E-yearbook of food and natural resource statistics for 2017

Statistical facts on agriculture, forestry, fisheries and hunting in Finland

Natural resources and bioeconomy studies 20/2018

http://stat.luke.fi/en/

Luke
LUONNONVARAKESKUS

Dear reader

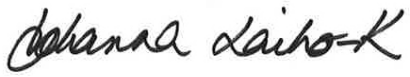
The e-yearbook of food and natural resource statistics is an annual compilation published by the Natural Resources Institute Finland (Luke). This is Luke's third publication of this kind. The publication portrays Finnish bioeconomy and natural resource statistics on agriculture and the food processing industry, the forest sector, and the game and fisheries industry. The publication contains links to our online statistical database.

Luke's statistical e-yearbook is available in the Natural Resources Institute Finland's statistics portal at stat.luke.fi/en/. A printed version can be ordered via Luke's online shop. In the electronic version of the statistical yearbook, links to tables in the online service provide access to up-to-date statistics. Instructions on using the statistics database are available in our online portal.

The editor-in-chief of this yearbook was Development Manager Tarja Kortesmaa, and the text was edited by Communications Specialist Aimo Jokela and Senior Communications Specialist Riitta Salo-Kauppinen. Several of Luke's statistical experts and researchers contributed to the contents and analyses presented in the publication. The layout was designed by Publication Specialist Irene Murtovaara and the infographics by Graphic Design Specialist Essi Puranen.

I would like to thank everyone who contributed to this publication and to Luke's statistics in general for their excellent work and know-how. Feedback and suggestions concerning the publication and our website can be sent by email to tietopalvelu@luke.fi.

Helsinki, December 2017



Johanna Laiho-Kauranne, Director of Statistics, Natural Resources Institute Finland

Twitter: @laihokauranne, @lukefinland

Contents

Agricultural statistics

Agricultural statistics for 2016 5
Structure of agriculture 7
Livestock production 12
Arable crops 19
Horticultural production 22
Use and stocks of agricultural products 24
Producer prices for agricultural products 28
Agricultural land rents 31
Profitability of agriculture 34
Balance sheet for food commodities 36

Forest statistics

Forest statistics for 2016 39
Forest resources 41
Forest protection and biodiversity 45
Silviculture 49
Wood trade 52
Removals and drain 56
Stumpage earnings 59
Profitability of non-industrial private forestry 60
Wood consumption 62
Forest industries 65
Foreign trade by forest industries 68
Finland's wood flows in 2016 71

Fisheries and hunting statistics

Fisheries and hunting statistics for 2016 73
Commercial marine fishery 75
Commercial inland fishery 78
Recreational fishing 80
Total catch in Finland 82
Aquaculture 84
Fish processing 86
Producer prices for fish 87
Foreign trade in fish 89
Profitability of fisheries 92
Fish consumption 94
Hunting 95

Links to statistical services 98

Agricultural statistics

Photograph: Erkki Oksanen / Luke

Agricultural statistics for 2016

The number of agricultural and horticultural enterprises was less than 50,000

There were a total of 49,707 agricultural and horticultural enterprises in Finland in 2016. The number of farms decreased by approximately 1,300 farms on the previous year. Two out of three farms are primarily crop farms and around 30% are primarily livestock farms. Of all agricultural and horticultural enterprises, approximately 14,000 were also engaged in other business activities in addition to agriculture and horticulture.

The number of people working in agriculture and horticulture totalled 115,600, of whom 46,500 were family farmers or shareholders of group holdings. This number has decreased by nearly a quarter from 2013, when the previous statistics regarding the agricultural and horticultural labour force were issued.

Milk production was down on the previous year, egg production grew

Milk production dipped slightly in 2016. Milk production amounted to 2,359 million litres, of which 55 million litres was organically produced. At the end of the year, there were approximately 7,300 milk producers, which is seven per cent lower than in the previous year. Egg production registered a fourth consecutive year of growth, being over 72 million kilograms. A total of 63% of eggs were produced in enriched cages, 32% in barn and free-range hen houses, and 5% came from organic poultry farms.

Meat production reached record numbers

Total meat production amounted to 404 million kilograms, which was just over two per cent more than in 2015. The record numbers in meat production were mainly due to the growth in broiler meat production. However, pork production decreased and beef production rose only slightly compared to the previous year.

Grass, barley and oats had the highest production volumes

In 2016, grass crops were grown on a third of the 2.3 million hectares of arable land in Finland. The second highest production plant was barley, covering one-fifth of total arable land, followed by oats, which was grown on 15% of arable land. The cultivation area of caraway and broad bean has grown over the past few years, but the share of total arable land of each still remains under one per cent.

This year's cereal harvest the second smallest in the 2000s

The cereal harvest in 2016 totalled 3.6 billion kilograms, which was the second smallest in the 2000s. This was mainly due to the decrease in the size of cultivated land. Oats was the only cereal whose cultivation area increased compared to the previous year. The wheat and rye yields decreased by a quarter. Nine per cent of the rye harvest and five per cent of the oats harvest was organic. The organic production of barley, wheat and potato remained under one per cent of the total production.

stat.luke.fi/en/

The growing season was favourable for outdoor vegetable production

Outdoor vegetable production increased by approximately six per cent compared to 2015 and amounted to 174 million kilograms. Carrots were the biggest crop, totalling 73 million kilograms. Tomato production amounted to 40 million kilograms, of which the share of special tomatoes totalled over four million kilograms, i.e. ten per cent of the total tomato harvest. The production of cucumber totalled 39 million kilograms. Raspberry production hit a record level, while the strawberry harvest remained lower than usual.

The food industry consumed one-third of all cereals

The industrial sector consumed a total of 1.3 billion kilograms of domestic and imported cereals in 2016. The food industry consumed one-third of all cereals and the feed industry just under half. The rest was consumed by other industrial sectors. Barley consumption was the highest with 550 million kilograms, of which 200 million kilograms was used to produce animal feed. Consumption of oats in the food industry has risen to the same level with rye, i.e. to over 80 million kilograms.

Producer prices for meat decreased for the third consecutive year

In 2016, the average producer prices for beef, pork and poultry meat decreased for the third year in a row, and the producer price for lamb for the second consecutive year. The producer price for milk fell slightly on the previous year. The producer prices for cereals also took a downward turn. Instead, the producer prices for food potatoes slightly increased compared to the previous year. The producer price for eggs decreased by two per cent on the previous year. Producers were paid 17% more for barn and free-range eggs than for enriched cage eggs.

New statistics about agricultural land rents

The first survey about agricultural land rents was conducted in 2016. The average annual price paid by agricultural and horticultural enterprises for rented agricultural land was EUR 223 per hectare. The rates were highest in Southwest Finland at EUR 350, in Satakunta at EUR 297 and Åland at EUR 272 per hectare and lowest in Lapland and Kainuu (EUR 100 and EUR 98 per hectare, respectively).

Profitability of agriculture continued to decrease

The profitability of agriculture continued to decrease in 2015. The profitability ratio of agriculture and horticulture decreased from 0.37 to 0.32. This is the weakest result in the 2000s. The return on total assets was negative by almost three per cent. In recent years, profitability has been the lowest on cereal farms and other crop production farms.

Poultry meat and egg consumption increased

The total consumption of poultry meat grew by almost nine per cent on 2015, while the consumption of beef and pork remained nearly the same. The consumption of eggs increased by three per cent. The consumption of skimmed milk decreased by almost ten per cent, which was the most of all milk products.

Structure of agriculture

In 2016, the trend in the structure of agriculture and horticulture continued the same as in previous years. The number of farms decreased, the number animal farms the most. The average size of the remaining farms grew, and the average age of farmers increased.

The number of farms totalled around 50,000

The number of agricultural and horticultural enterprises totalled 49,707. The number of farms decreased by approximately 1,300 farms. The average size of farms grew to 46 hectares. About 86% of farms were family-run farms and 8% were farming syndicates, less than three per cent were heirs of the estate, and less than two per cent were limited companies.

Two out of three farms have crop production as their primary production line, and 30% of farms are classified as livestock farms. The rest of Finnish farms are mixed farms with no clear primary production line. Cereal production was the most common primary production sector, and approximately 17,500 farms focused primarily on cereals. Most livestock farms focus on dairy cattle, which was the primary production sector on approximately 7,300 farms.

Average age of farmers is increasing

The average age of farmers was 52 years in 2016. The farmers responsible for the management of farms owned by limited companies were the youngest, and the farmers responsible for farms owned by heirs were the oldest. The average age of the former was 48 years and of the latter 58 years. One in ten farmers on family-run farms was under the age of 35 years, and one in four farmers were over the age of 60 years.

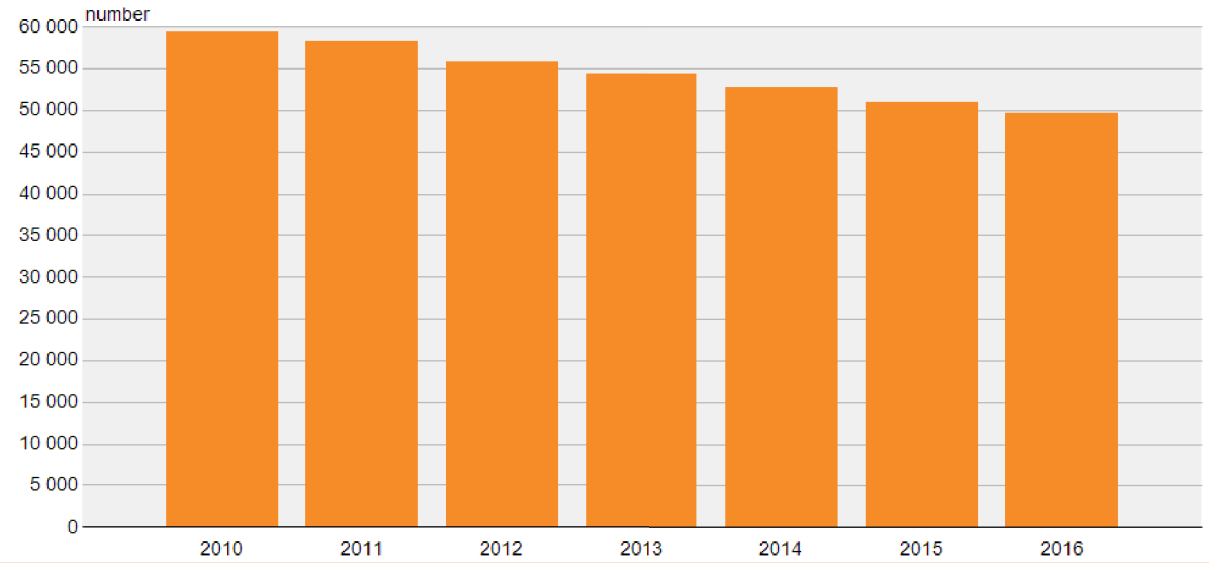
▶ Structure of agricultural and horticultural enterprises

Agricultural and horticultural labour force

The number of agricultural and horticultural labour force is also decreasing. This is partly due to the drop in the number of farms, but the number of workers per farm is also decreasing. The number of people working in agriculture and horticulture has decreased by nearly a quarter from 2013, when the previous statistics on the agricultural and horticultural labour force were issued. The relatively largest decrease has taken place in the number of permanent employees. Furthermore, the number of

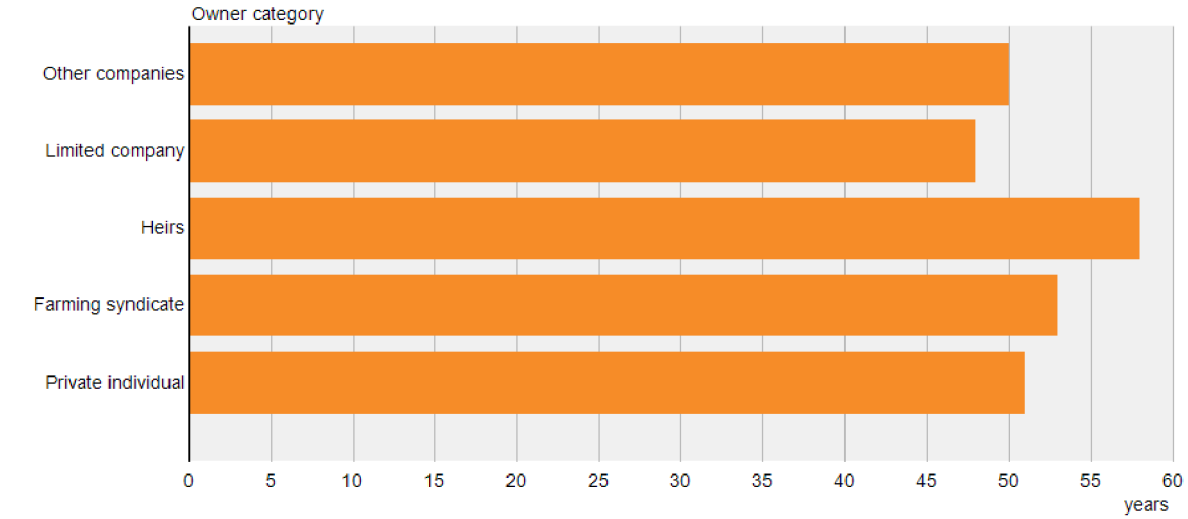
Number of agricultural and horticultural enterprises 2010-2016

▶ Background data as a table



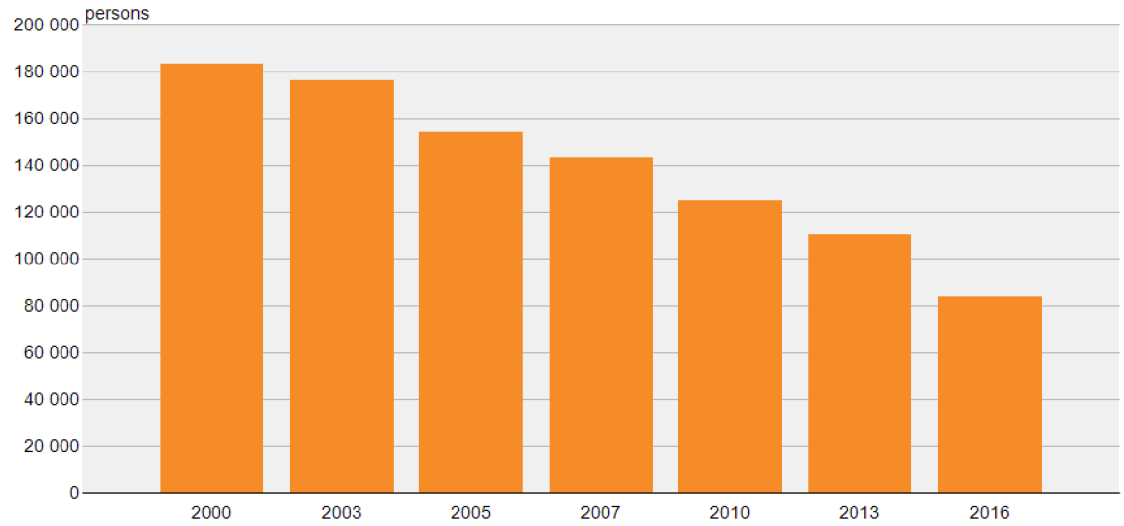
Average age of farmers by owner category 2016

▶ Background data as a table



Agricultural and horticultural labour force 2000–2016

▶ Background data as a table



family members working in agriculture and horticulture has decreased significantly.

Farmers form the largest worker group

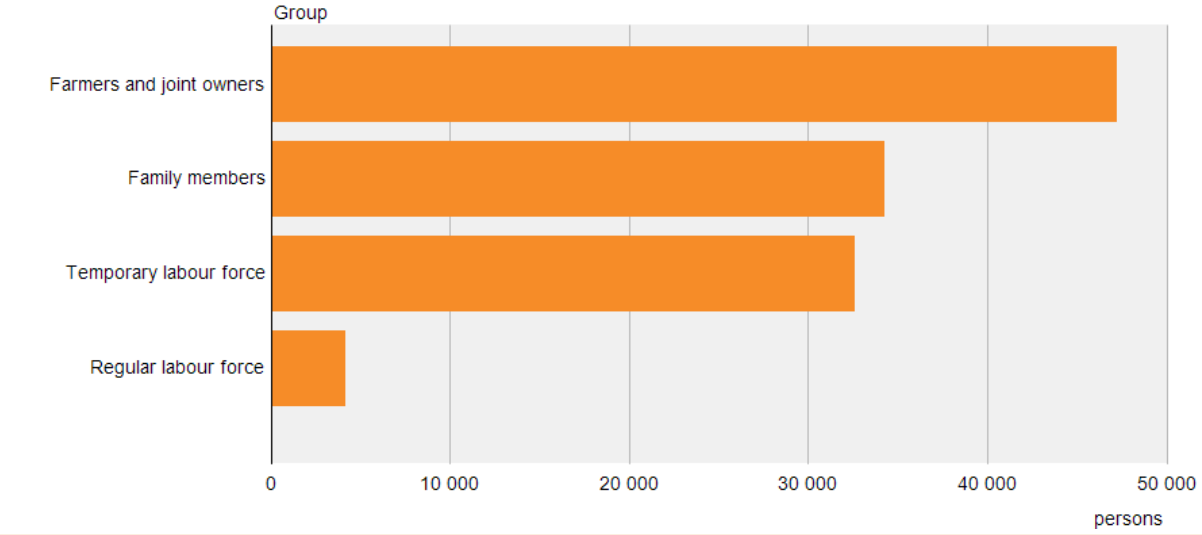
In 2016, agriculture and horticulture provided employment to 115,600 people, of whom 31,900 were temporary workers. Of the total labour force, 46,500 were farmers and shareholders of enterprises, 33,200 were family members, and 4,000 were permanent employees. Farmers and their family members accounted for nearly 70% of all the agriculture and horticulture labour force. The share of foreign nationals totalled 13%.

Around 60,200 person-years were recorded in agriculture and horticulture in 2016. Most work was carried out by farmers and shareholders of enterprises, who recorded a total of 34,000 person-years. Family members performed 13,200 person-years. The workload of short-term temporary labour force was higher than that of permanent employees. Short-term workers performed a total of 5,300 person-years, while permanent employees accounted for 3,500 person-years. In addition, holiday relief staff totalled 3,200 person-years and contract workers 1,200 person-years. The annual workload has decreased by nearly a fifth from 2013. The relatively largest decrease has taken place in the amount of work performed by permanent employees.

▶ Agricultural and horticultural labour force

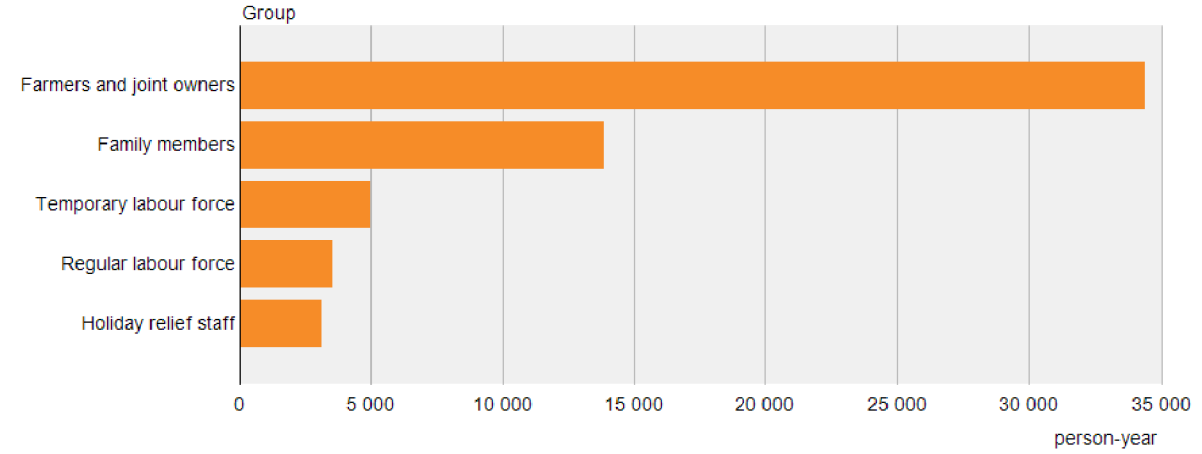
Number of persons who worked in agricultural and horticultural enterprises 2016

Background data as a table



Annual work performed in agricultural and horticultural enterprises 2016

Background data as a table



Other entrepreneurship in agriculture and horticulture

Approximately 14,000 farms were engaged in other business activities in addition to agriculture and horticulture in 2016. The number of farms has decreased by roughly 2,900 farms since 2013. Relatively speaking, the number of farms engaged in other business activities has decreased by two percentage points.

Other business activities employed approximately 22,000 people, who performed in total 8,800 person-years. The workload of hired labour is increasing In 2016, hired labour spent approximately 3,700 person-years performing work in other entrepreneurship, while farmers accounted for nearly 4,000 and family members approximately 1,200 person-years. Since 2013, the workload performed by farmers and family members has decreased considerably more compared to hired labour.

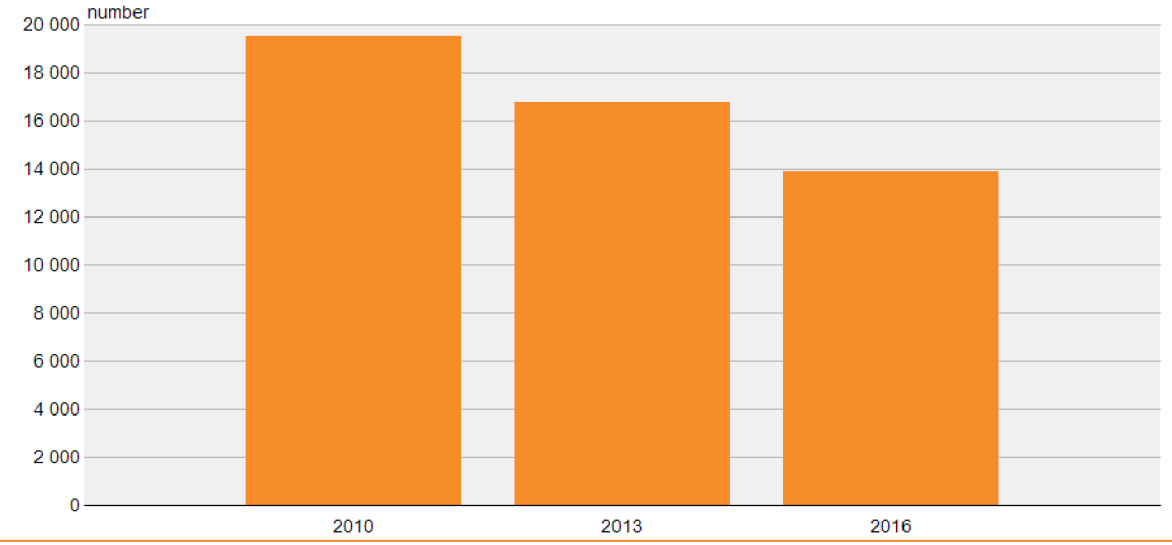
Contracting is the most common business field

Other business activities typically concern the production of various services. Contracting, such as agricultural machine contracting, snow ploughing or road maintenance, is the most common form of other business activities. In 2016, roughly 7,000 farms acquired additional earnings through contracting. Many farms also obtain additional earnings from leasing out holiday homes and offering other travel services, as well as from various horse services.

Other entrepreneurship in agriculture and horticulture

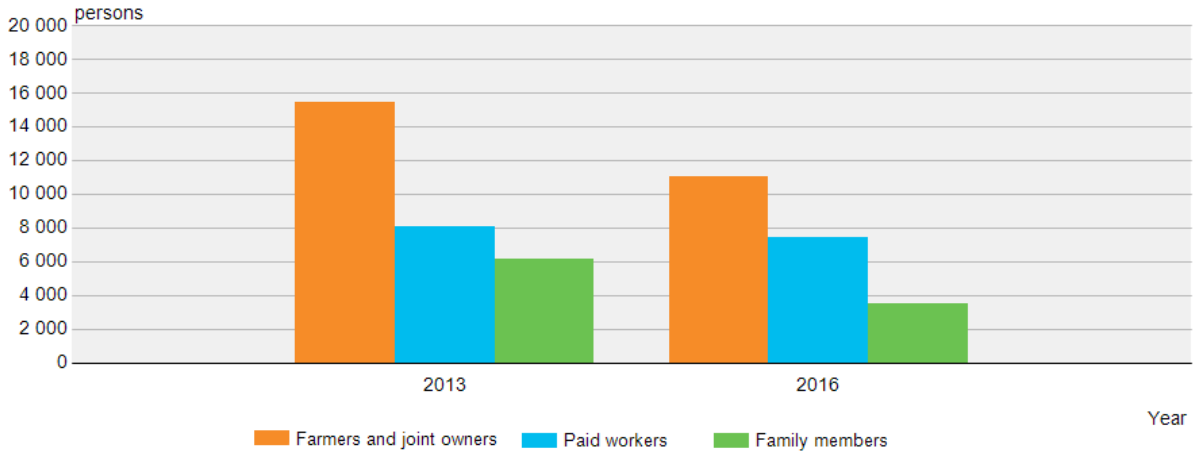
Number of diversified agricultural and horticultural enterprises

Background data as a table



Number of persons participating in other entrepreneurship 2013 and 2016

Background data as a table



Agricultural and horticultural energy consumption totalled around 10,000 GWh

Energy consumption of agriculture and horticulture has remained fairly stable. Based on the consumption figures, the most significant energy source was wood chips (2,767 GWh), which are used in heating, followed as close second by motor fuel oil (2,233 GWh), which is used in tractors and other machinery.

Heat production relies strongly on domestic energy

More than half of all energy consumed was wood- or peat-based, i.e. came from domestic sources. In boilers that operate on solid fuel, it is often possible to use a variety of fuels and fuel mixtures. Peat pellets, which have consistent quality, are particularly suitable for supplementing wood-based energy sources, because it can reduce corrosion in the boiler.

Drying of cereals depends on the autumn

Drying of cereals can form a significant cost on a farm. The drying need varies from year to year; in 2016, the consumption of fuel oil for drying of cereals totalled 664 GWh. Migration to the use of solid fuels in dryers is hindered by the high cost of replacing equipment in relation to their short annual running time.

The significance of electricity in agriculture is growing

The significance of electricity for agricultural and horticultural enterprises is great. Farm technology mostly relies on electricity as computers are increasingly responsible for controlling elements of production such as circulators, air conditioning, feeding, and monitoring. One of the main consumers of electricity is greenhouse enterprises, which need electricity for grow lights during winters. The total consumption of electricity in 2016 was approximately 1,577 GWh, i.e. 16% of the total energy consumption.

Agricultural and horticultural enterprises also produced their own electricity. The energy sources included, for example, solar panels, biogas plants, wind power, heat pumps, and hydropower. Of all electricity consumed in 2016, approximately one per cent, or 13 GWh, was produced on farms. Electricity is mostly produced for private use, and only possible excess is supplied to the national grid. Own production is still at a low level, but the particularly the popularity of solar panels is increasing.

Some farms are prepared for power outages. Most have a portable generator or a tractor-operated generator unit in use, which can safeguard critical operations on the farm at least temporarily. In 2016, 41% of farms had in use a secondary power supply.

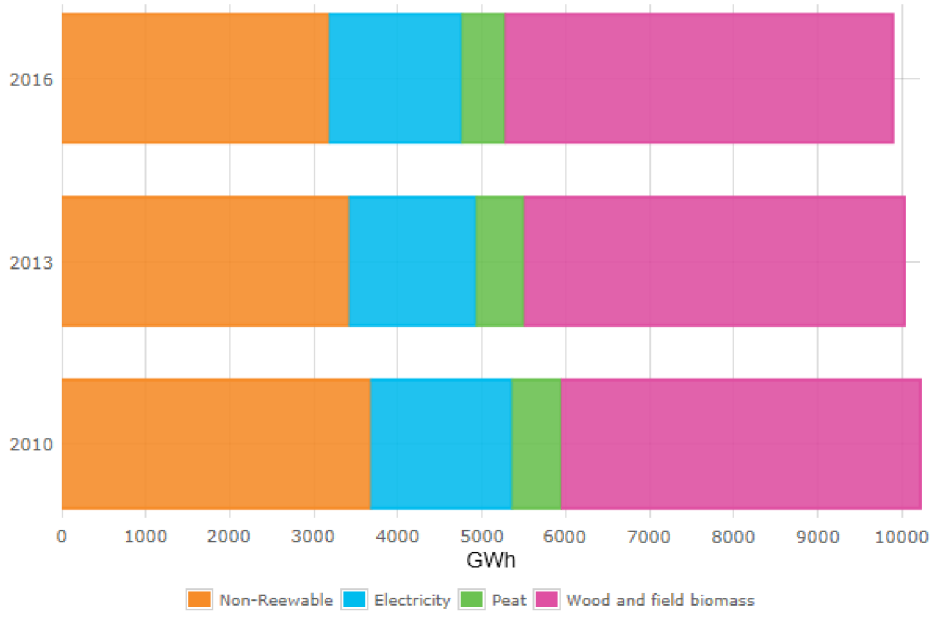
Statistics on agricultural and horticultural energy consumption are compiled every three to four years in connection with the survey investigating the structure of agriculture. The latest survey was carried out in 2016, and the next one will be performed in connection with the 2020 agricultural survey.

▶ Energy consumption of agriculture and horticulture

Photograph: Anna-Kaisa Jaakkonen / Luke

Energy consumption of agriculture and horticulture 2010, 2013 and 2016

▶ Background data as a table



Livestock production

The production of meat reached record numbers in 2016, mainly due to the growth in poultry meat production. Milk production dipped slightly on the previous year, but the production of organic milk increased. Egg production increased in 2016 to the highest level since 1995.

Organic milk production continued to grow

Milk production amounted to 2,359 million litres last year, which is slightly less than in the previous year. This amount also covers the estimated milk consumption on farms. The production of organic milk continued to grow. Organic milk production amounted to 55 million litres, which is nearly two per cent more than in the previous year. The production volumes still remain at a low level: the share of organic milk of the total volume of dairy milk production was slightly over two per cent.

The number of milk producers continued to decrease. At the end of 2016, there were a little over 7,300 milk producers in Finland, which is seven per cent fewer than at the same time in 2015. The number of organic milk producers totalled around 139 producers.

The number of producers has dropped to almost half in ten years. Despite the decrease in the number of farms and cows, the volume of milk produced in 2016 was higher than ten years ago. At the same time, the average production amount of cows has increased by 760 litres. In 2016, the average cow produced 8,400 litres of milk. The average volume of milk supplied to dairies was over 300,000 litres per farm.

Milk production peaked in the 1960s, when the volume of milk reached 3,700 million litres at the highest.

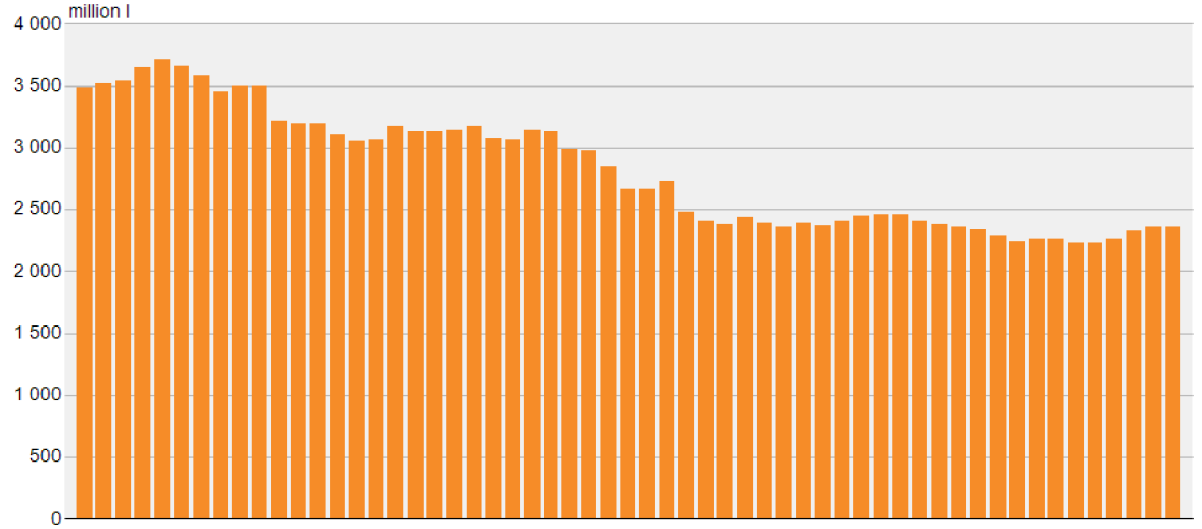
The largest milk producer municipality was Kurikka

Due to the municipal merger between Kurikka and Jalasjärvi at the start of 2016, Kurikka became the biggest milk producer municipality in the country. Kurikka produced only slightly more than the second biggest producer Kuopio: both produced over 55 million litres of milk. The next biggest milk producers were Kiuruvesi and Kokkola.

There are milk producers all over Finland; the northernmost dairy farms are located in Utsjoki. Just under 54% of

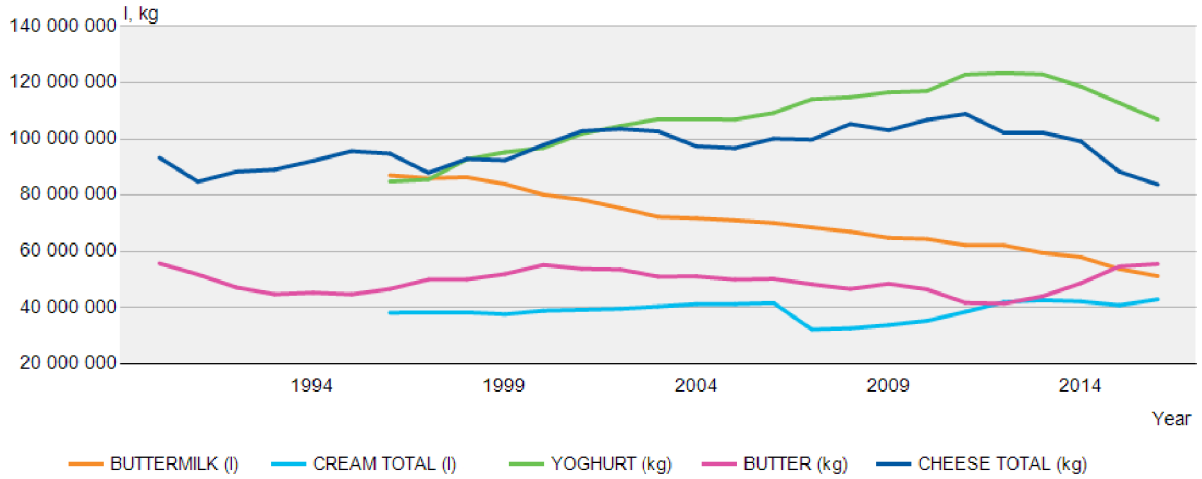
Milk production 1960–2016

▶ Background data as a table



Production of milk products 1990–2016

Background data as a table



Photograph: Tapio Tuomela / Luke

all milk is produced in Northern Savonia and in Ostrobothnia, which both have a strong history of milk production.

Production of fresh dairy products and cheese fell while butter production increased

The production of fresh dairy products amounted to approximately 900 million kilograms in 2016, which was around three per cent less than during the previous year. The production of milk, sour milk and yoghurt fell while the production volumes of cream and viili (a type of curd milk) grew. Of all fresh dairy products, milk accounted for 73%, yoghurt for 12%, sour milk for 6%, cream for 5%, and other fresh dairy products for 4%.

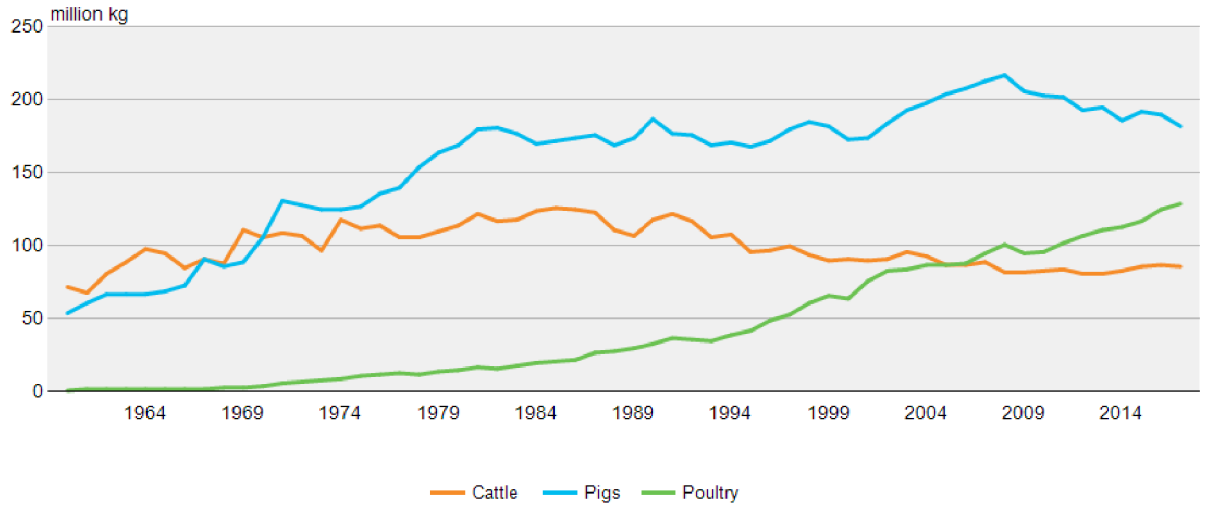
Cheese production amounted to 84 million kilograms, which is five per cent less than during the previous year. Butter production amounted to just over 55 million kilograms, which is almost two per cent more than in the previous year. Since the compiling of statistics began in the 1990s, butter production has reached a higher volume only in the year 1990. The production volume of cheese, on the other hand, was the lowest for the entire statistical period. Russian import restrictions and the poor market situation have contributed to the increase in the production volumes of butter and powders and to the decrease in the production of cheese and fresh dairy products.

Milk and milk product statistics

Milk production by area

Beef, pork and poultry meat production 1960–2016

Background data as a table



Meat production reached record numbers

Meat production amounted to 404 million kilograms, which was just over two per cent more than in 2015. The record number was mainly due to the growth in poultry meat production. However, pork production decreased and beef production rose only slightly compared to the previous year. Pork accounted for half, poultry meat for almost 30%, and beef for approximately 20% of the total amount of meat produced.

Beef production slightly increased from the previous year

Beef production increased to just under 87 million kilograms. The slaughter volume of bulls decreased while the slaughter volumes of cows and heifers rose. The average slaughter weight was 347 kilograms for bulls, 243 for heifers, and 283 for cows.

Similarly to previous years, the biggest beef producer was Kiuruvesi with 3.4 million kilograms, followed by Kuopio, Kurikka and Kauhava.

Domestic beef production is mainly based on dairy cows, which means that the decline in the number of dairy cows has also decreased the volume of beef production. An increase in the number of suckler cows and higher slaughter weights have slowed down the decline in beef production volumes.

Since the compiling of statistics began in the 1950s, beef production volumes have been at their highest in the mid-1980s, when 125 million kilograms of beef was produced.

Less pork than during the previous year

Just over 190 million kilograms of pork was produced in 2016, which was approximately one per cent less than during the previous year. Although the slaughter volumes of pigs grew, the average carcass weight decreased by a kilogram from the previous year to just under 91 kilograms.

Production volumes of pork have been at their highest in 2008 (217 million kilograms) and at their lowest in 1960 (54 million kilograms).

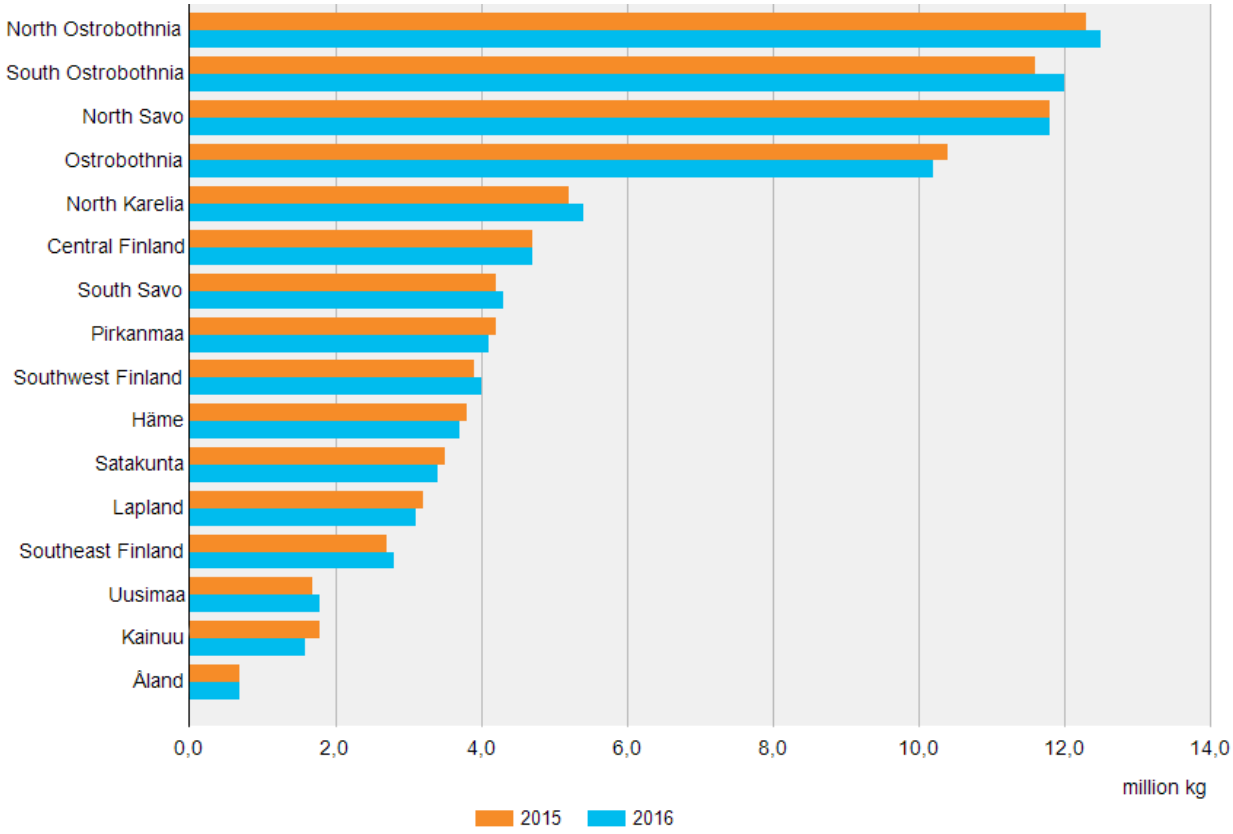
Pork is produced throughout the country, with the exception of the northernmost Lapland. The northernmost piggeries are located in Rovaniemi. Pork production is increasingly concentrated in the fertile cereal production regions of Southwest Finland, Southern Ostrobothnia and Ostrobothnia. The combined production volumes of these regions account for 63% of the total production volume.

Another record in poultry meat production

Poultry meat production continued increased to just over 125 million kilograms, which is another record. Production grew for the seventh year in a row. Broiler meat production increased by seven per cent on the previous year. Turkey meat production also grew. The share of broiler meat of the total poultry meat production was just over 90%.

Beef production by ELY Centre 2015 and 2016

▶ Background data as a table



Organic meat accounted for around one per cent of total meat production

Organic meat production amounted to just over 4.3 million kilograms, which is five per cent more than in the previous year. The share of organic meat of the total meat production was small, just over one per cent. Beef accounted for 67%, pork 22%, lamb 7% and poultry 4% of the total organic meat production.

▶ Meat production

▶ Meat production by area

Egg production volume was the highest since 1995

Egg production registered a fourth consecutive year of growth, being over 72 million kilograms. Last year's production volume was the highest in around 20 years, as the last time more eggs were produced was in 1995. The production of organic and can cage eggs increased, while the production of barn and free-range eggs slightly dropped. A total of 63% of eggs were produced in enriched cages, 32% in barn and free-range hen houses, and 5% came from organic poultry farms.

▶ Egg production

The number of dairy cows continued to decrease

Farms had a total of 909,000 cows, which was almost one per cent less than a year earlier. Cows were kept on a total of 11,790 farms.

Dairy cows numbered just over 282,400 in the spring of 2016, which is about one per cent less than in 2015. The average number of cows per farm was 35 cows. The average number of farms with over a hundred cows totalled around 370 farms.

The number of suckler cows has increased almost every year in the 21st century, and it has almost doubled in the last ten years. The number of suckler cows grew slightly to 59,000 last year.

The highest numbers of suckler cows and dairy cows were recorded in Northern Ostrobothnia and Northern Savonia.

The number of pigs was the highest in Huittinen

Pigs were kept on 1,240 farms in the spring of 2016, and they numbered approximately 1.23 million, which was slightly less than during the previous year. Sows numbered approximately 95,400, i.e. their number has dropped by seven per cent over the year. The number of pig farms has more than halved in ten years. Over the same period of time, the number of pigs has dropped by approximately ten per cent and the number of sows considerably more than that.

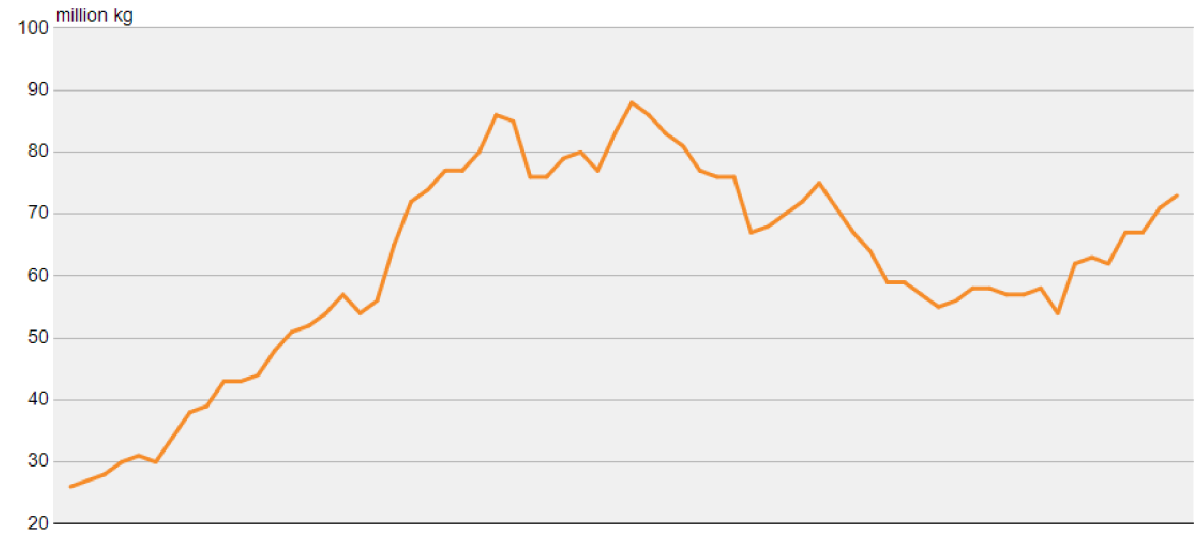
In 2016, there were pig farms in approximately 190 municipalities. The highest pig numbers were recorded in Huittinen, Uusikaarlepyy and Loimaa.

Chicken numbers were the highest in Southwest Finland and broiler numbers in Ostrobothnia

At the beginning of April, there were approximately 13 million poultry on farms. Broilers accounted for just over 60%, chickens for almost 30%, and turkeys, broiler breeder hens and other poultry for 10% of the total. Poultry were kept on a total of approximately 1,300 farms. The number includes all farms that have at least one poultry bird. In other words, the total number also includes a large number of farms with only a few birds. Poultry production was the main production line on 400 farms.

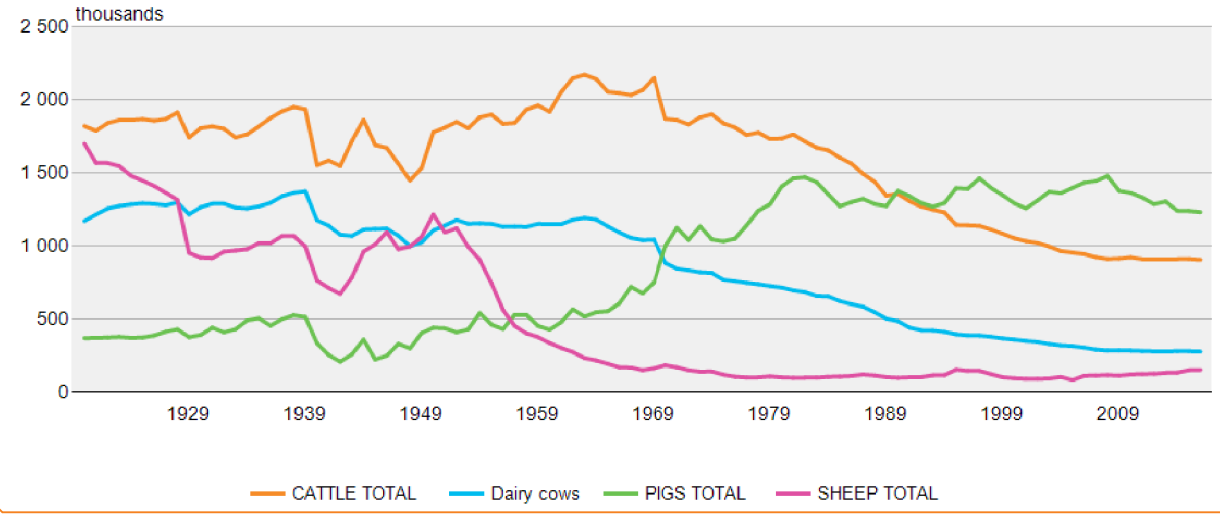
Egg production 1951–2016

Background data as a table



Number of cattle, pigs and sheep 1920–2016

Background data as a table



At the beginning of April, broilers numbers approximately eight million, and they were kept on 139 farms. Overall, the number of broiler farms totalled 190 farms.

The number of chickens on farms numbered just under 3.6 million. Over 65% of all chickens were kept on farms in Southwest Finland. Chicken numbers were the highest in Loimaa, Oripää and Laitila.

Sheep numbers at their highest in 20 years

Sheep numbers grew to around 156,500, of which just over 76,000 were ewes. Sheep were kept on 1,470 farms. The number of sheep and sheep farms has been increasing in recent years, as the sector has attracted new entrepreneurs.

Last year marked the highest sheep numbers in over 20 years. In light of statistics, sheep numbers have been the highest in the 1920s (1.7 million) and the lowest in the 2000s (90,000). There are sheep farms all over the country. The highest sheep numbers are found in Southwest Finland, Ostrobothnia and Lapland.

▶ Number of livestock

Reindeer husbandry is regulated by law

Reindeer herding area is a geographical area defined by law in which reindeer herding may be practised. The reindeer herding area comprises the almost entire region of Lapland and the northernmost areas of Northern Ostrobothnia and Kainuu. The area covers over a third of the entire territory of Finland. The reindeer herding area is divided into 54 reindeer herding cooperatives. In 2016, the number of reindeer owners totalled just over 4,400 people.

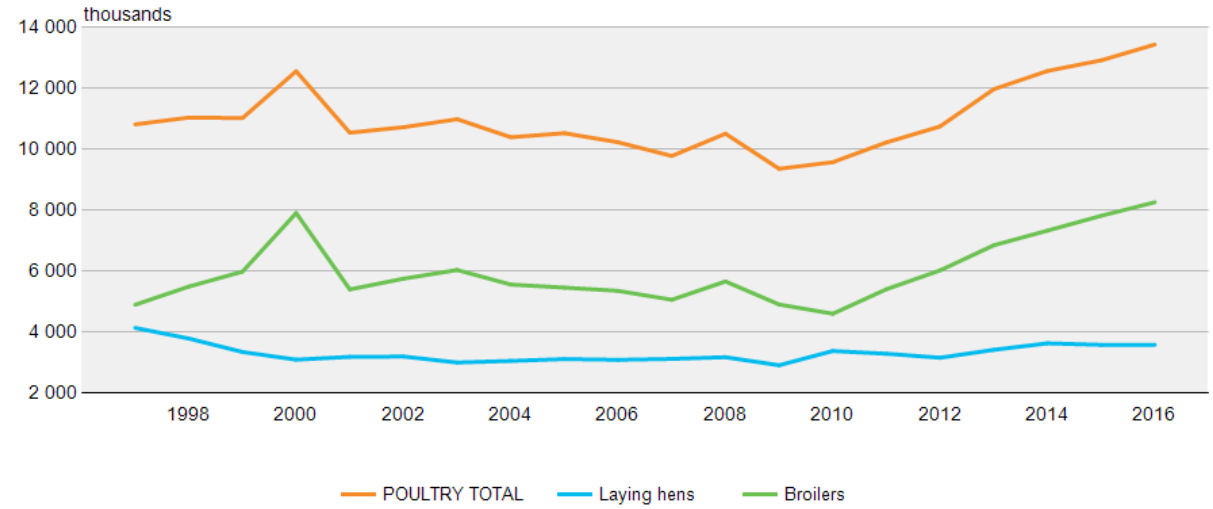
The Ministry of Agriculture and Forestry regulates the number of reindeer. Currently, the total number of living reindeer, i.e. reindeer other than reindeer intended to be slaughtered during the year in review, may not exceed 203,700 animals. In the 2016/2017 reindeer husbandry year, the number of living reindeer totalled 193,142. The production volume of reindeer meat fluctuates from year to year mainly based on the natural conditions and damage caused by carnivores. In 2016, reindeer meat production volume totalled just under two million kilograms.

Beekeeping and honey production

Around 80% (2,565 in 2016) of Finnish beekeepers were members of the Finnish Beekeepers' Association. The members included both those who keep bees as a hobby as well as professional beekeepers. There are in total around one hundred professional beekeepers in Finland. Beekeeping is practised almost throughout the whole of Finland. The majority of the production of honey and bee products is concentrated in Southern and Central Finland. The total number of honey bee colonies in Finland is currently around 54,000. The amount of honey pro-

Number of poultry 1997–2016

▶ Background data as a table



Reindeer husbandry in 2016

Number of reindeer	Reindeer meat production	Total number of reindeer owners
193,142	1.9 million kg	4,430

Source: Reindeer Herders' Association

Honey production in 2016

Total production volume	Average production per colony	Number of bee colonies in spring
1.2 million kg	26 kg	52,000

Source: Finnish Beekeepers' Association

duced per colony varies greatly depending, for example, on the weather and geographical location. Average long-term honey production per one colony totalled around 39 kilograms. The production volume of the last production season was smaller than in a few previous years, totalling on average 26 kilograms, while the total production volume remained at 1.2 million kilograms.

Photographs: Tapio Tuomela / Luke

Arable crops

Over the last hundred years, the arable area in Finland has gradually increased. After independence, the arable area steadily grew over a period of two decades from around two million hectares to 2.6 million hectares. During the war, the arable area shrank by approximately 300,000 hectares.

The arable area was restored back to its pre-war size within two decades, and it reached its largest surface area so far in 1968. However, the area then decreased again by around 300,000 hectares in just a few years.

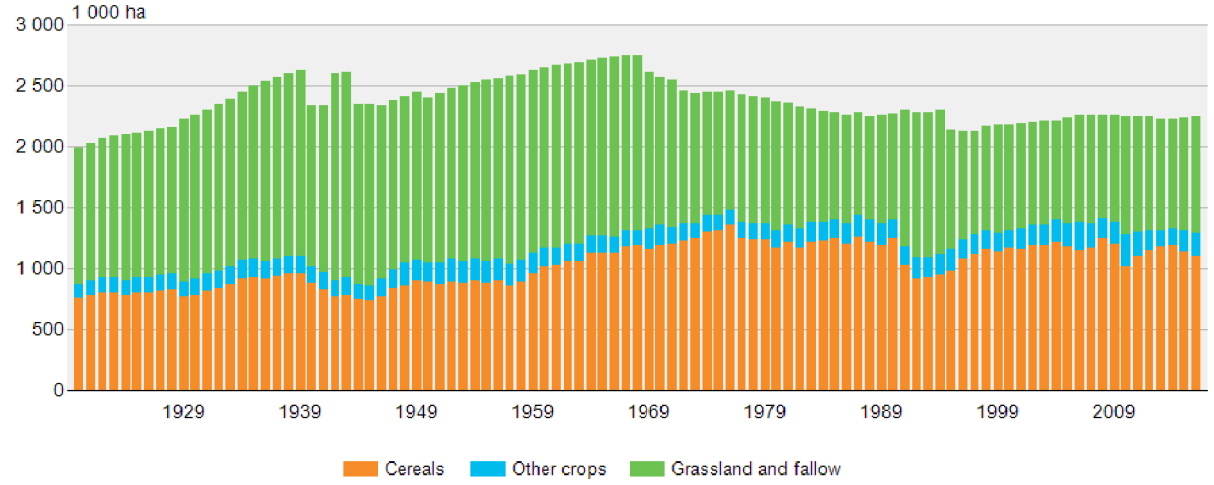
The third, less extensive reduction in the size of arable land occurred when Finland joined the European Union in 1995. Over the last decade, the arable area has remained quite stable in historical terms at around 2,250,000 hectares.

The reign of grass

The main crops grown on arable land in Finland are grass and cereals, when also accounting fallows in the grasslands figure. Other crops account for less than ten per cent of arable land. When considering the last hundred years, grasslands were far larger than the cultivation area of cereals for the first fifty years. The cultivation area of cereals exceeded the size of grasslands in the 1970s. The turn was propelled by the huge growth in the cultivation area of barley.

Use of arable land area 1920–2016

Background data as a table



Barley cultivation area grew from the smallest to the largest

In 1950, the cultivation area of barley was the smallest of all cultivated cereals. The growth in the cultivation area of barley started in 1951 and continued for the next three decades. Even before the end of the 1950s, the area of barley first exceeded the areas of rye and soon after the area of wheat. In the 1970s, barley cultivation also exceeded the cultivation area of oats. Since then, barley has been the most important cereal cultivated in Finland.

Cultivation is diversifying

Since the start of the compilation of statistics, the area of grasslands and fallows has varied between 0.8 and 1.7 million hectares, and the cultivation area of cereals between 0.7 and 1.4 million hectares. The cultivation areas of crops other than grass or cereals have remained between 100,000 and 300,000 hectares. The most important of these other crops are potatoes, turnip rape, oilseed rape, sugar beet, broad bean, caraway, and numerous horticultural crops. The cultivation areas of potatoes and turnip rape have only managed to exceed 100,000 hectares since the start of the compilation of statistics. In

the 2000s, the increase in the cultivation areas of turnip rape, oilseed rape, broad bean and caraway has diversified arable crops in Finland.

Utilised agricultural area

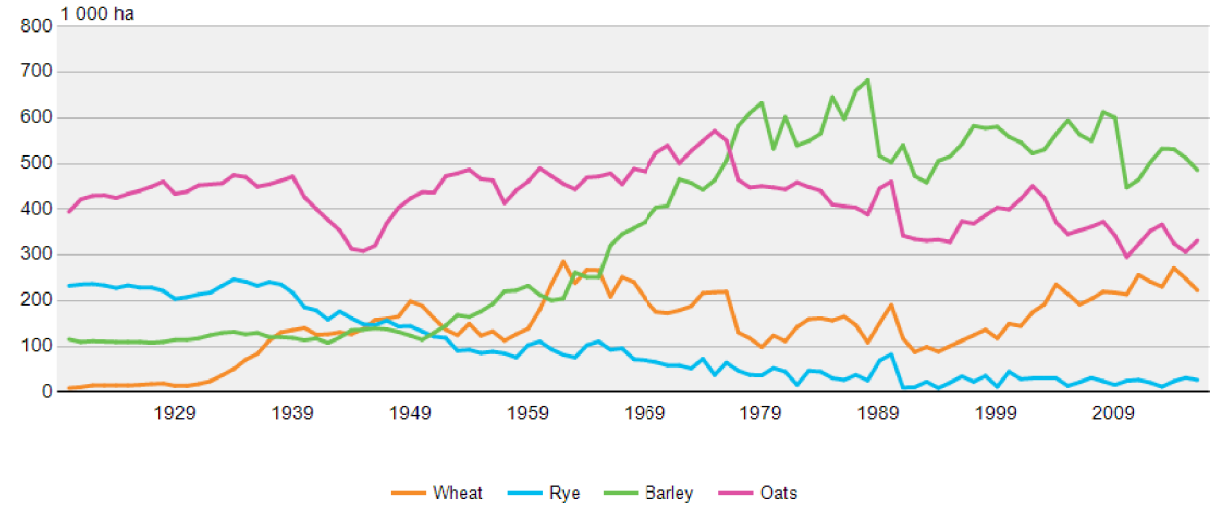
This year's cereal harvest the second smallest in the 2000s

The cereal harvest in 2016 was the second smallest in the 2000s. This was mainly due to the decrease in the arable area. The harvest totalled 3.6 billion kilograms, which is three per cent less than during the previous year. The cultivation area of wheat in particular shrank, which together with the poorer hectare-based crop than in the previous year, decreased the wheat harvest by nearly one-fifth compared to 2015.

See statistics database for harvest statistics from almost 100 years

Cereal cultivation areas 1920–2016

Background data as a table



Rye production in 1920, 1960 and 2016

250 million kg

186 million kg

87 million kg

Oats harvest increased by six per cent

Oats was the only cereal whose cultivation area increased compared to the previous year. The harvest of barley, which is the most cultivated grain crop in Finland, remained around the same as in the previous year. The barley harvest amounted to almost 1.6 billion kilograms, which accounts for approximately 40% of the total cereal harvest. This is nearly 20 times more than the harvest of rye, which totalled 87 million kilograms.

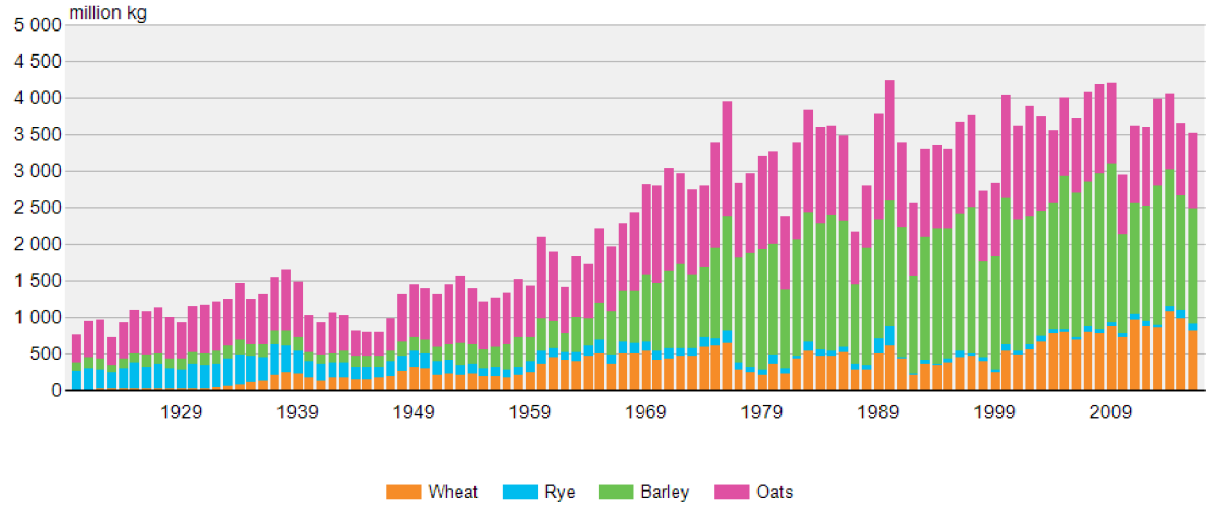
Organic production of fodder crops increasing

The share of organic production of green fodder, cereals harvested green, mixed cereals, broad bean and pea harvests now exceeds ten per cent of the total harvest. For example, the production of organically produced silage fodder has doubled in five years due to increased organic livestock production. Instead, the share of organic production accounts for only around one per cent of the total harvests of barley, wheat, potatoes and turnip rape.

High demand for organic oats and rye

While the share of organic production of the total harvest of barley and wheat remains below one per cent, the situation for rye and oats is different. Of the total rye harvest in 2016, the share of organic production amounted to nine per cent. The same figure for oats was almost five per cent. However, in terms of volume, the organic production of oats, which amounted to almost 50 million kilograms, exceeded six times the production of organic rye.

Cereal harvest 1920–2016

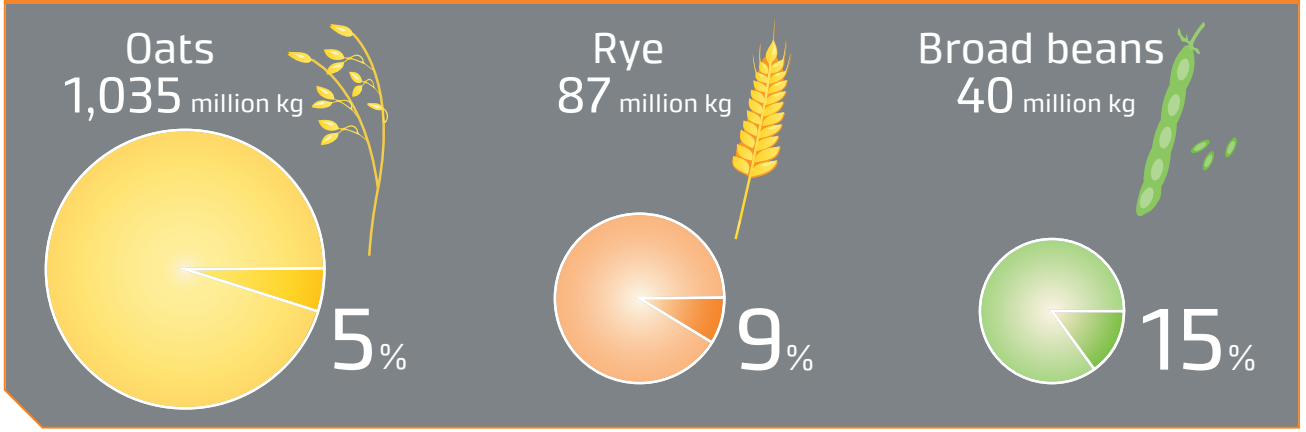


Background data as a table

Crop production statistics

Organic production statistics

Total production (million kg) and the share of organic production (%) in 2016



Horticultural production

A total of around 3,600 enterprises practiced horticultural production in the area of 17,700 hectares of fields and 400 hectares of greenhouses in 2016. The number of horticultural enterprises has steadily decreased. The enterprises that have ceased their horticultural operations have been smaller than those still continuing their business; on the other hand, the latter have also built new greenhouses or purchased or leased more fields for their operations.

Greenhouse production seeking growth through new products

The amount of greenhouse vegetables totalled 85 million kilograms. Majority of the harvest comprised tomatoes and cucumber, both amounting to around 40 million kilograms. The total production of potted vegetables remained at 100 million pots, of which the share of potted lettuce was 74 million pots. Although the number of horticultural enterprises has steadily decreased, the production volume has remained unchanged. One reason for this is the increase of year-round cultivation (cultivation season of ten months at a minimum).

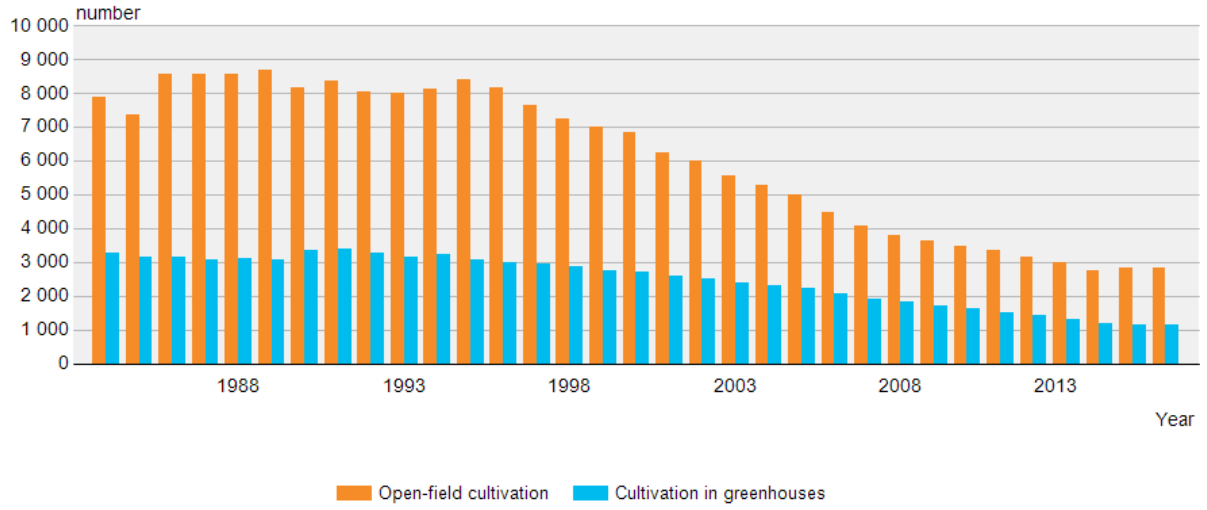
Due to strong competition in the market, enterprises focusing on greenhouse vegetables have been exploring new opportunities in specialty products. The cultivation of special tomato varieties, such as yellow tomatoes, cherry tomatoes or plum tomatoes, covered almost 200,000 square metres. Their harvests rose to four million kilograms, and accounted for ten per cent of the total tomato harvest. In potted vegetable production, the variety of salads has expanded, and the increase in the number of other potted vegetables cultivated reflects the growth in the demand for various special vegetables and herbs.

Ornamental plants were grown across an area of 121 hectares in greenhouses. The production volumes of bedding plants slightly grew compared to the previous year to 38 million flowers. However, the biggest surprise was the increase in the production of tulips: in 2016, tulip production reached the record of 81 million flowers.

Photograph: Finnish Glasshouse Growers' Association

Number of horticultural enterprises 1984–2016

Background data as a table



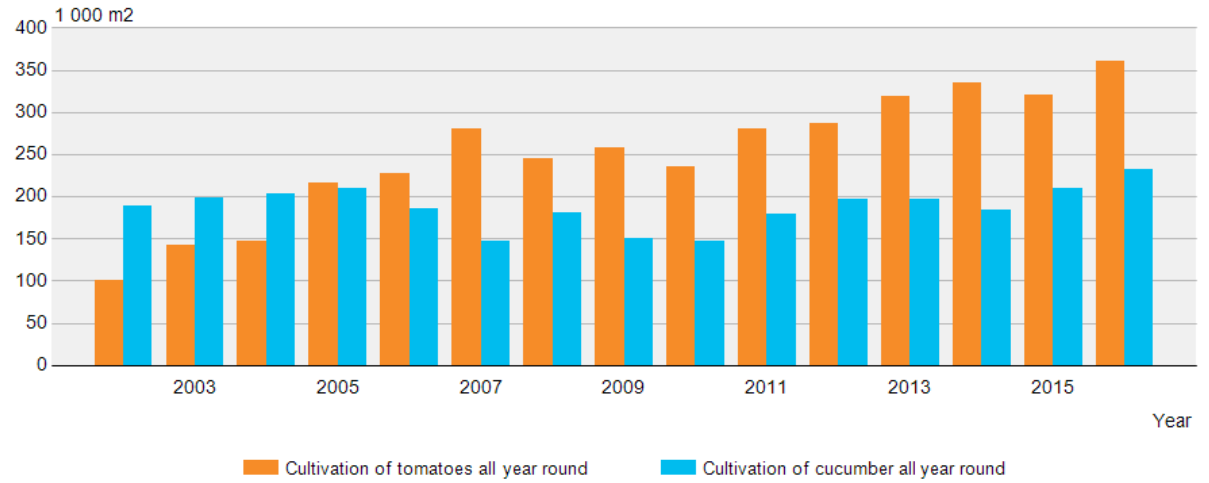
Growing of special tomatoes is increasing: the production in 2016 totalled four million kilos. Photograph: Finnish Glasshouse Growers' Association

Record harvests for apples and raspberry

Favourable weather conditions helped achieving the record apple harvest of 6.4 million kilograms. The raspberry harvest was also successful, and the total amount produced for sale reached 1.3 million kilograms. Instead, the strawberry harvest fell behind the usual level at 12 million kilograms. The total harvest of berries amounted to 15 million kilograms.

Cultivation of tomatoes and cucumber in greenhouses year round 2002-2016

▶ Background data as a table

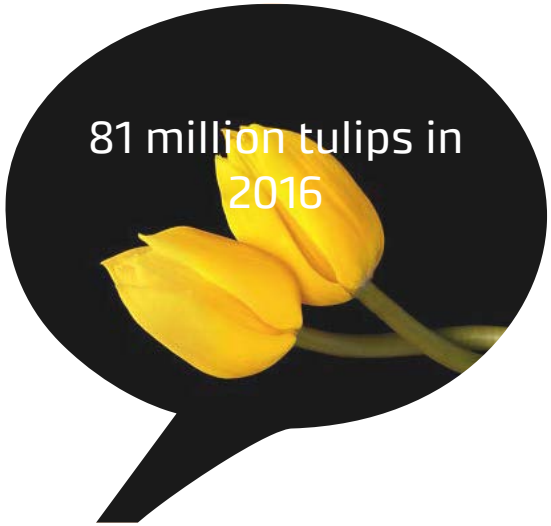


The area of tunnel production of berries grew to 26 hectares, of which raspberry covered 16 hectares and strawberry ten hectares.

Root vegetables and garden peas were the most important outdoor vegetables

Outdoor vegetable production totalled 177 million kilograms, of which carrot covered 73 million kilograms. In terms of surface area, the biggest crop was garden peas, which amounted to seven million kilograms and exceeded the previous year's harvest. Some of the pea harvest was produced for the canning industry and some sold retail as pod peas.

▶ Horticultural statistics



Use and stocks of agricultural products

Finnish farms produce approximately four billion kilograms of cereals each year. Two-fifths of the harvest is mainly used as livestock feed on farms. The rest ends up in industrial processes or is exported.

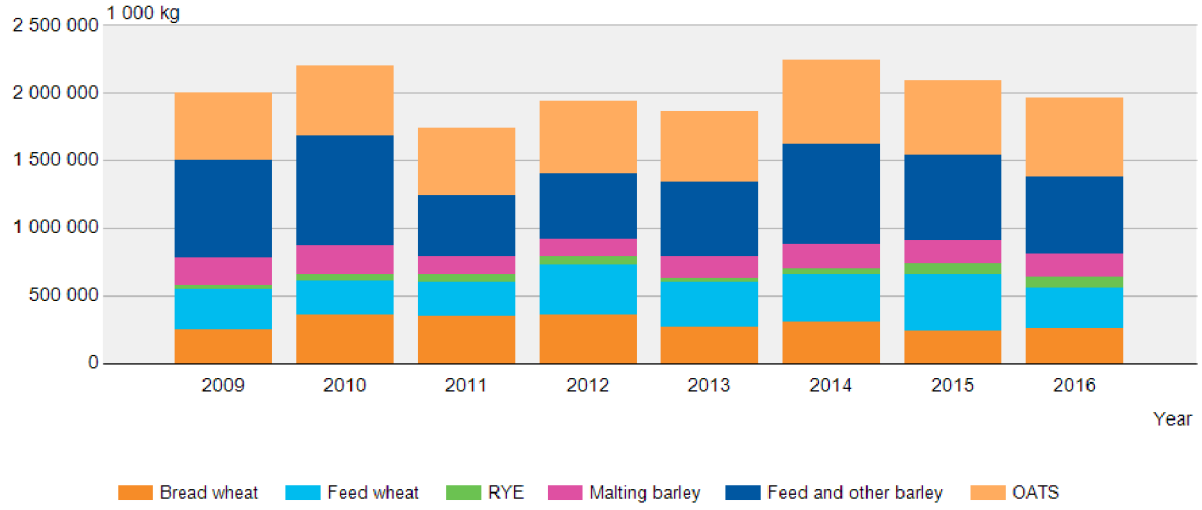
Farms' barley sales were the highest

Cereal wholesalers and the industries that use cereals purchased a total of almost two billion kilograms of cereals from farms in 2016. The figure was slightly lower than during the previous year. Farms' turnip rape and oilseed rape sales were higher than during the previous year: in total 77 million kilograms.

In terms of volume, farms' barley sales were the highest with 746 million kilograms. Of this, less than a quarter was malting barley, which remained at a similar level as in the previous year. The rest was mainly feed barley, the sales of which decreased on the previous year. Oat sales slightly grew to 585 million kilograms, meaning that oat sales was the second highest in 2016. Wheat sales reduced from the previous year to 564 million kilograms. Just under half of the wheat bought from farms was bread wheat and the rest was feed wheat. Feed wheat sales decreased on the previous year, while the sales of bread wheat increased. Rye sales amounted to 72 million kilograms, which was slightly less than during the previous year.

Cereals purchased from farms by industry and trade

Background data as a table



Photograph: Paula Häyrinen / Luke

The food industry consumed one-third of all cereals

The industrial sector consumed a total of 1.3 billion kilograms of domestic and imported cereals in 2016. The food industry consumed one-third of all cereals, and the feed industry just under half. The rest was consumed by other industrial sectors. Other uses include, for example, malting and the production of ethanol, starch, glue powder and enzymes.

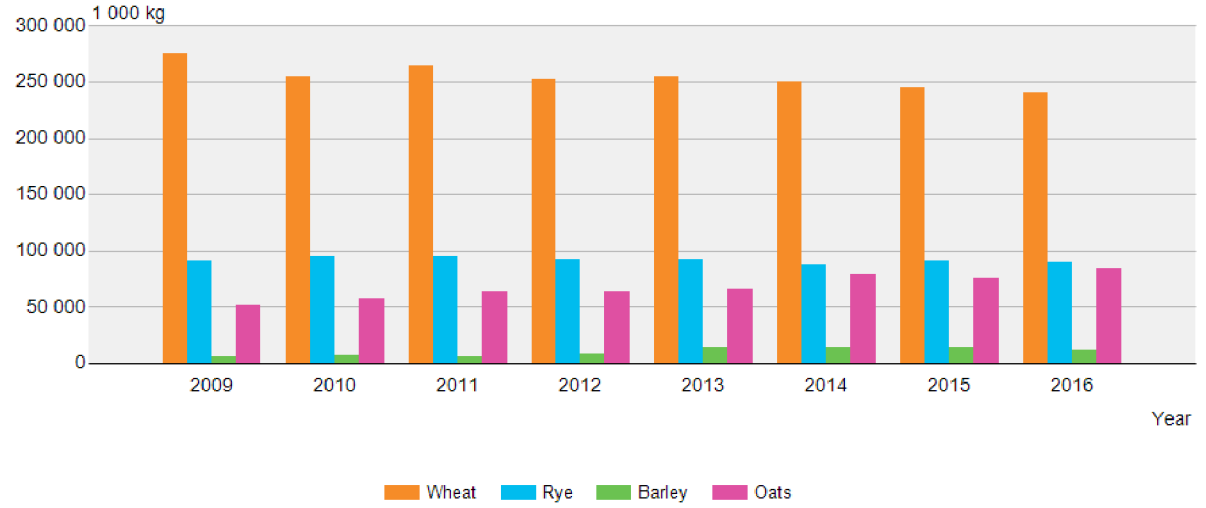
The cereal that the industrial sector consumed the most was barley, a total of 517 million kilograms, of which two-fifths were used to produce commercial animal feed. A small percentage of barley, 11 million kilograms, was consumed by the food industry. Other industrial uses of barley, including malting, amounted to a total of 305 million kilograms.

A total of 240 million kilograms of wheat was used for food production (mainly milling products) and 219 million kilograms for the production of animal feed, making the total 459 million kilograms.

The feed industry consumed two-thirds of all oats, and the food industry one-third. The feed industry consumed a total of 184 million kilograms of oats, which is 12% less than during the previous year. The food industry consumed oats nine million kilograms more compared to the previous year, i.e. in total 84 million kilograms. Indeed, in the food industry, the consumption of oat has now reached the level of rye.

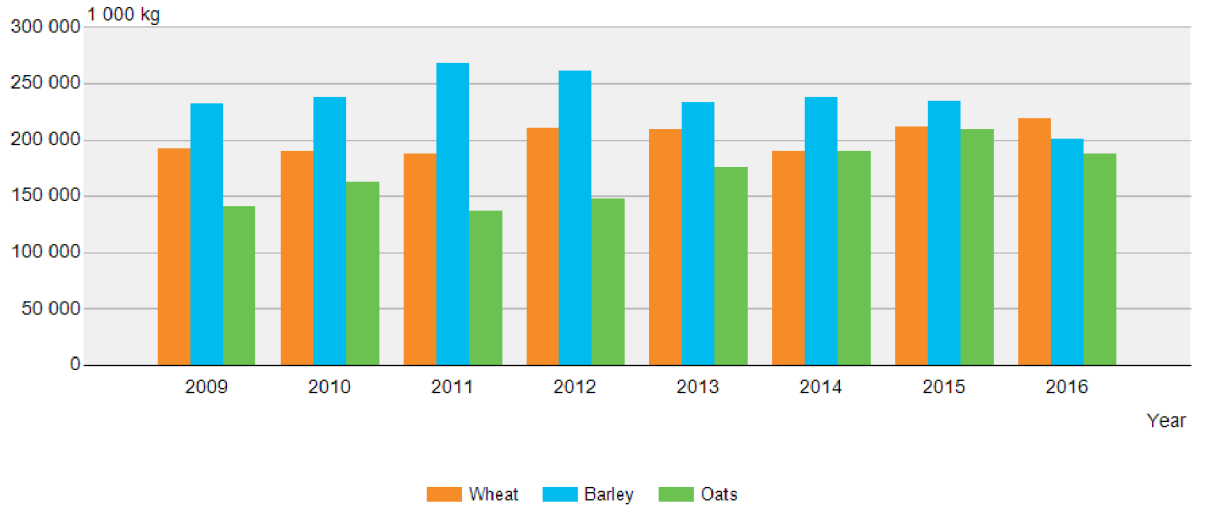
Cereals used by the food industry

Background data as a table



Cereals used by the feed industry

Background data as a table



Rye is a traditional bread cereal in Finland. The food industry consumed 89 million kilograms of rye, which was two per cent less than during the previous year.

Cereal stocks

At the end of 2016, industrial and commercial stocks of cereals amounted to 553 million kilograms of domestic and imported cereals. Oats had the highest stockpiles, totalling 175 million kilos. Barley stocks amounted to 168 million kilograms, wheat stocks to 140 million kilograms, and rye stocks to 69 million kilograms. A time series of the end-of-year stocks are available in the statistics database.

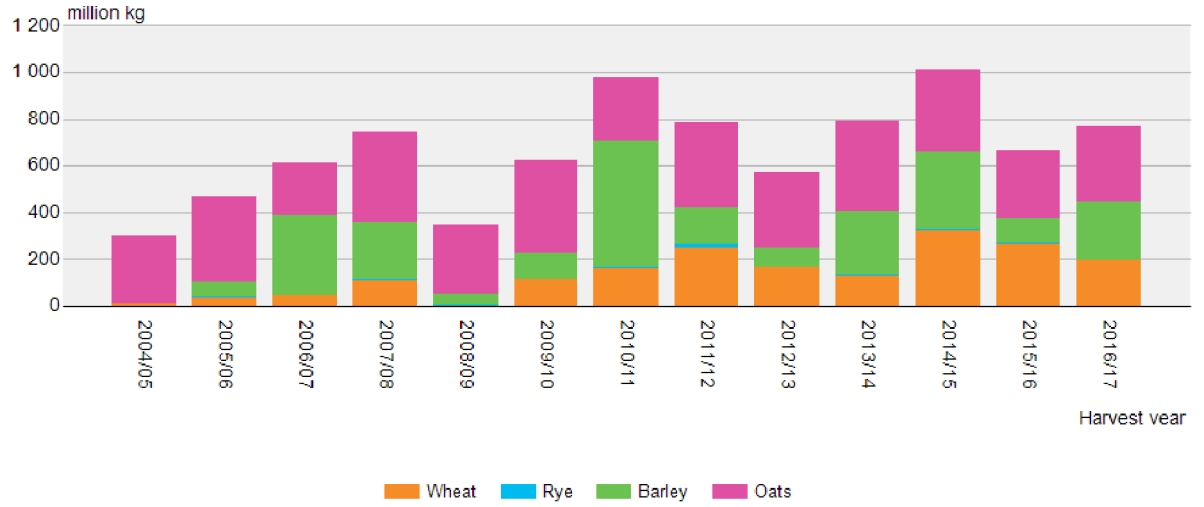
▶ Statistics on cereals purchased, used and stockpiled by industry and trade

The cereals balance sheet and use of crops on farms

Finland monitors the use of the four most important Finnish grain crops based on the cereals balance sheet both on farms and at national level. The balance sheet is prepared for each harvest year from 1 July to 30 June. Although some of the figures on the balance sheet are based on estimates, yearly monitoring still provides a sufficient view for the different actors in the grain chain of the availability and consumption of domestic cereals by harvest year. The development of the cereals balance sheet is also monitored several times per harvest year. The entire grain chain participates in this activity in the Finnish Cereal Committee.

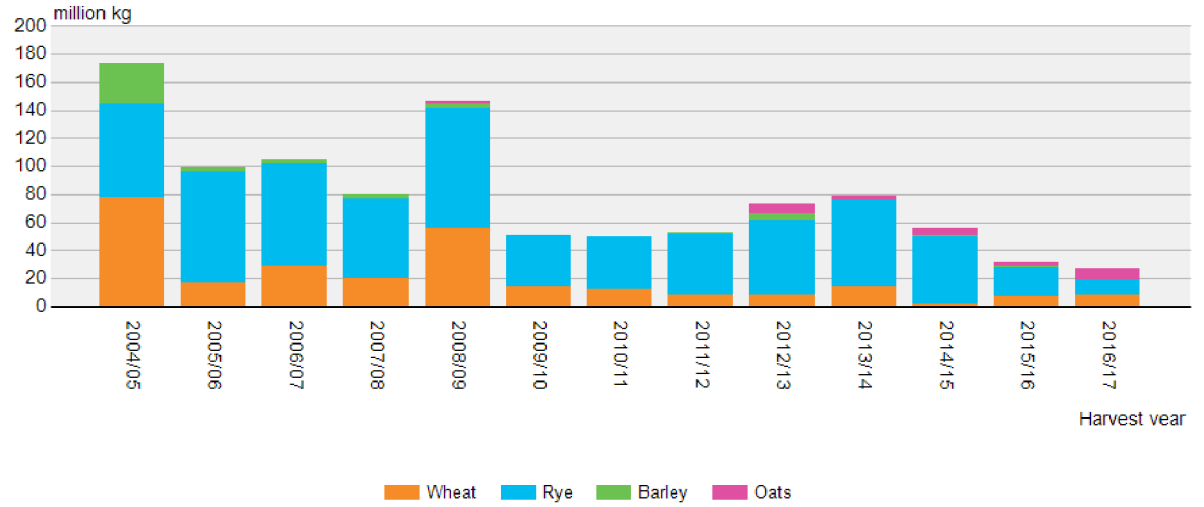
Export of cereals by harvest year

▶ Background data as a table



Import of cereals by harvest year

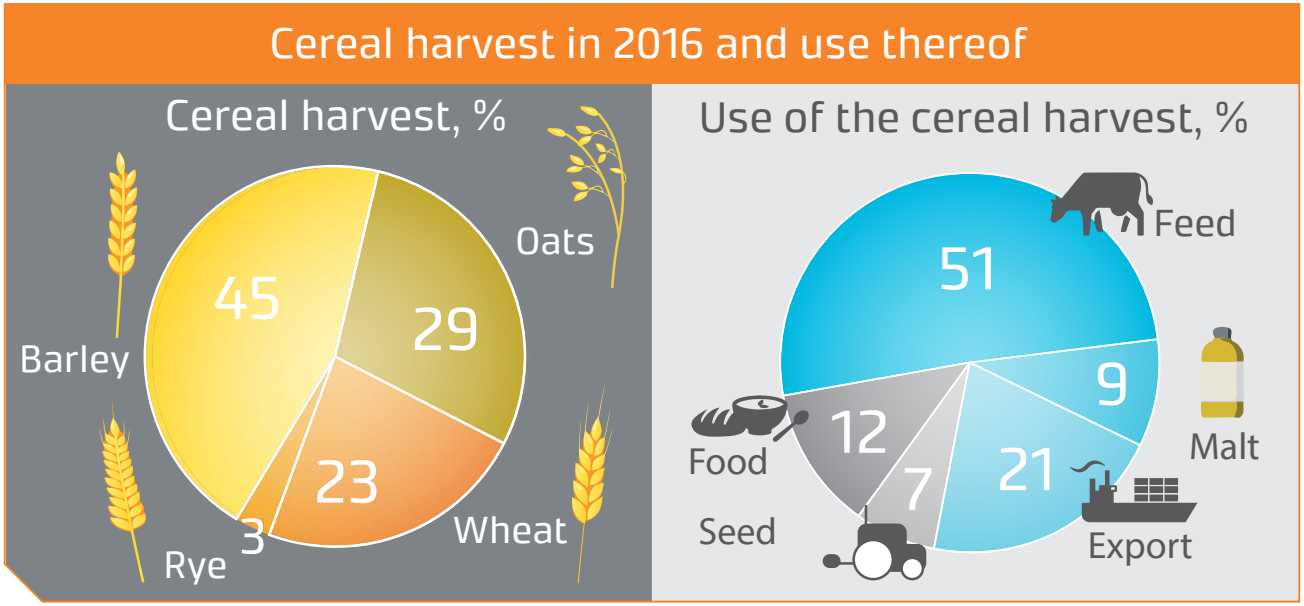
▶ Background data as a table



Half of cereals consumed as feed

The cereals balance sheet is divided into two separate balance sheets: one concerns farms and the other the markets. The cereals balance sheet concerning farms illustrates that during the last decade, farms have sold over half of their cereals for use in industries. Part of the amount sold to industries return to the farms as commercial animal feed. In other words, just over half of the cereal harvest in Finland is used as animal feed.

Over the last decades, the use of cereals to produce food has only been the third most common use area. Just over 400 million kilograms of cereals is used by the food industry, which amounts to around 12% of the total cereal harvest.



Export volumes depend on the harvest

The second most important area of use of cereals over the last decade has been export. Of the 2016 harvest, almost one-fifth, or 770 million kilograms, was exported. The exported volume has fluctuated greatly in the last ten years. The export was the lowest for the harvest year 2008/2009, being 350 million kilograms. The export of oats has been the most stable, amounting on average 340 million kilograms every year.

The import volumes of cereals amount to just under one-tenth of the export volumes. The average import volume is 65 million kilograms, of which majority is rye, because the domestic production typically is not enough to meet the annual demand of around 100 million kilograms. Over the last decade, the imported rye has covered almost half of the domestic consumption of rye, i.e. on average 45 million kilograms. However, the last two harvest years have been successful for rye, and the imported volume has remained at 10 to 20 million kilograms per year.

- Use of crops on farms
- Cereals balance sheet

Photograph: Paula Häyrinen / Luke

Producer prices for agricultural products

In 2016, the producer prices for milk, meat and cereals decreased compared to the previous year, while the producer prices for potatoes slightly increased. Producers were paid slightly more for barn and free-range eggs compared to enriched cage eggs.

Producer price for milk is decreasing

In 2016, producers were paid an average of 38.19 cents per litre for milk, which was slightly less than during the previous year. The figure factors in not just the milk account price but also the annual adjustment payment.

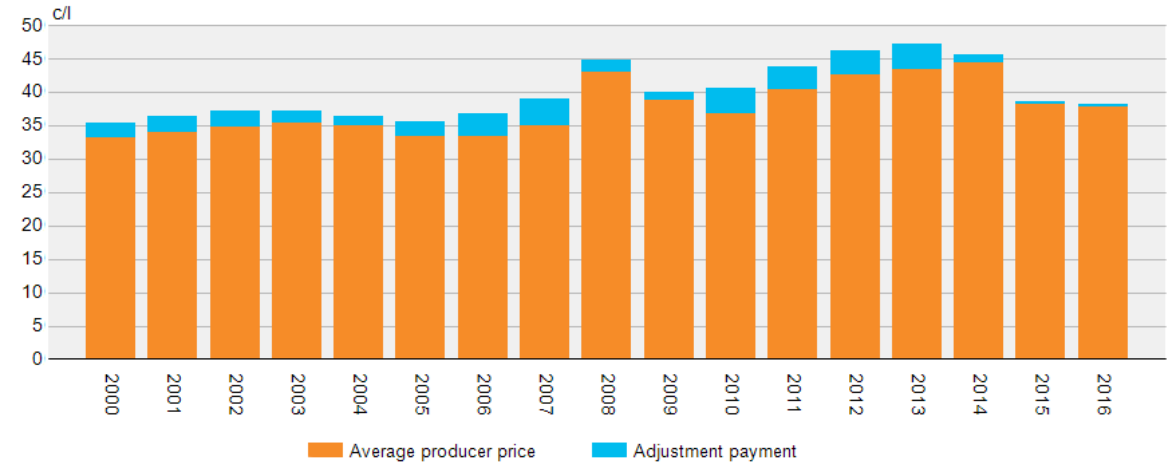
The producer price for milk increased between 2009 and 2013, but took a downward turn around the middle of 2014 due to weaker export markets. Dairy producers also received a smaller adjustment payment in 2014 and 2015.

Producer price for lamb was the highest

In 2016, the average producer price paid by slaughterhouses for meat from bulls was EUR 3.30 per kilogram and for all beef in total EUR 2.85 per kilogram. Both figures decreased by almost two per cent from the previous year. For pork, producers were paid EUR 1.42 per kilogram, which is four per cent less than during the previous year. The producer price for lamb was EUR 3.67 per kilogram, which is three per cent less than in 2015. The producer price for broiler meat also decreased by three per cent to EUR 1.31 per kilogram.

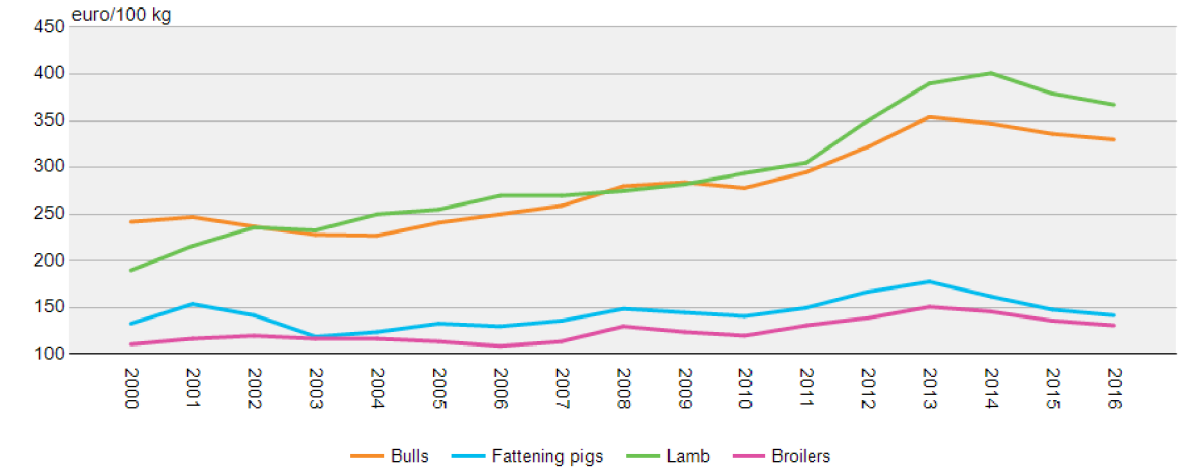
Average producer prices of milk by year

Background data as a table



Average producer prices of meat by year

Background data as a table

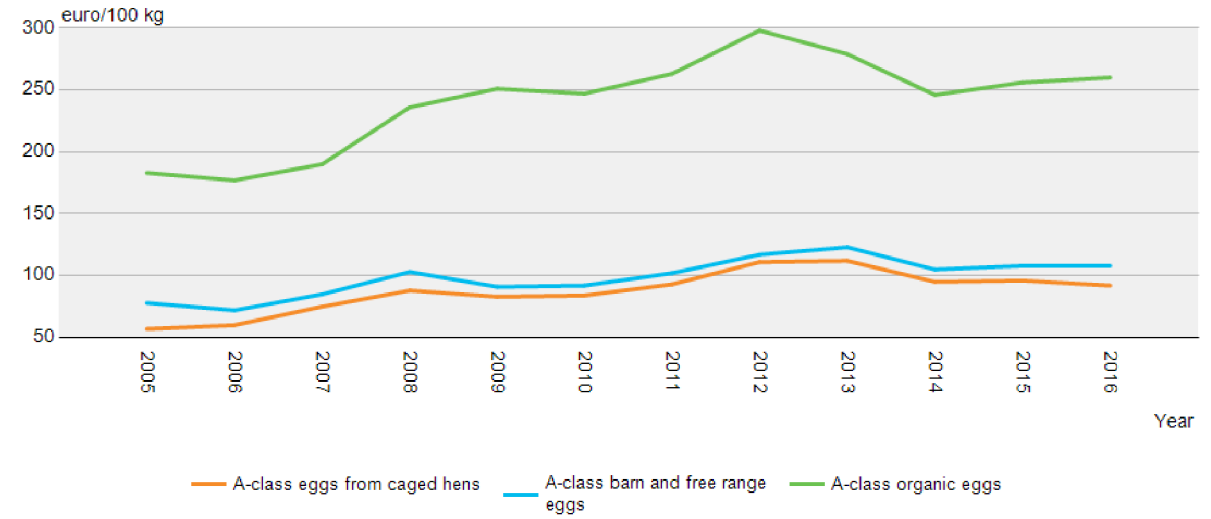


Photograph: Paula Häyrinen / Luke

The average producer prices began to fall in 2014, with the exception of lamb. The price of lamb also took a downward turn in 2015.

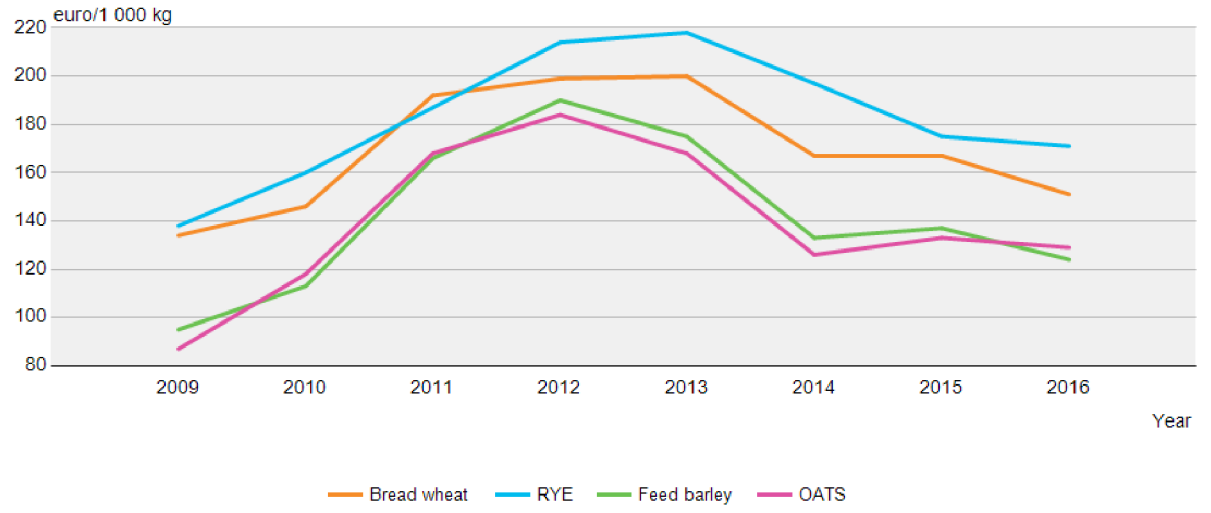
Average producer prices of eggs by year

Background data as a table



Average producer prices of cereals by year

Background data as a table



Production method affect the price paid for eggs

The average price paid to producers for class A eggs in 2016 was EUR 1.06 per kilogram, which is two per cent less than during the previous year. Barn and free-range eggs fetched EUR 1.08 per kilogram, which was 17% more than the price paid for enriched cage eggs. The average price paid for organic eggs was EUR 2.60 per kilogram.

Price paid for bread wheat is decreasing

The average price paid to farmers for basic-quality wheat in 2016 was EUR 139 per tonne, which is seven per cent less than during the previous year. The producer price for rye was on average EUR 171 per tonne, which is three per cent less than in 2015.

The average basic price for barley in 2016 was EUR 132 per tonne, which is seven per cent less than during the previous year. The basic price for oats was EUR 129 per tonne, which is three per cent less than in 2015.

The average basic price of turnip rape and oilseed rape was EUR 362 per tonne in 2016, which was slightly more than during the previous year.

Producer prices for food potato slightly higher

The average price paid to producers for food potatoes in 2015 was EUR 0.20 per kilogram, which was slightly more than during the previous year. The average price paid for early potatoes was slightly lower than during the previous year at EUR 0.33 per kilogram.

Producer prices are based on surveys

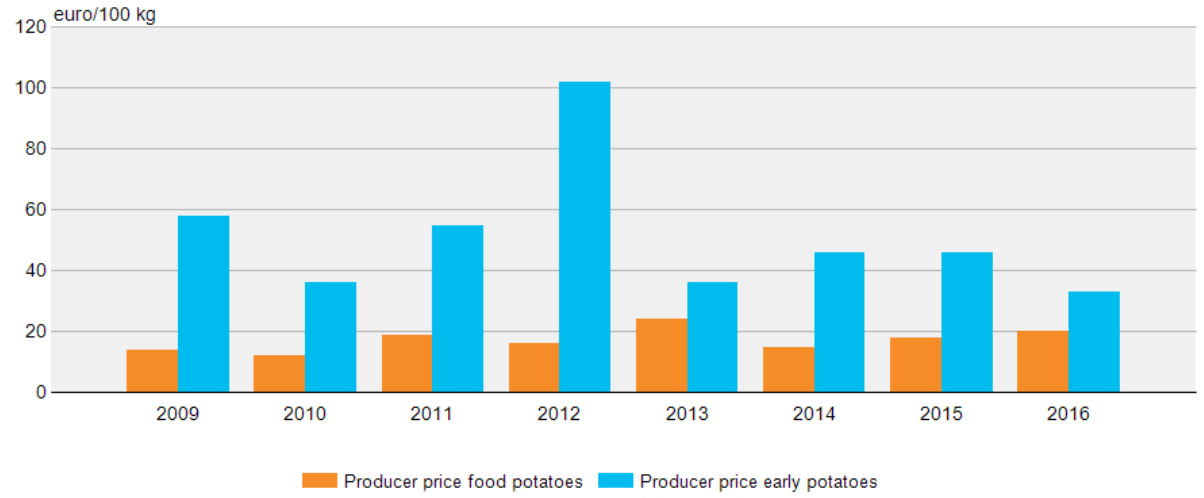
The producer price is the price paid to a farmer for an agricultural product excluding value-added tax. Information on producer prices is based on questionnaires sent to first-hand buyers, such as dairies, slaughterhouses, agricultural trade, industries that use cereals, and egg and potato packaging plants. The information is collected monthly, and it can be found on the statistics page.

▶ Producer prices of agricultural products

Photograph: Tapio Tuomela / Luke

Average producer prices of food potatoes by year

▶ Background data as a table



Agricultural land rents

In recent years, 60% of agricultural and horticultural enterprises had rented agricultural land. More than a third of all arable land has been rented.

The new agricultural land rents statistics contains information on average annual prices paid by agricultural and horticultural enterprises for rented agricultural land. In addition to the national average price, the statistics contains data by region, type of farm and line of production.

Land rents by region

The average annual price paid by agricultural and horticultural enterprises for rented agricultural land was EUR 223 per hectare. Farm-specific and regional differences are quite high in rental prices: the rates varied from one euro to two thousand euros per hectare.

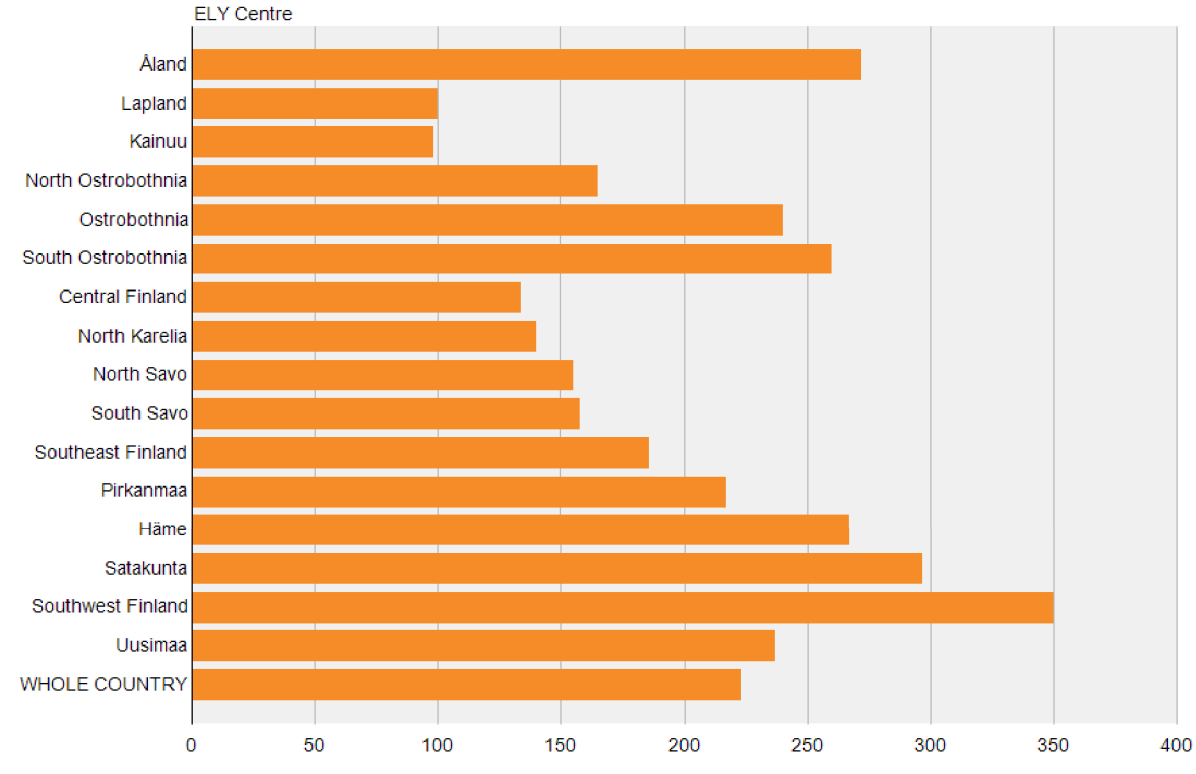
Regionally, the rates were highest in Southwest Finland at an average of EUR 350 per hectare. The average rate in Satakunta was EUR 297 and Åland EUR 272 per hectare. The average rate was the lowest in Lapland and Kainuu (EUR 100 and EUR 98 per hectare, respectively).

Land rents by farm type

Farms were classified into conventional, organic and horticultural farms. In the whole country, farms engaged in conventional production paid on average EUR 221 per hectare of agricultural land, while organic farms paid EUR 227 per hectare. The rent of agricultural land was considerably higher for horticultural farms at EUR 293 per hectare. See the statistics database for the same data by region.

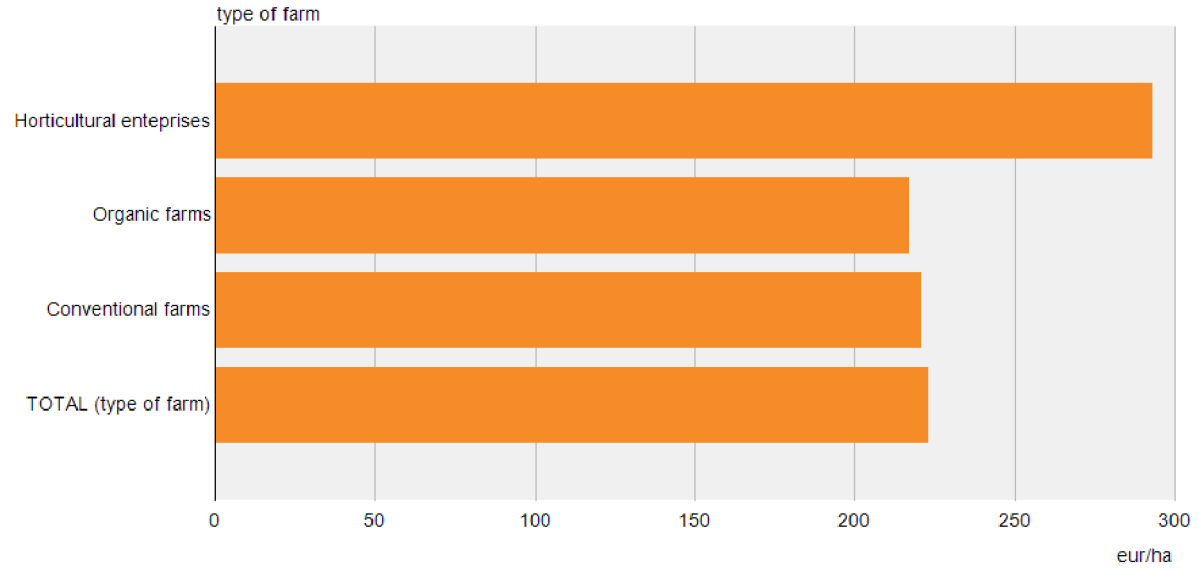
Agricultural land rents by ELY Centre 2016

▶ Background data as a table



Agricultural land rents by type of farm 2016

Background data as a table



Regional statistics by type of farm and production line are also available on map.

Photograph: Erkki Oksanen / Luke

Land rents by production line

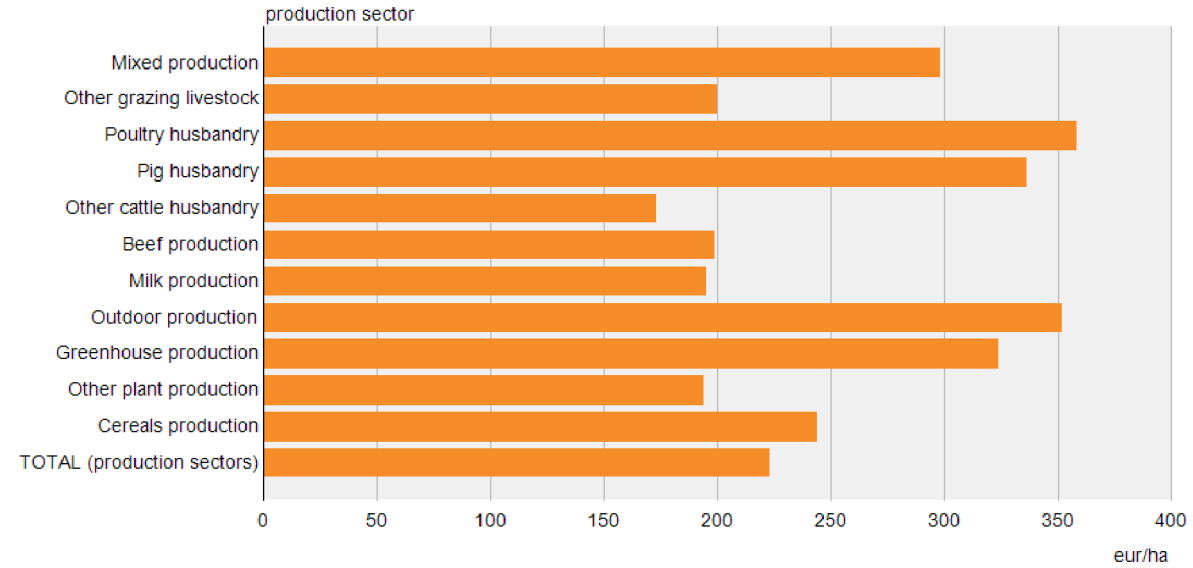
The classification by production line covers eleven sectors. Poultry and pig farms and horticultural farms paid more than EUR 300 per hectare for rented agricultural land, whereas for dairy and beef farms, the rents were approximately EUR 200 per hectare. See the statistics database for the same data by region.

The statistics are based on surveys

The new agricultural land rents statistics is based on prices collated in connection with the autumn 2016 crop and horticultural production surveys. The crop production survey is conducted every year and covers roughly 6,000 conventional and organic farms. Every year, some 3,100 farms engaged in horticultural cultivation in the open and in greenhouses participate in the horticultural survey.

Agricultural land rents by production line 2016

▶ Background data as a table



▶ Agricultural land rents

Photograph: Erkki Oksanen / Luke

Photograph: Janne Lehtinen / Luke's photo archive

Photograph: Erkki Oksanen / Luke

Profitability of agriculture

Luke's profitability accountancy monitors the economic development of agricultural and horticultural enterprises in Finland, on the basis of bookkeeping records compiled annually from 850 businesses.

Businesses operated at a loss

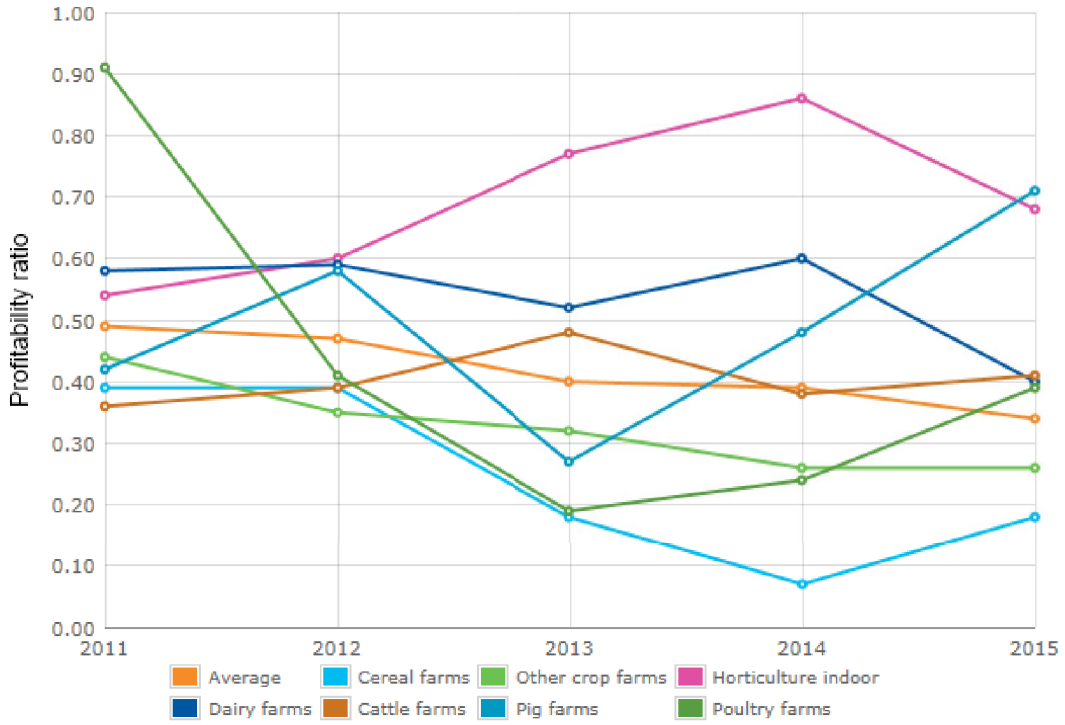
The gross revenue, i.e. the sum of agricultural production and subsidies, amounted to approximately EUR 155,200 per farm in 2015. However, agricultural production costs averaged EUR 184,800, which resulted in a loss of EUR 29,600 per farmer. The costs include family businesses' labour costs, which were calculated on the basis of an hourly rate of EUR 15.6, and interest on capital at 4.3%. Excluding these costs, the farm net income was EUR 15,000 in 2015.

Profitability ratio lowest since 2009

The profitability ratio, which is a farm net income divided by the sum of labour and capital costs, was 0.34 on average. Farmers achieved 34% of the labour cost and interest targets, i.e. an hourly rate of EUR 5.3 for labour and 1.4% interest on capital. The average return on total assets was negative on average by 2.5%. The size of agricultural and horticultural enterprises still continuing their operation has grown year after year, while smaller farms are ceasing their activities. Despite this, profitability has nevertheless been on the decline for the whole of the 2000s.

Profitability ratio of agricultural and horticultural enterprises

Background data as a table



Differences between production lines

In recent years, profitability has been the poorest in cereal farms and other crop farms: the profitability ratio has remained at around 0.2. The average income per farm has been approximately EUR 10,000 per year. In horticultural enterprises and livestock farms, the average income per farm has been significantly higher, but the average

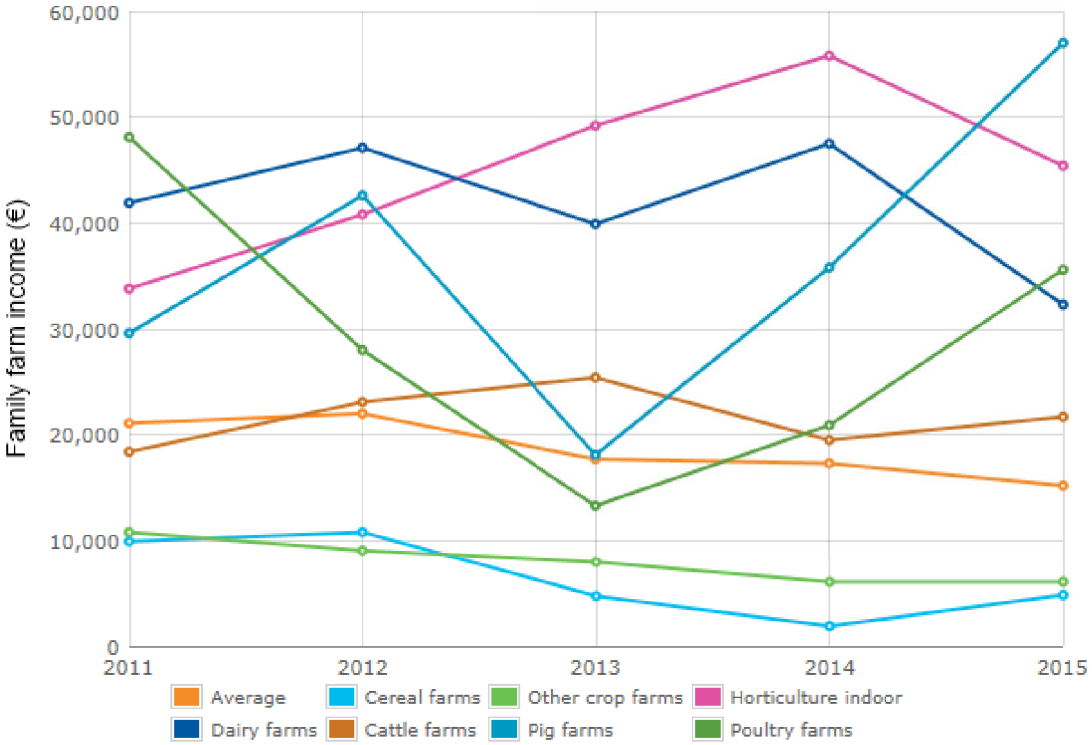
work load is also greater on these farms, which means that their profitability ratio typically remains below 0.5.

- Profitability of agriculture
- Economydoctor

Photograph: Anneli Nuoranne / Luke

Farm net income of agricultural and horticultural enterprises

- Background data as a table

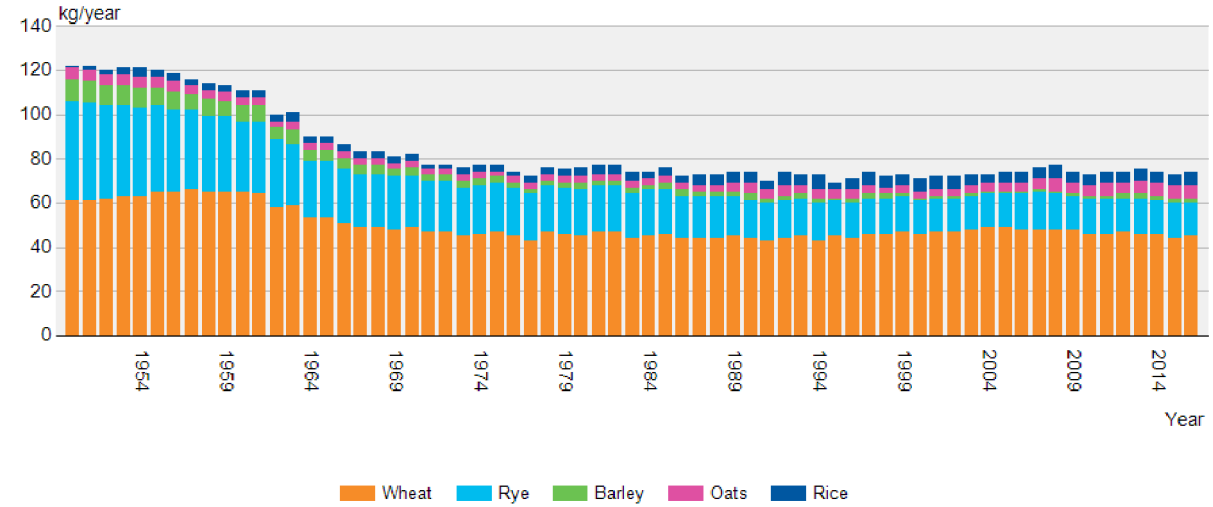


Balance sheet for food commodities

Statistics on food consumption have been compiled with the help of the balance sheet for food commodities since 1950. Over that period, several changes have taken place in the consumption figures. In the early years of the 1950s, cereal consumption totalled around 120 kilograms per capita, which is almost four times compared to meat consumption. In 2016, the consumption of cereals and meat both amounted to around 80 kilograms per capita. Since the start of the compilation of statistics, milk consumption has dropped to a third.

Consumption of cereals per capita 1950–2016

Background data as a table



Wheat accounts for half of all cereal consumption

The total consumption of cereals increased by one per cent on the previous year to 80 kilograms per capita in 2016. Of the total amount, wheat consumption covered 45 kilograms, rye consumption 15.5 kilograms, oat and rice each around six kilograms, and barley two kilograms. The consumption of wheat, oat and rice grew from 2015 by around half a kilo, while barley consumption fell by just over half a kilo. Rye consumption remained at the same level as during the previous year.

Poultry meat and egg consumption increased

Total meat consumption per capita increased by approximately two per cent on the previous year and amounted to 81 kilograms, when game and offal are also taken into account. The increase is mainly due to poultry meat, whose consumption rose by almost nine per cent on the previous year. Beef, pork and lamb consumption remained almost unchanged. In 2016, pork consumption amounted to 35 kilograms, poultry meat consumption to 23.5 kilograms, and beef consumption to 19 kilograms per capita. Lamb consumption totalled 0.7 kilograms, reindeer meat consumption 0.5 kilograms, and horse meat consumption 0.3 kilograms per capita. The meat consumption figures reported in the balance sheet for food commodities also include bones, i.e. they are reported as carcass meat. Typically, carcass meat contains 80% of boneless meat. In addition, the cooking loss ranges from 10 to 30%, depending on the product. The weight of cooked meat is around 50% of the weight of carcass meat.

Egg consumption continued to grow. Egg consumption amounted to almost 12 kilograms per capita in 2016, which was approximately three per cent more than during the previous year.

Milk consumption continued to fall

Milk consumption decreased by around four per cent and amounted to a total of 118 litres (or 122 kilograms) per

capita. The consumption of skimmed milk decreased the most, i.e. by almost ten per cent from the previous year. The consumption of low-fat milk and whole milk remained almost the same level as in the previous year. Low-fat milk accounts for 54%, skimmed milk for just 36%, and whole milk for 10% of all milk consumption.

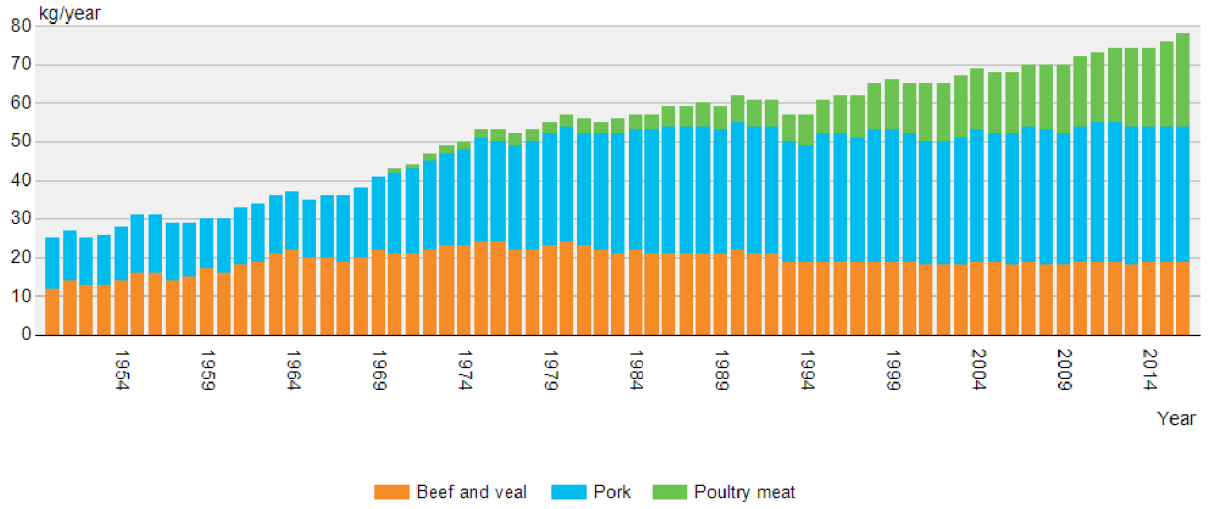
Sour milk consumption decreased slightly less than during the previous year, while the consumption of viili (a type of curd milk) remained almost unchanged. Instead, yoghurt consumption decreased by around five per cent on the previous year. Cream consumption increased by just under five per cent. The consumption of liquid milk products totalled 166 kilograms per capita in 2016, which is approximately four per cent less than in 2015.

▶ Balance sheet for food commodities

See statistics database food consumption of food commodities since 1950

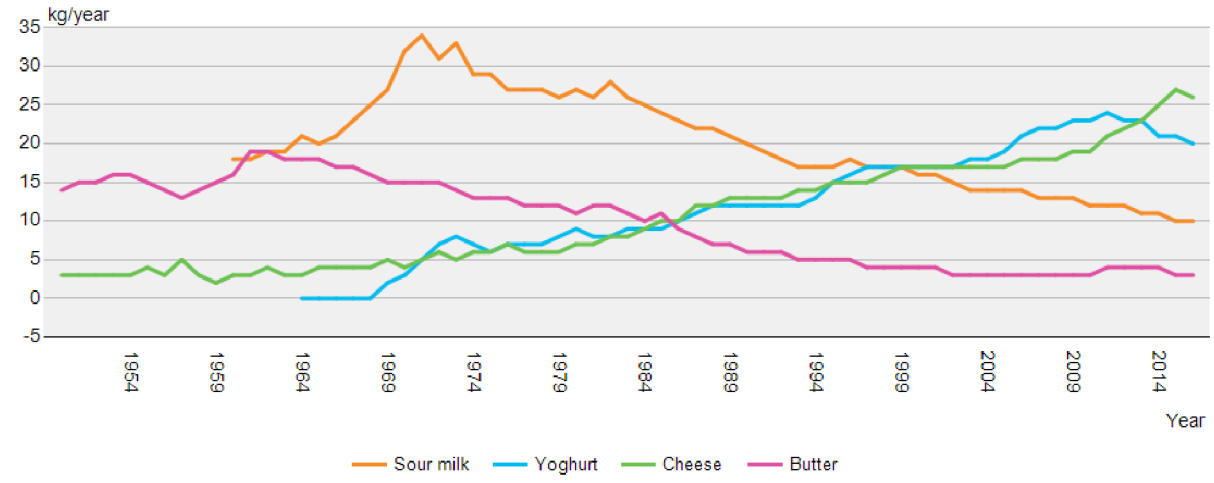
Consumption of beef, pork and poultry meat per capita 1950-2016

▶ Background data as a table



Consumption of sour milk, yoghurt, cheese and butter per capita 1950-2016

▶ Background data as a table



Forest statistics

Photograph: Erkki Oksanen / Luke

Forest statistics for 2016

Volume and increment of growing stock continues to increase - preliminary results of the 12th National Forest Inventory

On the basis of the NFI12 survey carried out in 2014-2016, the volume of growing tree stock in Finland totals 2.5 billion cubic metres. Compared with the previous inventory (2009–2013), the volume increased by more than 100 million cubic metres. The annual increment of growing stock totals 109.9 million cubic metres, while the figure in the previous inventory was 105.5 million cubic metres. The volume of decayed trees has increased in Southern Finland and decreased in Northern Finland.

Forest protection and biodiversity

Finland has a total of 2.7 million hectares of protected forest land and poorly productive forest land (12.0% of the total area of forest land and poorly productive forest land). Forest land accounts for 1.6 million hectares of this figure (7.7% of the total area of forest land). Protection is not alone enough to safeguard biodiversity in forests. In commercial forests, biodiversity can be taken into account in forestry measures and by safeguarding habitats of special importance referred to in the Forest Act, as well as other valuable nature sites.

Total costs of silvicultural works were EUR 251 million

Early and later pre-commercial thinnings generated the highest costs, i.e. EUR 59 million, while EUR 51 million was invested in artificial regeneration and EUR 42 million in forest improvement work. Three quarters (109,000 ha) of the forests regenerated with artificial regeneration was planted and one quarter was grown from seed. The estimated area treated with fellings totalled 653,000 hectares, of which clearcutting accounted for 141,000 hectares.

Industrial roundwood prices increased

The real stumpage price level of logs and pulpwood acquired by the forest industries from non-industrial private forests increased by just over one per cent on the previous year. The average price of energywood sold by standing sales for use as raw material for forest chips rose by 18%, while the average price sold by delivery sales dropped by eight per cent. Standing sales accounted for four-fifths of the total industrial roundwood sales and two-thirds of the total energywood sales.

Removals and drain continued to grow

Roundwood harvested for use by the forest industries achieved a record level for the second year in a row. Industrial roundwood harvesting totalled approximately 62 million cubic metres, and the harvesting of roundwood for use as energy amounted to over eight million cubic metres. Due to the increased harvesting, the removals totalled 70 million cubic metres, which was 86% of the total sustainable felling potential. The total drain of roundwood was 86 million cubic metres, which is around 25 million cubic metres less than the annual increment of growing stock.

Increased removals also increased wood production income

The gross stumpage earnings of forest owners amounted to EUR 2.1 billion in 2016. The earnings of private forest owners totalled EUR 1.8 billion and those of forest industry operators and the state EUR 0.3 billion in total. The operating profit in non-industrial private forestry increased to EUR 117 per hectare. In real terms, the result increased by four per cent on the previous year and approximately by ten per cent compared with the average of the previous ten years. Real investment returns on wood production in private forests were 4.3%. The returns were 1.1 percentage points higher than in the ten previous years on average, when the results were reduced by the decrease in stumpage prices.

Consumption of domestic roundwood on the rise

Roundwood consumption amounted to 76.9 million cubic metres in 2016, of which majority, i.e. 67.4 million cubic metres, was used to manufacture forest industry products. The 58.9 million cubic metres of domestic roundwood used by the forest industries was the second highest amount since 2007. The forest industries processed a total of 8.5 million cubic metres of imported roundwood. The chemical pulp industry consumed in total 31.7 million cubic metres of roundwood, which is the most of all forest industries. A total of 9.5 million cubic metres of roundwood was burnt in energy generation.

Pulp and paperboard turned the forest industries on the rise - investments increasing

In most major categories of the Finnish forest industries, production volumes in 2016 increased compared to the previous year. Pulp production increased by five per cent and paperboard production by nine per cent compared to 2015. Instead, printing and writing paper production decreased by around a quarter compared with the average of the previous ten years. Pulp and paper industry investments increased in real terms by up to 60% on the previous year. The increase in the production also enhanced the labour situation in the forest industries: in 2016, the number of workers increased by four per cent to 41,100 persons.

Forest industry products accounted for 22% of the total value of Finnish goods exports

In 2016, the exports value of forest industry products totalled EUR 11.4 billion. Compared to 2015, the value of exported forest industry products decreased by around half per cent in real terms. The value of the pulp and paper industries' exports dropped by two per cent on the previous year. However, the value of the wood products industries' exports increased by almost six per cent compared to 2015. Finland imported 9.8 million cubic metres of wood in 2016. The volume of wood imports increased by two per cent on the previous year. Majority of the imported wood came from Russia.

Forest resources

Statistics on forest resources are based on the National Forest Inventories (NFI) performed by Luke. Forest inventories have been carried out since the 1920s. The inventories gather information on the area of forest, the amount, structure and growth rate of growing stock, forest damage, as well as on the silvicultural quality and biodiversity in forests.

The 12th National Forest Inventory (NFI12) started in 2014. The inventory lasts five years, but some results have already been calculated using the measurements of the first three years (2014-2016). The earlier data is based on the 11th National Forest Inventory, whose field measurements were carried out in 2009-2013.

The measurements carried out during the three years are not sufficient to achieve reliable regional results, therefore regional forest resource results calculated using the measurements of last five years (2012-2016) have been updated to the forest resource statistics available from Luke's statistical services.

Forests cover still majority of the total land area

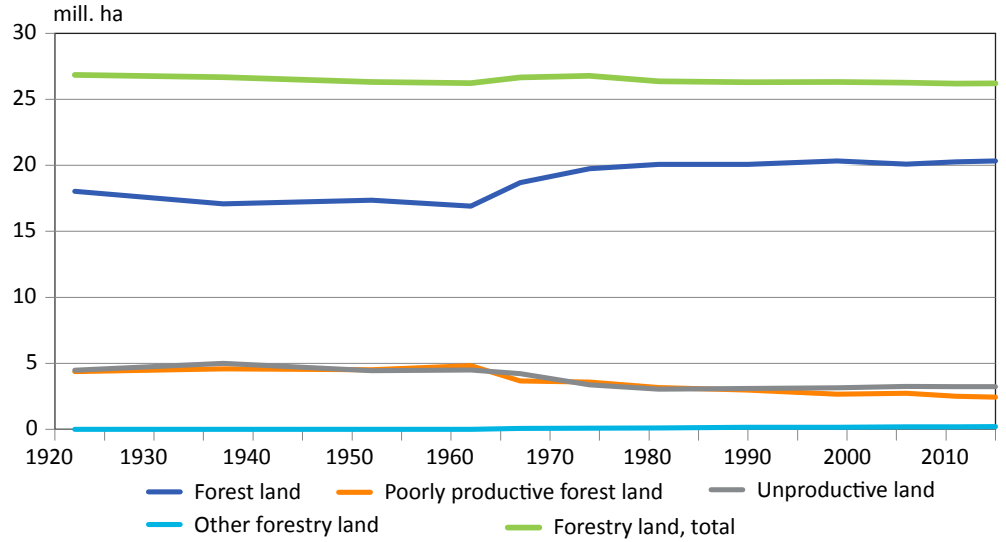
In the forest nomenclature, any land which has no special use purpose is considered forestry land; i.e. the land is not agricultural land or built-up land. Forestry land covers both land available for wood production and statutory or protected areas in which forestry activities are not allowed due to statutory reasons or decision by the owner.

Forestry land is further divided according to the productivity of the land into forest land, poorly productive forest land, and unproductive land. Forestry land also covers other forestry land, such as forest roads and permanent storage depots for timber.

Forestry land accounts for 86% of the total 30.4 million hectare land area of Finland. Majority of this area (20.3 million ha) is forest land. Poorly productive forest land accounts for 2.4 million, unproductive land 3.2 million, and other forestry land 0.2 million hectares. In Southern Finland, the share of forestry land of the total land area is 77% and in Northern Finland (Northern Ostrobothnia, Kainuu and Lapland) 95%. Due to construction and similar activities, the forestry land area has slightly decreased over the last hundred years. The forest land increased in the 1960s due to draining of peatlands, but has since

Land classes on forestry land 1921-2015

▶ Background data as a table



remained practically unchanged. According to the latest results, the area has increased by 65,000 hectares since the previous inventory.

Forestry is mainly practiced in forest land areas, of which 91% (approx. 18.5 million ha) is available for wood production. In Southern Finland, the area of forest land available for wood production amounts to 97%, while in Northern Finland, the same figure is 84%. This indicates that majority of the protected areas excluded from wood production are located in Northern Finland. Poorly productive forest land is mostly excluded from wood production, and removals are scarce also in non-protected areas.

Half of all peatlands are drained and are currently mainly fully drained peatland forests

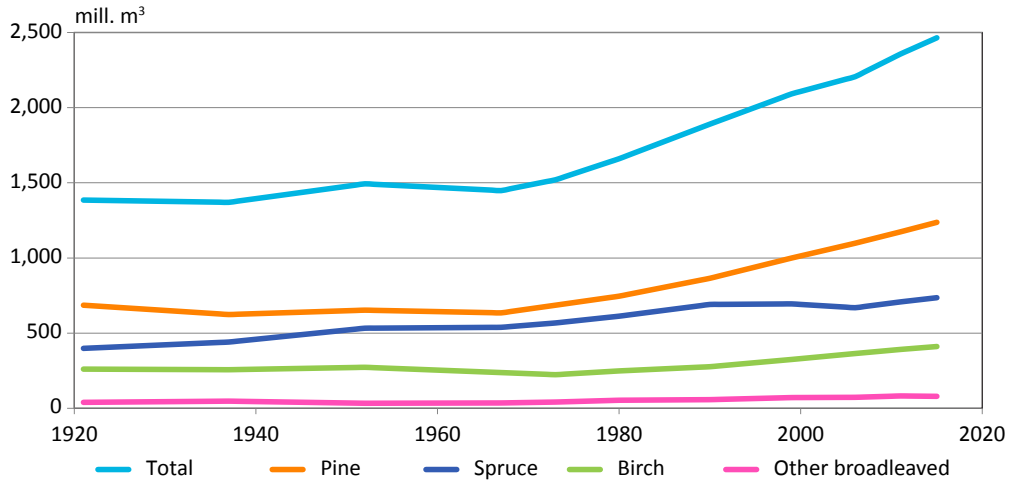
The share of peatlands of all productive, poorly productive and unproductive land is 33% (8.6 million ha). Of all peatlands, pine mires account for 59%, spruce mires 24%, and open marshes 17%. In Southern Finland, the share of peatlands of total forestry land is 26% and in Northern Finland 40%.

The total area of drained peatlands is 4.6 million hectares. In Southern Finland, 74% of the peatlands are drained, while the same figure in Northern Finland is 42%. A total of 70% of all drained peatlands in Finland are currently fully drained peatland forests. In Northern Finland, the same figure is only 53%. Drained heat forests which previously were partly peatlands cover 1.3 million hectares.

Photograph: Erkki Oksanen / Luke

Growing stock volume by tree species

▶ Background data as a table



drained areas. The significance of peatland forests will increase in the forestry industries in the future as drainage areas are increasingly entering the final cutting stage.

Volume and biomass of the growing stock continues to increase - the increase is mainly large-sized trees

The volume of tree stocks on forest land and poorly productive forest land totalled 2,465 million cubic metres, which is nearly 110 million cubic metres more compared with NFI11. A third of the total increase of growing stock is trees that are at least 30 cm in diameter. The volume of trees under 20 cm in diameter has slightly decreased. The volume of pine has increased the most, but the volumes of spruce and deciduous tree species have also increased.

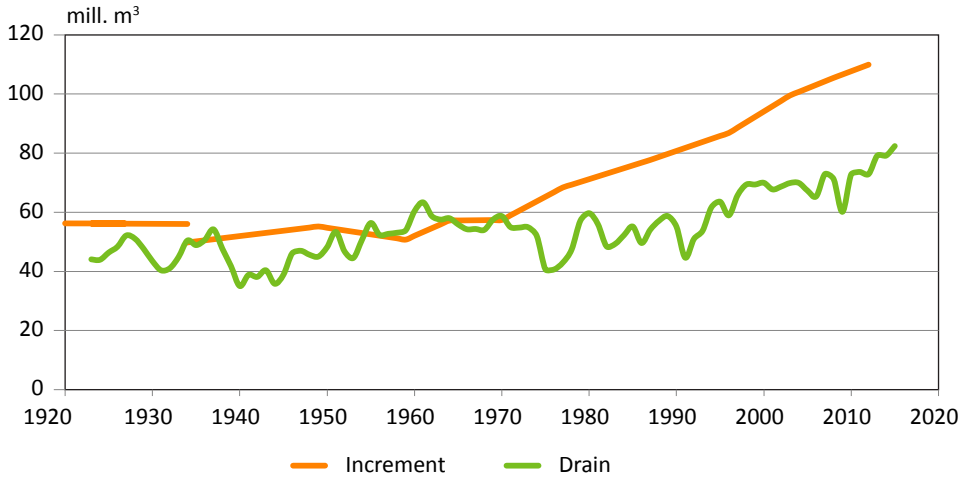
Biomass of the growing stock (stemwood, branches, foliage, stump, roots) has increased by 71 million tonnes.

Half of the growing stock is pine, while spruce accounts for 30% and deciduous tree species (mainly birch) a fifth. Around 45% of the growing stock are trees under 20 cm in diameter, 35% have a diameter of 20-30 cm, while a fifth are over 30 cm in diameter. A total of 90% of the total growing stock volume is located on land available for wood production. Of the total growing stock, 76.5% grow in heath forests and 23.5% in peatlands.

The volume of the growing stock is 1.7 times higher than the level in the 1960s, because since that time, the annual increment has increased clearly more than removals. The volumes of pine and deciduous tree species have nearly doubled, while the volume of spruce is nearly 1.3 times higher. The volume of trees over 30 cm in diameter is now 2.2 times the volume in the 1960s.

The average volume of growing stock in the forestry land area is now 118 cubic metres per hectare, while in the late

Annual growth and drain of tree stocks 1921–2016



Photograph: Erkki Oksanen / Luke

1960s it was only 77 cubic metres. In heath forests, the volume of growing stock totalled on average 120 cubic meters and in peatlands 112 cubic meters per hectare.

Annual increment of growing stock still on the rise

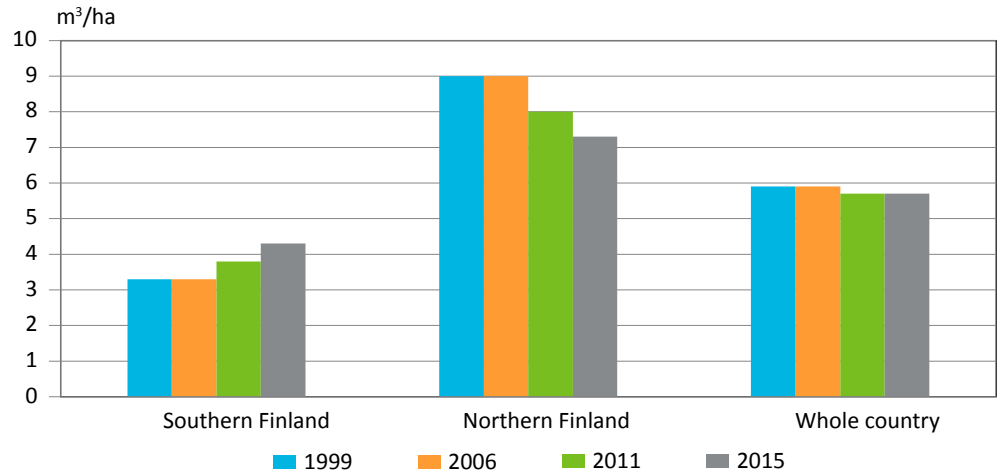
The annual increment of growing stock on forest land and poorly productive forest land totals 109.9 million cubic metres. Compared with NF111, there is an increase of 4.5%. Pine accounts for two-thirds and spruce for one-third of the increase of increment, and the increment of deciduous tree species has also slightly increased. The annual increment on forest land totals 108.1 million cubic metres, i.e. on average 5.3 cubic metres per hectare.

According to Luke's statistics concerning total roundwood removals and drain, the annual drain in 2012–2016 totalled on average 79.9 million cubic metres, which is 73% of the latest increment results.

The annual increment of growing stock took a clear upward turn in the 1970s and is now almost double the increment of growing stocks of the 1970s. The increment of pine stock has increased the most, and the increment of deciduous tree stock has also more than doubled. The increment of spruce stock is now 'only' 1.4 times the level in the 1970s, but the large share of spruce in forest regeneration will likely increase the annual increment of spruce in the future.

Mean volume of dead trees on forest land

▶ Background data as a table



The increase in the annual increment is mainly due to the drainage of peatlands, improved forest management activities and age structure of forests. There are now increasingly more young, 30-60-year-old, forests which are at their fastest growing stage and have large volumes of growing stock. The area of understocked forests has clearly decreased since the 1970s. Global warming has also accelerated the increment in growing stock. Over the last five years (2012-2016), forests have annually generated around 30 million cubic metres of growing stock more compared with the volume removed or drained through natural processes.

Volume of dead trees increases in Southern Finland and decreases in Northern Finland

The volume of dead trees, which are important for biodiversity in forests, has increased in Southern Finland, totalling on average 4.3 cubic metres per hectare of forest land. In Northern Finland, the volume of dead trees has decreased compared with the previous inventory, but it is still higher than in Southern Finland, totalling 7.3 cubic metres per hectare.

▶ Website of the National Forest Inventory (NFI)

▶ Forest resources on Luke's statistical services

▶ Forest resource tables in the statistics database

Forest protection and biodiversity

Finland has a total of 2.7 million hectares of protected forest land and poorly productive forest land (12.0% of the total area of forest land and poorly productive forest land). Forest land account for 1.6 million hectares of this figure (7.7% of the total area of forest land). Protected areas consist of statutory protected areas and biodiversity conservation sites in commercial forests.

Protection is not alone enough to prevent deterioration of biodiversity in forests. Preserving and improving biodiversity must also be taken into account in the management of commercial forests by, for example, safeguarding habitats of special importance according to the Forest Act and other valuable nature sites. From the point of view of enhancing forest biodiversity, the principle in removals and other forest management activities is to save deciduous trees, retention trees, decayed trees, and favour mixed forests and other activities promoting biodiversity.

Principles and classifications behind protection

For statistical purposes, protected forests are classified into two main categories: 1. statutory protected areas and 2. biodiversity conservation sites in commercial forests. The statistics also cover 3. areas supporting conservation of nature values. These, however, are not regarded protected areas in the statistics.

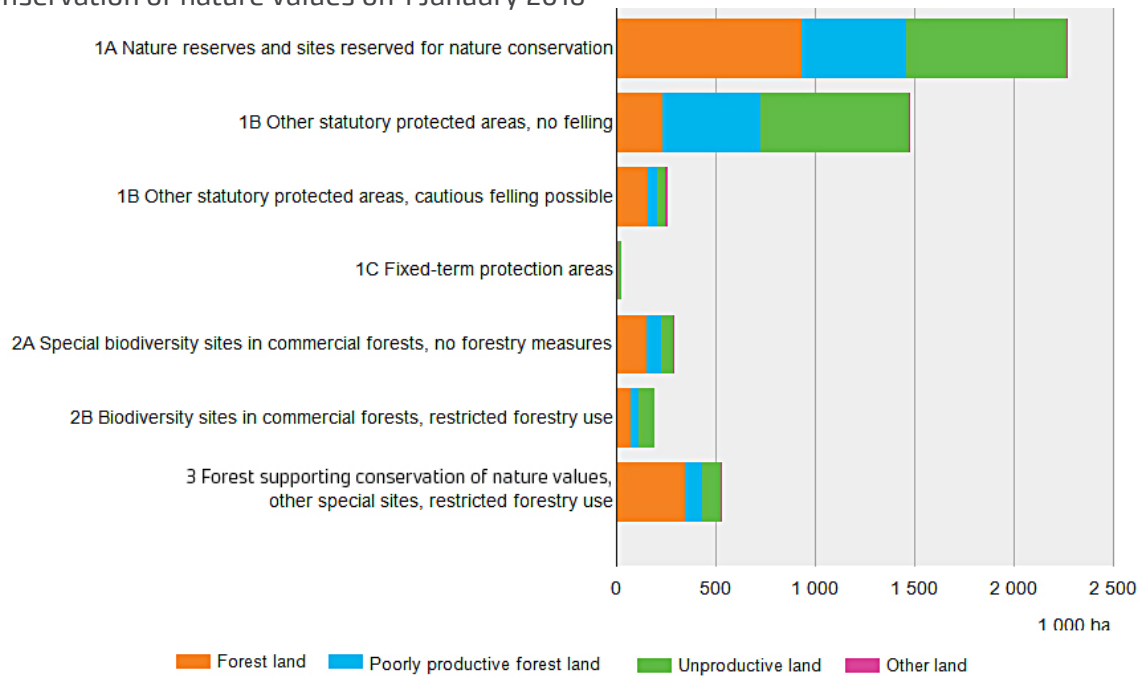
The latest statistics are based on the situation at the beginning of 2016. The definition of 'forest' used in the statistics is based on the combined area of forest land and poorly productive forest land. There are also separate statistics on forest land, and statistics that also cover water bodies. Further information about the classifications and background data are available from the provided infographics and from the website of the relevant statistics.

Statutory protected areas

Statutory protected areas encompass a total of 2.4 million hectares of forest land and poorly productive forest land, of which 1.3 million hectares is forest land. Statutory

Protected areas, biodiversity conservation sites in commercial forests, and areas supporting conservation of nature values on 1 January 2016

Background data as a table



Protected areas and biodiversity conservation sites in commercial forests on 1 January 2016.

	ALL FINLAND				SOUTHERN FINLAND				NORTHERN FINLAND			
	Forest land		Forest land and poorly productive forest land, total		Forest land		Forest land and poorly productive forest land, total		Forest land		Forest land and poorly productive forest land, total	
	Area (1,000 ha)	%	Area (1,000 ha)	%	Area (1,000 ha)	%	Area (1,000 ha)	%	Area (1,000 ha)	%	Area (1,000 ha)	%
1A Nature reserves and sites reserved for nature conservation	934.2	4.6	1,455.5	6.4	250.8	2.3	300.4	2.6	683.4	7.5	1,155.1	10.3
1B Other statutory protected areas - no felling	230.8	1.1	723.9	3.2	28.2	0.3	32.6	0.3	202.6	2.2	691.3	6.1
1B Other statutory protected areas - cautious felling possible	156.8	0.8	206.2	0.9	109.7	1.0	124.9	1.1	47.1	0.5	81.3	0.7
1B Other statutory protected areas, total	387.6	1.9	930.1	4.1	137.9	1.2	157.4	1.4	249.7	2.7	772.7	6.9
1C Fixed-term protection areas	9.8	0.0	16.8	0.1	8.8	0.1	13.5	0.1	0.9	0.0	3.2	0.0
1A + 1B + 1C Statutory protected areas, total	**1,331.6**	**6.6**	**2,402.3**	**10.6**	**397.6**	**3.6**	**471.3**	**4.1**	**934.0**	**10.2**	**1,931.0**	**17.1**
2A Special biodiversity sites in commercial forests, no forestry measures	152.7	0.8	225.1	1.0	23.0	0.2	31.0	0.3	129.6	1.4	194.2	1.7
2B Biodiversity sites in commercial forests, restricted forestry use	68.8	0.3	109.8	0.5	34.1	0.3	46.9	0.4	34.7	0.4	62.9	0.6
2A + 2B Biodiversity conservation sites in commercial forests, total	**221.5**	**1.1**	**334.9**	**1.5**	**57.2**	**0.5**	**77.8**	**0.7**	**164.3**	**1.8**	**257.1**	**2.3**
1A + 1B + 1C + 2A + 2B Protected forests, total	**1,553.1**	**7.7**	**2,737.2**	**12.0**	**454.7**	**4.1**	**549.1**	**4.8**	**1,098.3**	**12.0**	**2,188.1**	**19.4**

protected areas cover 10.6% the total area of forest land and poorly productive forest land in Finland and 6.6% of the area of forest land.

The most strictly protected areas include, among others, national parks and strict nature reserves, as well as private nature reserves and areas governed by nature conservation programmes. Statutory protected areas can also cover other permanently protected areas, and in some of these sites cutting for nature management purposes or cautious cutting that does not compromise the objectives of nature conservation may be allowed. The smallest category is fixed-term protection areas.

Biodiversity conservation sites in commercial forests

Biodiversity conservation sites in commercial forests are found across 0.3 million hectares of forest land and poorly productive forest land (1.5% of the total area of forest land and poorly productive forest land). Forest land account for 0.2 million hectares of this (1.1% of the total area of forest land).

In some of these sites selection cutting for nature management purposes or cuttings that does not compromise the nature values at the site may be allowed.

Areas supporting conservation of nature values

Areas supporting conservation of nature values include other special areas subject to forestry restrictions, such as forests designed for recreational use and special areas for reindeer husbandry and Sámi culture. Of these areas, forest land and poorly productive forest land accounts for a total of 0.4 million hectares, of which 0.3 million hectares is forest land. Areas supporting conservation of nature values are not considered protected areas in statistics.

Majority of forest protection is statutory and concentrated in the north

The majority of protected forests are located in nature reserves established pursuant to the Nature Conservation Act and in areas designated as nature reserves under nature conservation programmes adopted by the Government, as well as in wilderness reserves based on the Wilderness Act.

The majority of protected forest land and poorly productive forest land is located in Northern Finland, where protected areas amount to 2.2 million hectares, or 19.4% of the total area of forest land and poorly productive forest land. Forest land accounts for 1.1 million hectares of this figure (12% of the total area of forest land). Southern Finland has approximately 0.55 million hectares of protected forest land and poorly productive forest land (4.8% of the total area of forest land and poorly productive forest land). Forest land account for 0.45 million hectares of this figure (4.1% of the total area of forest land). A total of 87% of protected forest land and poorly productive forest land and a total of 83% of forest land are located on state-owned land.

The METSO programme has increased the scope of protected areas

The area of protected areas has increased in recent years thanks to conservation measures implemented on state-owned and private land on the basis of the Forest Biodiversity Programme for Southern Finland METSO, as well as land use decisions made by Metsähallitus, such as those related to natural resources planning.

Protected areas have increased by a total of approximately 62,000 hectares thanks to measures taken pursuant to the Nature Conservation Act as part of the METSO programme between 2008 and 2016. Of this area, three quarters is privately owned land. The Finnish Forest Centre has taken advantage of the Act on the Financing of Sustainable Forestry by imposing environmental forestry subsidy agreements on over 36,000 hectares of land and implemented nature management projects across nearly five thousand hectares of commercial forest. In addition, restoration activities have been carried out particularly in state-owned forests.

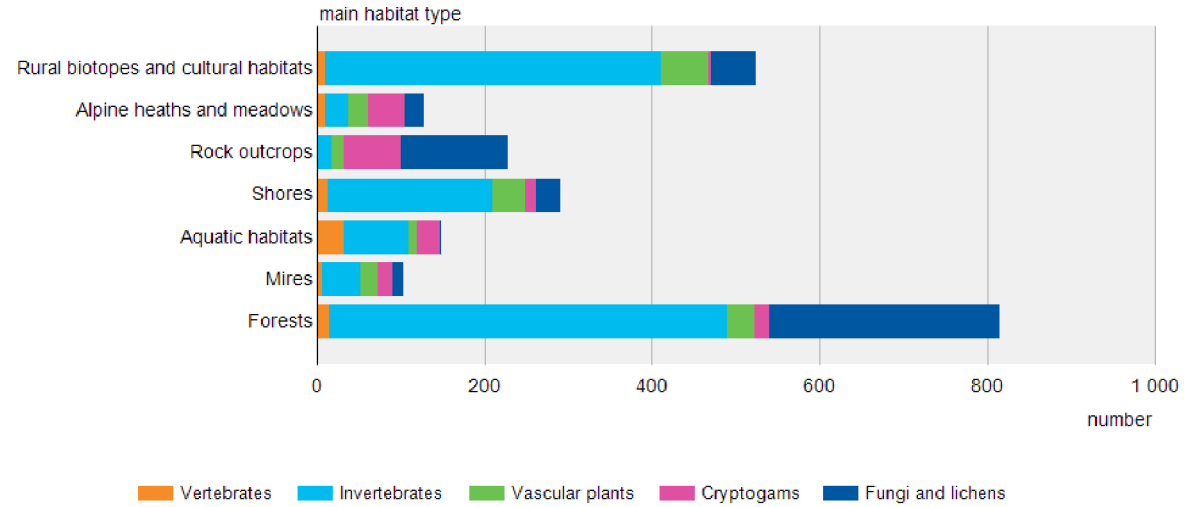
The aim of the METSO programme is to expand the network of nature conservation areas by a total of 96,000 hectares and in addition to that to safeguard biodiversity on a total of 82,000 hectares area in private, commercially managed forests with fixed-term contracts and nature management projects by 2025.

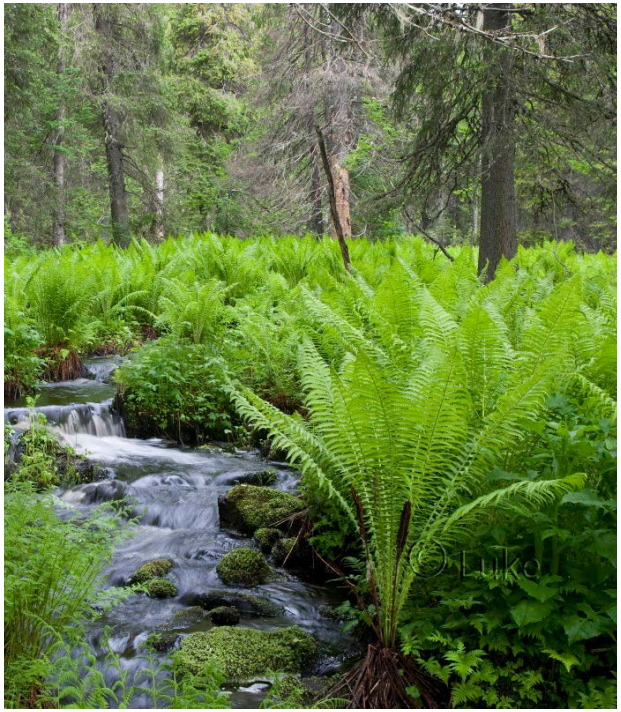
More than a third of threatened species in Finland are forest species

The fourth evaluation of threatened species in Finland was completed in 2010. According to the results, there are approximately 45,000 species in Finland, of which under half are known well enough to be included in the evaluation. A total of 2,247 species were classified as threatened, and of these, forest is the primary habitat for 814 species and peatlands for 104 species.

Number of threatened species by habitat 2010

Background data as a table





Photograph: Erkki Oksanen / Luke

Of threatened forest species, almost half live in herb-rich forests and a third in old forests. Compared with earlier evaluations, the number of threatened forest species has increased.

Biodiversity is also promoted in commercial forests

Forest protection is not alone enough to prevent deterioration of biodiversity in forests. Therefore, the aim is to also avoid activities threatening biodiversity in the management of commercial forests, as well as to enhance structural characteristics that are important in terms of biodiversity. As felling volumes increase, the significance of such measures continues to increase.

The aim in commercial forests is to safeguard the habitats of special importance referred to in the Forest Act and other sites with high nature values. Sites that should be preserved include, for example, the immediate surroundings of springs, brooks and other small water bodies, herb-rich forest patches and swamps, swamps with a sparse tree stand, heathland forest islets located in undrained peatlands, steep bluffs and the forest lying directly underneath.

Biodiversity in forests and threatened species are also taken into account in removals and other forest management activities. Examples of activities promoting biodiversity include:

- retaining and increasing the number of deciduous trees, retention trees, decayed trees
- favouring of mixed forests
- ensuring diversity in tree species and age classes and forest density.

Results of nature management in commercial forests

The Finnish Forest Centre assesses each year how nature management has been taken into account in felling activities in commercial privately owned forests. In 2016:

- The characteristics of valuable nature sites were retained in 92% of cases.
- The volume of retained growing stock totalled on average 80 cubic metres per hectare, of which five cubic metres was deadwood.
- The average size of valuable nature sites was 0.5 hectares.
- The volume of growing stock retained in clearcutting sites totalled on average 2.8 cubic metres and the volume of deadwood 0.7 cubic metres per hectare.

The volume of deadwood has also been monitored in forest resource inventories since the late 1990s. Since then, the volume of deadwood has increased in Southern Finland on average from 2.8 cubic metres to 4.3 cubic metres per hectare. In Northern Finland, the volume has decreased from 9.5 cubic metres to 7.3 cubic metres per hectare.

A total of 10% of forests on forest land are dominated by deciduous tree species, and the volume of deciduous trees is at least a quarter of the area in 12% of all coniferous forests. Biodiversity is further enhanced by the fact that majority of Finland's forests have generated naturally from indigenous tree species and elements.

▶ Forest protection
▶ Forest biodiversity
▶ Forest resources

Silviculture

The statistics on silvicultural and forest improvement works describe the amount of silvicultural and forest improvement works carried out in forests and the associated unit and total costs. The statistics cover a wide range of measures, of which only the most important will be discussed here. Silviculture refers to a chain of activities from forest regeneration operations through tending of young stands all the way to improvement of young stands before the next commercial felling. Forest improvement works typically involve far-reaching measures designed to promote the regeneration of forests, increasing wood production capacity by improving the growing conditions, and ensuring year-round harvesting of wood. The state contributes to the funding of forest improvement works according to the Act on the Financing of Sustainable Forestry.

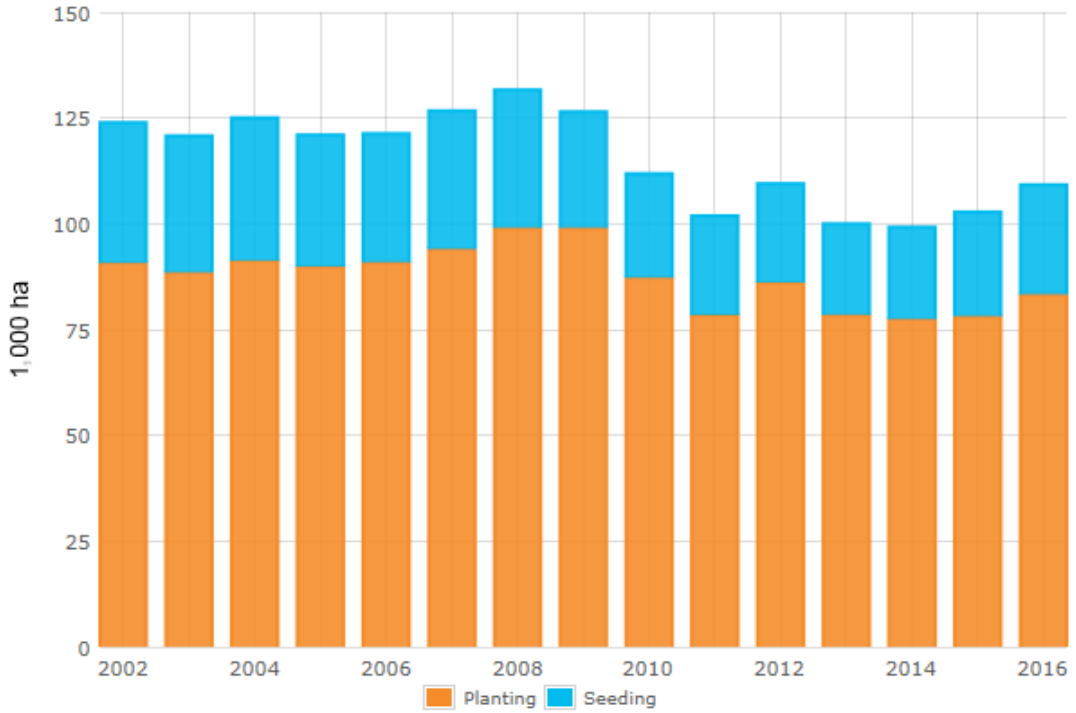
Revisions to silvicultural classifications and data gathering

The statistical classifications of different types of works were revised in 2015. The classification system was simplified, and developments in silvicultural techniques were taken into account. This meant dropping certain activities (such as pruning) from the statistics and combining statistical subcategories (for example, the afforestation of arable land and the supplementary planting of seedling stands are now included in planting). To react to the increasing mechanisation of the silvicultural operations, planting as well as early and later pre-commercial thinnings were divided into manual and mechanised works. Although the changes brought the statistical classification up to date, they also make comparisons to earlier statistics more difficult. The regional division of data gathering also changed and is now based on administrative regions instead of the former Forest Centre districts. So far, the new categorisation has been applied to statistics published for two years.

The statistics are based on data collated from forest management associations, providers of forest services

The area of artificial regeneration

Link to release



of forestry companies, the state, and a sample of small forestry service providers.

In addition to work carried out by forest management associations and other providers of forest services, the data on works carried out in non-industrial private forests include an estimate of the silvicultural work carried out by forest owners themselves under the supervision of forest management associations.

Since 2015, work carried out independently by non-industrial private forest owners without supervision are not included in the statistics because forest management associations cannot provide reliable data on such work. Prior to 2015, forest management associations provided an indicative estimate of such work, which were also included in the relevant statistics. This change in the compiling of statistics must be considered when comparing the figures against those of previous years, especially with regard to works that are often carried out independently by non-industrial private forest owners without supervision. Such work may include, for example, clearing of regeneration areas, manual seeding, improvement of young stands and early and later pre-commercial thinnings.

Artificial forest regeneration area increased from the year before

In 2016, the artificial forest regeneration area totalled 109,000 hectares, showing an increase of six per cent from the year before. The proportion between planting (76%) and direct-seeding (24%) remained unchanged from the previous year.

Of the forest planting area (83,000 ha), 63% was allocated to spruce and 32% to pine. Other planted tree species, birch mainly, accounted for five per cent. The proportion of pine increased from the year before. Planting was still almost always a manual process, as the proportion of mechanised planting was only one per cent.

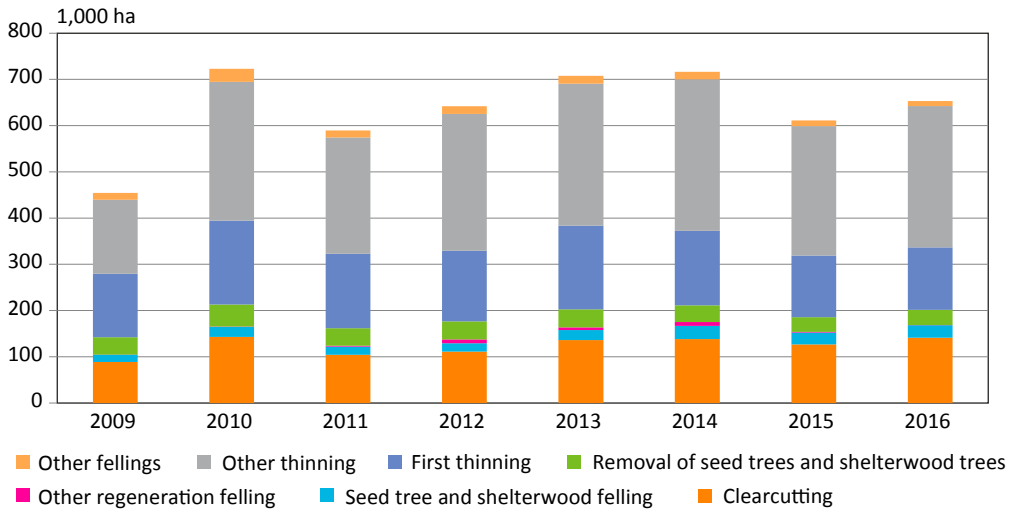
Forest seeding is mainly done mechanically. In the 2000s, the proportion of mechanical seeding has increased from 50% to the current level of 80%. When seeding, pine is nearly always the tree species used.

The soil is usually prepared for artificial regeneration to promote the growth of seedlings. Soil preparation was carried out across 103,000 hectares in 2016, which is almost the same as during the previous year. The most common method of soil preparation was mounding, which accounted for 62% of the total area prepared. Disc trenching accounted for 19%, patch scarification for 10%, and other soil preparation techniques (such as ploughing and ploughing of fields) for 8%.

147,000 hectares of seedling stands were tended

Early pre-commercial thinning is carried out four to six years after planting, and the pre-commercial thinning begins 10 to 16 years after planting. Early pre-commercial

Area treated with fellings, based on notifications of forest use



thinning involves removing ground vegetation and competing species of trees, while the later pre-commercial thinning can also involve the thinning of crop-trees. The total area of early and later pre-commercial thinnings was 147,000 hectares in 2016. Both are carried out manually and mechanically, even though the use of mechanical methods has not yet increased. The proportion of mechanical work of all pre-commercial thinnings was only two per cent.

The surface area of the improvement of young stands was 47,000 hectares. These works involve clearing and thinning young stands that have passed the seedling stage.

The area treated with fellings was estimated to total 653,000 hectares

The statistics on the area treated with fellings are based on notifications of forest use, which must be submitted before the start of the planned fellings. The notification of forest use is valid for three years of the date of lodging, so the fellings notified may not be carried out during the same year it was reported in the statistics. Furthermore, the notification does not obligate the reporter to perform the planned fellings. Despite this, notifications of forest use reflect the implemented fellings well.

The area treated with fellings, based on notifications of forest use, totalled 653,000 hectares in 2016. Clearcutting is estimated to total 141,000 hectares and natural regeneration 27,000 hectares. Reported first thinnings totalled 135,000 hectares and other thinnings 306,000 hectares. In private forests, the area treated with fellings was 452,000 hectares.

Costs of silvicultural works were EUR 251 million

Total costs of silvicultural works and forest improvement works were EUR 251 million in 2016. Of these total costs, EUR 195 million were allocated to non-industrial private forests and EUR 56 million to forests owned by companies and the state.

Early and later pre-commercial thinnings generated the highest costs, i.e. EUR 59 million, while EUR 51 million was invested in artificial regeneration. Costs of constructing and basic improvement of forest roads and ditch network maintenance totalled EUR 42 million.

Volume and costs of silvicultural and forest improvement works

The table below shows the volumes and costs of the most important silvicultural works. A more detailed breakdown of costs can be found on the statistics website.

▶ Silvicultural and forest improvement work

Volume and costs of silvicultural works in 2016.

	Volume, 1,000 ha	Unit cost, EUR/ha	Total cost, EUR million
Clearing of regeneration areas	37	176	6.3
Initial clearing of intermediate felling areas	62	270	16.4
Soil preparation	103	333	34.1
Direct seeding	26	222	5.7
Planting	83	546	45.5
Early and later pre-commercial thinnings	147	402	58.6
Improvement of young stands	47	416	19.0
Fertilisation	47	335	15.7
Repelling root-rot disease	117	64	7.6
Forest improvement work	.	.	42.5

The statistical survey included separate questions for unit costs and total costs by type of work, which is why the volume of work multiplied by the unit cost does not necessarily add up to the total cost.

Wood trade

The wood trade statistics contain data on wood purchased by the forest industry from non-industrial private forests through standing sales or delivery sales. Standing sales involve the buyer felling and transporting the wood to a roadside storage area, and the wood is charged according to stumpage prices. Delivery sales involve the forest owner felling the trees and transporting the wood to a location along a long-distance delivery route. The roadside price payable for the wood includes a charge for the harvesting involved.

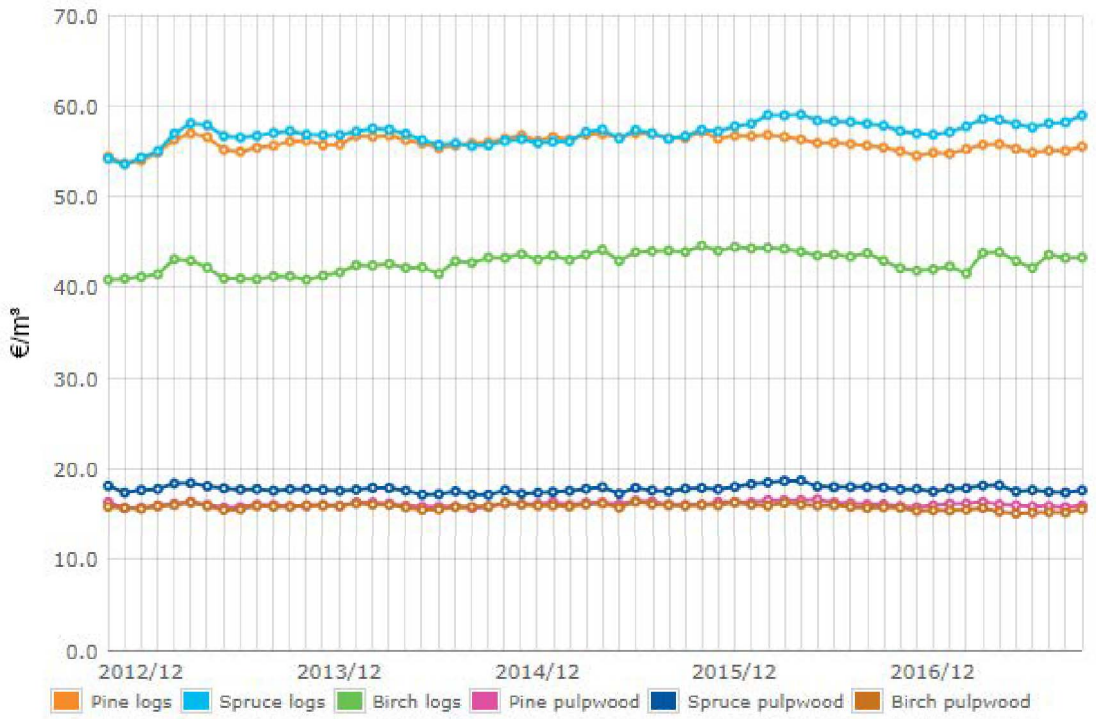
Wood trade statistics are based on more extensive data

Luke compiles statistics on both roundwood and energywood purchased from non-industrial private forests. The main focus in the statistics is on the prices of wood, but they also contain information about the volume of wood purchased. The prices of wood are given here in real terms, but the prices given in the statistics database of Luke are nominal values.

The data collected for the statistics have also been expanded. Some of the members of the Finnish Sawmills Association joined the data collection process at the beginning of 2013, which was estimated to increase the roundwood quantities recorded in the statistics to more than 90% of the quantity of roundwood purchased from non-industrial private forests. At the beginning of 2016, the number of companies submitting data was further increased. On that occasion, forest management associations also started to provide data about their wood trade activities. The latest expansion round can be seen in for the first time in the statistics for 2016. The wood volumes of the surveyed companies are shown in the statistics without adjustments, and they have not been extrapolated to reflect the total volume of roundwood purchased from non-industrial private forests. Therefore, the expansions of data collection cause a jump in

Real monthly stumpage prices of roundwood from non-industrial private forests (deflated using wholesale price index)

Link to release



Stumpage prices by roundwood assortments in 2016.

	Stumpage price	Increase/decrease in real terms	
		on the previous year, %	on the average of the previous 10 years
Pine logs	53.3	-0.9	-5.9
Spruce logs	55.3	+2.7	-3.7
Birch logs	41.5	-0.0	-6.0
Pine pulpwood	15.5	+0.8	-3.5
Spruce pulpwood	17.3	+3.1	-15.0
Birch pulpwood	15.2	-0.3	-3.0

Roadside prices by roundwood assortments in 2016.

	Roadside price	Increase/decrease in real terms	
		on the previous year, %	on the average of the previous 10 years
Pine logs	56.8	+1.6	-2.9
Spruce logs	57.2	+5.0	-1.1
Birch logs	47.0	+2.1	-2.9
Pine pulpwood	27.9	+1.7	-7.5
Spruce pulpwood	30.0	+2.9	-7.6
Birch pulpwood	28.5	-1.6	-6.9

time series, which means that direct comparison with the quantities recorded in the previous years will not reflect the developments accurately.

Roundwood trade covers all wood purchased from non-industrial private forests that is intended for making forest industry products. Energywood trade encompasses wood purchased for making forest chips, which can be used to fuel heat and power plants. Statistics on energywood trade have been compiled since 2014.

Stumpage prices of roundwood increased on the previous year

In 2016, the stumpage prices of roundwood increased on the previous year in real terms. The increase for logs and pulpwood was just over one per cent. Pine logs fetched EUR 53.3 and spruce logs EUR 55.3 per cubic metre in 2016. The stumpage price for spruce pulpwood was EUR 15.5 and for spruce pulpwood EUR 17.3 per cubic metre.

Compared to the average of the previous ten years, the stumpage prices of all main wood product categories had fallen. Based on this comparison, log prices had fallen by five per cent and pulpwood prices by eight per cent. The price of spruce pulpwood had decreased the most in real terms (-15%). The next biggest relative changes were recorded for birch logs and pine logs (-6%). The reference period of previous ten years contains the peak in log prices in 2007. However, over the last five years, the changes in wood prices in real terms have been moderate.

The price of wood depends on the felling method. Around two-thirds of wood sold by standing sales originated in regeneration fellings. The stumpage price for logs harvested by regeneration felling was two per cent and for pulpwood 12% higher than the average stumpage price. The stumpage price for logs harvested by means of thinning was 14% and for pulpwood eight per cent lower than the average stumpage price. Wood harvested in the course of a first thinning fetched just under 30% less than the average stumpage price.

The roadside prices of wood are on average higher than the prices in standing sales. The price difference is the largest for pulpwood, but for logs, the stumpage price and the roadside price can be quite close to one another. Depending on the tree species, the roadside price for logs is typically around two to five euros higher than the stumpage price. For pulpwood, the roadside price was EUR 12-13 higher than the stumpage price.

The roadside prices of wood purchased from non-industrial private forests increased in 2016. Compared to the average of the previous ten years, roadside price level was nevertheless down by four per cent. Most delivery sales involve pulpwood.

Wood purchases from non-industrial private forests at high level

The data collected for wood trade statistics expanded in 2016. Data collection extended to forest management associations and a few, new medium-sized forest industry companies. The expansion of the data collection caused a break in the homogeneity of the time series with regard to the wood trade volumes. Wood trade volumes also typically fluctuate considerably year on year.

The wood procuring organisations participating in the data collection purchased in total 41.4 million cubic metres of industrial roundwood from non-industrial private forests in 2016. Standing sales accounted for 82% (33.8 million cubic metres) of wood trade. Of this total, 16.5 million cubic metres were logs and 16.3 million cubic metres was pulpwood.

The great majority of wood sold by standing sales originates from regeneration felling stands. Regeneration felling accounted for 68% of all wood purchased by standing sales. Thinning accounted for 27% and first thinning stands for four per cent.

The volume of wood procured by means of delivery sales was 7.2 million cubic metres. Compared to standing sales, delivery sales are clearly dominated by pulpwood. Pulpwood accounted for 5.2 million cubic metres of all delivery sales and logs for 1.8 million cubic metres.

▶ Industrial roundwood trade

Percentages of different felling methods of the volume of roundwood sold by standing sales in 2016.

Product	Regeneration felling, %	Thinning and first thinning
Pine logs	80	20
Spruce logs	90	9
Birch logs	78	22
Pine pulpwood	41	58
Spruce pulpwood	67	33
Birch pulpwood	49	51

Photograph: Erkki Oksanen / Luke

Especially logging residue and pruned stems were procured for use as forest chips

With regard to standing sales of energywood in 2015, forest owners were paid most for pruned stems, on average EUR 4.3 per cubic metre. The average price for logging residue was EUR 3.2 per cubic metre, while unpruned stems fetched EUR 2.0 and stumps EUR 1.5.

The price of pruned stems sold in delivery sales dropped to EUR 22.7 per cubic metre. The unit price for unpruned stems was EUR 20.0, for logging residue EUR 14.8 and for stumps EUR 13.4.

Energywood prices in standing sales increased in 2016, with the exception of the price of logging residue. The relative change was the highest in lower unit prices: for example, the average price for pruned stems increased by EUR 1.2, which means that the relative increase was 40%. The average price for logging residue decreased by EUR 0.1, i.e. four per cent. The price paid for pruned stems in standing sales dropped by seven per cent (EUR -1.8) and the price for logging residue by four per cent (EUR -0.6).

In addition to the price paid by byers, forest owners also received state subsidies for a large percentage of their small-diameter stands, and these subsidies are not included in the statistics. In 2016, subsidies were paid for a large proportion of unpruned and pruned stems until 6 May, after which all subsidy applications were rejected due to insufficient funds. The subsidies paid for eligible

silvicultural works in young forests and the harvesting of small trees amounted to a total of EUR 430–450 per hectare. If the volume of energywood harvested from such a site totalled 50 cubic metres per hectare, subsidies amounted to around EUR 9 per cubic metre.

Energywood purchases continued to fall

Energywood purchases reported in 2016 amounted to 2.8 million cubic metres, which is estimated to cover approximately half of the total domestic energywood market. Logging residue from regeneration fellings accounted for almost half of the total purchases, and was thus the most important energywood type. The share of pruned stems decreased to slightly less than that, and unpruned stems and stumps accounted in total for almost ten per cent.

Two-thirds of all energywood was purchased by means of standing sales. Almost 85% of all logging residue purchased were procured by means of standing sales, while the same figure was almost 60% for pruned stems. These figures are remained almost unchanged from the previous year.

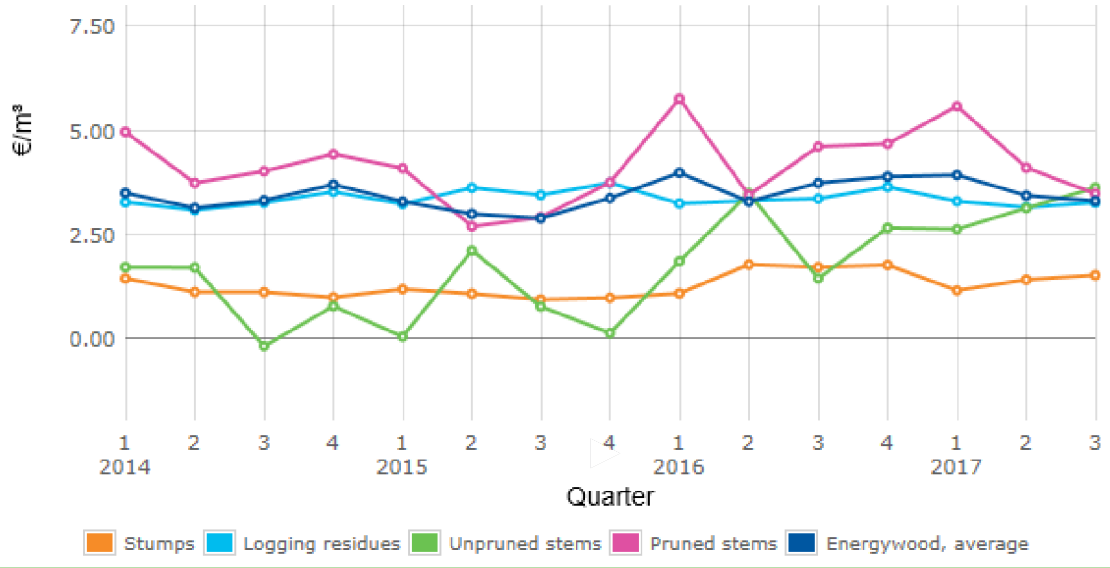
The extent of data collection for the statistics fluctuates. Notwithstanding this fact, the volume of energywood sold by standing sales decreased by one-sixth, and the volume of energywood procured by delivery sales by just over a quarter on the previous year. The volume of logging residue increased, while all other energywood purchases fell.

Energywood prices in 2016.

	Standing sales, EUR/m³	Increase/decrease on the previous year in real terms, %	Delivery sales, EUR/m³	Increase/decrease on the previous year in real terms, %
Average	3.51	+18	20.40	-8
Pruned stems	4.32	+40	22.74	-7
Logging residue	3.24	-4	14.81	-4
Stumps	1.54	+56	13.36	-13
Unpruned stems	2.02	+184	20.03	+2

Prices of energywood in standing sales at last quarter's prices

Link to release



Energywood sales has for several years now suffered from factors such as low energy prices, mild winters, existing energywood stocks, and good availability and competitive price of alternative fuels.

Energywood trade

Removals and drain

The volume of industrial roundwood harvested from Finnish forests reached a new record for the second year in a row. In 2016, the total volume harvested totalled 61.8 million cubic metres, which exceeded the previous record from 2015 by six per cent. The volume was 17% higher than the average for the preceding ten-year period. A total of 8.2 million cubic metres of roundwood was also harvested for energy production, which means that the total volume of harvested roundwood exceeded 70 million cubic metres.

The positive trend that continued in the forest industry in 2016 resulted in industrial roundwood felling hitting a new record high at 61.8 million cubic metres. The total volume of felling was 3.3 million cubic metres or six per cent higher than during the previous year and 17% higher than the average for the preceding ten-year period. The volume of wood imported for industrial purposes rose by two per cent on the previous year to 9.3 million cubic metres.

Logs accounted for 26 million cubic metres and pulpwood for 35.8 million cubic metres of the 2016 felling volume. The volume of logs increased by six per cent and the volume of pulpwood by five per cent on the previous year. Compared to the previous ten years, pulpwood removals grew by a fifth. The increase in the volume of logs amounted to 14%. Pine pulpwood (16.5 million m^3) and spruce logs (14.3 million m^3) were harvested the most.

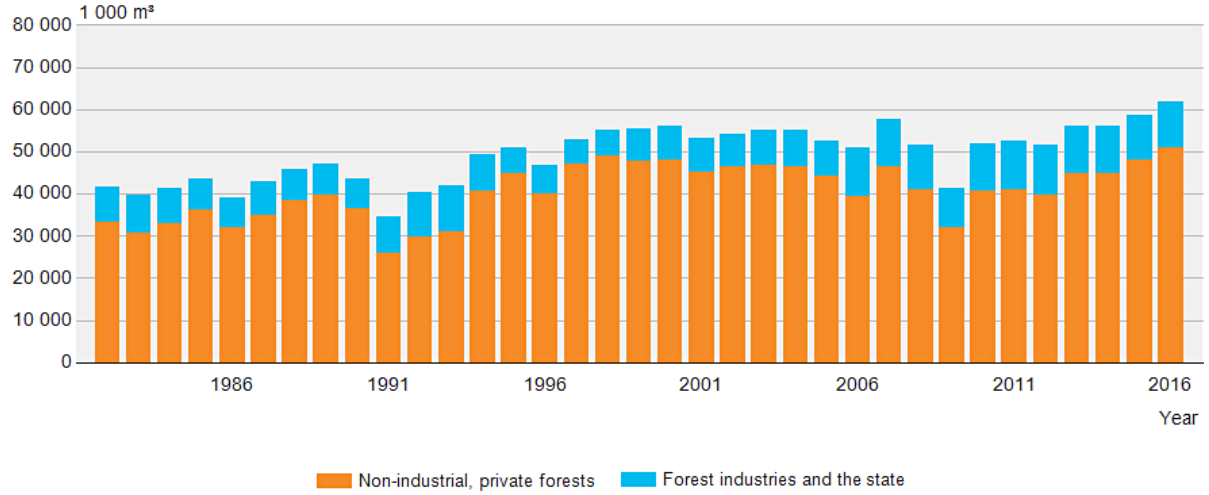
The majority of roundwood was sourced from non-industrial private forests

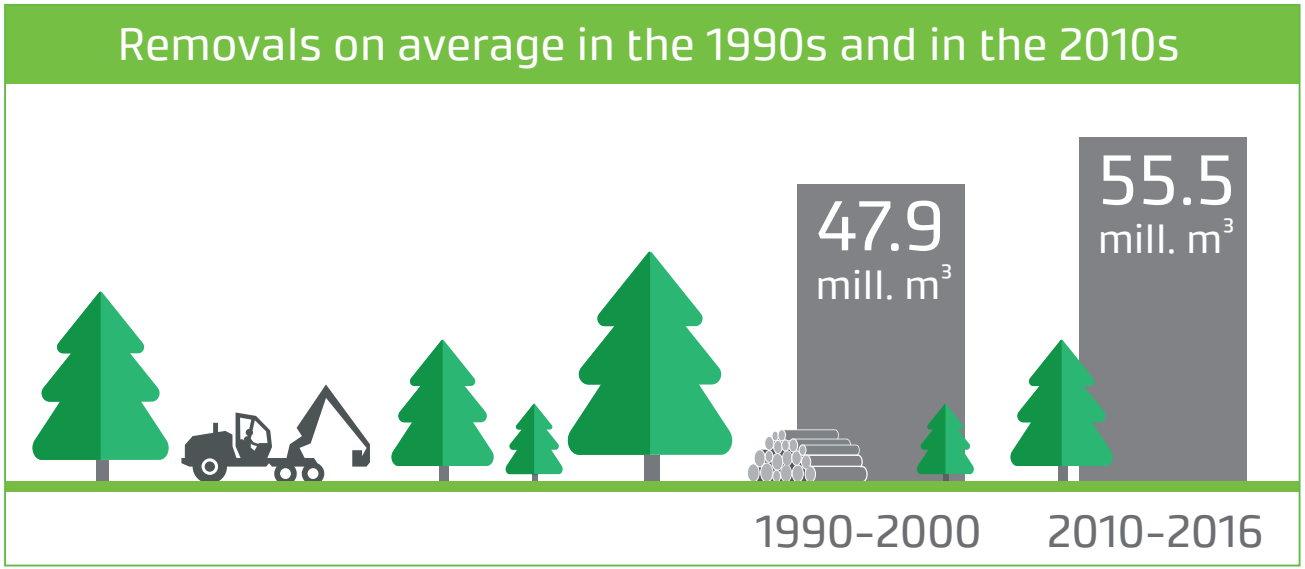
Approximately four-fifths of domestic wood for industrial purposes and export was sourced from non-industrial private forests, 51.1 million cubic metres in total. A total of 42.4 million cubic metres of timber, 11% more than in 2015, accumulated from standing sales in non-industrial private forests, while the volume of delivery sales shrank by 13% to less than nine million cubic metres.

The total volume of roundwood removed for the industrial sector from forestry companies' own forests and state-owned forests amounted to 10.7 million cubic metres. The figure is three per cent higher than during the previous year.

Industrial roundwood removals by ownership category, 1982–2016

Background data as a table





Highest felling volumes in Savonia and Central Finland

In 2016, the highest felling volumes were reported in the heavily forested regions of Southern and Northern Savonia and Central Finland. The quantity of industrial roundwood felled in Southern Savonia totalled 6.9 million cubic metres, 6.0 in Central Finland, and 5.9 in Northern Savonia.

Costs of harvesting and long-distance transportation of roundwood

The total costs of the wood procurement chain, i.e. harvesting and long-distance transportation of roundwood, are based on the performance and cost data submitted by the major forestry companies and Metsähallitus. The unit price for wood procurement is the sum of the unit costs per cubic metre of wood harvesting and long-distance transportation and the overhead costs. In 2016, the unit cost of mechanical harvesting totalled EUR 10.82 and the unit cost of long-distance transportation EUR 8.06 per cubic metre. The wood procurement overheads of domestic roundwood delivered on-site the factory amounted to EUR 2.92 per cubic metre. Thus, the total unit cost of wood procurement was EUR 21.80 per cubic metre. When the total felling volume of industrial roundwood is multiplied by the total unit cost, the total costs of industrial roundwood procurement chain amounts to just over EUR 1,300 million.

Total removals exceeded 70 million cubic metres

Total removals represent the total volume of roundwood harvested from forests. In addition to roundwood sold to the forest industry and to the export market as discussed above, the figure also includes wood harvested by forest owners from their forests for their private use, as well as roundwood harvested for energy production. The volumes (million m^3) of the aforementioned categories were as follows in 2016:

Total removals	**70.3**
Roundwood, of which	**62.1**
– forest industry and exports	61.8
– wood sawn for household consumption	0.3
Energywood, of which	**8.2**
– fuelwood for small-scale housing	5.4
– forest chips for heat and power plants	2.8

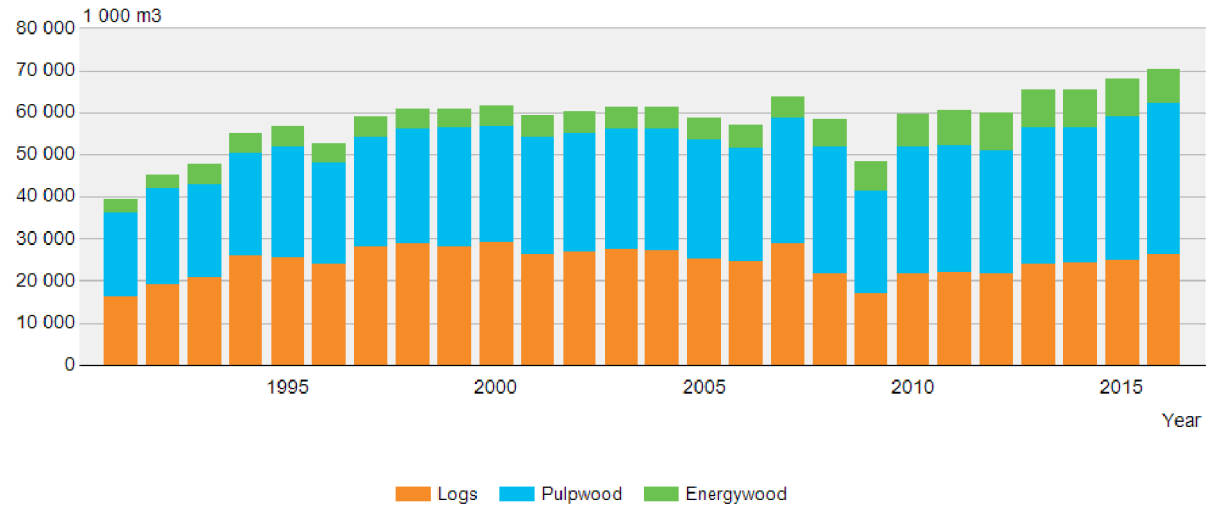
Total removals in 2016 exceeded the figure for the previous year by a total of two million cubic metres. The figure was record high, totalling 70.3 million cubic metres. The majority of the removals were logs and pulpwood harvested for raw material for the forest industry or for the export market: 62.1 million cubic metres in total (88%). The remaining 8.2 million cubic metres of roundwood was energywood, which can be turned into fuelwood for small-scale housing or into forest chips for heat and power plants. Total removals in 2016 consequently amounted to 16% more than the average of the previous ten years.

Logging residue and stumps also harvested for energy

In addition to roundwood, logging residue and stumps were also harvested from forests. A total of 2.3 million

Total roundwood removals 1991–2016

Background data as a table



cubic metres of logging residue and stumps were gathered for use as forest chips in heat and power plants and 0.6 million cubic metres as fuelwood in small-scale housing. These wood categories are not included in the total removals of roundwood.

The total drain was almost 86 million cubic metres

The total drain of roundwood refers to the quantity of roundwood excluded from the growing tree stocks in forests. In addition to removals, the total drain of the growing stock also takes into account roundwood left in forests in connection with felling and unused natural deadwood. In 2016, the latter wood categories totalled just over 15 million cubic metres, meaning that the total drain rose to almost 86 million cubic metres. The figure was four per cent higher than during the previous year and 18% higher than the average of the previous ten years.

The total volume of growing stock in forests increases when growth exceeds drain. The growth of Finnish forests has exceeded total drain every year since 1970, which means that the volume of wood has grown continuously. The annual increment is approximately 110 cubic metres, so the growth of forests exceeded total drain from removals and natural drain also in 2016 by nearly 25 million cubic metres.

Felling potential

Based on the 11th National Forest Inventory, the maximum sustainable felling potential of Finnish forests has been estimated at approximately 81 million cubic metres of roundwood per year between 2011 and 2020. Roundwood for the industrial sector (logs and pulpwood) accounts for 75 million cubic metres of the estimated felling potential and roundwood for energy production for six million cubic metres. Approximately 15 million cubic metres of roundwood logging residue and stumps can also be harvested for energy production in the form of forest chips each year.

Removals of roundwood in 2016 totalled around 70 million cubic metres, which means that 86% of the total sustainable felling potential was utilised (69% for logs and 93% for small trees). In 2011-2016, the total removals of roundwood has amounted to an average of 65 million cubic metres per year, so the removals carried out in 2017-2020 could exceed the maximum sustainable felling potential without threatening the sustainability of wood production.

- Industrial roundwood removals and labour force
- Industrial roundwood removals by region
- Harvesting and long-distance transportation of roundwood
- Total roundwood removals and drain
- Felling potential estimates

Stumpage earnings

Increased harvesting also increased gross stumpage earnings in 2016. The earnings were the highest since the peak year of 2007. Logs accounted for more than two-thirds of the total earnings.

The gross stumpage earnings of forest owners amounted to EUR 2.1 billion in 2016. The earnings of private forest owners totalled EUR 1.8 billion and those of forest industry operators and the state EUR 0.3 billion in total. Stumpage earnings were the highest in Southern Savonia (EUR 249 million) and Central Finland (EUR 210 million).

Timber harvesting increased by six per cent on the previous year, and the stumpage prices increased slightly in real terms. In euros, the stumpage earnings grew by EUR 114 million. In real terms, earnings increased by seven per cent on the previous year, when prices were converted using the wholesale price index.

Earnings of private forest owners increased

In real terms, stumpage earnings increased by nine per cent above the ten-year average. Private forest owners' earnings were up by 14%, but those of the forest industry and state fell by 12%.

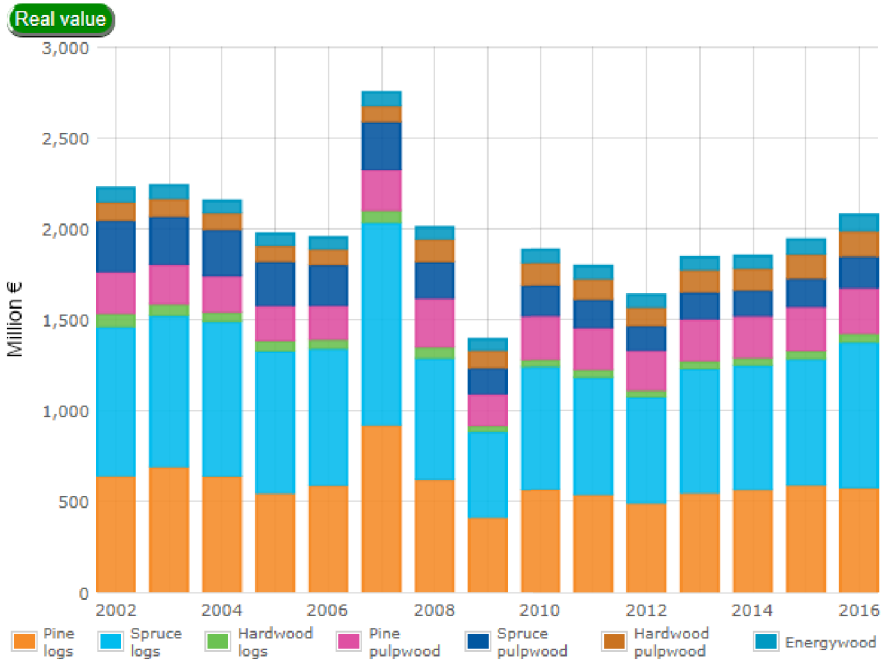
The share of earnings of the most important wood product category, spruce log, rose to two-fifths of the total. Spruce also maintained its position as the most important tree species. It yielded almost half of the total stumpage earnings. In Ostrobothnia and Northern Finland, the most important tree species was pine.

Four-fifths of the earnings of private forest owners resulted from standing sales and 13% from delivery sales. The value of wood sourced for private use accounted for just under six per cent, of which three-quarters concerned fuelwood.

- Stumpage earnings
- Gross stumpage earnings by ownership category and by region 2016
- Gross stumpage earnings by ownership category 2002–2016

Gross stumpage earnings 2002–2016 at prices for 2016

- Background data as nominal prices



Profitability of non-industrial private forestry

The positive trend in non-industrial private forestry resulted in an increase in the stumpage earnings in 2016. Investment returns on wood production changed only a little.

Operating profit in non-industrial private forestry improved by four per cent on the previous year

The operating profit of non-industrial private wood production per forest hectare was EUR 117 in 2016. In real terms, the operating profit increased by four per cent from the year before, and was ten per cent higher than on average in ten previous years, when prices were converted using the cost of living index. In recent years, the increase in the earnings has been mainly due to increased removals, since the stumpage prices have remained almost unchanged.

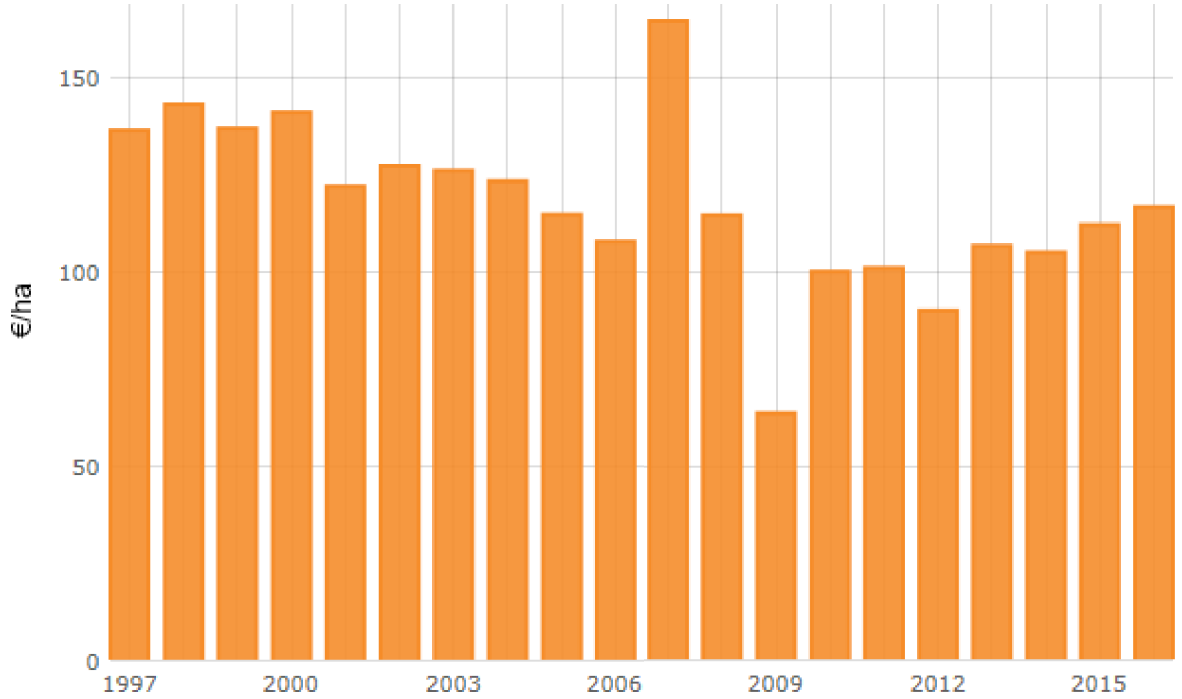
In Southern Finland, the operating profit totalled EUR 155 per hectare and in Northern Finland (Northern Ostrobothnia, Kainuu and Lapland) EUR 41 per hectare. The highest earnings per hectare were found in Päijänne Tavastia (EUR 249/ha), South Karelia (EUR 240/ha), Tavastia Proper (EUR 235/ha), and Kymenlaakso (EUR 233/ha).

The total earnings from non-industrial private wood production were EUR 134 per hectare in 2016. These earnings include gross stumpage earnings calculated on the basis of the quantity and stumpage price of wood from commercial roundwood and energywood felling and harvesting for private use.

The total costs of non-industrial private wood production were EUR 21 per hectare (in total EUR 280 million), of which investments in wood production accounted for EUR 16 per hectare. These investments also include just under two euros per hectare of work performed by forest owners. Compared to average of the previous ten years, the investments increased by one per cent. State subsidies for wood production totalled four euros per hectare (in total EUR 53 million).

Operating profit in non-industrial private forestry 1997–2016

Link to release



- Operating profit in non-industrial private forestry
- Operating profit in non-industrial private forestry 1991–2016
- Operating profit in non-industrial private forestry by region 2015–2016

Investment returns on wood production totalled over four per cent

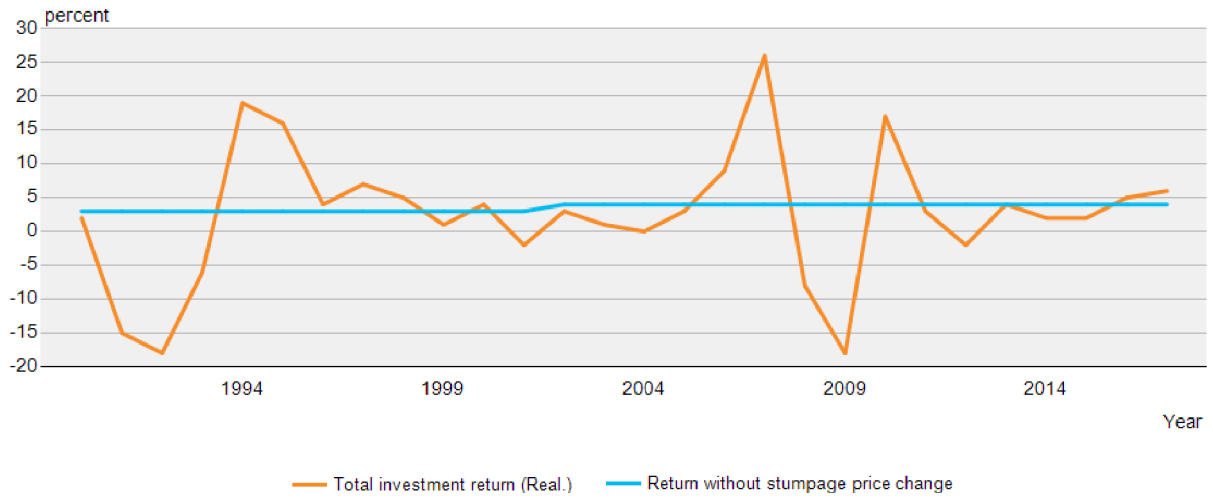
Real investment returns on wood production in private forests were 4.3% in 2016. The returns were 1.1 percentage points higher than in the ten previous years on average, when the results were reduced by the decrease in stumpage prices.

Of all factors, returns on wood sales increased total returns by 3.9 percentage points, the value of net increment by 0.7 percentage points and state subsidies for wood production by 0.1 percentage points. The increase in real stumpage prices increased total returns by 0.3 percentage points, when prices were converted using the cost of living index. Wood production costs decreased total returns by 0.6 percentage points.

In terms of regions, returns were 0.4–5.8% in Mainland Finland. Stump prices formed the most significant factor affecting variation in returns, as they decreased in 13 regions and increased in five. Without any fluctuation in stump prices, returns were 3.2–4.7%.

Investment return in wood production 1990–2017

- Background data as a table



- Forest as an investment
- Investment return in wood production by region 2015–2016
- Investment return in wood production 1990–2016

Photograph: Erkki Oksanen / Luke

Wood consumption

Roundwood consumption in Finland amounted to 76.9 million cubic metres in 2016. This was four per cent more than during the previous year and six per cent above the average of the previous ten years. Majority of the roundwood (67.4 million cubic metres) was used to manufacture forest industry products. The remaining 9.5 million cubic metres was burnt in energy generation as fuelwood in small-scale housing (5.4 million m^3) and as forest chips in heating and power plants (4.2 million m^3). The forest industries and energy generation utilised a total of 26.0 million cubic metres of forest industry by-products and wood residues.

Volumes of domestic roundwood record high

In 2016, the forest industries' roundwood consumption totalled 67.4 million cubic metres, which was four per cent more than during the previous year. The consumption of domestic roundwood was at its highest in 2006, when it amounted to 75.5 million cubic metres. The lowest consumption figure of the last ten years (51.5 million cubic metres) was recorded during the recession in 2009.

The consumption of domestic roundwood grew by five per cent on the previous year to 58.9 million cubic metres. This figure was the second highest since 2007. The forest industries consumed the same amount of imported roundwood as in 2015, 8.5 million cubic metres in total.

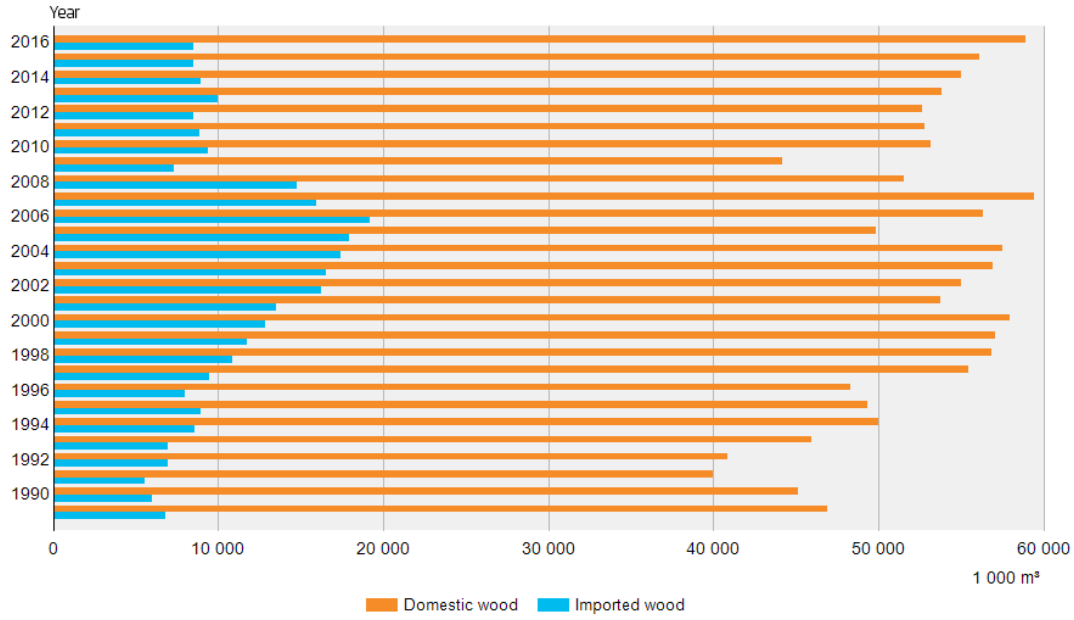
The consumption of imported roundwood has clearly reduced from the peak years in the mid-2000s. For example, in the peak year of 2006, the consumption of imported roundwood totalled 19.2 million cubic metres, which accounted for one quarter of the forest industries' total roundwood consumption.

In addition to roundwood, the forest industries used in 2016 a total of 9.3 million cubic metres of different types of forest industry by-products, mainly sawmill chips and dust, to manufacture forest industry products.

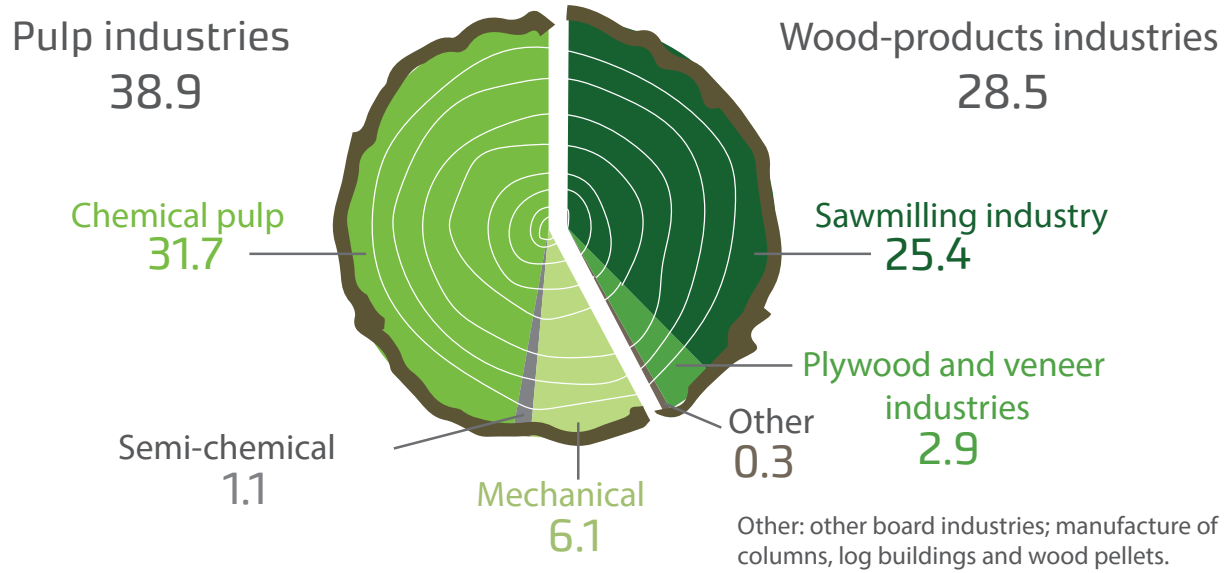
Chemical pulp industry consumes most of all roundwood

Compared to the previous year, wood consumption increased both in wood-products industries and pulp industries. The chemical pulp industry consumed the most roundwood, 31.7 million cubic metres in total (+5% on the

Forest industries' domestic and imported wood consumption ▶ Background data as a table



Use of roundwood in the forest industries by sector in 2016, mill. m^3



Other: other board industries; manufacture of columns, log buildings and wood pellets.

previous year). The volume of domestic roundwood consumed by the chemical pulp industry, 24.5 million cubic metres, was the highest figure recorded so far. The sawmilling industry consumed the second highest amount of roundwood, 25.4 million cubic metres (+6%). The most important roundwood assortments used by the forest industries were pine pulpwood (16.3 million m^3) and spruce logs (14.1 million m^3).

Consumption of wood in energy generation reached a record level in 2016

According to the energy statistics of Statistics Finland, in 2016, consumption of wood fuels in energy generation reached a new record, 97 TWh. Of the total consumption, solid wood fuels used in heating and power plants accounted for 37 TWh, burning of black liquor 41 TWh, small-scale combustion of wood 17 TWh, and other wood fuels 2 TWh. Wood fuels represented the most important energy source in Finland, covering 26% of the total energy consumption.

In 2016, heating and power plants consumed a total of 19.5 million solid cubic metres (37 TWh) of solid wood fuels, representing an increase of 1.1 million cubic metres (6%) compared to the previous year, the highest on record so far. Small-scale housing consumed in total 6.7 million cubic metres of fuelwood, of which roundwood accounted for 5.4 million cubic metres and various types of forest, sawmilling and construction wood residues 1.3 million cubic metres.

Forest chips consumption remained unchanged

The main solid wood fuel used by heating and power plants was forest chips, the consumption of which increased by one per cent year-on-year to 7.4 million cubic metres. The use of forest chips reduced by six per cent on the previous year to 4.5 million cubic metres in the combined heat and power production and increased by 15% to 2.9 million cubic metres in the generation of heat. Of the forest chips consumed by heating and power plants, around 0.4 million cubic metres (6%) was imported. Together with the forest chips burned in small-scale housing, the total consumption of forest chips reached 8.1 million cubic metres.

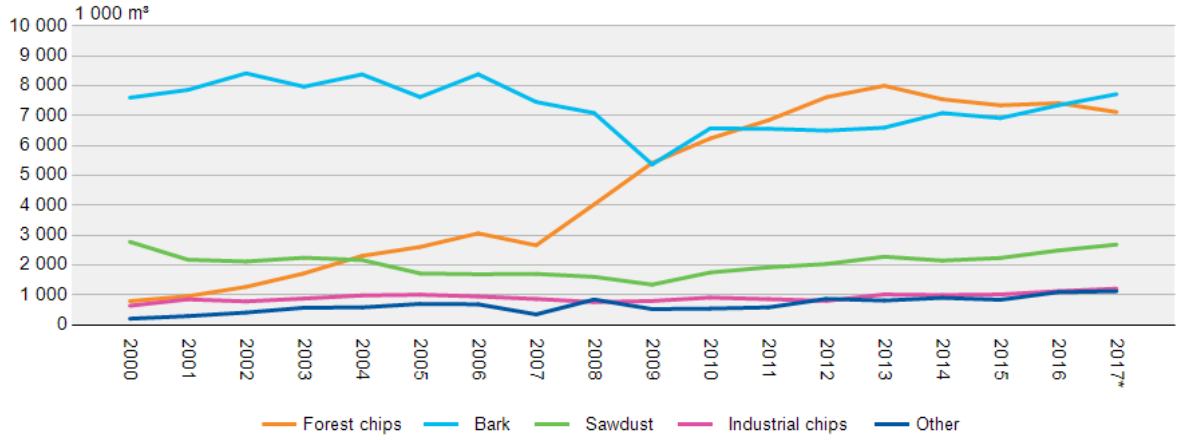
Small-sized trees were the most common source of forest chips

More than half, or 3.9 million cubic metres, of the forest chips consumed by the plants were manufactured from small-sized trees (mainly pruned small-diameter stems and unpruned small-sized trees). The second most common source, 2.5 million cubic metres, was logging residues. The use of stumps as raw material for forest chips came to 0.8 million cubic metres, and that of large-sized timber, unusable for manufacturing forest industry products, 0.3 million cubic metres.

Photograph: Erkki Oksanen / Luke

Solid wood fuel consumption in heating and power plants 2000–2016

▶ Background data as a table



Other: other forest industry by- and waste products, recycled wood and wood pellets and briquettes

Use of by-products in energy generation is increasing

Plants consumed eight per cent more forest industry by-products and different wood residues than in the previous year, a total of 11.0 million cubic metres. The main by-product used in burning was bark, accounting for almost 70%, or 7.4 million cubic metres, of all solid by-products. The use of nearly all types of solid wood fuels increased from the previous year. Proportionally, the greatest increase was seen in the consumption of wood pellets and briquettes (+41%), and recycled wood (+29%).

▶ Total wood consumption

▶ Forest industries' wood consumption

▶ Wood in energy generation

▶ Fuelwood consumption in small-scale housing

▶ Energy

Wood fuels covered three quarters of all renewables in 2016

Forest industries

Improved export demand was the main reason for the positive development of most forest industry indicators in 2016. The turn was clearest in the investments of pulp and paper industries, which grew in real terms by 60% on the previous year. The production of sawn goods, wood pulp and paperboard also increased from 2015. The forestry industries' share of the total value added in all sectors was 2.3%.

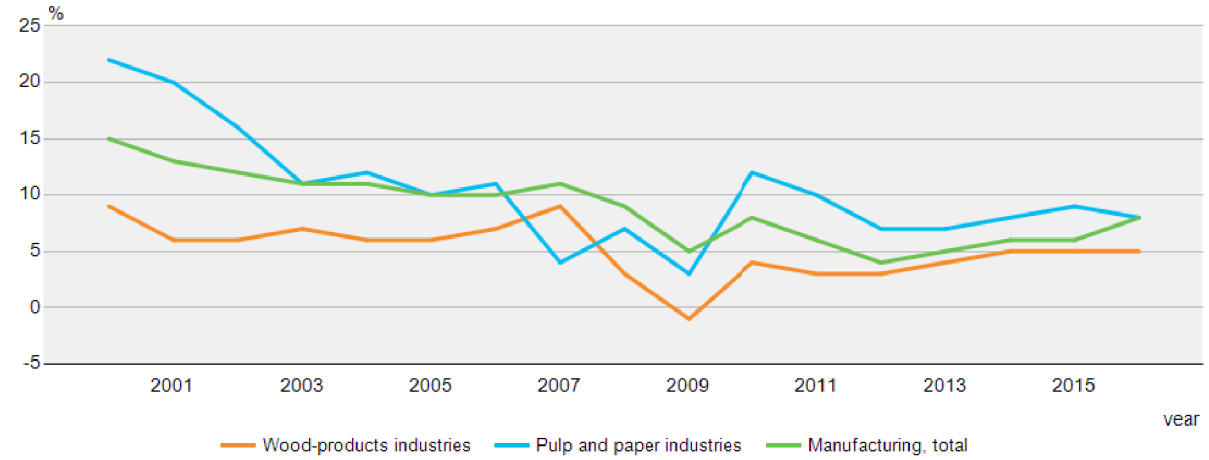
Paperboard, pulp and sawn goods pulled production on the rise

The production volumes of most forest industry products increased heavily in 2016. However, the demand varied between the main product categories. The production of the wood products industries grew on average by three per cent on the previous year, while the production of the pulp and paper industries fell by half per cent. Overall, the growth rate in manufacturing amounted to two per cent.

In addition to the positive market situation, particularly the investments made in the pulp and paperboard industries increased the production volumes. In 2016, the production of chemical pulp grew by five per cent on the previous year and amounted to 7.5 million tonnes in total. The production of paperboard (3.3 million tonnes) was nine per cent higher than in 2015. Of the main product categories, only the production of paper continued to fall. Printing and writing paper production totalled 5.5 million

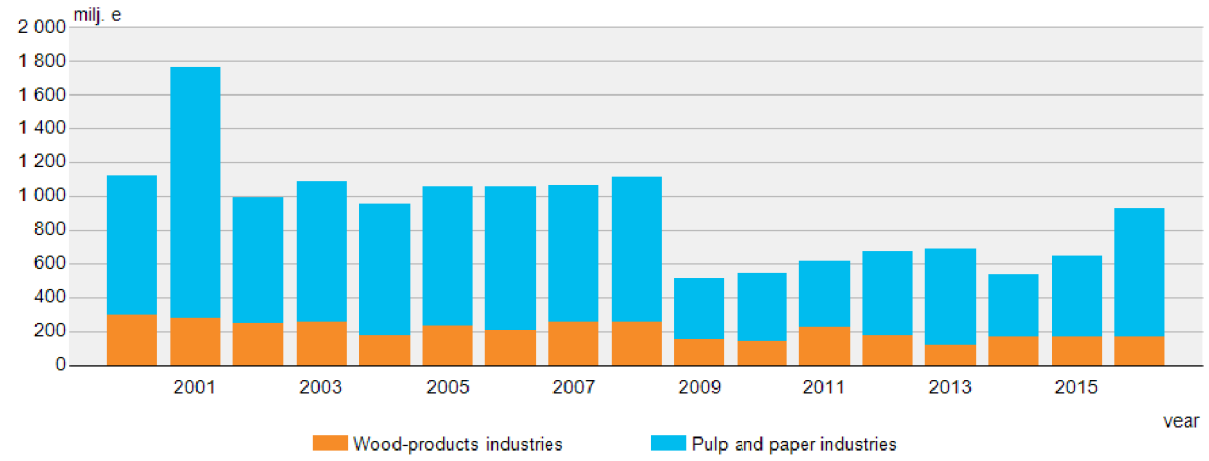
Profitability of the forest industries in Finland
(operating margin, % of operating income)

▶ Background data as a table



Investments of the forest industries in Finland

▶ Background data as a table



tonnes, which is seven per cent less compared to the previous year. Compared with the average of the preceding ten years, the drop amounted to almost one quarter.

The production of sawn goods increased by eight per cent to 11.4 million cubic metres. As in the last couple of years, of this total, around 3.2 million cubic metres remained in domestic use. Compared to the peak year of 2002, the drop totalled 40%.

The forest industries' turnover from domestic operations increased to EUR 27.3 billion in 2016. The pulp and paper industries' contribution to the turnover was approximately three quarters. The share of the forest industries of the total manufacturing totalled 22%.

Investments grew significantly

Forest industries' domestic investments grew significantly, albeit from a low level. In 2016, the real value of investments increased by 45% from the year before, totalling EUR 925 million. The investment rate was the highest since 2008, and mainly resulted from capacity increases in the pulp and paper industries.

In the wood products industries, the investments have steadily remained at the level of EUR 170 million over the past few years. The investments of the pulp and paper industries (EUR 755 million) represented four-fifths of the total investments in the sector. Their value relative to the value added (forest industries' investment rate) grew to 22%, while the figure for the entire manufacturing sector was one percentage point lower.

Additional investments have accelerated a more permanent change in the production structures in forest indus-

Key indicators for the forest industry in 2016.

	Unit	2016	Increase/decrease	Increase/decrease, average in
Forest industry production			2016/2015, %	2006-2015, %
Sawn softwood	million m^3	11.4	8	11
Chemical pulp	million t	7.5	5	7
Paper	million t	6.8	-6	-23
Paperboard	million t	3.3	9	16
Turnover of the forest industries*	EUR billion	27.3	8	17
Wood-products industries	EUR billion	6.4	5	-3
Pulp and paper industries	EUR billion	20.9	10	25
Investments of the forest industries*	EUR million	925	45	19
Wood-products industries	EUR million	170	1	-13
Pulp and paper industries	EUR million	755	60	29
Investment rate, forest industries	%	22	+7 % points	+5 % points
Profitability of the forest industries	Operating margin, %	7.5	-0.8 % points	+0.6 % points
Wood-products industries	Operating margin, %	4.8	-0.4 % points	+0.6 % points
Pulp and paper industries	Operating margin, %	8.3	-1.0 % points	+0.3 % points
Forest sector labour force	1,000 persons	62.9	-3	-13
Forestry	1,000 persons	21.8	-14	-8
Wood-products industries	1,000 persons	23.6	9	-10
Pulp and paper industries	1,000 persons	17.5	-2	-23
Value added, forest sector*	EUR billion	7.8	4	4
Forestry	EUR billion	3.5	7	18
Wood-products industries	EUR billion	1.2	-1	-10
Pulp and paper industries	EUR billion	3.1	1	-3

*Preliminary data.
Turnover, investments, profitability, and added value: increase/decrease in real terms, deflated using wholesale price index (1949=100). Investment rate: value of investments / value added at current prices in the industry (both data retrieved from national accounts). Operating margin, % = (operating income - operating costs) / operating income x 100 Sources: Statistics Finland, Finnish Forest Industries Federation and Finnish Sawmills Association.

tries: the share of paper of total production has significantly decreased while the importance of pulp and paperboard has grown. The construction of new bioproduct factories is reflected in the investment figures. The forest sector will continue to be the strongest cornerstone of the Finnish bioeconomy also in the future. According to an estimate by Statistics Finland, the bioeconomy investments of another important sector, namely the chemical industry, totalled around EUR 160 million in 2016.

Profitability indicators were slightly in the red

In 2016, the profitability of the forest industries remained at the same level as in the previous year. The sector's operating margin, i.e. earnings before interest, taxes, depreciation and amortisation, decreased by nearly one percentage point to 7.5% of operating income. However, the figure was around one percentage point higher than on average in the past ten years. The operating margin of the entire manufacturing sector was on average 8.1% of operating income. The other profitability indicators of the forest industries, namely net and total results, also indicated that the profitability slightly decreased in 2016.

In the pulp and paper industries, the operating margin totalled on average 8.3% and in the wood products industries 4.8% of operating income. Although the export prices took a downturn, the profitability of pulp and paperboard remained at a good level due to increased export volumes. Profitability of the sawmilling industry was reduced due to the difficult market situation of pine sawnwood in particular.

The financial position of the forest industries has significantly improved in recent years. In 2016, total debts comprised 71% of turnover, while the same figure for the preceding ten-year period was 94% on average. The equity ratio of the forest industries was 54%, which is four percentage points higher than on average in 2006-2015. Based on both these indicators, the financial position of the forest industries was better than in the manufacturing sector on average.

Forest sector labour force decreasing

The forest sector labour force has dropped by a third compared to the turn of the 21st century, and the trend also continued in 2016. Forestry and the forest industries employed in total 62,900 persons, which is three per cent of the total labour force in Finland. The forest industries employed a total of 41,100 persons and forestry alone 21,800 persons.

Compared to 2015, the number of the forest sector labour force decreased by 14%, although the forest industry labour force increased by four per cent. The wood-products industries employed around 23,600 persons and the pulp and paper industries 17,500 persons.

The number of unemployed persons in the forest sector dropped to 4,800 persons. The unemployment rate in the forest sector was 7.1%, which was almost two percentage points lower than in all other sectors on average.

- Forest industry
- Forest sector labour force

In 2016, the value added for the entire forest sector totalled EUR 7.8 billion, i.e. 4.2% of the value added for all Finnish industries. Forestry accounted for 1.9%, wood products industries for 0.6%, and pulp and paper industries for 1.7%. The figures are based on preliminary data from national accounts.

Foreign trade by forest industries

The value of forest sector exports totalled EUR 11.5 billion in 2016. The forest sector exports covered 22% of the total exports of Finland, the value of which was EUR 51.9 billion. In 2016, wood imports totalled 9.8 million cubic metres, which is slightly more than during the previous year. Despite the growth, the total volume has permanently halved since the wood import peak years more than a decade ago.

Wood is mainly imported from nearby areas

The imports of roundwood and wood residues totalled 9.8 million cubic metres in 2016. The value of imports was EUR 343 million. The imports of birch pulpwood totalled 4.6 million cubic metres, chips 2.5 million cubic metres, and spruce pulpwood 0.6 million cubic metres. Wood was mainly imported from Russia, Estonia and Latvia. Their combined share of total wood imports was 98%. However, as before, the most important source of imported wood was by far Russia with 85% of the total wood imports. Birch pulpwood and chips were mainly imported from Russia and Latvia. Chips and spruce pulpwood were imported from Estonia.

Compared with the previous year, the volume of imported wood increased by two per cent. However, the volume of imported birch pulpwood decreased by 3.3%, while the volumes of imported chips (+1%) and spruce pulpwood (+19%) increased. Compared to the average of the previous ten years, wood imports have decreased 24.3%.

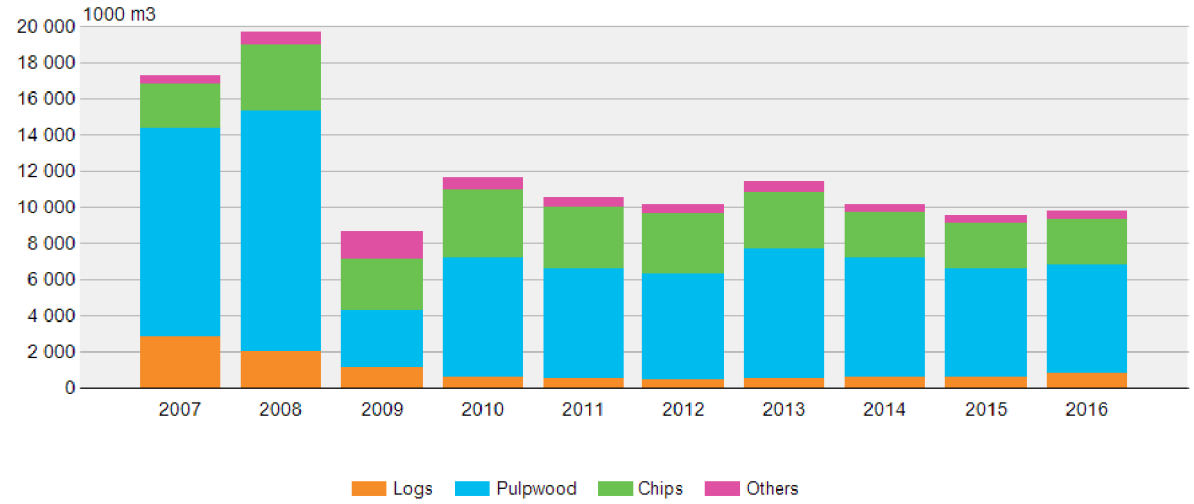
Sweden is the main wood export destination

The value of exported roundwood and wood residues totalled EUR 89 million in 2016. In terms of volume, softwood (0.9 million m³) and chips (0.2 million m³) had the highest export volumes. The main wood export destinations were Sweden (80% of total exports) and Egypt (6% of total exports). Pine logs, pine pulpwood and chips were the main products exported to Sweden. The exports to Egypt covered mainly pine.

Infographic: Eeva Vaahtera / Luke

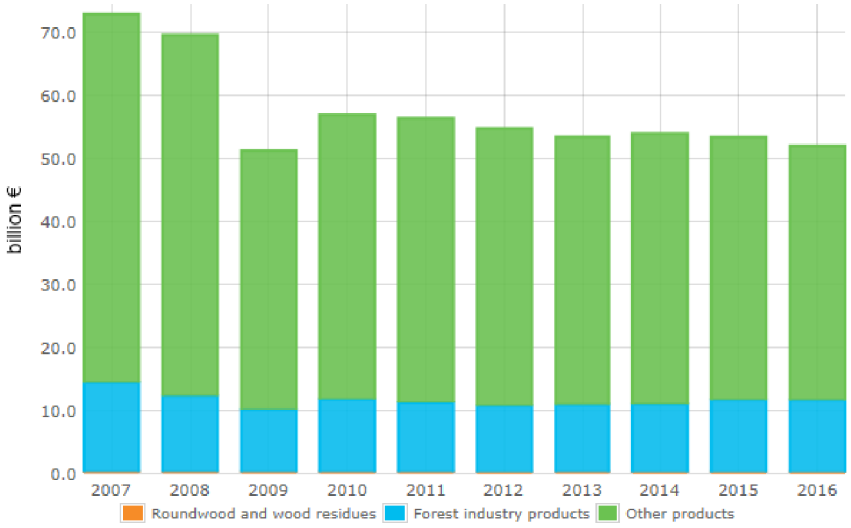
Wood imports 2007-2016

Background data as a table



Goods exports 2007-2016

Link to release



Compared to the previous ten years, the amount of wood exports has decreased around eight per cent and the real exports value by almost 19%. Compared to the previous year, the amount of wood exports has increased by just over one per cent, but the value decreased by over four per cent.

Majority of the forest industry products are exported to Europe

The value of exported forest industry products totalled EUR 11.4 billion in 2016. This was 22% of the total goods exports of Finland (EUR 51.9 billion). In total, the real exports value of forest industry products decreased by around half per cent from the year before. The exports value of pulp and paper industry products decreased by two per cent from 2015. However, exports of the wood products industry increased by 5.5%. The most significant exported products were paper (EUR 4.2 billion), followed by paperboard (EUR 2.4 billion) and pulp (EUR 1.8 billion). The value of sawn goods exports amounted to EUR 1.6 billion.

Two-thirds of the total export income from forest industry products came from Europe. The most important export countries were Germany and the UK. A total of 16% of the export income from forest industry products came from Germany, totalling EUR 1.9 billion. Exports to the UK covered eight per cent of the total and amounted to almost one billion euros. The third most important trading partner was China, to which forest industry products were

exported at a value of EUR 0.8 billion. Seven per cent of the total export income from forest industry products came from China. In 2016, nearly one-fifth of the total export income from forest industry products came from Asia. The significance of Asia has increased over the last ten years, while the importance of Europe has decreased.

Pulp is imported mainly from Brazil

Compared to export, the level of import of forest industry products is relatively low. The value of imported forest industry products totalled EUR 1.4 billion in 2016. In terms of value, the main import articles included pulp, converted paper and paperboard products, and furniture, which each were imported to Finland at a value of around EUR 0.2 billion. The most important trading partners in the imports of forest industry products were Sweden, Estonia and Brazil. The main import articles from Sweden were paper and paperboard and related products, from Estonia wooden furniture, and from Brazil pulp.

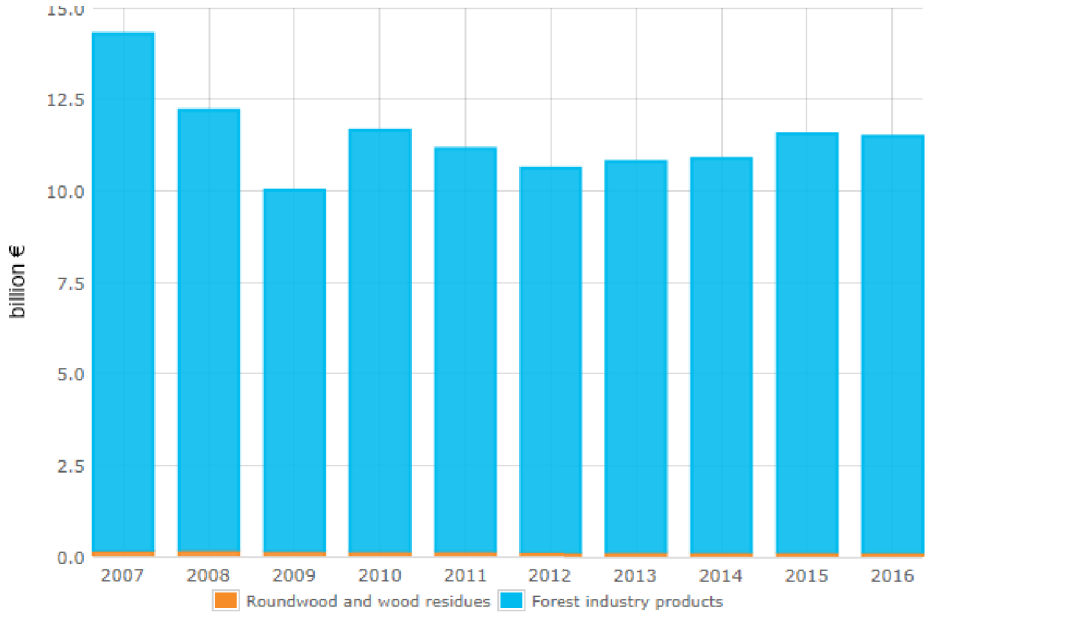
▶ Foreign trade in roundwood and forest industry products

Forest industry exports in the most important product groups in 2016.

		Increase/decrease in real terms, %		
	Value of export 2016 EUR billion	on the previous year, %	on the average of the previous 5 years, %	on the average of the previous 10 years, %
Finland's goods exports	**51.9**	**-2.6**	**-4.4**	**-12.4**
Forest industry products, of which	**11.4**	**-0.4**	**4.6**	**-2.1**
Paper	4.2	-7.0	-9.8	-21.4
Paperboard	2.4	5.6	18.2	22.5
Pulp	1.8	-0.9	17.5	31.5
Sawn goods	1.6	6.8	21.8	19.7
Plywood	0.5	-2.9	8.4	-3.7

Export in the forestry industries 2007-2016

▶ Link to release

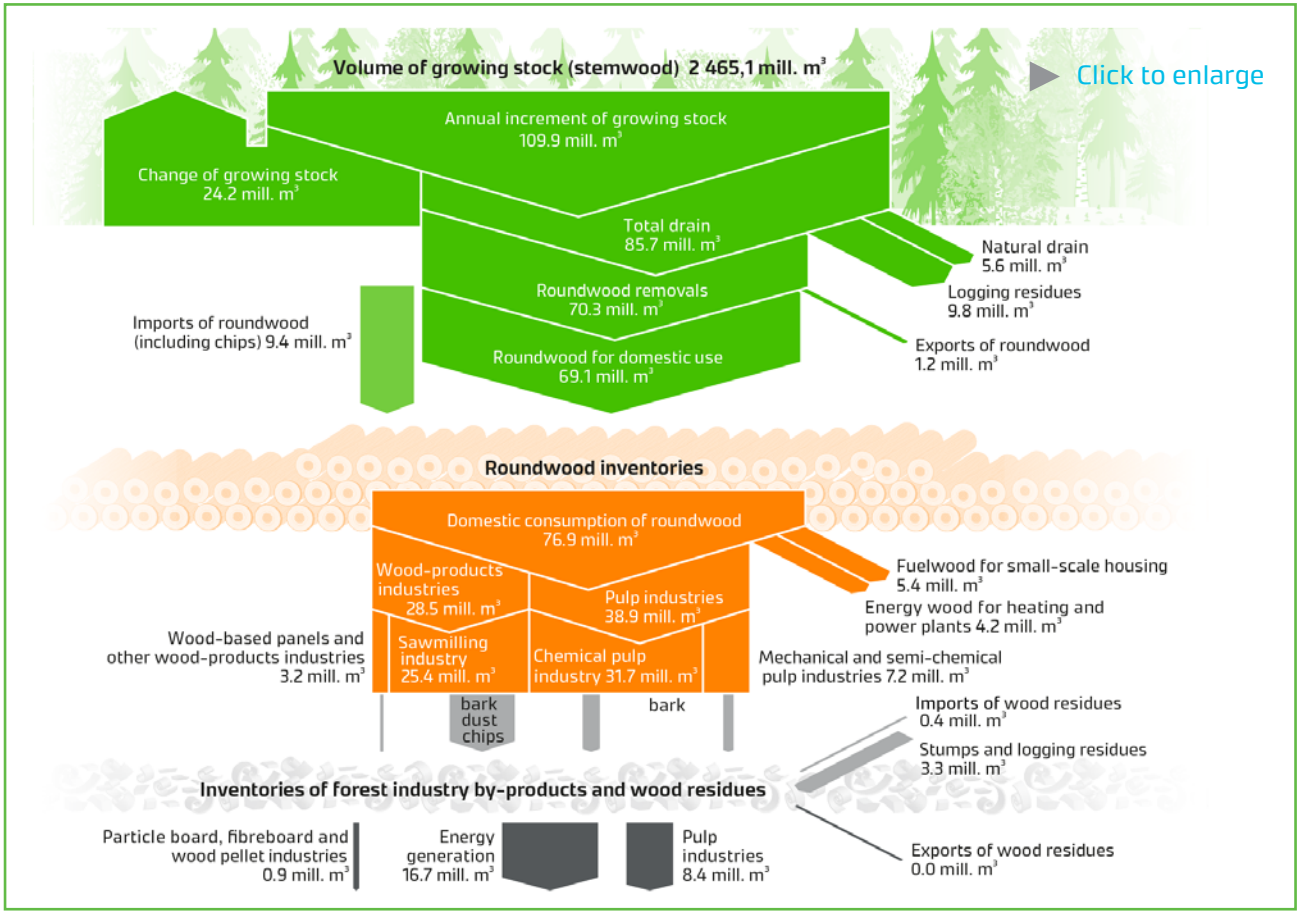


Finland's wood flows in 2016

The total volume of the growing stock (stemwood only) with bark in Finland's forests currently amounts to 2,465 million cubic metres. The majority of roundwood removed from our forests is used as raw material in industrial processes, and the rest is used to produce energy. In addition to stems, branches and stumps are also used for energy production, but the green (roundwood production) and orange (roundwood consumption) sections of the figure only include stems. By-products flows and wood residues flows also include other parts of trees.

The annual increment of the growing stock has risen to 109.9 million cubic metres of roundwood. In 2016, the total drain of roundwood was 85.7 million cubic metres. The drain of stemwood consists of fellings and natural drain (naturally dead trees). The difference between the increment and drain (24.2 million m³) increased the growing stock volume.

The volume of roundwood for domestic consumption (78.5 million m³) is calculated as the volume of roundwood removals (70.3 million m³) plus imports and minus exports of roundwood. Roundwood is then temporarily stored in roundwood inventories and is later consumed as raw material for domestic forest industries or energy generation. Domestic consumption of roundwood in Finland amounted to 76.9 million cubic metres, which equated to a computational increase of 1.5 million cubic metres in roundwood inventories.



The grey colour at the bottom of the diagram depicts the volume of solid wood residues left over from industrial processes or originating from other sources. They are primarily used to produce energy or as raw material in the pulp industry.

Fisheries and hunting statistics

Photograph: Jari Niukko / Luke

Fisheries and hunting statistics for 2016

Generous offshore Baltic herring and sprat catches, poor catches close to the shore

Finland's commercial marine fishing catch amounted to 157 million kilograms in 2016. Baltic herring accounted for 136 million kilograms and sprat for 17 million kilograms of the total. The majority of the Baltic herring and sprat were caught by trawling offshore. However, the majority of commercial fishermen used gillnets or trap nets to catch perch, European whitefish, pikeperch, salmon, and pike close to the shore.

1.5 million recreational fishers

In Finland, the number of recreational fishers totalled 1.5 million in 2016, while there were nearly 1.6 million two years before. Of the Finnish population, more than one in four is engaged in recreational fishing. Of Finnish males, more than one in three is a recreational fisher, while 20% of females go fishing. The catch made by recreational fishers totalled approximately 30 million kilograms. Net fishing accounted for 40% of the total catch. Fish caught by using a spinning rod or by trolling accounted for a total of 26%. Fish caught using a fishing rod and also a jig covered nearly 10% of the total catch.

Rainbow trout was the most important farmed food fish species

Approximately 14.4 million kilograms of fish was farmed for human consumption in Finland in 2016, the value of which amounted to EUR 69.1 million. The quantity was approximately 0.5 million kilograms smaller and the value EUR 13 million higher than in 2015. Rainbow trout accounted for 13.4 million kilograms, European whitefish for 0.8 million kilograms, and other species for approximately 0.2 million kilograms combined of the total farmed food fish volume. In addition, around 49 million fish fry of different ages were reared in fish farms and natural nutrition ponds, the value of which totalled in excess of EUR 20 million.

The processing industry used salmon, rainbow trout, Baltic herring and European whitefish the most

Of all fish processed in 2015, 26% was domestic Baltic herring and sprat, 32% other domestic fish species, and 42% imported fish. A total of 66% of all processed Baltic herring and sprat was frozen and imported whole. The most important domestic species used by the processing industry was rainbow trout. Of the total imported fish used by the processing industry in 2015, more than 90% was farmed Atlantic salmon originating in Norway. Statistics on fish processing are compiled every two years.

Producer prices for salmon and rainbow trout increased

Producers were paid an average of EUR 4.88 per kilogram for rainbow trout and EUR 10.11 per kilogram for farmed European whitefish. Fishermen were paid an average of EUR 5.35 per kilogram for salmon. The most valuable fish caught at sea was pikeperch. It fetched EUR 5.90 per kilogram. The producer price for Baltic herring sold for human consumption was EUR 0.26 per kilogram, while Baltic herring sold to the industrial sector fetched EUR 0.18 per kilogram. Majority of the Baltic herring catch is sold to the fur industry as animal feed.

Price increases also increased the value of foreign trade

A total of 101 million kilograms of fish and fish products were imported to Finland in 2016. The total value of imports was approximately EUR 398 million. Finland exported around 71 million kilograms of fish and fish products, the value of which totalled EUR 57 million. The volume of imports decreased by almost ten per cent, while the value of exports increased by a few per cent on the previous year. The value of both imports and exports increased by around EUR 20 million from 2015.

Fish processing had the highest employment and revenue

There were 1,747 fishery businesses in 2015, and the total revenue of the fishery industry was EUR 839 million. The fishery industry produced EUR 122 million in value added and provided 2,536 person-years of work in employment. Fishing companies accounted for 72% of all fishery businesses. The fishery sector with the highest revenue and employment was fish processing.

Consumption of imported fish slightly decreased

In 2016, Finnish people consumed approximately four kilos of domestic fish per person, converted into fillets, and a little more than nine kilos of imported fish. The total consumption of fish decreased by roughly eight per cent from the year before. Domestic fish consumption remained unchanged but consumption of imported fish slightly decreased.

Two-thirds of those who paid the game management fee actually engaged in hunting

A total of 304,000 hunters paid the annual game management fee in 2016. Approximately two-thirds of them actually engaged in hunting. Hunters spent a total of 3.4 million days on small-game hunting and roughly 1.5 million days on deer hunting. Of all game species, the most hunted were common wood pigeon (approximately 235,000), raccoon dog (approximately 212,000), and mallard (184,000).

Commercial inland fishery

The latest data on commercial inland fishery are from the year 2014. The commercial inland fishery catch amounted to approximately six million kilograms in 2014, of which almost half was vendace.

http://stat.luke.fi/en/

Commercial marine fishery

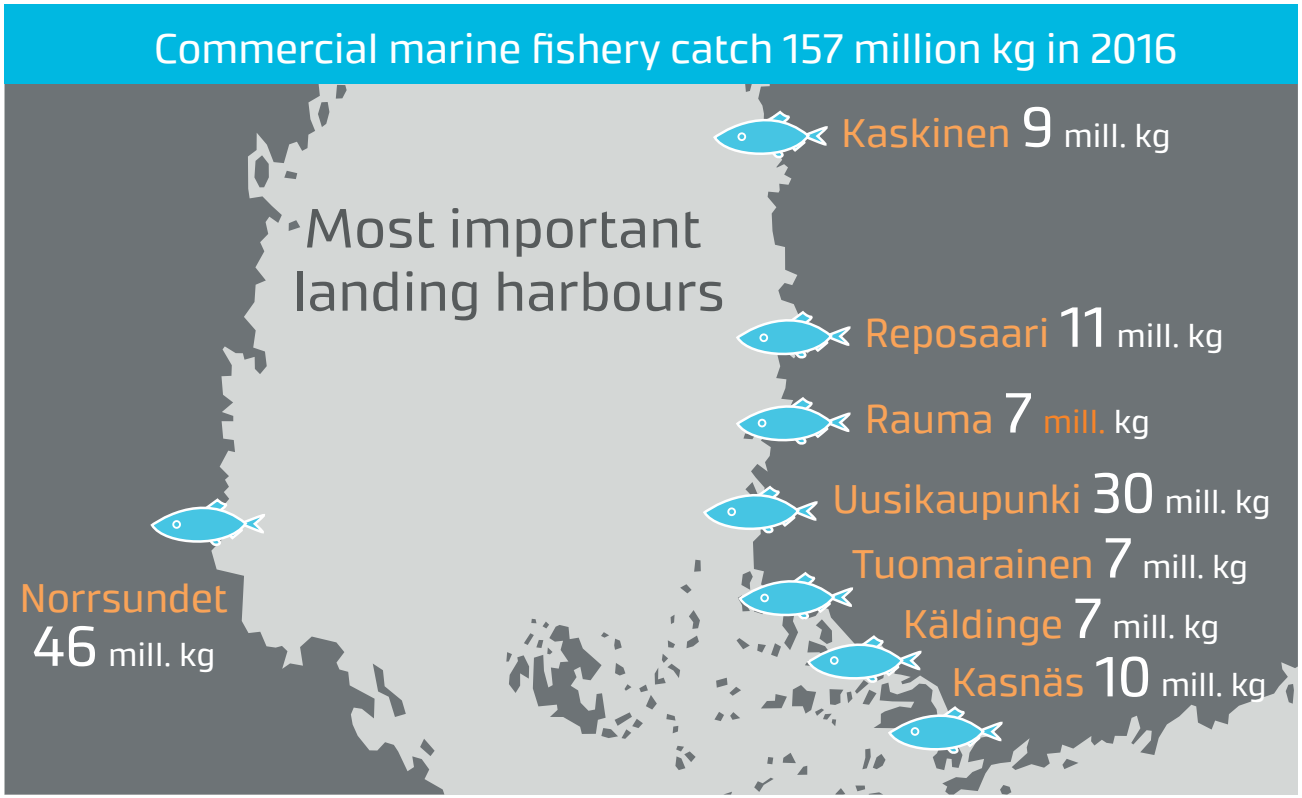
Record catches of Baltic herring and sprat

Fishing vessels registered to Finland caught a total of 157 million kilograms of fish at sea in 2016. The volume of the catch was unprecedented high and worth nearly EUR 40 million. Baltic herring was by far the most important species. It accounted for almost 90% of the total catch and for three-quarters of its value. The most important catch area was the Bothnian Sea, which yielded a total of 103 million kilograms of Baltic herring. This is seven million kilos more than during the previous year and five times more than in the 1980s.

The sprat catch was the second largest at 17 million kilograms. Fishery of Baltic herring and sprat is very centralised: only eleven trawlers accumulated half of the total catch. Some of the vessels sailed under foreign flag: half of the sprat catch and a third of the Baltic herring catch were landed in Swedish, Estonian and Danish ports. Most of the total catch was landed in the port of Norrsundet in Sweden, followed by the Finnish ports of Uusikaupunki, Reposaari in Pori, and Kasnäs in Kemiönsaari. Roughly 90% of the total Baltic herring and sprat catch was sold for use as animal feed.

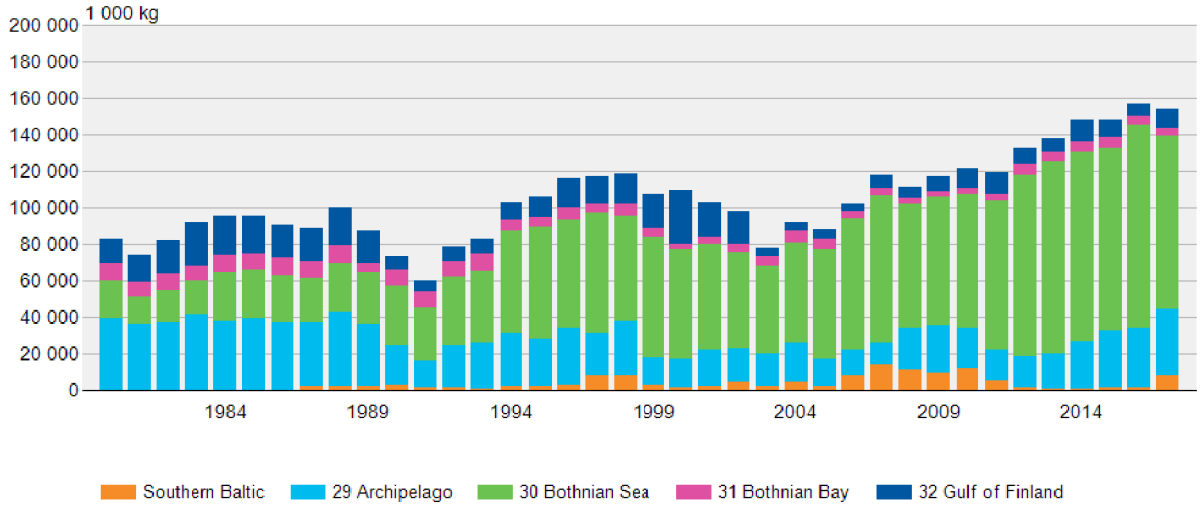
Poor catches for coastal fishers

Majority of commercial marine fishermen used gillnets or trap nets to catch fish. The most important fish species in coastal fishery were European whitefish, pikeperch, pike, and salmon. The pikeperch and perch catches in 2016 were smaller than during the previous year. The salmon and European whitefish catches were also considerable smaller than the long-term average. The weak ice conditions made fishing more difficult and decreased the catches. In addition, seals decreased the catches of one in three fishermen and cormorants of one in ten fishermen. The total coastal fishery catch was mainly sold for human consumption. Demand may have exceeded the supply, since consumers regard fish good for health and are willing to increase their fish consumption.



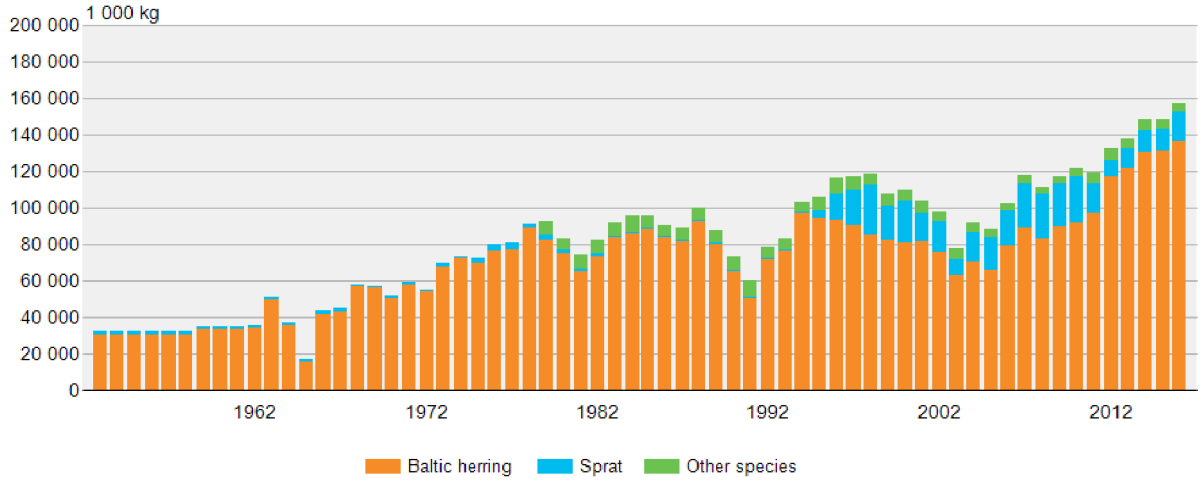
Catches in Finnish commercial marine fishery 1980–2016

Background data as a table



Finnish commercial marine fishery catch by species 1953–2016

Background data as a table



Fewer fishermen, larger catches

Official statistics on Finland's commercial marine fishery catch sizes have been compiled for over sixty years. During that time, fishing techniques have become considerably more efficient and the total catch has grown four times larger from 40 million to 157 million kilograms. Catches of many species, such as Baltic herring, sprat, cod, and salmon, have fluctuated over the last decades. The Baltic herring catch for 2016 is over four times larger than at the beginning of the 1950s, and the sprat catch has grown nine-fold. Instead, cod and salmon numbers have decreased. Cod catches were the largest in the 1980s, and up to sixty times larger than in 2016. Salmon catches were the largest in the 1990s, and the 2016 catch amounted to one-tenth of the record catch.

The fluctuations have been due to factors such as the introduction of new fishing techniques, demand for fish used as animal feed, changes in fish stocks, and fishing quotas.

Photograph: Ari Saura / Luke

Photograph: Pekka Hyvärinen / Luke

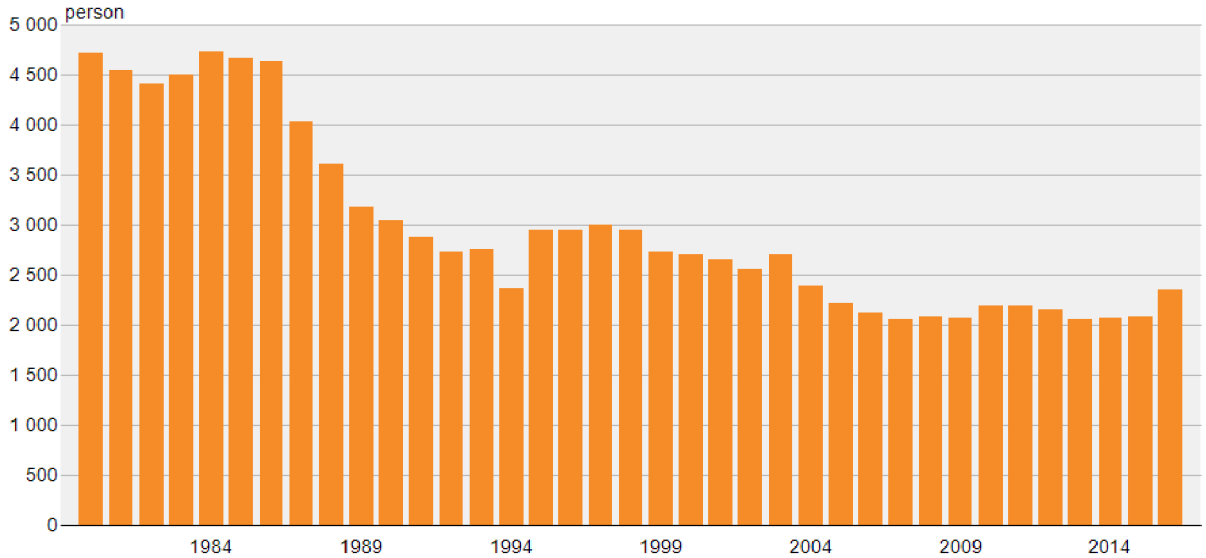
The new Fishing Act required establishing a register of commercial fishermen to which anyone who catches fish for the purpose of sale must belong. Commercial fishermen are entitled to use special fishing gear and larger numbers of fishing gear, which also attracted fishermen catching fish for domestic needs or recreation to register. Consequently, the number of commercial fishermen has increased on the previous year, and at the start of 2017, the register included a total of 2,360 fishermen. At the beginning of the 1980s, there was no extensive registers of commercial fishermen, but it has been estimated that the number of fishermen was double of that today, i.e. over 4,700 fishermen. Based on the age structure of fishermen, the number will continue to decrease in the future.

Fishing vessels registered for commercial fishing numbered 3,090. The majority of them were less than six metres long and primarily used in coastal trap net and gillnet fishing, but the register also included about thirty sturdy offshore vessels of over 20 metres in length. The average age of the fishing vessels is 27 years, but the oldest vessels were built already in the 1930s.

▶ Commercial marine fishery

Commercial marine fishermen 1980–2016

▶ Background data as a table



Commercial inland fishery

The new Fishing Act, which entered into force at the beginning of 2016, brought changes to commercial inland fishery. If a fisherman intends to catch fish for the purpose of sale, they must register as a commercial fisherman. Commercial fishermen are entitled to use the fishing gear and numbers of fishing gear permitted by law, but they also have the obligation to keep record of their fishing activities and report their catches to Luke.

The new act affected the number of fishermen

At the beginning of 2017, the commercial marine fishermen's register contained approximately 1,500 fishermen or fishing companies, who were divided into two categories based on their turnover. Almost 300 fishermen belonged to Group I, which means that their average turnover during the past three accounting periods exceeded EUR 10,000. The rest belonged to Group II, which contains commercial fishermen who catch less fish or crayfish than those in Group I, but presumably it also contains fishermen catching fish for domestic need or recreation who have registered to be able to use the larger number of fishing gear permitted by law for commercial fishermen.

Starting in 2016, Luke compiles annual statistics on inland commercial fishery on the basis of data submitted by the registered commercial fishermen. The previous statistics were compiled every second year and was based on a separate survey targeted at the 550 fishermen who were in the register at that time.

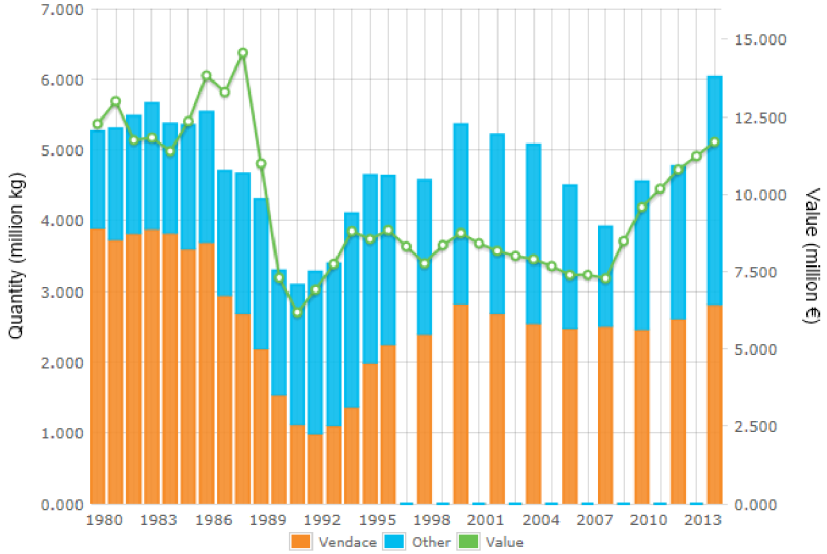
Vendace the most important freshwater species

Vendace accounted for approximately half of the total inland fishery catch. According to the latest statistics, commercial fishermen caught 2.8 million kilograms of vendace in 2014. The status of vendace as the most important species of commercial inland fishery is strong. Although the stock fluctuations that are typical for vendace cause regional fluctuations in catch sizes and the growing conditions in the vendace sizes, catch sizes have been relatively constant throughout the 21st century at around 2.5 to 2.8 million kilograms.

According to Luke's vendace monitoring, the vendace catch in 2016 was moderate. The estimations for 2017 expect good catches, particularly in the main vendace production area in the southern regions of Eastern Finland.

Volume and value of commercial inland fishery catch 1980–2014

Link to release



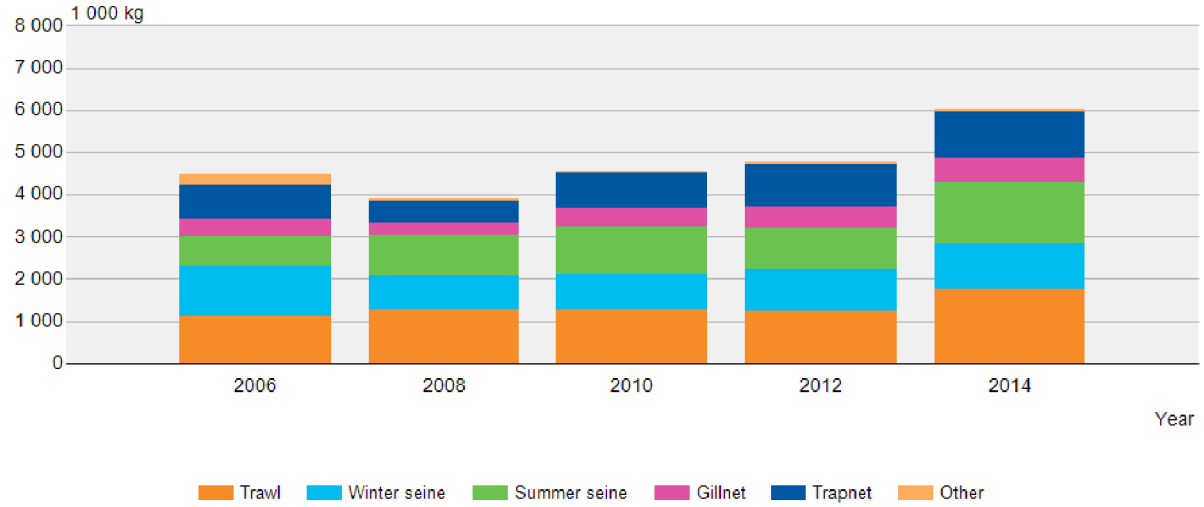
Pikeperch catches have grown

In recent years, after vendace, the most valued freshwater fish have been pikeperch. Perch and European whitefish are also valued fish species. Demand for freshwater fish has been on the rise in retail trade, which indicates that there also would be demand for even larger catch sizes.

Vendace catching on lake Oulujärvi. Photograph: Pekka Hyvärinen / Luke

Catches in commercial inland fishery by gear 2006-2014

▶ Background data as a table



In 2014, the value of the total inland fishery catch amounted to EUR 11.7 million, of which vendace and pikeperch accounted for 75%.

▶ Commercial inland fishery

Read more

- ▶ Commercial inland fishermen now required to report their catches (in Finnish)
- ▶ Data about vendace
- ▶ Vendace monitoring at Luke (in Finnish)

Recreational fishing

In Finland, the number of recreational fishers totalled 1.5 million in 2016, while there were nearly 1.6 million two years before. Of the Finnish population, more than one in four is engaged in recreational fishing. Of all recreational fishers, every one in three is a female. Of Finnish males, more than one in three is a recreational fisher, while 20% of females go fishing.

Number of elderly fishermen has increased

The number of people engaged in recreational fishing has increased among people aged over 64 years compared to the beginning of the 21st century. In all other age groups, the number of recreational fishermen has decreased. Between 2000 and 2014, the number of fishermen aged between 18 and 44 years halved, but the number turned upwards again in 2016.

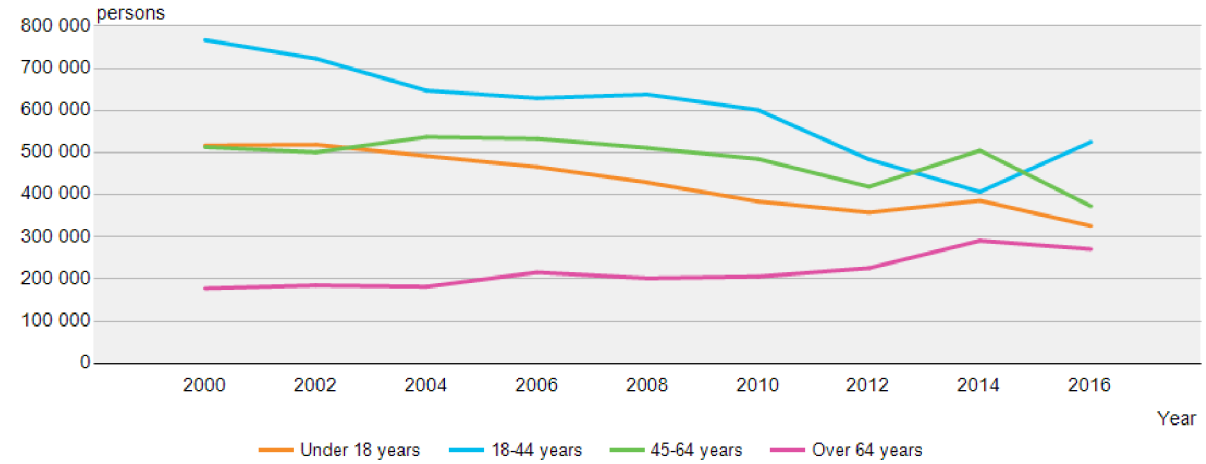
Rod and line still the most popular method

Rod and line was still by far the most popular method, and almost 60% of all fishermen used a rod and line in 2016. The next most popular was spinning rod, which was used by just over half of all fishermen. Ice fishing rod and trolling were used by just over a third of all fishermen. A total of five per cent of fishermen engage in fly fishing.

Compared to the year 2000, the number of fishermen who use a rod and line has decreased almost by a third. The

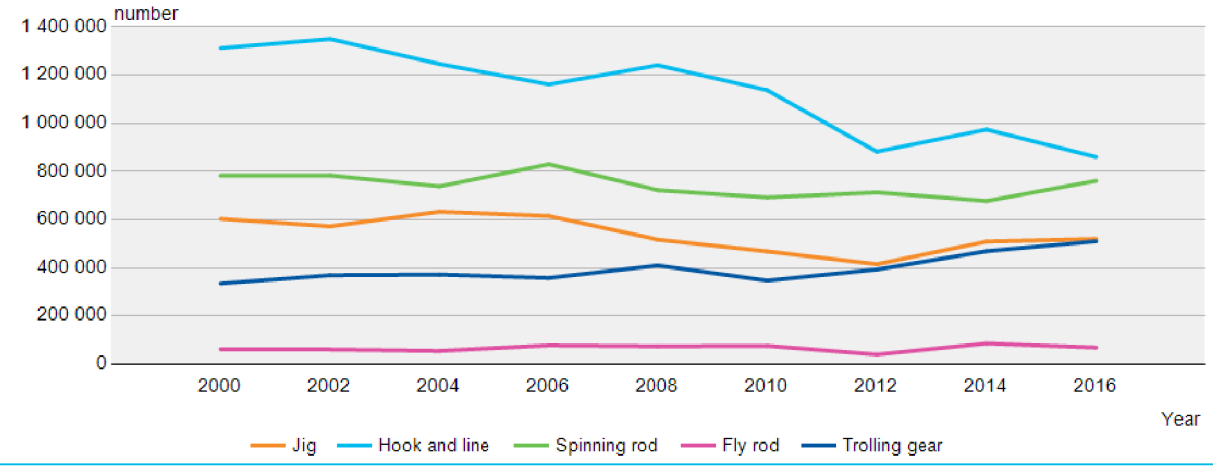
Number of fishermen by age group

Background data as a table



Number of fishermen using different types of gear

Background data as a table



number of people who engage in trolling, on the other hand, has grown slightly.

Gillnet users were older than previously

Fishermen who use gillnets accounted for almost a quarter of all fishermen in 2016. Fish traps or trap nets were used by one in five fishermen. The number of people using gillnets has decreased in all age groups, except among people aged over 64 years: third of all gillnet users belong to this age group.

Pikeperch catch increased, while perch and pike catches decreased

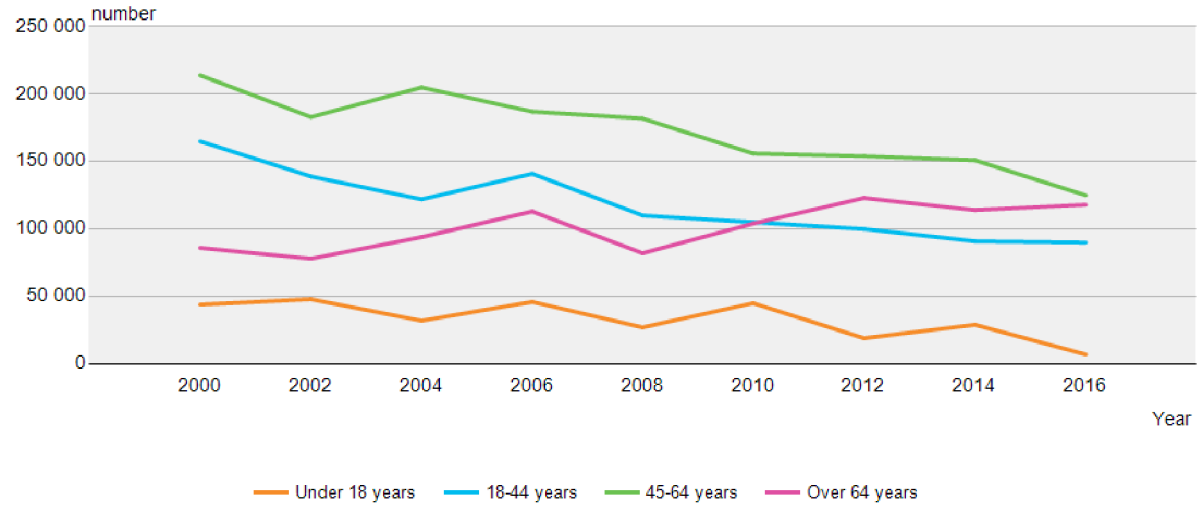
The catch made by recreational fishers totalled approximately 30 million kilograms in 2016. It increased slightly compared with 2014 when the previous statistics of recreational fishing were compiled. Net fishing accounted for 40% of the total catch. Fish caught by using a spinning rod or by trolling accounted for a total of 26%. Fish caught using a fishing rod and also a jig covered nearly 10% of the total catch.

In the 21st century, the catch made by recreational fishers has decreased by a third. Of the most common species, only pikeperch catches have increased. Instead, perch and pike catches have decreased. In 2016, they nevertheless accounted for almost half of the total catch made by recreational fishers.

▶ Recreational fishing

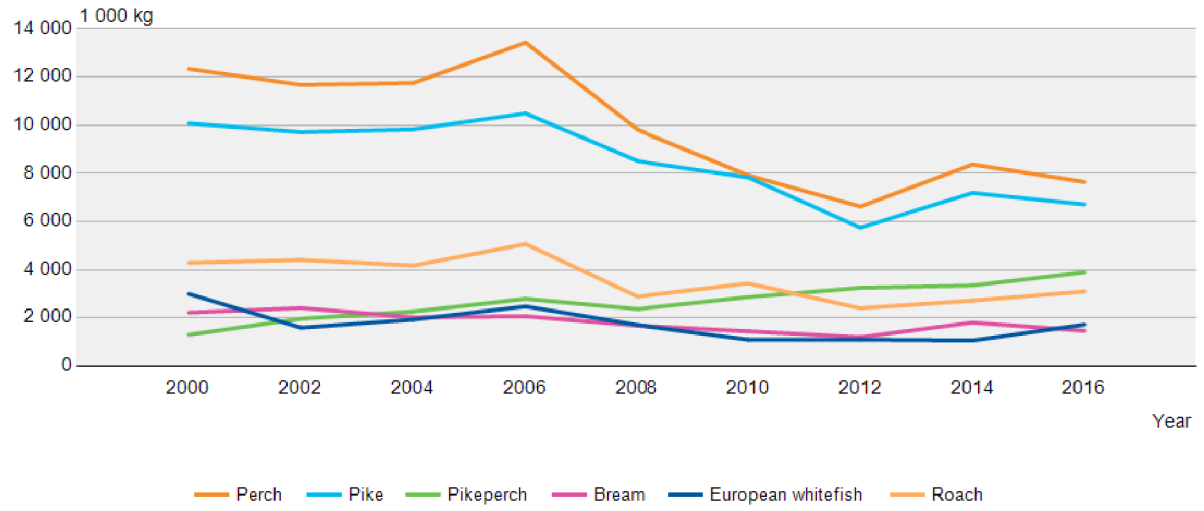
Number of fishermen using gill net by age group

▶ Background data as a table



Catches of most common species of fish

▶ Background data as a table

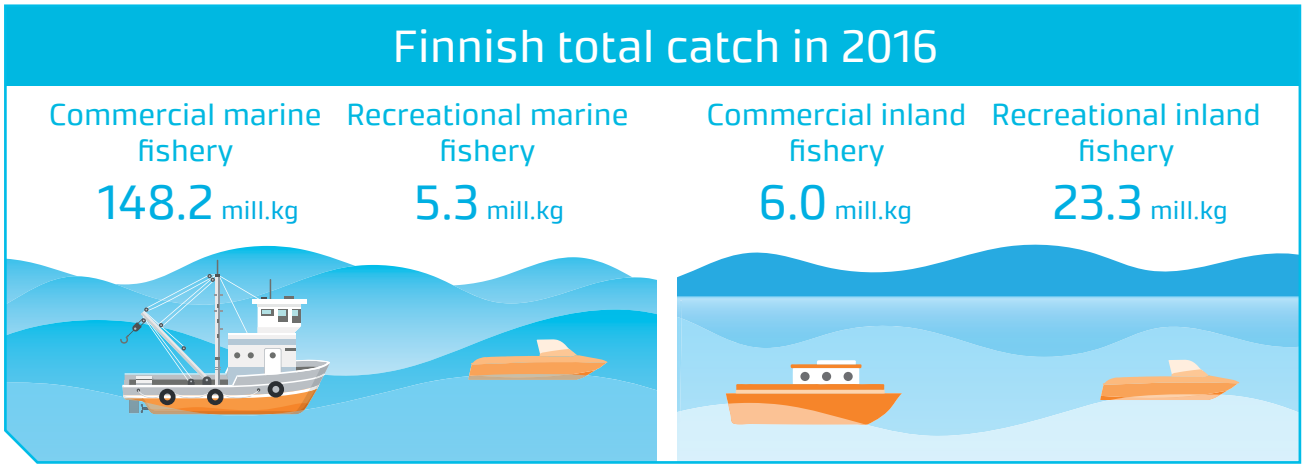


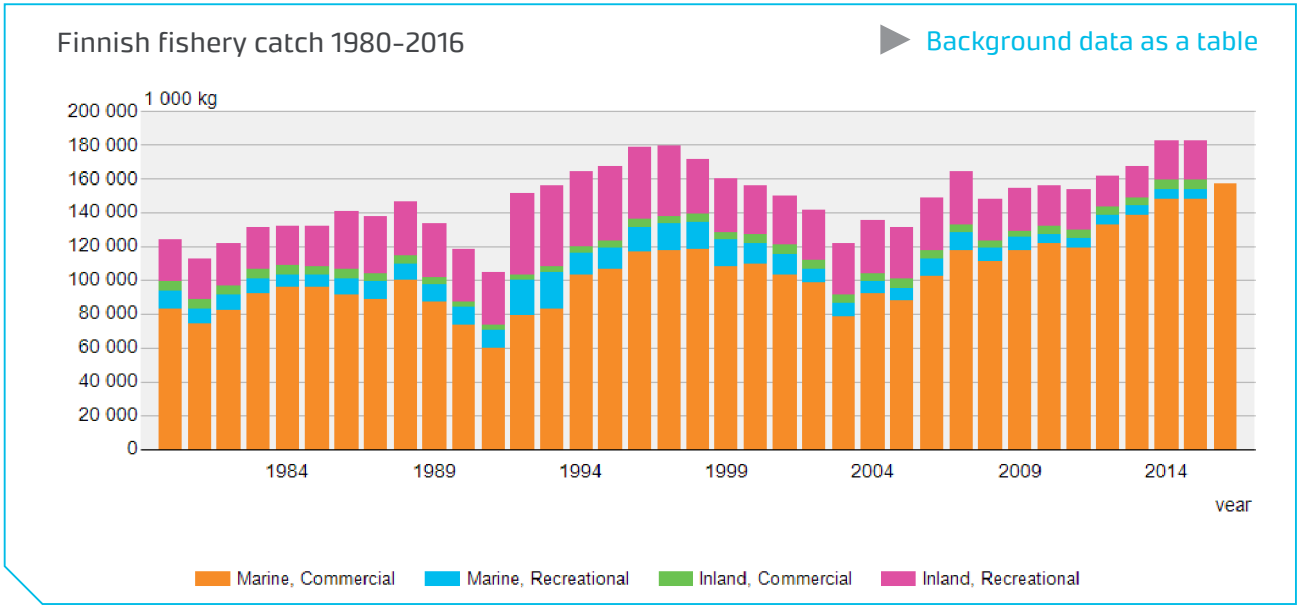
Total catch in Finland

Fishing in Finland is versatile. It is a recreational hobby for almost one in three Finns and a source of income for some 3,600 commercial fishermen. The catch size has ranged between 105 and 183 million kilograms in 1980-2015. A total of 50 to 80% of the total catch has been Baltic herring and sprat caught by commercial fishermen. The majority of this was sold as feed for fur animals and fish. The total catch was smallest in the beginning of the 1990s, when the demand of fish sold as feed decreased due to the economic downturn affecting the fur industry. Since then, the catch size has increased along with the demand for fish used as animal feed. The total catch for 2015 was record high. After Baltic herring and sprat, the largest catches were perch, pike, vendace, and pikeperch, which all were important species both in terms of commercial fishery and recreational fishing. In addition to demand for fish, another factor affecting the fluctuation in catch sizes is the status of the fish stocks. Annual fishing quotas are set for Baltic herring, sprat, cod, and salmon according to their stock status. The purpose of this is to control the size of catch. Of wild-caught domestic fish, vendace, pike, perch, pikeperch, European whitefish and Baltic herring were consumed the most in Finland in 2016.

Baltic herring and sprat from the sea

Both in terms of quantity and value, Baltic herring is by far the most important species in Finland. The Baltic herring catch has ranged between 53 and 132 million





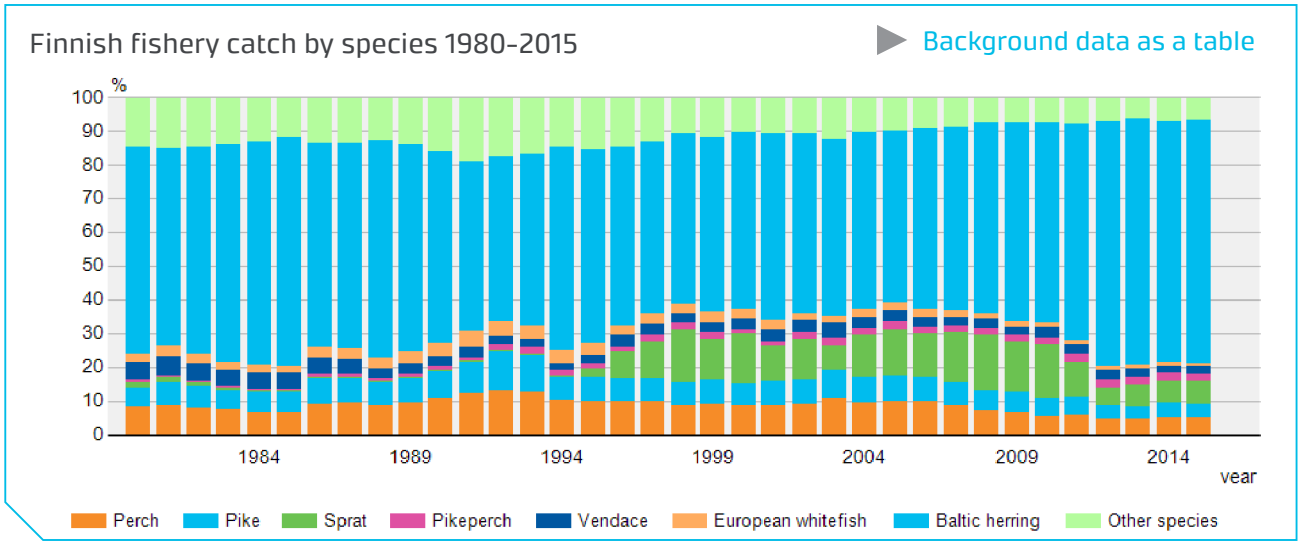
kilograms and the sprat catch between 0 and 27 million kilograms in 1980-2015. In the 1980s, fishery of Baltic herring was focused in the southwest marine areas, after which it has shifted to the Bothnian Sea. Sprat was mainly caught as a by-product of Baltic herring from the southwest marine areas, the Bothnian Sea, and the Gulf of Finland. Both species were mainly caught by trawling offshore and by a few dozen vessels. However, the majority of commercial fishermen used gillnets or trap nets to catch European whitefish, perch, pikeperch, and salmon close to the shore.

Vendace from inland waters

The annual vendace catch has varied between 3 and 7 kilograms in 1980–2015. Of this total, commercial fishery accounted for 1 to 4 million kilograms. Both in terms of quantity and value, vendace is by far the most important species in commercial inland fishery, but it is also popular catch among recreational fishermen. Vendace is principally caught from inland waters, but small vendace catches were also made in the Bothnian Bay. Commercial fishermen caught vendace by trawling and purse seining, recreational fishermen by gillnets.

Recreational fishermen caught perch and pike

After Baltic herring, sprat and vendace, the perch and pike catches were the largest. Perch and pike were also the most important species in recreational fishing. The perch catch has ranged between 8 and 20 million kilograms and the pike catch between 7 and 17 million kilograms in 1980–2015. Roughly 90% of the perch catch and 95% of the pike catch were made by recreational fishermen. The majority of the perch and pike catches in recreational fishing were caught using different types of rods, while the majority of the catches in commercial fishery were made using gillnets and trap nets.



Total catch in Finland

Aquaculture

Approximately 14.4 million kilograms of fish was farmed for human consumption in Finland in 2016. The figure was approximately 0.5 million kilograms lower than during 2015. However, the value of food fish production (approx. EUR 69.1 million) was roughly EUR 13 million higher than during the previous year.

In 2016, there were a total of 81 food fish enterprises operating in Finland. They farmed food fish on a total of 158 fish farms. Approximately 56 enterprises operated a total of 91 nurseries. The number of natural nutrition ponds totalled 189.

Rainbow trout was the most important farmed food fish species

A total of 13.4 million kilograms of rainbow trout was produced in 2016, amounting to EUR 59.4 million in monetary value. Rainbow trout accounted for over 90% of total food fish production, and roughly 86% of its value. Although there were no significant changed in the volumes of farmed fish, the considerable value increase on the previous year mainly resulted from the increased producer price for rainbow trout. The price paid for gutted rainbow trout in 2016 was the highest in the 21st century so far. The price for European whitefish was also good. A total of 83% of all food fish farmed in Finland was produced at sea.

▶ Aquaculture

The production volume of roughly five million kilograms for 1980 grew more than four-fold in the space of just over ten years to over 19 million kilograms. Production volumes fell again and stabilised at between approximately 11 and 12 million kilograms during the 21st century. In the last two years, production volumes have slightly grown to almost 15 million kilograms.

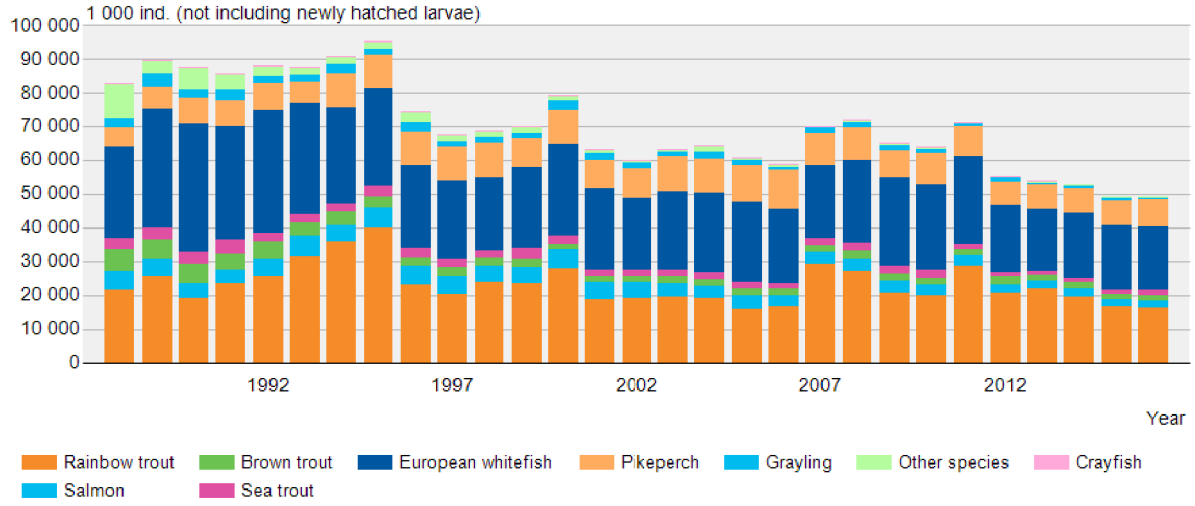
European whitefish farming became more popular in the 2000s

The range of species farmed for human consumption is limited as only a few species are suitable for farming. In addition to rainbow trout, European whitefish is also an important food fish species. In 2016, European whitefish farming totalled around 0.8 million kilograms, which is just under six per cent of the total production and ten per cent of its value.

European whitefish farming methods were actively developed in the mid-1990s. However, farming of this new species has proved laborious, and also requires inquisitiveness and risk-taking from fish farmers. Indeed, it took more than a decade before European whitefish farming started to gain popularity. In 2011-2013, European white-

Production of fish juveniles 1988-2016

▶ Background data as a table



fish production rose to around one million kilos, but since then, it has remained at the level of around 800 tonnes. More than three quarters of European whitefish is raised in cages offshore.

Over the last ten years, small amounts of species such as brown trout, char pikeperch, sturgeon, vendace, common eel, grayling, burbot, and beloribitsa, have also been farmed for food either constantly or occasionally.

Seals cause losses to fish farmers

Seals cause losses to fish farmers in all marine areas. The losses result, for example, from fish killed, damaged or released by seals and growing cages damaged by seals. Damages reported in 2016 (just under 0.2 million kilograms) were significantly smaller than the long-term average. Fish damages were the largest in the turn of the 2010s, amounting to around 0.4 million kilograms. The losses have ranged over the years between EUR 0.6 and 1.6 million.

Fry farming is an important aquaculture segment

In addition to food fish, around 49 million fish fry of different ages were reared on inland fish farms and in natural nutrition ponds, the value of which totalled in excess of EUR 20 million. Of the total value of fish farming, fry farming accounted for almost a quarter. Around a total of 16.5 million rainbow trout fry were produced on fish farms mainly for farming for human consumption. This accounts for a third of the total fry production volume and around half of its value. Salmon and trout fry produced in nurseries for farming also account for a major share of the total production and almost a third of its value. Natural nutrient ponds are used for nursing European whitefish, pikeperch and grayling fry, majority of which are released to natural environments when they are around one summer old. Production volumes of European whitefish fry are the highest: in 2016, European whitefish fry accounted for almost 40% of the total fry production and around 14% of its value.

Fry volumes have decreased in the past five years by around ten million compared to the volumes earlier in the 2000s. The most significant drop has taken place in production volumes of European whitefish. The number of farmers using natural nutrient ponds has also decreased over the same period. Increases in wild fish stocks have also decreased the demand for salmon fry. Rainbow trout fry were nursed for exporting to Russia over a few years after 2007, which increased the production volumes of rainbow trout fry.

Photograph: Markus Kankainen / Luke

Signal crayfish is now an 'invasive alien species' - crayfish farming brought to a halt

A total of 200,000 to 400,000 individuals of juvenile crayfish were nursed for farming each year in the peak years of the 1990s. In the last ten years, the juvenile production amounted to around 10,000 to 30,000 individuals per year. The principal species farmed was the signal crayfish, but small amounts of noble crayfish were also farmed. Originally from North America, the signal crayfish was introduced to Finland mainly in the 1980s and 1990s. The demand for juveniles also peaked during that period. Since the start of the 2000s, the production of crayfish for human consumption has amounted to around one to three tonnes per year. The EU Regulation on Invasive Alien Species entered into force at the start of August 2016, pursuant to which the signal crayfish was recorded as an invasive alien species in Finland. Pursuant to the Regulation, the species may no longer be bred or released into the environment. Catching, trade and consumption of crayfish caught from only certain types of ponds specified in the national crayfish management plan or from natural water bodies may be continued, but feeding of the crayfish is now prohibited. In addition, planting of crayfish into water bodies, including those that already have signal crayfish, is also prohibited. The crayfish farming industry will have to rely on noble crayfish in the future.

Fish processing

The total volume of fish processed for human consumption has nearly doubled in 2001-2015 from over 40 million kilograms to 80 million kilograms. Of all fish processed in 2015, 26% was domestic Baltic herring and sprat, 32% other domestic fish species, and 42% imported fish. A total of 66% of all processed Baltic herring and sprat was frozen and exported whole.

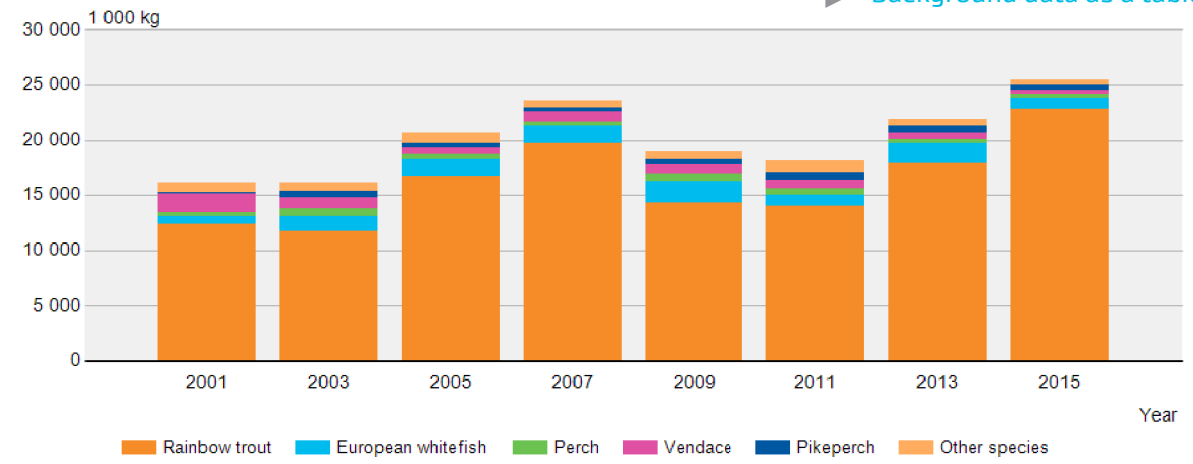
The most important domestic species used by the processing industry was rainbow trout. The statistics on processing also consider rainbow trout farmed by Finnish enterprises in Sweden as domestic rainbow trout. Other important species include European whitefish, perch, vendace, pike, and pikeperch.

The most significant change has been the increase in imported fish from seven million kilograms to over 30 million kilograms in 2001-2015. Of the total imported fish used by the processing industry in 2015, more than 90% was farmed Atlantic salmon originating in Norway.

▶ Fish processing

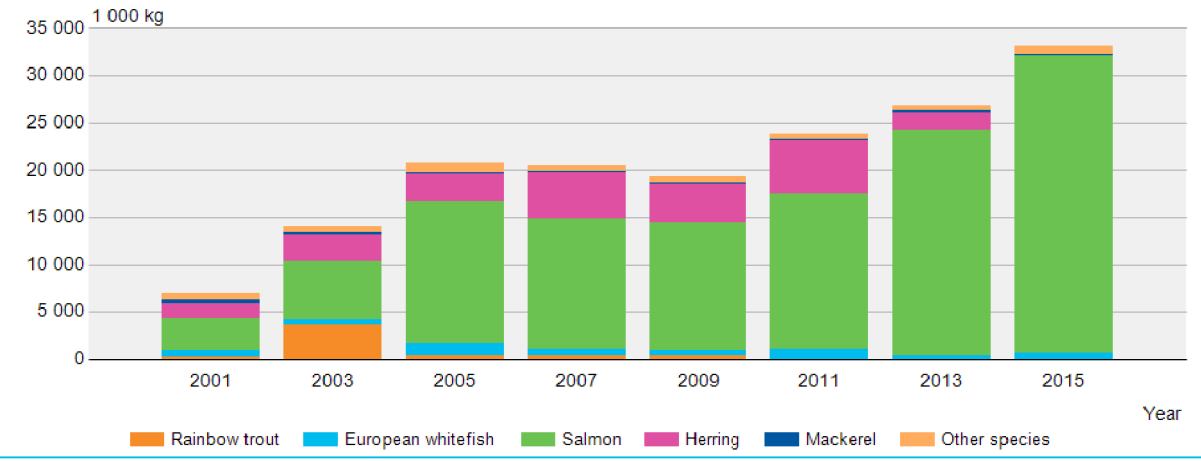
Volume of domestic fish used in fish processing, excluding Baltic herring and sprat

▶ Background data as a table



Volume of imported fish used in fish processing

▶ Background data as a table



Producer prices for fish

The producer prices for farmed food fish increased on the previous year. The price for Baltic herring remained roughly in the same neighbourhood as in 2015. The producer prices for other fish species mostly slightly increased.

The majority of Finland's Baltic herring and sprat catch is sold to the animal feed industry

Baltic herring is the most important species in Finnish commercial fishery. The majority of Finland's Baltic herring catch is mainly sold for use as feed for fur animals or fish. Over the last ten years, around 30 to 40% of Baltic herring catches landed in Finnish ports have been sold for human consumption, with the exception of the last two years, during which only around 20% of the total Baltic herring catch was sold for human consumption. In 2016, the producer price for Baltic herring sold for use as animal feed totalled on average EUR 0.18 per kilogram, while Baltic herring sold for human consumption fetched EUR 0.26 per kilogram.

The second most important species in Finland is sprat. Sprat catches are mainly sold to the feed industry. The price for sprat is similar as the price for Baltic herring sold as animal feed. In 2016, fishermen were paid on average EUR 0.18 per kilogram for sprat.

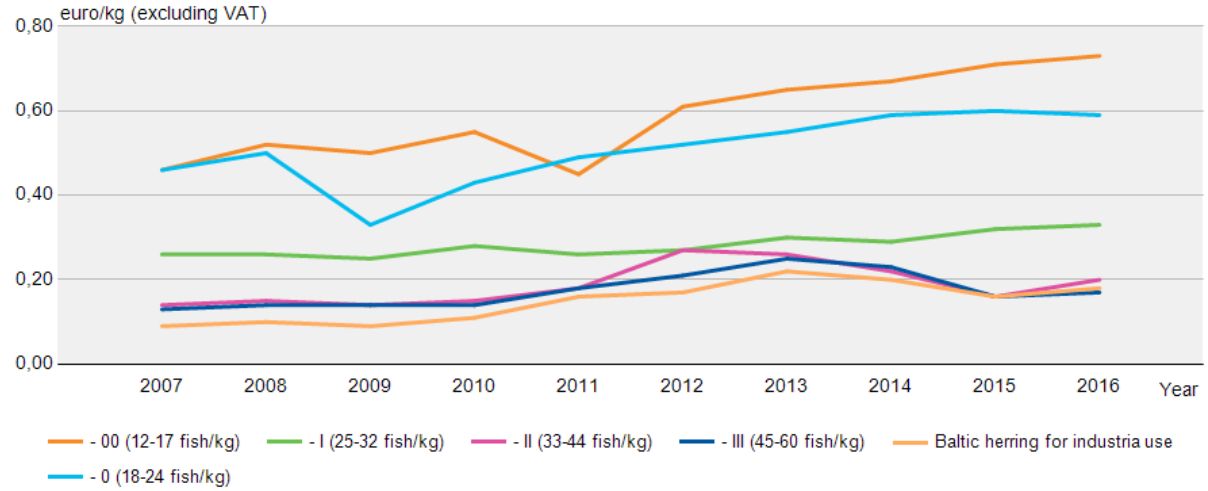
Size does matter

The size of fish is an important factor when determining the price. Baltic herring sold for human consumption is divided into size classes, which are determined based on the number of Baltic herrings in one kilogram. In 2016, majority of Baltic herring sold for human consumption (60%) belonged to Class II (33-44 fish/kg), which means a smallish herring size. Baltic herring belonging to Class I (25-32 fish/kg) accounted for around 20% of the total. The price for larger sized herring was at least three times higher than the price paid for the smaller herring. Only around six per cent of Baltic herring sold for human consumption was classified as large (24 fish/kg). The price for the smallest herring sold for human consumption was EUR 0.17 per kilogram.

Record price for rainbow trout

The price for rainbow trout typically follows the world market price for salmon. In the 1990s, the producer prices for both species were roughly equal, but since the beginning of the 2000s, the price for salmon has typically been higher than the price for farmed rainbow trout. In 2016, the producer prices for both species increased on the previous year. The word market price for salmon at that time was record high, partly because the salmon production of Chile, which is one of the largest producer countries,

Producer prices for Baltic herring by size class 2007-2016 ▶ Background data as a table



Photograph: Ari Saura / Luke

plummeted due to algae issues. Norway also produced less salmon than during the previous year, which has increased the demand for salmon. In 2016, the average producer price for rainbow trout was EUR 4.88 per kilogram, while the average price for salmon from the Baltic Sea was EUR 5.35 per kilogram.

In addition to rainbow trout, small quantities of European whitefish are also produced for human consumption in Finland. The producer price for farmed European whitefish has generally been around double the price paid for rainbow trout. In 2016, fish farmers were paid for European whitefish on average EUR 10.11 per kilogram.

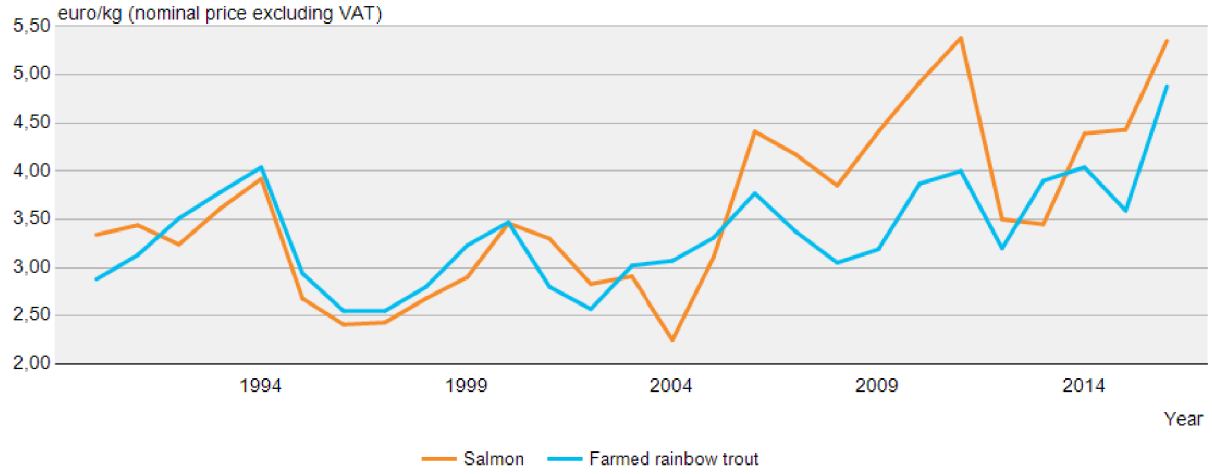
Producer prices for other species

Of other species, the most economically important species are European whitefish, pikeperch and perch. In 2016, the producer price for European whitefish totalled on average EUR 4.31 per kilogram, while pikeperch fetched EUR 5.90 and perch EUR 2.38 per kilogram.

▶ Producer prices for fish

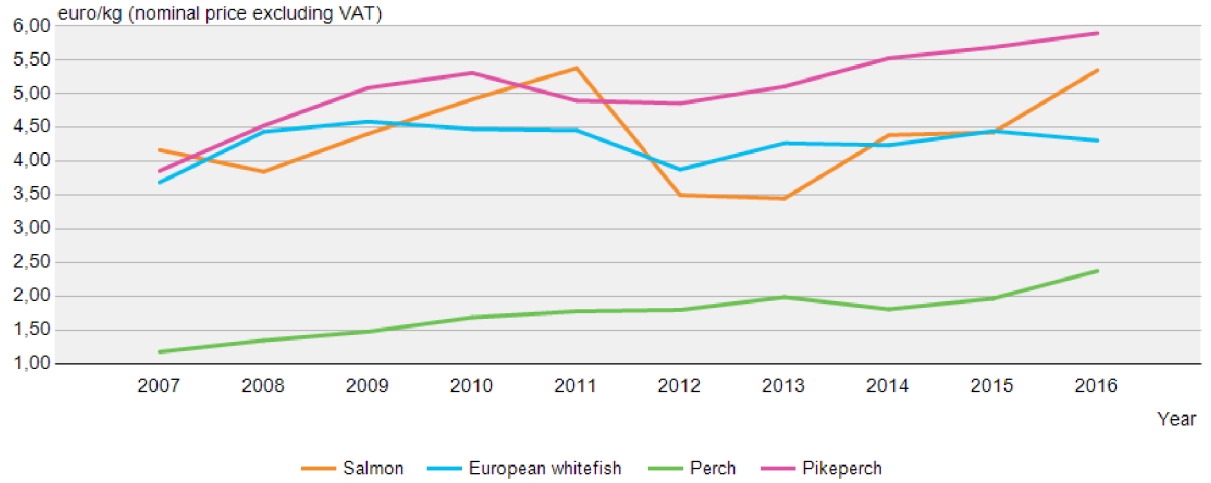
Producer prices for salmon and rainbow trout 1990–2016

▶ Background data as a table
▶ Real prices



Producer prices for European whitefish, pikeperch, perch and salmon 1990–2016

▶ Background data as a table
▶ Real prices



Foreign trade in fish

A total of 101 million kilograms of fish and fish products were imported to Finland in 2016. The total value of imports was approximately EUR 398 million. Finland exported around 71 million kilograms of fish and fish products, the value of which totalled EUR 57 million. The volume of imports decreased by almost ten per cent, while the value of exports increased by a few per cent on the previous year. The value of both imports and exports increased by around EUR 20 million from 2015.

The Nordic countries and Estonia are the most important trade partners

Fish and fish products were imported from 63 countries. Around three quarters of total imports came from the Nordic countries, over 15% from other European countries, and just under ten per cent from outside Europe. The most important country by far in terms of the total import value is Norway, followed by Sweden, Denmark and Estonia.

Fish and fish products were exported to 23 countries. Around two-thirds of total exports were destined to the Nordic countries, under one-third to other European countries, and only a few per cent outside Europe. By monetary value, the most important export destination was Estonia, followed by Denmark and Belarus.

Volume of fish imported for human consumption increased

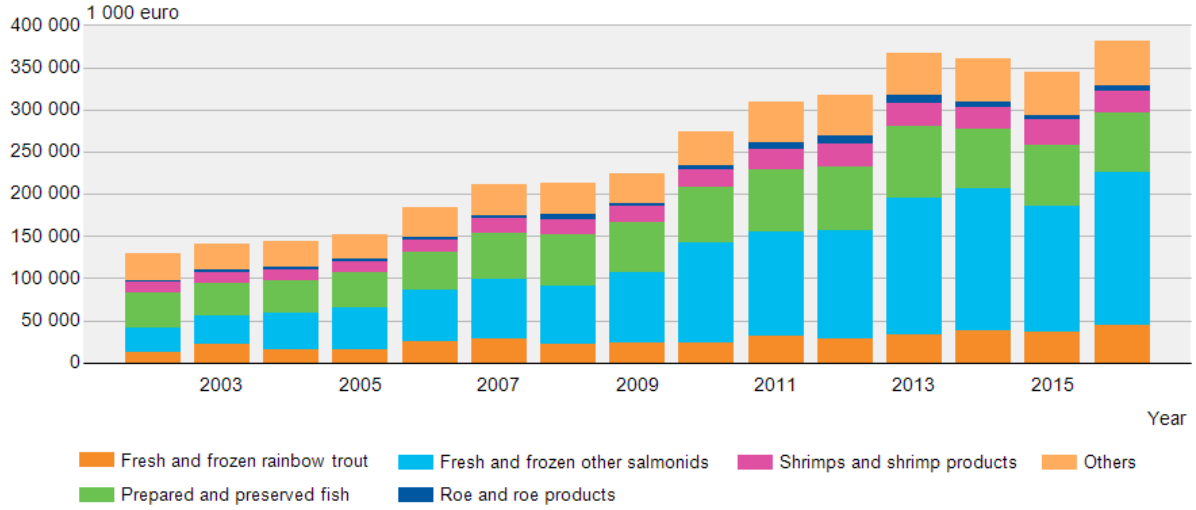
Although the total imports in 2016 decreased by around 13 million kilograms on the previous year, the volume of fish imported for human consumption increased by over half a million kilograms. Overall, products imported for human consumption accounted for 73% of the total imports and 95% of its value. Total imports were reduced by the decrease in the import of products sold for purposes other than human consumption, such as fish oil or gutting waste.

Norwegian salmon is the most important import article

The imports of fresh Atlantic salmon from Norway totalled around 25 million kilograms in 2016. Although the increase in the import volumes took a downturn already a year before, Atlantic salmon continued to be the most important imported fish product. The total value of salmon imports still continued to grow (EUR 161 million). The import of Atlantic salmon from Norway has quadrupled and the value has grown six-fold over the last 15 years.

Value of imported products suitable for human consumption 2002–2016

Background data as a table



Of all fish and fish products imported to Finland in 2016, 44% originated in Norway. In addition to Atlantic salmon, the most important products imported from Norway for human consumption were shrimps and herring products and canned herring.

Rainbow trout from Sweden

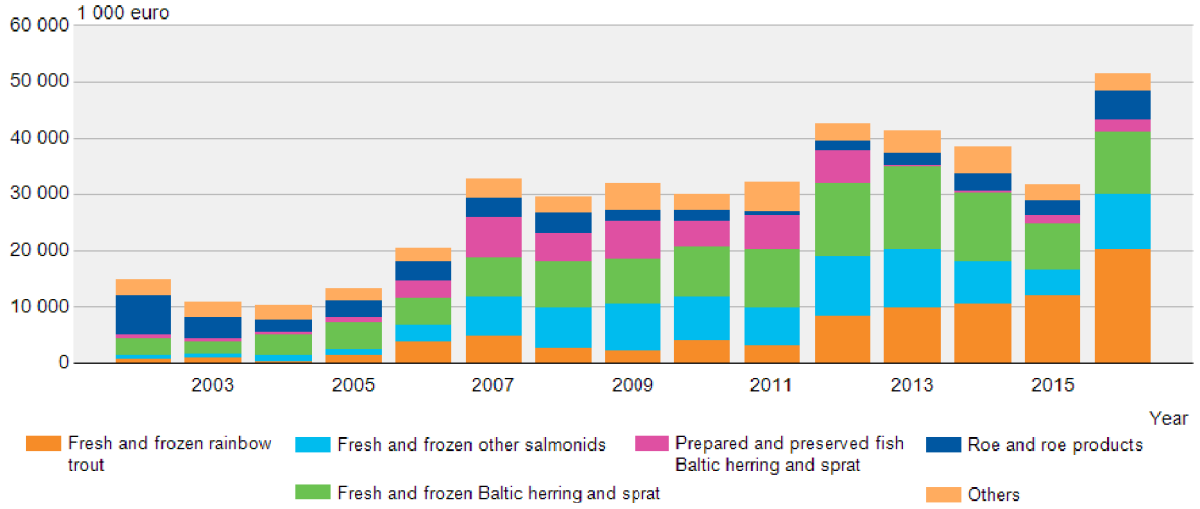
Imports of fish and fish products from Sweden totalled 18 million kilograms, of which the share of fresh whole rainbow trout was ten million kilograms with a value of EUR 40 million. The rainbow trout imports from Sweden have steadily grown and doubled since the beginning of the 2010s. Imports of fish products from Denmark totalled 11 million kilograms, of which a third was sold for human consumption. Imports from Denmark also covered a variety of fish product and canned fish, frozen fish products of different species, crustaceans, molluscs, etc.

Products other than fish and fish products, such as crustaceans and molluscs, accounted for around four per cent of the total imports and six per cent of its value.

Rainbow trout and salmon the most valuable export articles

In monetary terms, the most important export article in Finland is rainbow trout. In 2016, the exports of fresh and frozen rainbow trout totalled EUR 20 million. Although the volume of exported rainbow trout (4 million kg) did not change significantly, the export value of rainbow trout doubled compared to the past few years. Other valuable salmonids were also exported with a total value of EUR 10 million. Salmon exported from Finland is not produced in Finland, and neither is a large proportion of rainbow trout. The most important export destinations for rainbow trout and other salmonid were Estonia and Belarus.

Value of exported products suitable for human consumption 2002-2016



Background data as a table

Baltic herring and sprat were exported to Denmark

After salmonids, the most important export articles were fresh and frozen Baltic herring and sprat, fish eggs and related products, and fish sold for use as animal feed. Baltic herring and sprat were mainly exported to Denmark (around 28 million kg).

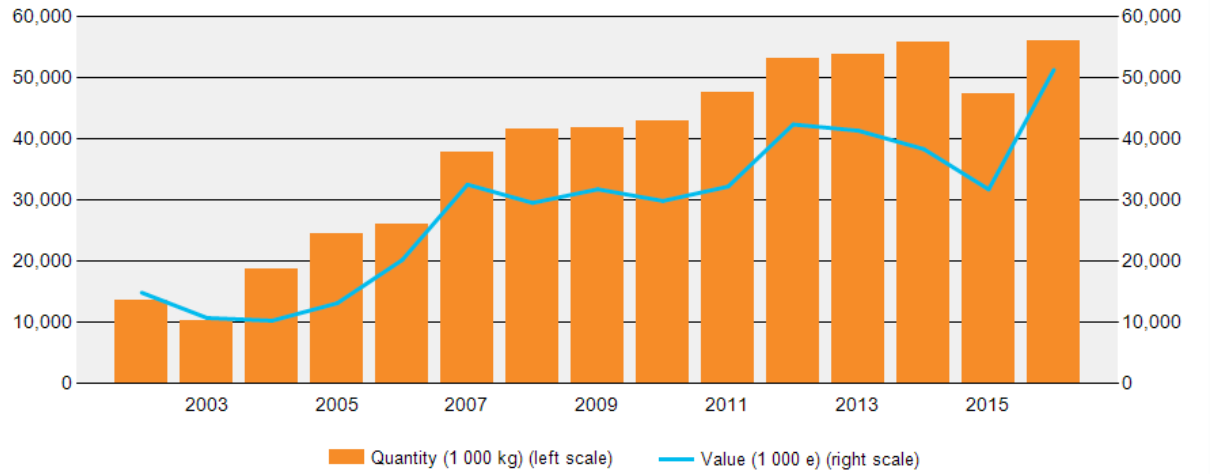
The value of foreign trade increased in 2016

The value of both imports and exports has steadily increased throughout the 2000s. Compared to other products, the growth has been the fastest for rainbow trout and salmon. The considerable increase in the total value of foreign trade in 2016 compared to 2015 is partly explained by the increased in the monetary value of rainbow trout and salmon. In 2016, the world market price for salmon was at a record high, which also increased the price for rainbow trout higher than before.

Foreign trade in fish

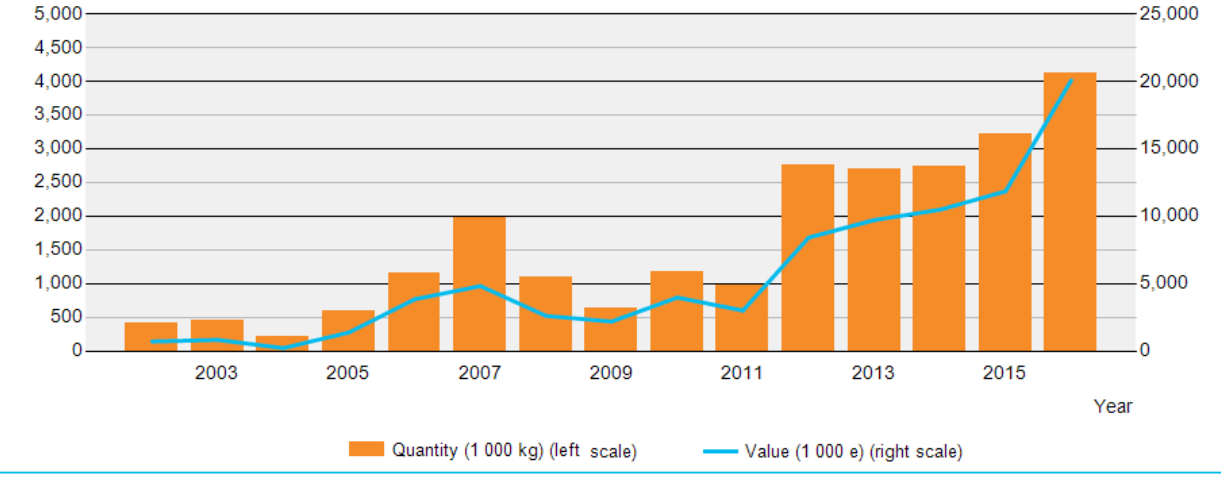
Volume and value of exports of products suitable for human consumption 2002-2016

▶ Background data as a table



Volume and value of rainbow trout exports 2002-2016

▶ Background data as a table



Photograph: Tapio Tuomela / Luke

Profitability of fisheries

Year 2015 was bleaker than usual in the fishery sector as revenues decreased having been on the increase for many years. However, there are some positive signs of development in primary production of the fishery sector. Lower fuel prices had a positive impact on the financial results of large fishing trawlers. Although the price of rainbow trout decreased, the increased production of aquaculture also increased the revenues and profitability of the sector. In turn, fish processing and fish trade did not do so well. The fish processing industry and fish trade which primarily rely on imported fish saw their profitability decrease due to the high price of imported salmon.

Total revenues of the fishery industry decreased

In 2015, there were 1,747 companies working in the fisheries sector. Most of them (72%) were fishing companies. Total revenues of the fishery industry (EUR 839 million) decreased by 12% from 2014. The added value produced by fishery industry decreased by one-fifth to EUR 122 million. Fish trade and fish processing are very centralised sectors, and centralisation has also taken place over the past few years in fishery and aquaculture.

Fish processing provided the most employment

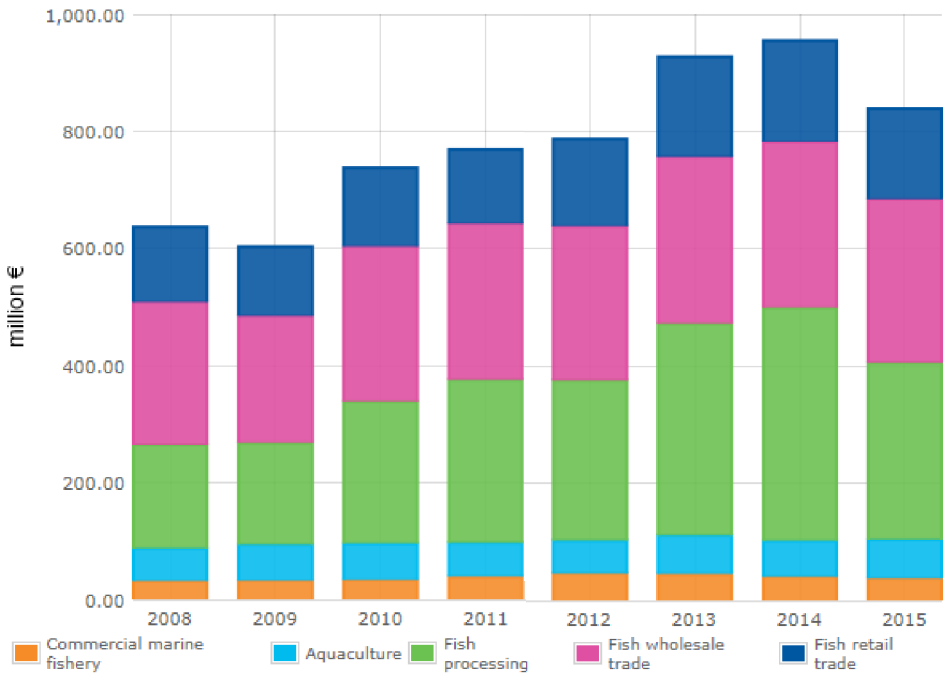
The fishing industry provided 2,536 person-years of employment. Fish processing provided the most employment, 32% of the entire sector. The number of person-years increased in primary production and decreased in fish processing and retail trade specialised in fish.

Revenues of fish trade took a downward turn

Total revenues of the fishery industry decreased for the first time in seven years in 2015. Of the different segments, only aquaculture companies increased their revenues. Revenues of wholesale trade and fishery decreased only a little, but revenues of the fish processing segment dropped almost by a quarter. Despite the reduction in revenues, the net result of fishing improved, mainly thanks to reduced fuel costs of large trawlers.

Total real income of commercial marine fisheries, aquaculture, fish processing, fish wholesale, and fish retail

▶ Background data as nominal income



Aquaculture companies also improved their profitability. Revenues decreased most in the fish processing segment, almost by a quarter, which also significantly reduced the segment's net result. Wholesale trade net result also decreased, even though the revenues remained at the 2014 level. Retail trade revenues decreased and the net result turned negative. Fish processing yielded higher revenues than wholesale trade or retail trade. In 2015, revenues of the fish trade decreased having been on the increase for many years.

Large trawlers improved their results

In 2015, there were 1,256 fishing companies operating at sea. Most of the fishing companies were coastal fishing companies using vessels less than 12 metres long. Of all fishers, 71% were coastal fishers with annual revenues below EUR 8,500. Only four per cent of fishing companies used trawlers.

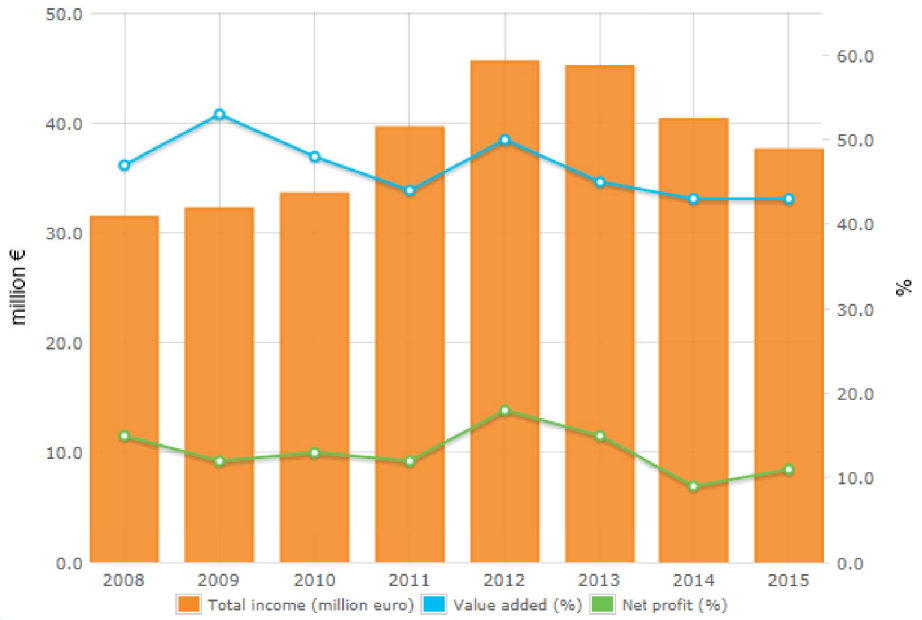
The total revenues of fishing companies amounted to EUR 38 million. Large trawlers accumulated half of the total revenues in the fishery segment. Revenues of coastal fishers and large trawlers decreased, while small trawlers increased their revenues. Large trawlers improved their net results thanks to cheaper fuel. The best financial results were achieved by the coastal fishers with annual revenues over EUR 8,500, in all EUR three million. Apart from small coastal fishers, fishing produced a positive net result.

Marine fishers made net investments totalling approximately eight million euros. The biggest investors were large trawlers (EUR 4 million) and small coastal fishers (EUR 2 million). Apart from the large trawlers, solvency of the fishing companies was good and liquidity satisfactory or good. Large trawler companies had a poor equity ratio and liquidity.

- Profitability of fishery
- Economydoctor

Photograph: Luke's photo archive

Real development of total income, value added and net profit of fishing companies



- Background data as nominal income

Fish consumption

In 2016, Finnish people consumed approximately four kilos of domestic fish per person, converted into fillets, and a little more than nine kilos of imported fish. The total consumption of fish decreased by roughly eight per cent from the year before. Domestic fish consumption remained unchanged but consumption of imported fish slightly decreased.

Consumption of imported salmon decreased

Of all domestic fish, rainbow trout was consumed the most, i.e. 1.2 kilos per person, whereas of imported fish, farmed salmon was consumed the most, i.e. 3.5 kilos per person. The consumption of imported salmon decreased by nearly 15% from the previous year.

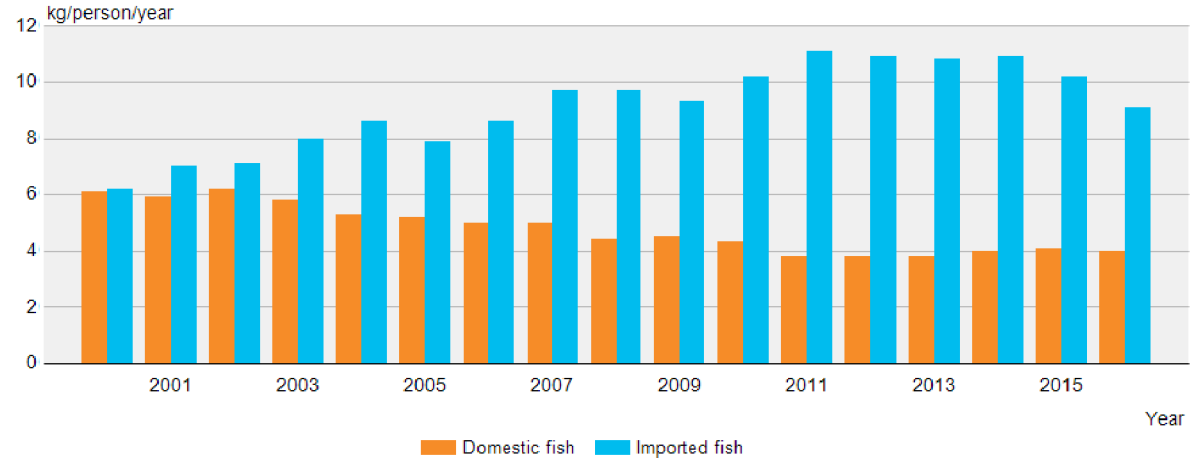
Of wild-caught domestic fish, vendace, pike, perch, pikeperch, European whitefish, and Baltic herring were consumed the most.

With regard to the consumption of imported fish products, farmed Norwegian salmon was followed by canned tuna and other tuna products, farmed rainbow trout, frozen pollock, and shrimps and shrimp products.

▶ Fish consumption

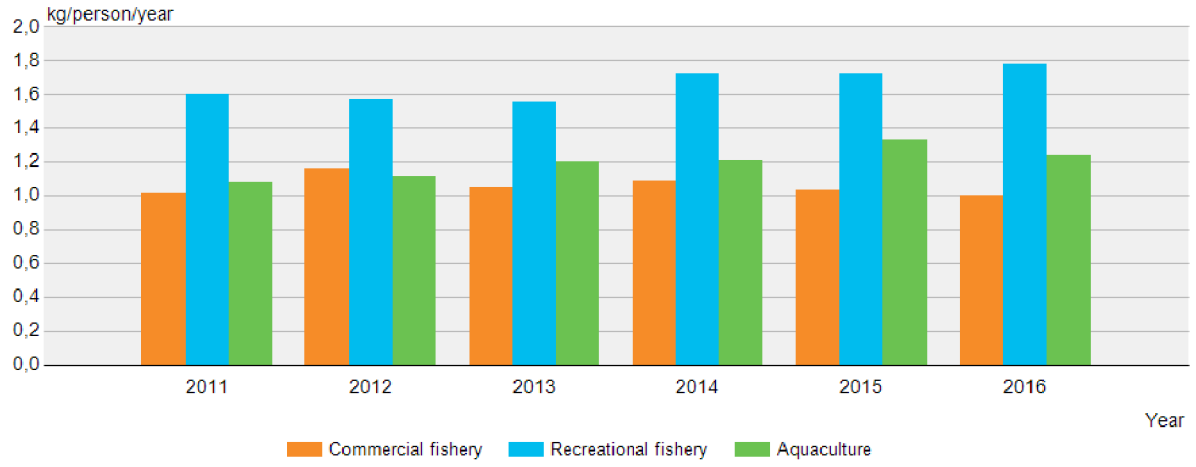
Use of fish for food 2000–2016

▶ Background data as a table



Domestic fish consumption by origin

▶ Background data as a table



Hunting

Approximately 300,000 hunters pay the game management fee each year in Finland. The number of hunters has hardly changed since the 1980s. However, not all people who pay the game management fee engage in hunting activities. Roughly two-thirds of those who paid the game management fee actually engaged in hunting in 2016. The number of those hunters has decreased during the current decade.

Traditionally, hunting has been considered a job or hobby suitable for men, but today around seven per cent of hunters are women. Lapland has the most female hunters.

Most hunters hunt small game

In 2016, a total of 84% of those who had engaged in hunting hunted small game, while 58% hunted deer. The number of those who hunt small game has decreased over the recent years, but in 2016, slightly more people engaged in deer hunting (around 115,000 people) than during the last four years. One factor affecting the number of deer hunters may have been that the number of hunting licences for elk and white-tailed deer was increased to keep the stocks at a desired level.

In 2016, a total of 93,000 people hunted grouse and around 82,000 hunted waterfowl. Particularly the number of grouse hunters has decreased over the last three years along with the declining grouse stocks.

The most hunted game in 2016 included common wood pigeon, raccoon dog and mallard

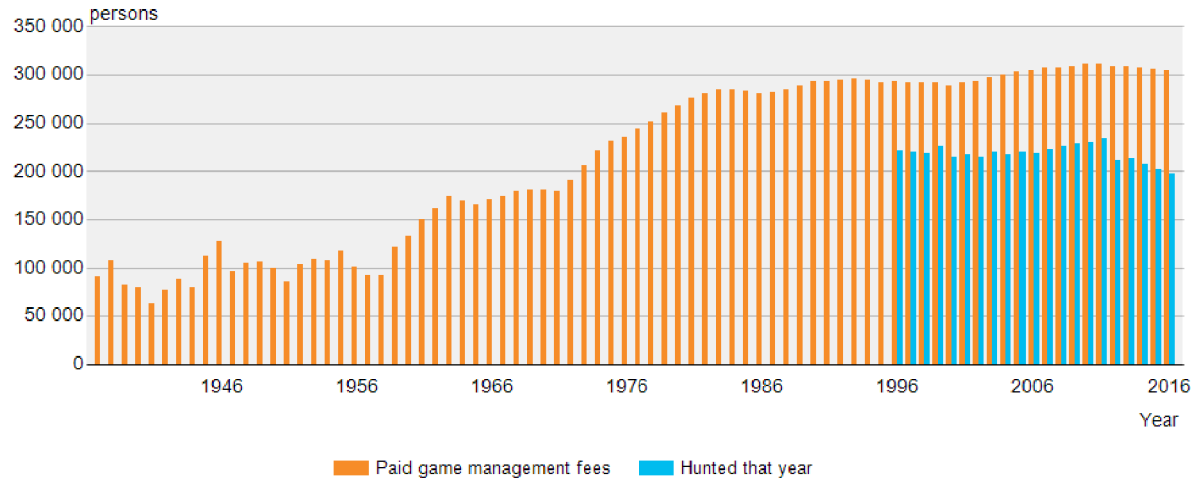
The common wood pigeon bag has increased over the last two decades, but not in the last couple of years. The mallard bag has decreased and the raccoon dog bag increased in the recent years. In the first half of the present decade, the black grouse bag was large, but in the last three years, it has considerably decreased. Previously, the mountain hare bag was typically larger than the raccoon dog bag, but as raccoon dog stocks have increased and mountain hare stocks decreased, their positions have switched.

Three in four small game hunters were successful

A total of 45,000 hunters caught mallard in 2016, followed by small game hunters who caught mountain hare and raccoon dogs. Around 26,000 hunters managed to catch the most important game in terms of volume, the common wood pigeon. The average game bag of hunters who managed to catch game has mostly remained at the

The number of hunters who paid the game management fee 1937–2016 and hunted that year 1996–2016

▶ Background data as a table



same level from year to year. For example, in recent years, hunters who have caught black grouse have on average caught two to three birds per year, while the same figure for mallard hunters in four to five birds.

For some species, the annual game bag per hunter can be quite large. These include, for example, willow grouse and long-tailed duck. The exceptionally large game bags caught by a few individual hunters may decrease the reliability of the game bag estimate, particularly if the number of these hunters is low. The game bag estimates are most reliable for most hunted species.

The waterfowl bag has decreased in the last two decades

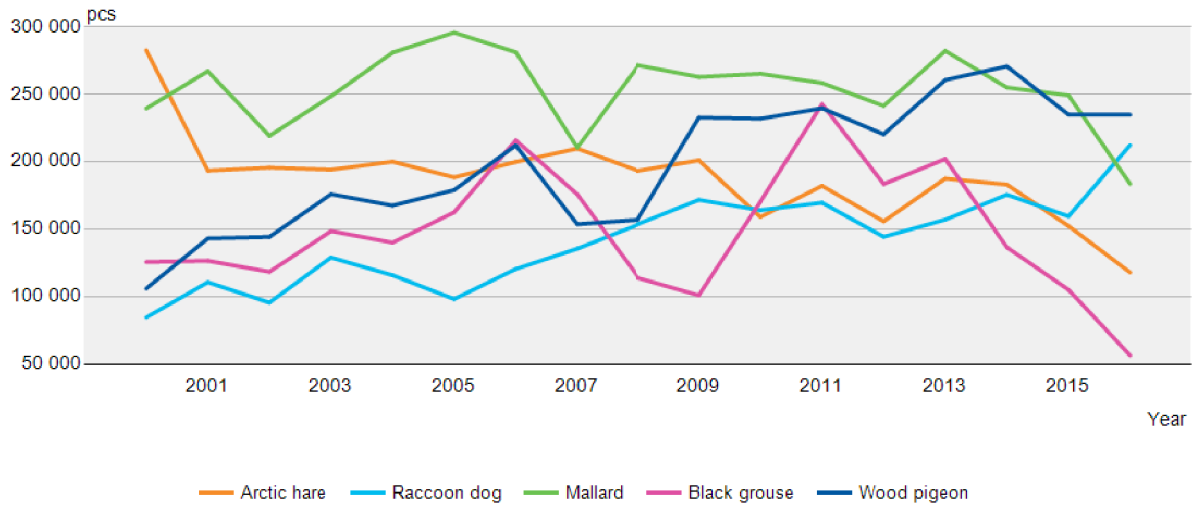
Long-term game bag statistics show that the waterfowl bag and the mountain hare bag have both decreased in the 1990s, and still continue to decrease today. Over the last 40 years, the fur animal game bag has hardly changed, although there have been changes between the species in game volumes. In the 1970s and 1980s, muskrat was still hunted in large numbers, while today the most hunted species is raccoon dog. Grouse volumes seems to some extent follow the natural fluctuations in grouse stocks.

▶ Hunting

Photograph: Erkki Oksanen / Luke

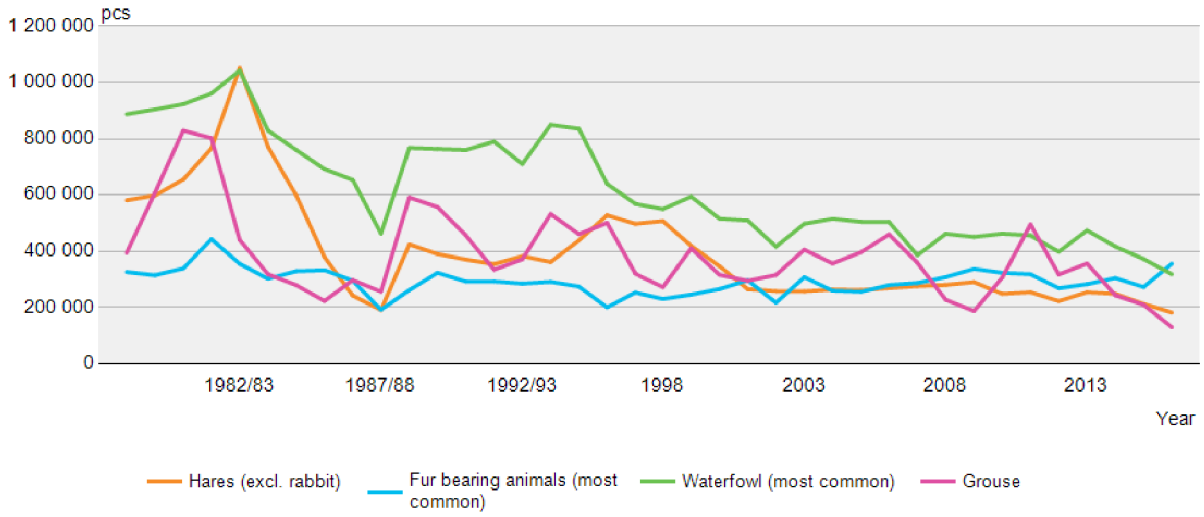
Bag of the most common game in the 2000s

▶ Background data as a table

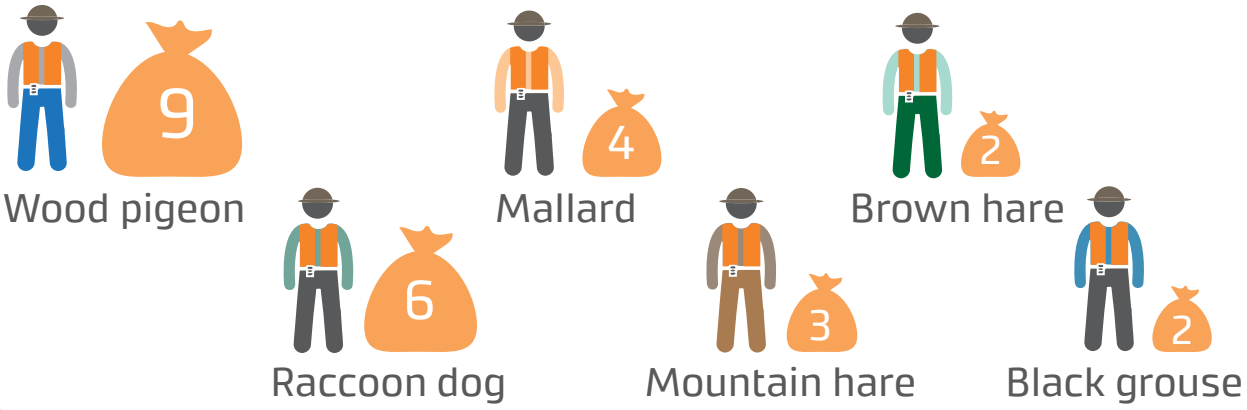


Bag of game during the hunting years 1978/1979–1994/1995 and during the calendar years of 1996–2016

▶ Background data as a table



Average small-game bag of hunters who caught something in 2016 (number of individuals)



Links to statistical services

Luke's statistical services: *http://stat.luke.fi/en/*

Luke's statistics database: *http://statdb.luke.fi/PXWeb/pxweb/en/LUKE/?rxid=b0e6dfb7-16bd-45ae-bbf9-5caad11d7a1b*

Instructions on using the database: *http://stat.luke.fi/sites/default/files/tilastotietokanta_ohje_evuosikirja.pdf*

Statistics Finland: *http://stat.fi/til/index_en.html*

Eurostat database: *http://ec.europa.eu/eurostat/data/database*

FAOSTAT statistical database: *http://faostat3.fao.org*

Eurostat agricultural statistics: *http://ec.europa.eu/eurostat/web/agriculture/overview*

Agricultural statistics of Sweden: *http://www.jordbruksverket.se/omjordbruksverket/statistik.4.67e843d911ff9f551db80003060.html*

Global Forest Resources Assessment 2015 – Country Reports: *http://www.fao.org/forest-resources-assessment/documents/en/*

State of Europe's Forests 2015 Report: *http://www.foresteurope.org/*

State of Europe's Forests database: *http://w3.unece.org/PXWeb2015/pxweb/en/STAT/STAT__26-TMSTAT1/*

FAO Forestry Statistics: *http://www.fao.org/forestry/46203/en/*

UNECE Forestry and Timber: *http://www.unece.org/forests/welcome.html*

Forest statistics of Sweden: *https://www.skogsstyrelsen.se/statistik/*

European Commission Fishery Statistics: *https://datacollection.jrc.ec.europa.eu/*

ICES Fishery Statistics: *http://www.ices.dk/marine-data/dataset-collections/Pages/Fish-catch-and-stock-assessment.aspx*

FAO Fishery Statistics: *http://www.fao.org/fishery/statistics/en*

Fishery statistics of Sweden: *https://www.havochvatten.se/hav/samordning--fakta/data--statistik/officiell-statistik.html*

Photograph: Markus Kankainen / Luke

EDITORS
Tarja Kortesmaa, Aimo Jokela, Riitta Salo-Kauppinen

CONTENTS
AGRICULTURE: Tarja Kortesmaa, Jaana Kyyrä, Sanna Vuorisalo, Anneli Partala, Anna-Kaisa Jaakkonen, Sirpa Karppinen, Arto Latukka

FORESTS: Antti Ihalainen, Terhi Koskela, Aarre Peltola, Ville Kankaanhuhta, Jukka Torvelainen, Elina Mäki-Simola, Olli Salminen, Esa Uotila, Esa Ylitalo, Martti Aarne, Eeva Vaahtera

FISH AND GAME: Pirkko Söderkultalahti, Leena Forsman, Riitta Savolainen, Pentti Moilanen, Heidi Pokki

LAYOUT
Irene Murtovaara

PHOTOGRAPHS
Luke's photo archive, Pekka Hyvärinen, Paula Häyrinen, Anna-Kaisa Jaakkonen, Markus Kankainen, Jari Lindeman, Jari Niukko, Anneli Nuoranne, Erkki Oksanen, Ari Saura, Tapio Tuomela, Ville Vähä, Finnish Glasshouse Growers' Association

INFOGRAPHICS
Essi Puranen

stat.luke.fi/en/

Natural Resources Institute Finland (Luke)
Statistical Services
Latokartanonkaari 9
FI-00790 HELSINKI

Switchboard +358 295 326 000
firstname.lastname@luke.fi
www.luke.fi

ISBN 978-952-326-564-6 (electronic)
ISBN 978-952-326-563-9 (printed)
ISSN 2342-7639 (electronic)
ISSN 2342-7647 (printed)
URN http://urn.fi/URN:ISBN:978-952-326-564-6