Agriculture and Danish farm returns through 100 years

1916-2015

STATISTICS DENMARK

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Addresses:
Statistics Denmark
Sejrøgade 11
2100 Copenhagen Ø, Denmark
Tel. +45 39 17 39 17

Email: dst@dst.dk
www.dst.dk

Authors:
Henrik Bolding Pedersen
Born in 1963
Chief Advisor at Statistics Denmark.
Employed at the Food Industries office since 2009.
MSc in agricultural economics from the Royal Danish Veterinary and Agricultural University

Steffen Møllenberg
Born in 1957
Senior Advisor at Statistics Denmark.
Employed at the Food Industries office since 2009.
MSc in horticulture from the Royal Danish Veterinary and Agricultural University

Contributions from:
Seges, by Arne Oksen, national consultant, et al.
The Department of Food and Resource Economics (IFRO) at the University of Copenhagen by Henning Otte Hansen, Senior consultant, Jesper Sølver Schou, Associate professor, et al.
The Ministry of Environment and Food of Denmark, the Danish AgriFish Agency by Knud Bjerre, Special consultant, et al.

Symbols:

-	Nil
0	Less than 0.5 of the applied unit
0.0	Less than 0.05 of the applied unit
•	Not applicable
..	Available information not conclusive or not disclosable
…	Data not available
*	Provisional estimated figures
|	Horizontal or vertical line indicates break of data in a time series. Data from before and after the break of data is not fully comparable.

Due to rounding, the sum of the figures in the tables may differ from the total.

Preface

With the publication of accounts statistics for agriculture 2015, official accounting results for agriculture in Denmark have been published for 100 years. The purpose of this publication is to gather some of the material and look back on the development in agriculture and its economy as well as on the most important changes in the agricultural accounts statistics. In addition, key figures from the agricultural accounts have been compiled in a table in Statbank Denmark, JORD100.

In 1918, Det Landøkonomiske Driftsbureau (the Bureau of Agricultural Economics) was established with government aid at the initiative of Det Kgl. Danske Landhusholdningsselskab (The Royal Danish Agricultural Society). The bureau was charged with the collection and processing of accounting information from the agricultural sector and helping accounting gain ground. The first farm returns were collected for the accounting year 1916/17. The first time that the accounting results for agriculture were published in the Danish Statistical Yearbook was in the 1923 edition.

In connection with Denmark's entry in the EEC in 1973, these statistics became the foundation for Denmark's reports to the European financial database, Farm Accountancy Data Network (FADN), where data is used to monitor the common agricultural policy.

In 2009, accounts statistics for primary industries were transferred from the Department of Food and Resource Economics (IFRO) at the University of Copenhagen to the division of Food Industries at Statistics Denmark.

Three external contributions are included in this publication. SEGES has written about the collaboration between the advisory services/accounts offices of Danish agriculture and the statistics. The Danish AgriFish Agency together with the Department of Food and Resource Economics (IFRO) at the University of Copenhagen have made a contribution about the use of the statistics in the serving of authorities and, finally, the IFRO has written about use of the statistics in agricultural economics research.

Statistics Denmark, May 2017

Jørgen Elmeskov, National Statistician
Henrik Bolding Pedersen, Chief Adviser

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Summary

A century of accounting results for the agricultural sector reflects a part of the history of Denmark. The background for the statistics was the establishment of the Bureau of Agricultural Economics in 1918 for the purpose of collecting and processing financial data from the agricultural sector.

The main results of the publication include:

- The development in the Danish economy has had the effect that the contribution of the primary agricultural sector to GDP is about 2 per cent today as against just over 20 per cent a century ago.
- The structure of Danish agriculture has developed substantially over the last century from many small all-round farms to a relatively small number of specialised full-time farms and a high number of part-time farms for which the main income is not from agriculture.
- Strong collaboration with agricultural advisory services has ensured automated and standardised data collection as well as a joint basis for data and analyses for public and business use.
- Over a century, a total of just over 144,000 agricultural accounts have been collected and processed for statistical purposes.
- In the 20 years following World War II, the agricultural sector developed rapidly, and motorised traction in the form of tractors replaced the large stock of workhorses.
- The area devoted to agriculture in Denmark has been reduced by 13 percentage points over a century to 61 per cent.
- Mechanisation and specialisation have facilitated large-scale production advantages and contributed to a substantial structural development towards fewer and larger farms. In 2015, the average farm has 72 hectares as against 17 hectares in 1965.
- Of all the types of farming, fur farms have shown the highest profits on average in recent years.
- Over the last decade, the average degree of profitability of 1.7 per cent for pigs has been below that for crops (1.9 per cent) and for cattle (2.2 per cent).
- The profit from pigs and fur animals clearly shows a more cyclical trend than that from cattle and crops. The two latter have also been more heavily regulated, e.g. by milk quotas.
- The market value of agricultural assets has increased rapidly in the last 20 years to DKK 227,000 per ha in 2015, which has contributed to a declining degree of profitability. Liabilities have also increased and were DKK 151,000 per ha in 2015.[1]
- In the years up to 1975, labour productivity increased more rapidly than the average farm size which meant that farmers were able to replace employees partly with machines, partly with his/her own labour. Since 1975,

[1] In 2015, the average exchange rates were:
EUR 100 = DKK 746
USD 100 = DKK 673
GBP 100 = DKK 1,028

Source: Statistikbanken.dk/DNVALA

the size of farms has increased more than labour productivity which has resulted in relatively more employees per farm.

- For a number of years up until around 1960, there were approximately 200,000 farms in Denmark. Since then, the number has fallen steadily to approximately 37,000 farms in 2015.
- In all years, pigs and cattle account for more than 90 per cent of the agricultural gross output from livestock. In this period, pigs accounted for an increasing part.
- In the beginning of the period, smallholdings were created by means of government-sponsored programmes. Later, smallholdings became too small to live off. From about 1960, a large share of the small farms were converted to part-time farms, or they discontinued as independent units and merged with other farms.
- Throughout the period, the agricultural sector depended on external trade in terms of exports of pigs, milk, eggs, etc., but also in terms of imports of feed and fertiliser.
- Until Denmark joined the EEC, international trade in agricultural products was often regulated by bilateral trade agreements with our neighbouring countries. After our entry in the EEC, the trade has been freer between the countries within the EEC, which later became the EU.
- Aid to agriculture and regulation of the agricultural production was a national issue before Denmark entered the EEC – subsequently, decisions were made to a much wider extent by the EEC/EU.
- Two world wars created havoc in the existing trade pattern. During both wars, the agricultural sector had relatively good income.
- Denmark's entry in the EEC and the technological development impacted the statistical methods. Where the selection of accounts was previously left to the reporting offices, a stratified sampling and weighting of the farms would now take place.

Statistics Denmark and accounting results for the agricultural sector

Statistics Denmark (then called the Statistical Bureau) was set up shortly after the constitutional act of Denmark was adopted in 1849. Already in 1847, as an assistant employed in the statistical services of the Kingdom of Denmark, ***Adolph Frederik Bergsøe*** (the first head of the statistical bureau 1850-1854) had carried out assessments of income and expenditure for a typical farm of about 27-33 hectares of good farmland.

On 1 April 1918, the ***Bureau of Agricultural Economics*** was established. Prior to this, preparatory studies had been conducted by the Danish Agricultural Society and T. Westermann, professor at the Royal Danish Veterinary and Agricultural University. As a specially invited participant, ***Adolph Jensen*** (head of department 1913-1937) from the Statistical Department (now Statistics Denmark) also took part in the preparatory studies. The Bureau of Agricultural Economics was charged with the collection and processing of accounting information from the agricultural sector and helping accounting gain ground. The bureau has published accounting results for Danish agriculture throughout the period for the operating years 1916/17 to 1975/76, after which the bureau was changed to ***Jordbrugsøkonomisk Institut (Institute of Agricultural Economics), (later Statens Jordbrugsøkonomiske Institut (National Institute of Agricultural Economics), Statens Jordbrugs- og Fiskeriøkonomiske Institut (National Institute of Agricultural and Fisheries Economics), Fødevareøkonomisk Institut (Danish Research Institute of Food Economics) and now Department of Food and Resource Economics (IFRO)) which in its capacity as a government research institute*** published the accounts statistics up until the financial year 2007. For each year, there was a committee or a board of directors behind the bureau or institute in which the Statistical department/Statistics Denmark was represented, typically by the head of division for ***the office of agriculture***. For example, ***Einar Cohn***, head of division (and later head of department 1936-1955), was a member from 1923 until 1937, where he had taken over the job as head of department one year earlier.

In the 2007 government coalition agreement, the stage was set for bringing together all official agricultural statistics at Statistics Denmark. This resulted in a transfer of all statistical activities from the department of food economics, which became part of Copenhagen University from 1 January 2009. Since then, Statistics Denmark has handled the accounts statistics for the food sector.

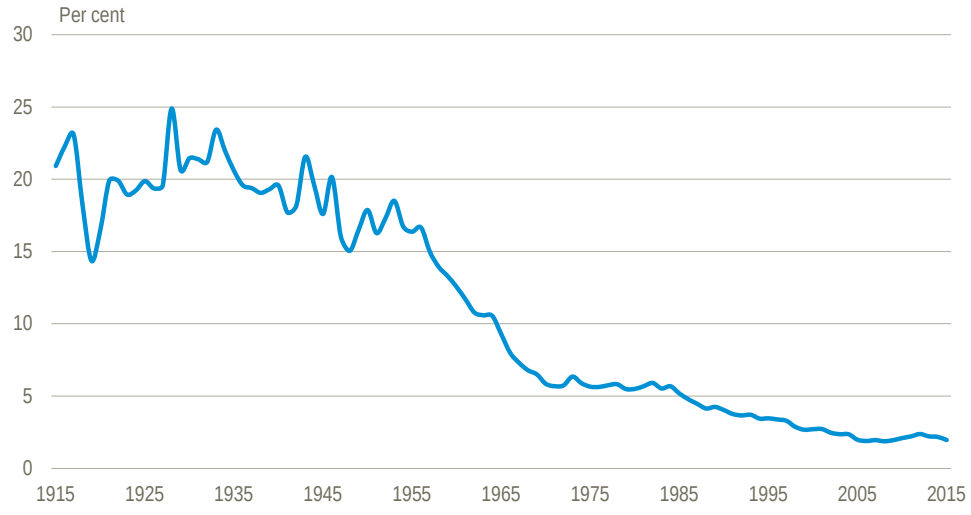
- When Denmark entered the EEC, the already existing accounts statistics were applied to meet Denmark's commitment to the EU's information network for agricultural bookkeeping, the Farm Accountancy Data Network (FADN). FADN was established in 1965 and, for each country, it has a regulative sample of farm accounts.
- This set of statistics is regarded as highly reliable and is an important part of a strong knowledge base for administration and policy development.
- It is based on strong cooperation on research application with the Department of Food and Resource Economics (IFRO) at the University of Copenhagen.

1. Agriculture in Denmark 1916-2015

Primary agricultural production today accounts for approximately 2 per cent of GDP

The primary agricultural production today accounts for approximately 2 per cent of the value of Denmark's total production measured in terms of the national accounts. The agricultural share has decreased over time, from a level around 20 per cent up until 1950. Especially in the period after World War II, the share of agricultural production was declining. In this period, the industrialisation kicked into high gear, and the agricultural sector passed through a mechanisation, which resulted in increased production and an exodus from farming. The mechanisation will be illustrated in a subsequent section.

Figure 1 The agricultural value share of total Danish production



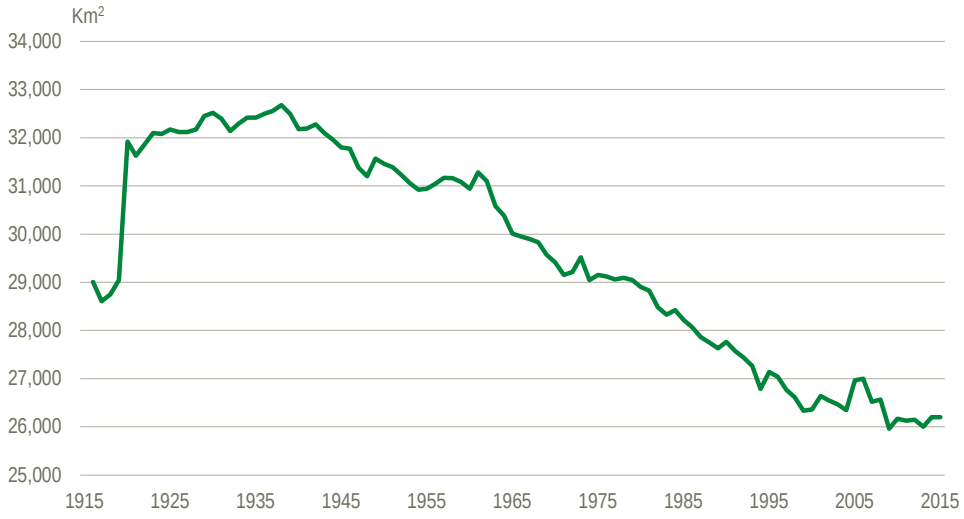
Source: www.statistikbanken.dk/NABP69 for the years 1966-2015. For the years before 1966, we have used information from Svend Aage Hansen: Økonomisk vækst i Danmark, volume II: 1914-1970.

1.1 Development in area and livestock

Agriculture dominates the land use

Agriculture takes up a lot of space in Denmark compared to other countries. In 2015, the agricultural area amounted to 61 per cent of Denmark's 42,925 km^2. A hundred years ago, the farmland share reached 74 per cent, but increased afforestation and the need for areas for urban expansion and infrastructure has gradually reduced the agricultural area.

Figure 2 Denmark's agricultural area

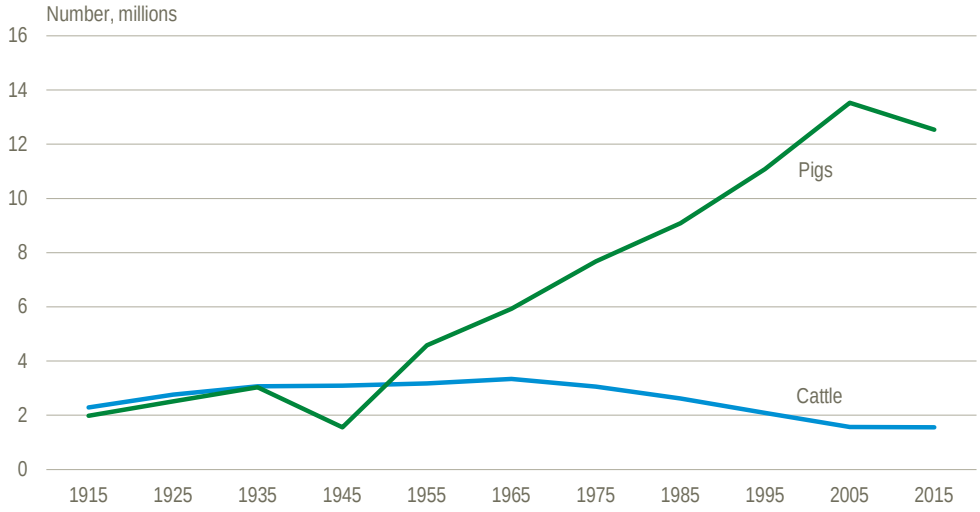


Note: Southern Jutland is included in the statistics from 1920.
Source: Statistical Yearbook, agricultural census, multiple annual volumes.

Has the curve been broken for the pig population?

The population of cattle and pigs has been calculated by Statistics Denmark by means of periodic censuses. The population of cattle reached a peak in the 1960s, whereas the population of pigs – except from a decline during World War II – was increasing steadily to 13.5 million pigs in 2005 after which the population has dropped to 12.5 million pigs in 2015.

Figure 3 Denmark's population of cattle and pigs

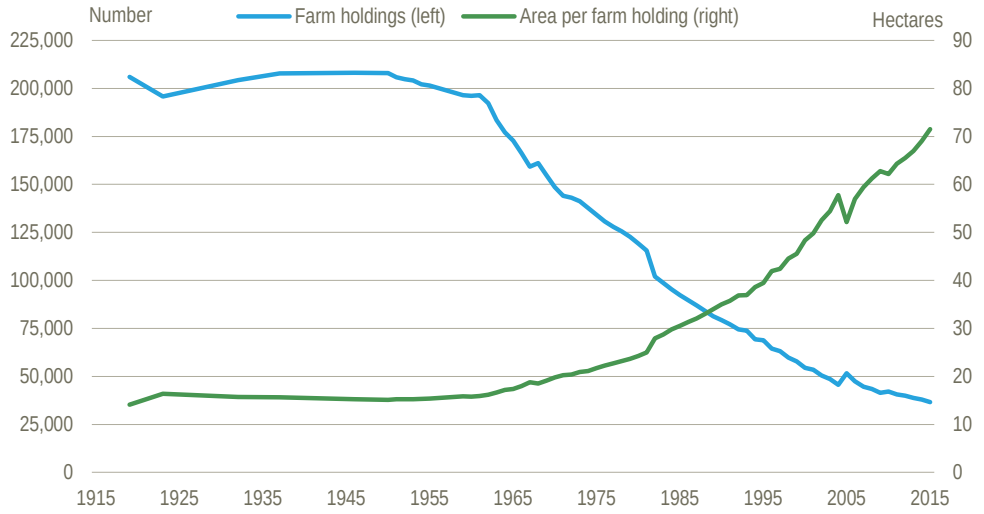


Source: Statistical Yearbook, agricultural census, multiple annual volumes.

The structural development really gathered speed from 1950

For an extended period of time, the number of farms was relatively stable up until around 1950 with approximately 200,000 farms, which meant an average size per farm of approximately 15 ha calculated on the basis of the total agricultural area. The mechanisation and later the specialisation (see section 2) resulted in a declining number of farms and an increasing average area per farm.

Figure 4 Farms and area per farm



Source: Statistical Yearbook, agricultural census, multiple annual volumes.

The number of farms is defined slightly differently over the course of the period, e.g. horticulture farms are only included from the late 1960s. For instance, as many as 5,101 horticultural enterprises were not included in 1963. In recent years, many of the smallest farms have not been included due to a lower threshold measured in Standard Output. It is estimated that there were a little less than 7,000 farms of less than 5 ha with a limited livestock in 2015 which were not included in the census. By way of comparison, the statistics included 39,143 farms of 0.55-5 ha in 1956.

Table 1 Population of farms, area, livestock and tractors

		1916	1925	1935	1945	1955	1965	1975	1985	1995	2005	2015
		1,000 ha										
1	Agricultural area	2 901	3 217	3 242	3 180	3 094	3 001	2 915	2 822	2 714	2 697	2 620
		number, 1,000										
2	Farms	206	206	204	208	201	173	134	92	69	52	37
3	Tractors	...	2	7	13	60	133	183	169	151	113	80
4	Horses	515	536	521	558	308	53	58	32	18	54	58
5	Horned cattle	2 290	2 758	3 072	3 091	3 179	3 345	3 060	2 618	2 090	1 570	1 552
6	Pigs	1 983	2 517	3 036	1 560	4 579	5 934	7 682	9 089	11 084	13 534	12 538

Source: Statistical Yearbook, multiple annual volumes, closest agricultural census.

1.2 Agriculture in Denmark at the start of the statistics

Organised trade

When the Bureau of Agricultural Economics was created at the end of World War I, the old barter economy was long gone. Accordingly, the production of the agricultural sector was first and foremost intended for sale in the market. In the last quarter of the nineteenth century, cooperative dairies and cooperative slaughterhouses had been established, and the purchase of feeding stuff and chemical fertiliser was also organised.

Number of farms increased to 200,000

The number of farms had increased from approximately 70,000 around 1850 to approximately 200,000 around World War I, partly in connection with the division of farms into smallholdings, partly because the cultivated areas were increasing.

Progress already before World War I

The agricultural sector had experienced a period of growth in terms of production and productivity, and among other things this had resulted in the exports of animal products growing steadily. A few farm returns from the turn of the century until World War I showed a major increase in earnings.

High prices during the war

During the war, the demand for food increased and all that could be produced could be sold at high prices. Product prices tripled, and even though the costs were also increasing, the net earnings also increased considerably.

Denmark around 1917 according to Statistical Yearbook

In the first financial year of the accounts statistics, the world was at war in World War I. Denmark did not take part in it, and some parts of society, including the agricultural sector, benefitted from the demand for their products by the countries at war. It was difficult, however, to get hold of certain imported goods. Looking at Statistical Yearbook from 1917, we get some idea of the Danes' everyday life:

An average yearly pay for male farmhands in agriculture was DKK 795 in 1915. Included in the pay was DKK 354, which was the value of the board. A female farmhand was paid DKK 569 per year. The daily net working hours were about 8 hours in the winter and about 10 hours in the summer.

In the urban trades, hourly wages for skilled workers in the provinces in 1917 were around DKK 0.50-0.75 (e.g. DKK 0.57 for a bookbinder and 0.726 for a bricklayer) and for unskilled workers around DKK 0.30-0.60 (e.g. in cotton mills, women were paid DKK 0.333 and men DKK 0.487). In Copenhagen, hourly wages were slightly higher. Daily working hours were commonly 9-10 hours.

In 1916, a civil servant family with a yearly income of between DKK 3,000 and 4,000 and consisting of 3.93 persons had food expenditures of DKK 1,039 out of their total expenditure of DKK 3,471. In 1909, an urban worker family in the provinces of 5.0 persons had an annual food expenditure of DKK 673, which was 46.3 per cent of the total consumer expenditure. The food consisted of e.g. 326.5 kg of rye bread, 290 kg of potatoes and 90.5 kg of fresh meat. For an agricultural worker family of 4.7 persons, the food expenditure was DKK 563, which was 61.2 per cent of total consumer expenditure. The food consisted of e.g. 379.3 kg of rye bread, 465.3 kg of potatoes and 60.2 kg of fresh meat.

The retail price of 4 kg of rye bread was DKK 0.60 in 1909, but in 1917 it had gone up to DKK 0.89. 50 kg of potatoes cost DKK 2.92 in 1909 and DKK 5.18 in 1917. 1 kg of veal cost DKK 0.85 in 1909, and DKK 1.95 in 1917. During World War I, maximum prices had been provided for a number of goods and, on top of that, rationing was introduced.

Incidentally, Statistical Yearbook was already in 1917 a publication of 260 pages. As nowadays, the texts were available in two languages, the second language being French until 1951. Only from 1952, Statistical Yearbook was in Danish and English. Statistical Yearbooks back to 1896 are available in pdf-version at Statistics Denmark's website.

Decreased livestock

World War I caused the livestock to be reduced because the necessary import of feed was cut off. During the first year of the war, imports of e.g. fertiliser continued, but towards the end of the war, the volume of imported fertiliser fell drastically.

1.3 The years between World War I and World War II

Expensive animals

The livestock prices continued to go up, and when attempts were made after the war to re-establish the livestock population, this was done at high cost. Not until 1921 did the prices of animal products fall worldwide. At first, it proved troublesome for the agricultural sector, but prices went up again already the following year, first of all because of a decline in the value of the Danish currency. In the mid-1920s, prices dropped again as the value of the Danish currency went up again due to a decision by the government and the National Bank. The price development for e.g. agricultural products appears from figure 7.

The world in recession

In 1929, the severe economic depression set in worldwide. Cereal prices dropped to half from 1929 to 1931, which could initially be beneficial to Denmark as it imported feed grain. However, Danish agriculture experienced difficulties with sales in the main markets where unemployment increased drastically. Germany increased customs duties for cattle and butter and, for the first time, England introduced customs duties on butter and eggs. Also bacon exports encountered problems, and Denmark had to increase its consumption of English products such as coal in exchange for its agricultural exports to England.

Bilateral trade agreements

World trade relied largely on bilateral agreements between the countries and were to ensure that they bought equally much from each other. The trade agreements rendered governmental measures necessary to manage the production, for instance.

Source: Landbrugets økonomi i 50 år 1918-1968, Det Landøkonomiske Driftsbureau (the economy of Danish agriculture through 50 years 1918-1968, the Bureau of Agricultural Economics) Comment: A pig ticket which entitled the holder to a higher price for his fattened pig.

Emergency farm aid – help for indebted farms

The Danish government introduced emergency farm aid: In 1931, financial aid for the payment of taxes and interests was given to the most indebted farms and, the following year, a respite arrangement was introduced. In 1933, the Danish currency was depreciated, which increased the value of the Danish exports. Also in 1933, Denmark introduced a cereal scheme with import duties whereby the Danish cereal

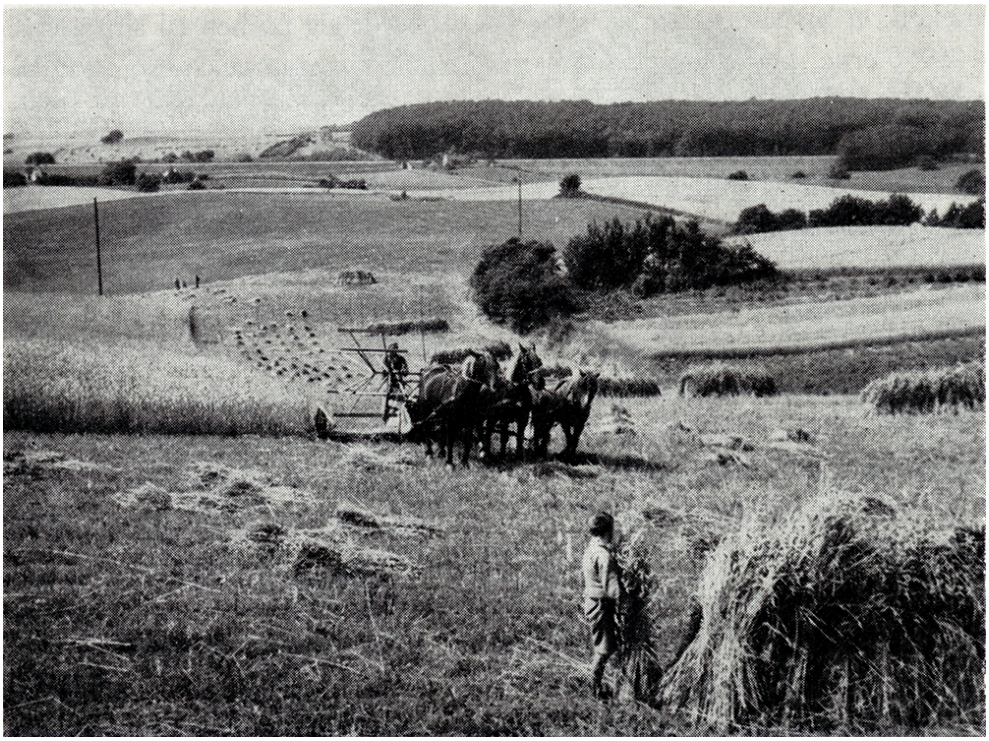
prices could be maintained at DKK 15 per quintal of rye and wheat, DKK 14.50 for barley and DKK 14 for other cereals. The duties were collected in a foundation which was allocated to farms with a land value of less than DKK 10,000.

Pig tickets

Pigs delivered to the slaughterhouse were to be accompanied by a so-called pig ticket which would result in increased payment. A lower price was paid for those pigs for which the supplier did not have tickets. Various schemes were also introduced for cattle, butter, sugar, and potato flour.

An indebted agricultural sector in the 1930s

In 1936, a scheme was introduced so that farmers with a debt in excess of 110 per cent of the mortgage value could obtain a reconstruction loan for payment of the debt. The reconstruction loans were not allowed to exceed 25 per cent of the mortgage value, and the creditors were repaid in 4.5 per cent government bonds. The farmers paid varying interest rates depending on the degree of profitability in farming, but the interest rate had to be between 1.5 and 6 per cent.



Source: Landbrugets økonomi i 50 år 1918-1968, Det Landøkonomiske Driftsbureau (the economy of Danish agriculture through 50 years 1918-1968, the Bureau of Agricultural Economics)

1.4 The 1940s: World War II and the post-war years

Declining agricultural output that was easily sold

The outbreak of the war in 1939 changed the situation for agriculture. Where the 1930s had surplus production, it was now easy to sell all that could be produced. In the same way as during World War I, production declined since it was difficult to import feeding stuff and fertilisers. This was particularly hard on the population of pigs and chicken, whereas the farmers were more successful in maintaining the population of cattle for which the feed was home-produced to a wider extent.

Oilseeds and textile crops

The composition of the crops changed: areas for oilseed (white mustard and flax grown as an oilseed crop) and with spinning material (fibre flax and hemp) for the textile industry were expanded, and so were areas for vegetables and potatoes and sugar beets. The area for chicory roots was also expanded; in 1942 there were 1,217 ha – most likely for the production of coffee substitute. In the same way as during World War I, maximum prices and rationing were introduced.

Restoration of the productive capacity

The agricultural economy in the war years was better than in the preceding 15 years, but after the end of the war, a considerable amount of reconstruction work had to be done to bring the productive capacity up to a satisfactory level.

Renewed exports to England

After the war, Denmark focused on re-establishing the export to England, which had been interrupted in the war years. However, the English were not willing to pay as much for the agricultural products as the Germans had done during the occupation, and the exchange rate of the pound sterling was fixed at a lower level than in the 1930s. The English still agreed to pay what the Germans had paid in the first months after the war.

The price of butter, pork and eggs had to be raised

To compensate for the effect of reduced export prices, the government subsidized especially butter, pork and eggs in order to maintain settling prices above the level that consumer prices could condition. Towards the end of the 1940s, an agreement was reached for higher prices in the English market, and the mentioned subsidies were gradually abolished.

Increased dollar rate

In 1949, the dollar exchange rate was increased from 4.79 to 6.92 which contributed particularly to increased import prices. Agreements on increased prices for agricultural products exported to England resulted in various measures for the purpose of keeping Danish consumer prices under control. Cereals were also regulated.

1.5 The 1950s and 1960s: The EEC, EFTA and complicated agricultural schemes

The signing of the Rome Treaty

In 1957, the Rome Treaty was signed by West Germany, France, Italy, the Netherlands, Belgium and Luxemburg. The EEC was a reality.

The EEC aiming for self-sufficiency in food

The establishment of the EEC had a great impact on Danish agriculture, as the treaty between the six countries included an agreement on common agricultural schemes which, first of all, made provisions for the agricultural producers in the common market countries at the expense of the countries which had previously exported agricultural products to these countries. In the first decades after the war, the member countries wanted to increase the production to become self-sufficient in food. For this reason, farmers were guaranteed a minimum price for their products which would usually be above the world market price.

EFTA missing agricultural agreement

In response to the EEC, England took steps to the establishment of EFTA, which, in addition to Great Britain, would include the Scandinavian countries along with Austria, Switzerland and Portugal. EFTA, which was created in 1960, is a free trade organisation, but it did not include a general agreement on the agricultural policy as the EEC did. Already in 1961 and again in 1967, Denmark, Great Britain, Ireland and Norway applied for membership of the EEC, but Charles de Gaulle, the French president, vetoed it due to his reluctance against the admission of Great Britain. Not until de Gaulle stepped back in 1969 did it become possible for the four countries minus Norway to become members of the EEC as at 1 January 1973.

Reduction of duties on manufactured goods

First and foremost, EFTA opened up to the reduction of duties on manufactured goods. However, Denmark obtained some reduction of duties for agricultural products to EFTA members and a share of import quotas. E.g. Denmark obtained 47 per cent of the market supply of bacon for the British market as well as a quota of approximately 100,000 tons of butter.

Fixed prices on bread grain and reduced property taxes

In 1958, Danish agriculture entered into negotiations with the minister of agriculture with a view to improving the conditions for farmers, e.g. by improving the sale of agricultural products in the home market. The negotiations led to a relief in property taxes of DKK 17m and, in connection with the collective bargaining in the

labour market in 1958, the government promised to implement certain schemes in support of agriculture to ensure that an agreement was reached between the labour market parties. It was a bread grain scheme which fixed a hand-over price of DKK 48 per quintal of wheat, DKK 45 per quintal of rye plus a storage premium. Countervailing charges were fixed for feed grain when the import price went below DKK 37 per quintal of wheat and sorghum, DKK 40 for barley and DKK 42 for maize – however, the minimum price would be reduced if the pork price fell to less than DKK 3.65 per kg. Furthermore, a state-guaranteed minimum price for butter of DKK 6 per kg was introduced.

Enabling act and duty on pork

The minister of agriculture was authorised to determine rules for the export and to impose duties on pork as well as the other agricultural products. The duties were to be included in funds for the promotion of agricultural exports. The minister started using the enabling act in 1961 when the price of pork in the home market could become subject to a duty of up to DKK 0.50 per kg, the proceeds of which was made available to the sales association of the export pork processing plants for price equalisation and sales promotion in favour of the producer prices.

Subsidies and reduced chemical fertiliser prices

The enabling act resulted in DKK 250m being made available for repayment of land tax, subsidies for dairy cows and a special property subsidy which was allocated to smallholdings. Furthermore, the minister of agriculture was authorised to grant DKK 50m annually for reduction of the chemical fertiliser prices. Finally, DKK 150m were made available for the sales organisations for promotion of the sale of agricultural products.

The mentioned agricultural schemes were further developed over the following years.

1.6 The 1970s: Denmark in the EEC

NORDEK is cancelled

In 1968, Denmark initiated negotiations about a Nordic customs union, which was called NORDEK. The treaty was actually ready to be signed on the threshold of 1970. However, Charles de Gaulle had left the office as president of France making it possible for Denmark and Norway to be admitted to the EEC and, accordingly, the NORDEK plans were abandoned.

Negotiations with four countries, Norway says no

The EEC initiated accession negotiations with Great Britain, Denmark, Norway and Ireland, but in a referendum in Norway, a majority voted against membership of the EEC.

Important to quickly become part of the common agricultural policy

For Denmark, it was important that the agricultural sector would benefit fully and as quickly as possible from the common EEC agricultural policy. By obtaining the benefit of the elevated prices on agricultural products in the EEC, national subsidy schemes could be phased out and still earnings could increase for Danish farmers.

No progress for the agricultural sector according to accounts statistics

The accounts statistics do not show actual progress for the agricultural sector after Denmark joined the EEC – although we do not know how things would have evolved without the EEC. There would most likely still have been national subsidy schemes which, to some extent, would have maintained incomes at a tolerable level. One theory is that the fixed, regulated prices have contributed to the specialisation of the agricultural sector, since the spreading of risk was no longer necessary.

Transition period of five years

The Danish negotiators obtained a transition period of five years before the agricultural sector would benefit fully from the common agricultural policy, but they were given access to receive compensatory amounts from the EEC's agricultural fund already from the first year.

63 per cent yes

In October 1972, a referendum was held about Danish membership of the EEC. In the time running up to the referendum, EEC supporters focused mainly on the financial advantages of EEC membership whereas the opponents focused mainly on the loss of sovereignty implied in the membership. In the referendum, 63.4 per cent of the votes were in favour of membership.

1.7 The 1980s and forward: Adjustments in the common agricultural policy

The EEC gradually becoming self-sufficient in food

As mentioned previously, the price of agricultural products in the EEC was maintained above the world market price in order to increase the production and obtain self-sufficiency. Around 1980, self-sufficiency in a number of different products had become a reality, and further increase in the production had to be sold in the world market at the lower market prices or had to be stored – both of which involved costs to the community. Moreover, the intensification of agricultural production had an environmental impact.

Milk quotas introduced and abolished

Accordingly, the agricultural production was under dual pressure. In 1984, milk quotas were introduced according to which member countries were only allowed to produce a specified amount of milk. The milk quotas were not withdrawn until 2015.

MacSharry and area compensation payment

In addition, the minimum prices for cereals and beef were approaching the world market prices. In 1992, the so-called MacSharry reform became effective. Instead of supporting the agricultural sector through artificially high prices, farmers were given area compensation payment, i.e. a fixed amount per hectare of crops and, at the same time, the product price was reduced. The minimum price for cereals was cut by 35 per cent and for beef by 15 per cent. A special subsidy was given for bull calves when they were slaughtered. Furthermore, forced set-aside of farmland was introduced. In 1995, nine per cent of the farmland was set-aside according to the accounts statistics. Area compensation payment was given for the set-aside farmland. However, the percentage set-aside was gradually reduced and, from 2008, only voluntary set-aside exists.

Multi-purpose restructuring of the agricultural policy

The idea of the restructuring of the aid was that when farmers were paid less for the products, they would have less financial incentive to obtain a high yield in terms of volume per hectare. In this way, the surplus production within the EEC would be reduced while obtaining environmental benefits, since it was no longer cost-effective to use quite as much chemical fertiliser and pesticides. Also, in the set-aside farmland, neither fertilising nor spraying with pesticides was required. In addition to the production purposes, the reform was also a trade policy tool; because it meant that a major part of the aid to agriculture became acceptable in relation to the international trade negotiations within the framework of GATT and WTO.

Agenda 2000

The agricultural schemes have been continuously adjusted. Agenda 2000, which was adopted in 1999, involved a further reduction in the guaranteed minimum prices of the products which were compensated by increased livestock premiums and area compensation payment.

The single payment scheme

An important change was the introduction of the single payment scheme in 2005. The aid was no longer granted per hectare with each crop, but collectively for the farm which was granted a certain number of rights, depending on previous production. The rights depended on the number of hectares of land, but also previous production of milk, beef and sugar, as some of previous years' aid for these products was now included in the single payment. In this way, the aid was further *decoupled*, i.e. independent of the physical production on the farms.

Green methods

However, the farm land areas had to live up to common standards in terms of environment, animal welfare and food safety. In the latest reform, which came into force in 2015, the focus on green farming methods is even stronger. Some of the aid is granted via the rural aid programme, which is focused more on the individual conditions of the farms. The aid to agriculture rests on two pillars, the first one being the single payment which is independent of the production, and the second pillar is the rural development aid.

Lower share of the EU's budget

At an overall level, though, the aid has been slightly reduced. In 2020, however, it is expected that Danish farmers will still receive aid in the amount of DKK 6.6bn. In the EU, the aid to agriculture has constituted half of the EU's budget for a number of years, in the 1970s even as much as nearly 70 per cent. Today, it constitutes about 36-38 per cent of the budget. From the 1990s, a higher share of the amount has been paid as rural region aid, but in 2015 this only constitutes about three per cent of the aid through the single payment.

2. Mechanisation and specialisation

2.1 The effect of increasing productivity

Long period of increasing productivity

Calculations based on the accounts statistics show that productivity has increased continuously over the last 100 years. When it becomes possible to produce at lower costs, market forces trigger a relative decline in the product prices compared to the prices of input in the agricultural sector, i.e. the terms of trade deteriorate. However, wars, world crises and other periodic fluctuations have changed these terms from time to time.

Source: Landbrugets økonomi i 50 år 1918-1968 (the economy of Danish agriculture through 50 years 1918-1968), the Bureau of Agricultural Economics.

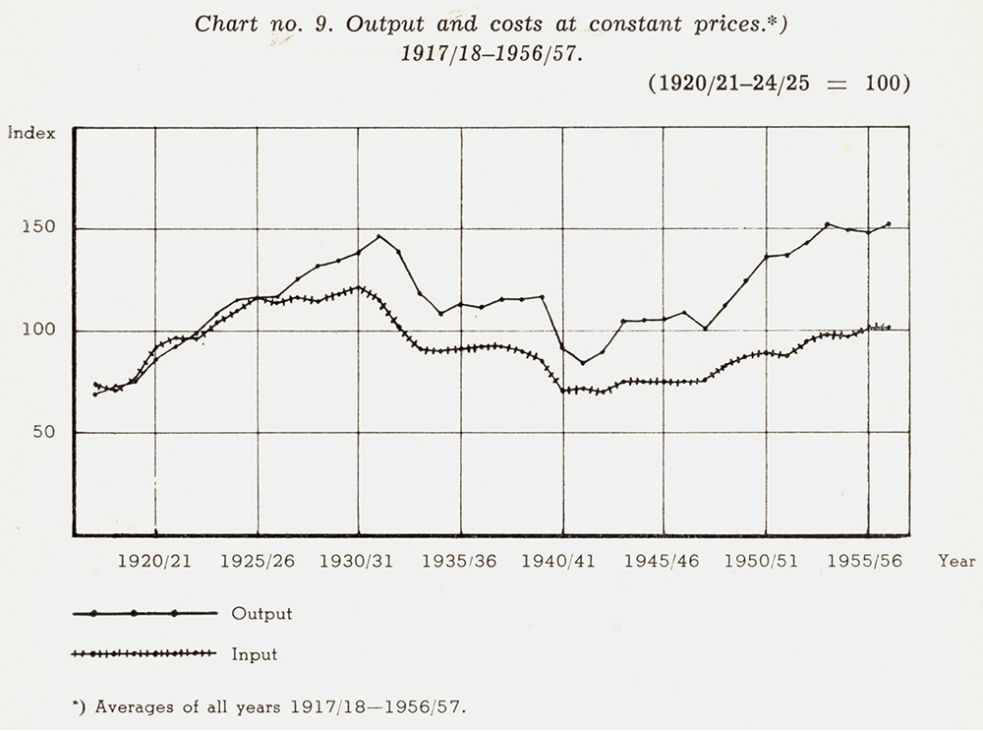
Increased production compared to input, for which the price increased even more, however

In the period from 1916 until approximately 1960, the number of farms is relatively stable. In the individual farms they experience that the price of the products increases less than the price of the input which is necessary in the production. See figures 7 and 8 where the development in the agricultural terms of trade is shown for the period after 1949. However, the agricultural sector manages to gain more from the applied input. See figure 5, from which it appears that the production increases more than the farms' input. E.g. the consumption of feed for production of 1 kg of pig fell from 5.4 feed units in the 1920s to 4.4 feed units in the mid-1950s. In the 1950s, the livestock production is quite intensive in the farms with relatively small agricultural areas.

Technical progress

Technical progress implies that it is now possible to run the fields and stables without the same extent of hired help, see figure 15. In order to make ends meet, the number of employees is reduced. Throughout most of this period, there are only limited economies of scale. Source: Niels Kærgård and Tommy Dalgaard as well as the Bureau of Agricultural Economics.

Figure 5 Gross output and operating costs at fixed prices

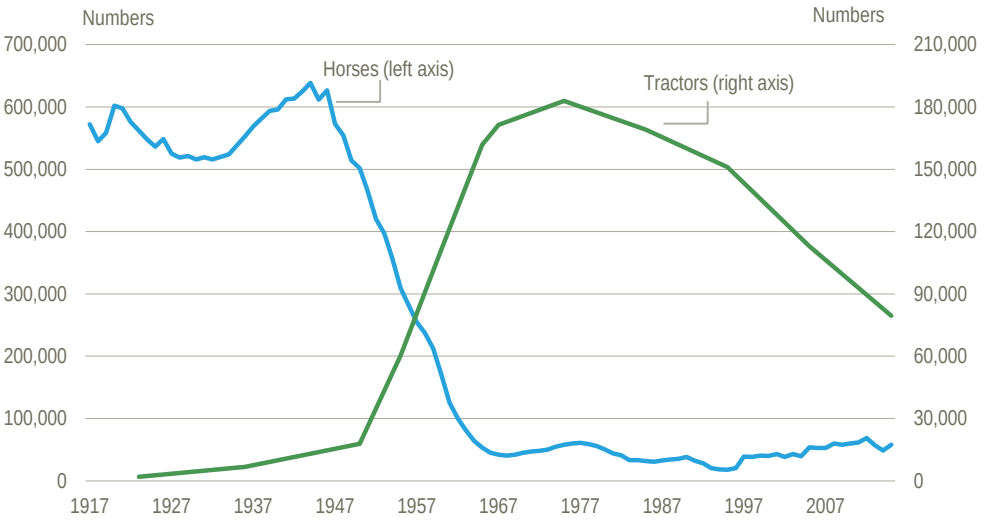


Source: Technical and Economic Changes in Danish Farming. 40 years of Farm Records 1917-1957. The Bureau of Agricultural Economics.

Tractors instead of horses

The mechanisation of the Danish agricultural sector really gained momentum over a period of 20 years during which work horses were replaced by tractors and agricultural implements. Denmark's stock of horses was reduced by more than half a million to 53,000 horses in 1965, whereas the number of tractors increased by 120,000 to 133,000 in 1965, see figure 6.

Figure 6 The mechanisation of Danish agriculture, illustrated by the number of horses and tractors



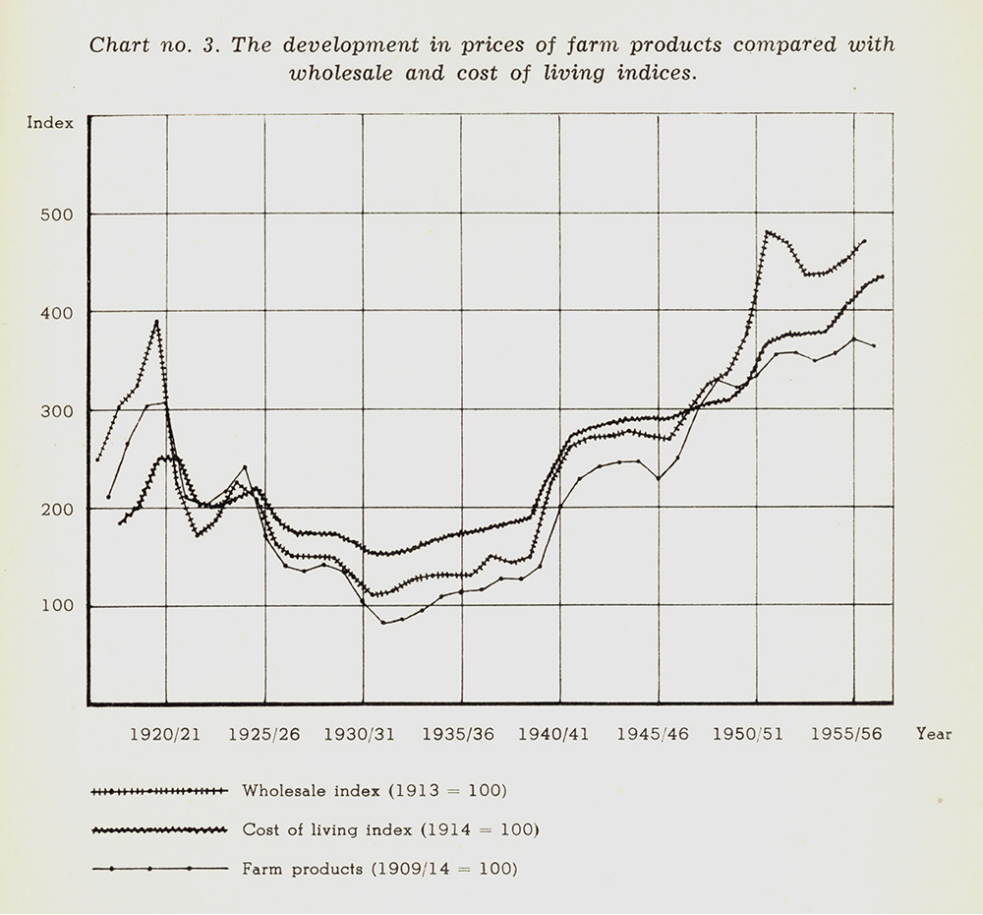
Source: Statistical Yearbook, agricultural census, multiple annual volumes.

Gradual economies of scale

In the period from around 1960, the economies of scale gradually became significant and, at the same time, the terms of trade continued to decline, see figure 8. In order to make a living of his farm, the individual farmer had to expand: Buy more land and/or invest in larger stables and corresponding livestock. This implies structural development towards fewer, larger and more specialised farms. Also, wages

are rising, both in terms of the wages that the farmer must pay to employees and in terms of what the farmer could earn by getting a job outside the farm.

Figure 7 Prices of agricultural products compared to wholesale price and cost of living index

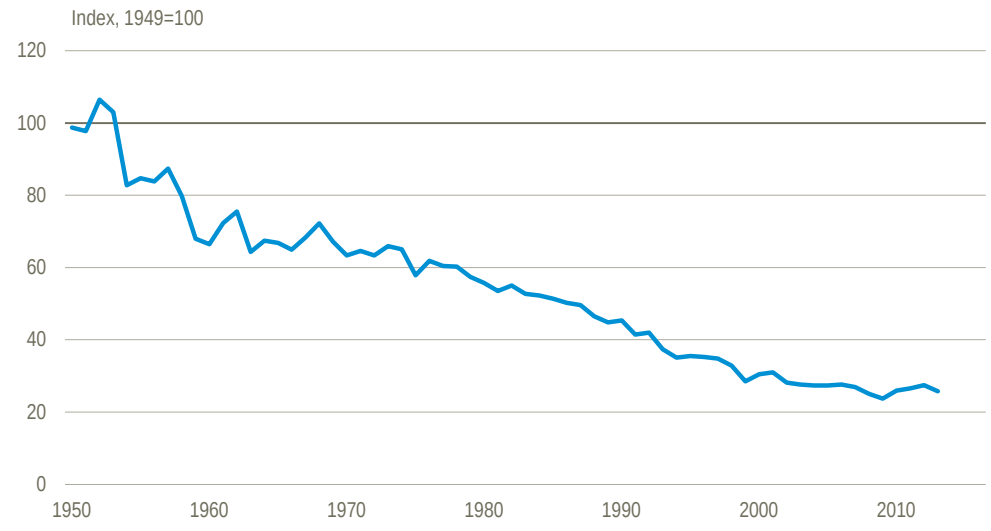


Source: Technical and Economic Changes in Danish Farming. 40 years of Farm Records 1917-1957. The Bureau of Agricultural Economics.

Structural development towards fewer, but larger farms, also due to a liberalisation of the agricultural property law

The structural development was relatively limited until around 1960, at which point there were still just below 200,000 farms. Twenty years later, the number had been close to halved, and another 20 years on, it had been halved again. Moreover, the total agricultural area only fell slightly and the average area increased from around 15 ha in 1960 to over 70 ha in 2015. However, it was not only economics that set the structural development in motion: The agricultural property law also contributed. About the middle of the century, merging of farms was not allowed. It was possible, however, to own two farms. The land laws were gradually liberalised over the next decades – probably influenced by the economic conditions.

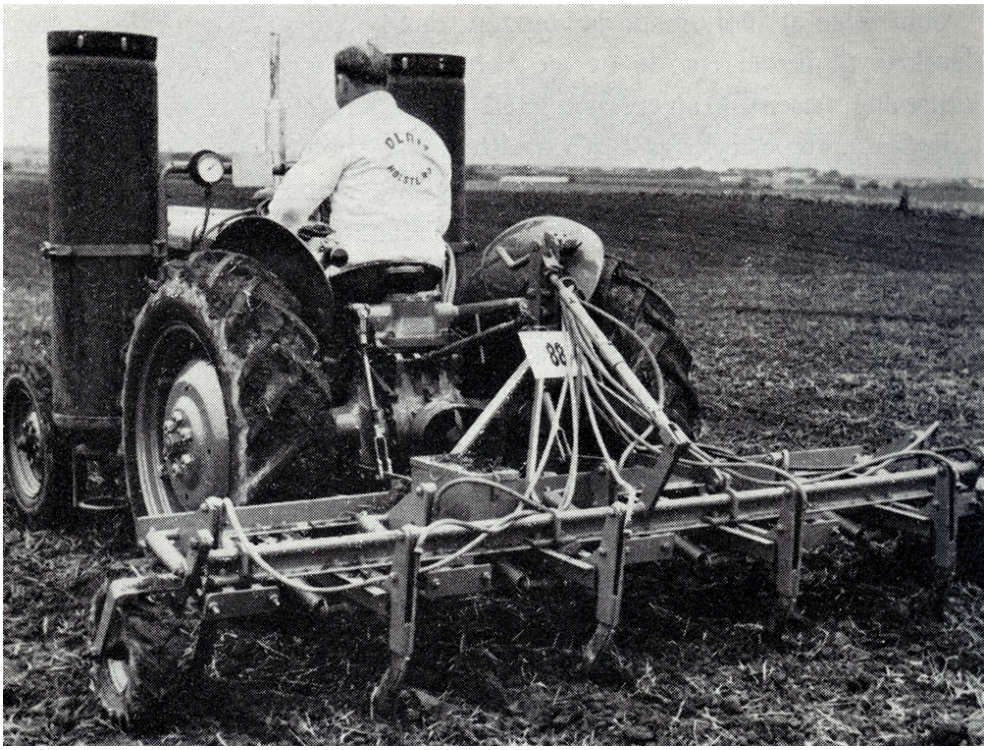
Figure 8 The agricultural terms of trade



Source: Henning Otte Hansen, IFRO.

Increased level of specialisation

The economies of scale contribute to increased specialisation, since the specialisation enhances specific agricultural activities at the individual farms. The farms of former times with fields as well as cows and pigs became increasingly rare and were replaced by farms which had either fields with cash crops or pigsties or cowsheds. In 1970, 68 per cent of the farms had both cattle and pigs, whereas this was only the case for 18 per cent of the farms in 1990, and 4 per cent in 2007. However, to get rid of the manure, for example, the livestock farmers still have fields. A large share of the crops is used for feed. Read more about specialisation in section 2.4.



Source: Landbrugets økonomi i 50 år 1918-1968 (the economy of Danish agriculture through 50 years 1918-1968), the Bureau of Agricultural Economics.

More part-time farms

A third option for the farm families who wanted to continue living at the farm, but did not want to invest, was to find a job outside the farm. This has resulted in a large number of part-time farms. Accordingly, there are far more part-time farms than full-time farms in 2015.

Smallholdings created with government aid

In the first part of the twentieth century, approximately 30,000 new smallholdings were created with government aid according to various laws, the first of which was adopted in 1899. The land for the smallholdings came from different sources: Parcelling out from manors and rectories etc. but also to some extent new farm land based on drainage, land reclamation etc.

According to the law from 1899, state loans could be offered of up to 90 per cent of the value of land, buildings, livestock and equipment, although maximum DKK 4,000. The farms were small, between 1.9 and 2.8 hectares and the smallholder often had to hold paid jobs elsewhere. To be considered, an applicant was required to have held a job in farming or horticulture for at least five years, be able to provide testimony of honesty and to have a fortune of at least DKK 400. Interest on the loans to be paid was at a relatively low rate of approximately 4 per cent, and the repayment was on easy terms.

The law from 1899 was changed multiple times, and the farms did become somewhat bigger. An important change was the introduction of the so-called land rent farms in 1919. This meant that the state could create smallholdings on their own land to which the smallholders had a right of use against payment of an annual rent to the state.

Especially in the period until around 1930, many smallholdings were created on this basis, but as the agricultural sector was mechanised and it became harder to live off smallholdings, it was no longer relevant to create more smallholdings. However, the last ones were created as late as 1964, and the act on state smallholdings remained in force until 1971.

To determine the interest rate for the state loans for smallholdings, an annual special extract from the accounts statistics has been used which determined the rate of interest for the year for these farms.

An increasing part of the land is under tenancy

The freehold was dominant for a major part of the period: In 1956, five per cent of the farms were tenancies. Concurrently with the structural development, an increasing part of the land is under tenancy. The first actual data about the share of land under tenancy is from the accounts statistics for 1973/74 where approximately 3 hectares out of the average farm's barely 25 hectares are rented, i.e. 13 per cent. In 2015, slightly less than 26 out of the average farm's 84 hectares are rented, i.e. 31 per cent.

2.2 Specialisation of the agricultural sector after 1973

The main part of the land is cultivated by full-time farmers

The use of the agricultural area is distributed with approximately 80 per cent full-time farms and 20 per cent part-time farms, which has been pretty constant in the last 40 years. On the other hand, the number of full-time farms has dropped from constituting 69 per cent in 1973 to 37 per cent in 2015, while the size in terms of agricultural area has increased from 29 hectares to 167 hectares.

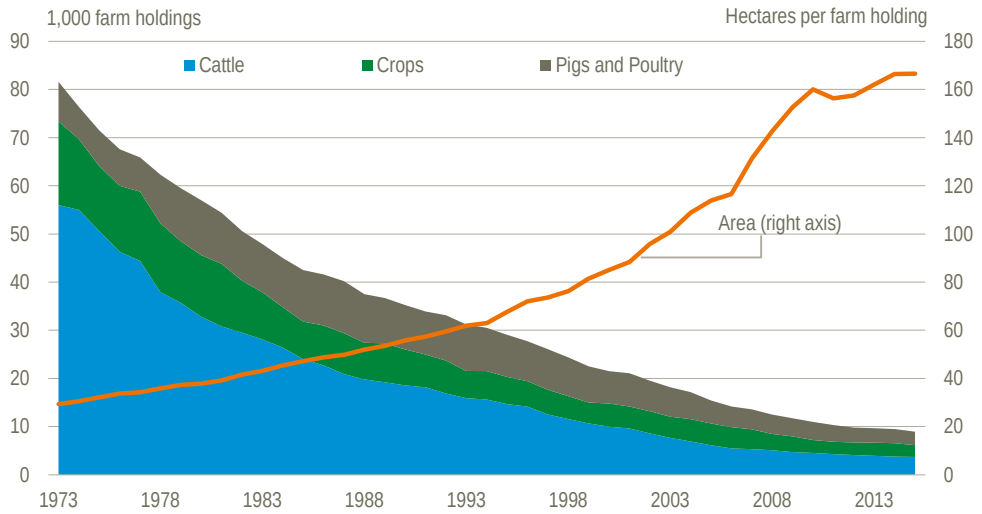
Fewer full-time farms

For full-time farms defined as cattle farms, the 3,700 farms in 2015 only constitute 6.6 per cent of the number that existed in 1973. Correspondingly, there are 2,800 full-time farms with pigs as their type of farming, which is 34.1 per cent of the number that existed in 1973, whereas there are 2,400 full-time farms with crop production as their type of farming. This is 14.1 per cent of the number that existed in 1973. Finally, there are 1,300 full-time farms with fur animals as their type of farming in 2015.

Part-time farms with less livestock

In the part-time farms, the livestock production has been reduced and constitutes about 11 per cent on average of the gross output including subsidies in 2015.

Figure 9 Development in the number of full-time farms

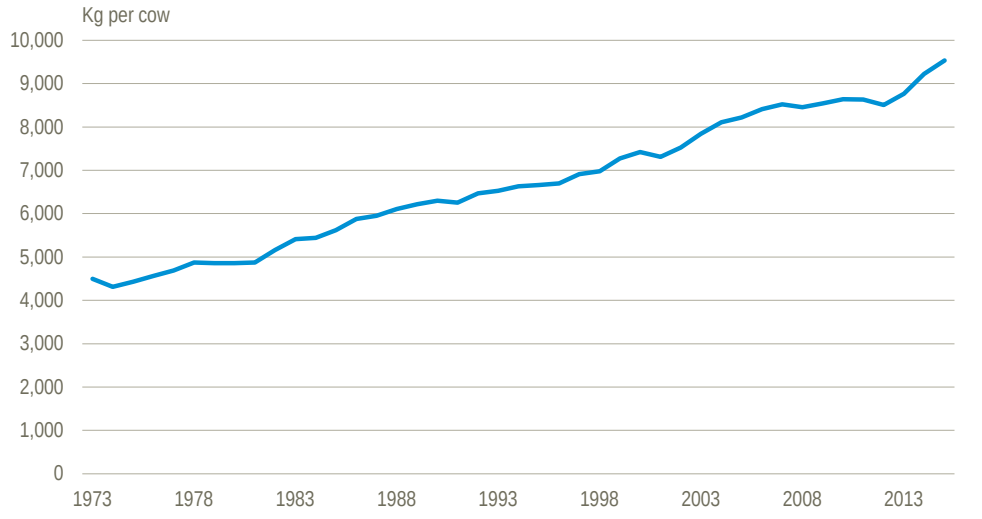


Source: Accounts Statistics for agriculture, multiple annual volumes.

Cattle farms in particular have decimated in number

Particularly the number of farms with cattle has been substantially reduced. From 1984 to 2015, the milk production was regulated by quotas, but since the quotas were partly tradeable, it has not stopped a concentration of the milk production on fewer farms. A strong development in the breeding has resulted in increasing production performance per cow (see figure 10), which has necessitated a higher quota for the individual dairy farmer to avoid a reduction in the farm's stock of cows. In later years, additional specialisation has taken place of farms where the production of heifers is outsourced to so-called heifer hotels providing the dairy farmer with more space for an increased and more specialised milk production.

Figure 10 Milk yield per cow

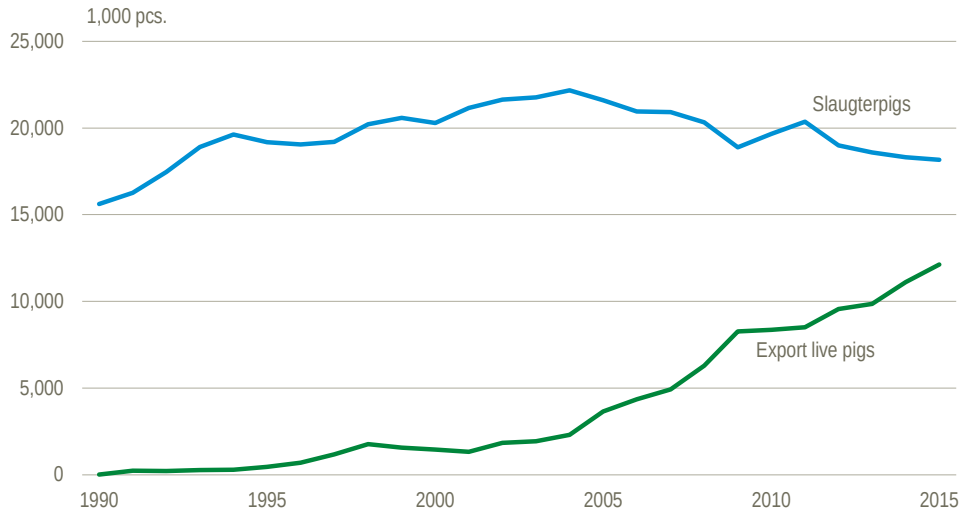


Source: www.statistikbanken.dk/ANI5. Before 1990 from Agricultural Statistics, multiple annual volumes.

Pig holdings are often specialised in piglets or pigs for fattening

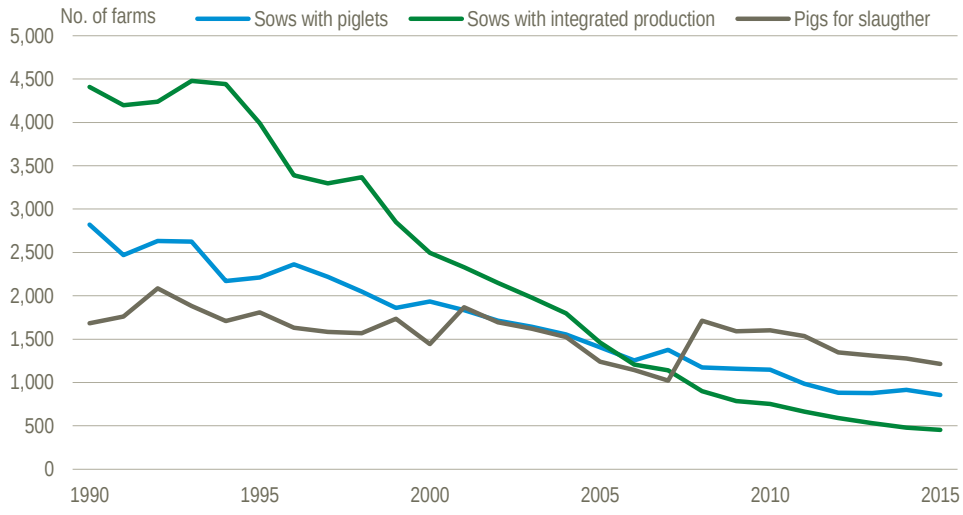
The pig farms have not been subject to the same EU regulation of the production as the cattle farms. The number of traditional pig farms with both sows and pigs for fattening has been in decline over a number of years during which the main part of the pig farms have specialised in either piglets or pigs for fattening, which has also in recent years resulted in new business opportunities in connection with a significant export of piglets to pig fatteners in Germany and Poland.

Figure 11 Slaughtering and export of pigs



Note: The export of live pigs consists predominantly of piglets.
Source: www.statistikbanken.dk/ANI5.

Figure 12 Number of farms with pigs



Note: A change in typology causes a data break between 2007 and 2008.
Source: www.statistikbanken.dk/JORD2 and www.statistikbanken.dk/REGNSV1.

In figure 12, the number of pig farms with sows and piglets as well as pigs for fattening has declined relatively more than pig farms specialised in either piglets or pigs for fattening. Farms with livestock are regulated by environmental legislation indicating the number of animal units allowed per hectare. To benefit from economies of scale, it can be profitable to specialise the production.

3. Accounting figures for 100 years

Quite a few changes occur in statistics in the course of 100 years

As described in the section about sampling and weighting, fundamental changes have obviously occurred in the accounts statistics in the course of a period as long as 100 years. Before around 1970, it was up to the accounts offices to select the farm returns from which to submit material, which obviously did not provide a random, representative sampling. As an example, farm returns were generally submitted for farms larger than average. In the presentation of results, it was attempted to take this into account by showing only the average per hectare, where each farm was represented with one hectare, whereas a sampling and weighting of

the farms was introduced from 1973 and, after this, average figures were shown per farm.

Accounting figures for 100 years

In the table section of the publication, long-term series are displayed in which the farms' gross output, costs and results are shown per hectare. Adjustments have been made for significant data breaks, whereas other data breaks have been described in notes. For operating costs, remuneration of the family's labour has been included. Accordingly, net output shows the result available for return on capital.

Approximately 144,000 accounts collected

The sample of accounts was made up of 75 farm accounts the first year, 1916/17. After this, the sample was gradually extended to a level around 1,000 farms in the years 1940-1960, though with a setback in the early 1930s where the recession affected the funding of the Bureau of Agricultural Economics. In the 1970s, the sample was adjusted to changing times after the EEC accession, where the sample for Denmark was now prescribed by regulations. In 1980, the sample was further extended due to a special collection of accounts for horticultural enterprises, and in 1996 a special set of statistics was created for organic farms. Over a century, a total of about 144,000 accounts have been collected and processed.

The first accounts statistics

In the first publication from the Bureau of Agricultural Economics: *"Undersøgelser over Landbrugets Driftsforhold – Nogle Regnskabsresultater fra danske Landbrug i Aaret 1916-17"* (surveys of the operating conditions of the agricultural sector – selected accounting results from Danish farms in the year 1916-17), the intended scope of the statistics is defined in the preface (translated):

"The purpose of the surveys, which are to eventually include a sufficiently large number of farm returns to fully represent all farm sizes and types of activities, is e.g. to focus on:
a. The size and distribution of the farm capital under different circumstances.
b. The agricultural sector's total operating economy (gross output, costs, net output and degree of profitability).
c. The economy of the individual agricultural activities; including producer prices, deployment prices, labour costs, expenses for horse keeping and material, etc.
d. The household economy.
e. The farmer's net income and its distribution and – according to circumstances – more specific questions regarding the economy."

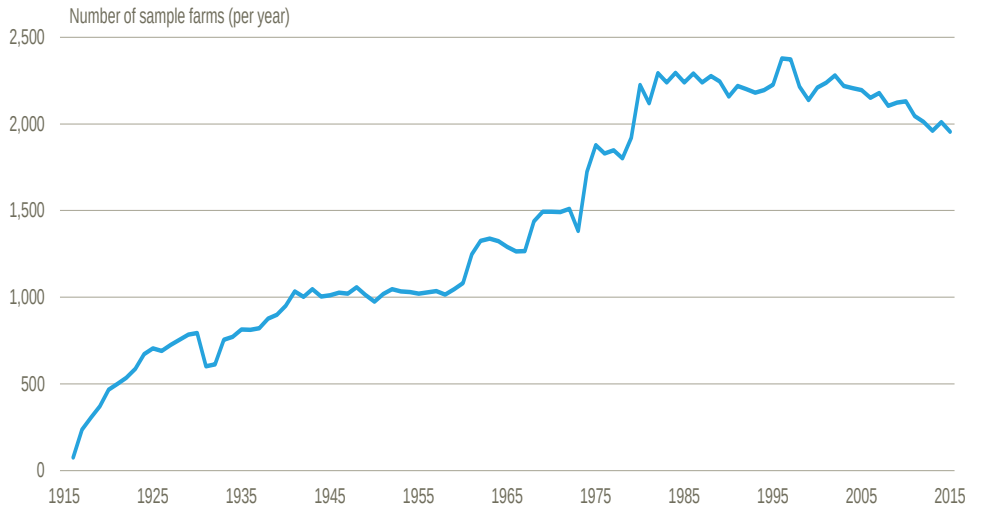
Initiative to harmonise the financial statement

For the statistics 1916/17, seventy-five farm returns were collected from eight different farm holder unions: Kalundborg, Odense, Samsø, Kolding, Ribe and three in the county of Copenhagen. It further appears from the publication that (translated):

"A preliminary survey of the accounting in the individual districts had shown that the approach to accounting as well as to the statistics was quite different in the various unions, which is why concerns had been voiced about taking on such common processing of previous years' farm returns, on which the committee did not exert any influence whatsoever."

There had indeed been no cooperation between the various unions, but in the spring 1917, after the committee for the Bureau of Agricultural Economics had held its first meeting with accountants for the purpose of implementing such future cooperation with more consistent rules for assessments and statistics, most of the accountants gathered at a meeting to conduct negotiations in Odense in order to bring about more consistency already in the statement of accounts from 1916/17". From "Undersøgelser over landbrugets driftsforhold 1916/17" (surveys of the operating conditions of the agricultural sector 1916/17), the Bureau of Agricultural Economics.

Figure 13 The annual sample of farm returns through 100 years



Source: Census on the accounts statistics, multiple volumes.

Change from summer accounts to calendar year accounts

All the way up to the statistics for 1980/81, the farm returns were based on a period ending 1 May - 1 July. In this way, the statement was very much in line with the crop year, and valuation of large home-grown stocks was avoided in the farm returns. Up to 1980 and after, use of the calendar year based farm returns became more widespread and, from 1999, the number of agricultural accounts taking stock in the summer was so insignificant that only calendar year farm returns were used for the statistics from then on.

The smallest farms are excluded from the accounts statistics

In general, the farms are slightly bigger in the accounts statistics than in the agricultural census due to a lower threshold of economy and area defined for the survey. However, smallholdings are included if they have a considerable livestock production. In 2015, the average land use for farms in the statistics was 86.1 hectares as against an average of 71.5 hectares for all farms in Denmark.

3.1 Gross output

Gross output is a fundamental concept in the farm returns

The gross output is the fundamental concept for describing the revenue section of the farm returns. With only minor changes, the concept has been applied throughout the history of the accounts statistics. The gross output includes sale of the farm's products including feed and seed used at the farm. Work performed for other farms, typically contract operations work, changes in the value of livestock and stocks as well as payments-in-kind are also included. Gross output is different from turnover in that a number of internal transfers are not included; e.g. the sale of piglets to other farmers is included, but if the piglets are used on the farm, they are not included in the gross output.

Subsidies

Subsidies were previously part of the gross output, since the predominant part of the aid via the agricultural policy consisted in minimum prices and buying-up arrangements. In this way, the subsidies were part of the prices which the farmers received for the products. In the early 1990s, a reform of the common agricultural policy was commenced (see also section 1.7) where direct price support was replaced by area compensation payment. Today, almost all aid to agriculture is detached from the production and is consequently not included in the gross output.

Table 2 Accounting results

		1916	1925	1935	1945	1955	1965	1975	1985	1995	2005	2015
		DKK per hectare										
1	Agricultural assets[1]	3 016	3 305	2 697	4 451	7 147	13 280	26 181	54 519	57 742	118 975	227 341
2	Gross output	824	880	609	1 222	2 579	4 240	7 461	17 907	18 941	21 958	31 876
2.1	Crops[2]	149	82	68	277	360	607	1 606	4 625	3 905	3 685	8 548
2.2	Cattle	368	416	270	600	1 156	1 719	3 398	6 196	5 466	4 943	6 736
2.3	Pigs	206	293	184	210	801	1 492	2 122	5 804	5 902	7 224	7 935
2.4	Poultry	…	45	49	61	205	179	…	…	508	801	882
2.5	Other livestock	…	…	…	…	7	6	157	337	302	1 430	2 731
2.6	Other sources	101	37	28	42	50	237	193	946	2 859	3 876	5 043
2.6.1	Subsidies[3]	…	…	…	…		92	87	356	2 187	2 733	2 527
2.6.2	Other	…	…	…	…		145	106	590	672	1 143	2 516
3	Operating costs	604	836	521	1 120	2 342	4 002	7 220	16 891	18 048	21 172	29 819
3.1	Agricultural inputs	…	344	175	287	836	1 579	2 890	7 106	6 364	7 894	13 847
3.2	Services	…	168	119	253	126	238	618	1 897	2 349	3 685	5 064
3.3	Maintenance and depreciation	…	…	…	…	339	628	1 016	2 929	3 445	4 129	5 170
3.4	Taxes	…	…	…	…	94	117	224	208	297	429	293
3.5	Labour costs	114	324	227	580	947	1 440	2 472	4 750	5 592	5 037	5 447
3.5.1	Hired labour	…	157	101	262	383	342	350	788	1 000	1 411	2 444
3.5.2	The family's labour	…	167	126	318	564	1 098	2 122	3 962	4 592	3 626	3 003
4	Net output[4]	220	44	88	102	237	238	241	1 016	894	786	2 057
5	Debts	…	…	…	…	…	…	8 409	28 495	38 812	90 077	150 914
		per cent										
6	Degree of profitability[5]	7.3	1.2	3.3	2.3	3.3	1.0	0.9	2.2	2.0	0.2	0.3
7	Farm solvency[5]	…	47.5	31.1	51.6	50.2	63.3	76.0	55.3	49.1	44.2	44.2
		index, year 1900=100										
8	Consumer price index	165	244	196	328	474	686	1 461	3 507	4 686	5 790	6 891

Note: The scope of the accounts statistics has varied during the period, which means that breach of data occurs in the time series. However, this must be assumed to be less important when looking at economic indicators per hectare rather than per farm. Where more data is available for the same years and variables, the latest definition level has been applied. E.g. the years 2008 and 2009 were originally calculated based on a Standard Contribution Margin and a matching typology, but have been recalculated according to the current standard output and the matching typology.

1 Stated at market price with varying methods over time.

2 From 2006, gross output of home produced roughage has been estimated, which from then on is included together with other internal turnover of feed and seed in the total gross output and in the operating costs.

3 Direct subsidies. Previously indirect subsidies for agricultural products, e.g. in form of the EU's former intervention system

4 As opposed to today's statistics, a financial statement has been chosen where all subsidies are included in the gross output and a calculated remuneration for the family's labour is included in the operating costs. Consequently, it has been possible to present a time series of 100 years. The net output shows the amount that is available for return on capital.

5 Net output in per cent of the agricultural assets constitutes the degree of profitability. Previously, the term "rate of return" was applied, which means the same. Farm solvency is the net capital in relation to total capital and is the opposite of the previously applied term debt ratio.

Source: Data exists in the Statbank Denmark table JORD100, which also holds data for types of farming and full-time farms for the period back to 1973. Here you will also find data per farm. A consumer price index can be found in the Statbank Denmark table PRIS8.

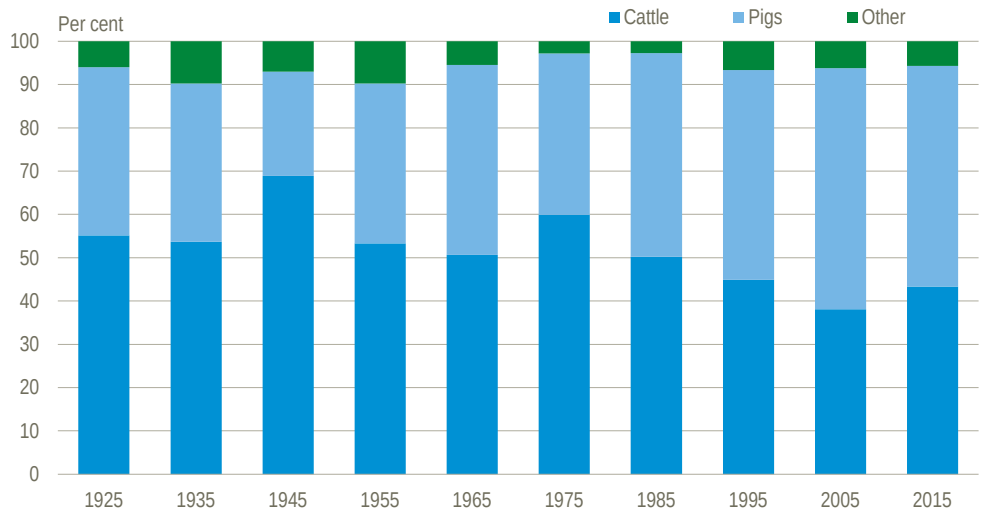
Time series for gross output includes subsidies

In this context, however, it has been chosen in the time series to add all subsidies to the gross output for the whole period in order to show total output from the land use per hectare.

More specialised farms mean more emphasis on crop production and pigs

Seen in a long perspective, crop producers have had a larger share of the total gross output for an average farm. This can be attributed to the change from the all-round to the specialised farming, where more farms have been specialised in crop production exclusively. In addition, the pig production has been specialised in either sow keeping or pigs for fattening, which means that a higher share of the piglets appear in the gross output, since these are traded between farms.

Figure 14 Composition of the livestock production in the gross output



Source: Table 2, calculations based on the accounts statistics, multiple volumes.

For livestock, cattle and pigs are predominant

Contributing with more than 90 per cent of the gross output from livestock, cattle and pigs dominate the livestock contribution to gross output. In a long-term perspective, the contribution from cattle has been declining while the contribution from pigs has been increasing correspondingly. However, the pig production has been on a downward trend in recent years. *Other livestock* includes in particular contributions from poultry and fur animals.

The Bureau of Agricultural Economics 1918-1977, management and staff

After the start-up of the bureau by *J.C. Overgaard*, principal, *O. H. Larsen*, professor, took charge of the bureau from 1920-45, where he was succeeded by *Johs. Ridder* who was appointed chairman and held this position until 1965. Before this, Ridder had worked for the bureau as an assistant from 1920 and as a head of division from 1942. In 1966, *H. Vitting Andersen* took up his duties as the principal. As a young graduate, he had worked for the bureau from 1951-53, but came from a position with the Agricultural Council of Denmark. Vitting Andersen held the position until the bureau was replaced by the National Institute of Agricultural Economics in 1978.

Ivar Dokken, consultant, was one of the pioneers as an employee at the bureau's start in April 1918.

Helge Larsen, graduate in agriculture, became the third permanent employee as an assistant from 1922-1942, where he was appointed head of section. Helge Larsen resigned in 1965, at the same time as Ridder.

Yelva Krog Larsen was one of eight women employed at the bureau. Like Johs. Ridder, Yelva Larsen started in 1920, and after 22 years of employment, she was appointed as an assistant in 1942. In 1968, Yelva Larsen still worked at the bureau, part-time by then.

The first government grant for the bureau amounted to DKK 12,000 in the fiscal year 1918/19 and increased to DKK 57,000 in 1925/26. After this, the recession was reflected in the grants, which did not reach the same level until 1938/39. In 1957/58, the budget amounted to DKK 285,000 and the bureau had about 16 employees.

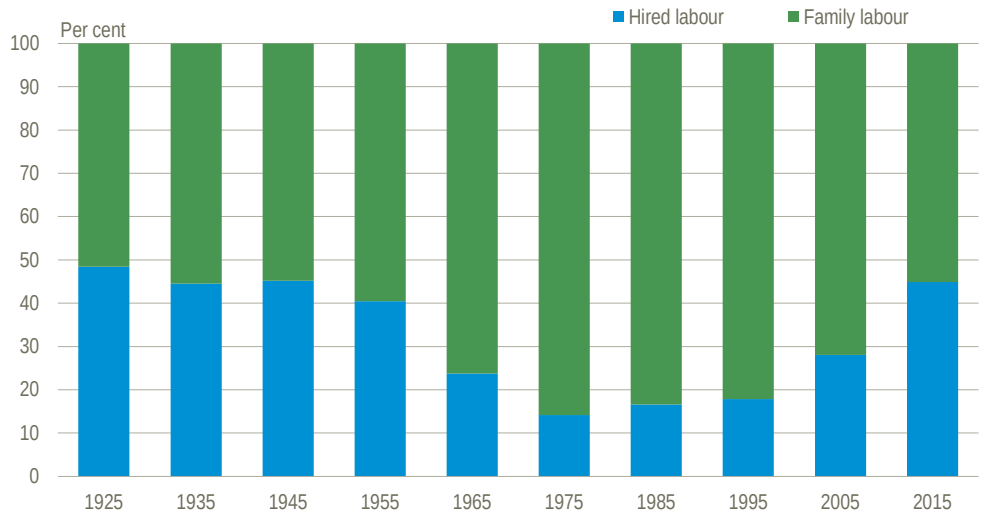
Source: The Bureau of Agricultural Economics: "25 Aars Undersøgelser over Landbrugets Driftsforhold, 1918-43" (25 years of surveys of operational conditions for the agricultural sector, 1918-43) and "Landbrugets økonomi i 50 år 1918-1968" (the economy of Danish agriculture through 50 years 1918-1968).

3.2 Operating costs

Operating costs reflect the costs involved in the production of the gross output

Operating costs are a key concept that reflects the costs involved in the production of the gross output, including the stock reduction in feed, fertilizer and other means of production. Operating costs also include maintenance and depreciation of assets in the form of land improvements, buildings, machinery and equipment. Costs for financing are not included in the operating costs.

Figure 15 The distribution of labour costs on employees and family



Source: Table 2 and www.statistikbanken.dk\JORD100 based on calculations on the accounts statistics, multiple volumes.

National Institute of Agricultural and Fisheries Economics
The former government research institute under the Danish Ministry of Food, Agriculture and Fisheries, established in 1978 as the National Institute of Agricultural Economics in replacement of the Bureau of Agricultural Economics. The institute performed research, surveys and advisory services concerning agricultural and later also fisheries economics from a macroeconomic as well as an operational perspective, including the economic aspects of resource and environmental administration. Moreover, it prepared accounts statistics for agriculture and fisheries. The institute had research departments for agricultural policy, agricultural and fisheries economy and administration as well as a statistics department. In 2002, the institute was renamed Department of Food and Resource Economics (IFRO) and, in 2004, it was merged (keeping its name) with two sections at the Royal Danish Veterinary and Agricultural University, to which the department was transferred. In 2007, the Royal Danish Veterinary and Agricultural University became part of the University of Copenhagen.
Arne Larsen, Ove W. Dietrich: Statens Jordbrugs- og Fiskeriøkonomiske Institut (National Institute of Agricultural and Fisheries Economics) in *Den Store Danske*, Gyldendal.
Retrieved on 13 February 2017 from www.denstoredanske.dk

The department of statistics was transferred from the institute to Statistics Denmark as at 1 January 2009.

Remuneration for the farmer's labour

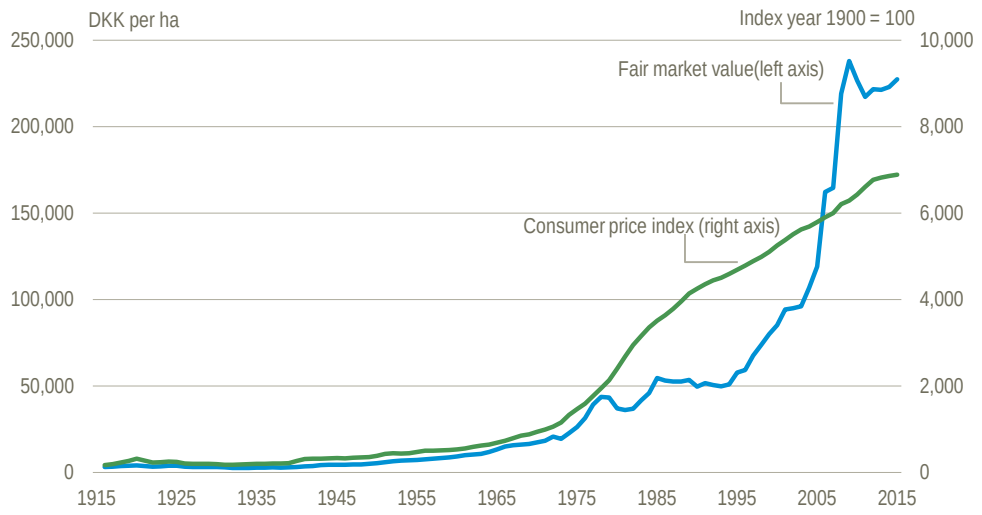
For the entire lifetime of the accounts statistics, remuneration has been calculated for the farmer's and his family's labour. For many years, this remuneration was considered part of the operating costs. In the 1970s, in connection with a major restructuring to show the result per farm, the remuneration was excluded from the operating costs. In the time series for 1915-2015, it has been chosen to include the remuneration in the operating costs.

3.3 Capital

The capital is measured by the market value of the agricultural assets. Today, a broker valuation of the property and a stocks and livestock valuation at fair market value are applied, if possible. In the early years of the statistics, the market value was the result of a valuation of the asset value made by an accounting consultant and the farmer. Specifically in the period 1981-2008, public land assessments of farm properties were used as an indication of the market value. Already from 1973/74, the public land assessments were shown in the statistics as a supplement to the estimated market value.

Obviously, the complex of buildings, machinery and equipment, stocks and livestock has grown over time, but in a long-term perspective it can be argued that the value of the farm has kept pace with the inflation. In a period from the mid-1990s, farm owners made large potential profits due to fluctuations of the market for land, whereas they suffered losses due to fluctuations of the market after the financial crisis in 2008-09. In the accounts statistics, the losses are handled in different ways, since price-induced changes in stock and livestock affect the result, while corresponding changes for land, buildings, machinery and equipment only affect their net capital.

Figure 16 The market value of farms per hectare and consumer price index

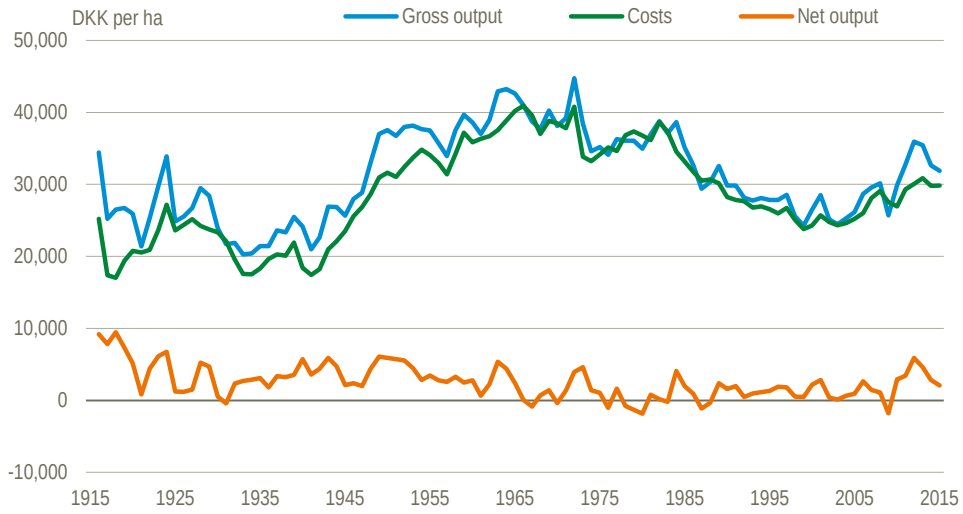


Source: Table 1.2 and www.statistikbanken.dk\JORD100 based on calculations on the accounts statistics, multiple volumes.

3.4 Economic indicators

Over the years, several targets for the performance of agriculture have been used, whereas the unit has been changed from focusing on the result per hectare to focusing of the result per farm. The change coincided with improvements in the sampling and weighting of the farms included in the accounts sample. Moreover, the development from all-round family farms to specialisation in different types of farming and a higher share of part-time farms where the actual farming makes up a minor part of the family's income has created a need for new breakdowns in the statistics.

Figure 17 Gross output, operating costs and net output at constant 2015 prices, DKK

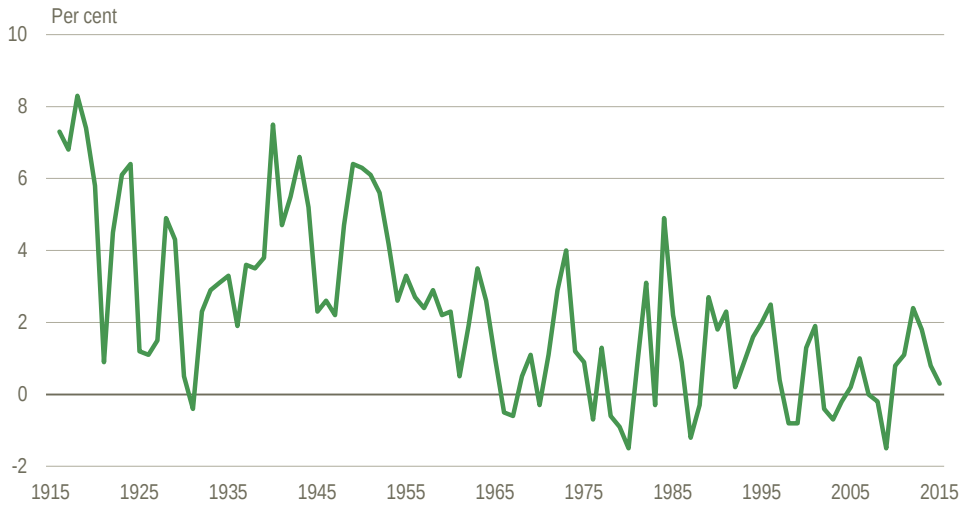


Note: Gross output includes subsidies, and operating costs include remuneration of the farm family's labour. The figures have been deflated to 2015 prices using the consumer price index.
Source: Table 1.2 and www.statistikbanken.dk\JORD100 based on calculations on the accounts statistics, multiple volumes.

Today, in the accounts statistics, the difference between gross output and operating costs is referred to as profit/loss from primary operations. Here the gross output does not include general subsidies which are not related to the production, and the operating costs do not include remuneration of the family's labour. In order to obtain a long, more comparable time series, we have chosen to define a gross output for the whole period which includes all subsidies and operating costs including remuneration for the family's labour. The difference between this defined gross output and operating costs is referred to as net output. The net output is the amount that is available for return on capital.

The ratio between the net output and the value of the farm assets is an indicator of the degree of profitability,[2] which shows the return on capital. The return on capital is subject to a condition that the labour provided by the farm family is remunerated with a pay corresponding to the pay in other lines of business.

Figure 18 Degree of profitability for agriculture



Source: Table 1.2 and www.statistikbanken.dk\JORD100 based on calculations on the accounts statistics, multiple volumes.

[2]Previously, the term "rate of return" was applied.

Household expenditure

In the statistics, accounts have been kept of the home-grown products used in the household. In the publication from the Bureau of Agricultural Economics: "25 Aars Undersøgelser over Landbrugets Driftsforhold, 1918-43" (25 years of surveys of the operating conditions of the agricultural sector, 1918-43), it is stated that (translated):

"It is difficult to determine in exact figures what it means for the overall farm that the housewife is economical in her housekeeping. This is not only a matter of economising, but also a matter of creating conditions for the family and labourers that boost their health, working capacity and commitment"... "The housewife manages around 16 per cent of the farm's total cash income, and it should be clear that more or less economical management of this amount may have a considerable impact on the farm's general financial situation..."

3.4.1 Results for types of farming

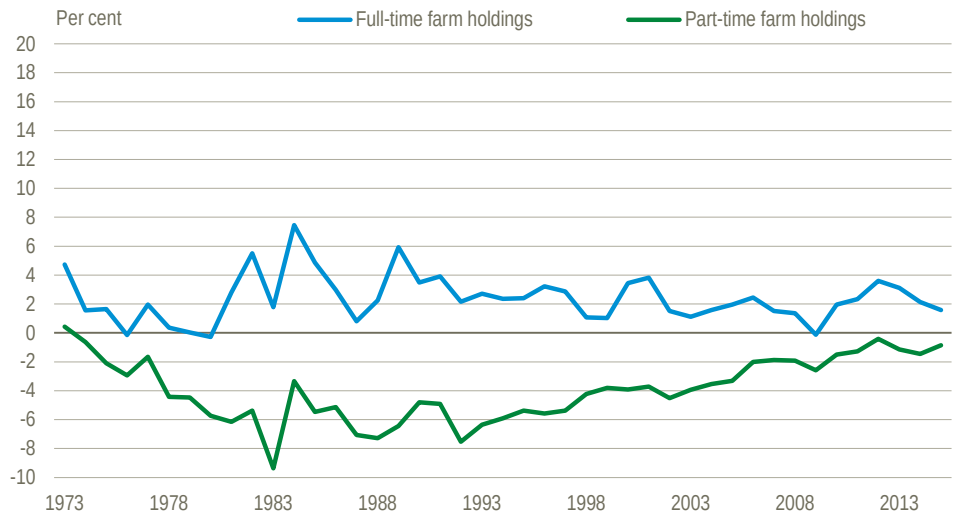
Breakdown into full-time, part-time and types of farming back to 1973

For the period after 1973, the results can also be displayed for farms broken down into full-time farms and part-time farms according to type of farming. The type of farming "fur animals" has been added as the last one in 1997. The breakdown into types of farming has been changed over time and, until the transition from breakdown according to Standard Contribution Margin to Standard Output, farms with specific types of farming were determined based on a two-thirds criterion where at least two thirds had to come from the specific activity. Moreover, the types of farming were more comprehensive, as the type of farming "pigs" also included poultry, and the type of farming "cattle" included dairy cows as well as other types of cattle. In 2010, the typology was changed so that types of farming had at least 50 per cent of standard output from the activity in question, whereas the types of farming became more specific so that "dairy cows" were shown separately and "pigs" did not include poultry.

Different profits for full-time and part-time farms

Figures 19-23 show the development in the degree of profitability for full-time and part-time farms as well as for various types of farming for full-time farms. There is a distinct difference between the degree of profitability for full-time and part-time farms, as it appears from figure 19. For part-time farms, the degree of profitability has been negative on average.

Figure 19 Degree of profit for full-time and part-time farms

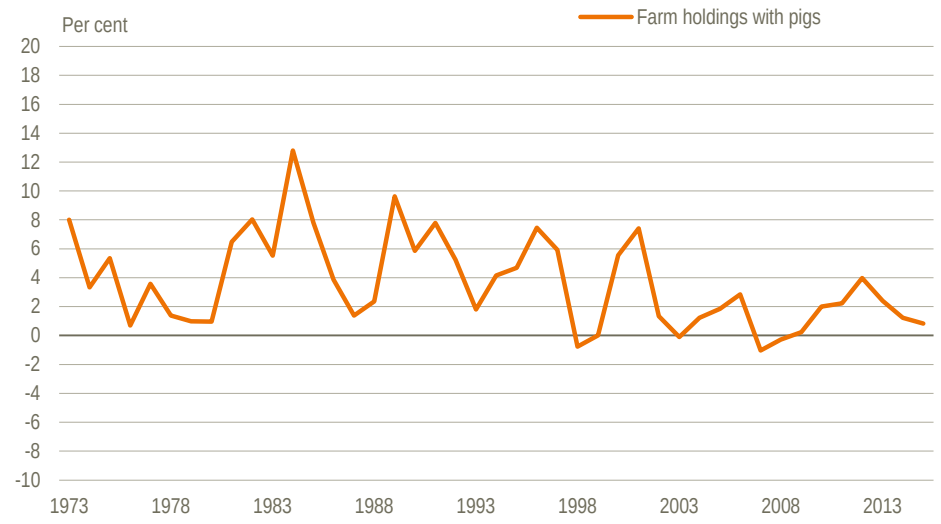


Source: www.statistikbanken.dk\JORD100 based on calculations on the accounts statistics, multiple volumes.

More cyclic fluctuations for pigs and fur animals than for crop production and cattle

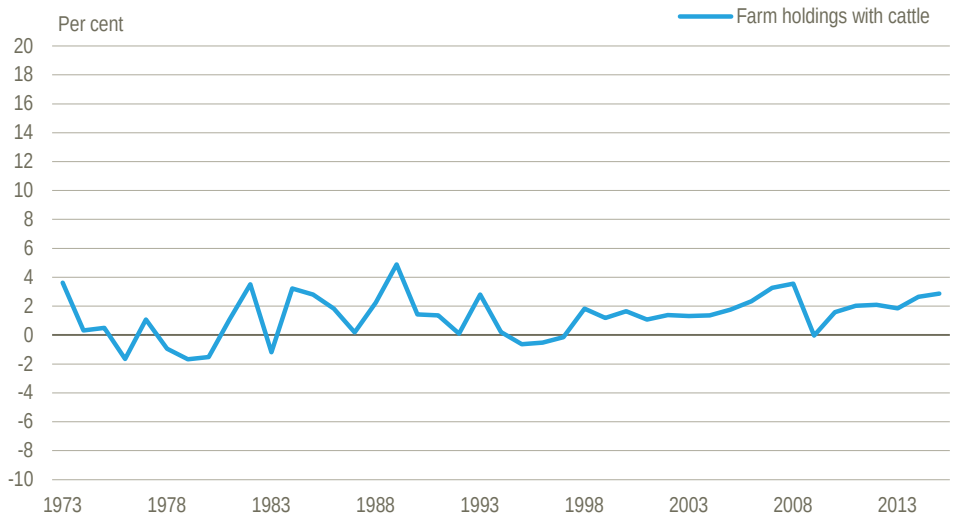
For the types of farming in agriculture, cyclical fluctuations in the degree of profitability is generally seen for pigs and fur animals, which have been subject to market conditions, whereas crop production and cattle, which have been heavily regulated by the EEC agricultural policy measures, have generated a profit at a more stable level; see figures 20-23.

Figure 20 Degree of profitability for pig farms



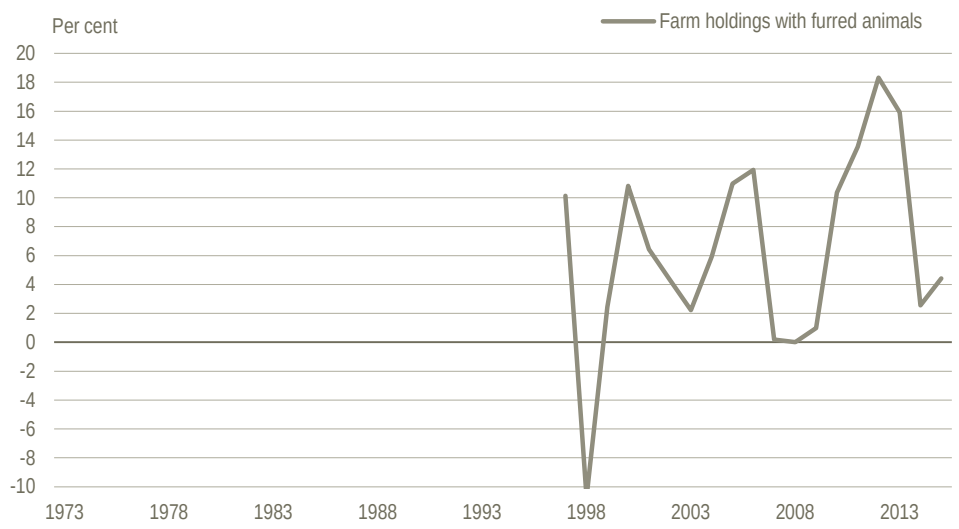
Source: Table 1.2 and www.statistikbanken.dk\JORD100 based on calculations on the accounts statistics, multiple volumes.

Figure 21 Degree of profitability for cattle farms



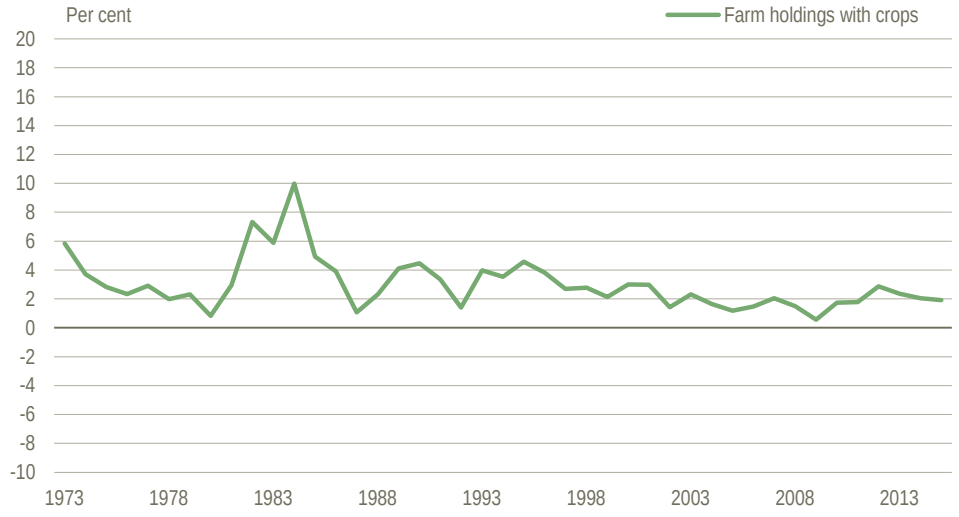
Source: Table 1.2 and www.statistikbanken.dk\JORD100 based on calculations on the accounts statistics, multiple volumes.

Figure 22 Degree of profitability for fur farms



Source: Table 1.2 and www.statistikbanken.dk\JORD100 based on calculations on the accounts statistics, multiple volumes.

Figure 23 Degree of profitability for crop cultivation farms



Source: Table 1.2 and www.statistikbanken.dk\JORD100 based on calculations on the accounts statistics, multiple volumes.

Since 1973, highest profitability for fur animals followed by pigs

The degree of profitability for the type of farming fur animals has generally been somewhat higher than for any of the other types of farming in agriculture. For the period since 1997, the degree of profitability has been 7.4 per cent on average. For the other types of farming, the degree of profitability on average in the period 1973-2015 has been 3.6 per cent for pigs, 3 per cent for crop production and 1.3 per cent for cattle.

For the last 10 years, however, pigs have generated the least profit

If we only look at the last 10 years from 2005 to 2015, the picture is somewhat different: Fur animals are still the most profitable with a rate of return of 8.1 per cent, followed by cattle with 2.2 per cent and crop production with 1.9 per cent, whereas pigs are the least profitable with a rate of return of 1.7 per cent.

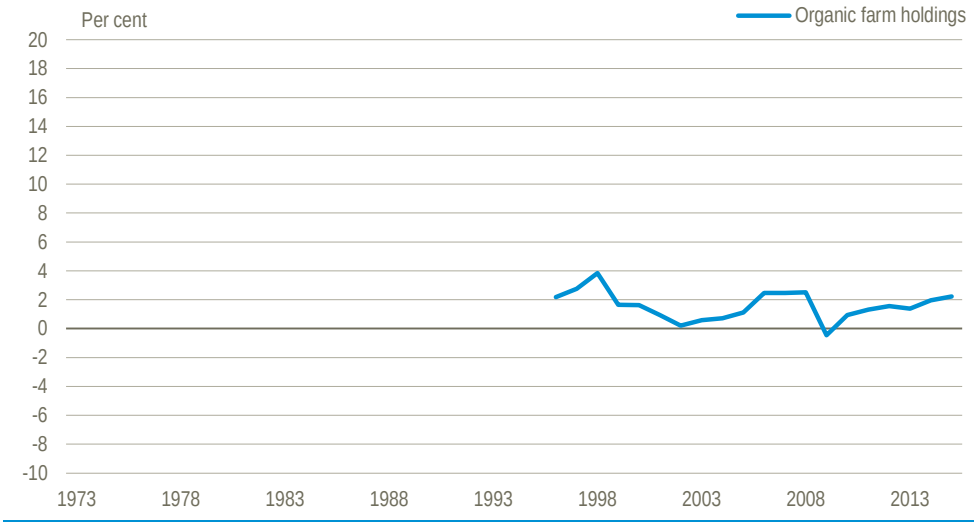
Statistics by agricultural activities

In the entire history of the accounts statistics, a further processing of the accounts information has been carried out in order to show contribution margin and profit for the individual agricultural activities stated per hectare or per animal. The principle is to allocate variable costs as well as overheads. Accordingly, a net output appears for the crop cultivation – or land rent – which is the amount that the agricultural activities related to crop production can pay for the land. Correspondingly, a net output is calculated for the agricultural activities related to livestock. Today, the cost allocation is made by means of a model with estimated key figures for the individual agricultural activities. Results can be found in the Statbank Denmark tables REGNPRO1 for crop production and REGNPRO2 for livestock.

3.4.2 Organic farms

In 1996, a special set of accounts statistics was started for organic farms. During the first year, accounts were collected from 146 organic farmers representing 832 farms. Twenty years later in 2015, the sample amounted to 190 farms representing 1,387 organic farms. Throughout the period, dairy cows have been the predominant type of farming among the organic farmers, which is particularly concentrated in the southern part of Jutland.

Figure 24 Degree of profitability for organic farms



Source: Calculations based on the accounts statistics, www.statistikbanken.dk/JORD1 and www.statistikbanken.dk/REGNOK1

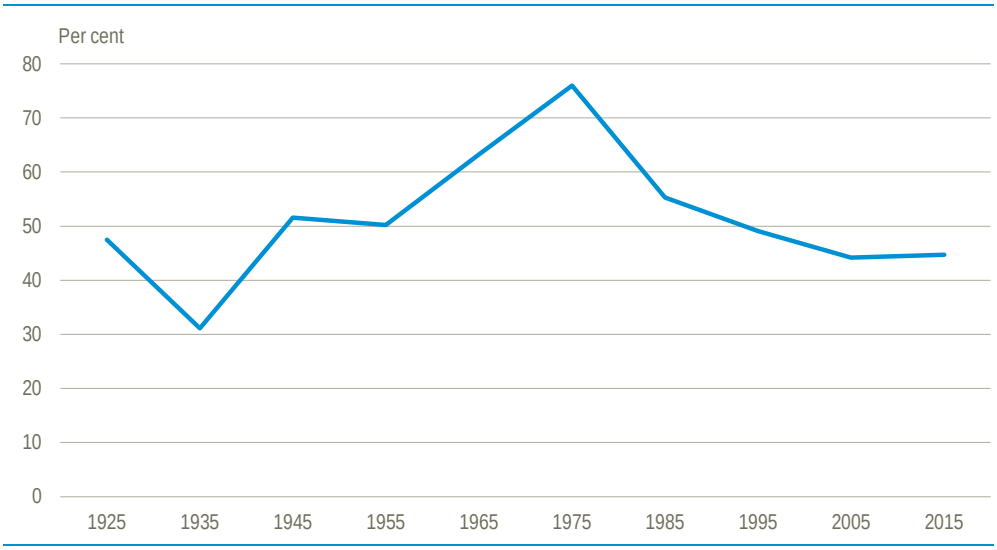
3.5 Debt

Debt problems in agriculture in the 1920s and 1930s

Already in the 1920s, increasing property prices were referred to as a reason for the steep rise in the debt of the agricultural sector. Like today, the debt was calculated for the sector by the Statistical Department (now Statistics Denmark) and amounted to DKK 3.328bn in 1926 of which 3.032bn were mortgage debt. With the crisis in the early 1930s, the debt increased further and amounted to DKK 4.432bn in 1937. In the first half of the 1930s, the number of forced sales reached its peak with 2,029 properties in 1932. Various measures were taken to solve the debt problem of the agricultural sector, e.g. a scheme of reorganisation loans was introduced in 1936 for the most indebted farms; see also section 1.2.

Figure 25

Farm solvency



Source: Table 1.2 and the accounts statistics, multiple volumes.

Seen in a long perspective, deflation by the consumer price index results in a debt in 1937 corresponding to DKK 149bn in 2015, or approximately half of the agricultural sector's debt today, although it should be taken into consideration that the farm assets have also increased considerably per hectare.

The farms' financial circumstances have been surveyed since 1922

In the accounts statistics, the farms' financial circumstances were first surveyed for the accounting year 1922/23. The assets were assessed at DKK 100,531 on average per property (where the size was 36.1 hectares), whereas the liabilities were assessed at DKK 46,563, which resulted in a farm solvency of 53.7.

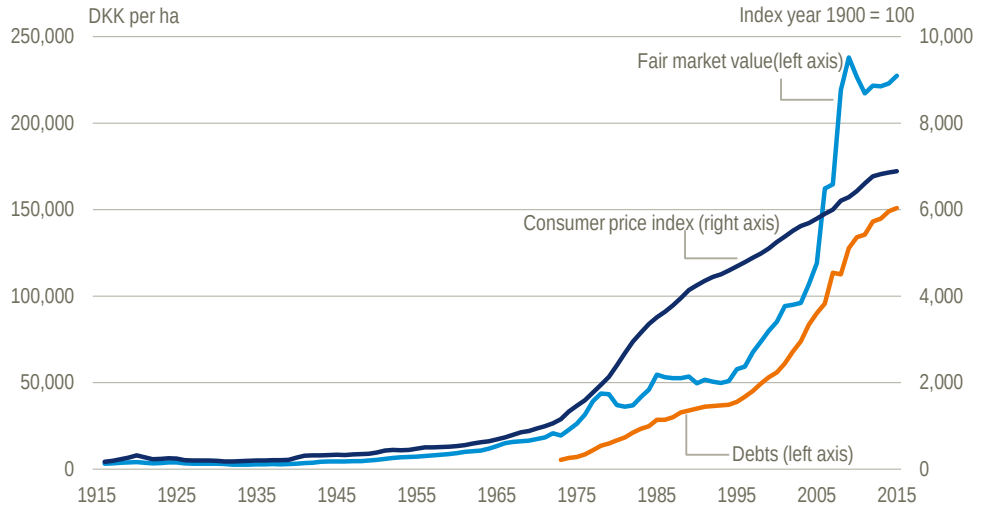
The agricultural sector's solvency was at an all-time low in the 1930s

The farm solvency dropped to a low during the crisis in the 1930s due to increased debt as well as a lower value of the assets. After this, the farm solvency went up until the 1970s after which it dropped to a level around 45 per cent in 2015.

Sharp rise in the market value of agricultural assets per hectare since 1994

The market value of the agricultural assets is shown in figure 26. Not until 1994 did the market value of agricultural assets pass DKK 50,000 per hectare, but has since increased more than fourfold to DKK 238,000 per hectare in 2009, after which it declined to DKK 227,000 per hectare in 2015. From 1994 to 2015, the consumer price index only increased by 50 per cent. However, for a period in the late 1970s, the market value of agricultural assets increased less than the inflation.

Figure 26 Agricultural assets and liabilities and the consumer price index



Note: 1: The market value consists of total agricultural assets per hectare. I.e. in addition to the land, buildings, machinery and equipment, stocks and livestock are also included.

Note: 2: The debt has been adjusted for non-agricultural debt by the ratio between agricultural assets and total assets.

Source: Accounts Statistics, multiple annual volumes. Consumer price index www.statistikbanken.dk/PRIS8.

The debt which can be associated with the farming has increased correspondingly from DKK 37,000 per hectare in 1994 to DKK 151,000 per hectare in 2015.

4. Preparation of the statistics

Incipient interest in accounting in the 19th century

The interest in bookkeeping and accounts in agriculture can be traced back to the 19th century. The adoption of the constitution in 1849 and the major crisis in the agricultural sector later in the century made it more relevant to register, and a change of the fiscal act in 1903 did the same. The development gathered pace when the first accounts offices were set up from 1910.

Organisations for Danish farmers

Local offices for smallholders, medium-sized and large farms emerged in the 19th century. In 1893, the national organisation *De Samvirkende Danske Landboforeninger (the Federation of Danish Agricultural Societies)* was founded and represented medium-sized farms, while a central association was established in 1923 for the tolvmandsforeningerne *(National Federation of Large Farmers' Unions)*, which represented the large farms. In 1992, the Danish Commercial Farmers' Association was established in a merger of the National Federation of Large Farmers' Unions and Landsforeningen af Danske Kornproducenter (the national association of Danish grain producers). In 1997, the Danish Commercial Farmers' Association was merged into De Danske Landboforeninger (Danish Farmers' Unions). In 1910, *De samvirkende Danske Husmandsforeninger (the Federation of Danish Smallholders' Societies)* was established. In 2003, it merged with the Danish Farmers' Unions and created *Dansk Landbrug, the later Danish Agriculture & Food Council.* The Danish Agriculture & Food Council has centralised the agricultural consultancy in an advisory centre based in Skejby near Aarhus. Today, the centre is named SEGES.

Source: www.denstoredanske.dk.

4.1 Sampling and representativeness in the early years

Increasing number of farm returns

In the first publication of the accounts statistics from 1916/17, seventy-five farm returns were included from six accounts offices. At the time, there were thirteen offices preparing a total of 313 accounts. Already the following year, seventeen offices submitted 235 farm returns and, in the years that followed, the number of accounts offices as well as the number of farm returns increased. In 1940/41, there were more than 100 accounts offices of which 82 submitted a total of 950 farm returns. At that time, a total of 7,660 farm returns were kept in the offices.

Farm returns also prepared by the Bureau of Agricultural Economics

The accounts offices, however, were not the only ones to keep farm returns. Some farm returns – probably around 20-30 from large farms in particular – were prepared by the Bureau of Agricultural Economics.

Representativeness and smallholdings in the statistics 1935 (translated):

"... As opposed to this, the representative nature of the accounting material with regard to the size of the properties is still fairly inadequate, since the number of smallholding returns from farms of less than 10 hectares remains much too small compared to this property group's share of the total number of farms. According to the official statistics from 1933, the farms of less than 10 hectares accounted for a little less than 52 per cent of all farms, whereas they only account for approximately 18 per cent of the bureau's material. This figure practically corresponds to the smallholdings' share of the total agricultural area; but there is every reason to seek to increase the number of smallholding farm returns and, consequently, the bureau will continue its endavours to provide a substantially higher number of smallholding farm returns". From "Undersøgelser over landbrugets driftsforhold 1935/36" (Surveys of the operating conditions of the agricultural sector 1916/17), the Bureau of Agricultural Economics.

About 1,000 farm returns each year

The number of farm returns remained around 1,000 for a number of years after which funds became available during the 1960s to increase the number. The financial year 1972/73 included 1,510 farm returns.

Farm returns representative of the individual accounts districts

A point was made of the consultants selecting the farm returns so that the average of the submitted farm returns would reflect to the extent possible the average of the relevant accounts districts, both in terms of net profit and average size. For the very first years, it was necessary to adjust according to what was feasible. For a period, *a little less than 30 per cent came from farms of less than 10 hectares, 58 per cent from farms of between 10 and 50 hectares and the rest from the largest farms; and 40 per cent from farms on the Danish islands and 60 per cent from Jutland.* This did not correspond exactly to the distribution in the population of farms as in 1956/57, for example, 47 per cent of the farms were of less than 10 hectares.

Fixed weighting

The average for all farms was, at least for part of the period, weighted with fixed weights from one year to the next so as to not allow variations in the composition of the material to affect the figures from all farms. This was possible because only a limited structural development took place. See description of section 4.3.

Slightly improved cereal harvest in the accounts statistics

It was monitored closely whether the production corresponded to that of all farms. This was not always so – e.g. the average cereal harvest per hectare in the period 1945-65 according to the accounts statistics was 8 per cent higher than according to the official statistics. In the period 1936/37-1940/41, the difference amounted to 12 per cent.

4.2 Sampling and representativeness after the accession to the EEC

Not actual types of farming

Before Denmark gained membership of the EEC, types of farming were not included in the classification of the accounts statistics for farms – the statistics were only broken down by size of the farm area and region. Nor in the agricultural census were the farms broken down by types of farming, so it would have been difficult to make a representative sampling of the farm returns on this basis.

New requirements in connection with the accession to the EEC

However, the EEC required breakdown by type of farming and, at the time, Denmark had also realised the advantage of it. Consequently, the major change in the sampling of farms occurred in connection with the accession to the EEC, since the requirements that FADN (see section about FADN) made for sampling were not met with the previous methods. Furthermore, a structural development and specialisation (the following sections) of the farms had started in the course of the 1950s and this was intensified in the subsequent years and made the previous methods insufficient.

Stratification

The population was now stratified, i.e. broken down in groups, *strata*, and sampling was made with various percentages depending on stratum. The farm returns were not sampled based on the optimum percentage in the strata you found relevant.

Sampling at the Bureau of Agricultural Economics

The farm returns were still provided by the accounts offices, but the actual sampling of the individual farm returns would now take place at the Bureau of Agricultural Economics. At first, the sampling was only made from farms that had a profit and loss account. In 1972/73, the agricultural organisations prepared approximately 35,000 farm returns, far less than the total number of farms – in 1973 there were 118,000 farms of at least 5 hectares.

Also private audit professionals

Especially after the creation of the horticultural statistics, a share of the farm returns was submitted by private accountants.

4.3 Weighting in the early years – and before the computerisation

Technical challenges and less need

The reason that the statistics had not previously been broken down by type of farming is thought to be partly down to a limited need for it, partly down to the technical challenges involved at the time before the computerisation.

Mixed agriculture

The limited need was due to the fact that the farms were not specialised to the same extent as later. Most farms had farm land as well as cattle and pigs and, accordingly, the type of farming was by definition *mixed farming*.

Fewer strata without computerisation

The technical challenges of introducing types of farming in the accounts statistics, and also in the Agricultural census for that matter, were first and foremost an increased number of *strata*, i.e. groups, in which to break down the farms. As mentioned, there was already a number of size groups and a number of regions, and a breakdown into types of farming would imply that the number of strata be multiplied by the number of types of farming. This would be a challenge with the calculation methods available at that time.

Focus on representativeness

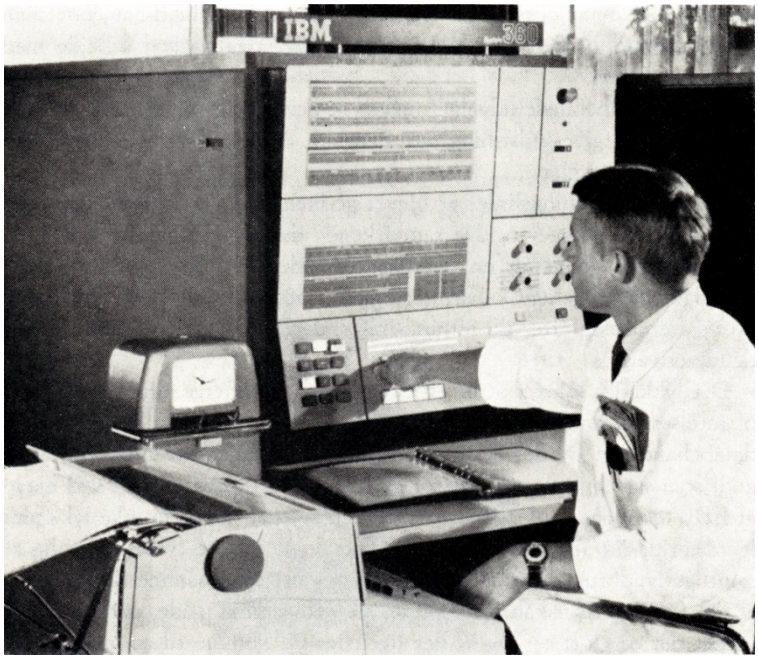
In the same way, an actual weighting of the farm returns, as we know it today, would be extremely demanding. It was less complicated to ensure that the farm returns were representatively sampled based on e.g. region – making weighting less necessary. The challenge was to obtain random sampling when not everyone kept accounts, and when the chance of obtaining farm returns for reporting varied from one size group to the next and from one region to the next.

Not everyone kept accounts

It took a number of years to improve the representativeness, but it has been difficult to claim that the sampling of farm returns was random, since not everyone kept accounts.

A bit of weighting

As mentioned previously, there was a bit of weighting: Accounting results for *all farms*, which were stated per hectare and not per farm, were weighted together in the way that each size group was allocated a weight based on its share of the total farm area.



Source: Landbrugets økonomi i 50 år 1918-1968 (the economy of Danish agriculture through 50 years 1918-1968), the Bureau of Agricultural Economics.

4.4 Weighting from the 1960s and after the accession to the EEC

Electronic data processing along with specialisation in farming

Electronic data processing was gradually introduced from the 1960s in connection with the preparation of the accounts statistics. However, the first statistics had been prepared already in the mid-1950s at the request of *Foreningen af jydske Landboforeningers regnskabsudvalg (the accounting committee of the federation of Jutland farmers' unions)*. Electronic data processing provided new opportuni-

ties. Running fairly parallel with the development in electronic data processing, the specialisation in agriculture necessitated the breakdown by types of farming.

Structural development in agriculture

The accession to the EEC was thus an opportunity to do something which had perhaps been expedient already for some time. According to the first accounts statistics for Denmark in the EEC, 1973/74, 62 per cent of the 117,960 farms of more than 5 hectares were mixed farms at the time. I.e. the other 38 per cent were specialised in some type of farming or other – mostly arable farming, cattle or pigs. In 2015, the number of farms had dropped to 30,340 and the share of specialised farms had increased to 78 per cent. Here, the criterion for being among the farms was a *Standard Output* of at least EUR 8,000.

5,940 groups among the farms

In the accounts statistics for 1973/74, the farms are grouped by a number of criteria: Area, type of farming, region, farmer's age and extent of paid labour outside the farm. With these criteria, the population of farms was broken down into 5,940 strata. However, not all strata were represented as only 1,383 accounts were included in the statistics. Also, not all strata were relevant.

Weighting of the farm returns

It had now become possible to weight the farm returns. If a relevant stratum had e.g. 100 farms, but only 4 had been sampled, the individual farm returns would be allocated a weight according to the share that had been sampled. So, if for various reasons, the representativeness varied in the different strata, it now became possible to obtain a weighted result. This meant that the average of the criterion variable in each stratum corresponded to the average if all farms had been included.

Different sampling in the groups

In addition to the fact that it was now less of a problem if a stratum did not contain enough farm returns it also became possible to sample the farm returns optimally within the individual strata. This means that relatively more farm returns were selected if the spreading within a stratum was high, as it often is among the biggest farms.

Good representativeness

From an overall point-of-view, the representativeness must be said to be good. A few issues remain, however: Participation is voluntary meaning that a good share of farm returns is not available. The financial year must be the calendar year (does not apply to the horticultural enterprises, though). Finally, the farm returns must include a full year, which often makes it impossible to use farm returns from the farm's year of creation and year of termination.

New weight program from 2007

Up until 2006, a number of weights were attached to each farm in order to describe various purposes, but, from 2007, a new statistics tool was brought into use: the SAS program CLAN, originally developed by the Swedish statistical bureau. In this program, each farm is only allocated one weight. The population is divided into strata according to size and type of farming. The program also offers target variables, e.g. that a compilation on the farms' use of area is exactly equal to the agricultural area in Denmark.

Personal data

Today, approved projects can get access to anonymised personal data through Statistics Denmark's Research Services, www.dst.dk/en/TilSalg/Forskningsservice. Personal data are strictly confidential.

Until 1970, the annual publications contained large tables with accounting results for the individual farms which were included in the statistics for the year. A sequential number was allocated to the farms and they were divided into geographical areas.

4.5 Common accounting systems in agriculture

S72 accounting system

Around 1970, the farmers' unions and smallholders' associations were working together in the joint committee of the farmers' organisations on developing an accounting system, S72. Data was processed in the computer centre of Danish agriculture, LEC, and this was an advantage also for the accounts statistics as it enabled paperless data exchange. However, a number of unions decided to continue with their own systems.

Electronic data, but a lot of data entry

The statistical process in the former Institute of Agricultural Economics involved that the caseworker received a printout of the farm returns in the requested statistical format supplemented with a printout of particularly problematic account areas in S72 where use of the chart of accounts varied. The caseworker was then able to send corrections of the farm returns which had to be entered by the office staff and sent to the regional data centre NEUCC at DTU in Lundtofte. The results would then be returned and the caseworker could check that everything was in order now. In the process, the institute would be in contact over the telephone with the farmer's accounting consultant.

Ø90 – new accounting system with a common chart of accounts

After a massive amount of development work, the farmers' unions and smallholders' associations started using a new accounting system, Ø90, in 1990. The system basically consists in a common chart of accounts with 10,000 numbers. The entire overall financial statement is defined at country account level. This ensures a consistent statement and it allowed the accounts statistics to perform online log reading in the chart of accounts. After the launching of Ø90, all accounts offices organised in the umbrella organisation Dansk Landbrug (Danish agriculture) have decided to use the system.

Big advantages for reporting offices and for the statistics

Today, Ø90 means big advantages for the accounts statistics as well as for the reporting offices and for the preparation. The actual accounting data is transferred at the press of a button in the accounting system, so transferring data only takes a small extra effort for the reporting person. In the Ø90 system, the farm returns are marked as selected for statistics, which requires entry of a few supplementary details in the accounting system, and the farm returns then undergo some logical checks before they are ready for transfer. The maintenance of the logging for Ø90 is carried out in collaboration between SEGES and Statistics Denmark.

Copy of the farmer's Ø90 accounts

To optimise the task of validating data, a pdf copy of the farmer's real Ø90 accounts is uploaded along with the data transfer. This has minimised the need for contact with the reporting person, since the answers to many questions can be found by looking in the accounts specifications, notes or management report.

IT systems provide efficient case handling

From 1990 to 2005, a case handling system developed in VMS was used to handle the farm returns in the statistics. This enabled interactive testing and screen-based adjustments. From 2006, a system developed on a Microsoft SQL server has been used. It is expected that the statistics for 2016 are the last ones in the present system, since an upgraded system, still based on an SQL server, is being developed.

A few farms are not using Ø90

Finally, it should be noted that there is a small group of farmers that does not have their farm returns drawn up by an accounts office organised in Danish Agriculture and Food (Landbrug & Fødevarer), and consequently their farm returns are drawn up in another system. For these farms, a table report is required.

5. EU – FADN

Common EU accounts statistics

Since 1965, an EU regulation has put each EU (EEC) country under an obligation to submit a number of farm returns. The aim is for the farm returns to be prepared according to the same guidelines in all member countries. In Brussels, the farm returns are used for the preparation of common accounts statistics.

The data network for Landøkonomisk Bogføring

In Denmark and internationally, we often use the English abbreviation FADN, which is short for Farm Accountancy Data Network. However, the EU regulations exist in the languages of all the EU countries, where the Danish abbreviation (and the German) is INLB, in Danish: Informationsnettet for Landøkonomisk Bogføring. The French abbreviation RICA has also been used in Danish, since it is easier to pronounce than the other two.

5.1 Danish participation in FADN

Alignment with the EEC required

Some countries did not have national agricultural accounts statistics when they entered the EEC or later the EU, and consequently they have had to create an organisation for collection of farm returns. This was not the case for Denmark, as we had already compiled accounts statistics for nearly six decades when Denmark became a member in 1973. However, we needed to make some rather significant adjustments before we were able to provide data that complied with the EEC regulation.

Improved representativeness

First of all, there was the issue of representativeness. The sampled farm returns had to be representative for the population of farms. Before 1973, it was – to a certain extent – the Danish accounts offices that selected the farm returns they wanted to submit, see section 4.1.

Units based on wheat

In connection with Denmark's entry into the EEC, it became necessary to divide the farms according to type of farming, e.g. crop production, cattle, pigs, etc. At first, the breakdown was made based on *standard gross output*, which was based on the normal value of the production per unit in the original six EEC countries. The baseline was the value of one hectare of wheat, which was set at 1.00. In spite of the new initiatives, the sampling was still only random to a limited extent, since the sampling was only carried out among farms for which a profit and loss account was made.

Standard gross margin

Later, the farms were classified according to their *standard gross margin* which was based on the conditions in the individual member country. From the financial year 1979/80, the standard contribution margin grouping is included in the Danish accounts statistics.

Criteria the first years

The sample of farm returns for 1973/74 contained 1,383 accounts – a little less than the previous years. These were probably all forwarded to comply with Denmark's new obligations towards the EEC data network for agricultural accounts. From the 1,725 farm returns included in the Danish agricultural accounts statistics for 1974/75, 1,578 farm returns were selected for the EEC. The criterion was that farm returns for the EEC should be from farms of at least 5 hectares, and the farmer's paid labour outside the farm amount to less than 67 days per year. The following year, the criterion was further that the standard labour involved in running the farm should be at least ¾ FTE, corresponding to 1,575 hours.

Horticultural enterprises were included

From 1980, another requirement from the EEC was met: Accounts were provided also from horticultural enterprises. Already the first year, 204 horticultural accounts were provided in addition to 1,654 farm returns, and on a national level, the first edition of the publication *Gartneriregnskabsstatistik* (horticultural accounts

statistics) was issued. Later, the sample of farm returns for the EEC was further extended.

5.2 FADN requirements affect the accounts statistics

Standard Output

The classification based on standard contribution margin was replaced from the financial year 2010 by *Standard Output* (SO). Also this time, FADN had a significant impact on the drawing up of the Danish agricultural accounts statistics, where the change presented an opportunity to also change the entire classification system, which is substantially different from the EU system, though; e.g. because it requires only 50 per cent of a certain activity for a farm to belong to a type of farming whereas the EU still requires two thirds.

Difference between national Danish statistics and EU statistics

However, there are still major differences between the definition of the variables included with FADN and those included with Statistics Denmark. This also applies to the economic indicators, where the Danish *net profit* is not significantly different from *Farm Net Income*, however.

Influencing data collection

Requirements from the EU also have an impact on the Danish data collection. Some items in the farm returns are only included for the sake of FADN, e.g. requirements regarding the amount of fertilizers, which can also be utilised nationally, however. Furthermore, the definitions of certain variables are different in the Danish accounts statistics compared to those of FADN.

No personal finances

However, some of the items collected in Denmark are not used by the EU. This is the case with e.g. personal financial data.

The farm returns are converted

After the farm returns have been processed for the Danish statistics, they are converted to FADN's table format. The table pretty much remained unchanged for a long period of time, but was regularly adjusted to incorporate new requirements. At some point, a revision was required and, from the financial year 2014, a new accounting table was introduced along with the introduction of a new file format.

No longer courier

Until 1997, data was sent by courier to Brussels on big magnetic tapes. A few years followed where a CD-ROM was sent, and since 2002 the data has been sent via the internet.

5.3 Publication of FADN data

Publications with FADN data

For a long period of time, data was published in publications that were issued at a couple of years' interval and a couple of years after the financial years they concerned. Moreover, data is used in a number of surveys which are carried out in connection with the FADN unit in Brussels as well as in the individual member countries.

Also for research

It is possible to gain access to FADN data for research purposes in member countries, which many people have made use of, e.g. in Denmark, where the IFRO under the University of Copenhagen has had several projects.

Make your own table

For a number of years, it has been possible to find data at FADN's home page http://ec.europa.eu/agriculture/rica/, where you can generate your own tables (click Public Database) based on a number of criteria – variables as well as financial years, member country and, if relevant, region, type of farming and size of the farm. Data exists here back to 1989, although you need to be aware of the change of definition in connection with the change to classification by means of Standard Output from 2010.

FADN data in Regnskabsstatistik for jordbrug (accounts statistics for farms)

In *Regnskabsstatistik for jordbrug (accounts statistics for agriculture)*, there are a number of sections with FADN data for Denmark compared to six selected countries and for types of farming which are important in Denmark. Unfortunately, FADN data is published later than national data and, consequently, the most recent data is not for the same year as the Danish data produced with Statistics Denmark.

Comparability target

With FADN, the aim is to make data from the individual EU countries comparable. However, there are differences in the collection, e.g. the minimum size for the various farms included. The minimum size must reflect the population of farms in the member country in a way so that a certain minimum of the country's farm production is represented.

5.4 The FADN committee

The EU countries' representatives meet in Brussels

The EU member countries influence the work with the FADN data via the FADN committee, which meets in Brussels about three times a year with representatives from all EU member countries. The member countries have voting rights in connection with amendments of the legislation on the FADN work.

Governed by EU regulations

Previously, there were a number of FADN regulations – a major regulation from the Council of Ministers and a number of commission regulations. In connection with the Treaty of Lisbon coming into force, these were reduced to one regulation from the Council of Ministers (1217/2009) and two regulations from the Commission: The Commission's delegated regulation 1198/2014 and the Commission's implementing regulation 2015/220. The two first mentioned contain overall rules, whereas the last mentioned regulation contains details such as the items of the accounting table and breakdown of farms into types of farming and size groups.

FADN under DG AGRI

Ordinarily, the task of collecting and processing data is carried out by an office under DG AGRI (the Directorate-General for Agriculture) in Brussels, which is part of the European Commission.

6. Use of the accounts statistics in the research

by the Department of Food and Resource Economics, University of Copenhagen

The Department of Food and Resource Economics (IFRO) at the University of Copenhagen (KU) makes frequent use in various ways of Statistics Denmark's accounts statistics in their research and education in agricultural economics.

Use in education

When it comes to teaching and education, the agricultural accounts statistics are often used in connection with students' preparation of bachelor assignments and master's theses as well as in the teaching at the University of Copenhagen. For example, the new students are given an introduction to Statbank Denmark in connection with exercises where they must extract aggregated tables for the economy of various types of farming.

Use in research

When it comes to research, use of the statistics goes through Statbank Denmark as well as the Research Service. Below, four specific examples are shown of use of the accounts statistics in the research.

Example 1: Productivity study of Danish agriculture

The research use of the accounts statistics for agriculture is presented with an example of a productivity study of Danish agriculture in the period 1985 to 2006, "Scale efficiency in Danish agriculture: an input distance–function approach" performed by Svend Rasmussen, senior lecturer. The study was published in 2010 in the European Review of Agricultural Economics (Rasmussen) and the data preparatory work has been published in FØI Working Paper 2008/13 (Rasmussen 2008). The level of detail in the accounts statistics for agriculture allows a very detailed estimation of the production technology for the relevant agricultural activities in Danish agriculture, which indeed appears from Rasmussen (2008).

The combination of valid accounting entries concerning income and assets compared with detailed information about the production volume is decisive to be able to provide reliable research about the economic situation of agriculture. Furthermore, the consistent statistics on the economic situation for agriculture through time is essential to the ability to perform reliable research on time series data. Reliable time series analyses are decisive in a sector where biology and weather impact the results compared with fluctuating prices yielding extremely varying incomes.

In Rasmussen (2010), the productivity improvement in the period is decomposed to an effect of the changed size of farms (scale) and to productivity changes in the period. The analysis shows that young farmers are more productive than old farmers, and it further shows that there is a difference in the productivity improvement depending on the agricultural activity. Productivity was improved by 3.3 per cent annually for the arable farmers, 2.4 per cent annually for the dairy farmers and 2.1 per cent annually for the pig farmers over the entire period of 22 years.

List of references

Rasmussen, S. (2008). Data for analysing productivity changes in Danish agriculture 1985-2006. Fødevareøkonomisk Institut, Københavns Universitet. (IFRO Working Paper; No. 15, Vol. 2008).
Rasmussen, S. (2010). Scale efficiency in Danish agriculture: an input distance-function approach. European Review of Agricultural Economics, Vol. 37, pp. 335-367.

Example 2: Financial data and economic models

Within the agricultural economics research, the development and use of economic models for e.g. projections and impact assessments has played a vital role throughout the last 20-25 years. At the Department of Food and Resource Economics, this has taken the form of e.g. an economic model focused on the macroeconomic impact of agriculture (Adams et al., 2002), two models for the agricultural sector's

economy (Jensen, 2001; Wiborg), and a number of analysis models focused on the macroeconomics of specific types of farms or horticultural enterprises (e.g. Abildtrup et al., 2008). The models have been used in research projects as well as in the department's teaching. In addition, the models have been used for consultancy services for the authorities, e.g. in connection with the work of The Commission on Nature and Agriculture (Natur- og Landbrugskommissionen, 2013). In these contexts, the access to the agricultural accounts statistics – and the underlying data material – has been pivotal for the determination of an empirical basis for such economic analyses as well as for the basis for statistical analyses uncovering central parameters for the farms' adaptations to e.g. changed price and regulation conditions.

List of references

Abildtrup J., Nissen C.J.V. & Ørum J.E. (2008) Områdebaserede analyser af driftsøkonomi og miljø, Fødevareøkonomisk Institut working paper 2008/12 (area-based analyses of macroeconomics and environment, IFRO working paper; No. 12, Vol. 2008).

Adams P.D., Andersen L. & Jacobsen L-B. (2002) Structural forecast for the Danish economy using the dynamic-AAGE model, Fødevareøkonomisk Institut, rapport nr. 133 (IFRO report no. 133).

Jensen J.D., Andersen M. & Kristensen K. (2011) A regional econometric sector model for Danish agriculture – a documentation of the regionalized ESMERALDA model, Fødevareøkonomisk Institut, rapport nr. 129

Natur- og Landbrugskommissionen (2013) Natur og Landbrug – En ny start (The Commission on Nature and Agriculture (2013) nature and agriculture – a fresh start).

Wiborg T. (1998) KRAM – A Sector model of Danish Agriculture: Background and Framework Development, CARD working paper 6-1998

Example 3: Danish horticulture and the green growth cluster

The department was given an assignment in 2010 by Danish Horticulture in connection with the work on the project "Dansk gartneri og den grønne vækstklynge" (Danish horticulture and the green growth cluster). The purpose of this assignment was to create new growth in the industry via a number of different strategic initiatives. The department's assignment was to analyse economic and market challenges and to come up with concrete possible solutions.

Production, value creation, earnings etc. in the horticultural enterprise were very important details in this analysis. In addition, it was significant to obtain data for the individual sub-sectors and for the individual years. In this way, the accounts statistics were an important source. Via the accounts statistics, it was also possible to make comparisons with the corresponding development in Dutch horticulture which gave the analysis an important international dimension.

The final report was thus part of a business strategy, while it also had a research element. As part of the project, the assignment was released as a peer reviewed book.

Reference

Hansen, Henning Otte (2012): Dansk gartneri og den grønne vækstklynge – Udfordringer og strategiske udviklingsmuligheder. (Danish horticulture and the green growth cluster – challenges and strategic growth potential). Handelshøjskolen Forlag.

Example 4: Agricultural barometer 2015

As part of IFRO's contract with the Ministry of Environment and Food of Denmark, an analysis has been prepared of Danish agriculture's competitiveness compared to a number of other European countries' agricultural sectors in the period from 2004 to 2012 expressed by its utilisation of production possibilities and farm management. The analyses are based on financial data from a large number of farms in all the European countries collected by the Farm Accountancy Data Network (FADN). The farms are classified according to agricultural activities (crop production, dairy

production, pig production) based on a target for specialisation determined by FADN. In addition, a minimum requirement has been defined for the size of the farms within each agricultural activity. The analyses have been made separately for each of the years 2004-2012. The analysis models include all three inputs (different types of costs) used to produce two different outputs (revenue). Accordingly, the results express the farms' efficiency in terms of the transformation of costs to revenue. The analysis is based on two elements: First, the group of farmers in Denmark that best generates revenue given their use of production factors is compared to the corresponding group of farmers in the other countries. This gives an indication of the differences in the production possibilities available to the (best) Danish farmers compared with the possibilities available to the farmers in the other countries. Second, it has been analysed how the farmers in one country do on average compared to the best farmers in the relevant country, which indicates the relative farm management skills.

The results show that the most efficient Danish producers, in all three agricultural activities, are generally much worse than the most efficient ones in more or less all the other countries. I.e. the production possibilities (understood as the possibility to transform costs to revenue) for the Danish farmers are among the worst in Europe. Besides, the average utilisation of the production possibilities (the relative farm management skills) for the Danish farmers is not higher for the Danish farmers than for the farmers in the other European countries.

Reference

Asmild, M., Hjorth, K.M. and Zobbe, H, (2015), Landbrugsbarometer 2015: En vurdering af dansk landbrugs relative konkurrenceevne udtrykt ved udnyttelse af produktionsmuligheder og driftsledelse (agricultural barometer 2015: an assessment of Danish agriculture's relative competitiveness expressed by utilisation of production possibilities and farm management), (IFRO Working Paper 2015 / 30).

7. The accounts statistics and Servicing of authorities

by the Ministry of Environment and Food of Denmark, the Danish AgriFish Agency and the Department of Food and Resource Economics (IFRO), University of Copenhagen

Statistics with high reliability

Rooted in a strong professional environment and with a high degree of continuity over time, the work of Statistics Denmark with the farm returns amounts to an important knowledge base. The work is characterised by a high level of reliability among the users of the statistics and among decision makers. This applies historically, and it will also be very necessary in future.

The statistics are an important part of a strong knowledge base for administration and policy development

The need for a strong knowledge base for administration and policy development has probably never been greater. The accounts statistics constitute an important part of this base. At the right level of detail, the statistics must live up to the requirements for continuity, relevance, representativeness and be readily available. This applies both when statistics and data are used directly by the authorities themselves, and when statistics and data are used by research scientists in projects and memorandums prepared for the authorities.

Annual statement on the agricultural economy

The use of the agricultural accounts statistics for information and servicing of the authorities has an equally long history as the statistics themselves. The statistics are the principal data basis for the annual statement on the agricultural economy, which is an important part of the authority agreement between the Department of Food and Resource Economics (IFRO) and the Ministry of Environment and Food of Denmark In addition to the historic reports for the past few years, the statement contains a forecast of the results for the year in question, an assessment of the market conditions for the coming year based on recent financial data and the expected price development for the most essential input factors and agricultural products. The publication on the agricultural economy also holds detailed accounts of the operating results for selected types of farming and size groups based on extracts from the agricultural accounts statistics, which contributes to a detailed insight into the differences in the economic situation within the agricultural sector.

Use in regular investigations

In addition to the annual use of agricultural financial data in the Agricultural economy, the statistics are used in a number of investigations where various issues related to the agricultural sector's current economy and forecasts of it are sought clarified.

This includes e.g. a broad spectrum of analyses of anticipated consequences in connection with changes in EU's aid to agriculture and the preparations of international trade agreements, e.g. WTO, analyses of costs in connection with reduced allocation of fertilizer and pesticides as well as recent analyses of the risk of bankruptcy among various groups of farms.

The Rural Development Programme

The statistics are also used by the Ministry of Environment and Food of Denmark in connection with their administration of the numerous schemes in the rural development programme, where the statistics constitute the basis for aid and compensation meeting the regulation requirements determined by the European Commission, e.g. area compensation payment for organic production.

The Commission on Nature and Agriculture

Several major agricultural policy investigations have made use of the statistics through the years. Lately, the statistics have been the basis of comprehensive investigations in the Commission on Nature and Agriculture due to the moderate productivity development in the manufacturing sector, low earnings and high borrowing in agriculture as well as the continuous development in the common agri-

cultural policy towards less direct aid to agriculture. In this context, the statistics were used to prepare a detailed description of the situation in the agricultural economy and presentation of scenarios.

High level of detail decisive

In the multitude of applications, the level of detail and breakdown in types of farming (types of farms) and agricultural activities (the individual products) in agricultural accounts statistics is decisive in providing the requested analyses within a reasonable time span and with a high level of data quality.

The European angle

The collection of financial data in agriculture is not only a matter of national interest. The statistics are also part of the ”Farm Accountancy Data Network (FADN),” which has collected information about agricultural profit and loss accounts across member countries for more than 50 years. This enables e.g. financial analyses across member countries on e.g. the competitiveness and development potential of Danish farmers.

Expectations to future statistics

Technological progress will add to the interest of and enable collection of even more data from the agricultural production – and it will also reduce the costs. This presents new opportunities for analysing the operation and the net profits and consequently improved ability to contribute to the development of the administration and policy as well as benchmarking of the farmers based on colleagues in Denmark and abroad. It will also impact the future development in the effort involved in the agricultural profit and loss accounts.

Important interaction with users and industry

It is important for tradition and innovation to go hand-in-hand in the development of the accounts statistics for the coming years – and for this to happen in close cooperation with the stakeholders, authorities, research institutions and stakeholder organisations.

“Happy anniversary”

8. The accounts statistics and the industry

by SEGES (Danish Agricultural Advisory Service)

Accounting in the agricultural sector started on a small scale in the beginning of the twentieth century, but a systematic preparation of capital structure as well as income and expenditure in agriculture did not get going until the formation of the Bureau of Agricultural Economics in 1918.

Statement of accounts

Already at the beginning in 1918, a plan was prepared for two accounting procedures, i.e. 'A accounts' and 'B accounts'. A accounts have a total account for the agricultural income and expenditure, whereas the B account facilitates a more detailed breakdown of income and expenditure on the individual farm's various agricultural activities. Already back then, they were working with internal transfers between field and stable. The option to prepare the somewhat more simple 'profit and loss account' (A accounts) and then add the 'B accounts' has been maintained throughout all of the 100 years. For many years, the A accounts were called the profit and loss account, and today it is identical with the internal part of the farmer's annual report. This financial statement format has always been and still is the cornerstone of the economic consulting and accounts statistics.

Agricultural activities accounts

For a period, the B accounts were called the Contribution Accounts. With the introduction of the computer system S72 in the 1970s, it was renamed the Agricultural Activities Accounts. This offered a basis for stating the contribution margin per unit (annual yield of a cow, annual yield of a sow, hectare etc.) at a very detailed level. For the field, this means crop per hectare and for the livestock it means annual yield of livestock or produced livestock (annual yield of a cow, annual yield of a sow, annual yield of a hen, produced pigs for fattening, produced chicken for fattening etc.) This form of statement was very costly and the number of prepared Agricultural Activities Accounts declined in the early 2000s.

Agricultural activities analysis

After the financial crisis and with many highly specialised farms, a new statement has gained ground in the financial consultancy, i.e. the agricultural activities statement. In this statement, all input factors are remunerated, and cost prices can be calculated. The agricultural activities analysis is very similar to the B accounts from 1918 – and has the advantage over the Agricultural Activities Statement that all input factors are remunerated and a calculation can be made of the cost price for the most essential products of the farm.

Accounts offices

In 1910-11, the first accounts district started the preparation of accounts. The district of Samsø was the first. The first year with eleven members. The accounts districts were part of the local farming organisations' professional work. Back then, the first priority of this work was to improve the efficiency of the livestock farming and field cultivation. In the beginning, it was typically agricultural scientists who managed the preparation of accounts in the winter time for the members who requested this.

Increasing number of agricultural accounts, especially after VAT and liability to keep books

Through the 1920s and 30s, an increasing number of agricultural districts were created which managed the preparation of accounts. Accordingly, in 1935, there were 79 accounts districts preparing approximately 5,000 statements of accounts. In 1956 there were 120 accounts districts preparing about 12,000 statements. In 1965, approximately 22,000 accounts were prepared. With the introduction of VAT and a liability to keep books, the number increased rapidly in the 1970s.

Agronomists and agricultural technicians as accounting consultants

In the first many years, the accounting consultants were trained either at the agricultural university as graduates of agricultural sciences or as agricultural technicians from Vejlby Landbrugsskole (agricultural school). The approach was that you needed agricultural knowledge to the able to advise farmers on finance and ac-

counts. The agricultural technicians were able to specialise in economics, and at the agricultural university they also offered courses in economics. To obtain enough graduates with an interest in economics, a separate programme was introduced at the agricultural university in the 1980s which combined courses in agronomics and economics. However, relatively few students opted for this programme.
The lack of agricultural graduates with an interest in economics paved the way in the 1980s for accountants and graduates in economics to be used as accounting consultants.

Focus on the agricultural profession characterises the farmer's accounts

As opposed to other industries, there has been a lot of focus on the agricultural content in the financial consultancy. This continues to characterise the financial work, where many key figures and accounting analyses and presentations are based on technical terms and not the generally applying accounting terms from the accounting business in general. Not until 2009 were the accounts prepared with external accounts in compliance with the present Danish Financial Statement Act.

Internal accounts for consulting and analysis

The internal accounts are still used for discussion with farmer and creditor rather than the external accounts. Correspondingly, the internal financial statement format is applied for statistical analyses and for reporting to Statistics Denmark. The fact that we assess size in farming based on standard hours, production volume such as number of animals and area rather than turnover and classic financial key figures is very much due to the close integration of financial counselling and consulting from professionals with the same educational background and from the same advice centres. Inter-disciplinary co-operation has always been at the heart of the advisory services.

There was some extent of a common chart of accounts with the many accounts offices. Still, there were many individual approaches in the classification and presentation of the accounts during the time where it was carried out manually.

Building an accounting system S72

In the 1960s, the farmers' organisations started building a common accounting and classification system. This was called S72, as the start-up was in 1972.

Establishing the computer centre of Danish agriculture, LEC

The inter-disciplinary co-operation also manifested itself in that dairies and slaughterhouses in the 1960s together wanted to improve and develop the data effort, and when the farmers agreed to establish the computer centre of Danish agriculture, LEC, it was natural to incorporate the preparation of an electronic accounting system which would be owned by all consulting districts jointly. This created the basis for the unique accounting system (s72). It is based on a common chart of accounts and common maintenance of the system at the Faglige LandsCenter (now Seges). Due to the technological development, it was modernised to Ø90 in 1990, but the fundamental principles and many modules were still based on S72.

Same classification – quality boost in analysis data

The building of the classification and accounting system S72 resulted in the districts using the system automatically using the same classification and accounting build, which lead to a considerable quality enhancement of the data and improved the basis of analysis. S72 was based on a central database. Development and operation was carried out (and still is) in close cooperation between Det Faglige LandsCenter (now Seges) and the computer centre of Danish agriculture, LEC – which has since been acquired by IBM.

S72 was built so that the system could handle bookkeeping, VAT, tax statements, profit and loss statements and contribution costing as well as 'comparative figures.' The Profit and Loss Statement as well as the Contribution Costing was originally called 'Accounting Reports.' The inspiration for these came from The Bureau of Agricultural Economics and they were used for the statistical work in agriculture as well as for reporting to the Bureau and later the Institute of Agricultural Economics. The accounting reports were of course also part of the advisory work with the

individual farmers and the communication with the financial and public institutions. The comparative tool 'Dit regnskab sammenlignet med andre' (your accounts compared to other accounts) was a very popular product in the 1980s and was also based on the structure of the profit and loss account.

In 1983, 115 districts owned by associations prepared a little less than 70,000 accounts. Half of these were reported to the farmers' organisations' database as accounting reports. Approximately 2,500 of these 35,000 profit and loss accounts also had contribution costing. The reporting for statistics of accounts was done on the basis of the Profit and loss account, which had extensive data overlapping.

Today, Ø90 is the focal point of all financial analyses

The use of Ø90 by the vast majority of all farmers for all financial entries is the focal point of financial analyses of the individual farm and reporting to creditors. It includes a pronounced degree of benchmarking, which means that the individual farmer knows his level and knows where his potential for improvement is. One of the reasons for this is the fact that the relevant key figures from e.g. cattle, pigs and field databases are included together with the accounting information. This facilitates advice based on subject-related as well as financial data. The same thing applies in terms of statistical analyses and reporting to Statistics Denmark.

Building today's accounting system Ø90

With the building of Ø90 from 1990, it became possible to automatically transfer accounts from the Ø90 accounting system to statistics.

Standardised and automated collection of data from the accounts

Through the last decades, data collection in connection with transfer of the accounts to Statistics Denmark has been further automated and standardised. This has happened in order to rationalise the work, but also very much so to ensure that data application and analyses are based on common ground between 'public use' and the agricultural sector's own analyses.

Data from the accounts is logged in a reference number system

All central data in the accounts is logged in a reference system and kept for financial analyses and benchmarking as well as transfer to Statistics Denmark. This logging system is continuously maintained and adapted to any requests and requirements the users may have. This creates consistency in concepts as well as in the content of the data that a farmer sees in his accounts and across to any national analyses on the agricultural economy performed by e.g. researchers at a university. The consistency begins by considering e.g. any new expenditure or income, how it should be handled in the chart of accounts. The account number and placement allocated to it must be followed through from classification, preparation of accounts, budget, benchmarking, application in statistical analyses and reporting to Statistics Denmark – and accordingly also be used among public analysts and researchers.

9. Publications

The farm returns used in many publications

A number of different publications have been published based on farm returns from Danish agriculture. A major part of these has been series which are published annually. In addition, the farm returns have provided contributions to a number of special surveys, each of them dealing with specific subjects. A part has taken place within the agricultural sector's own organisations, a part at various schools and institutes of higher education, and finally much has been written and calculated in the institutions which have collected and processed the accounts since 1916.

Below, we will merely go through the series of publications issued by the Bureau of Agricultural Economics and subsequent departments.

9.1 Accounting results from Danish farms

Surveys of the operating conditions of the agricultural sector split in two from 1944/45

From the financial year 1916/17 upwards, *Undersøgelser over Landbrugets Driftsforhold. Regnskabsresultater fra danske Landbrug* (surveys of the operating conditions of the agricultural sector: accounting results from Danish farms) was issued. This series was issued with roughly the same title each year until around 1970. The publication from 1916/17 was 48 pages, but in the following years it was expanded, and from 1944/45 a part one and a part two were issued, which amounted to hundreds of pages combined. Part one was issued at the end of the year in the closed financial year, part two approximately one year later with a more thorough review.

Much more than accounts statistics

Undersøgelser over Landbrugets Driftsforhold (surveys of the operating conditions of the agricultural sector) did not only contain financial data, but also many other kinds of statistics of relevance to the agricultural sector: Prices, crop yield, milk yield, long text descriptions, weather conditions, foot and mouth disease, import/export and many other things.

Household expenditure including "expenditure per standard cost day"

They also included a section on household expenditure including e.g. the *expenditure per standard cost day*, see figure 26. Finally, there were tables showing accounting results for each of the participating farms, not mentioning names, however.

From grey to yellow and later just accounts statistics

Undersøgelser over Landbrugets Driftsforhold. Regnskabsresultater fra danske Landbrug (surveys of the operating conditions of the agricultural sector. Accounting results from Danish farms) was changed to just *Regnskabsresultater fra danske Landbrug* (accounting results from Danish farms) around 1970, where the colour of the cover also changed from grey to yellow. The publications gradually became thinner and they focused on the actual accounts statistics. Part two was the agricultural activities statistics. From 1977, the Bureau of Agricultural Economics was replaced by the Institute of Agricultural Economics.

Part one becomes Agricultural accounts statistics, Part two becomes the Economy of the agricultural activities A series and B series

Part one of *Regnskabsresultater fra danske Landbrug* (Accounting results from Danish farms) became *Landbrugsregnskabsstatistik* (Agricultural accounts statistics) from the financial year 1980/81 and was also called *Serie A* (the A series). Part two became *Økonomien i landbrugets driftsgrene* (the economy of the agricultural activities), changed colour from yellow to olive and was called *Serie B* (the B series). This is how it was for the remaining period in which the accounts statistics were prepared at the Institute of Agricultural Economics and subsequently the National Institute of Agricultural Economics, the National Institute of Agricultural and Fisheries Economics and IFRO. However, the B series was made in a new version from 1991/92 after being absent for two years. The A series was profoundly changed around year 2000.

Figure 27. Example of statement of household expenditure. 1924/25

	Under 10 ha	10—20 ha	20—30 ha	30—50 ha	50—100 ha	Over 100 ha	Alle Ejendomme
Antal Regnskaber	46	58	91	120	56	31	402
Udgifternes Sammensætning:							
Flæsk	16	16	16	18	18	18	17
Anden Hjemmeslagtning	1	2	3	4	5	9	4
Æg og Fjerkræ	12	11	10	11	10	8	10
Mælk	8	11	11	12	12	14	11
Kartofler	5	6	5	6	6	7	6
Havesager	4	4	3	3	3	5	4
Brændsel	11	14	13	14	14	19	14
Kontante Indkøb (Kolonialvarer m. m.)	100	106	109	114	120	121	111
Forrentning	4	3	3	3	3	4	3
Husleje	9	9	9	9	11	11	10
Husmoderens Arbejde	52	29	20	15	8	2	20
Pengeløn til Medhjælp	2	12	16	19	21	26	16
Kost til Medhjælp	3	18	24	29	32	36	24
Ialt 1924—25	227	241	242	257	263	280	250
do. 1923—24	206	215	231	243	246	252	232
do. 1917/18—1924/25	211	227	241	255	269	283	248
Folkeholdets procentiske Andel i de samlede Husholdningsudgifter 1924—25	$13._1$	$32._6$	$43._3$	$50._3$	$55._0$	$68._7$	$43._9$

Note: Household expenditure stated in Danish coin equal to DKK 0.01 per standard cost day.

Source: Undersøgelser over Landbrugets Driftsforhold 1924-25 (Surveys of the operating conditions of the agricultural sector 1924-25). The Bureau of Agricultural Economics.

The Danish term for agricultural activities changed

After being transferred to Statistics Denmark, the agricultural accounts statistics for 2008 and 2009 were issued under the Danish title *Regnskabsstatistik for landbrug* (accounts statistics for agriculture). From 2010, farming accounted for the major part of *Regnskabsstatistik for jordbrug* (accounts statistics for agriculture). The Danish title *Økonomien i landbrugets driftsgrene* was changed to *Økonomien i landbrugets produktionsgrene* (economics of agricultural activities) and is still published (most recent edition for 2015) as a publication under this title.

Internet

From some time in the 1990s, the accounts statistics have been available in book form as well as online. Data can be found with Statistics Denmark in *Statbank Denmark* at www.statbank.dk/ and as publications etc. at www.dst.dk/en/Statistik/emner/erhvervslivets-sektorer/landbrug-gartneri-og-skovbrug.

9.2 Related publications

A number of other publication series originated from the original *Undersøgelser over Landbrugets Driftsforhold* (surveys of the operating conditions of the agricultural sector).

C series:

Landbrugets prisforhold also existed in the 1970s but was replaced by the C Series from 1980/81. From 1999, horticultural products were included, and the Danish title of the publication was changed to *Jordbrugets prisforhold* (agricultural terms of trade). It is still published annually under this name.

D series: *Gartneriregnskabsstatistik* (Horticultural accounts statistics). This started by volume 1980 and was published in parallel with the A series, largely with the same definitions. The horticultural accounts statistics were created partly because of recommendations from an appointed committee, partly to accommodate requirements from the EEC, since FADN, then as now, considers horticulture to be part of the total agricultural sector. After transfer to Statistics Denmark, it was published with the Danish title *Regnskabsstatistik for gartneri* for the financial years 2008 and 2009, but it has been part of *Regnskabsstatistik for jordbrug* (Agricultural accounts statistics) since the financial year 2010.

E series: *Heltidslandbrugets økonomi* (the economy of full-time farming) became the E series in 1981/82, but was also published a few times before then. From 1993/94, the E series became part of the A series.

F series: *Fiskeriregnskabsstatistik* (Fishery accounts statistics). Not a part of agriculture, but it was decided to organise the statistics together with the accounts statistics for agriculture. It was first published for the financial year 1995 – after transfer to Statistics Denmark under the name *Regnskabsstatistik for fiskeri*. From the financial year 2013, it is part of *Regnskabsstatistik for fiskeri og akvakultur* (Accounts statistics for fishery and aquaculture).

G series: *Regnskabsstatistik for økologisk jordbrug* (Accounts statistics for organic agriculture). It was first published for the financial year 1996/97 and continued after transfer to Statistics Denmark under the name until it became part of *Regnskabsstatistik for jordbrug* (Accounts statistics for agriculture) from the financial year 2010.

H series: *Regnskabsstatistik for akvakultur* (Accounts statistics for aquaculture). Not a part of agriculture, but it was decided to organise the statistics together with the accounts statistics for fishery. It was first published for the financial year 2004 and continued after transfer to Statistics Denmark under the name until it became part of *Regnskabsstatistik for fiskeri og akvakultur* (Accounts statistics for fishery and aquaculture) from the financial year 2013.

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STATISTICS DENMARK

Statistic Denmark
Sejrøgade 11
DK-2100 København Ø

Phone +45 39 17 39 17
www.dst.dk
dst@dst.dk