per capita. The consumption of sheep meat decreased from the previous year. While consumption totalled roughly 0.5 kilograms per capita, this was not the lowest volume ever recorded.

The Finnish Grocery Trade Association publishes statistics on the development of the retail sale of foodstuffs by product group. Quarterly data is more up to date than other statistics.

The meat consumption figures above have been calculated including bones, i.e. they are reported as carcass meat. Typically, carcass meat contains 80% of boneless meat. In addition, the cooking loss of meat ranges from 10% to 30%. The weight of cooked meat is around 50% of the weight of carcass meat.

According to the European Commission's meat balance sheet, meat consumption in the EU per capita decreased during the last two years, while

it is expected to increase by roughly 0.5 kilograms per capita in 2021. According to the balance sheet, the consumption of pork will increase, while the consumption of other types of meat will remain close to the previous year's figures. Based on the European Commission's consumption figures, Finland was in tenth place in the consumption of beef per capita among the EU27 countries in 2019. Finland was 25th in terms of pork consumption and 18th in the consumption of poultry meat among the EU27 countries. The European Commission's consumption figures have been calculated based on production and foreign trade volumes.

Consumption of cereals stable, that of liquid milk decreasing

In recent years, the total consumption of cereals has been fairly stable. According to the Balance Sheet for Food Commodities, consumption has been slightly less than or slightly more than 80 kilograms per capita. According to preliminary calculations, the consumption of cereals was roughly 82 kilograms per capita in 2020, showing an increase of 0.5% from the previous year. The consumption of wheat and rice increased slightly and that of oats decreased, while the consumption of other cereals remained relatively unchanged. The peak in the consumption of oats was in 2019, roughly 9.5 kilograms per capita. Last year, their consumption was approximately 8.5 kilograms per capita, still significantly higher than before 2019. In 2020, the consumption of wheat was 45, rye 15.4, barley 1.8 and rice 7 kilograms per capita.

The consumption of liquid dairy products has dropped by roughly 13% during the last five years. According to preliminary calculations, the consumption of liquid dairy products was roughly 144 kilo-

grams per capita last year. In 2020, an average of 98 litres (approximately 101 kilograms) of liquid milk per capita was consumed. The consumption of liquid milk decreased by roughly 3.5% from the previous year. The proportions of different types of milk of the total consumption remained nearly unchanged, with low-fat milk at 58%, skimmed milk at approximately 29% and whole milk at just over 10%. Fresh products include puddings and flavoured quarks. Their consumption has increased in previous years. According to the European Commission's dairy products balance sheet, the consumption of liquid dairy products per capita was at its lowest in the EU in 2019, while preliminary figures for 2020 and 2021 indicate that consumption will increase slightly.

Consumption of vegetables and eggs increasing

The total consumption of fish has been roughly 15 kilograms per capita in recent years. According to the Balance Sheet for Food Commodities, no major changes have taken place in several years. Consumption in 2020 has yet to be calculated. According to calculations, the consumption of fresh vegetables was 66 kilograms per capita in 2019, but this volume also includes any waste and is only indicative. Based on sales statistics, purchases of vegetables by households showed a euro-denominated increase of 11.5% in 2020 compared with the previous year. The consumption of fresh fruit was approximately 59 kilograms per capita in 2019. The consumption of citrus fruits increased by half a kilogram from the previous year to 14.3 kilograms. For several years, the consumption of eggs has been a little less than 12 kilograms. According to preliminary calculations, their consumption increased slightly in 2020 to 12.4 kilograms per capita.

The calculation does not indicate the exact amount of food consumption. The figures in the Balance Sheet for Food Commodities represent the amount available for consumption rather than actual

consumption, because volumes of storage losses and other waste are not available for all phases in the food chain.

Consumption of certain foodstuffs per capita in 2016–2020, kg.

Year	Fresh vegetables ¹	Cereals total	Sugar	Meat total ²	Beef	Pork	Poultry	Eggs
2020*	64.1	80.7	32.1	79.2	18.6	29.7	27.5	12.4
2019	66.3	81.4	27.9	79.6	18.8	30.8	26.4	11.9
2018	63.5	79.1	29.2	81.3	19.3	32.5	25.6	11.8
2017	63.8	80.3	30.6	81	19.4	33.4	24.9	11.9
2016	63.7	79.7	29.1	81.1	19.2	34.7	23.5	11.9

¹Including any wastage. ²Including bones, i.e. carcass meat, including edible offal. * Preliminary data. Source: Natural Resources Institute Finland (Luke), Balance Sheet for Food Commodities.

Megatrends and new phenomena in food consumption

Trends in food consumption partly follow general consumption trends. General megatrends in consumption include operational resilience, the ability to adapt to and recover from crises, sustainable development, digitalisation and increased staying at home. Well-considered consumption is a phenomenon in food purchases, especially if a household's financial situation has deteriorated. The food trends identified by domestic retail stores emphasise the rise of plant-based proteins, particularly chickpeas, tofu and hemp, as well as condiments and ethnic foods. In addition, ease and quickness continue to be highlighted in home cooking. PTY's statistics support the aforementioned trends, as euro-denominated sales of condiments increased by 16%, and those of pickled and processed vegetables by 14% in 2020. As prices

remained nearly unchanged at the same time, this increase came from growing volumes.

Sustainable development and climate smartness will increase in significance in food choices if consumer information is available when making choices. As fish and plant-based proteins (such as broad bean, pea and oat proteins), in particular, combine the qualities of domestic origin, health and sustainability, their consumption can be expected to increase in the near future.

These trends are also supported by the increase in total sales of organic products by as much as 9.7% from the previous year (to EUR 409 million). Organic products accounted for the largest part of the value of sales in the product group of baby food (24%), followed by eggs (21%). Organic flours, sweeteners and spices showed the most growth, as the

pandemic increased home cooking and baking, and people are looking for spicy food experiences. In addition, sales of organic vegetables, coffee and tea increased significantly. However, organic products only account for less than 3% of total sales and to increase this proportion, the product range should be expanded to breads, cold cuts and sausages.

The digital leap forward has especially materialised in how food is bought, with a little more than a quarter of Finns (26%) buying food online. In October 2020, Finnish people were inspired to search for information about various cooking methods and accessories. Searches were targeted at air fryers, meat grinders, slow cookers and egg cookers. Air fryers can be used to prepare vegetables, fish and meat products, while meat grinders and slow cookers are indicators of the use of slowly cooked meat products.

In PTY's data for the last quarter, these trends are supported especially by sales of beef, which increased by up to 16% from the same quarter in the previous year. Beef prices only increased by 1% from the previous year. This cannot be regarded as a direct increase in consumption, as coronavirus restrictions transferred meat purchases to home kitchens from restaurants. According to Luke's calculations for the Balance Sheet for Food Commodities, beef consumption remained close to the previous year's level in 2020.

In European food trends, the ketogenic diet is expected to emerge strongly in retail trade. In Finland, shops have already made room on their shelves for ketogenic products. The ketogenic diet is a new version of the meat-containing Atkins

diet, with high-quality fats (oils, avocados, nuts and almonds) playing a significant role alongside meat- and plant-based proteins, whereas the role of carbohydrates is much smaller than in current recommendations. In PTY's data, the consumption of plant-based oils showed a significant increase of nearly 17%.

Retail sales increased; wholesale foodservice slowed down

In 2020, retail sales of foodstuffs and non-alcoholic beverages increased by 7.3% (turnover EUR 14.2 billion). The increase in sales in euros can mainly be explained by the increase in sales volumes, as

the increase in food prices was only 1.7%. Growth in food sales was partly driven by the coronavirus restrictions, which increased household food consumption after March 2020, as remote working increased and schools shifted to remote teaching. During the second quarter of 2020, the impact of the coronavirus pandemic was especially reflected in increased sales of canned fish and shellfish products, and frozen fruits and berries. Of beverages, sales of grape wine and non-alcoholic and low-alcoholic beers increased significantly. There was also a significant increase of more than 15% for rice, flour, pasta and other cereal products, and pickled vegetables.

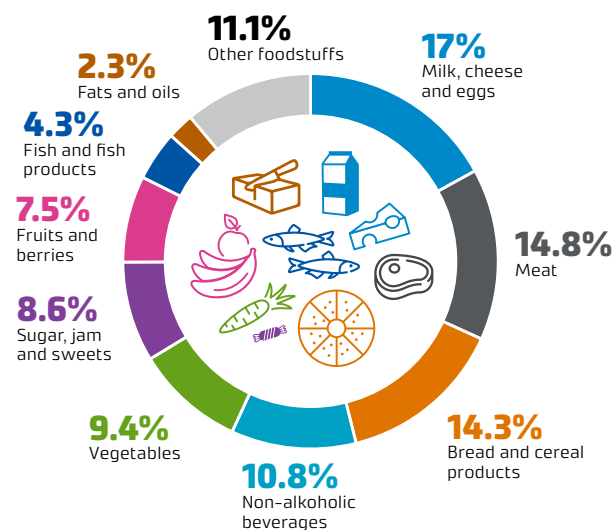
Annual changes in foodstuffs and non-alcoholic beverages, 01/2016–03/2021.

	2016	2017	2018	2019	2020	2021
January	-2.3	-2.4	1.5	2.1	1.8	0.4
February	-1.7	-0.5	1.3	2.0	1.3	-0.2
March	-1.6	-1.7	2.5	0.9	1.8	0.5
April	-0.9	-1.7	1.7	2.0	1.0	
May	-1.7	-1.0	2.4	0.5	2.4	
June	-1.6	-1.0	2.4	1.1	2.4	
July	0.0	-1.5	2.0	0.7	2.9	
August	-0.6	-0.1	1.8	1.7	0.9	
September	-0.7	-0.4	2.8	0.3	2.0	
October	-1.3	-0.3	2.6	0.4	1.7	
November	-0.8	-0.3	1.1	1.1	1.5	
December	-0.6	-0.1	1.1	1.8	0.2	
Yearly average (%)	-1.2	-0.9	1.9	1.2	1.7	
Consumer price index	98.9	97.9	99.8	101.0	102.7	

Source: Statistics Finland.

According to the domestic consumer price index, food prices increased continuously until February 2021. When examining 2020 as a whole, euro-denominated sales increased most for frozen fruits and berries (22%), grape wines (19%), pasta products (17%), potatoes (16%), fish and shellfish products (16%), and beef (15%). During 2020, the most significant price increases concerned fruit and vegetable juices (7.0%), sugar (6.9%) and potatoes (6.5%). Such price increases are often based on factors related to lower production volumes. Consumption shocks caused by the coronavirus pandemic also reduced prices. The price of fresh and frozen fish fell by as much as 11%. More detailed information about the fish market is available in Luke's Fish Market Review.

Euro-denominated retail sales of foodstuffs and non-alcoholic beverages per product group in 2020, %



Source: PTY.

Annual change in food prices per product group in 2016–2020, %

	2016	2017	2018	2019	2020
Food and non-alcoholic beverages	-1.2	-0.9	1.9	1.2	1.7
Grain products and bread	-0.9	-0.1	0.4	1.9	0.7
Meat	-3.4	-1.2	1.6	4.4	2.0
Fish and shellfish	8.0	7.3	0.3	-0.1	-1.8
Milk products, cheese and eggs	-2.6	-0.6	2.1	1.7	0.0
Fats and oils	-1.9	1.8	5.2	3.1	-0.7
Fruits and berries	0.0	1.3	3.8	-2.4	4.4
Vegetables	1.0	-2.8	5.7	-1.8	1.6
Sugar, jams, honey, chocolate and candies	0.1	-10.5	1.3	0.6	1.9
Prepared food, other	-1.1	-1.3	-0.2	0.0	0.0
Non-alcoholic beverages	-2.2	2.4	-0.2	1.3	5.3

Source: Statistics Finland.

The coronavirus epidemic is especially testing the food service providers. In addition to restrictions on restaurant activities, extended remote working practices reduce the consumption of lunch by workers. In Finland, more than 16,000 professional kitchens prepare roughly 749 million meals a year, and the majority of these (67%) are private entre-

preneurs or limited liability companies. The most significant impact focus on the Uusimaa region, where the number of meals prepared per year has been more than 212 million. Wholesale foodservice will continue to decrease due to lockdowns in March 2021, after which recovery is expected as restrictions are lifted.

In economics textbooks, potatoes are often used as an example of an inferior, or diminishing, commodity, meaning that, when the level of income increases, their consumption decreases. During the coronavirus pandemic, sales of potatoes at retail shops increased significantly more than sales of other products. New cooking methods such as air frying enable the preparation of healthy, low-fat potato-based meals at home. Yet this trend also signifies a return to familiar and traditional meals.

Small Finland as part of global food security

Food security can be examined at different levels: globally, nationally, regionally or the level of individual households. What is significant, in addition to sufficiency, is the price at which food with a sufficient nutritional quality is available. The most recent FAO food security report points out that the price of healthy food has increased. What is making this situation even more difficult is that global food prices (Food Price Index) increased to their highest level in six years in March 2021.

Disruptions in the distribution of food caused by the coronavirus pandemic and decreased income in households have affected the procurement of healthy and nutritious food. Although the goal is to eradicate hunger by 2030, the number of people suffering from malnutrition globally has started to increase slightly, and the FAO estimates that there are more than 690 million malnourished people (previous estimate: 860 million), comprising roughly 8.9% of the world's population (previous estimate: 11%). Compared with the previous year, China's figures have become more accurate, and a significant downward adjustment has been made. According to preliminary estimates, the coronavirus pandemic has increased the number of malnourished people by approximately 83-132 million.

When examining food security at the household level, 11% of respondents to Finsote's survey in Finland feared food would run out before they received the money to buy more. In 2018, it was estimated that 856,000 Finnish people were at risk of poverty or social exclusion, i.e. nearly 16% of the entire population, and the coronavirus pandemic has increased this risk further. According to a survey

conducted during the coronavirus pandemic, a fifth of all 20-74-year-olds feel that their financial situation has deteriorated. Currently, product ranges in shops are affected by polarised consumption, as the number of unemployed and laid-off people has increased.

In normal circumstances, Finland's food security is sufficient at a national level when the ratio between production and consumption using Luke's calculations for the Balance Sheet for Food Commodities is examined. Globally, Finland is ranked first out of 113 countries in food security (Global Food Security Index). Nevertheless, the domestic food system should be developed to increase its resilience: in particular, a more systematic storage of key production inputs as part of the security of supply, combined with the development of Finland's preparedness for crises. Although Finland's security of supply is high in normal circumstances, we are still dependent on imported food.

To increase the global availability of food and to safeguard our security of supply, Finland could replace the most significant imported crops (rice,

soy and turnip rape) with domestic cereals and legumes (barley and oats, peas and beans, turnip rape and rapeseed). As a result, Finland's field crop production should be diversified even further, which would enrich crop rotation, reduce the imports of global virtual water, and outsource the environmental impact of food production to other countries. At the same time as the consumption of red meat should be decreased due to health and environmental impact, Finland, as a country with an abundant supply of water, would have the potential to increase the exports of virtual water through the exports of beef and pork, for example, and therefore reduce the shortage of water elsewhere.

Virtual water, or the hidden flow of water, means the total water volume consumed during product growing, production and processing.

Statistics

Luke, **Balance Sheet for Food Commodities EU balance sheets**
PTY, **Sales by product group**



Foreign trade in foodstuffs

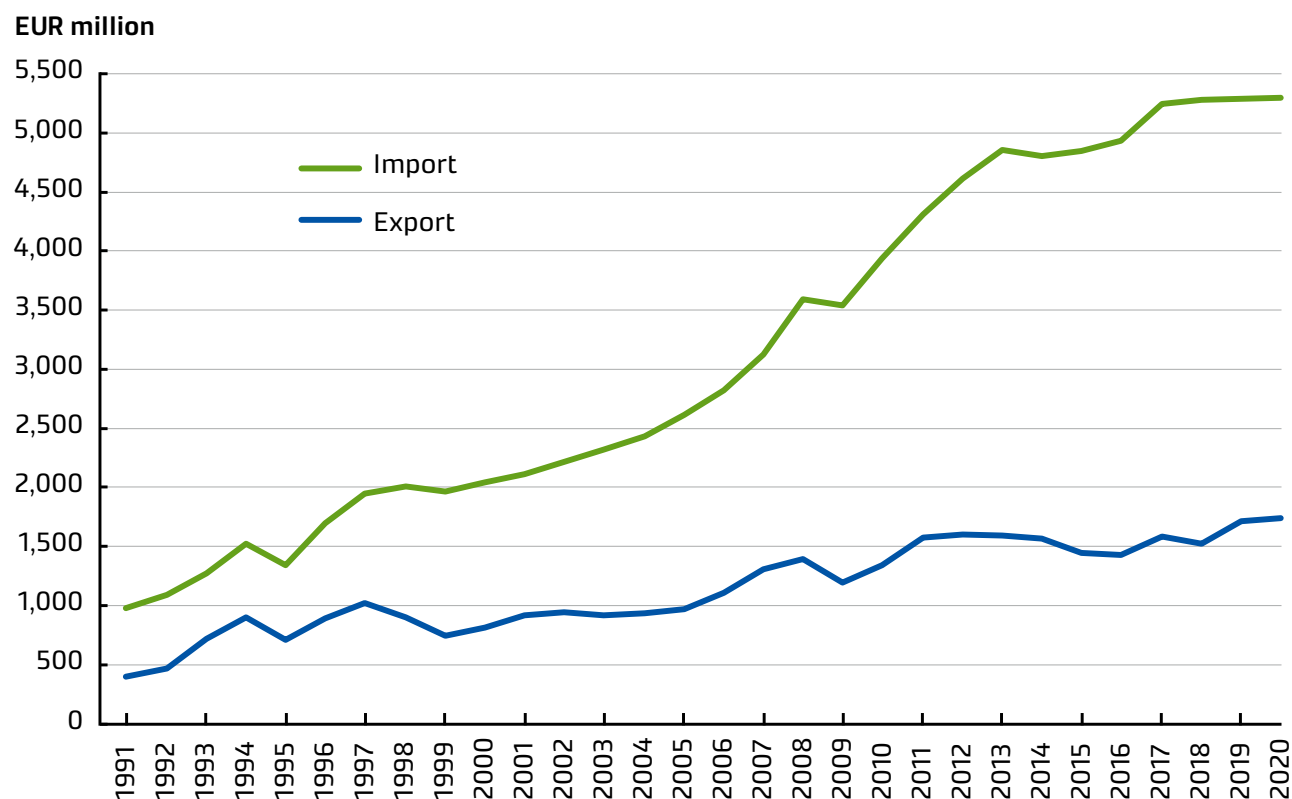
Csaba Jansik and Irene Rosokivi

The value of Finland's food exports increased much more slowly in 2020 than in the previous year. The value of food exports from Finland totalled EUR 1,739 million, up by 1.3% from 2019. Of all export countries, China especially showed rapid growth, driven by pork and milk powder. Correspondingly, the value of food imports to Finland was EUR 5,295 million, being at the 2019 level, with growth only less than 0.1%. Following the years of high growth at the beginning of the millennium, growth in imports has decelerated clearly since 2013, remaining close to the 2017 level in recent years.

Trade deficit decreased

As a joint impact of the development of imports and exports, the food trade deficit decreased for the second year in succession. In 2020, it decreased by EUR 34 million from EUR 3,567 million to EUR 3,529 million. Traditionally, the trade deficit has mainly been due to the large import volumes of fruit, vegetables, raw coffee, alcoholic beverages, and tobacco. Other important products imported into Finland include cheeses and cereal products. In recent years, Finnish food production has faced competition in product groups that used to be dominated by domestic production such as meat, dairy and fish.

Imports and exports of agricultural products and foodstuffs in 1991–2020, EUR million (CN01-24).



Source: Finnish Customs, ULJAS database.

In 2020 moderate imports and the improvement in the trade balance were affected by the coronavirus epidemic, as a result of which the consumption of food decreased in the foodservice sector and was

channelled to households through retail sales. For example, this trend can be seen in the increased domestic content in the consumption of meat.

Imports and exports nearly unchanged

Agri-food products are mostly imported into Finland from other EU states. The percentage of imports from EU states increased from 70% in the 2010s by a few percentage points, and has remained at 75-76% in recent years. As a result of the UK's withdrawal from the EU at the end of January 2020, the percentage of the EU states from imports decreased by 1.5 percentage points from 76% in the previous year to 74.5%.

The table below shows the value of imports according to the Combined Nomenclature (CN01-24). It includes individual product groups that are not foodstuffs, but these are usually relatively small batches. Different plant oils and their fractions imported for the production of biodiesel are an exception. They are imported from the Far East via the Netherlands. This transiting needs to be taken into account in figures concerning the Netherlands. The value of plant oil imports was EUR 193 million

in 2018 and EUR 160 million in 2019. Last year, it increased considerably to EUR 254 million. Without it, the value of imports from the Netherlands was EUR 552 million. At this value, the Netherlands would have been only the third largest country of origin for imports in 2020. Using corrected figures, Germany has been the largest import country for several years.

The largest countries of origin for food imports into Finland

	2019, EUR million	2019, %	2020, EUR million	2020, %	Annual change in value (%)
The Netherlands	721	13.7	806	15.2	11.8
Germany	675	12.8	642	12.1	-4.8
Sweden	580	11.0	555	10.5	-4.4
Spain	339	6.4	335	6.3	-1.3
Norway	324	6.1	323	6.1	-0.2
Denmark	294	5.5	292	5.5	-0.6
Italy	208	3.9	223	4.2	7.6
Poland	198	3.7	187	3.5	-5.5
France	187	3.5	184	3.5	-1.7
Estonia	169	3.2	175	3.3	3.6
Belgium	171	3.2	161	3.0	-5.5
United Kingdom	116	2.2	138	2.6	19.1
Brazil	142	2.7	108	2.0	-24.0
Lithuania	100	1.9	106	2.0	6.5
USA	71	1.3	78	1.5	9.7
Other	997	18.8	981	18.5	-1.6
Total	5,290	100	5,295	100	0.1

Source: Finnish Customs, ULJAS database.

The largest destination countries for food exports from Finland

	2019, EUR million	2019, %	2020, EUR million	2020, %	Annual change in value (%)
Sweden	366	21.3	354	20.4	-3.3
Estonia	151	8.8	147	8.4	-2.9
China	88	5.1	145	8.4	65.2
Germany	120	7.0	121	7.0	1.3
Russia	104	6.0	99	5.7	-4.5
The Netherlands	87	5.1	88	5.0	0.6
France	86	5.0	83	4.8	-3.2
Denmark	87	5.1	83	4.8	-4.2
Poland	76	4.4	61	3.5	-20.3
Norway	62	3.6	55	3.2	-11.5
Lithuania	44	2.6	41	2.4	-5.6
Belgium	36	2.1	35	2.0	-3.5
United Kingdom	43	2.5	33	1.9	-23.9
USA	33	1.9	31	1.8	-6.6
Spain	20	1.2	28	1.6	42.0
Other	333	19.4	335	19.3	0.7
Total	1,716	100	1,739	100	1.3

Source: Finnish Customs, ULJAS database.

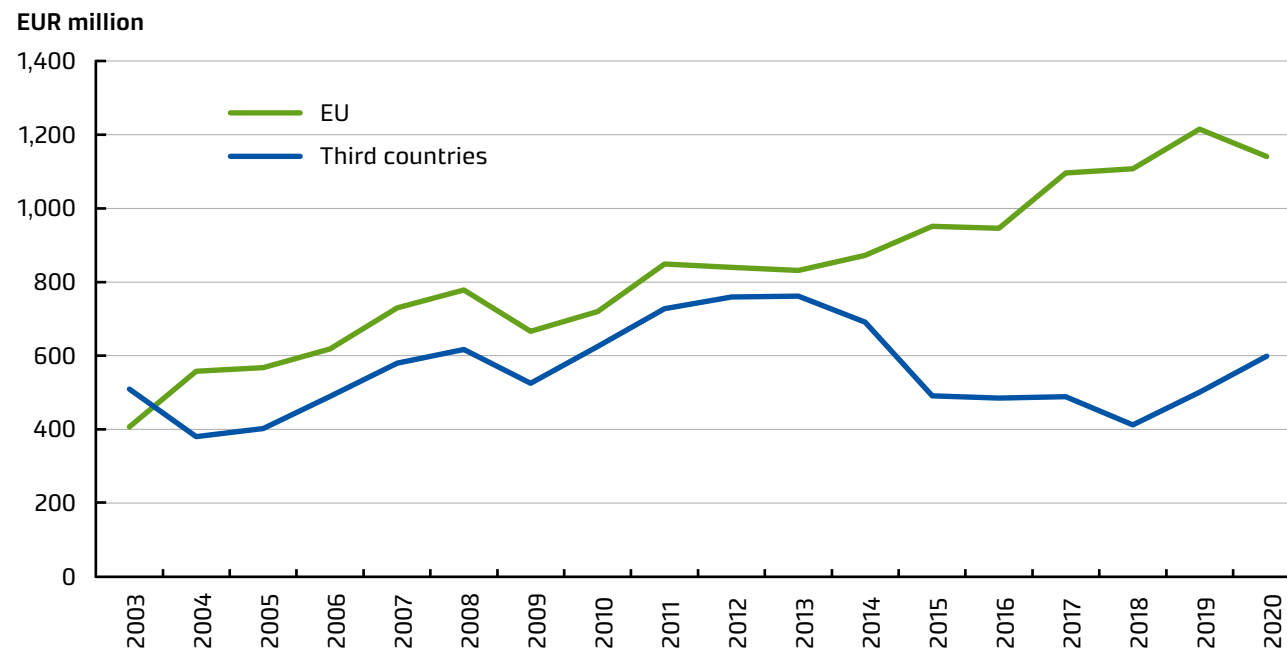
The geographical distribution of food exports has varied considerably more than the structure of food imports. Until the beginning of the 2010s, Russia was the largest destination country for exports. As a result of the import ban imposed by Russia in 2014, Finland's exports to Russia have fallen dramatically. In the peak year of 2013, the value of food exports to Russia totalled EUR 440 million. In 2016, the value of exports to Russia was only EUR 126 million, and in 2020 only EUR 99 million. The proportion of Russia in Finnish food exports has therefore fallen from the peak levels of 26-28% to less than 6%.

More than half of Finnish food exports have traditionally gone to neighbouring countries, but their total proportion fell dramatically following Russia's import ban. In 2020, neighbouring countries accounted for less than 38% of total food exports.

Exports of foodstuffs in 2020 remained at the previous year's level or decreased slightly in almost all target markets. This trend was balanced by the considerable increase in the markets of two destination countries. Exports to China increased by 65%, driven by pork and milk powder, and exports to Spain increased by 40%, driven by fish and cereals.

As a result of increased exports to China and Brexit, the EU's position in the structure of our food exports has decreased, while that of third countries has correspondingly risen. In 2020, the value of exports to the EU fell significantly for the first time in several years.

The value of Finland's food exports to the EU and to third countries



Source: Finnish Customs, ULJAS database.

Foreign trade by product group

The main items of food imports to Finland are beverages (10.1%), fruit (9.5%), bakery products (8.2%), miscellaneous edible preparations (7.7%), fish (7.0%), coffee, tea, and spices (4.9%), cheese (5%), and vegetables (5.1%).

Dairy products continue to be the most significant single product group in food exports. However, exports of dairy products have dropped from EUR 521 million in the peak year of 2013. They were at their lowest, at EUR 346 million, in 2016. Exports have since increased gradually, reaching EUR 429 million in 2020. In 2020, the sector made up less

than a quarter of total food exports, while dairy products accounted for a third of all food exports just a few years ago.

The dairy industry continues to be the only industry in the Finnish food sector that has maintained a positive trade balance throughout Finland's EU membership. Nevertheless, the trade balance was barely positive in 2016 following a dive to under EUR 16 million from EUR 160 million in 2013. In 2020, the positive balance of dairy products increased from EUR 67 million in the previous year to EUR 100 million. At the same time, the product structure of dairy exports has developed less favourably. For

example, the dramatic drop in cheese exports has been replaced by exports of butter and milk powder. Between 2013 and 2020, the percentage of cheese of the exports of dairy products dropped from 32% to 13%. During the same period, the percentage of butter and milk powder increased from 32% to 59%.

In 2020, the value of exports increased moderately by 1.3% from the previous year. Of the most significant export items, exports of meat (14%), fish (8%), cereals (16%) and milled products (8%) increased more than on average. In addition, the exports of dairy products increased slightly more than food exports as a whole by 3.8%.

Pork exports increased

Of the groups mentioned above, the largest increase came from pork, whose export value was EUR 75 million in 2019 and EUR 99 million in 2020. This shows an increase of 32% which came from Chinese markets in practice. Exports to China increased from EUR 19 million to EUR 46 million. Exports to South Korea increased slightly from EUR 13.7 million to EUR 15.4 million. Of other destination countries, the largest in 2020 were New Zealand (EUR 13 million), Poland (EUR 7 million) and Sweden (EUR 5 million).

Alongside the increase in exports, the value of pork imports decreased from EUR 62 million to EUR 47 million. This mainly resulted from the decrease in imports from Germany from EUR 50 million to EUR 38 million. It can be explained by the decreased meat demand of the Finnish foodservice sector and institutional kitchens.

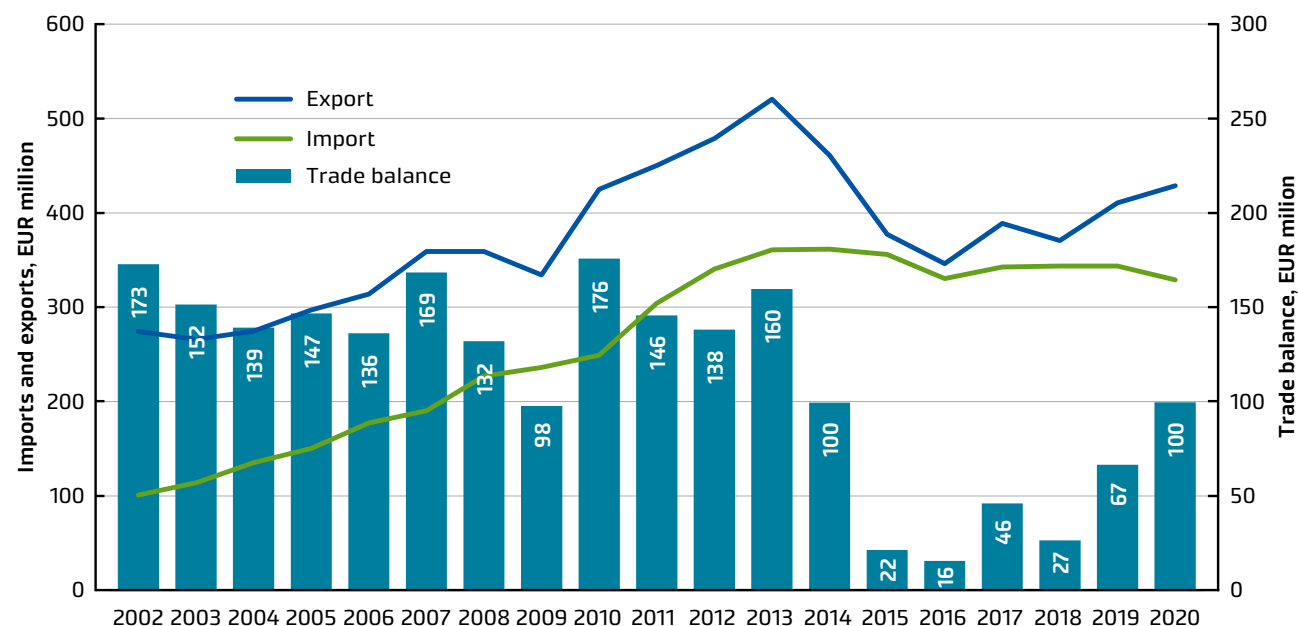
Alongside pork and poultry meat, alcoholic beverages make up another product group whose foreign trade was affected by the coronavirus epidemic and restrictions on the HoReCa sector. Due to the coronavirus, imports of strong alcoholic beverages decreased by 15% from EUR 91 million in the previous year to EUR 77 million in 2020. Restrictions imposed due to the pandemic had an even more negative impact on exports of strong alcoholic beverages

from Finland. Exports of alcoholic beverages fell by 27% from EUR 116 million to EUR 85 million.

Exports of fresh or frozen fish account for nearly 84% of total fish exports. However, the increase of more than EUR 12 million in fish exports, mostly from exports of fish fillets, was a positive sign last year. This signifies an increase in the exports of products of a higher processing rate.

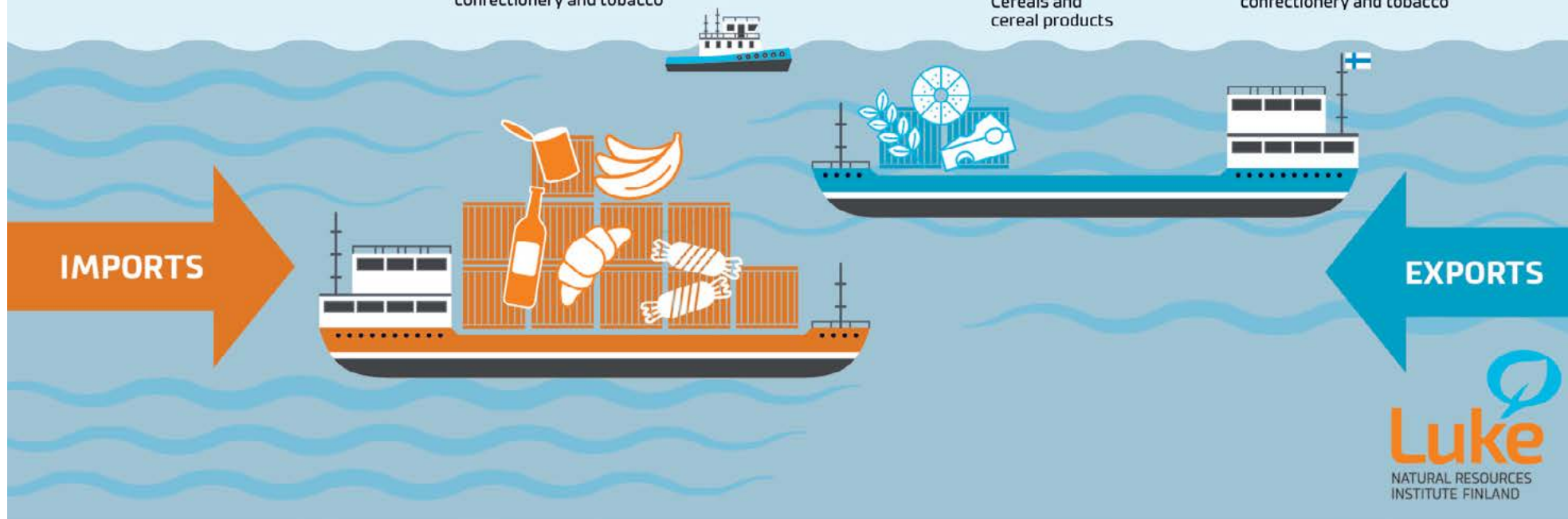
Statistics: Finnish Customs, [Uljas - Foreign Trade Statistics](#)

Trade balance of dairy products in Finland 2002–2020



Source: Finnish Customs, ULJAS database.

Foreign trade in agri-food products 2020



Agricultural policy

Jyrki Niemi and Olli Niskanen

The European Council's agreement on the EU's multiannual financial framework (MFF) in July 2020 pushed negotiations over the reform of the Common Agricultural Policy (CAP) a crucial step forward. However, the new policy will not be implemented in the EU until 2023. In 2021–2022, the agricultural policy for the previous 2014–2020 period will be followed, while funding will be drawn from the CAP's budget allocation for 2021–2027. Funding provided for agriculture in Finland will increase during the new funding period as a result of the July 2020 budget agreement. The national strategy plan for the agricultural policy will be prepared during 2021. The European Commission is expected to handle and confirm the plan in 2022.

A solution for the post-2020 agricultural policy has already been sought in the EU for three years. The Commission published its legislative proposal for the CAP reform in June 2018. However, the decision on the final content and details of the reform was delayed, because a political consensus for the EU's budget for 2021–2027 was not reached until July 2020.

The implementation of the new CAP therefore did not start in the EU states at the beginning of 2021 as was originally planned. Instead, a transitional regulation was introduced for the years 2021 and 2022. During these years, most of the CAP rules that were in place during the 2014–20 period will be followed, while the funding will be drawn from the CAP's budget allocation for 2021–27. This means

that the implementation of the new CAP will start in the EU states in 2023.

In the EU's budget negotiations, safeguarding funding for agriculture was one of Finland's political priorities. A successful result in agricultural funding is directly linked to Finland's net contribution position, because agriculture accounts for more than 60% of total EU expenditure in Finland. In addition, subsidies play a much more important role in the generation of agricultural returns than in other EU states on average. In recent years, total subsidies have accounted for roughly 30% of total returns on agriculture in Finland.

According to the budget agreement drafted in July 2020, funding received by Finland's agriculture will increase by 2.5% during the 2021–2027 period from the 2014–2020 period, calculated at nominal prices. If recovery funding is also included in the comparison between funding periods, funding received by Finland's agriculture will increase by 6.0% in total. Changes in funding will be at different sizes between pillars I and II of the CAP. Direct subsidies of pillar I will decrease by 0.8%, while agricultural development funds of pillar II will increase by 7.6% with regard to the MFF.

Agriculture ministers from the EU member states reached an agreement on the main guidelines of the CAP reform in October 2020. At that time, MEPs also reached a consensus on the reform. Subsequently, the European Parliament, Commission and Council started close negotiations concerning the final details of the legislative package. Political understanding on the content of the CAP until 2027

was reached in June 2021, when the European Commission, Council and Parliament were finally able to reconcile their positions after three years of negotiations.

The basic structure of the CAP will remain nearly unchanged during the 2021–2027 funding period. However, the Commission's proposed reform will raise the level of ambition in terms of the climate and environment. The Commission has further emphasised the even more ambitious climate and environmental goals through the European Green Deal and the From Farm to Fork strategy published in 2019–2020. As the most significant policy instrument, the Commission proposes new "green architecture" for the CAP, whereby the Member States will have elements consisting of mandatory and voluntary environmental measures.

As a new element, the CAP will include national strategy plans to describe how the Member States can respond to the Commission's goals. In December 2020, the Commission provided the Member States with recommendations for the preparation of national plans. The purpose of the recommendations is to ensure that strategy plans related to the CAP are in line with the European Green Deal, the From Farm to Fork strategy, and the EU's biodiversity strategy.

The national CAP plan has been prepared in Finland by working groups in cooperation between central government and the sector. The plan was completed and submitted for comments in June 2021. The European Commission is expected to handle and confirm the national plan in 2022.

EU agricultural support in Finland

In 2021, according to the government budget proposal, a total of EUR 1,762 million, the same as in 2020, will be paid in subsidies to farmers in Finland. CAP support totals EUR 1,443 million. The support consists of direct CAP income payments for arable crop and livestock farmers (EUR 526 million), natural constraint payments for less-favoured agricultural areas (EUR 552 million) and agri-environment payments (EUR 238 million). In addition, compensation for organic production and animal welfare is paid (EUR 127 million).

CAP support is either fully funded by the EU or co-funded by the EU and Finland. Direct CAP income payments are fully financed from the EU's budget. The EU pays just under 20% of the natural constraint payments and a little over 40% of the agri-environment payments. The remainder is nationally funded.

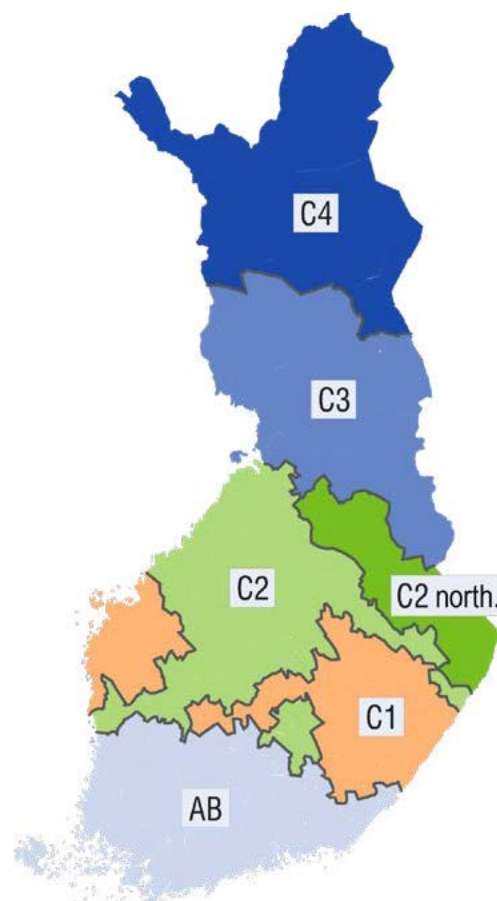
In 2021, a total of EUR 773 million, or 44% of total farmer subsidies, will be paid from the EU budget. In addition to the fully or partly EU-funded support, a total of EUR 319 million of nationally funded aid will be paid to farms in 2021. The national aid consists mainly of Nordic aid (EUR 296 million) and national aid for farmers in Southern Finland, as well as other forms of aid (EUR 23 million).

To better target the support, Finland is divided into two main support areas (AB and C support areas). Support paid throughout the country includes CAP income, agri-environment and natural constraint payments. Nordic aid is paid in support area C, which is divided into five support regions for the differentiation of the aid. Support regions C3 and C4 are also further divided into sub-regions. National

aid for farmers in Southern Finland is paid in support area AB.

The key premise of Finland's agricultural policy objectives has been compensation for the permanent negative impact on the competitiveness of agriculture caused by conditions during the EU period to assist domestic production in succeeding in the European single market.

Support areas in Finland



Direct CAP income payments

Direct CAP payments for arable crop and livestock farmers are fully funded from the EU budget. CAP payments applied in Finland includes basic payments, greening payments, support for young farmers and coupled support.

In 2021, the amount of direct CAP payments will be roughly EUR 526 million in Finland. Basic payments account for 48% of this amount, totalling EUR 254 million. Greening payments account for 30%, or EUR 157 million, and support for young farmers makes up roughly EUR 10 million. In addition, Finland has decided to pay nearly 20%, or EUR 103 million, in coupled support.

To be eligible for CAP payments, farmers must be actively engaged in farming and comply with cross-compliance requirements that consist of standards for good agronomic and environmental conditions, as well as statutory management requirements. Greening payments include three additional requirements: crop diversification, the maintenance of existing permanent grasslands, and the maintenance of an ecological focus area. The farmer must cultivate at least two or three different crops on the holding, maintain existing permanent grassland, maintain an ecological focus area (EFA) of at least 5% of the arable area of the holding in the regions of Uusimaa and Southwest Finland.

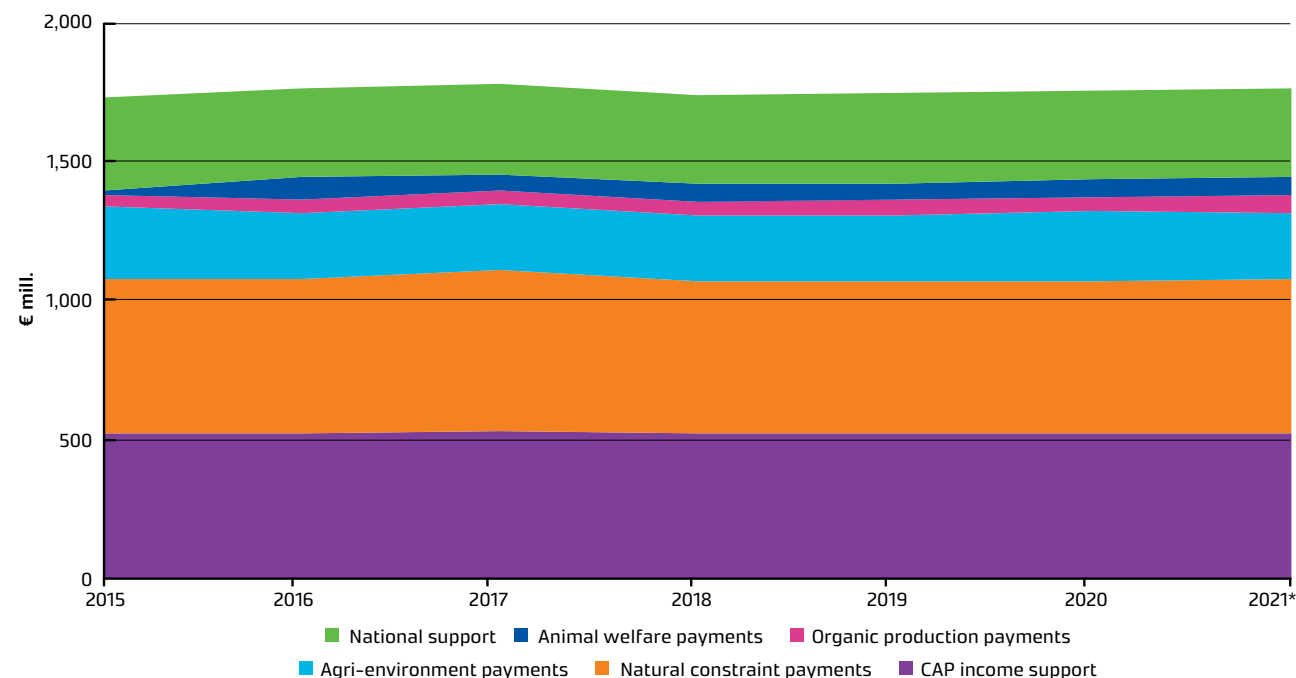
Support for young farmers is paid for five years after the establishment of the holding if the applicant has established their holding for the first time as the main entrepreneur under the age of 40. The support is intended to facilitate the establishment of agricultural production and the structural development of agriculture.

Coupled support is paid in the AB support area in Southern Finland for suckler cows, nanny goats and ewes, as well as outdoor vegetable production. In addition, coupled support is paid in all support

areas in Finland for beef, lamb and kid goat meat production, and the cultivation of protein and oil crops, rye, sugar beet and starch potato.

the number of farms and maintain economically viable agricultural units, and thus to also maintain employment in rural areas and promote their economic development.

Composition of agricultural support in Finland in 2015–2021, € million.



Natural constraint payment (less-favoured areas)

Certain rural areas in the EU are classified facing natural or other specific constraints (ANCs). The ANCs are those areas that are more difficult to effectively farm due to specific problems caused by natural conditions. In order to prevent this land from being abandoned, the EU provides support

for farmers in the ANCs. In Finland, this support accounts for almost the entire cultivated area (2.16 million hectares). The budget for natural constraint payments for 2021 is EUR 552 million.

The objective of the natural constraint payment is to maintain agricultural production despite the unfavourable climatic conditions, manage

Agri-environment payments

The agri-environment support is intended to compensate farmers who commit to measures to reduce the environmental burden of agriculture for income losses resulting from reduced production and increased costs.

The aim of the agri-environment payments scheme is to promote biodiversity and reduce emissions from agriculture to air and water. Agri-environment payments are divided into the compulsory measure of balanced use of nutrients and optional parcel-specific measures.

All farmers committed to the programme must adhere to certain limits for the use of nitrogen and phosphorus in arable crops. In addition, there are parcel-specific agri-environment measures concerning the plant cover on arable land in winter, promoting biodiversity in arable environments, and the utilisation of manure and recycled nutrients.

The agri-environment payments budgeted for 2021 total EUR 238 million, of which the national contribution is EUR 138 million. In addition to the agri-environment payments, a total of EUR 127 million is paid as compensation for organic production and animal welfare. Support for organic production and animal welfare aims to steer agricultural production in a more ethical and ecological direction.

EU agricultural support in Finland in 2013–2021 (fully or partly financed by EU), million €.

	2013	2014	2015	2016	2017	2018	2019	2020	2021
CAP income support	539	524	527	527	534	522	524	524	526
Natural constrain payments	412	423	552	547	573	543	543	545	552
EU contribution	115	118	97	97	103	95	95	95	94
National share	297	305	455	450	470	448	448	450	458
Agri-environment payments*	379	369	255	236	241	239	238	248	238
EU contribution	112	107	107	99	101	101	100	105	100
National share	267	262	148	137	140	138	138	143	138
Organic production payments	-	-	45	50	50	53	56	56	60
EU contribution	-	-	19	21	21	22	23	23	25
National share	-	-	26	29	29	31	33	33	35
Animal welfare payments	-	-	13	79	55	58	60	62	67
EU contribution	-	-	5	33	23	24	25	26	28
National share	-	-	8	46	32	34	35	36	39
Total*	1,330	1,316	1,392	1,439	1,453	1,415	1,421	1,435	1,443
EU contribution, mill. €, total	766	749	755	777	782	764	767	773	773
National share, mill. €, total	564	567	637	662	671	651	654	662	670

*In the years 2013–2014 agri-environment payment also includes support payments to organic production and animal welfare.

National aid

Nordic aid, national aid for Southern Finland and certain other forms of support paid from national funds form a whole which aims to ensure the conditions for Finnish agriculture in different parts of the country and in different production lines. In connection with the EU accession negotiations, the basic principles for determining the level of national aid and for regional distribution were agreed. The aid must not increase production or exceed the total pre-accession aid level.

Nordic aid

The Treaty of Accession of Finland (Article 142) includes the right to pay national Nordic aid for regions north of the 62nd parallel and some adjacent areas south of that parallel, i.e. to support area C. A good 1.4 million hectares, or 55.5%, of Finland's arable land has been defined as eligible area.

Nordic aid consists of milk production aid, aid paid on the basis of livestock numbers and aid paid on the basis of the arable area. The scheme also

includes greenhouse production aid and storage aid for horticultural products, wild berries and mushrooms, as well as headage-based reindeer husbandry aid.

In 2021, the total amount of Nordic aid will be close to EUR 296 million. The most significant individual forms of support are the Nordic milk production aid (EUR 160 million) and Nordic livestock headage aid (EUR 78 million).

National aid for Southern Finland

In 2015, Finland transferred a significant share of the coupled support to Southern Finland to the direct payments fully funded by the EU. As a result, Southern Finland milk and beef production, sheep and goat husbandry, and cultivation of starch potato, as well as outdoor production of vegetables, are now mainly supported by a scheme based on EU subsidies.

National income aid in Southern Finland is still paid for pig and poultry farming and horticultural production under Article 214a of the Single CMO Regulation and Commission Decision C(2014) 510 for the period 2014 onwards. This legal basis under Community law to continue the payment of national aid for farmers in Southern Finland was approved by the EU institutions in the autumn of 2013. The total amount of aid paid in 2021 will be approximately EUR 17 million.

National agricultural aid in Finland in 2013–2020, € million.

	2013	2014	2015	2016	2017	2018	2019	2020	2021
Nordic aid	317.4	314.7	296.5	285.7	296.3	294.5	297.3	296.3	296.4
National aid for Southern Finland	62.5	62.5	28.9	27.0	25.1	23.2	20.2	17.4	17.4
Nationally paid natural constraint top-up*	119.3	118.6	-	-	-	-	-	-	-
Other national aid	5.7	6.3	6.7	9.6	5.4	5.5	5.0	5.3	5.3
Total	504.9	502.1	332.1	322.3	326.8	323.2	322.5	319.0	319.1

*Since 2015, the national top-up for natural constraint payment has been paid as part of the EU payment scheme.



Structural support aims to develop the operating conditions and competitiveness of agriculture by improving the efficiency and quality of agricultural production following the principles of sustainable development. In practice, forms of structural support include subsidies, interest subsidies and state guarantees.

Agricultural investment support aim to promote growing farm sizes and thus to reduce production costs. In 2020, investment supports were granted for 2,542 farms, totalling EUR 127 million. Investments in dairy cattle farms, the largest single topic, accounted for roughly 33%, while its proportion was more than 40% in the previous year. In 2021 and 2022, the number of investments in dairy cattle farms is expected to decrease further, which will also lead to a slight reduction in the need for investment funding. At the end of 2020, support applications shifted from larger new building projects to smaller and more affordable renovations. The start-up subsidy paid to young farmers supports the passing on of business activities from one generation to the next. In 2020, the start-up subsidy was granted to around 244 farms, totalling EUR 7.3 million.

In 2020, the authorization to grant interest subsidy loans to finance farm production buildings and purchase real estate and movable property related to the start-up subsidy paid to young farmers was a maximum of EUR 250 million. The capital of interest subsidy loans granted for investments was EUR 143 million, and that of start-up loans was EUR 35 million. Interest subsidy costs have been moderate for the state due to low interest rates, regardless of the large loan portfolio. According to

confirmed 2019 financial statements, these costs were approximately EUR 12 million.

Farm relief services

Farmers involved in livestock production on a full-time basis are entitled to 26 days of holiday per year. The Ministry of Social Affairs and Health is responsible for the management, control and coordination of farm relief services. Their purpose

is to ensure that farming activities continue uninterrupted during holidays, and that substitute help is available in the event of illness or accidents. The number of farmers entitled to an annual holiday has decreased annually as the number of livestock farms has decreased. In 2021, the estimated number of entrepreneurs is 13,205, which is approximately 800 fewer than in the previous year. The trend has developed rapidly: for example, farm relief services

accounted for 26,340 entrepreneurs in 2010. In 2020, a total of around EUR 122 million was spent on farm relief services, whereas in the 2021 budget the amount will decrease to EUR 117 million.

Structural support projects; number of objects and funds (EUR million) committed to them in 2012–2020.

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of support decisions	2,205	2,461	2,694	1,317	2,174	2,393	2,502	2,337	2,786
Funds committed, € mill.	73.1	92.2	92.3	52.8	98.6	116.0	129.5	151.0	133.9
Dairy and beef cattle buildings	363	376	319	116	255	311	305	310	284
Buildings in pig production	38	29	27	17	29	37	33	48	42
Horticulture investments	55	51	41	51	59	72	54	69	65
Sub-surface drainage	368	324	428	336	590	618	554	494	725
Interest subsidy loans for investments	129.9	140.3	105	60.1	105	127	134	158	143
Subsidy for young farmers	544	597	1,108	127	309	301	446	281	244
Interest subsidy loans for starting farm, € mill.	60.9	68.9	134.9	19.4	46.6	46.0	67.2	39.4	35.1
Total interest subsidy expenses, € mill.	18.6	11.3	12.5	12.7	11.0	10.6	11.0	12.2	13.8

Source: Ministry of Agriculture and Forestry, Finnish Food Authority.

Agricultural and food markets



Cereals market

Csaba Jansik and Anneli Partala

Cereal production is stable in Finland, exceeding domestic needs. In the upcoming harvest season, the proportion of winter wheat of total wheat has raised. Rye is increasingly being produced under production agreements. Exports of oats are growing steeply, both in the form of grains and milled industry products. Due to the success of winter crops a fair production of wheat and rye is expected in 2021, while drought and heavy rains in the summer are about to notably reduce oats and barley production.

Wheat

The area sown of winter wheat doubled in the autumn of 2020. The area sown for summer wheat also increased slightly. The total area of wheat increased in 2021 by around 38,000 hectares to over 272,000 hectares compared to 2020. Wheat has an established and stable market in Finland in both the food and fodder sectors, which explains the growth in its popularity in the 2000s.

The weather being favourable for sowing in the autumn of 2020 and the financial incentives of agri-environment support granted for winter crop cover contributed to the increase in the area sown of winter wheat. Cultivating winter crops levels out the workload of agriculture, because winter crop workload peaks do not coincide with the peaks of sowing and harvesting summer crops. Demand exists in both the food and fodder sectors for a stable amount of winter wheat at the start of the harvest season. A strong incentive for winter wheat cultivation is also the significantly better average

yield compared to summer wheat. Poultry farms, which cultivate fields of their own use, favour winter wheat, because it provides fodder and an opportunity to level out the workload of manure application. Due to the higher area and good yield level of winter wheat, the production of wheat is expected to be 712,000 tonnes in 2021, over 5% higher than in 2020.

No significant change occurred in the use of wheat in the 2020/21 harvest season compared to the previous harvest season. The use of wheat as fodder remained at the previous year's level, but the use of barley and oats as fodder has somewhat decreased its relative share. The demand-supply situation and changes in price levels continue to steer the use of different cereals as fodder. In the 2021/22 harvest season, the use of wheat is expected to increase slightly due to increased supply.

Rye

Approximately the same amount of rye was sown in the autumn of 2020 as in the previous year. The area sown for rye has varied between 20,000 and 30,000 hectares in recent years. The yield was small in 2018, and the increase in prices that followed it led to 40,000 hectares of rye being cultivated in the following year. In turn, the record yield of 2019 pushed the prices down to an all-time low. This unstable market situation highlighted the importance of contract production, both to farmers and the milling industry. In the spring of 2021, there are still ample stocks of rye, and the price levels have remained reasonable, which has resulted in the field area being used to cultivate other winter crops.

Since the variation in crop yields and prices in the 2010s, a rather stable group of farmers has been producing rye in Finland, with long-term objectives and under contracts. They supply rye to their biggest buyers, the mills. Most of the demand for rye is currently met by contract production. Production contracts are also promoted with storage fees.

The use of hybrid rye increasing from the earlier 50% to nearly 70% affects the production of rye and the long-term development of its area sown. The yield of hybrid rye is excellent, and average yields have increased by a tonne per hectare in the last decade to around 3.6 tonnes. The growth in the popularity of hybrid rye is expected to further increase the average yield of rye.

Of the around 18,000 hectares of the 2021 field area, a yield of 69,000 tonnes of rye is expected according to the first preliminary production estimates. This will help reduce the stocks remaining from the record yield of 2019.

Most Finnish rye is used for food production. Recently, its use as fodder has increased slightly, but the current level of 5,000 tonnes is low compared to the levels of wheat, barley and oats used as fodder.

High supply and low prices have resulted in the unusual situation of rye being exported. In the autumn of 2020, for the first time in decades, significant amounts of rye were exported from Finland. The primary destination country was Germany. Due to ample stocks and low prices, exporting rye is not impossible in the future either, but it will probably remain occasional.

Barley

The initial stocks of barley at the start of the summer of 2021 and its level of consumption are balanced. This means that even the slightest deviations in the sowing weather or longer dry spells in the summer may temporarily increase the demand of early 6-row barley in particular. Early varieties of barley enable the sowing of winter crops. For example, the current prices of oil crops have caused farmers to consider adding winter oil crops to their crop rotation.

The production of barley is based mostly on contracts with the malt and ethanol industries. However, the majority of barley is produced without a contract. No significant changes are expected in the use amounts of barley. During the 2021/22 harvest season, around 910,000 tonnes may be

used as fodder, and around 330,000 tonnes for other purposes, including small-scale but steady use in food production.

Oats

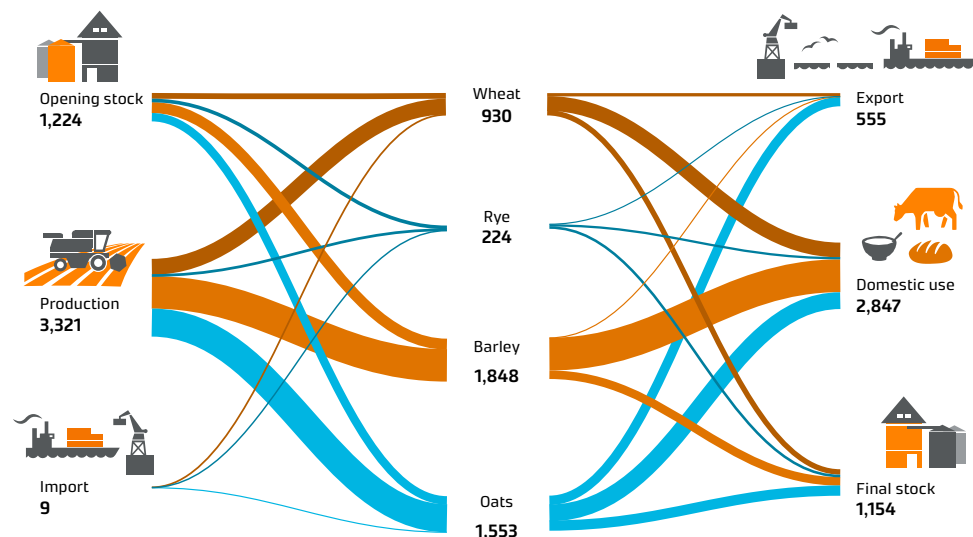
The area sown of oats decreased slightly, 4,5%, from the previous year to 332,000 hectares. Due to the extreme dry period in July and heavy rains in August, the production of oats is to drop much more than its area. The most recent estimates indicate 919,000 tonnes of production for 2021, 23% less than in 2020. The use of oats as fodder is expected to remain around 450,000 tonnes. However, the increase in its use in food production and for export seen in recent years is expected to continue.

In recent years, new capacity has and will become available in the milling industry to process oats for

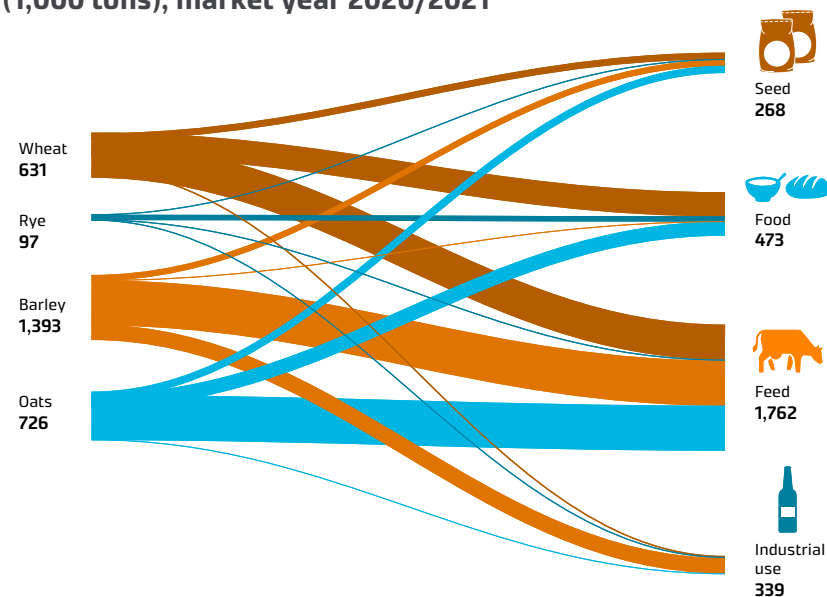
export in increasing amounts. The previous level of 152,000 tonnes of oats used in food production in the 2020/21 harvest season is expected to climb to 168,000 tonnes in the 2021/22 harvest season.

The export of raw oats has also been increasing strongly. In 2019, around 366,000 tonnes of oats were exported, and this figure grew to 409,000 tonnes in 2020. The estimated 400,000 tonnes of export in 2020/21 may even be exceeded, and in the 2021/22 harvest season, the amount of exported oats is expected to be as high as 500,000 tonnes. The current popularity of oats in the international markets has contributed significantly to the increase in the export of both unprocessed oats and flakes.

Provisional Grain balance sheet for Finland 2020/2021, estimate 21.6.2021 (1,000 tons)



Estimated Use of the Grains in Finland (1,000 tons), market year 2020/2021



Price development

At the start of the 2020/21 harvest season, the low price levels of barley caused it to be used as fodder more, but as the season progressed, oats became the most affordable fodder crop. At the start of 2021, the prices of wheat and barley increased

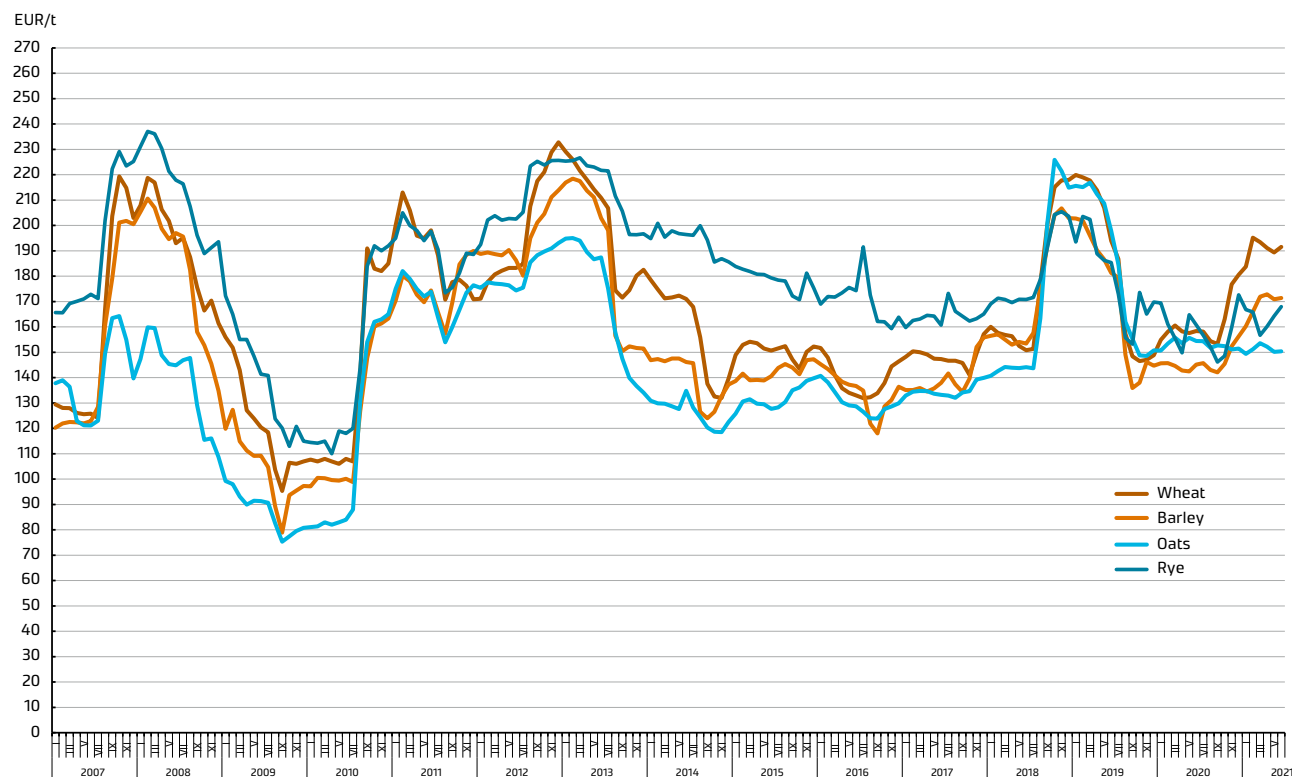
heavily. The price of rye increased only slightly, and the price of oats remained the same. This was probably due to the high stock levels of rye and oats. If the forecasts on areas sown and average yields are materialised, the prices of rye and oats will probably remain the same.

Cereals self-sufficiency

Finland has been self-sufficient for barley and oats throughout its EU membership. Self-sufficiency for wheat was achieved in the 2000s and for rye in the late 2010s. When assessing self-sufficiency in the context of cereals, stock levels should be considered due to their relatively high level. The inclusion of wheat, barley and oats stocks in the assessment does not change the baseline - Finland's self-sufficiency rate has been more than 100% with or without the stocks. However, stocks play a more significant role for rye, the production in 2019 was double compared with its consumption, which resulted in record stocks. Due to this, the smaller yields of the following years have still been sufficient to meet demand.

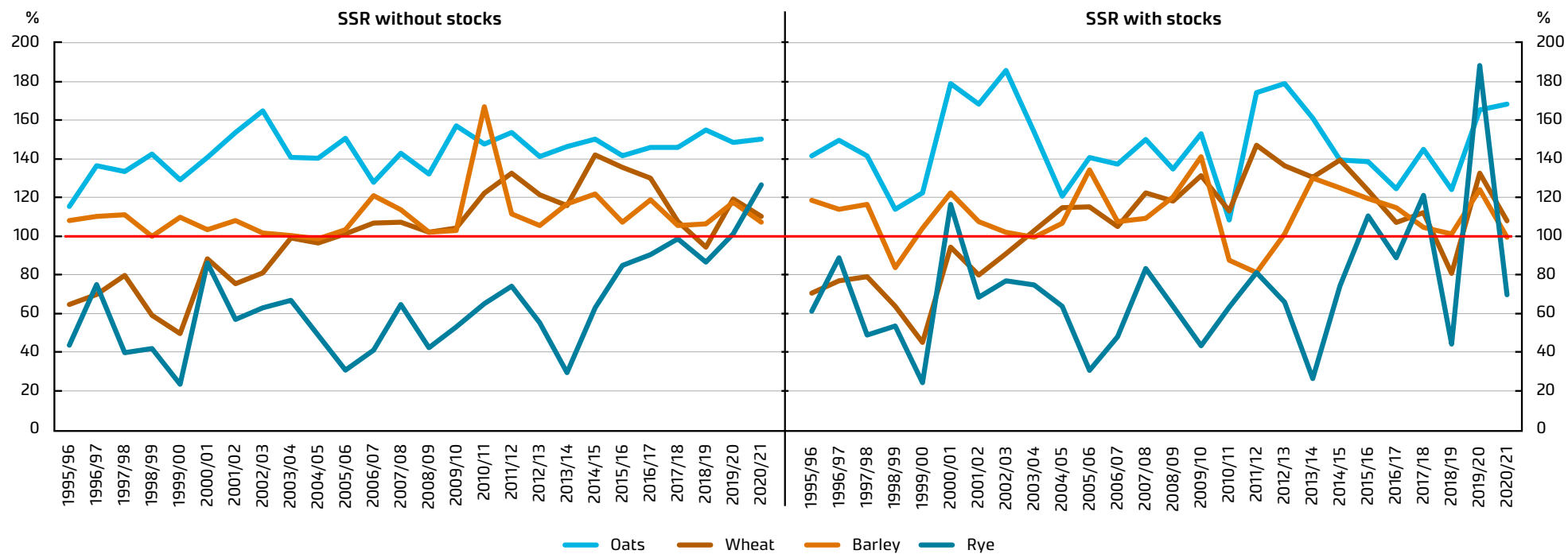
The graphics below illustrate the differences in self-sufficiency when assessed with and without the stocks. For barley, oats and wheat, the variation in the annual self-sufficiency rates slightly increases when the stocks are included in the calculations. For rye, the variation in the self-sufficiency rate is accentuated when the stocks are included, because their effect on domestic production and consumption can occasionally be significant. In the 2010s, Finland has been self-sufficient in all cereals.

Monthly prices of cereals in Finland in 2007–2021



Source: Luke.

Development of cereal self-sufficiency rates in Finland



Source: own calculations by using Luke statistics.

Calculation formula: $\text{production} / (\text{production} + \text{import} - \text{import})$.

Calculation formula: $\text{production} / (\text{production} + \text{import} + \text{import} + \text{stock level change})$ (Puma et al., 2015).

Oil and protein crops markets

Csaba Jansik

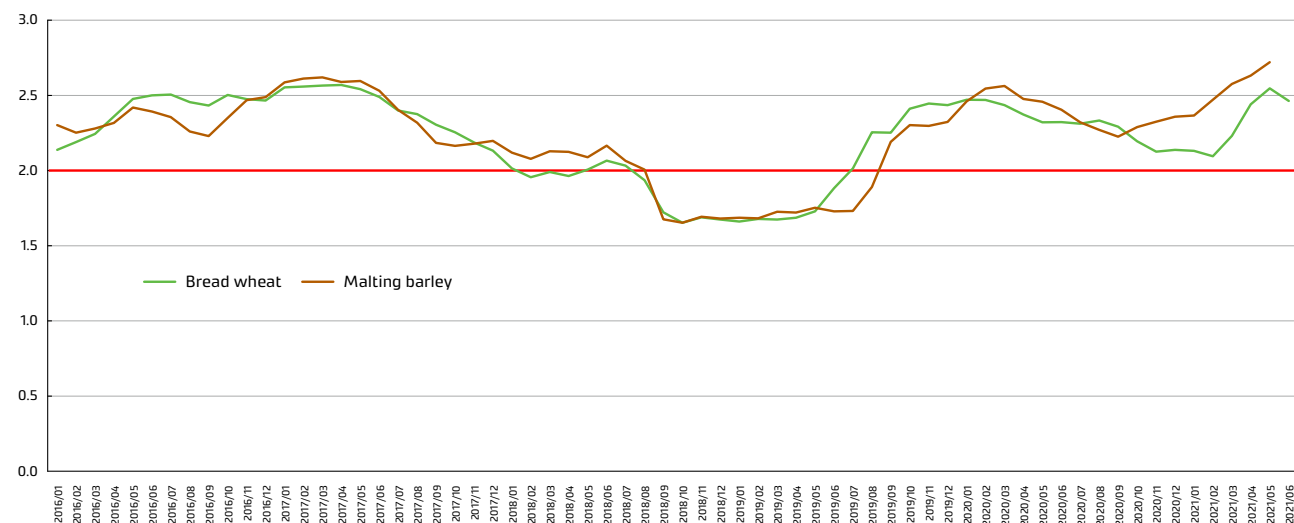
Oil and protein crops provide farmers with significant benefits through crop rotation and profitability. In recent years, the cultivation of pea has particularly increased. However, interest in the cultivation of turnip rape, rapeseed and broad beans has decreased due to increased uncertainties concerning cultivation and lower yields. Although the total self-sufficiency rate of plant-based proteins is high in Finland, the self-sufficiency rate of the complementary proteins required for livestock continued to be alarmingly low in 2020. Improving self-sufficiency is a common goal of the crop and livestock sectors.

Oil crops

The area of winter oil crops sown doubled in the autumn of 2020, reaching 5,200 hectares. The area comprises both turnip rape and rapeseed. Good sowing weather, subsidies related to plant cover, and favourable prices contributed to the increase in the area sown. The higher average yield of winter oil crops compared to summer oil crops and the lower risk of pests also play a part in the increase in popularity.

The area sown of summer oil crops in the spring of 2021 increased from last year's 30,000 hectares to 38,000 hectares in 2021 due to the improved prices of oilseeds in relation to grains. On the European market, the futures prices of rapeseed are more than twice the futures prices of wheat. The price multiplier of 2.0 is deemed a threshold ratio that incentivises oil crop cultivation.

The price of turnip rape and rapeseed relative to bread wheat and malting barley in 2016–2021



Source: Luke's calculations based on Luke's price statistics.

The long-term development of summer oil crops is currently uncertain, because permits for seed treatment chemicals are only granted for one harvest season at a time. If no long-term solution is found to the use permit scheme for plant protection products, the cultivation of summer oil crops may be reduced due to the risk of crop failure. Pests can cause significant crop losses with summer oil crops.

The decrease in the production of turnip rape and rapeseed in Finland since 2018 is a sum of many factors. The strong fluctuation in the levels of yield and price have decreased interest in cultivating oil crops. For example, the drought of the summer of 2018 resulted in the lowest yields of the century and also took its toll on oil crop production. Although the area of turnip rape and rapeseed sown was almost

the same as in the previous year, the yield of 2018 was 23% smaller than in the previous year.

In recent growing seasons, weather conditions have not always been favourable for oil crop cultivation. Colder weather has hindered sprout emergence, and heat waves during flowering have hindered common pollen beetle control and slowed down the development of the plants during a period that is vital for their yield. In addition, the development by pests of resistance to pest control products has created completely new challenges. The common pollen beetle's developing of resistance to pyrethroids is a widely recognised problem in Finland. It is important for the improvement of yield levels and to secure cultivation reliability that farmers apply appropriate plant protection strategies.

The industries using turnip rape and rapeseed try to increase the popularity of oilseed cultivation by highlighting its benefits such as their usefulness in crop rotation, and their demand and profitability. In addition, the aim is to make oilseed cultivation more collaborative by increasing contract production and encouraging farmers to enter long-term production contracts.

In addition to the traditional regions, the cultivation of summer oil crops has also been spread to the north and east. The potential for good yields also exists in these new cultivation areas, and the risk of disease and pests can be lower. The appreciation of

summer turnip rape's cultivation reliability has also increased, which is materialised in a larger share of turnip rape than rapeseed in the total cultivation amount of oil crops. In addition to summer oil crops, significant potential exists in winter oil crops in Finland, and it is hoped that their cultivation area will increase in the future.

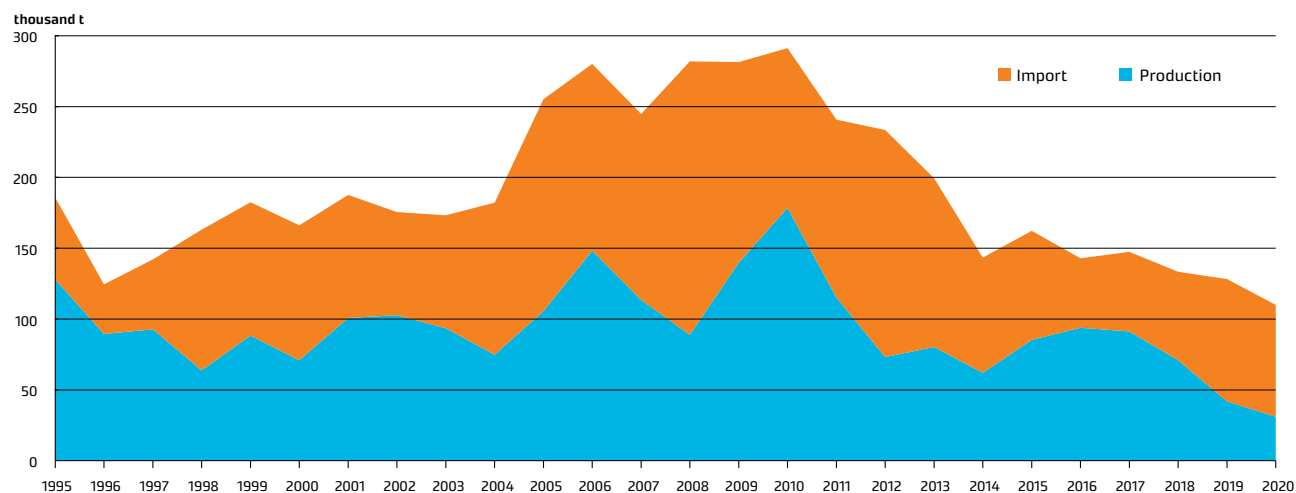
Regarding self-sufficiency, the oil crop balance sheet differs significantly from that of cereals. The domestic content of crushed oilseed was only 28%. In 2020, some 79,000 tonnes of rapeseed were imported from Baltic countries, mainly for crushing.

Protein crops

Pea and broad bean are the most important legumes in Finland. Their current and potential role as fodder is increasing in significance in the livestock sector, which has traditionally fulfilled its need for complementary protein crop fodder by importing soybean meal. In the long term, imported soybean meal can be replaced with domestic legumes, which would improve Finland's self-sufficiency rate in terms of complementary protein crop fodder.

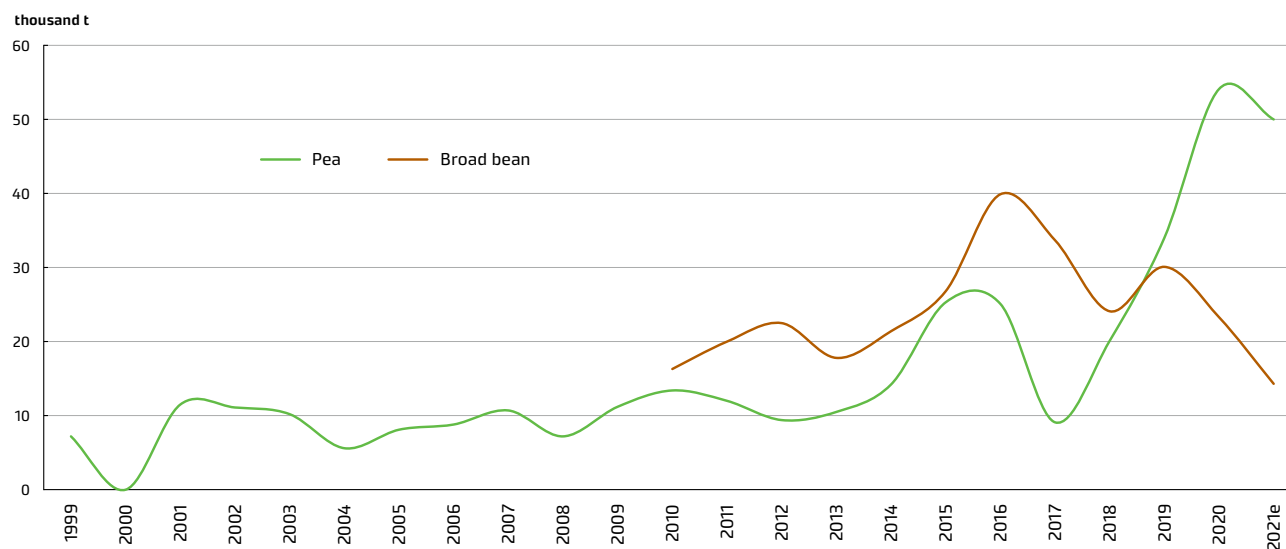
In addition to improving the security of food supply, this would have other beneficial outcomes. By reducing imports from areas sensitive in terms of biodiversity and environmental sustainability, Finland's field crop production and crop rotation would be diversified. This would have a positive effect on the use of nutrients and on the structure and fertility of the soil, and it would reduce the risk of plant diseases and pests.

Crushed turnip rape and rapeseed in Finland, thousand tonnes



Source: Luke's crop statistics and the Finnish Custom's ULJAS database.

Production volumes of pea and broad bean in Finland, thousand tonnes



Source: Luke's crop statistics Note: figures for 2021 are preliminary.

Replacing soy with domestic alternatives is a multi-faceted issue. Whether soybean can be replaced with peas or broad beans varies, depending on the animal species. It must also be possible to adapt the legumes to large-scale fodder production and for recipes. On the level of individual farmers, attractive prices and more experience in and reliability of cultivation are required.

In the short term, pea seems a more viable option, both in terms of cultivation and for use as fodder. The cultivation reliability of pea is good, and varieties with improved yields are already in use or will become available soon. The cultivation reliability of broad bean is less good, and the plant is very sensitive to drought especially. In addition, broad bean still contains antinutrients that limit its use as

fodder. In pea plant breeding, the aim is to increase yield in the future, whereas broad bean plant breeding must also resolve the issue of reducing antinutrients in future varieties. Around 80% of pea is used as fodder, and the rest is used in food production as dried pea. In addition to harvested dried pea, around one thousand hectares of land are dedicated to producing pea for silage fodder and about 7–9,000 tons is harvested fresh to produce frozen peas. In 2020 the volume of this so called “garden pea” amounted to 7,400 tons.

Due to the benefits of pea, its production has surpassed the production of broad bean in recent years. Only moderate growth has been seen in the sown area of pea and a rather notable decrease in the sown area of broad bean in the spring of

2021. According to the first harvest estimates a slight decrease, from 54,000 to 50,000 tonnes, is expected in the production of dried peas in 2021 compared to the previous year. Broad bean being a highly drought sensitive crop has suffered from the unprecedented drought in June and July and its average yield level in 2021 is forecast to be as low as 71% of year 2020. Production is estimated to drop from 23,000 tonnes in 2020 to only 14,000 tonnes in 2021.

Protein crops mostly come from a stable group of producers. The number of newcomers was insufficient this spring. Negative experiences – for example, the poor resistance to drought of broad bean varieties and the resulting crop loss – contribute to reducing the plant's area sown.

Protein crop self-sufficiency

The self-sufficiency rate of Finnish plant-based protein is quite high. In the 2010s, the rate of domestic production and domestic consumption has fluctuated between 85% and 100%. Of the raw plant-based protein produced in Finland in the 2010s, 47% came from cereals, and 48% from grass. The rest of Finland's raw plant-based protein production came from oil and protein crops, and other crops. Finland's self-sufficiency in cereals and grass, from which most of the raw protein supply originates, has been high. However, the import of oil crops and legumes has been significant compared to domestic production levels.

Raw plant-based protein is mostly used as fodder for livestock. Only around 20–25% of protein crops is used for food production. Finnish production of milk and beef depends on domestic sources of protein due to the use of grass silage and cereals.

The role of imported complementary protein crops is considerably more significant in the production of pork, poultry meat and eggs.

In the early 2000s, soybean meal was the most important complementary protein. It reached its peak - more than 170,000 tonnes - in the late 2000s as the production of pork increased, driven by exports. As the export of pork slowed down in the early 2010s, the demand for soybean meal also decreased.

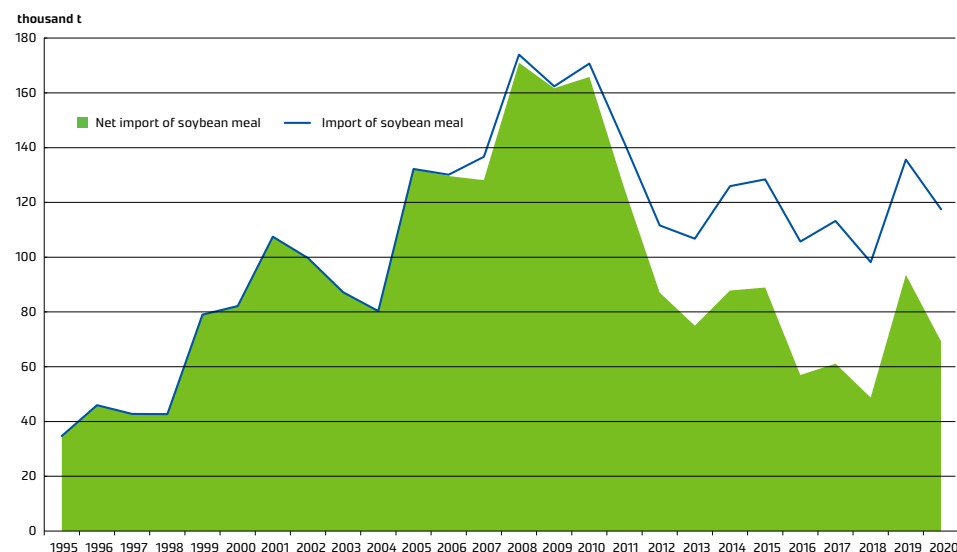
Today, only a fraction of Finland's 240,000-tonne capacity for soy crushing is in use, and the import amount of soybean varies between 10,000 and

70,000 tonnes. In 2020, nearly 30,000 tonnes of soybean were imported. The import of soybean meal has also decreased significantly in recent years from its peak; currently, around 100,000-130,000 tonnes are imported annually. Finland's exports have mostly focused on soy protein concentrate, which is supplied to the Norwegian fishery sector.

In addition to soybean meal, increasing amounts of rapeseed meal have been imported into Finland. In 2020, the amount was as much as 289,000 tonnes, coming from Germany and other European countries. The imported amounts have increased due to changes in fodder used on Finnish cattle farms. Studies on the suitability of turnip rape, rapeseed

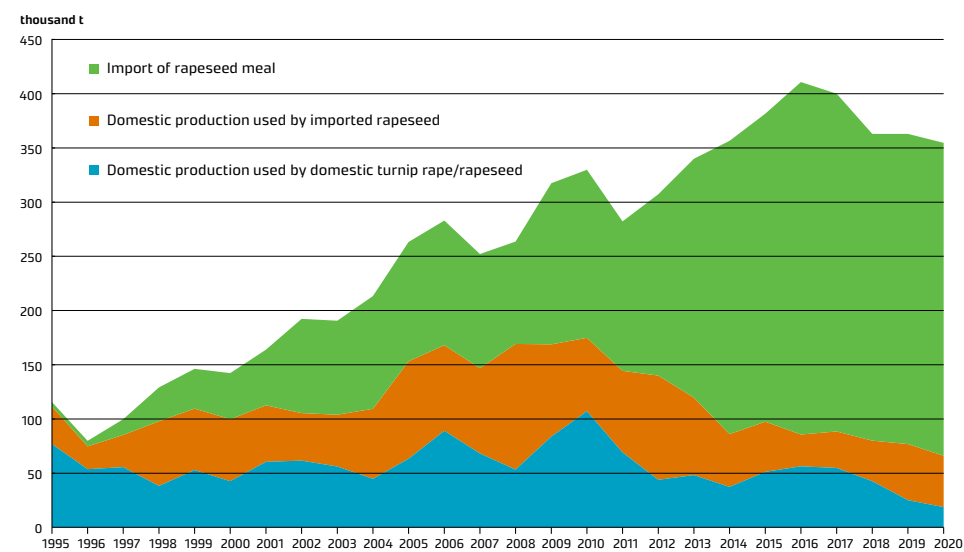
and soybean for use as fodder began in the late 1990s. Results have shown that fractions of turnip rape and rapeseed are more suitable for use as fodder for cattle than soy protein fractions. This resulted in a slow shift, as fodder producers started using more turnip rape and rapeseed meal in their recipes for cattle fodder. Soy protein was completely abandoned in 2018, as cattle were already fed with soy-free fodder in practice. Another reason for declining imports of soybean meal is the increased use of domestic legumes as fodder by pork and poultry farms.

Development of the import of soybean meal, thousand tonnes



Source: The Finnish Customs, ULJAS database.

Production of turnip rape/rapeseed meal, thousand tonnes



Source: Luke's crop statistics and the Finnish Custom's ULJAS database.

Complementary protein crop self-sufficiency rate

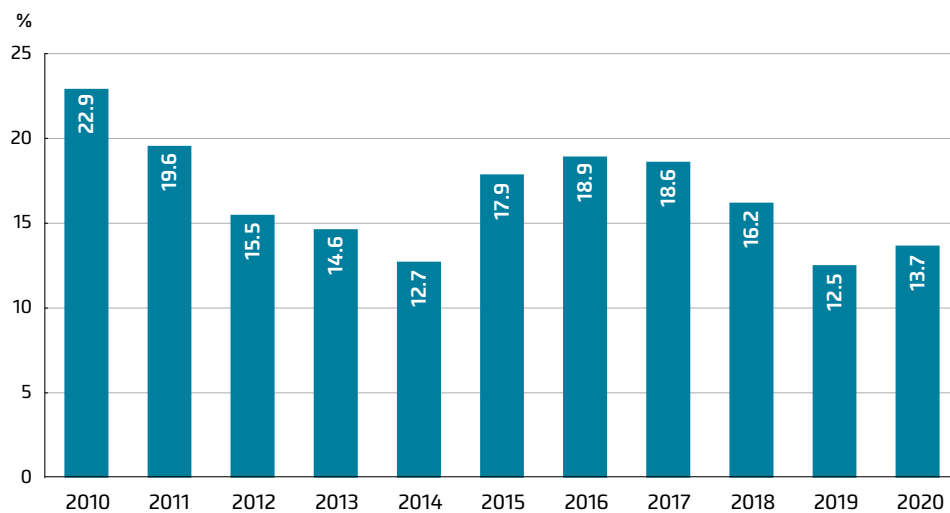
The domestic content of cereals and grass production is nearly 100%, but for the complementary protein crop, the share of imported goods is significant. Self-sufficiency in the complementary protein crop decreased in the second half of the 2010s, from 19% to 13% measured in raw protein. This calculation includes foreign trade, and the domestic production of oil crops and legumes. In addition to rapeseed meal and soybean meal, 13,000 tonnes of sunflower seed meal were imported to Finland in the second half of the 2010s, for example.

The decrease in the self-sufficiency rate is related to the significant decrease in Finnish oil crop production. In 2020, the share of the domestic oil crop of the 356,000 tonnes of turnip rape and

rapeseed meal used in Finland was only 5%. At the same time, broad bean production has been stagnant. The impressive increase in pea production has only been partly able to slow down the decline in the complementary protein crop self-sufficiency rate. In 2021 the self-sufficiency rate is expected to decrease due to the notably lower production of domestic legumes.

The share of imported soybean meal is still large on the complementary protein crop balance sheet. Improving the balance sheet figures is a common goal of the crop and livestock sectors. In the long term, both crop farmers and feed crop buyers keep an area of 200,000 hectares ideal. For comparison, the current area is 33,000 hectares. Improving the balance sheet figures will require a significant increase in both pea and broad bean total yields.

Complementary protein crop self-sufficiency rate



Source: Luke's crop statistics and the Finnish Custom's ULJAS database Note: The self-sufficiency rate is calculated with figures for raw protein.



Meat market

Csaba Jansik

In Finland, meat production is increasing, driven especially by the growing production of poultry meat and pork. Poultry production is sped up by domestic markets, and pork production by export markets. The meat self-sufficiency rate increased significantly in 2020 as a result of growing production, and it is also expected to increase slightly this year, approaching 100%. However, the self-sufficiency rate shows considerable differences by type of meat. The most notable phenomenon in the foreign trade of meat and meat products is the significant improvement in the trade balance of pork. The long-term consumption of meat has levelled out at 79-80 kilograms per capita.

Development of meat production and consumption

The level of beef production is determined by the number of calves born and the average carcass weight. In recent years, the average carcass weight has been steadily increasing. However, it has now achieved its peak, which means it can no longer be the source of production increase. Since milk production has become more efficient, the number of dairy cows has decreased in the latter half of the 2010s. In 2015, there were 282,000 dairy cows in Finland, and at the end of 2020, there were only 256,000. Although the number of suckler cows has slightly increased - from 57,000 to 61,000 - it has not been enough to stop the decrease in the number of calves. Production of beef decreased by more than one million kilograms in 2020, and according to the estimates, the pace will further



accelerate: production is expected to decrease by around two million kilograms this year.

In practice, the consumption of beef has remained at a steady level of 18-19 kilograms per capita for more than twenty years. The restrictions placed on the food service sector in 2020 somewhat decreased the demand for the most valuable parts of beef, because their sales have not entirely shifted from the food service sector to the retail. However,

the sales of minced meat levelled out the decrease in the consumption of the valuable parts, and the consumption of beef also remained at the same level in 2020. No significant changes are expected in beef consumption in 2021 either.

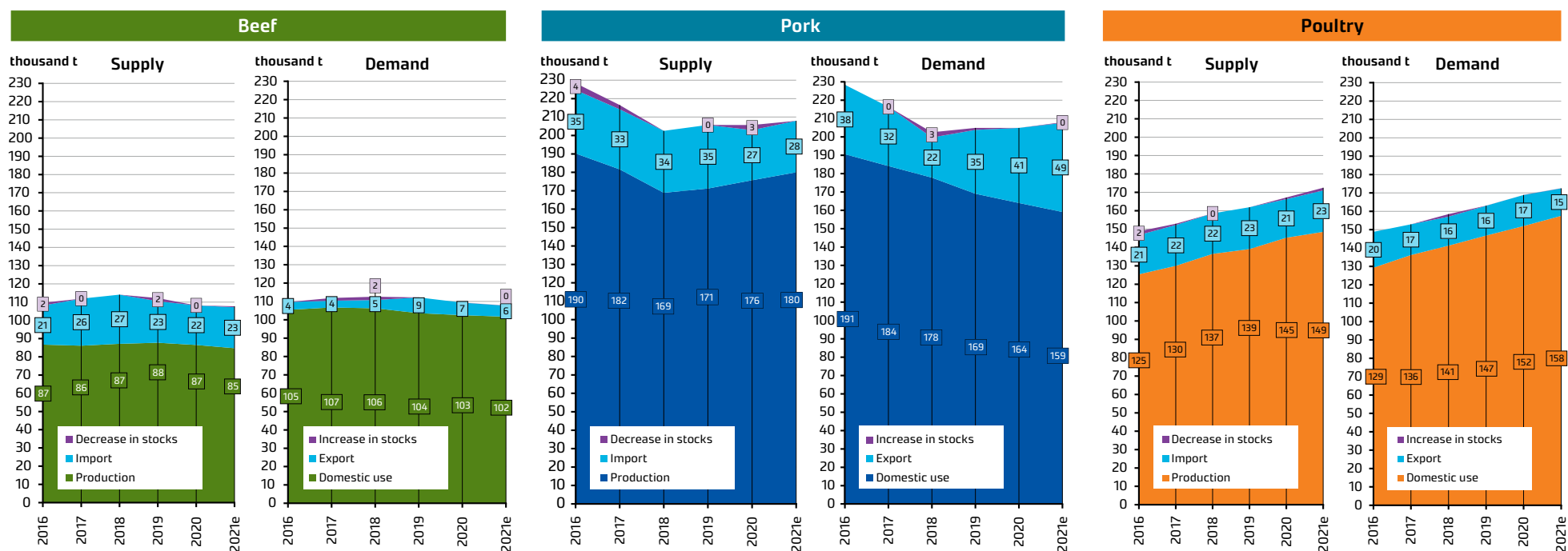
The public debate on reducing meat consumption is currently evident only in the consumption of pork. Its consumption declined throughout the 2010s, and the decrease gathered pace in the latter half

of the decade. In 2016, nearly 35 kilograms of pork per capita were consumed in Finland, but in 2020, the figure was under 30 for the first time ever. In the current year, the figure is expected to further drop to 28.7 kilograms per capita. A decrease of 5% was expected in 2020 in the consumption of the single most popular pork meat product, Christmas

ham. Due to the coronavirus, consumers had to spend their Christmas at home, and the figure for Christmas ham in 2020 was ultimately similar to that of 2019. However, due to restrictions on social gatherings, the sizes of packages were smaller.

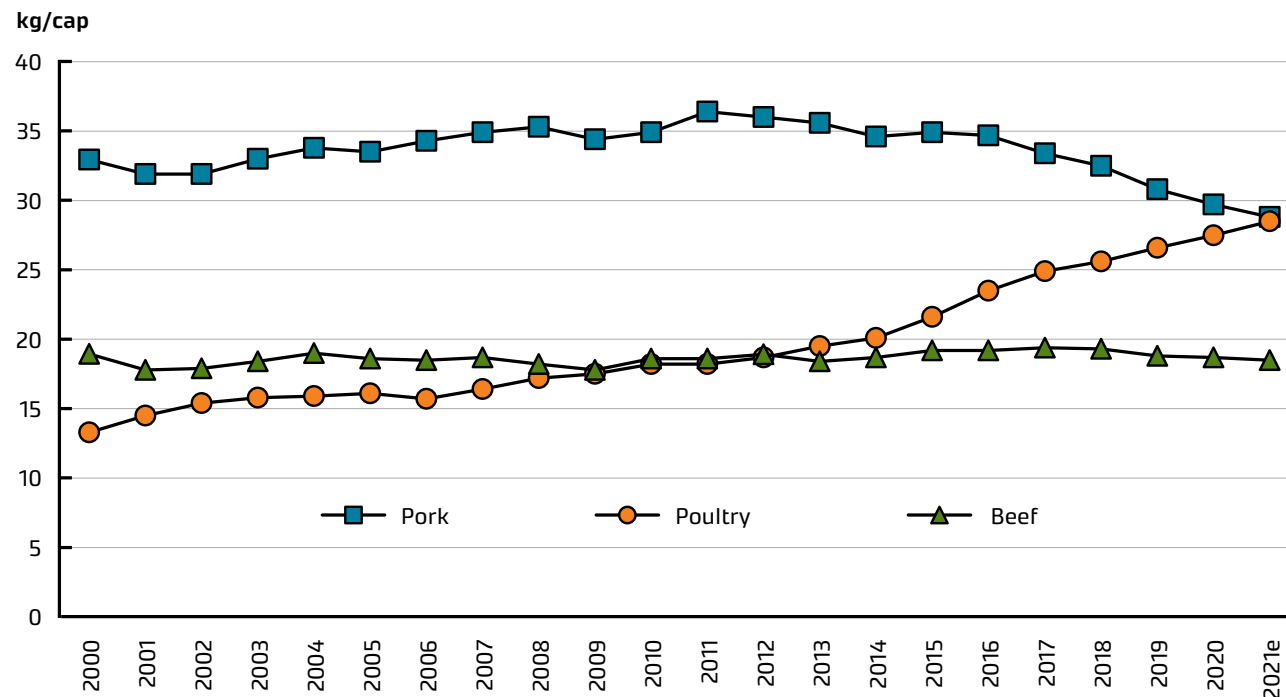
In the late 2010s, the production of pork has recovered, largely due to exports, after the significant drop of more than 10% seen in 2016-2017. In 2020, the recovery was supported by the decrease in imports resulting from the coronavirus and the increase in the relative share of domestic pork in the total consumption of pork in Finland.

Finland's meat balance sheets by meat type, thousand tonnes



Source: Luke and the Finnish Custom's ULJAS database Forecasts for 2021: Luke and Kantar.

Meat consumption in Finland from 2000–2021e



Source: Luke, forecasts for 2021 Kantar TNS.

Consumption of poultry meat has been steadily increasing in the last two decades. In 2020, 27.5 kilograms of poultry meat per capita were consumed in Finland, and the consumption is expected to increase to 28.5 kilograms per capita in 2021. Most poultry meat consumed is broiler chicken meat – the share of turkey is around 5%. Traditionally domestic production of broiler meat has been deliberately increased to keep up with the increase in consumption, but in the 2010s, domestic production was not quite able to keep up.

Only slight changes have been seen in the total consumption of meat. Around the middle of the last decade, poultry meat consumption levelled out the decreasing pork consumption, with annual increases of up to 6–9%. This resulted in the total consumption of meat remaining at more than 81 kilograms per capita in 2016–2018. As the annual increase in the consumption of poultry meat slowed down to 3%, the total consumption of meat in Finland decreased to less than 80 kilograms per capita in 2019. In 2020, total meat consumption was 79.4 kilograms per capita, and it is also expected to remain close to that level in 2021.

Beef and pork consumption will presumably decrease throughout Europe, but no sudden changes to the level of meat consumption are expected. According to the December 2020 forecast of the European Commission, total meat consumption will see a decrease of just one per cent in the next decade. The consumption per capita will decrease by one kilogram by the end of 2030 from the 68 kilograms in 2020 (EC, 2020). These EU figures are calculated as retail weight per capita. Converted into the Finnish system of carcass weight per capita, the figures are 84.5 kg per capita in 2020 and 84.6 kg per capita by 2030. This means that the per capita consumption of meat in Finland in 2020 was around 5 kilograms, or 7%, less than the average per capita consumption in Europe, which means Finland is not one of Europe’s leading meat consumption countries.

Foreign trade¹

The effect of the coronavirus pandemic on the meat markets has been dichotomous. On one hand, imports in the food service sector were dramatically reduced, both in Finland and elsewhere in Europe. On the other hand, the situation resulted in a decrease in the price of meat in Europe, and the Finnish meat processing industry was able to procure affordable raw materials from outside Finland, which in turn increased meat imports.

¹The figures presented in this section for the volumes of import and export differ from the figures for foreign trade in the meat type balance sheets. The volumes of the meat balance sheets have been converted to include bones by Kantar TNS, using multipliers approved by operators in the industry. The figures presented in this section, including unit price calculations and time series, are based directly on figures obtained from the Finnish Customs’ ULJAS database.

Development of producer prices of pork (CLASS E) in Denmark, Germany and Finland in 2008–2021



Source: The European Commission.

In Germany, prices of pork have been low in the last 12 months due to the situation with African swine fever (ASF). In the spring and early summer of 2021, the price of pork increased in Europe, but this was due to the temporary shortage of available pigs and the number of production animals decreasing in Germany and the Netherlands. The price-increasing effect of these events is expected to be temporary, as indicated by the sharp turn in July, and forecasts

for pork prices in Europe are rather conservative for the entire year.

If the coronavirus situation subsides in 2021, and the food service sector can recover after the restrictions are lifted, all types of meat imports are expected to increase. Small and medium-sized meat processing enterprises using imported meat will increase the supply of cold cuts on the market,

for example. This will be seen as a more diverse selection in grocery shops in the summer or autumn. The increase in supply may cause the price levels of the Finnish market to decline somewhat. The raw material imports will have less of an effect on barbecue products, because the market for them is mainly dominated by large industry brands.

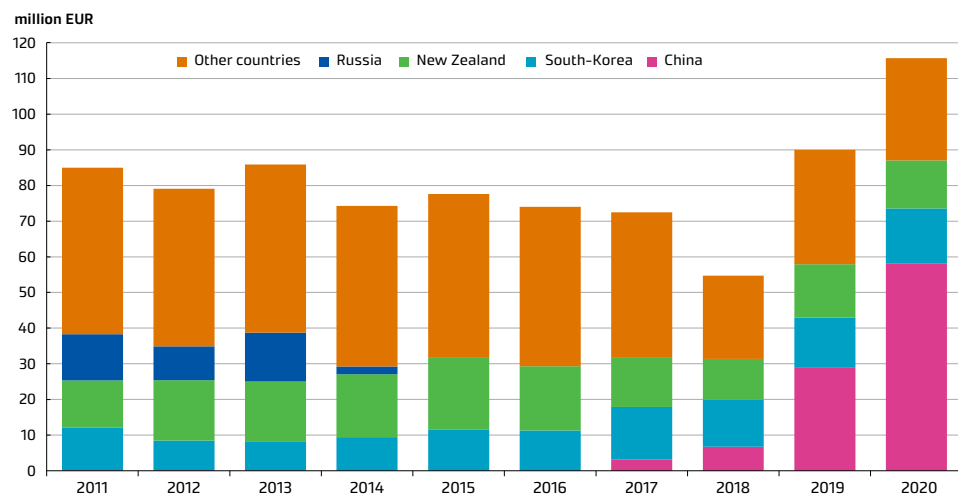
Exports of pork from Finland to China have been increasing exponentially since 2017. In 2020, the total value of the pork exported to China was EUR 58 million, which is precisely half of all Finnish pork exports. The European Commission expects the wave of pork exports to reach its peak in 2021, and in the meantime, Finland is riding the crest of that wave to the full. The trend is caused by the joint effect of the drastically reduced production in China due to ASF and the increase in consumption. China's domestic pork production is expected to recover to its level before the ASF crisis only in 2025, by which time demand for imported pork is expected to gradually decrease. There are still no reliable forecasts on how quickly and at what capacity China's pork production will recover, but for Finland's pork exports, it is important to use these remaining years to move the exported products to market segments with higher price levels, i.e. to speciality product segments, either by utilising a higher processing rate or focusing on the Finnish production practices in the marketing of the products. In the 2020s, China will target its domestic production to replace the import of large product batches.

In addition to pig carcase, China has also been a suitable destination market for other edible parts of pigs, which had a share of 20% of Finland's total pig meat exports in 2020. This year, exports to China are expected to further increase. The largest risk factor for the export of Finnish pork is ASF, because it is the only factor that could stop Finnish exports within the coming years.

Although the balance sheet of Finland's foreign trade of pork has been positive in volume, the value of the balance sheet became positive only in 2020. This is due to the rather different product structure of imports and exports. Of the total value of Finland's exports, 80–85% has traditionally come from fresh, frozen, or chilled pork, and 10–15% from other edible pig parts. The price level per kilogram for the former is EUR 2–2.5, and EUR 1–1.5 for the

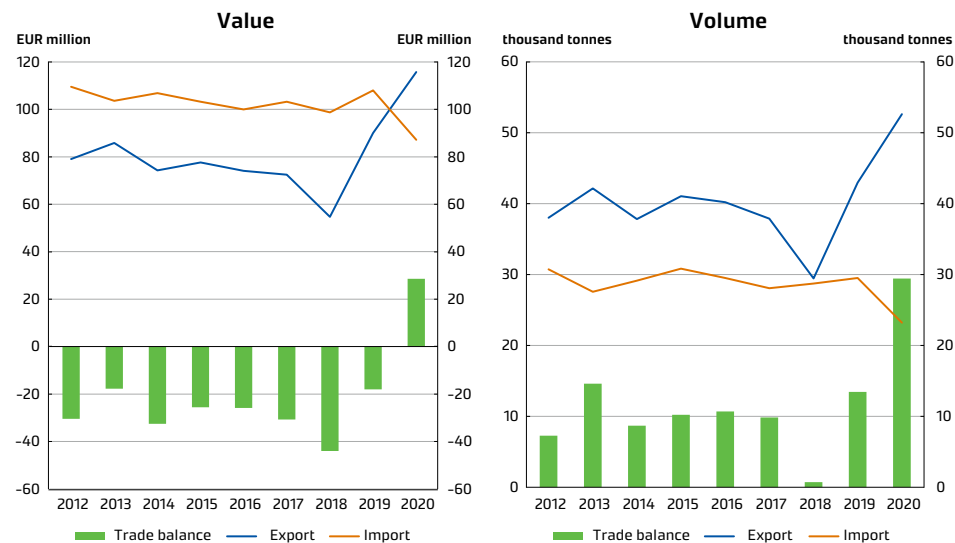
latter. In terms of imports, a fifth consists of cured, smoked or dried ham and pork shoulder and ribs, and another fifth of processed and preserved pork products. Their average prices have fluctuated between EUR 5 per kg and EUR 12 per kg. In addition to Italy and Spain, expensive and highly processed pork products have been imported from the Netherlands, Germany, Denmark and Poland, for example.

Value of exported Finnish pork by country, EUR million



Source: The Finnish Customs, ULJAS database.

Development of export, import, and foreign trade balance of pork



Source: Luke's calculations based on the ULJAS database of the Finnish Customs.

The foreign trade balance for beef has been starkly negative. The valuable parts of the carcass have dominated Finland's beef import structure. In 2020, exports decreased by 8%, and imports by 10%. Beef was imported to a total value of EUR 80 million and exported to a total value of EUR 32 million.

The foreign trade of poultry resembles that of pork and beef. Imports have focused on processed products valued at EUR 4–5 per kg and the valuable parts of the carcass such as chicken breast. However, exports have mostly consisted of the other broiler chicken parts, valued at less than EUR 1 per kg. This difference in structure explains the fact that the value of the 14,500 kilograms exported in 2020 was EUR 12 million, while the value of the 17,800 kilograms imported was more than EUR 68 million.

Self-sufficiency

The self-sufficiency rate for meat is calculated using the figures of meat balance sheets, the figures for production, import, export, and stock level changes. Finland's self-sufficiency rates improved or remained at the previous year's level in 2020. In 2021, a variety of different changes are expected to occur in the self-sufficiency rate for different types of meat.

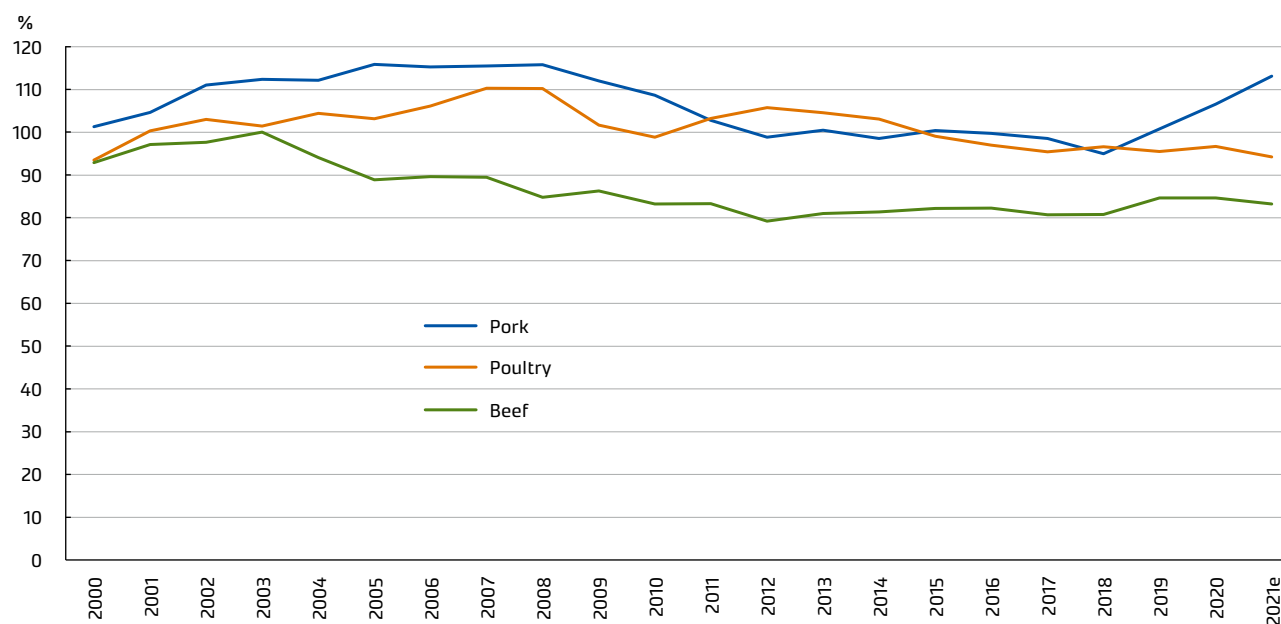
In 2020, the self-sufficiency rate for beef remained at the previous year's level. In 2021, it is expected to slightly decrease, from 84% to 83%, due to the decrease in domestic production. The self-sufficiency rate for pork improved strongly in 2020 due to production gathering pace in 2019. In 2021, it is expected to further improve from the 107% of 2020 to up to 113%. The self-sufficiency rate for poultry

improved in 2020, but according to forecasts, domestic production will not be able to keep up with the increasing consumption in 2021, which will reduce the rate from 97% to 94%.

It is important to note the differences between the concept of the self-sufficiency rate and 'domestic content', another term, often used in public media. The domestic content of consumption is calculated as the rate of the difference between consumption and imports from total consumption. In 2020, this figure was 79% for beef, 83% for pork and 86% for

broiler meat. The figures for the domestic content of consumption are typically smaller than the figures for self-sufficiency rates, because export and stock levels are excluded from them. Domestic content only demonstrates the share of imported goods in the domestic market. For the total performance of the meat sector, it is more appropriate to use the calculation formula for the self-sufficiency rate and the related figures, because they demonstrate the relationship between Finnish production and consumption and competitive position in the export markets.

Self-sufficiency rates of meat from 2000 to 2021 (estimated)



Source: Calculations based on the meat balance sheet, Luke and Kantar TNS.

Dairy market

Olli Niskanen and Sanna Vuorisalo

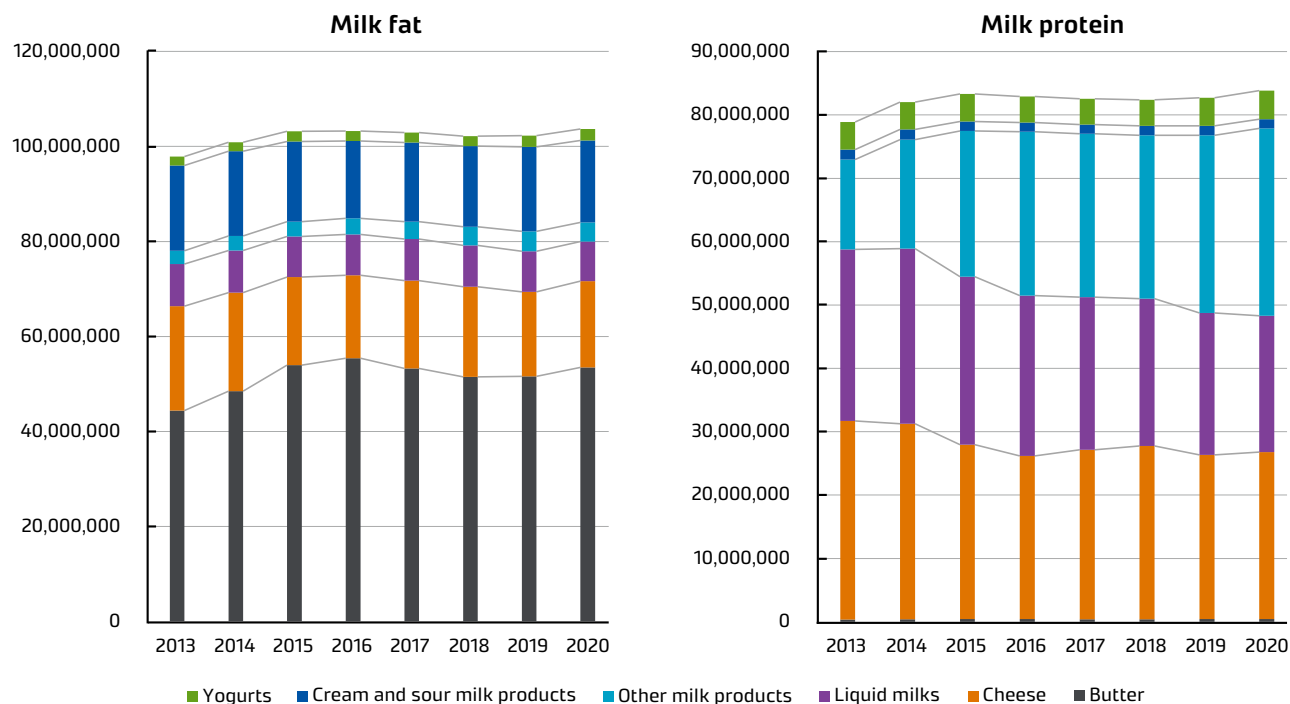
Demand for domestic dairy products was high in 2020. Grocery shop sales of dairy products increased during every quarter, driven by the coronavirus restrictions, compared with corresponding periods in the previous year. On the other hand, demand for dairy products consumed in food services decreased for the same reason. The milk trade balance increased due to increased exports and decreased imports. The average producer price increased from the previous year and was slightly more than 39 cents per litre. In addition, cooperatives paid 1.3 cents per litre as an adjustment payment, the highest sum since 2013. Total milk production increased by 1.4% to 2,293 million litres. The structural change continued to be rapid, with 7% of farms discontinuing their production operations during the year. At the end of 2020, milk was produced on 5,566 farms, 139 of which were organic. Valio Group's transition to contractual milk production at the beginning of 2021 will restrict the total volume growth of milk production. During the first quarter of 2021, the total production volume was 3% lower than in the previous year. According to the Finnish Food Authority, this was already reflected in the investment subsidy applications of dairy farms at the end of 2020, after which applications have mainly concerned renovations, with larger projects awaiting the granting of agreements in the future.

Production and consumption in Finland

Of the total consumption of milk in Finland, a significantly larger share is consumed by eating than drinking. In 2020, a total of 555 million litres of liquid milk was packed. The share of liquid milk in the total consumption of milk protein further decreased to 29% (-1%). Its share of milk fat consumption was

around 10% (-1%). Compared to 2019, the production of liquid milk products in litres decreased by 3.3%. The production volume of sour milk was 43.4 million litres (-2%), while the figure for cream was 43.4 million litres (-5%), for yoghurt 119 million kg (+3%) and for cheese 85.7 million kg (+2.5%). Butter production increased by 3.1% to 52.9 million kg.

Use of milk protein and milk fat for different product categories in 2013-2020.



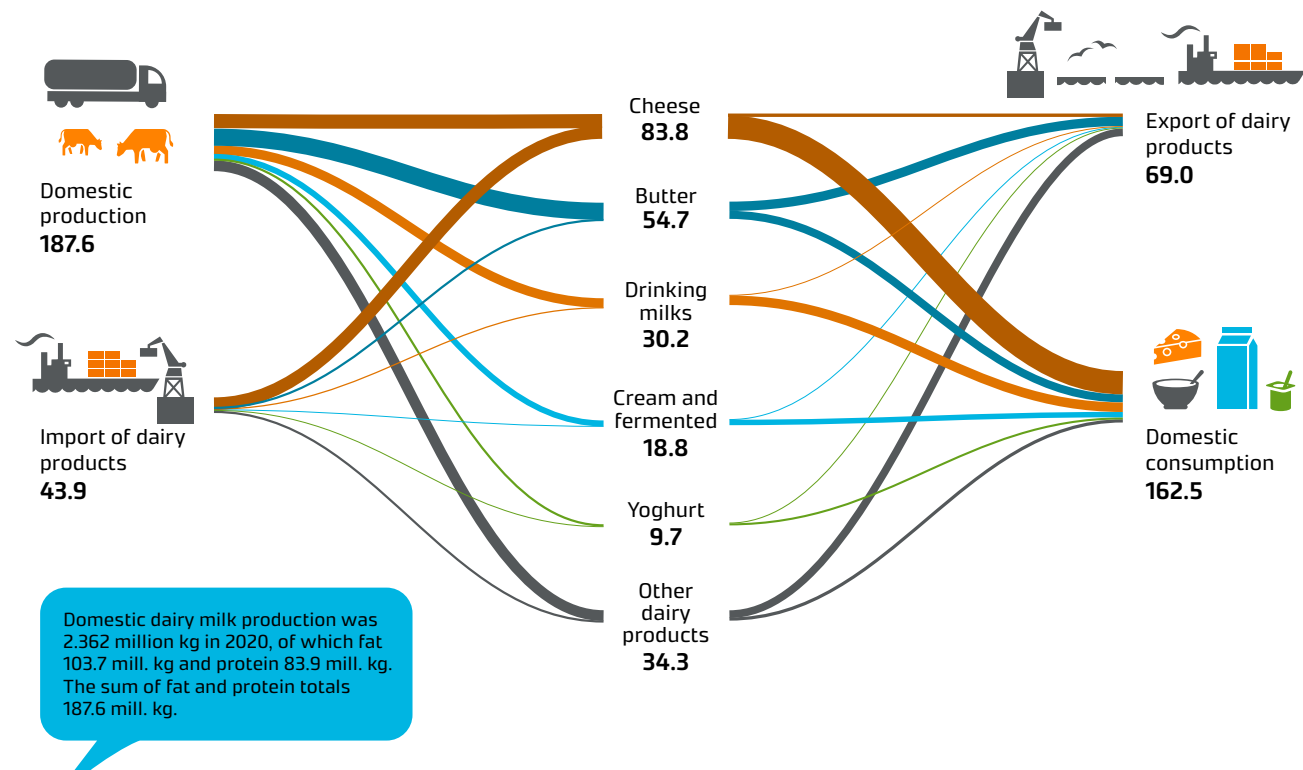
Trade balance improved

The trade balance for dairy products improved in 2020. The total value of exports increased by nearly 5%, to more than EUR 400 million. Export unit prices also slightly increased with global commodity prices. On the other hand, the total value of imports decreased by 4%, to EUR 326 million. The most important destination country for dairy product exports was again Sweden, to which goods to a total value of EUR 95 were exported. However, China took second place, with exports worth nearly EUR 80 million. China overtook France, to which dairy products to a value of EUR 42 million were exported. The most significant countries for imports were Denmark, with a total import value of EUR 84 million, Germany with EUR 79 million, Sweden with EUR 34 million, and the Netherlands with EUR 33 million.

The share of imported goods in domestic consumption is around 29% for milk protein and 25% for milk fat. Of the imported goods, 90% are cheese. The self-sufficiency rates for milk protein and milk fat have improved in recent years as the structure of domestic demand has changed, and the contents of primary production have improved. The share of domestic production of total domestic consumption in 2020 was 111% for milk protein and 119% for milk fat.

The global market prices for dairy products have traditionally correlated with economic growth indicators. The coronavirus slowed down economic growth globally, but it did not cause global market prices to decrease, although this was expected at the start of the pandemic. The increase in the popularity of dairy products in large markets such as China and smaller markets in individual European

Allocation of fat and protein of delivered milk to different dairy products, and their domestic use including imports and exports in 2020

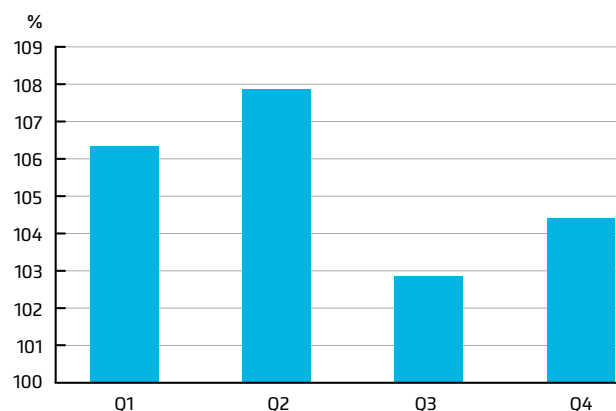


countries has probably resulted in a more long-term increase in demand. Based on the data available in the spring of 2021, the boom in the global markets is also expected to continue for the rest of 2021.

The restrictions placed on restaurant services to combat the coronavirus decreased dairy product demand in the HoReCa sector, but increased dairy product retail sales significantly. Compared to the previous year, retail sales increased by EUR 125 million, with total sales of nearly EUR 2.5 billion.

The figures for retail sales exceeded those of the previous year for each quarter, with the largest figures occurring in April-June 2020 (+8%), when the restrictions were at their severest in Finland. Of the total sales value, the share of cheese was 38%, the share of other dairy products (such as UHT products) was 21%, the share of liquid milk was 19%, the share of yoghurt was 14%, and the share of butter was 8%.

Value of dairy product retail sales per quarter in 2020 compared with retail sales of 2019



Dairy consumption in various countries

The level of Finland's dairy product consumption compared with other countries has been a hot topic. It has been difficult to communicate the level of total consumption and its changes, because the various components of milk are used in such a large variety of products. Creating statistics based on different dairy products without a uniform unit of measure provides no information on the overall situation. Instead, it leaves considerable room for misinterpretation. The lack of accessible international comparisons has only made debate more opinion-based.

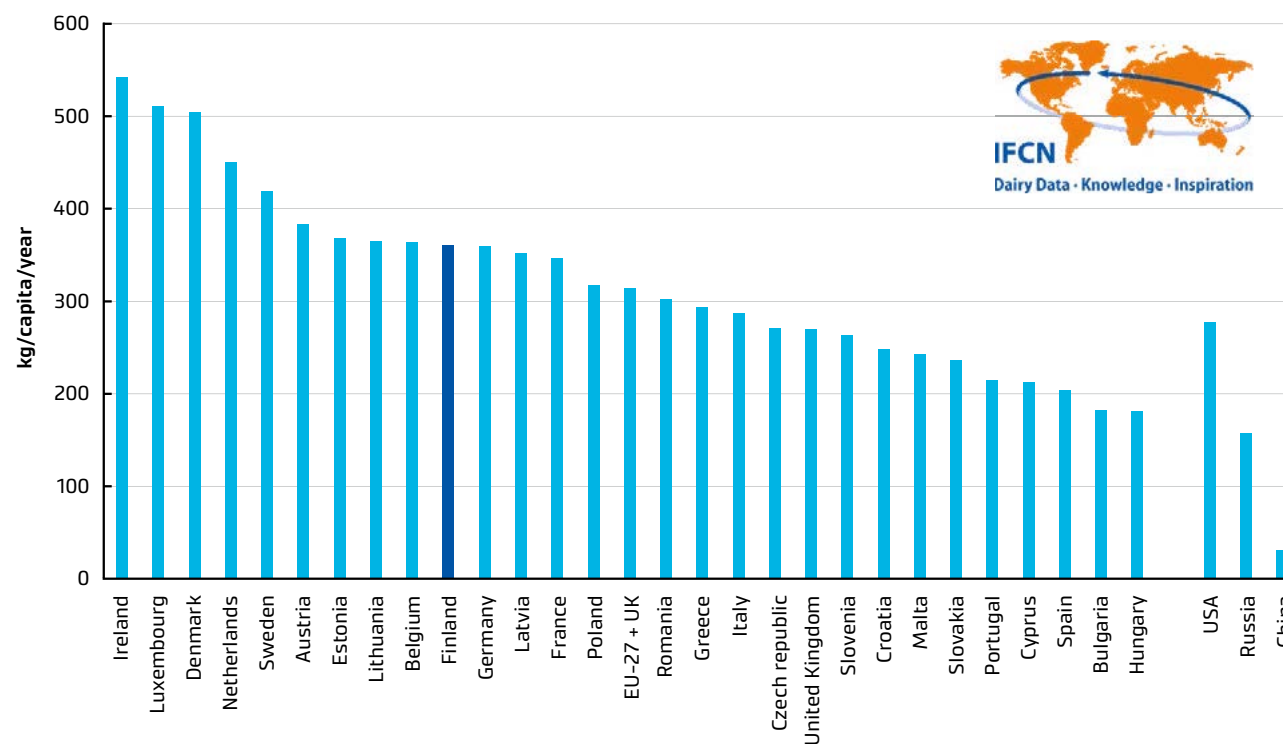
The starting point for calculating the dairy product consumption of an individual country is the country's milk production statistics. An estimate of a country's dairy product consumption is produced by adding the amount of imported dairy products to the amount of milk delivered to dairies, deducting exports, and accounting for possible changes in stock. For international trade, the products must first be converted to milk equivalents, based on the

amount of milk required to produce the products. In the comparison, it must be remembered that the product categories of international trade are aggregates that include similar products, and there can be slight deviations, for example, in the fat content of products belonging to the same category. In addition, there is no way to exclude dairy products supplied to the fodder industry, for example, and they are therefore included in the calculations of consumer consumption.

According to the International Farm Comparison Network (IFCN), the per capita total dairy product

consumption in Finland is about 360 kg of milk equivalents, whereas the average consumption in Europe is about 310 kg of milk equivalents per capita. The largest consumers are Ireland, Luxembourg, Denmark and the Netherlands. Sweden's consumption per capita is also higher than Finland's. Consumption is lower than average in East European countries such as Hungary and Bulgaria, and in some South European countries such as Spain, Cyprus and Portugal. The total consumption of dairy products has remained relatively stable with only minor annual fluctuation.

Milk consumption, kg milk equivalents per capita



Source: IFCN.

Egg market

Jukka Markkanen

In 2020, the consumption of eggs was higher than ever before this century being 12.5 kilograms per consumer. This increase can be explained by consumers spending more time at home and cooking more themselves. Currently, egg consumption and production are well balanced, as a result of which producer prices for eggs have been fairly stable. Producer prices of eggs produced in enriched cages and barn henhouses increased by a few per cent, while those of free-range and organic eggs decreased slightly. The number of farms and production in enriched cages is decreasing, while the average farm size is increasing.

Egg consumption was the highest for this century in 2020. Consumption steadily increased from 2007 to 2017. In 2017–2019, it was somewhat stable at 12 kilograms per capita. However, in 2020, consumption increased by more than 5% to 12.5 kilograms per capita, and a slight increase is still expected for 2021. This means that on average, Finns consume around four eggs per week and two hundred eggs per year per person.

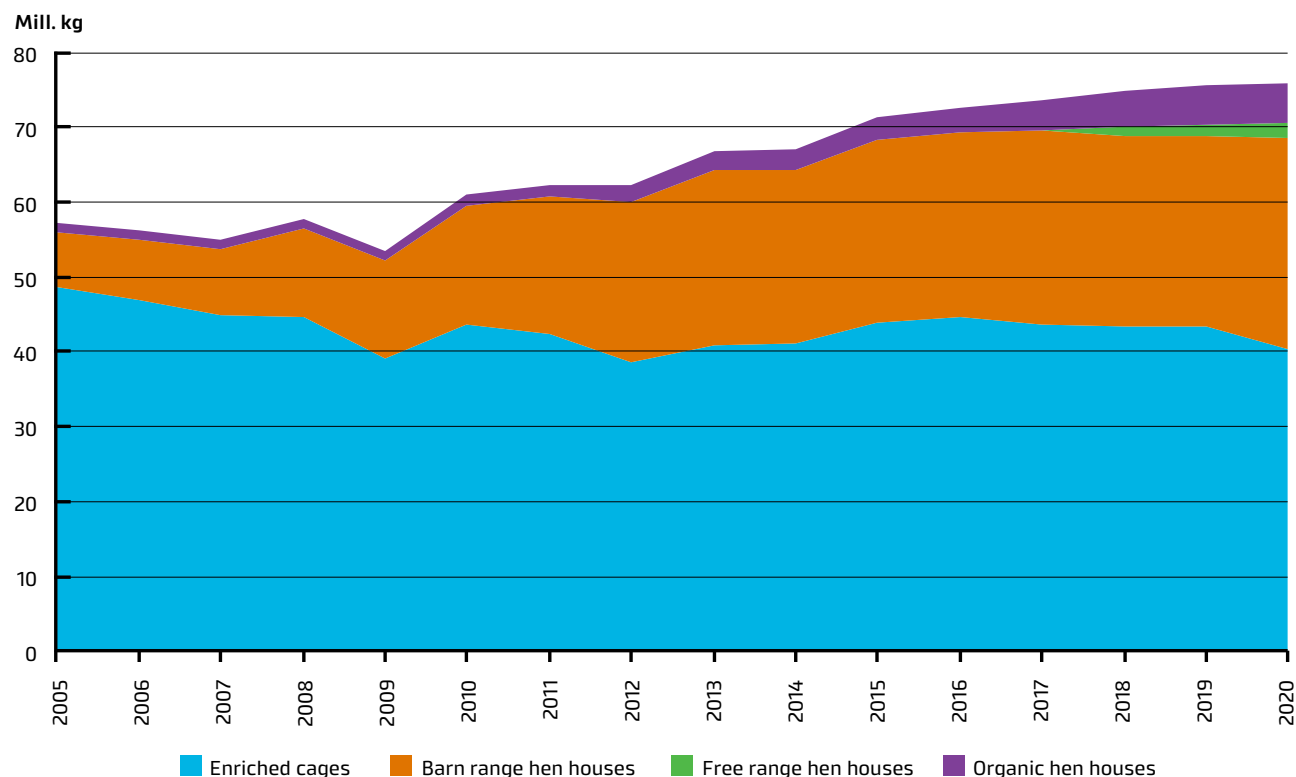
In 2020, around 69.7 million eggs were consumed in Finland, including imports. Consumption increased by 5.3% and was around 4 million kilograms more than in the previous year. The import of shell eggs and processed egg products increased to a total of 10.3%, or 2.5 million kilograms. Consumption of imported shell eggs is low. The increase in egg consumption was affected by the changes made to Finland's nutritional guidelines in 2016, and the fact

that people stayed at home and cooked at home more in 2020. Now the increase in consumption is expected to slow down and stabilise. Although direct sales and other schemes for distributing locally produced goods directly to consumers have become more popular, only some 1 million kilograms of eggs are sold directly to consumers by the producers.

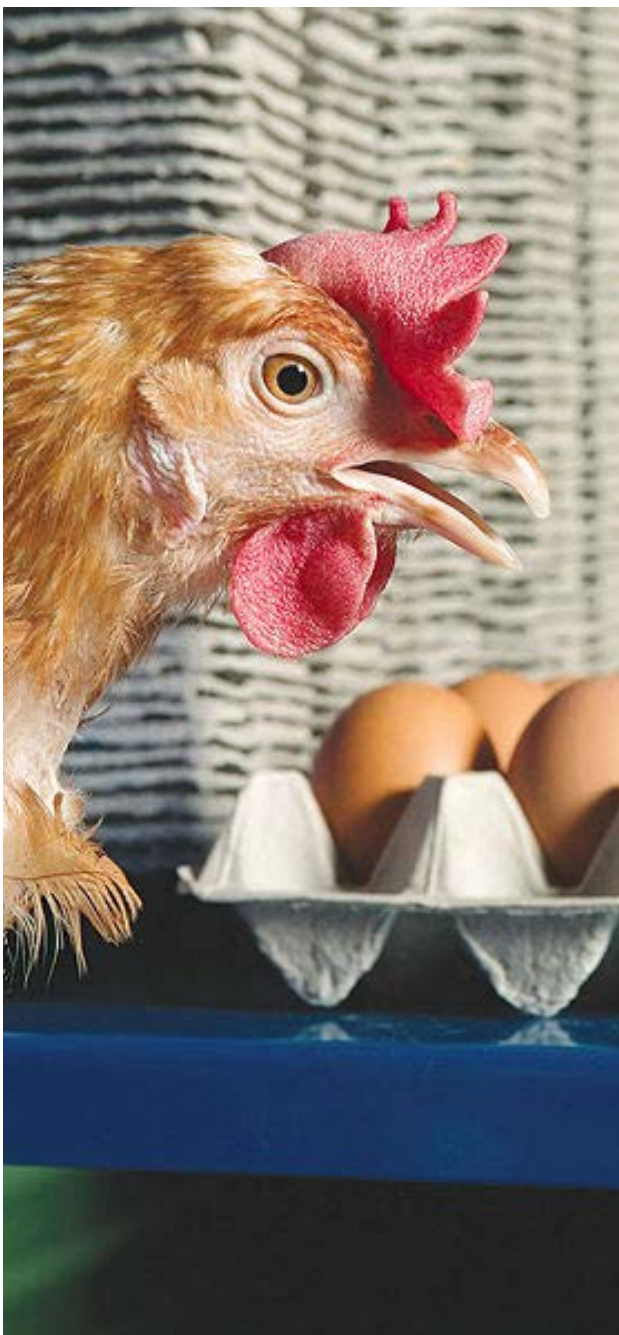
In 2020, slightly less than 77 million kilograms of eggs were produced, which is around 0.3% more

than in the previous year. Of that amount, 75.8 million kilograms were supplied to packaging plants, which is roughly the same amount as in the previous year. In the first half of the year, production decreased by one per cent. However, it increased by two per cent in the second half. An increase of 2–3% in production is expected for 2021. The self-sufficiency rate for eggs decreased by around 5% last year to 111%. In 2021, it is expected to increase by 1–2%.

Egg production per production method 2005–2020



Source: Luke.



Of all eggs, 57.5% were produced by chicken farms with enriched cages at the start of 2020, and 50.8% by the end of 2020. Correspondingly, 37.3% of eggs were produced by chicken farms with barn and free-range henhouses at the start of 2020, and 41.9% by the end of the year. There are around a dozen chicken farms with free-range henhouses, and their share of total egg production is only 3%. The share of organic chicken farms was 7.2–7.3%. Organic eggs are produced by around 50 chicken farms, with an average henhouse size of 6,000 chickens. To qualify as organic, eggs must be produced in henhouses with less than 3,001 chickens.

The number of chicken farms with enriched cages has decreased rapidly due to the new requirements of Finland's largest grocery shop chains. This will result in a significant decrease in the demand for eggs from chicken farms with enriched cages in the near future. According to the estimates of Finland's poultry association (Siipikarjaliitto), this will result in an investment requirement of EUR 50 million in the industry within a short time.

Egg exports totalled 9.8 million kilograms. Eggs were mainly exported in shells, which accounted for 7.6 million kilograms from total exports. The amount of exported shell eggs decreased by 17.5%. Some 2.2 million kilograms of processed egg products were exported, which is a decrease of 19.9%. In 2020, eggs were mainly exported to Denmark (42%), Sweden (20%), Germany and Latvia (13% each).

At the start of 2021, the number of egg-laying hens was almost identical to that of the previous year, i.e. 4 million. In the spring, the number of hens is expected to grow slightly and then decrease during the summer. The forecast for the end of 2021 is 4.1 million egg-laying hens.

A larger number of chicken farms with more than 100 chickens discontinued production in 2020 than in the previous year. Of the 276 farms in operation at the start of 2020, 7% discontinued production, and there were 257 farms at the end of the year. It is expected that there will be around 240 farms at the end of 2021. The average number of chickens per farm was 15,280 chickens at the end of 2020, and the number is expected to increase by 10%, i.e. to 16,700 chickens, in 2021. More than a quarter of all chickens in Finland are grown on a farm with more than 50,000 chickens. A set of large investments is underway that will probably alter the egg production structure in Finland in the coming years.

On the other hand, there is a relatively high number of small-scale non-professional henhouses in Finland. Although slightly fewer than 900 farms had egg-laying hens, 86% of all chickens were kept in henhouses of more than 10,000 chickens, despite the fact that there were only 130 such henhouses. More than two thirds of chicken farms had fewer than 50 chickens.

Statistics

Egg production <https://stat.luke.fi/en/egg-production>

Horticultural market

Anu Koivisto and Anna-Kaisa Jaakkonen

From the horticultural sector's perspective, the summer of 2020 and the coronavirus epidemic revealed how much Finland's horticultural production depended on foreign seasonal workers. Market chains for horticultural products also had to make rapid changes, as they needed to find new market channels for production intended for restaurants and workplace cafeterias. Yet households purchased more vegetables at retail shops, preferring Finnish production. Horticultural statistics show no slump in total production volumes and areas, even though some farms experienced problems and crops remained unharvested.

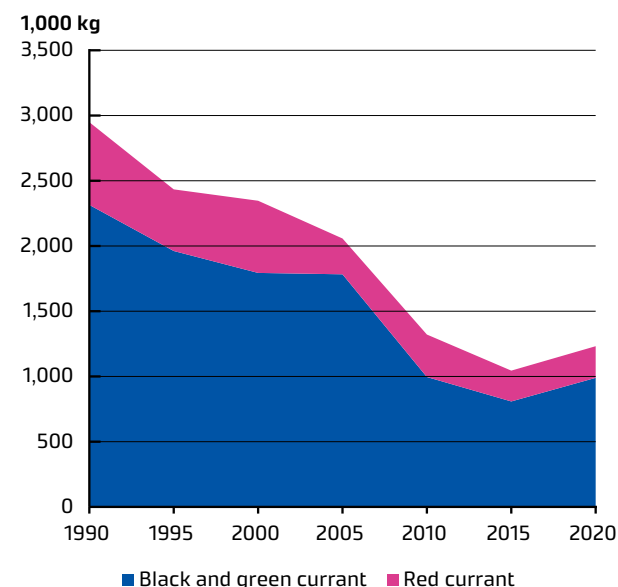
The changing berry market

The change in consumer behaviour is particularly evident in the sales of currants. The varieties of red currant, black currant and 'green currant' (cultivated mostly in Finland) currently cultivated are more suitable for the use of industry or for households for preserving, e.g. for making juice, due to their flavour and usability. Urbanisation, the limited cold storage space of modern apartments, and the ageing of the generation that is more used to preserving have resulted in a significant decline in demand for currants, which in turn has resulted in smaller total yields produced in recent decades.

The quantity of Finnish currants used by industry has also significantly decreased.

The nutritional content of currants makes them a superfood. However, the breeding of currant varieties, the development of cultivation methods, and the productisation of currants have fallen behind the expectations of modern consumers, who have access to a wide selection of easy-to-use and tasty berry products. Without a change in course, currants will continue their downhill slide, and what was once the most important berry plant in Finland will become a marginal product.

Total yield of currants



Source: Luke.

Of berry plants, strawberry's development has been quite the opposite - both its total yields and consumption have increased significantly in recent decades. Most strawberries are sold fresh to consumers, and the share of industry of their overall consumption is small. Improvements in cultivation methods, such as the use of grow tunnels and waiting-bed plants, have enabled a longer and more stable season for fresh strawberry sales, which has probably contributed significantly to the increase in consumption.

Of the area sown for strawberries, 5% is organic production. Strawberries are one of the few horticultural crops for which the area sown of organic production and the total organic yield have increased in recent years. The increase in organic production is primarily due to demand, and organic production is also expected to increase in the future.

In addition to domestic production, some 3 million kilos of fresh strawberries are imported annually. Spain and Belgium are the most significant countries for imports. The largest batches are imported in the spring and early summer, between April and June, when the supply of Finnish strawberries is still limited and prices high, but consumers are already eager for the strawberry season to start. According to the statistics of Finnish Customs, the value of imported strawberries in April-June has been around EUR 3-4 per kilogram, which is significantly lower than the price of early Finnish strawberries.

The increasing popularity of grow tunnels can be seen in the price development for strawberries. It

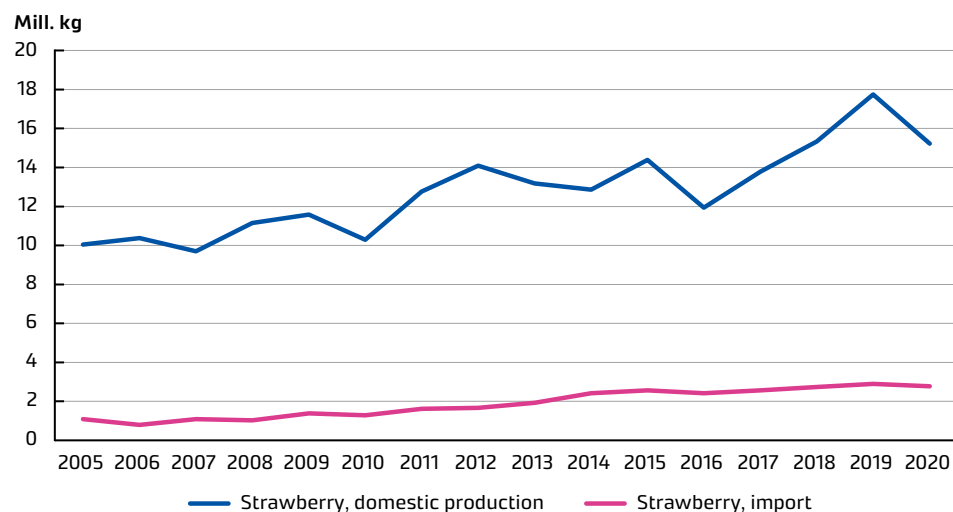
has also resulted in the harvest season starting earlier and on the other hand, continuing longer. The area sown for strawberries grown in tunnels is increasing, and in 2020, it was as much as 44 hectares. The strawberry price is at its highest at the start of the harvest season. The earlier the harvest season of domestic strawberries starts, the higher the price at the start of the season is. In a best-case scenario, tunnel grown strawberries

with higher production costs can be sold before the season for open-air strawberries starts. The price development for strawberries has remained relatively stable in recent decades during the primary harvest season, i.e. the harvest season for open-air strawberries.

The use of waiting-bed plants and grow tunnels could enable further extending the strawberry

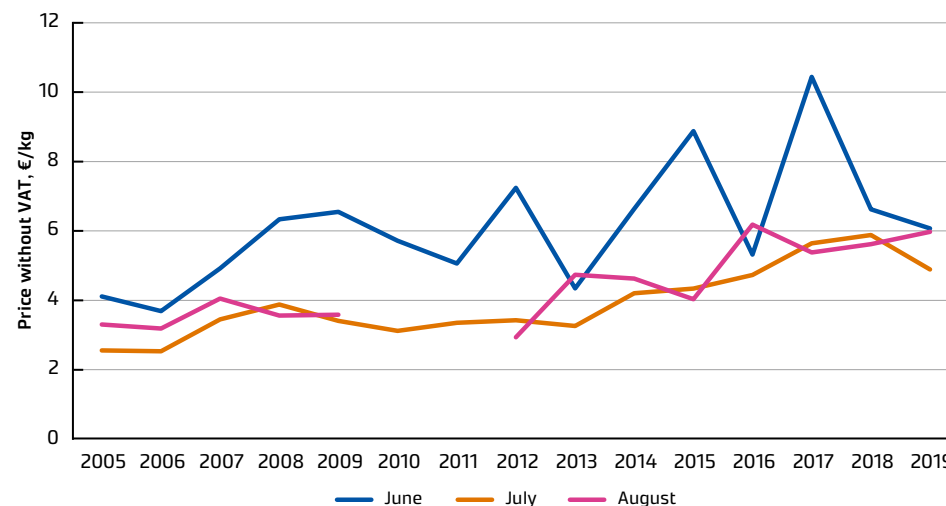
harvest season in the autumn compared with its current season. Consumers' willingness to pay, i.e. the selling price for strawberries, in August has not developed along the same lines as their willingness to pay at the start of the harvest season, which is also evident from the price statistics. It seems consumers are still unwilling to pay a sufficient price for late-season strawberries to cover the higher production costs of late-season cultivation.

Strawberry production and imports



Source: Luke.

The development of the average VAT exclusive price of strawberries per month



Source: Kasvistiето Oy.

Greenhouse vegetable yields increasing

Greenhouse-grown cucumber is a household staple in Finland. The production and consumption of greenhouse cucumber have continued to increase in the last couple of decades. The fact that the European cucumber, eaten fresh and packaged in plastic, has remained the same as a product for decades is remarkable. There has been no proper product development or further breeding of cucumber varieties (excluding the development of completely new varieties), yet its consumption growth curve has been heading upwards in recent decades. Finns consume more than 10 kilograms of cucumber per capita annually.

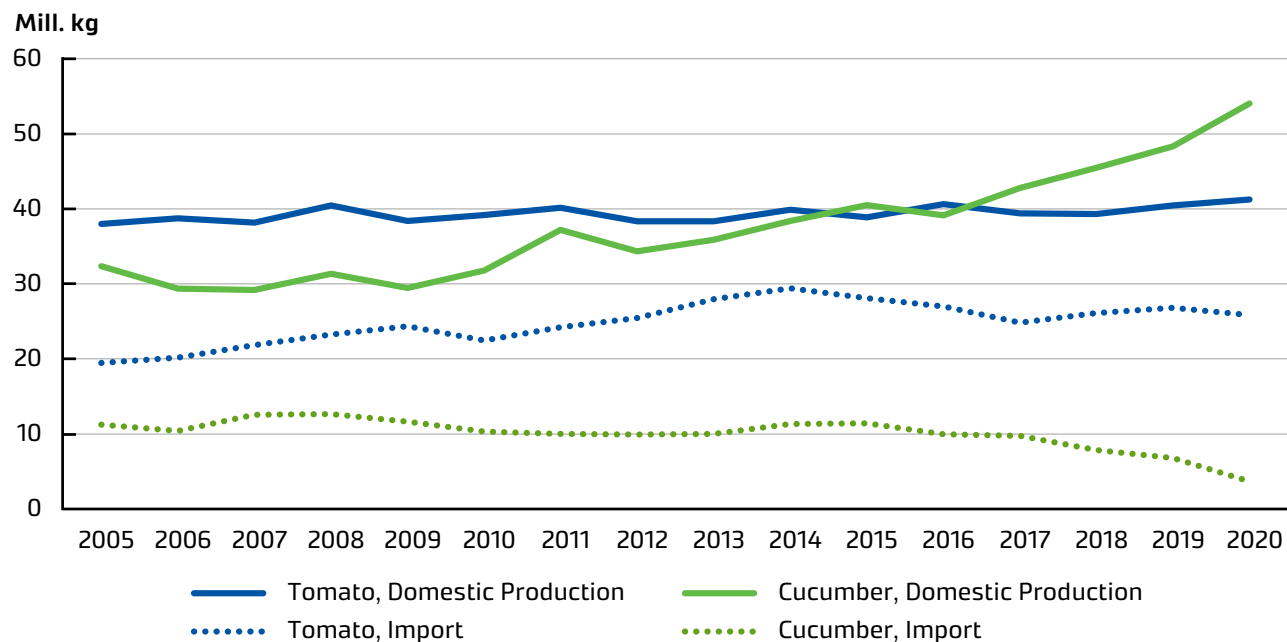
In addition to domestic production, fresh cucumber is imported to Finland, mainly from the Netherlands and Spain. In 2020, only a little under 4 million kilograms of cucumber were imported; a decade ago, more than 10 million kilograms of cucumber were imported. Domestic production has been able to take over some of the market share of imported cucumber, which can be seen in the decrease of import amounts and the simultaneous increase in domestic production.

The total production of tomatoes has remained quite stable for an extended period. Fresh tomatoes are imported significantly more than cucumber,

with an amount of around 26 million kilograms. Spain and the Netherlands are the most significant countries for imports.

As a fresh product, tomato is slightly more versatile than cucumber and more productised, although most tomatoes sold are still round basic tomatoes. The production of special varieties of tomato such as plum tomatoes, cherry tomatoes and trusses of tomatoes has been continuously increasing in recent years and is expected to keep increasing. Their current share is 15% of total production.

Production and imports of cucumbers and tomatoes



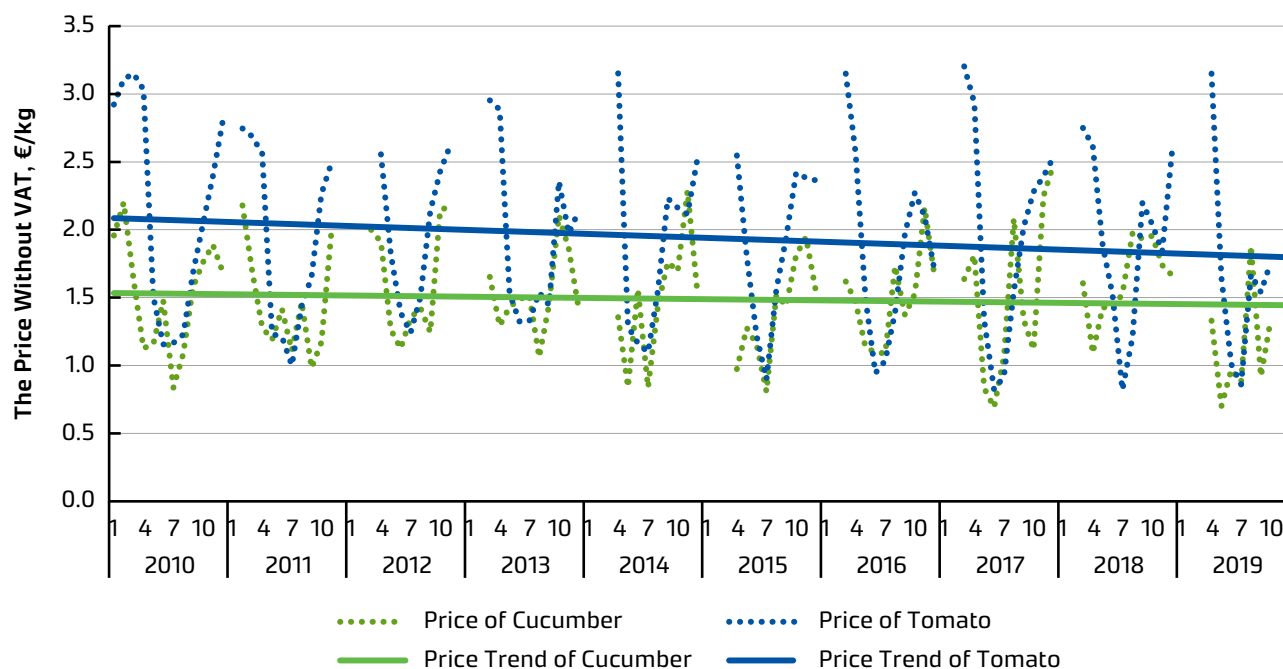
Source: Luke.

Compared with many other EU countries, the production and consumption of tomatoes are still rather limited in Finland, and the market lacks tomato varieties intended specifically for cooking or preserving. Tomatoes are an important vegetable both globally and in Europe, and their total production in Europe is nearly 16.5 million tonnes, most of which is supplied to the food industry. The

largest producer of tomatoes consumed fresh is Spain, with 6.5 million tonnes annually. Finland's share of the total fresh tomato production in the EU is only 0.5%. It should be noted that in the largest production areas in Italy and Spain, tomatoes can be grown in the open air or in plastic greenhouses with a very light structure. In Finland, tomato cultivation requires robust heated greenhouses.

The prices of both cucumbers and tomatoes fluctuate greatly per month, with prices at their highest in the winter and at their lowest in the summer. The trendline depicting the price development shows no significant decrease in price in the last decade to explain the increase in demand. The downward curve of the price trendline for tomatoes is slightly steeper than for cucumbers.

Development of the VAT exclusive producer price of cucumbers and tomatoes



Source: Kasvistieto Oy.

Preparations made for the labour needs of the horticultural sector

Horticulture is a labour-intensive industry. Compared to other production lines in the agriculture and horticulture sectors, the share of foreign workers is large in horticulture, both in open-air and greenhouse production. The share of Ukrainian workers is clearly the largest. Another large group is Russian workers. Open-air horticultural farms have the greatest need of foreign workers. Greenhouse companies hire foreign workforce with longer contracts.

The coronavirus crisis and the restrictions on free movement placed to control it showed that the horticultural sector has become quite dependent on foreign workers. According to a survey conducted by TTS, most horticultural companies had workforce-related difficulties during the coronavirus crisis. The difficulties were related to the availability of workers, the special arrangements required for quarantine, the larger number of employee sick leaves, and the absences resulting from and requirements to self-quarantine in the event of flu symptoms, for example.

Farms have taken precautions early for the workforce-related challenges they expect to face this autumn. They have recruited workers from Finland and abroad. Securing the workforce for the horticulture sector's seasonal work has been defined as critical for Finland's security of supply, and amend-

ments have been made to legislation governing seasonal work to make hiring workers easier, particularly for farms hiring the same people year after year. The mobility of the workforce between farms is also facilitated. It is especially important to take health issues into account, and employers must prepare an occupational health plan for seasonal workers prior to their starting work. The plan must include practices for coronavirus testing and quarantine. These measures aim to ensure the smooth handling of seasonal work this harvest season.

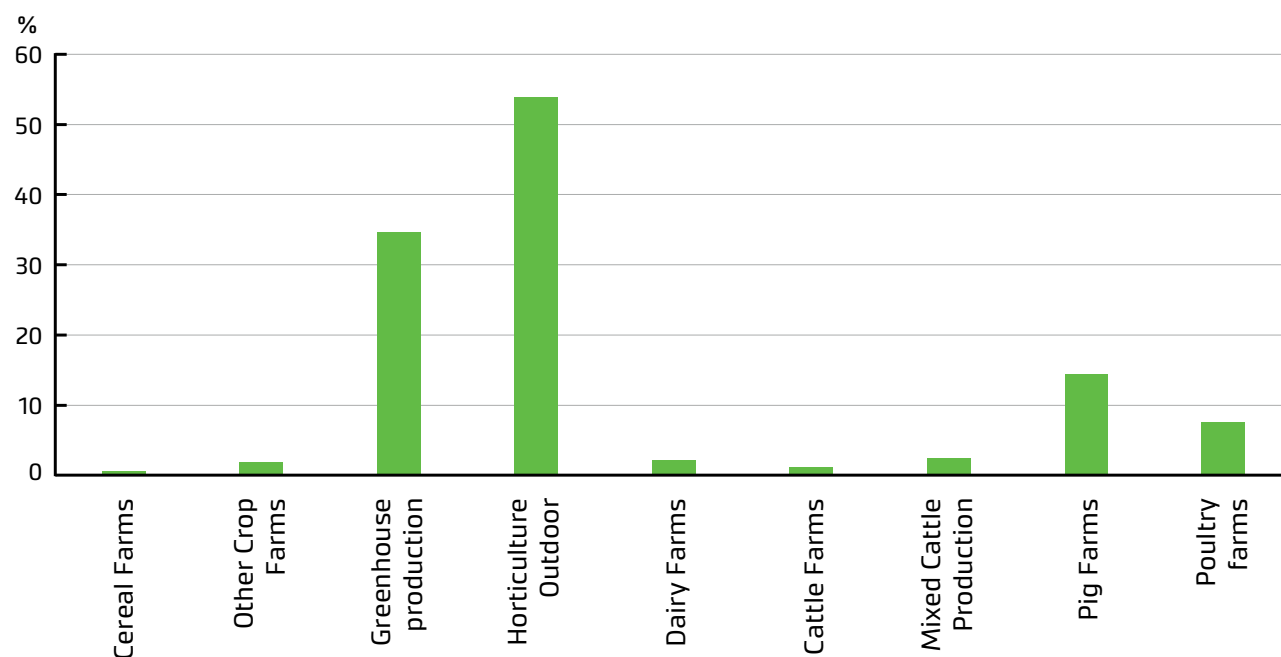
Statistics

Horticultural statistics <https://stat.luke.fi/en/horticultural-statistics>

Agricultural and horticultural labour force statistics <https://stat.luke.fi/en/labour-force>

Foreign trade in agri-food products <https://stat.luke.fi/en/foreign-trade-in-agri-food-products>

Share of foreign labour force by production in 2016



Source: Luke.

Structural development and economic situation of agriculture



Structural development in agriculture

Jaana Kyyrä, Arto Latukka and Minna Väre

In 2020, there were approximately 45,400 agricultural and horticultural enterprises in Finland, which was 1,400 fewer than in the previous year. However, the decrease in the number of farms had no significant impact on production volumes. The fields of discontinued farms were transferred to other farmers continuing production. In addition, unit sizes increased on livestock farms. Farms have also become specialised and increased their production. For example, meat production has increased during the 2000s, although the number of livestock farms has decreased. Similarly, milk production has only decreased by a few per cent, even though the number of dairy farms has nearly halved from the situation ten years ago, and the number of dairy cows has decreased by more than a quarter during the 2000s. The proportion of combination farms has decreased in all livestock production lines.

Production lines and production branches of agricultural and horticultural enterprises

As the number of livestock farms has decreased, the share of crop production farms has grown. In 2020, crop production was the main production line of nearly 70% of farms, and livestock of only 25% of farms, i.e. 11,000 farms. In 2000, there were around 37,000 livestock farms.

Agricultural and horticultural enterprises can be further categorised according to their production line and branch. Farms are primarily categorised into 11 production lines according to their primary operations. The farm's financially most significant product determines its production line. For example, farms with cereals production as their production line can therefore also cultivate other crops or have livestock, but these operations are financially less significant than the farm's cereals production.

In recent years, farms with other crop production as their production line have had the largest share of the total number of farms. In 2020, every third farm was a farm with other crop production as its production line (14,700 farms). Other crop production includes the cultivation of grass crops, pea, potato and caraway. The second largest production line was cereals production (14,700 farms), which was once overwhelmingly the largest production line. The third largest product line was dairy cattle (around 5,400 farms).

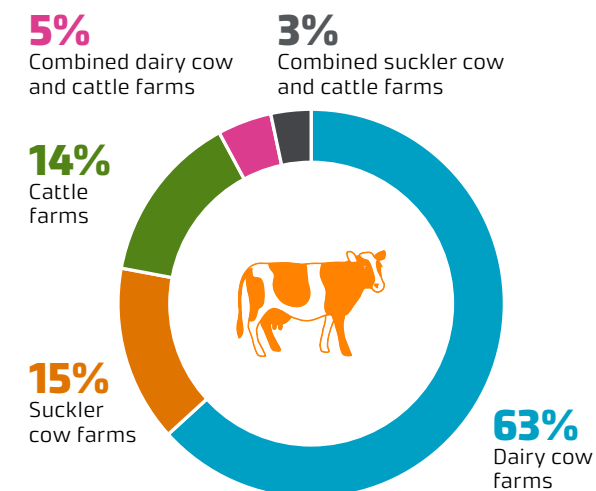
Cereals make up half of Finland's total area sown

Of the agricultural land in use in Finland (2.2 million hectares), nearly half is used to cultivate cereals (around 1 million hectares). The area of grass plants sown was smaller than that of cereals, but around 0.8 million hectares of land were still dedicated to the cultivation of grass. In addition, some 0.2 million hectares are used for fallow, environmental fallow and grasslands for green manure.

The total area of other crops, such as oil crops, potato, pea, caraway and horticultural crops, was less than 0.2 million hectares. For example, the financial output of potato and horticultural crops

was significantly larger than that of cereals. This means that a farm's production line can be 'other crop production', even if most of the farm's field area is dedicated to cereals.

Distribution of cattle farms in 2020



Source: Luke

Rapid decrease in the number of dairy cattle farms

Three production lines are defined for cattle farms: dairy cattle; other cattle; and beef production. The share of dairy cattle farms is the largest. The decrease in the number of dairy cattle farms has been rapid. In 2010, there were around 10,200 dairy cattle farms, but in 2020, there were only around 5,400. The number of farms with an equal financial output from milk and beef production was less than 400 in 2020.

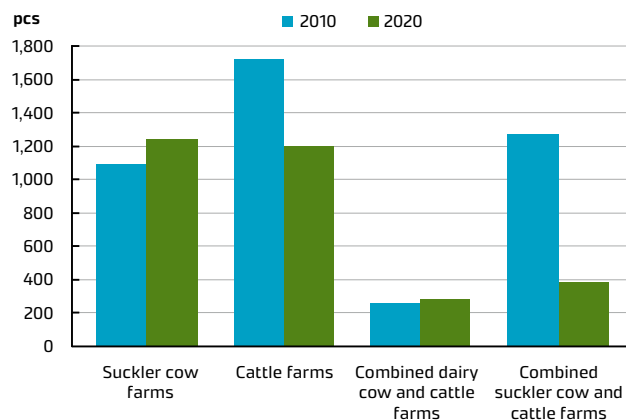
Farms with beef production as their production line are further divided into three production branches: suckler cow rearing; beef cattle rearing; and a

combination of suckler cow and beef cattle rearing. Most farms specialise either in suckler cows or beef cattle. There were 1,200 farms of each in operation last year. Less than 300 farms had combined suckler cow and beef cattle rearing as their production branch.

A farm's production line is defined based on calculations for statistics (Commission Regulation 1242/2008). Production lines are further divided into subcategories called production branches. A farm's production line and production branch are defined based on the farm's animal- and crop-specific financial output. The financial output is calculated using the Standard Output (SO) method.

The type of product from which at least two thirds of the farm's total financial output is gained is considered the farm's product line. If no product line can be determined based on financial output, the farm is a 'mixed farm'.

Farms rearing beef cattle in 2010 and 2020



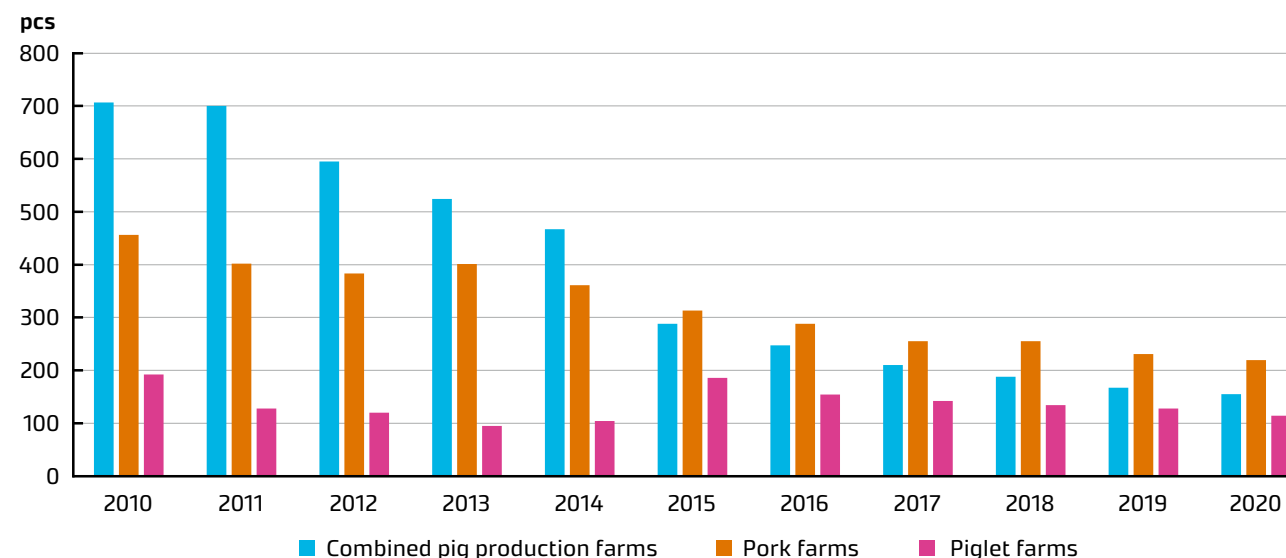
Source: Luke

Combination rearing decreased at pig farms

Less than 500 farms had pig farming as their main production line in 2020. Of these, 110 specialised in piglet production, 220 raised pigs for meat, and 160 farms were engaged in combination rearing. Today,

almost half of all pig farms specialise in raising pigs for meat. The share of combination rearing farms has decreased in the last ten years - more than half of all pig farms were combination farms in 2010, but last year, their share was only 30%.

Number of pig farms in Finland in 2010–2020



Source: Luke

Number of poultry farms increased

Last year, around 420 farms had poultry as their main production line. Of these, 240 farms had poultry meat production as their production branch, and 180 farms were egg production farms. Only five farms were engaged in combined production of meat and eggs. As a deviation from the trend of other livestock farms, the number of farms with poultry as their main production line has increased by 90 farms since 2010. However, the number of farms with egg production as their main production line has slightly decreased in the same period. Nevertheless, eggs are now produced by a larger number of farms overall. In 2019, nearly 1,000 farms had laying hens, of which most had less than 50 chickens.

Farms often switch from livestock production to crop production

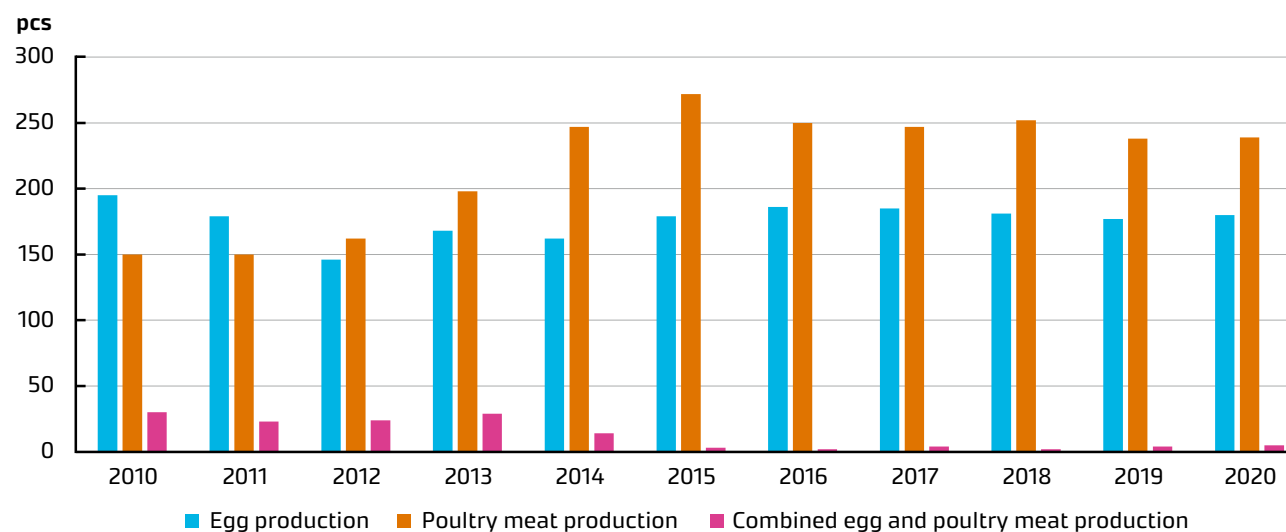
Farms' production lines are determined annually. In extreme cases, a farm's production line can change annually, but the SO typology used to determine production lines reliably shows the structural development of agriculture. In the 'Change of production type' service on the EconomyDoctor website maintained by the Natural Resources Institute Finland, changes in production lines and branches can be viewed in more detail at an annual level.

Comparing the number of agricultural enterprises in consecutive years shows the net decrease in the number of farms. However, it should be remembered that new enterprises entering the

field of agriculture and horticulture, and businesses returning to the field increase the total number of enterprises, which means there has been a larger number of enterprises closing down production than can be interpreted by comparing the total figures.

Luke's 'Change of production type' service, available on the EconomyDoctor website, shows that farms with livestock production as their primary production line are changing their production line to crop cultivation. The enterprises completely closing down their agriculture operations are also mainly livestock farms. New enterprises are set up for all production lines, but the shares of sheep, goat and grazing livestock farms are the largest.

Number of poultry farms in Finland in 2010–2020



Source: Luke

Statistics

Luke's EconomyDoctor, Change of production type www.luke.fi/economydoctor/change_of_production_type

Luke, Structure of agricultural and horticultural enterprises <https://stat.luke.fi/en/structure-of-agricultural-and-horticultural-enterprises>

Luke, Utilised Agricultural Area <https://stat.luke.fi/en/utilised-agricultural-area>

Financial development in agriculture

Jukka Tauriainen

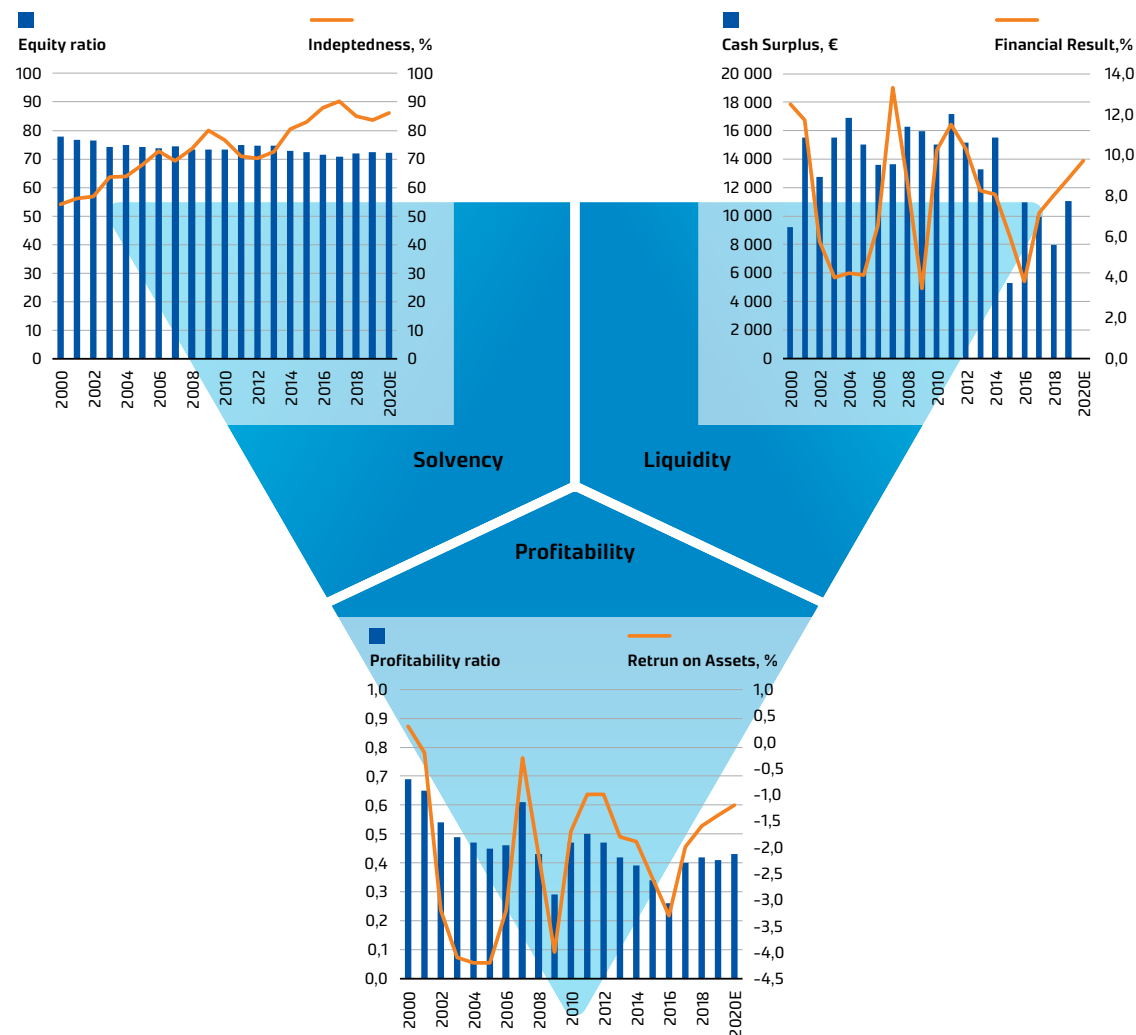
Profitability

Profitability is also the foundation of business in agriculture, and the long-term continuity of business operations are built on it. The return on assets has been lower than interest on long-term state loans throughout the 2000s. This is a sign of businesses not being able to produce added value for the capital invested in them. In calculating the return on assets, the pay adjustment for the unpaid work input of the entrepreneur family is deducted as an expense.

The same conclusion can be drawn from the profitability ratio: the profitability target has not been achieved. The average profitability ratio in recent years has been around 0.4, which means only 40% of the target pay for the entrepreneur's work input and target equity interest has been achieved. Agricultural entrepreneurs have received EUR 7 per working hour, with a return on equity of 1.6%.

Return on assets = (net result + interest) / average total assets

Profitability ratio = entrepreneurial income / (pay adjustment for entrepreneur family + target return on equity)



Solvency

On average, Finnish farms have a good self-sufficiency rate, with more than 70% of capital committed in the business as equity. Averages indicating an acceptable self-sufficiency rate (< 40%) are only found in milk production, beef production and greenhouse production.

The decrease in profitability also affects the farms' debt service ability. During the 2000s, the debt ratio has increased to nearly 90%. This is an alarming trend, as growing unit sizes take up more and more loan capital. At the same time, producer prices are increasing slowly, while increased costs reduce profits and preconditions for profitability.

Self-sufficiency rate = equity on 31 December / (total assets - received advance payments)

Debt ratio = total liabilities on 31 December / gross revenue

Gross revenue = sales revenue + subsidies + other revenue

Liquidity

A business must be able to cover all the ordinary expenses related to its operations. Luke's profitability accounting monitors the liquidity of agriculture enterprises with dynamic cash flow indicators.

According to the liquidity calculation, the average cash flow surplus of farms has fluctuated between EUR 5,000 and EUR 17,000 per year. In practice, a cash flow surplus is any amount left of a farm's cash flow that is available for private expenses. In determining cash flow surplus, all expenses, including taxes and investments, are deducted from the income received and loans taken out by the enterprise. On average, farms can cover their liabilities, but the level of surplus is low. Combined with the large deviation in the key figure, it can be concluded that for some farms in some years, no cash flow surplus is accumulated at all.

The financial result indicates the share of the result available for paying off debt, making investments, and profit sharing to the entrepreneur. There has been considerable deviation in the 2000s, but the financial result has remained positive. In addition to ordinary expenses, entrepreneur families have been able to meet their targets for paying themselves income.

Cash flow surplus = income - expenses - net loans taken out - net investments - taxes

Financial result = (net result + depreciations) / gross revenue

Sensitivity of the income level

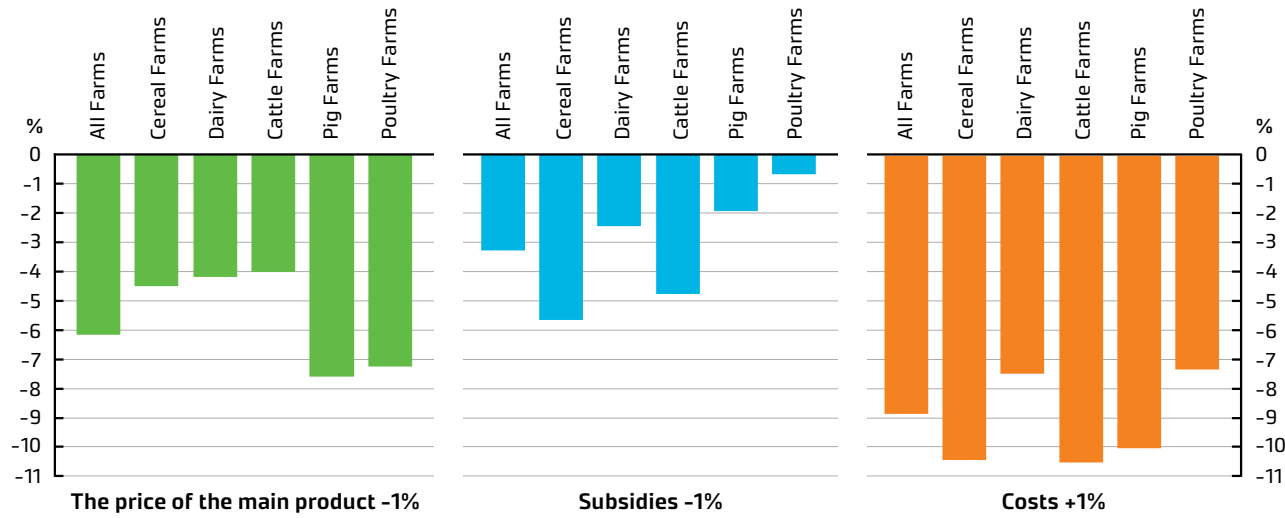
Around 34% of the gross revenue in agriculture comes from subsidies paid to farmers, with the share per enterprise ranging from 5% for greenhouse production enterprises to 66% for sheep farms. The financial status of farms with production lines dependent on subsidies is sensitive to changes in policies. If subsidies are cut by 1%, the entrepreneurial income of farms with cereal or beef production as their primary production line is reduced by around 5%.

The larger the share of a farm's primary product sales from the farm's gross revenue, the more sensitive its financial status is to changes in producer prices or production volume. A change of 1% in the producer price or production volume of pig or poultry farms results in a more than 7% change in entrepreneurial income.

Farm expenses are fairly high relative to income. Here, 'expenses' refers to production costs, excluding the calculated pay adjustment for the entrepreneur's own work input and the target return on equity. Entrepreneurial income reacts strongly to changes in costs. If all costs increase by 1%, the average entrepreneurial income of farms will decrease by nearly 9%. Cereal and beef farms are the most sensitive production lines to changes in costs.

Entrepreneurial income = gross revenue - production costs, excluding the pay adjustment for the entrepreneur's own work input and the target return on equity

Changes in entrepreneurial income if the price of the farm's primary product, the amount of subsidies paid to farmers, or the amount of expenses change by 1%, calculated by weighted averages from 2019.





Special themes



Five aspects of using peat in agriculture and horticulture

Lasse Aro, Titta Kotilainen, Terhi Latvala, Markku Saastamoinen, Niko Silvan and Anne Tolvanen

Towards carbon neutrality

As part of the European Union's (EU) common climate targets, Finland has committed to decreasing its greenhouse gas (GHG) emissions. The EU's target is being climate neutral by 2050, whereas the target set for Finland by Prime Minister Sanna Marin's government programme is more ambitious: being carbon neutral already by 2035. Reaching this target requires both increasing emission reductions in several sectors and strengthening of carbon sinks.

The decrease of GHG emissions in the agricultural sector demands for large-scale changes in the use of peatlands, increase in carbon sequestration as well as changes in the energy use and production of agriculture.¹ Different uses of peat production areas removed from production have a considerable impact on the climate because the areas start to act as either a carbon sink or a source of carbon emissions to the atmosphere.² Hence, their use for cultivation and other land-uses should be assessed carefully.

A rise in the price of emission allowance together with high taxation of energy peat steer the consumption towards carbon-free or low-carbon

alternatives. According to Finnish peat and energy company Vapo, this rise in price has caused peat an extra cost of over €12 per megawatt-hour. Thus, the energy use of peat has declined in the past years much faster than the original target set by the Finnish government, that is, halving the use of energy peat by 2030.³

When the use of peat decreases, there will be changes in the energy and bedding material use on farms and the impacts are reflected not only in agriculture but also in horticulture and particularly in greenhouse cultivation. In this special topic, these impacts are assessed from five different aspects: 1) energy use of peat in agriculture and horticulture, 2) peat as bedding and enrichment material for animals, 3) peat as growing medium in horticulture, 4) sphagnum biomass as peat replacement, and 5) possibilities of biomasses as peat replacements.

Energy use of peat in agriculture and horticulture

In 2016, the total of 11,381 GWh of energy was consumed in agriculture and horticulture, 563 GWh of which was produced by peat. The share of peat in the total energy consumption was 5% which is a bit more than the current share of peat in the total energy consumption in Finland. For energy, 96,000 m³ of loose milled peat, 339,000 m³ of sod peat and 363,000 kg of peat pellets were used. Based on its energy content, the most important material was sod peat and its share was 84% of the consumption of energy produced by peat. In 2010-2016, there were no significant changes in the use of energy peat in the energy volume of consumed peat or in its relative share of the total consumed energy.⁴

The total energy consumption of greenhouse companies in 2017 was 1,628 GWh and the share of peat was 14%. The share of peat in the energy consumption of greenhouse companies in 2006-2017 varied between 6% and 18%. Also in greenhouses, most of peat energy was produced by sod peat.⁵

Peat is usually burned together with other biomass types. Older boilers require a specific minimum quantity of peat so that the boiler's lifetime will not significantly decrease. In newer boilers, peat can be replaced by renewable biomass without technical changes. If peat is omitted from material supply, some of agricultural and horticultural companies have to invest in boilers.

In terms of turnover, peat production was the largest other business activity on a hundred farms in 2016. This number had decreased into a third from 2000. Peat production was included in the business of 160 agricultural and horticultural companies in 2016, and the number of companies had halved in the past three years. The importance of peat production for businesses can be considered small, because about 14,300 farms had other business activities besides agriculture and horticulture in 2016. Agricultural machine contracting was the most common form of contracting, but the statistics do not show which part of it related to peat production.⁶

A decrease in the use of peat in production of heat will have a positive impact on the carbon footprint of products grown in greenhouses. For example, the climatic effect of the production of greenhouse tomatoes in 2017 was reported as 2.6 kg CO₂ equivalents per 1 kg of tomatoes, which meant a decrease of 61% compared with the year 2004. The share of

peat via consumption of heat energy in the carbon footprint of tomatoes was still 38%, even though the use of peat had decreased.⁷

In total, a strong decrease in the share of peat in energy consumption will not probably weaken the operating conditions of agriculture and horticulture in Finland. However, the regional impact might be more serious: for example, the peat sector has the greatest impact in proportion to area size in South Ostrobothnia and in single regions in Northwest Pirkanmaa and North Ostrobothnia.⁸ Furthermore, it should be noted that a considerable decrease in use of peat as energy or its total abolition will hinder the use of peat as bedding materials or growing mediums.

Peat as bedding and enrichment material for animals

Peat has been abundantly used as bedding material in Finland, which is due to its good features as bedding and good availability. Peat used as bedding is coarse peat with low degree of humification, extracted from the bog surface. It has an outstanding ability to bind moist and gases of dung and urine, especially ammonium, and thus to decrease the forming of odours in animal facilities.

The good qualities of peat as bedding material have partly enabled the decrease in the use of antibiotics in animal husbandry. Peat as bedding in broiler houses is an essential part in guaranteeing the health and welfare of broilers. The authorities monitor the welfare of broilers by assessing the footpads of the birds (international footpad index) which is directly related to the good quality of litter. Furthermore, the use of bedding enables species specific behaviour of animals, such as scratching for poultry and rooting for pigs.⁹

Finnish animal husbandry uses about 0.6-1.3 million m³ peat as bedding material annually. The most significant user in terms of quantity is the equine sector. Cattle farms (mainly beef production) also

use large quantities. About 90% of broiler farms use peat as bedding material, and the increasing production of poultry meat will increase the use of peat.

Share of peat in bedding materials used on animal farms and consumption by animal species^{10,11}

	Beef cattle	Dairy cow	Horse	Broiler
Share of peat in used bedding materials, %	29-44	6-24	42-46	90
Consumption of peat, 1,000 m ³ /year	180-280	65-260	370-400	55

The challenge in animal husbandry is to find materials to replace peat which can achieve the corresponding qualities as bedding material and other uses. Additionally, material choices should take into consideration their impacts on the health of both animals and people working at animal facilities^{12,13,14} and on the quality of products.

The replacement should also be at least as good as peat in terms of recycling manure nutrients and other secondary uses. Secondary use can include the use of manure in production of energy, mainly biogas, and as soil conditioner or in landscaping.^{10,15} The good composting of manure both prevents harmful microbes and parasites from growing and contributes the destruction of the germination of weed seeds (such as wild oats).¹⁶

The quick decrease in harvesting of energy peat has an impact in the availability of bedding peat and particularly its price and, thus, the bedding material supply. The harvesting of peat solely for bedding material or growing medium without extracting

fuel peat, which exists deeper in the ground, is not considered economically viable.

Peat as growing medium in horticulture

Globally, about 55 Mm³ of various growing media are used annually, of which almost 40 Mm³ is peat. Other growing media include coconut fibre (about 5 Mm³) and rock wool (about 1 Mm³).¹⁷ The use of peat, rock wool and coconut fibre alike as growing media is challenging due to ecological, social and economic issues.

In Finland, peat is used in horticulture for about 200,000 m³ per year. The global demand for various growing media solutions in both outdoor and greenhouse cultivation is estimated to at least quadruple by 2050. Sales related to growing media is about €1.3 billion in the EU. A Finnish-owned company, Kekkilä BVB, has good export prospects in the global market of growing media.

The quality requirements of growing media vary according to usage, from landscaping and seedling production to professional greenhouse cultivation.

Indeed, the potential of using recycled raw materials varies in accordance with the application. The quality requirements of products targeted to professional plant production are the highest. The commercial importance of cultivation of tall plants, such as tomato, cucumber and pepper, in particular, is significant also globally and at the moment mainly peat or rockwool is used as a growing media. Because the cultivation of tall plants is intensive in terms of production technology and the duration of one crop rotation is several months, it sets special requirements for the growing medium.

Considering commercialization, the manufacturing costs of the growing media or bedding material products and the abundant and continuous availability of material of uniform quality are critical. The new raw materials or manufacturing methods replacing peat need to be sustainable in both economical and environmental perspective.

Sphagnum biomass as peat replacement

There is currently only one Finnish company, Ecomoss Oy in the Biolan Group, which extracts sphagnum. Biolan Oy introduced the first commercial sphagnum-based growing mediums for household and professional use in 2019, and the annual production quantity (in 2020) is about 30,000 m³. There are commercial sphagnum-based brands such as MossWool (growing medium product for professional use) and SammalMultta (peat/sphagnum mix for household use). Currently, sphagnum is still a small growing medium component compared with light-coloured sphagnum peat which is produced in Finland for little less than 2 million m³ annually. There have been considerable investments in the further processing of sphagnum material: Biolan and its subsidiary Novarbo Oy

have invested millions of euros to the industrial processing of sphagnum in their facilities in Eura. Kekkilä Oy, a part of the Vapo Group, also refines significant quantities of sphagnum products but its own extraction quantities have been extremely small batches intended for testing.

Sphagnum is at least as good a growing medium as peat or rock wool. Its superior quality compared with many other growing mediums is its good buffer capacity against moulds. It also has natural mechanisms for protecting itself from rot fungi and plant diseases. As a porous material, the sphagnum base promotes the welfare of roots at the same time as it keeps the growing medium adequately moist. It thus binds water well and delivers water evenly to the plants for use. Sphagnum is quite similar to horticultural peat in greenhouse cultivation as it does not require significant farming-technical changes compared with using horticultural peat. However, sphagnum must be watered more frequently than peat and with smaller dosages. As living material, sphagnum degrades slower than peat and less humus is loosened from it to the irrigation water than from peat, which facilitates the recycling of irrigation water.

Possibilities of biomasses as peat replacements

Possible peat replacements in animal rearing are particularly sought from various secondary material flows, the most important being by-products of the wood-processing industry. A particularly good alternative for bedding for horses is straw as pellets or briquettes produced from secondary flows of agriculture. It is also possible to produce material suitable for beddings by separation of manure. The cost of the replacement bedding material should

be reasonable and its availability good in different parts of Finland and the production should be close to the users. Furthermore, farms should be able to spread the created manure with the technique they already use. Replacement materials are searched in a joint project Renewable litter materials to replace use of peat by the Natural Resources Institute Finland (Luke) and the Finnish Environment Institute (SYKE).

Luke's and SYKE's project studies alternatives

The project Renewable litter materials to replace use of peat by the Natural Resources Institute Finland (Luke) and the Finnish Environment Institute (SYKE) establishes litter alternatives in co-operation with actors in the livestock sector. The project studies the qualities of selected litter materials (such as their capacity of binding liquids and gases) on laboratory scale and in practical piloting tests. There are materials such as common reed, reed canary grass, industrial hemp, reed mace, rape straw, zero fibre and cotton textile partially in some processed form (pellets, briquettes, shreds). Based on laboratory test results and availability, the bedding materials have been pilot-tested in practice with broiler chickens, horses and beef cattle. The environmental impacts of the materials are established by life-cycle assessment. The cost impacts are also evaluated. The project will end and the results will be completed this year. www.luke.fi/projektit/turveke

Sphagnum is also suitable for grow medium in greenhouse cultivation as well as bedding material for poultry, pig and dairy cow farming and equine farms. Sphagnum is at least as good a bedding material as sphagnum peat and its absorbency and antiseptic qualities are better than those of peat. The use of sphagnum as bedding material is limited by its high price and its poor availability. Its use as bedding material has thus been limited to the scale of testing.

Sphagnum has given promising results in growing tests. Luke has tested Biolan's Mosswool grow slabs in a greenhouse in Piikkiö. Cucumber yield on sphagnum-based grow slab was 107 kilograms, whereas the yield was no more than 100 kilograms on peat or rock wool. Additionally, it has been noticed in small-scale commercial farming so far that the yields of greenhouse cucumber are slightly better on sphagnum than on peat.

The most significant disadvantage of sphagnum is currently its price as its cost is twice that of horticultural peat. The significance of price will probably diminish along with the abolishment of peat use, whereby the most important factor will be that the bedding raw materials are renewable and carbon neutral. More regulation is also needed for the extracting of sphagnum.

In horticulture, no single material cannot necessarily replace peat in terms of quantity and, on the other hand, no material alone is not probably directly usable as growing medium in terms of its qualities. For example, promising growing medium materials have been produced by composting secondary industrial flows and reed canary grass in a joint project by Jyväskylä University of Applied

Sciences (JAMK) and Luke¹⁸. A reed canary grass mix has been tested as the growing medium of greenhouse tomato. We still need more research on which secondary flows of wood processing industry will be suitable for the intended use and how they should be processed.

For the part of wood-based materials, such as secondary flows of forest industry, there are still many unstudied technological possibilities for processing them into growing medium. It is possible to develop quicker methods than composting and to utilise already existing pulp, cardboard and paper processes. Instead of closing forestry production facilities, it should be studied if these facilities are suitable e.g. for manufacturing various growing mediums. Furthermore, we need information about the climate and economic impacts of alternative products for their whole life-cycle as well as assessment of economic and social impacts which enables evaluating the repercussions of the alternative products in terms of total sustainability.

Conclusions

Increase in emission allowance price and taxation of peat have quickly decreased the use of energy peat. The extraction of energy peat is also connected with many operations in agriculture and horticulture in uses for heating, bedding materials and enrichment materials and as growing medium. This special topic considered five aspects of decreasing the use of peat.

- Apart from some regions, a strong decrease in the share of peat in energy consumption will not probably significantly weaken the operating conditions of agriculture and horticulture in Finland. As a result of the decrease in the use

of fuel peat, the price of surface peat used as growing medium will rise and, through that, the cost pressure for animal husbandry will rise. The extraction of peat solely for bedding material or growing medium is not considered economically viable.

- Peat has several good qualities as bedding and enrichment material for animals which are difficult to replace by other alternatives. Animal rearing is searching for possible replacements for peat particularly from the secondary flows of agriculture and forestry.
- The global demand for various manufactured growing medium solutions in farming of both outdoor plants and greenhouse plants is estimated to at least quadruple by 2050. Finnish companies would also have increasing export prospects in the global market of growing mediums because the production of outdoor horticultural plants will increasingly transfer to the so-called limited growing mediums and cultivation under cover and greenhouse cultivation will increase as the result of climate change (due to extreme weather, increase of dryness etc.). Pressure to find solutions to replace peat as growing medium will increase.
- From materials replacing peat, sphagnum is particularly suitable for both growing medium and bedding material for animals. There have been significant investments in further processing of sphagnum and the first commercial products are on the market but, at least for now, the price of sphagnum is not competitive. In future, important factors affecting the choice alongside with price

are the renewability and carbon neutrality of growing medium materials.

- There is a continuous effort to find materials to replace peat from secondary flows of agricultural products and wood processing industry. In horticulture, no single material cannot necessarily replace peat in terms of quantity and, on the other hand, no material alone is not probably directly usable as growing medium in terms of its qualities. A lot of research is needed for various materials and their life cycle impacts.

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Packing labels can inform consumers about farm animal welfare

Jarkko K. Niemi

Farm animal welfare is an important part of the sustainability of animal production alongside economic and environmental sustainability. Packing labels can effectively inform consumers about food quality and sustainability. Animal welfare has become more important in food marketing and it is an issue that interests both consumers and companies. Even though welfare is increasingly emphasised in the marketing of food of animal origin, there is no comprehensive farm animal welfare label in the Finnish market. It is important for the success of an animal welfare label that consumers are interested in and aware of the welfare label, actors along the value chain are engaged in quality work extensively enough and the industry is willing to be transparent.

In the Eurobarometer published in 2016, 64% of Finns desired more information about the conditions under which farmed animals are kept and 38% perceived that the choice of animal-friendly food products in shops and supermarkets is insufficient.

Information was requested by especially those respondents who were willing to pay for improved animal welfare. The share of respondents satisfied with the product selection had decreased in ten years from 65% to 46%. While consumers' concerns are partially due to their unfamiliarity with production methods, consumers' attitudes have also changes and the importance of sustainability and responsibility in consumer choices has increased.

In 2016, in the Finnish government report on food policy suggested that a quality label related to animal welfare to support credible marketing of a high-quality domestic products and improve communication of the strengths of the livestock sector in Finland is needed. More attention was to be paid to the quality of production and it was considered important to encourage private food-sector actors to favour foods produced in an animal-friendly way. Recently, the European Union has also looked into the possibility to establishing an EU-wide harmonised animal welfare labelling scheme.

According to the Eurobarometer, 57% of Finns looked for labels related to animal welfare when buying products. The labels were particularly interesting for respondents who were willing to pay for welfare and with better financial status. Furthermore, the Finns thought that the production of goods imported from outside the EU should respect the same animal welfare standards as those applied in European production.

Research results suggest that consumers perceive animal welfare particularly through the concepts of naturalness and humane treatment of animals. Many consumers consider that the current animal production does not comply with these concepts satisfactorily. During the past 25 years, quality labels related to animal welfare have been introduced into markets in various European countries. There are both quality labels that have remained marginal and those having achieved a considerable market share. For example, the market value of meat sold under the Beter leven label in the Netherlands was about €2.5 billion in 2020. The Danish governmental animal welfare label has also quickly achieved a slice of the consumer market.

The standards presented currently by the European animal welfare labels vary from label to label. For some part, current prevent agricultural production methods in Finland fulfil and even statutorily exceed the requirements of many animal welfare labels, but different welfare labels also have requirements which the Finnish production does not automatically fulfil. There has been no comprehensive welfare label in Finland even though there are some products on the market which emphasise animal welfare and the pork industry has planned to extend their Laatuvastuu (quality responsibility) national quality system into an animal welfare label.

Welfare is measured in various ways

Animal welfare refers to the animal's own experience on its physical and mental state. The welfare of production animals can be improved by eliminating factors which affect negatively to the animal's welfare and by increasing positive experiences and possibilities in the animal's life.

Animal welfare should be measured extensively enough from the animal itself and the resources being available to it. Animal-based welfare indicators consider the animal's status and observe e.g. its behaviour, health and output. For example, output or animal's health status can reveal the level of welfare together with other indicators, but on their own they do not tell enough of the animal's welfare. Welfare indicators often describe how well the animal can adapt to its environment.

Resource-based indicators describe welfare by measuring resources available for the animal. Resources are for example quantity and quality of space available for the animal, possibilities for grazing and moving around or the availability of rooting materials. Housing conditions are important enabling factors for welfare but they do not reveal how the animal itself feels. Indeed, welfare should be examined broadly enough and by considering several aspects.

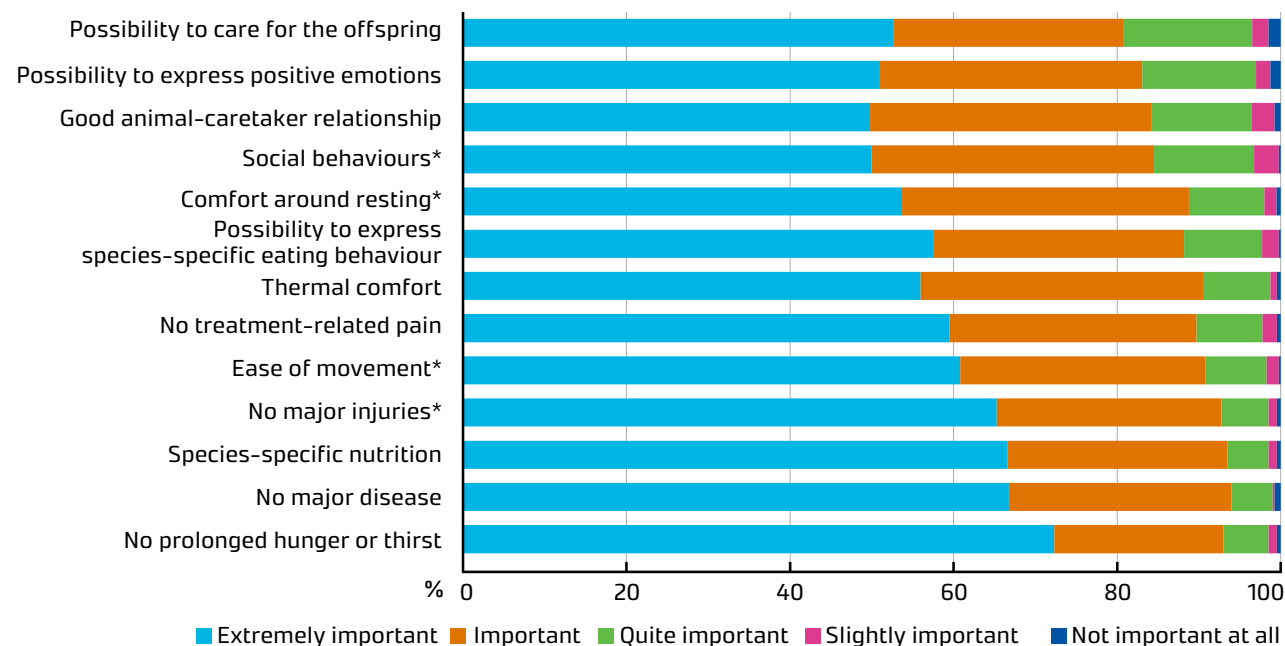
Preventive actions important for consumers

The domestic origin, local origin, healthiness, nutritional content, and small environmental impact of food are the most important qualities of food sustainability according to consumers. In food of animal origin, animal welfare is also one of the important product qualities.

The Finns consider animals' basic needs, such as good and species-specific feeding and good health and the most important characteristics of farm animal welfare. These are followed by factors mainly related to housing conditions, such as ease of movement or comfort around resting, and lastly by factors related to animal behaviour. Animals' behavioural needs are particularly important to those persons who are concerned about or interested in animal welfare. Additionally, good housing and appropriate behaviour are important for many potential buyers of welfare-labelled products.

Good health, absence of pain and stress, good care, and housing environment are very important qualities when designing animal welfare labelling. These can be promoted by measures such as preventive health care, good treatment and handling of animals, grazing, non-tethering or increased freedom of movement, additional space allowance, provision of enrichment materials, rooting and exploration possibilities, and species-specific feeding.

Significance of the welfare criteria of production animals to Finns



Finns' (N=400) opinions on how important they consider that criteria assessed in the Welfare Quality method are fulfilled for Finnish production animals. There was a statistically significant difference between successive criteria designated with the same symbol (*) (Wilcoxon signed-rank test).

Encouragement, involvement and impact in focus

Natural Resources Institute Finland (Luke) and Pellervo Economic Research PTT have studied the possibilities of animal welfare labelling in Finland. The study examined a voluntary labelling scheme related to production methods and quality which promotes animal welfare, describes the production method and product quality of food of animal origin from the animal aspect, facilitates developing the livestock sector and offers consumers choices and assistance in purchase decisions and realising the additional value of the product.

The keys to successful animal welfare labelling are business operators' desire for openness, participation of industry, retailers and interest groups in implementing the labelling, and consumers' awareness of the label and its benefits. Informing consumers requires an adequate, extensive and consistent communication because receiving additional value from the market requires that the consumer understands the benefits of the label. In addition to extensive involvement of actors, it is critical that the monitoring scheme in place is reliable and that quality criteria are understandable and realistic. Finding a consensus between experts and other actors on the criteria of the labelling is essential.

The body governing the label, transparency of the scheme and wide involvement of actors in decision-making were also brought up in the studies of the ClearFarm project as important factors. It is important particularly to producers that they are involved in the decision-making related to the labelling. The consumers' views highlighted the

correctness and reliability of information about the labelling.

The requirements set for the animal welfare label affect how much impact the label can generate. In Europe, there are examples of labels which have set their criteria at a lower start level and labels which have targeted to very ambitious requirements already at the start. From the perspective of the impact of the labelling, the question is then if we wish to improve the welfare of a smaller number of animals a lot or of a larger number of animals less. Labels having achieved larger market shares usually started from the welfare improvements of a large number of animals.

In Finland, the animal welfare payment, payment for advisory services and work done with the health care registers for Finnish cattle herds and pig farms (Naseva and Sikava, respectively) and their further development offer a good starting point for basic-level and comprehensive animal welfare labelling. Along with the LaatuVastuu quality system, other promising alternatives for the first steps of the welfare labelling include e.g. suckler beef cattle which is kept outdoors around the year.

Consumers are willing to pay for welfare

In the study by Luke and PTT, 76% of Finns perceived purchasing a product with an animal welfare label positively. Several studies suggests that consumers are willing to pay a price premium for products originating from animal-friendly farming systems. Consumers are, however, a heterogeneous group of people. While some of them are interested in farm animal welfare and willing to pay a price premium at least for some welfare improvements, others may have no interest in animal welfare.



The Eurobarometer measured the Finns' willingness to pay a price premium for products with enhanced animal welfare: 45% were willing to pay at the most 5%, a fifth were willing to pay 6-10% and a tenth were willing to pay more than 10% premium on top of the base price. However, branding of welfare affects willingness to pay. According to an international meta-analysis, consumers were willing to pay a 31% price premium for dairy products with enhanced animal welfare, 29% for organic milk, 34% for hormone and antibiotic-free milk, 30% for country of origin, 39% for food safety, 25% for grass-based and 25% for environment-friendly labelled dairy products. In beef and mutton, consumers' willingness to pay was about 19% for enhanced animal welfare, 31% for organic and 24% for hormone and antibiotic-free meat, 24% for country of origin information, 23% for food safety, 22% for grass-based and 19% for environment-friendly labelled meat. An older and less extensive meta-analysis found that the price premium for meat was about 14% for animal welfare. These figures are in line with the results of the questionnaire by Luke and PTT on the welfare qualities of pork and mutton.

Willingness to pay for improved animal welfare typically increases with higher income and education. Women are in general more willing to pay for animal welfare than men. Other factors affecting the willingness to pay include way of life, consumption habits and consumer attitudes towards animal welfare. For example, the young are often more interested in welfare than the older persons.

When improving animal welfare is demand-driven, it is important to differentiate high-market and

mid-market welfare level products and markets. With mid-market products, welfare can be promoted more extensively, and a wider consumer group can have a possibility to buy products promoting welfare. For example in the Netherlands and Denmark, such products have gained a foothold in consumer markets. From the impact perspective, it is the better the larger the share of animals is that benefits from certain improvements in welfare. Simultaneously, a larger share of consumers would also benefit from labelled products.

As the price rises, some consumers become excluded at the buyers of welfare-labelled products. Thus, the price premium and cost cannot become too high. The mid-market products might be an interesting, although not always very interesting alternative for consumers who would otherwise buy food of standard quality and for whom the price is often the main driver when purchasing food.

“Consumer acceptance is of critical importance in launching new animal welfare products”

Clear and simple communication is required

Gaining consumers' trust is a key factor for successful labelling. Quality labels are typically committed to continuous improvement of operation and to the communication of the quality of product. Communication should be multichannel and uniform. When launching a new product, one should pay special attention to marketing, sales promotion and highlighting the strengths of the product. The basis of the animal welfare label

should be the description of the production process which is explicit and depicts such value-adding factors which are central to both animal welfare and consumer communications. The label should have both short-term targets which are achievable, and long-term targets which may be more ambitious than short-term targets.

The positioning of welfare-labelled products on the market affects how the consumers perceive them. Products which have been positioned to evoke consumers' emotions and curiosity can steer most effectively the demand towards animal-friendly products. These these approaches are most effective for consumers who base their choice solely on maximizing either self-interest or societal interest.

Generally, consumers are concerned about the sustainability of production, but this concern is diminished on product-level. Even though the consumers recognize packing labels related to sustainability quite poorly, they can still evaluate their meanings. Research suggests that offering additional information on animal welfare to consumers in the purchase situation increases their intention to purchase animal-friendly products.

The communication should take into account the limitations set by the regulations; a product cannot be marketed with qualities it does not have, marketing cannot be misleading, comparative statements should be verifiable, and the product cannot be marketed with qualities which also all other products may be assumed to have (e.g. requirements imposed by law). The welfare label should describe how the labelled product exceeds the minimum requirements imposed by the law

and how it is different from other products on the market.

All packing labels should be easily noticeable, readable and comprehensible. Partially due to legislative requirements, animal welfare is often described by arguments either being comparisons, such as “more welfare”, or depicting the production method, such as free farrowing or outdoor rearing.



Proposition for animal welfare symbol.

Increased quality incurs costs

Increased quality is not created for free. Rather it requires effort at the different stages of the production chain. In addition to the actual welfare measures implemented on farms, costs are incurred by measures to verify the implementation of welfare measures e.g. by an independent external auditor, separation of labelled and non-labelled products, ensuring traceability of the products and communication and marketing of the label.

In order for companies to have an incentive to be part of the welfare labelling, these additional costs have to be covered by additional revenues obtained from the market, by possible productivity improvements, or by other means. Welfare improvements that require investment and repetitive work (e.g. daily routines) as well as handling and separation of small product batches increase costs. The higher

animal welfare requirements bring about more welfare to animals but they also increase the costs, which decreases the demand for product.

Generally, good care of animals, preventive health-care and enhancements in producers' knowhow can be expected to be profitable as such and, in many cases, they improve farm's productivity. In Finland, animal welfare is also produced by means of animal welfare payment, payment for advisory services and investment aid for animal welfare. By means of the animal welfare payment, methods such as free farrowing have become quickly more common in Finland. In order to be able to utilize synergies between schemes, it is important that both the market initiatives and the agricultural policy steer the animal welfare into the same direction.

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Agri-food sector outlook analyses the current situation and the near-term prospects of Finnish agri-food sector.

Description of development in the agri-food sector:

- food production
- food consumption and prices foreign trade in foodstuffs
- agricultural policy
- agricultural structures
- development of economic situation in agriculture

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