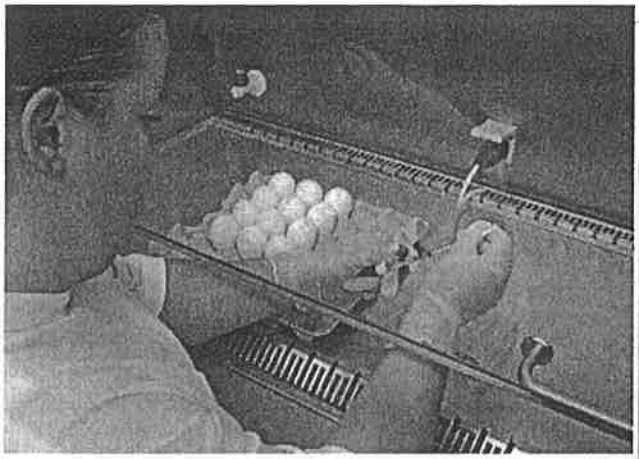
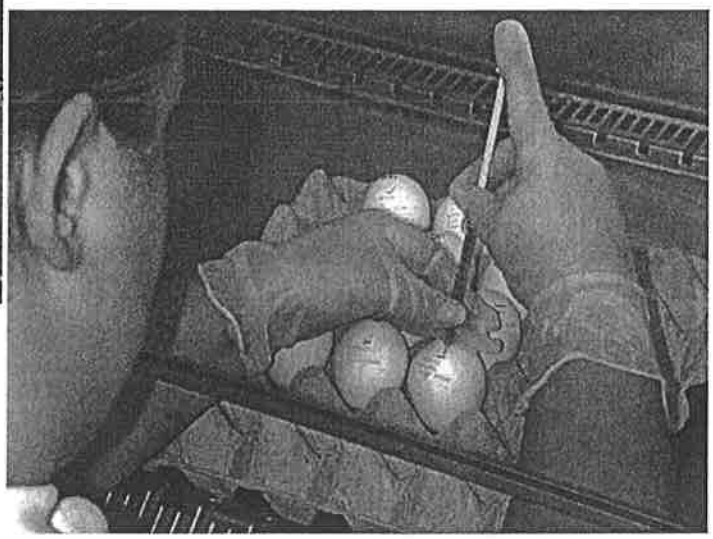
# Embryo Inoculation via Allantoic Cavity





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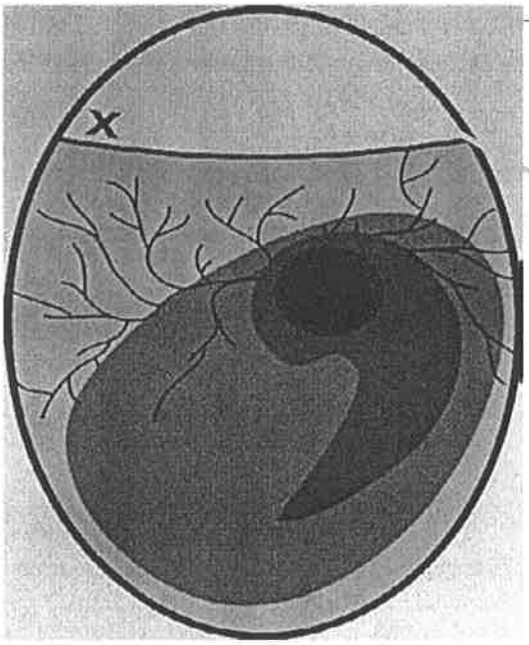
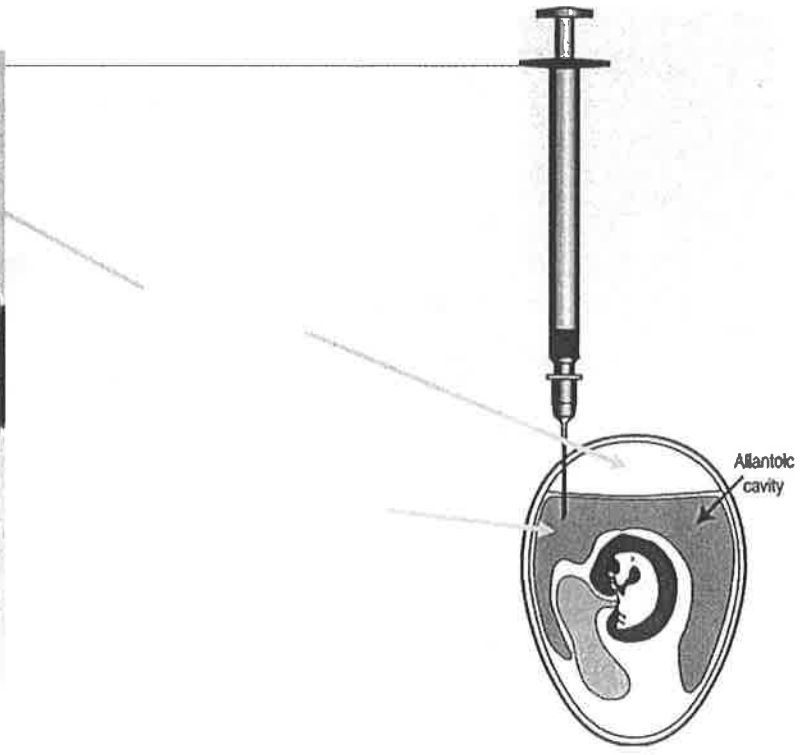
# Inoculation of embryonated egg




Courtesy FAO

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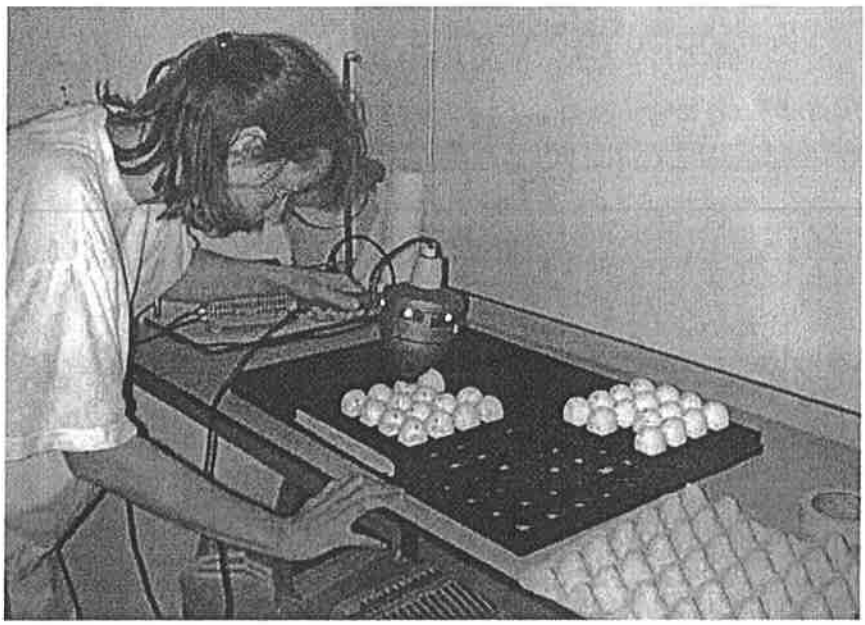
# Virus isolation: daily candling



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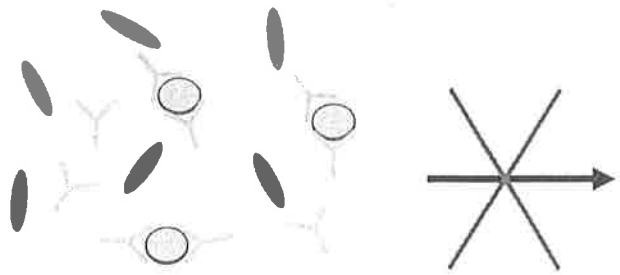
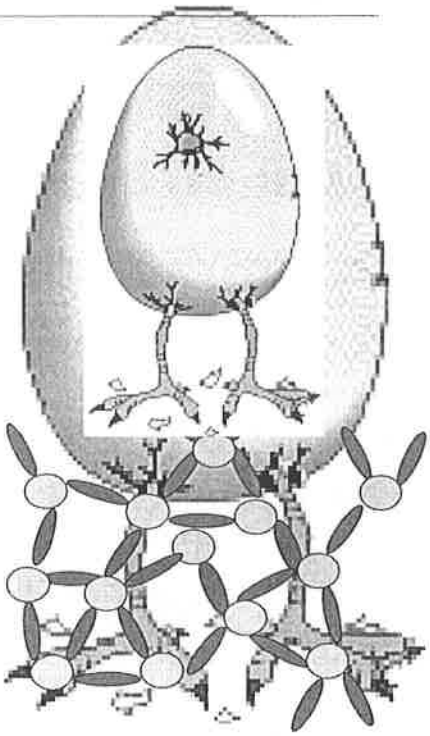
# LABORATORY DIAGNOSIS OF AI

- Mean death time 48-72 hours.
- Haemagglutinin activity
- Typing using polyclonal antibody





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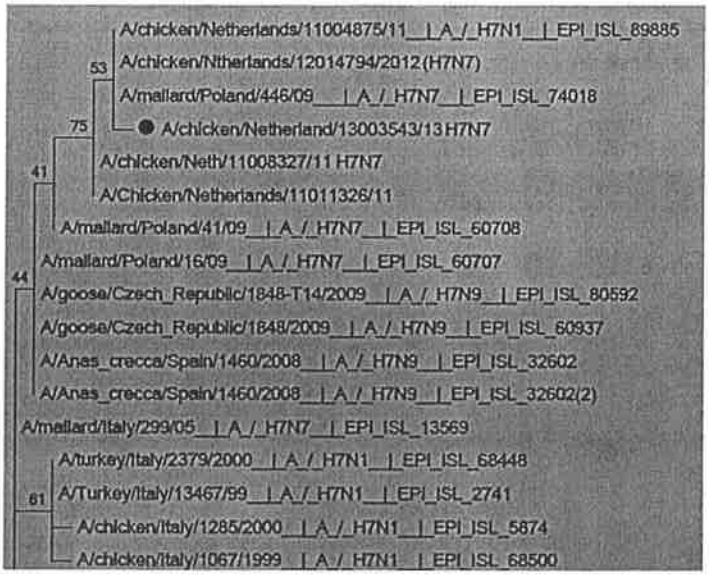
# Completion Lochem

- 20 April second cleaning and disinfection
- 27 April last cleaning and disinfection
- All measures are lifted 21 days after the first cleaning and disinfection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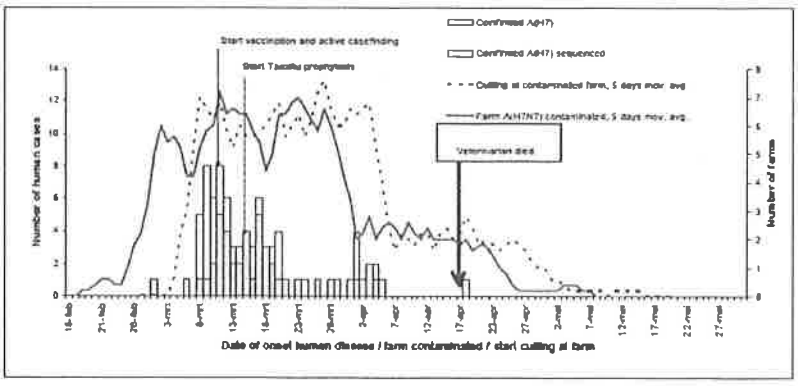
# Avian Influenza prevention, monitoring and diagnosis in the Netherlands

## ALL TO PREVENT A NEW OUTBREAK OF HIHGLY PATHOGENIC AVIAN INFLUENZA

H7N7 outbreak, Netherlands 2003




255 farms and 89 human cases; > 30 million poultry culled

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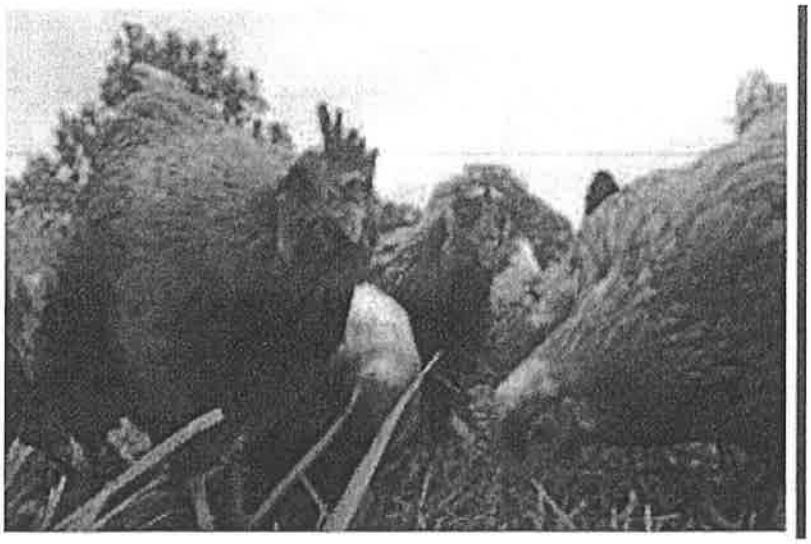
# Thank you

## Questions and Discussion



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Ministry of Food, Agriculture and Fisheries

# Animal Health status in Denmark 2014

John Larsen
Deputy Chief Veterinary Officer
Danish Veterinary and Food Administration

Ministry of Food, Agriculture and Fisheries

# Livestock statistics, 2013

| Species | Number of holdings | Number of animals |
|---|---|---|
| Cattle | 16,644 | 1,599,254 |
| Pigs | 8,732 | 13,280,931 |
| Sheep | 7,247 | 153,708 |
| Goats | 3,334 | 22,844 |
| Fur | 3,334 | 15,294,765 |
| Layers | 710 | 4,086,494 |
| Broilers | 300 | 20,837,800 |

# Danish livestock disease status

## OIE Listed diseases

The following diseases do not occur in Denmark:

| | |
|---|---|
| • **Foot and mouth disease** | **1983** |
| • **Vesicular stomatitis** | **(never recorded)** |
| • **Swine vesicular disease** | **(never recorded)** |
| • **Rinderpest** | **1782** |
| • **Peste des petits ruminants** | **(never recorded)** |
| • **Contagious bovine pleuropneumonia** | **1886** |
| • **Lumpy skin disease** | **(never recorded)** |
| • **Rift Valley fever** | **(never recorded)** |
| • **Bluetongue** | **2008 (BTV 8)** |
| • **Sheep pox and goat pox** | **1879** |
| • **African horse sickness** | **(never recorded)** |
| • **African swine fever** | **(never recorded)** |
| • **Classical swine fever (hog cholera)** | **1933** |
| • **Highly pathogenic avian influenza (Fowl plague)** | **2006** |
| • **Low pathogenic avian influenza** | **2013** |
| • **Newcastle disease** | **2005** |



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# Danish animal health status

Freedom from:

- Aujeszkys disease
- Bovine brucellosis
- Bovine tuberculosis
- Enzootic bovine leukosis
- Infectious bovine rhinotracheitis
- Brucella melitensis

- BSE - "OIE Neglible BSE risk"
- Bovine Virus Diarrhea – eradication in progress

# Rules for import of live animals

- Only from countries approved by the EU and placed on the list in Annex I, Directive 79/542/EEC
- From 3. countries only via border inspection posts
- From EU only in accordance with the EU legislation
- In case of outbreak of a severe contagious animal disease
  - Immediate ban of import of live animals of susceptible species
  - EU Commission Decision will be issued.

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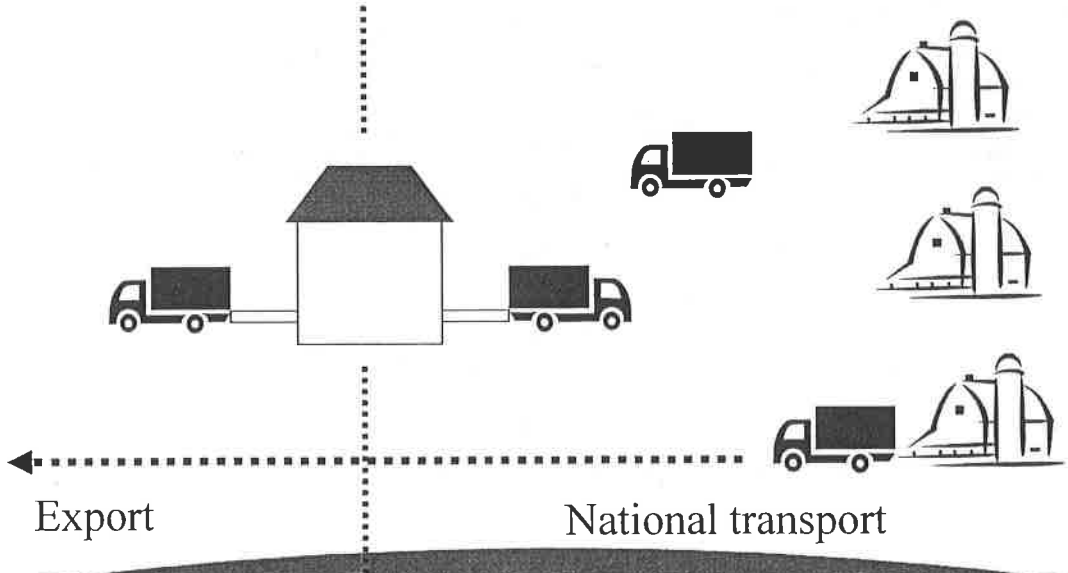
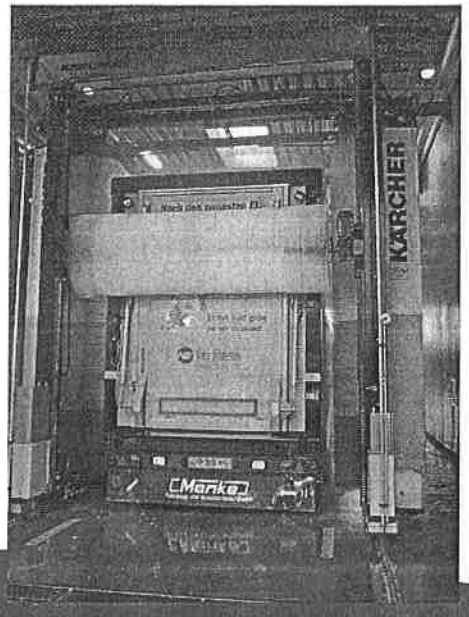
# Precautions by exports – assembly centres



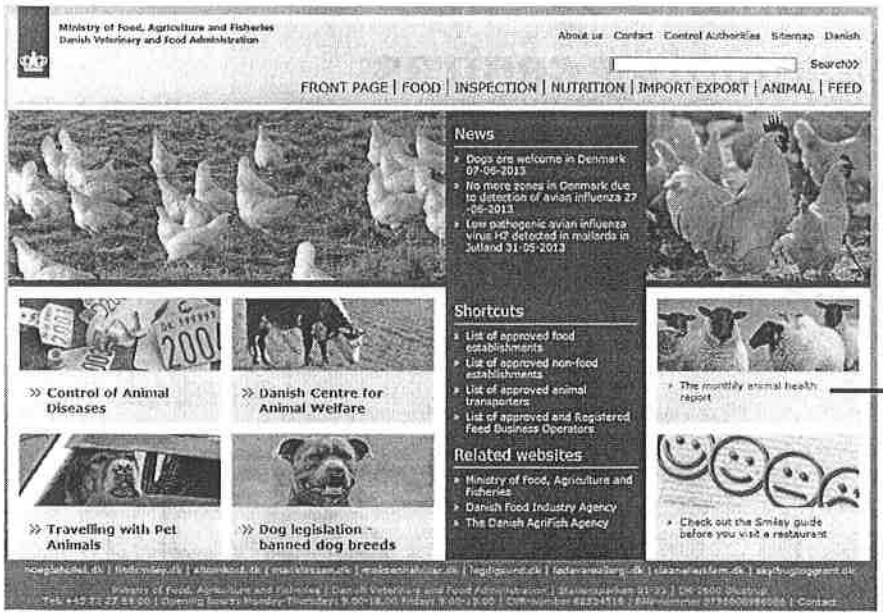
# Animal transport vehicles (cloven hoofed animals) returning to Denmark

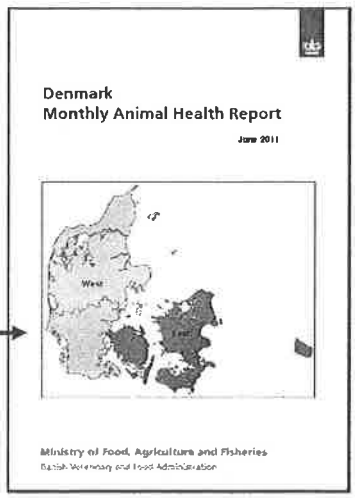
- Industry code of practice
- Compulsory washing and disinfection at the border
- 48 hour quarantine before access to a farm






# Notifiable animal diseases



# Cornerstones in the veterinary system

- Harmonised EU legislation on animal health area
- Quarantine of farms with suspected disease
- Culling of infected farms
- Tracing of contacts
- Cleaning and disinfection National stand-still for live animals
- Ban on export of live animals of susceptible species
- Protection and surveillance zones
- Vaccination

- Compensation payments to owners
- National Veterinary Institute – reference lab for animal diseases
- Contingency plans

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# Geographical information (GIS)

- All farms
  - Digital maps
  - Zones
  - Analysis

# Strategy for disease control

- Targets
  - Clinical suspect farms must be investigated within 4 hours by the local veterinary authority
  - Killing of outbreak herds within 24 hours
  - Killing of contact herds within 48 hours
  - Preliminary cleaning and disinfection completed within 2-8 days of killing

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# Notification duty

Laboratory

Farmer

Private veterinary practitioner

Danish Veterinary and Food Administration

Regional Animal Health Units →
Central Veterinary Authorities

# Surveillance active and passive

- **Primary/passive e.g.:**
  - Notification
  - Inspection by veterinary authorities
    - Abattoirs, markets and shows/fairs
- **Secondary/active e.g.:**
  - Serological and virological surveillance
    - Animals for slaughter, export, AI centres, or in farms
  - Targeted or random sampling

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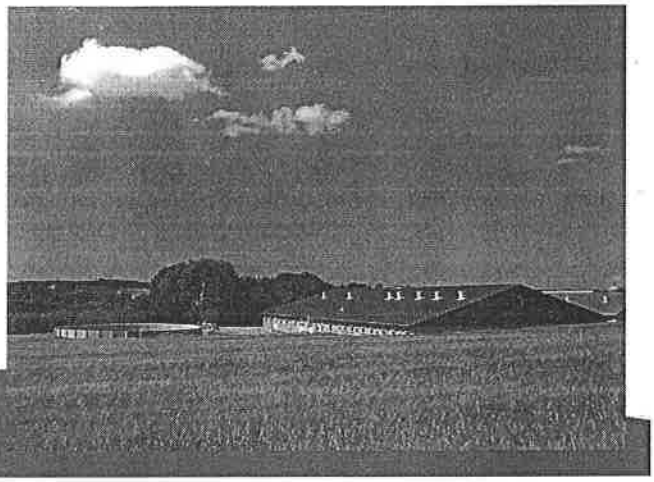
# Health advisory contract

- Contract between farmer and private veterinarians
- 6 - 12 annual advisory visits
- Report drawn up after each visit
- Annual status report
- Medicine may be prescribed for use for treatment of diagnosed disease for 35 days

# Biosecurity plans in large farms

- Large farms are herds with more than :
  - 2.200 sows with piglets
  - 18.000 fattening pigs
  - 425 dairy cows



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# Biosecurity plans in large farms

- Definition of farm area
- Identification of potential risks (HACCP)
- Animals, feed, bedding, semen, medicine
- Slaughter pickup and dead animals
- Trucks and machines, tools
- Personnel
- Rodents, insects, birds
- Urine, manure, slurry
- Products

# Vaccination – notifiable diseases

- Prohibited to vaccinate
  - Foot and mouth disease
  - Classical swine fewer
  - Avian influenza in poultry
  - Bluetongue
  - Aujeszky's disease
  - IBR
  - .....
- Mandatory vaccination programme
  - Newcastle disease
- Voluntary vaccination programmes
  - Avian influenza in zoo birds

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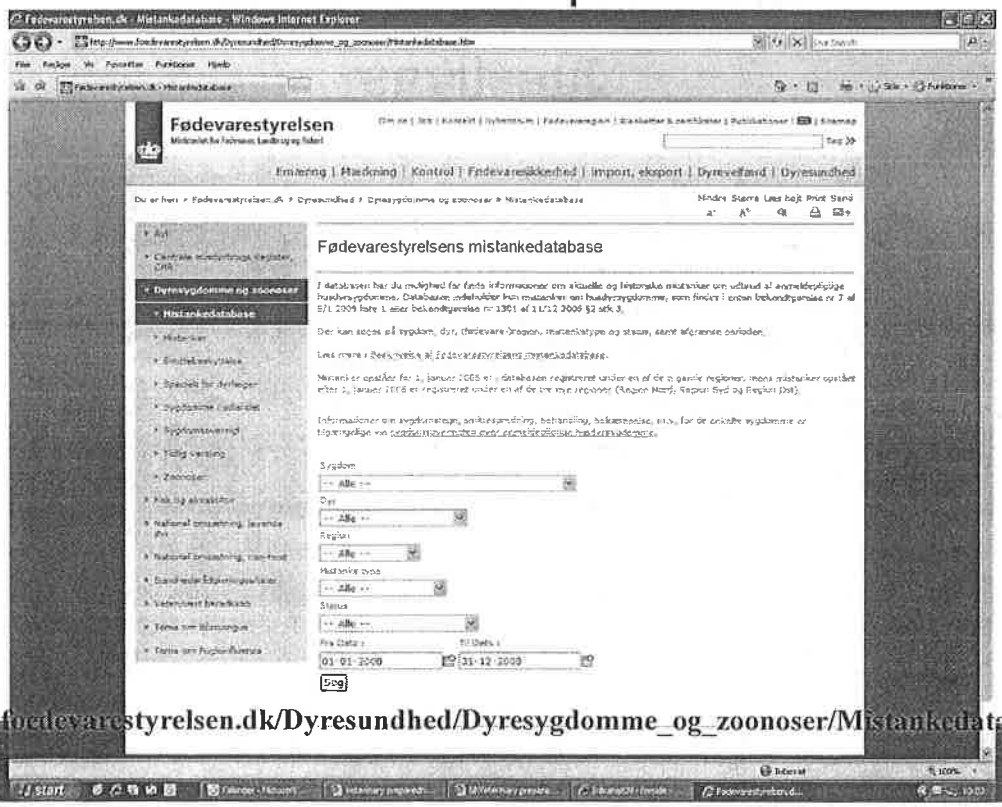
# Public access to suspicion database




http://www.fodevarestyrelsen.dk/Dyresundhed/Dyresygdomme_og_zoonoser/Mistankedatabase.htm

# Suspicions – www.fvst.dk

| Disease | Total number of suspicions 2012 (215) | Number of infected 2012 |
|---|---|---|
| African Swine Fever | 1 | 0 |
| Classical Swine Fever | 2 | 0 |
| Anthrax | 2 | 0 |
| Svine Vesicular Disease | 32 | 0 |
| Brucellosis | 37 | 0 |
| Newcastle Disease | 2 | 0 |
| Avian Influenza | 5 | 0 |
| Aujeszky's disease | 1 | 0 |
| Enzootic Bovine Leucosis | 10 | 0 |
| Bluetongue | 3 | 0 |
| Rabies | 15 | 0 |
| TB, bovine and humane type | 17 | 0 |

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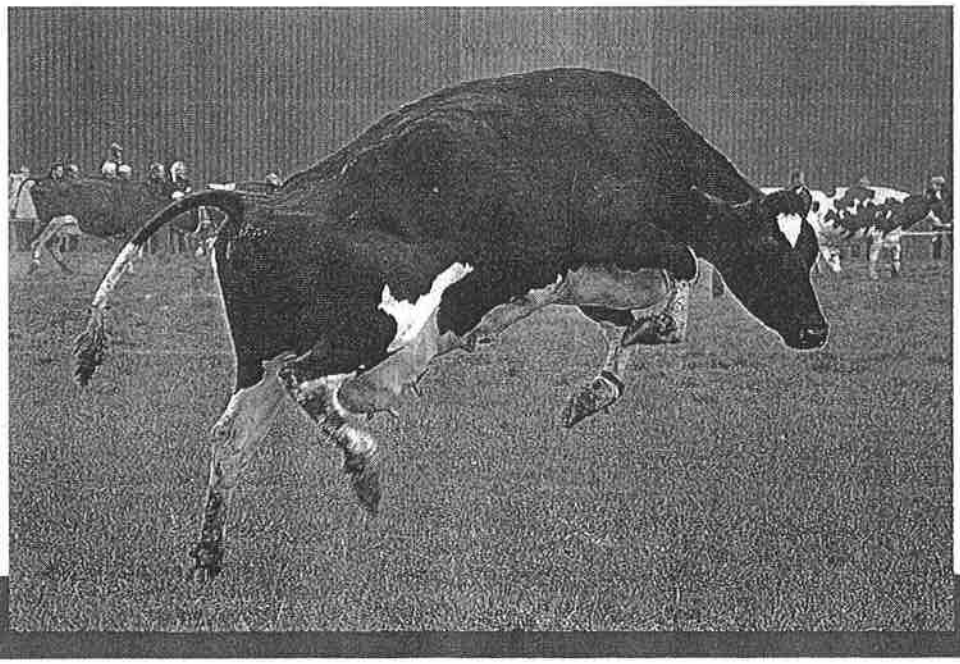
# Thank you for your attension
# Questions



# DanAvl Breeding Programme

## Facts about the high performing Danish Breeding Programme

DanBred INTERNATIONAL

# **The Danish** Breeding Programme

The Danish pig breeding programme, DanAvl, has existed since the 1890s. DanAvl is organised by the Danish pig producers and is directed by the Danish Pig Research Centre.

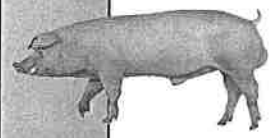
The DanAvl breeding programme is responsible for the genetic improvement of all DanAvl pork products and is therefore considered a very important part of the whole industry.

The aim of DanAvl is to develop breeding pigs that meet the demands for an efficient and competitive product given the best possible overall economy for the industry.

The selection programme within DanAvl is based on data from the entire population and includes results for animal performance, fertility as well as carcass traits. Thorough selection has ensured not only genetic progress, but also significantly improved overall efficiency.

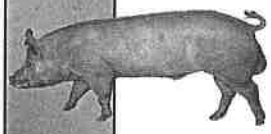
The result is high-yield animals with high fertility, good longevity, excellent meat quality, low slaughter loss and potential for continued genetic development.

## **DanAvl** Breeds



### DanAvl Landrace

DanAvl Landrace is a dam line in the DanAvl crossbreeding programme for production of DanAvl Hybrid (LY/YL) gilts. The fertility and mothering abilities of the DanAvl Landrace are excellent. DanAvl Landrace is a very long and strong pig with good legs. It is world famous for excellent carcass quality.



### DanAvl Yorkshire (Large White)

DanAvl Yorkshire is a second dam line in the DanAvl crossbreeding programme. DanAvl Yorkshire is a perfect all-round breed. It is mainly used in the production of DanAvl Hybrid (LY/YL) gilts. With fast growth, low feed conversion ratio and excellent carcass quality, the breed is a very effective producer of meat. The fertility and mothering abilities of the DanAvl Yorkshire are very good.

### DanAvl Duroc

DanAvl Duroc originates from North America; the race was imported to Denmark in the 1970s. Through meticulous selection the breed has been improved particularly in regard to meat percentage and slaughter loss. DanAvl Duroc performs very well as a terminal sire in combination with DanAvl Hybrid (LY/YL) females. DanAvl Duroc produces large litters as well as fast growing slaughter pigs with low feed conversion ratio and a high lean meat percentage. As an extra benefit DanAvl Duroc produces carcasses with excellent meat and sensory qualities.

### DanAvl Hybrid

DanAvl Hybrid is a production sow mainly used for slaughter pig production. DanAvl hybrid is a first cross (F1) between a DanAvl Landrace and a DanAvl Yorkshire. DanAvl Hybrid combines the high fertility and excellent mothering abilities of the DanAvl Landrace and the robustness and carcass quality of DanAvl Yorkshire. DanAvl Hybrid females are very fertile and have excellent milking abilities. They are very durable and easy to keep.

# **DanAvl** Structure

### Purebred nucleus breeding herds

The DanAvl breeding programme has approx. 25 nucleus herds in contract. These herds have a total purebred sow population of approx. 6,200 sows. The DanAvl purebred population has since 1996 been free of the halothane stress gene.

| | | |
|---|---|---|
| ♂ LL x LL ♀ | 2,200 sows on contract |
| ♂ YY x YY ♀ | 2,250 sows on contract |
| ♂ DD x DD ♀ | 1,750 sows on contract |

### Multiplier herds

Approx. 170 herds are licenced as DanAvl Multiplier herds. 45 of these multiplier herds are situated outside Denmark. The population of the DanAvl multiplier herds is approx. 85,000 sows, approx. 58,000 of these sows are in Denmark.

| | |
|---|---|
| ♂ LL x YY ♀ | |
| ♂ YY x LL ♀ | |

---

# The Flow of **DanAvl females**

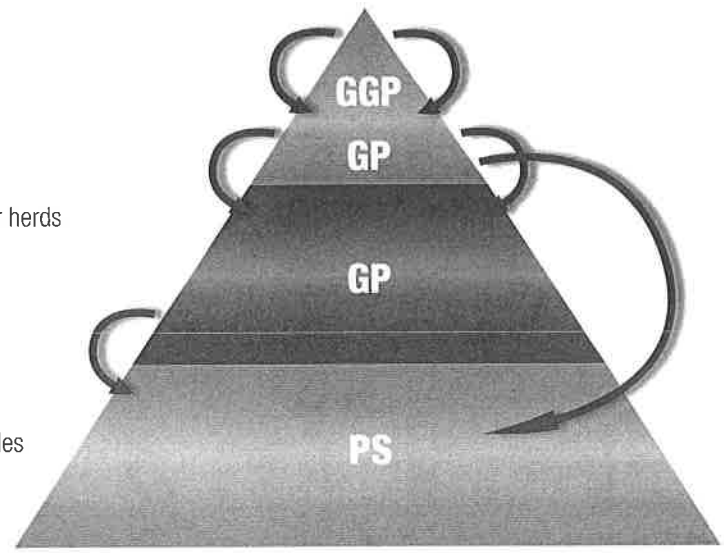
### Purebred Females

**GGP** - Great Grand Parents for further genetic improvement

**GP** - Grand Parents for multiplier herds

### Crossbred Females

**F1 DanAvl hybrid LY/YL** to be used as **PS** - Parent Stock Females in commercial production




# The Flow of **DanAvl males**

### Purebred Males

**GGP** - Great Grand Parents for further genetic improvement.

**GP** - Grand Parent boars for multiplier herds and terminal boars for commercial production.

The Parent Stock commercial sow herds produce pigs for slaughter on the basis of DanAvl Hybrid females and DanAvl Duroc boars. Approx. 30 million piglets are produced in Denmark every year. 2/3 of these are slaughtered in Denmark and the rest are exported live piglets. 90% of the pork processed in Danish slaughterhouses are sold for export.

# **DanAvl** Genetic Improvement

## Breeding objectives

The breeding objectives for DanAvl are set in close cooperation between the pig producers, the pig research centre and the slaughterhouses. The breeding objectives differ for the dam lines and the terminal sire line. The differentiation of the breeding goals has been set to maximise the genetic potential of different traits for the dam lines and terminal sire line. This means that traits like live piglets at day 5 after farrowing and longevity are included in the breeding goal for the dam lines, but not in the sire line. Traits referring to growth and meat production, like slaughter loss, lean meat percentage and feed conversion ratio is weighed higher for the sire line.

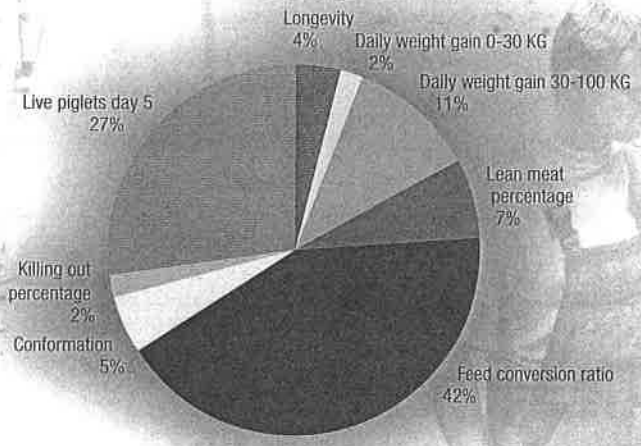
The breeding objectives are not static as changes in genetic parameters and production/marked situation may justify or demand changes of the objectives. Every 3 or 4 years the genetic improvement of breeding objectives is reviewed and adjusted if needed.

The traits summarised in the breeding objective are weighed in accordance with the economic value that they have for the production of breeding pigs in a combined piglet and finisher herd. The economic weighting is an expression of the value of the improvement of the respective traits measured in revenue per finisher.

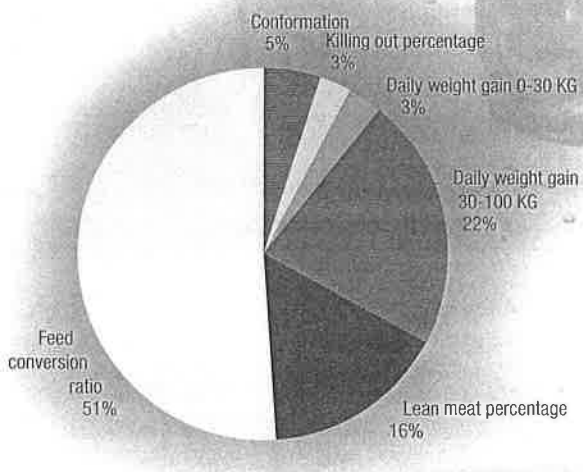
The economic weighting is determined according to how changes in the different traits influence the cost and uptake in a herd. An improvement in the lean meat percentage will thus increase the proceeds, whereas an improvement in the daily weight gain will reduce rental costs and staff costs. Thus, the economic value of the individual traits in the breeding objective can be determined.

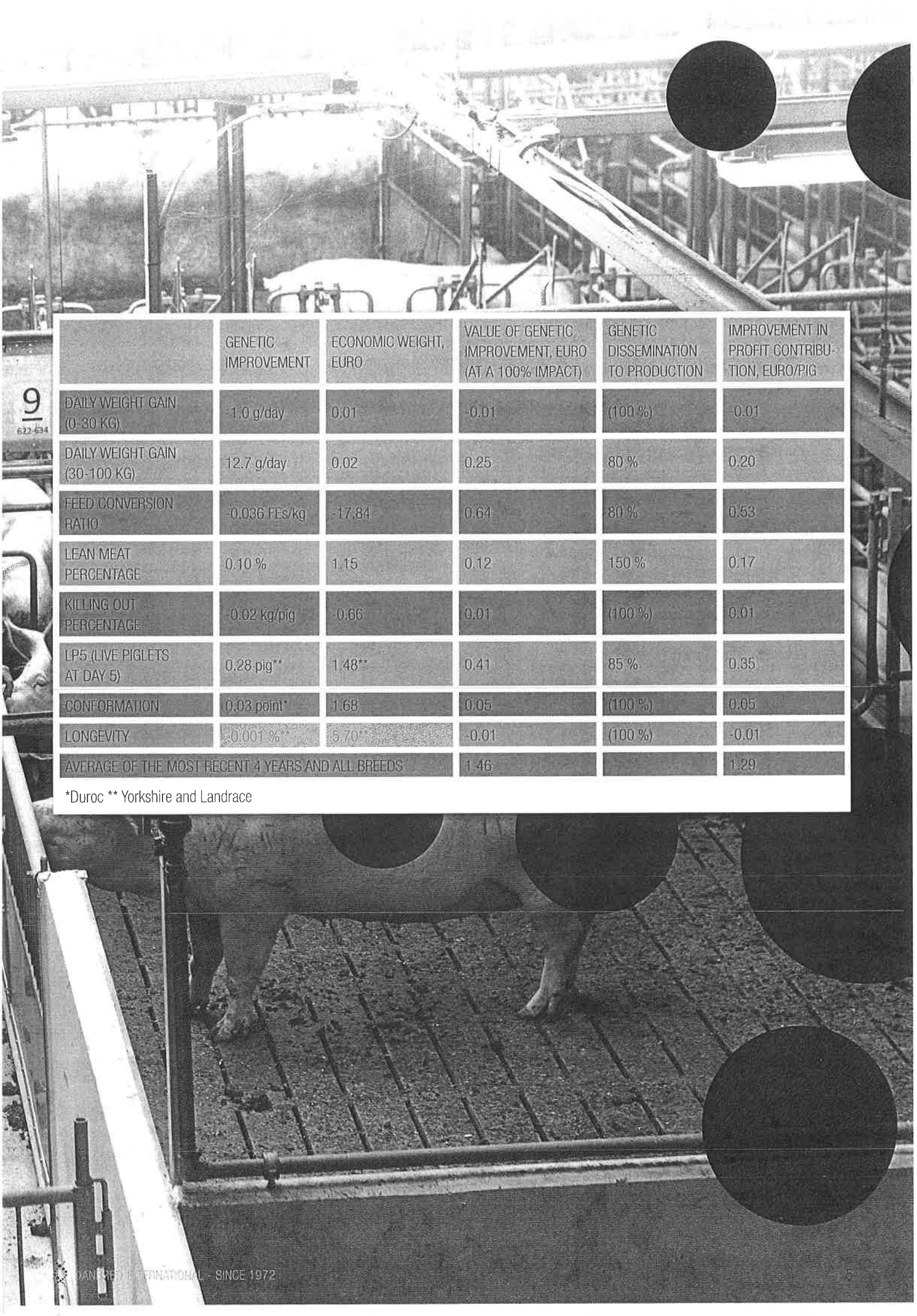
The economic weighting is used to create the total index based on the breeding values of the respective traits. However, the economic weighting alone does not determine which genetic progress is achieved. The progress is also, with the exception of economic weighting, dependent on the extent of testing, the selection strategy, heritability and genetic variation.

## Breeding Objective of DanAvl Landrace/Yorkshire Weighting of Traits




## Breeding Objective of DanAvl Duroc Weighting of Traits





| | GENETIC IMPROVEMENT | ECONOMIC WEIGHT, EURO | VALUE OF GENETIC IMPROVEMENT, EURO (AT A 100% IMPACT) | GENETIC DISSEMINATION TO PRODUCTION | IMPROVEMENT IN PROFIT CONTRIBUTION, EURO/PIG |
|---|---|---|---|---|---|
| DAILY WEIGHT GAIN (0-30 KG) | 1.0 g/day | 0.01 | -0.01 | (100 %) | -0.01 |
| DAILY WEIGHT GAIN (30-100 KG) | 12.7 g/day | 0.02 | 0.25 | 80 % | 0.20 |
| FEED CONVERSION RATIO | -0.036 FEs/kg | -17.84 | 0.64 | 80 % | 0.53 |
| LEAN MEAT PERCENTAGE | 0.10 % | 1.15 | 0.12 | 150 % | 0.17 |
| KILLING OUT PERCENTAGE | 0.02 kg/pig | 0.66 | 0.01 | (100 %) | 0.01 |
| LP5 (LIVE PIGLETS AT DAY 5) | 0.28 pig** | 1.48** | 0.41 | 85 % | 0.35 |
| CONFORMATION | 0.03 point* | 1.68 | 0.05 | (100 %) | 0.05 |
| LONGEVITY | 0.001 %** | 5.70** | -0.01 | (100 %) | -0.01 |
| AVERAGE OF THE MOST RECENT 4 YEARS AND ALL BREEDS | | | 1.46 | | 1.29 |

*Duroc ** Yorkshire and Landrace

# **DanAvl** Testing

The testing of DanAvl breeding pigs is carried out at the central test station and on-farm under the supervision of the Danish Pig Research Centre.

All litters from Landrace and Large White sows are recorded both in breeding and multiplier herds. This is a total of 110,000 litters per year.

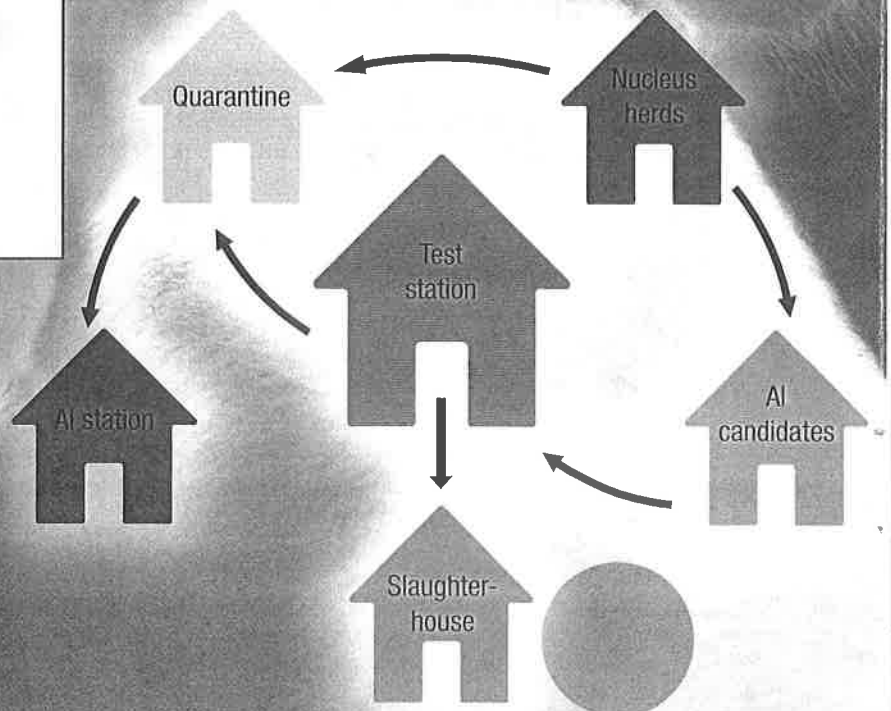
All testing is done individually in the weight interval from 30 to 95 kg. A specific compound feed and specific feed dispenser common to all DanAvl herds is used; tests and results are controlled by the Danish Pig Research Centre. The pigs are fed ad libitum during the whole growth period.

At the end of the test all pigs are weighed and the back-fat thickness is measured ultrasonically. Finally, the conformation of each animal is evaluated. To measure individual feed intake, a transponder feeding system is used on the test station (ACEMA). Approximately 85 % of the boars that are being tested on the station are slaughtered after the test is completed. The production results for the DanAvl breeding herds and central test station in 2012 appear from the tables below.

## Testing programme

| On station | On farm |
|---|---|
| 5,000 males per year | 98,000 males/females per year |
| • daily gain 30-100 kg<br>• lean meat percentage<br>• feed conversation<br>• conformation<br>• slaughterloss | • daily gain 0-30 kg<br>• daily gain 30-100 kg<br>• lean meat percentage<br>• conformation<br>• LP5 (dam) |

## The principles and the structure of the test procedure



## Nucleus breeding herds –average production results for boars

| Breed | Number of pigs | Daily gain (0-30 kg) | Daily gain (30-100 kg) | Lean meat percentage | Conformation |
|---|---|---|---|---|---|
| Duroc | 7,215 | 393 | 1,135 | 61.1 | 2.91 |
| Landrace | 13,264 | 375 | 1,011 | 62.3 | 2.99 |
| Yorkshire | 14,722 | 358 | 977 | 61.8 | 3.13 |
| Total | 35,201 | | | | |

## Nucleus breeding herds –average production results for females/gilts

| Breed | Number of pigs | Daily gain (0-30 kg) | Daily gain (30-100 kg) | Lean meat percentage | Conformation |
|---|---|---|---|---|---|
| Duroc | 9,642 | 396 | 1,086 | 61.4 | 2.98 |
| Landrace | 19,104 | 380 | 952 | 62.7 | 3.08 |
| Yorkshire | 18,390 | 360 | 944 | 61.6 | 3.20 |
| Total | 47,136 | | | | |

## Central test station –average production results for boars

| Breed | Number of pigs | Daily gain (30-100 kg) | Feed conversion FU/kg of gain | Lean meat percentage | Slaughter loss, kg |
|---|---|---|---|---|---|
| Duroc | 2,358 | 1,111 | 2.30 | 60.0 | 24.9 |
| Landrace | 1,271 | 1,021 | 2.41 | 60.4 | 25.3 |
| Yorkshire | 1,217 | 951 | 2.41 | 60.8 | 25.4 |
| Total | 4,846 | | | | |

# **DanAvl** Index Calculation

Selection of breeding animals is the foundation of improvements within the breeding programme; therefore selection is a very important task within the DanAvl.

Since the early 1980s all animals within DanAvl breeding and multiplier herds have been registered in the DanAvl Databank. Each week the breeding and multiplying herds send all data concerning matings, farrowings, litters, live born, still born and LP5 and weaning to the DanAvl database. Once a week the central computer at the Pig Research Centre automatically runs an index calculation for all animals within the population. Consequently, a new index for all animals in the breeding programme is available every Thursday morning.

The calculations are made by a UNIX computer using the PEST programme developed by E. Groeneveld. The method used for the index calculation is the Best Linear Unbiased Prediction method also known as BLUP.

A reliable multi-trait animal model is used. The model is developed on the basis of well-founded assessments of genetic correlations and heritabilities meaning all known correlations between the various traits of the breeding goal. This is very important when a trait is measured on a few animals, such as for example feed conversion, which is only measured at the test station.

When computing the breeding values, the results are obtained using the following model:

$$Y = S + K + a + l + p + e$$

**where:**
**S** is the effect of section (contemporary group)
**K** is effect of sex
**a** is the breeding value
**l** is the effect of litter
**p** is the effect of pen
**e** is residual

In the DanAvl breeding programme, 90-95 % of the sows are artificially inseminated. By means of AI and the station test, genetic relationships are created between the breeding stocks in different herds. This genetic relationship allows the efficient use of the multi-trait BLUP method.

All litters, from 1985 to the present day, are taken into account in the weekly index calculation. There is therefore a high degree of certainty for the estimation of the fertility of the breeding population.

# **DanAvl** Genetic Trend

The purpose of breeding is to create a genetic improvement for the traits that are part of the breeding goal. The table below shows the average genetic improvement for all three breeds achieved during the last four years.

## Breeding progress 2009-2013

| Breed | Daily gain (0-30 kg) g/day | Daily gain (30-100 kg) g/day | Feed conv. FUs/kg of gain | Lean meat percentage | Slaughter loss, kg | Confor-mation | LP5* | Longevity |
|---|---|---|---|---|---|---|---|---|
| Duroc | 3.6 | 17.9 | -0.045 | 0.16 | 0.01 | 0.02 | - | - |
| Landrace | -0.4 | 7.9 | -0.033 | 0.07 | -0.07 | 0.05 | 0.19 | -0.03 |
| Yorkshire | -0.4 | 7.7 | -0.028 | 0.02 | -0.03 | 0.05 | 0.29 | -0.03 |
| Average (all breeds) | 1.6 | 12.9 | -0.038 | 0.10 | -0.02 | 0.04 | 0.24 | -0.001 |

* Live piglets at day 5 after farrowing.

As shown above, significant genetic improvements are found for all traits within the breeding goal. The genetic progress created by DanAvl has a high economic value. It is estimated that the competitive performance of Danish breeding pigs increases with 1.2 EUR/1.5 USD per pig per year.

The important question is whether the improvements seen in the breeding herds, penetrate to the commercial herds or if a genotype by environment interaction will affect the results from the breeding herds and the results in the commercial herds. DanAvl has carried out trials to shed light on this question.

The trials included the traits daily gain and lean meat percentage. The tables below show how the genetic improvement achieved in the breeding programme is being transferred to the commercial herds.

Consequently, DanAvl is a breeding programme that does not merely create genetic improvement in the nucleus. It has been established that the commercial herds benefit from these improvements.

## Transfer of production traits measured in 4,500 slaughter pigs (crossbreds)

| | Daily gain | Lean meat percentage |
|---|---|---|
| Males | 104 % | 83 % |
| Females | 84 % | 93 % |
| Castrates | 37 % | 185 % |
| Average (females + castrates) | 61 % | 139 % |
| Average (females + males) | 93 % | 88 % |

# **DanAvl** Genomic Selection

DanAvl has within the past few years refined the selection index by adding genomic information into the calculation, to create further genetic progress. This means that DNA information from animals in the breeding herds and AI stations is being included when calculating the breeding values and index of the DanAvl population.

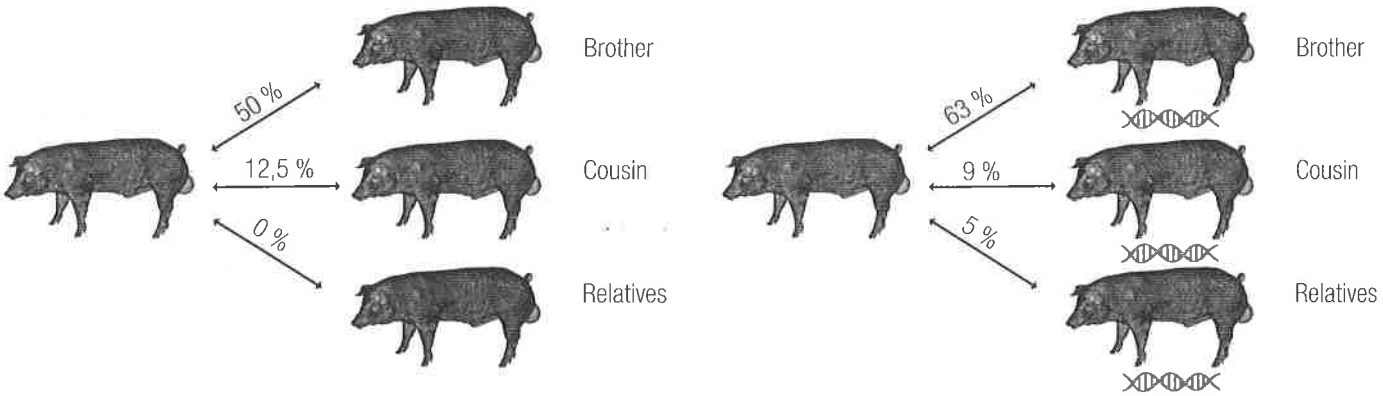



Figure: Traditioinal relationship versus genomic tested relationship between brother, cousin and distant relatives.

## Traditional relations versus genomic relations

Genetic relations between siblings are traditionally calculated to be 50 %. Cousins traditionally share 12.5 % genes and distant relatives are traditionally not related. The traditional relations are thus only an expression for the average genetic relations. DNA tests can reveal the accurate genetic relationship within a family.
The exact genetic relationship between the tested animals might show a closer genetic relationship to siblings than the expected, but a more distant genetic relationship to a cousin. The test can even reveal if there is a genetic relationship to distant relatives.

## DanAvl advantage of genomic selection

DNA tests of the animals in the Danish breeding herds and AI stations, reveals the relationship between the animals within the population. From animal performance tests the Danish Pig Research centre have information of the performances. When combining the information on genetic relations between the animals of the population with the actual performance results of the animals, a more accurate breeding value can be calculated. This makes it possible for the breeding herds to select the animals with the highest heritability for the traits within the breeding scheme as foundation for the next generation.

The advantage of including the genetic information to the breeding index calculation is that the breeding progresses for all traits are accelerated. This will for example mean that traits as feed utilisation, longevity and lean meat percentage, will improve more rapidly than seen by using traditional selection. The improvement will spread as ripples from the breeding farms over the multiplier farms to the commercial production.

# **DanAvl** Genetic Progress

Figure: Trend in piglets alive at day five and mortality in nucleus and multiplier herds

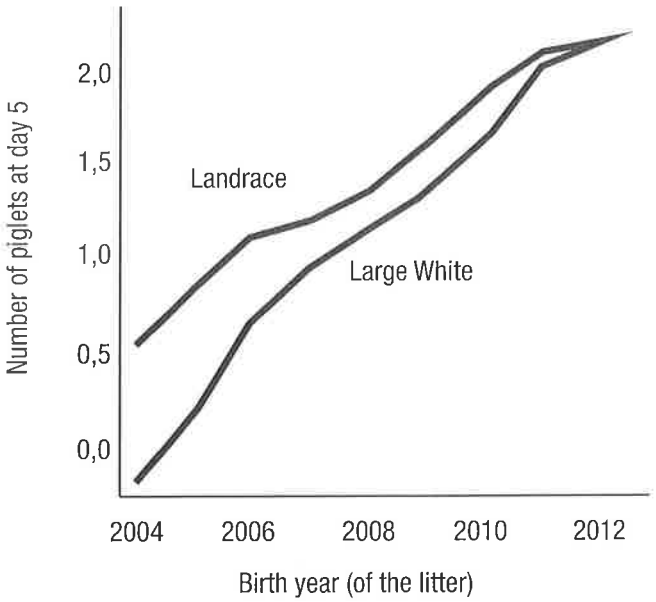
The essential goal within the DanAvl breeding programme is to continuously improve the overall production results for the breeds within the breeding programme. This is done by ongoing research and development in association with the leading universities and research institutes all over the world as well as analysing the results in the Danish commercial production, in order follow the effect of the breeding objectives to the end user.

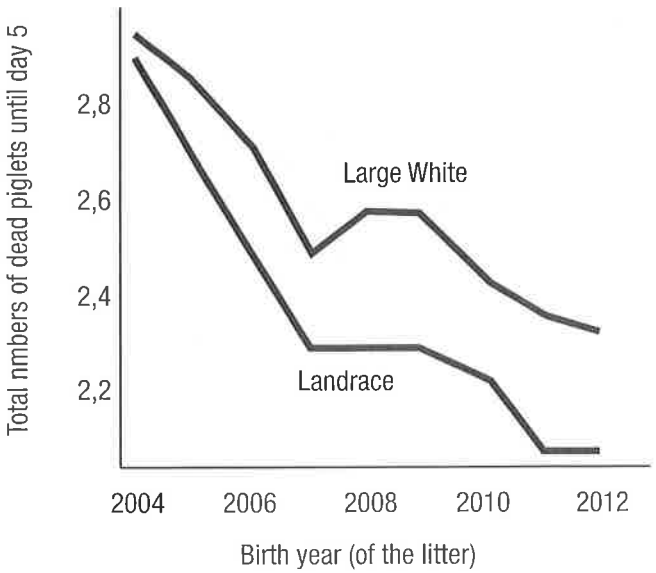
## Dam line Progress

One of the big successes within the DanAvl breeding programme is the continual improvement of number of live born piglets. The dam lines within DanAvl are highly prolific and strong sows. Litter size has been a part of the DanAvl breeding objective for more than 20 years and the litter size is still increasing. As shown in the table below litter size has developed with around 2.5 piglets over the last 10 years and the average number of weaned piglets is reaching 30 per sow per year in Danish sow herds. A goal of 35 piglets per sow per year is not unachievable.

In 2004 the Danish Pig Research centre changed the breeding objective for the DanAvl Dam line from focus on litter size to focus on piglets alive on day 5, the LP5 trait. The new trait was chosen because this would secure ongoing progress in litter size as well as a reduction in piglet mortality at birth and until day 5.

As shown in the figure below, the LP5 trait has been a success as the number of piglets alive on day 5 has increased and piglet motility has been reduced over the last 10 years. The Danish Pig Research centre expects the mortality to decrease even more over the coming years, as well as the number of live born will rise.




## Average production level in sow herds from 2004 to 2012

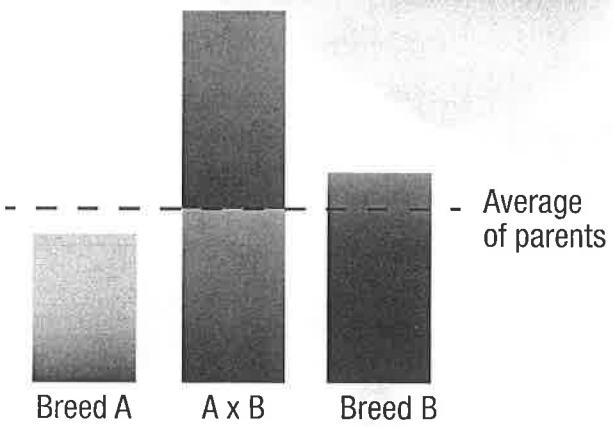
| | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Average weaned per sow per year | 29.6 | 28.8 | 28.1 | 27.5 | 27.2 | 27.3 | 26.0 | 25.6 | 25.0 | 24.6 |
| Liveborn per litter | 15.1 | 14.8 | 14.5 | 14.2 | 14.1 | 14.0 | 13.6 | 13.3 | 13.0 | 12.7 |
| Weaned per litter | 13.1 | 12.7 | 12.4 | 12.2 | 12.1 | 12.1 | 11.7 | 11.4 | 11.2 | 10.9 |

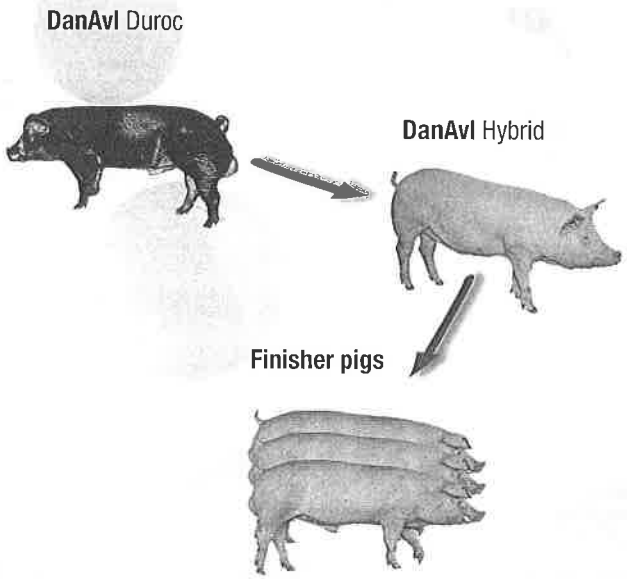
# **DanAvl** Crossbreeding

The purpose of crossbreeding is to utilise the effects of heterosis. Partly to improve fertility and production, partly to combine the different characteristics for which the lines were previously selected. For meat production a desirable quality in the final product is to produce large numbers of rapidly growing individuals. This requires good fertility in the mother combined with good growth rate in the progeny.

The heterosis effect makes the hybrid pigs better than the average of the parents. The traits with the lower heritability show the largest heterosis effect. This is particularly true for fertility, mothering abilities and body structure, which have a low heritability.

## Heterosis Effect




The performance of the DanAvl breeds in regard to daily gain, feed conversion ratio, lean meat percentage, LP5 (live piglets at day 5 after farrowing), body structure and killing out percentage (also called slaughter loss) is improved continuously and successfully by DanAvl.

However, the benefits from these improvements can be maximised by crossbreeding the DanAvl breeds.

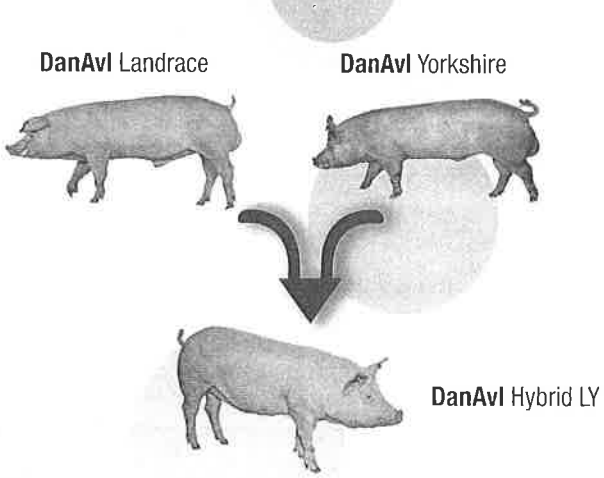
The DanAvl Crossbreeding Programme consists of the two 2 dam lines: DanAvl Landrace and DanAvl Yorkshire (Large White), and the sire line: DanAvl Duroc.

DanAvl Landrace and DanAvl Yorkshire (Large White) are the ideal breeds to produce females. These two breeds have a high fertility, very good mothering abilities combined with very good meat quality.

The first cross between the mother lines is the DanAvl hybrid (LY/YL). The DanAvl Hybrid is very popular as parent sow in the commercial herds. Studies have shown that DanAvl Hybrid females produce 1.5 more piglets per litter than purebred DanAvl Landrace and Yorkshire.

The terminal sires within the DanAvl crossbreeding programme is the DanAvl Duroc, which show very good mating abilities. Studies carried out by the Danish Pig Research Centre comparing different mating combinations have shown that pure DanAvl Duroc as terminal sires ensure the best economic results.

About 95% of the annual production of slaughter pigs produced in Denmark originates from pure DanAvl Duroc sire the rest are using either a DanAvl Duroc crossbred boar or foreign breeds. Using the Danish crossbreeding programme Danish pig producers produce 29 mill slaughter pigs per year and obtain excellent results.



## Sow units – top 5 herds. top 25 percent and average production level for 2011 and 2012

| Herd Rank | 1 | 2 | 3 | 4 | 5 | Top 25% | Av. 2012 | Av. 2011 |
|---|---|---|---|---|---|---|---|---|
| Weaned pigs per sow per year | 35.9 | 35.8 | 35.3 | 35.1 | 34.8 | 32.3 | 29.6 | 28.8 |
| Live born pigs per litter | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Weaned pigs per litter | 14.8 | 15.1 | 15.2 | 14.9 | 14.8 | 14.0 | 13.1 | 12.7 |
| Weight at weaning (kg) | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 7.1 |
| Age at weaning (Days) | 26 | 29 | 31 | 32 | 27 | 30 | 31 | 31 |
| Mortality during lactating period (%) | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Farrowing rate (%) | 92.8 | 94.4 | 92.0 | 96.3 | 90.7 | 90.1 | 87.0 | 86.7 |

## Slaughter pigs - top 5 herds. top 25 percent and average production level for 2011 and 2012

| Herd Rank | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | Av. 2012 | Av. 2011 |
|---|---|---|---|---|---|---|---|---|
| Daily gain (30-100 kg) | 1113 | 1078 | 1068 | 1050 | 994 | 973 | 906 | 899 |
| Feed units per kg gain | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 2.87 |
| Carcass weight (kg) | 83.6 | 84.2 | 84.4 | 83.4 | 80.8 | 82.2 | 81.8 | 81.6 |
| Live weight at slaughter (Kg) | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Lean meat percentage | 59.2 | 59.3 | 59.2 | 59.3 | 60.2 | 60.4 | 60.4 | 60.4 |
| Mortality (%) | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

# **Danish** health declaration

Denmark is declared free of all contagious diseases such as Classical and African swine fever, Foot and Mouth Disease, SVD, aujeszky's Disease and Teschen's Disease as well as Brucellosis, Tuberculosis and Trichinosis.
Additionally all the registered DanAvl breeding and multiplier herds are affiliated to the Danish SPF programme, and are placed within the highest health and security levels of the health programme.

## The Danish SPF Health Programme

SPF (Specific Pathogen Free) is a closed production and health system. Farms affiliated to the SPF programme must follow a strict set of rules regarding infection control and health control.

All farms that comply with the rules of the Danish SPF Health Status Department (SPF-SuS) are given a SPF status.
The three main points of any Danish SPF health status are:

1. A colour coded safety level
2. A SPF Health declaration
3. An Additional Status Information

## 1. Colour coded Safety Level:

The Danish SPF herds are organised into three overall safety levels: Red, blue and green.

**Red:** The highest safety level. Health control is carried out once per month by the veterinarians form the Danish Pig research centre.

**Blue:** The second highest safety level. Health control is carried out at least once every 15th week.

**Green:** Herds aspiring to get the blue status.

## 2. SPF Health Declarations

The Danish SPF diseases declared on the basis of the SPF health control are:

- Myc: Mycoplasma hyopneumonia (Enzootic Pneumonia)
- Ap: Actinobacillus pleuropneumoniae (Pleuropneumonia) serotypes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12
- Nys: Atrophic rhinitis
- Dys: Swine dysentery
- PRRS: Porcine Reproductive and Respiratory Syndrome DK virus (European strain) Vaccine virus (American strain)
- Skab: Mange
- Lus: Lice

Should one of the above-mentioned deceases appear in a Danish SPF herd will this disease be added to the Health status; this could for example be Blue SPF+Myc+Ap6, meaning that this herd is placed in the second highest safety level and is not free of Mycoplasma hyopneumonia or Actinobacillus pleuropneumoniae serotype 6.

## 3. Additional Status Information

This is information to the potential buyers about conditions which does not directly influence the health or safety level of the herd.

**Additional status information may include:**

- Salmonella index: The current monthly index of a breeding and multiplier herd
- Salmonella level: The current salmonella level in meat juice samples
- Oedema disease: SPF farms are obligated to inform of oedema disease up to 12 months after the symptoms have disappeared.

The Danish SPF Health Programme is an open programme and the health status of all herds within the programme is available to the public via the web site www.spf-sus.dk

Animals from Danish SPF herds are transported in specially equipped trucks with pressurized air-filter ventilation to avoid contamination of the animals during transfer from one farm to another.

# **10 good reasons**
# for using DanAvl breeding stock

1. Strong body conformation
2. Excellent durability
3. Large litters
4. Vigorous litters
5. Good mothering abilities
6. Good teat lines
7. Good milking abilities
8. Low feed conversion ratio
9. High lean meat percentage
10. No stress

DanBred International has more than 40 years of experience in continued provision of breeding support and implementation of genetic solutions customised to suit the needs, demands and expectations of professional commercial pig producer all over the world. DanBred International strives to provide the best possible service for our customers, including assistance in selection of breeding pigs and carrying out export arrangements as well as implementation and breeding support to all parts of the world. For further information and contact addresses please visit our website: Danbredint.com

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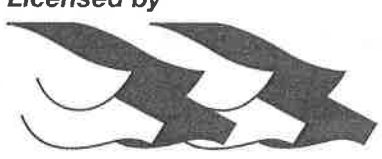


**Dan Avl**

Link Grafik

KNOWLEDGE – GROWTH – BALANCE

# FACTS AND FIGURES

## DANISH AGRICULTURE AND FOOD 2012

Danish Agriculture
& Food Council

# Facts and figures about Danish agriculture and food

2012

Among the Nordic countries, Denmark is the southernmost and also the smallest. The peninsula of Jutland shares its southern border with Germany and is connected to the two major islands of Funen and Zealand by bridges. Formed by the movement and melting of Ice Age glaciers, the 4.3 million hectares landscape is flat and fertile, and more than 60 percent of the land is cultivated. The climate is tempered and fairly distinct in four annual seasons.

Denmark has a population of approximately 5.5 million, one fourth of which lives in and around the capital of Copenhagen. The country is characterised by a thriving business life and a highly competetive research and development environment. For centuries, agriculture was the main industry in Denmark and farming still plays a vital role. Today, Danish agriculture is among the most efficient and knowledge based agricultural sectors in the world. This succes can be ascribed to a high level of education and organisation, embodied in the Danish co-operative movement, as well as good agricultural soil. Internal competition and demand from consumers and export markets create a constantly changing business environment for Danish agriculture and food production and, on a global scale, Denmark is in the lead when it comes to food quality and safety and the development of new agricultural products.

# Content



"Danish agriculture is **among the most efficient** and knowledge based agricultural sectors in the world."

## Danish co-operatives

The major food producing enterprises in Denmark are farmers' co-operative companies. The tradition of farmers' co-operatives dates back around 150 years to a time when farmers formed local co-operatives to strengthen their position in the value chain. Through a gradual process of mergers and consolidation, local co-operatives have metamorphosed into global-scale enterprises.

Although these enterprises are among the world's largest exporters of safe quality food products, they still operate according to the principles of full farmer ownership, voluntary and open membership and democratic member control, namely one member – one vote. Today, the co-operatives are among Denmark's largest enterprises and their collective turnover is close to 10 percent of the country's GDP.

Table 1

## TURNOVER IN DANISH CO-OPERATIVES, MILLION DANISH KRONER

| | 2010 |
|---|---|
| Dairy sector | |
| Arla Foods | 49,030 |
| Thise | 501 |
| Meat sector | |
| Danish Crown | 45,211 |
| Tican | 4,001 |
| DAT Schaub | 2,530 |
| Daka | 966 |
| Farm supply sector | |
| DLG | 39,364 |
| DLA Group | 19,000 |
| Other sectors | |
| Kopenhagen Fur Center | 7,117 |
| DLF Trifolium | 2,001 |
| Danæg | 963 |
| KMC / AKV Langholt | 788 |

Source: Company balance sheets

171,472 ≒ 948,183.4

# Agricultural production

Denmark is home to various types of agricultural production from animal products such as pork, beef, poultry and dairy to vegetable products including potato starch and grass seeds, as well as traditional grain and vegetable crops. Due to structural development, farms have become fewer and larger and with modern trade patterns their profitability increasingly depends on global market trends.

## Basis for productivity

In 2010, the arable land in Denmark was 2,646,000 hectares (6,538,000 acres). The total area of grain production was 1,469,000 hectares (3,630,000 acres). Whereas the shares of winter wheat and rye are increasing, spring barley, oats, meslin and triticale are decreasing. The number of farms in 2010 was 42,099, out of which approximately one third is owned by full-time farmers. The total number of cattle in 2010 was 31,000, and the total number of pigs was 13,173,000.

Table 2

## AGRICULTURAL AREA BY TYPE OF CROP, 1,000 HA.

| | 1995-99 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Winter wheat | 643 | 684 | 639 | 716 | 744 |
| Spring wheat | 7 | 8 | 11 | 9 | 14 |
| Rye | 81 | 30 | 31 | 42 | 51 |
| Winter barley | 174 | 169 | 127 | 141 | 143 |
| Spring barley | 530 | 457 | 581 | 443 | 426 |
| Oat, dredge, corn and triticale | 48 | 97 | 117 | 101 | 83 |
| Cereals, total | 1,483 | 1,445 | 1,505 | 1,461 | 1,469 |
| Pulses | 82 | 6 | 5 | 6 | 10 |
| Linseed | 5 | 0 | 0 | 0 | 0 |
| Winter rape seed | 89 | 179 | 173 | 160 | 163 |
| Spring rape seed | 34 | 1 | 0 | 1 | 1 |
| Rape seed, total | 123 | 180 | 173 | 161 | 165 |
| of this non food rape seed | 21 | 31 | 0 | 0 | 0 |
| EU-reform fallow | 176 | 154 | 71 | 6 | 10 |
| Set a-side area, total | 197 | 184 | 71 | 6 | 10 |
| Potatoes | 40 | 41 | 42 | 38 | 38 |
| Sugar beets for production | 67 | 39 | 36 | 38 | 39 |
| Seeds for sowing | 70 | 87 | 82 | 90 | 67 |
| Horticultural products | 22 | 21 | 22 | 21 | 20 |
| Others | 1 | 18 | 20 | 52 | 41 |
| Cereal for green fodder | 109 | 60 | 52 | 56 | 63 |
| Maize for silage | 43 | 145 | 159 | 169 | 172 |
| Fodder sugar beets | 37 | 4 | 5 | 5 | 4 |
| Grass, lucerne etc. in rotation | 253 | 266 | 304 | 311 | 327 |
| Grass outside rotation | 177 | 197 | 190 | 192 | 200 |
| Roughage incl. green cereal | 442 | 475 | 520 | 541 | 566 |
| Total cultivated areas | 2,689 | 2,663 | 2,668 | 2,624 | 2,646 |
| Cultivated in percent of Denmarks area | 62.4 | 61.8 | 61.9 | 60.9 | 61.4 |

Source: Statistics Denmark

## Grain is Denmark's main crop

Denmark's total area is 4,310,000 hectares (10,650,000 acres). In 2010, 2,646,000 hectares were cultivated, corresponding to 61.4 percent of Denmark's total area. The highest percentage was reached in the 1930's, when 3,268,000 hectares corresponding to 76 percent of Denmark's area was cultivated. A large proportion of the land which has been given over to other use is now utilised for nature reserves and recreational purposes.

**Table 3**

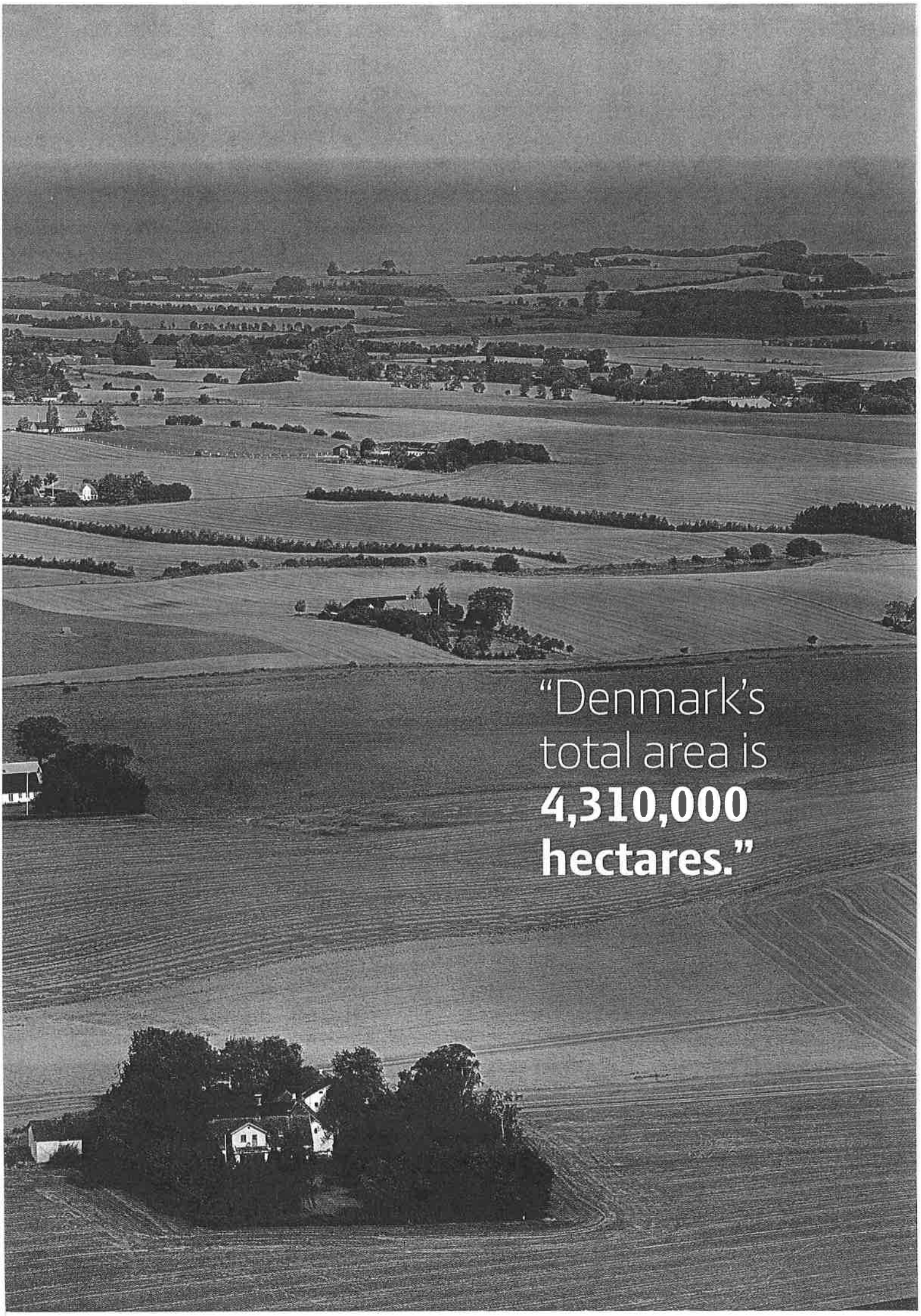
**AGRICULTURAL AREA AND NUMBER OF HOLDINGS, SORTED BY SIZE OF HOLDING**

| | Agricultural area, 1,000 ha | | | | Number of holdings | | | |
|---|---|---|---|---|---|---|---|---|
| | 1995-99 | 2008 | 2009 | 2010 | 1995-99 | 2008 | 2009 | 2010 |
| Without cropland | | | | | 814 | 785 | 679 | 1,980 |
| Less than 5 ha | 4 | 3 | 3 | 4 | 1,268 | 953 | 826 | 1,099 |
| 5-10 ha | 74 | 61 | 62 | 58 | 10,139 | 8,476 | 8,615 | 8,031 |
| 10-20 ha | 192 | 117 | 108 | 112 | 13,204 | 8,157 | 7,556 | 7,785 |
| 20-30 ha | 214 | 122 | 112 | 106 | 8,668 | 4,943 | 4,532 | 4,304 |
| 30-50 ha | 433 | 208 | 195 | 191 | 11,109 | 5,365 | 5,018 | 4,896 |
| 50-100 ha | 836 | 477 | 435 | 426 | 12,003 | 6,619 | 6,034 | 5,925 |
| 100-200 ha | 599 | 748 | 728 | 702 | 4,512 | 5,315 | 5,176 | 4,981 |
| More than 200 ha | 338 | 932 | 981 | 1,048 | 1,072 | 2,800 | 2,949 | 3,098 |
| Total | 2,689 | 2,668 | 2,624 | 2,646 | 62,788 | 43,413 | 41,385 | 42,099 |
| Average size of holding | | | | | 42.8 | 61.5 | 63.4 | 62.9 |
| Horticultural holdings | 30 | 34 | 32 | | 2,254 | 1,580 | 1,360 | |

Source: Statistics Denmark

Note: From 2010 onwards, holdings with fur animals as their sole agricultural activity are included, as are several/more small holdings.

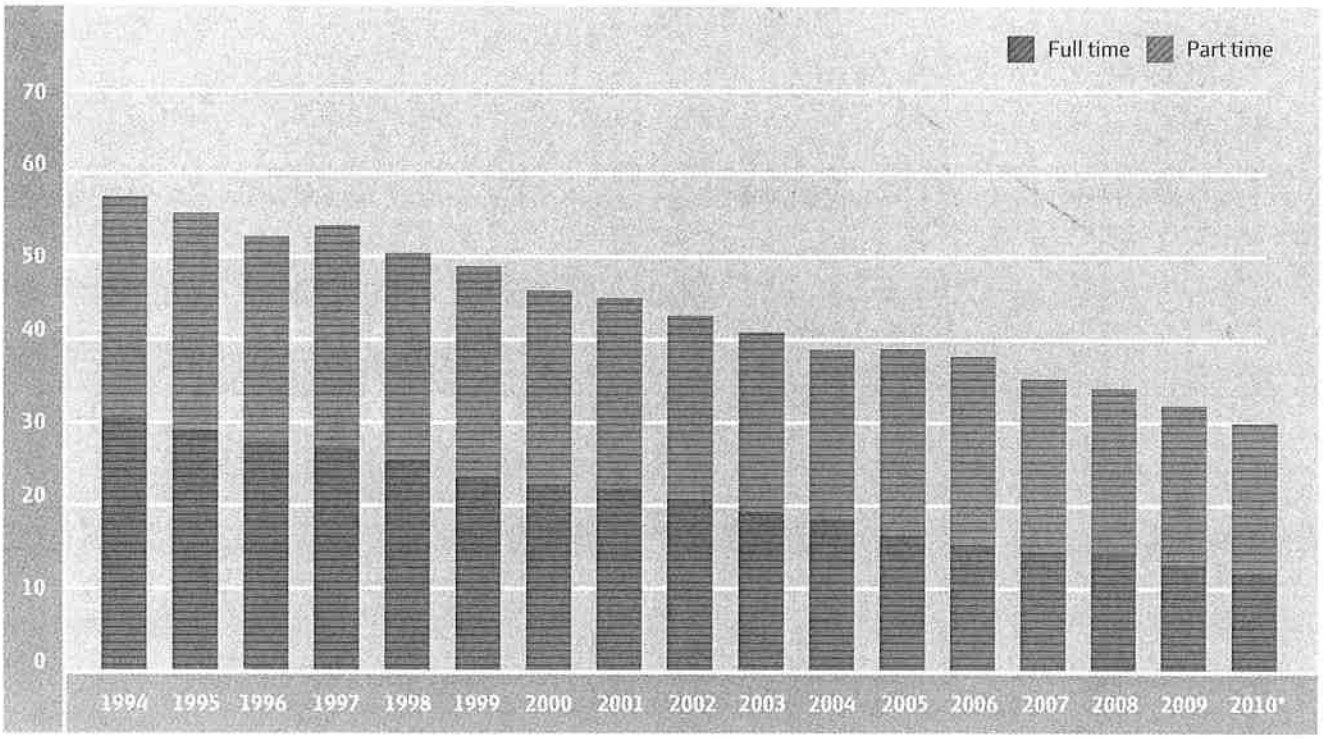
The total area of forage crops is expected to increase in 2011 due to a rise in grass areas in rotation and corn for silage. Wholeseed grain areas are also expected to increase despite a slightly higher yield of feed units per hectare for corn.


"Denmark's
total area is
4,310,000
hectares."

## Fewer farms with cultivated land

There is an overall decreasing tendency in the number of farms in Denmark. Recent deviations from this tendency are mainly due to new procedures for compilation of statistics. Especially farms in the size range 5-10 hectares decreased in 2010, whereas the number of farms between 10-100 hectares and over 200 hectares rose 2.2 and 5.5 percent, respectively. Consequently, the average farm size grew slightly less than one percent to 65 hectares per farm. This tendency is in accord with the continued structural development of production being concentrated on fewer, larger farms. Both full-time and part-time farms are estimated to have decreased in 2010. Full-time farms are defined as farms requiring work equal to one full-time position or more.

**Figure 4** – Development in number of farms, 1,000.




Source: Statistics Denmark

## Decreasing horticultural businesses

In 2009 there were 1,360 horticultural businesses in Denmark. The horticultural sector is subject to the same structural tendency of consolidation into fewer and larger units.

## Animal stock

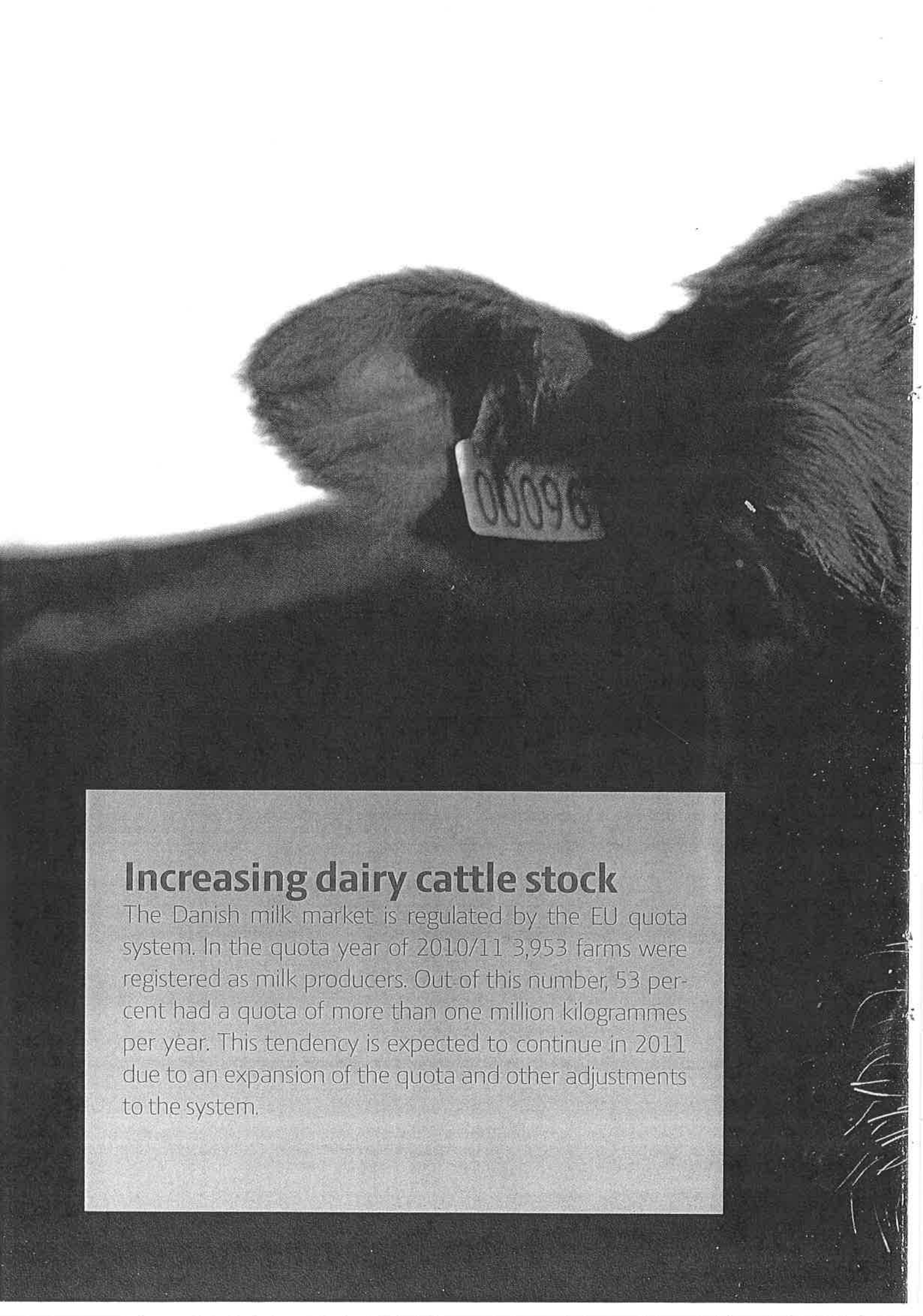
Animal production in Denmark has followed the overall structural tendency towards fewer, larger farms. Simultaneously, farms have become more specialised, focusing on one type of animal production. In 2008 only 3 percent of Danish farms had both cattle and pigs. In recent years pork production has increased its share of the total livestock production, and herds have increased in size. 77 percent of Danish pigs are kept on farms with herds of more than 2,000 pigs.

**Table 5**

**LIVESTOCK NUMBERS IN MAY/JUNE, 1,000**

| | 1995-2000 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Cattle, total | 1,987 | 1,566 | 1,564 | 1,540 | 1,571 |
| of which dairy cows | 670 | 545 | 558 | 563 | 568 |
| suckler cow | 123 | 106 | 107 | 96 | 101 |
| Pigs, total | 11,429 | 13,723 | 12,738 | 12,369 | 13,173 |
| of which sows | 1,055 | 1,148 | 1,059 | 1,088 | 1,117 |
| Sheep | 150 | 136 | 136 | 104 | 160 |
| Hens more than ½ year old | 3,999 | 3,521 | 3,521 | 3,280 | 3,900 |
| Young chickens | 15,172 | 12,793 | 11,189 | 15,944 | 14,184 |
| of which broilers | 13,682 | 11,758 | 9,737 | 14,787 | 12,836 |
| Turkey | 452 | 194 | 169 | 165 | 201 |
| Ducks | 361 | 211 | 214 | 208 | 224 |
| Geese | 19 | 14 | 14 | 10 | 7 |
| Mink, breeding females | 2,298 | 2,832 | 2,807 | 2,720 | |

Source: Statistics Denmark



## Increasing dairy cattle stock

The Danish milk market is regulated by the EU quota system. In the quota year of 2010/11 3,953 farms were registered as milk producers. Out of this number, 53 percent had a quota of more than one million kilogrammes per year. This tendency is expected to continue in 2011 due to an expansion of the quota and other adjustments to the system.

00096

## Fewer suckler cows

There is a long-term tendency towards decrease in the number of suckler cows. The minor deviation in 2010 is due to new compilation methods which include more small-scale farms.

## More pigs

The pig sector is characterised by a high degree of specialisation and growing sizes of production units. Around 50 percent of pigs are in farms with more than 5,000 pigs. The average number of pigs per pig farm was 2,599 in 2010. The total pig population was 13,173,000 in 2010, corresponding to an increase of 6.5 percent from the previous year.

**Table 6**

**CHANGES IN THE STRUCTURE OF PIGHERDS**

| | Pigherds, total | | | Pct. of total pigherds | | |
|---|---|---|---|---|---|---|
| | 1995-99 | 2009 | 2010 | 1995-99 | 2009 | 2010 |
| **Number of pigs in the herds:** | | | | | | |
| 1-49 | 23.8 | 10.9 | 10.8 | 0.8 | 0.1 | 0.1 |
| 50-99 | 10.3 | 2.3 | 2.5 | 1.2 | 0.1 | 0.1 |
| 100-499 | 29.9 | 12.0 | 10.8 | 12.6 | 1.3 | 1.2 |
| 500-999 | 16.1 | 11.5 | 11.1 | 18.8 | 3.5 | 3.2 |
| 1,000-1,999 | 13.1 | 19.4 | 19.4 | 29.9 | 11.6 | 10.9 |
| 2,000-4,999 | 6.1 | 30.0 | 29.3 | 28.5 | 39.1 | 36.5 |
| 5,000 and more | 0.7 | 14.0 | 16.0 | 8.2 | 44.3 | 48.1 |
| Total, pct. | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Herds, total | 18,648 | 5,042 | 5,068 | | | |
| and pigs, 1,000 | 11,406 | 12,369 | 13,173 | | | |
| Pigs per farm | 612 | 2,453 | 2,599 | | | |

Source: Statistics Denmark

## Increasing stock of hens

The stock of hens was 3.9 million in 2010. Egg production has been subject to a significant consolidation in recent years, partly driven by the egg packers' wish to rationalise the collection of eggs from producers.

## Fewer broilers

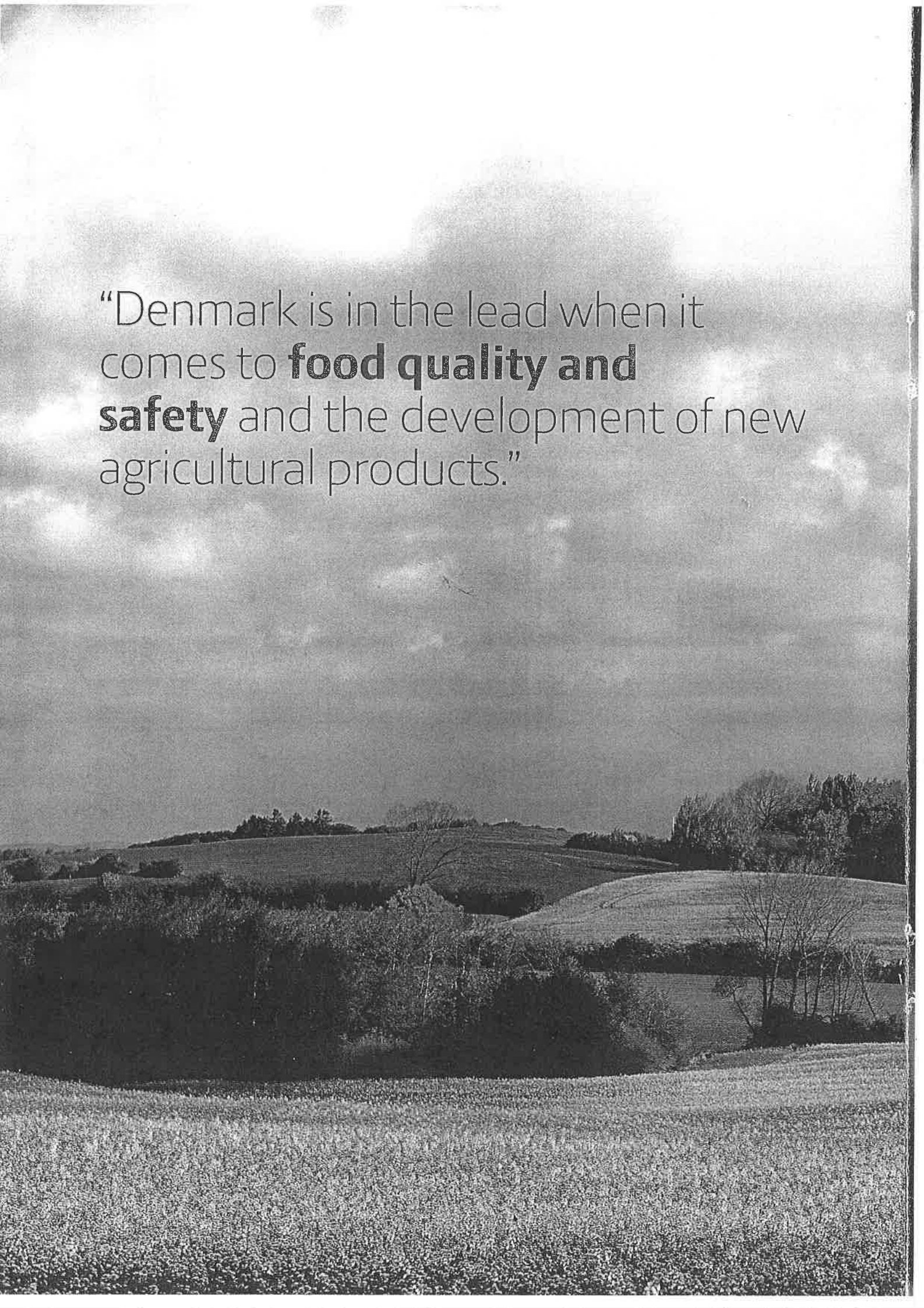
The stock of broilers was 12.8 million in 2010, decreasing by 13 percent from 2009. Broiler production is concentrated on a few large units, and the majority of farms have more than 25,000 broilers.

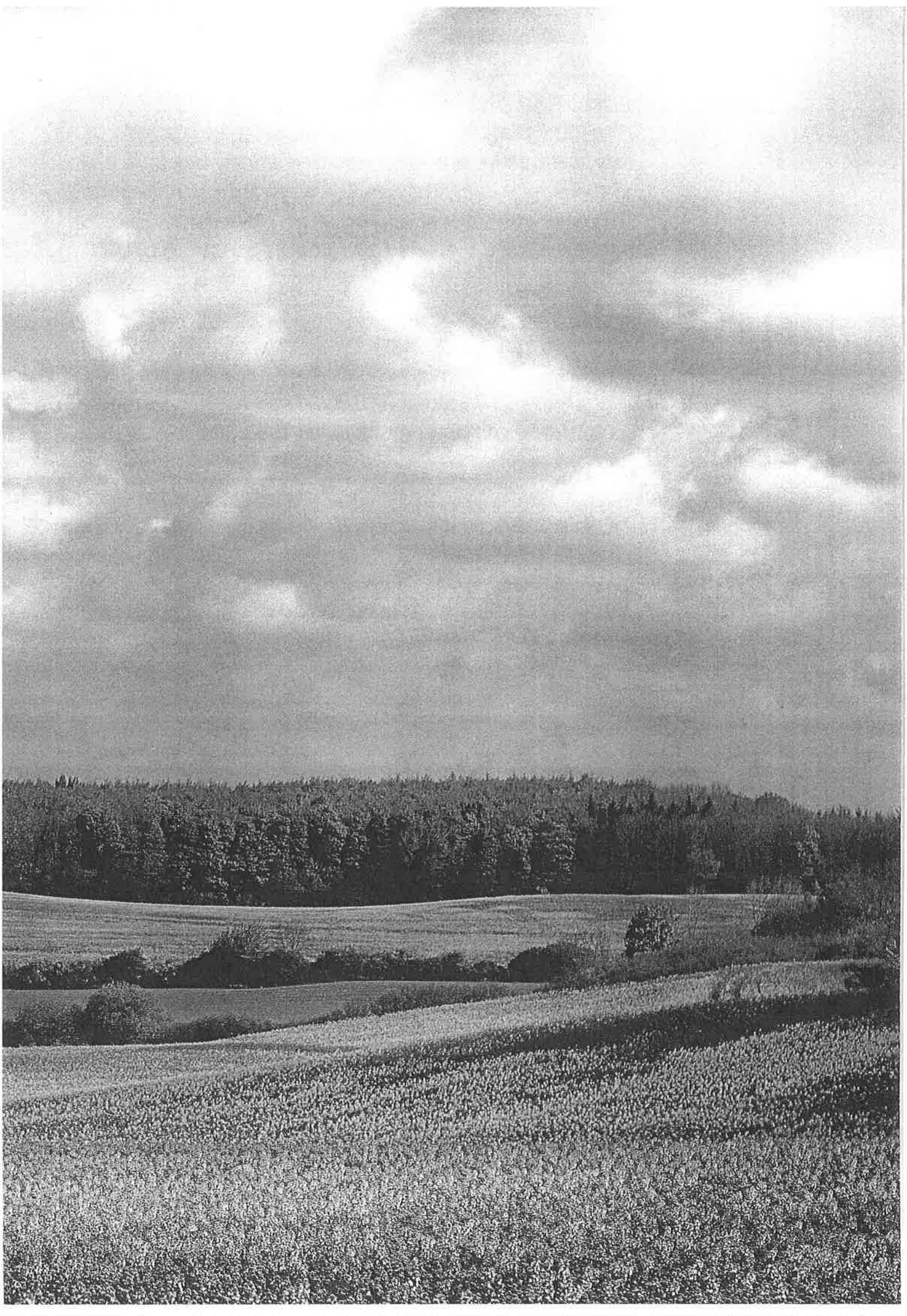
**Table 7**

**SIZE OF LIVESTOCK PRODUCTION, MILLION KILOGRAMMES**

| | Size of livestock production, mill. Kg. | | | | | |
|---|---|---|---|---|---|---|
| | 1995-99 | 2006 | 2007 | 2008 | 2009 | 2010 |
| Milk production, total | 4,665 | 4,627 | 4,650 | 4,720 | 4,814 | 4,909 |
| Butter | 52 | 38 | 36 | 38 | 37 | 34 |
| Cheese | 297 | 335 | 346 | 324 | 321 | 292 |
| Beef and veal | 189 | 140 | 141 | 138 | 137 | 142 |
| Pork | 1,672 | 1,957 | 2,046 | 1,985 | 1,898 | 1,974 |
| Horse meat | 1 | 1 | 1 | 1 | 1 | 1 |
| Lamb and mutton | 2 | 2 | 2 | 2 | 2 | 2 |
| Poultry | 190 | 185 | 198 | 205 | 197 | 219 |
| Eggs | 76 | 67 | 67 | 68 | 61 | 63 |
| Fur skin, 1,000 | 10,400 | 13,500 | 14,500 | 14,000 | 14,000 | 14,000 |

Source: Statistics Denmark


"Denmark is in the lead when it comes to **food quality and safety** and the development of new agricultural products."



## Growing stock of ducks and turkeys

The last decade saw an overall decrease in the stock of ducks, geese and turkeys, due to increased veterinary demands and the closing of slaughterhouses. The tendency was reversed in 2010, when the stock of ducks rose by 7 percent to 224,000 and the stock of turkeys rose by almost 22 percent to 201,000. In 2010, the stock of geese decreased by 27 percent to 7,000.

## More sheep in Denmark

The stock of sheep has generally been decreasing since 2006. An increase of 53 percent to 160,000 sheep in 2010 was mainly due to new compilation methods for the number of animal farms.

## Stable mink stock stable

The mink stock is relatively stable around 2.7 million breeding animals. Mink farms are geographically concentrated in the Western regions, with more than half of the farms located in the northern and western parts of Jutland.

## Agricultural production

After a record year in 2009, vegetable production decreased 13.5 percent to 156,000 tonnes in 2010. Conversely, animal production in such areas as dairy, beef and pork increased in 2010.

## Decreasing vegetable production

After a record harvest of 10.1 million tonnes of grain in 2009, yield decreased to 8.7 million tonnes in 2010. The decrease can mainly be attributed to significant decreases in the output of Denmark's three major cereal types: winter wheat, spring barley and winter barley. Production of winter wheat decreased 15 percent from 2009 to 2010. The spring barley and winter barley yields showed comparable decreases, whereas the production of spring wheat and rye went up by 46 percent and 7 percent, respectively.

In 2010 the production of fodder beets decreased 27 percent, while the more popular sugar beets increased 24 percent. The production of rape and potatoes was previously stable, but fell 9 and 16 percent respectively from 2009 to 2010. The production of pulses fell by 14 percent in the same period.

**Table 8**

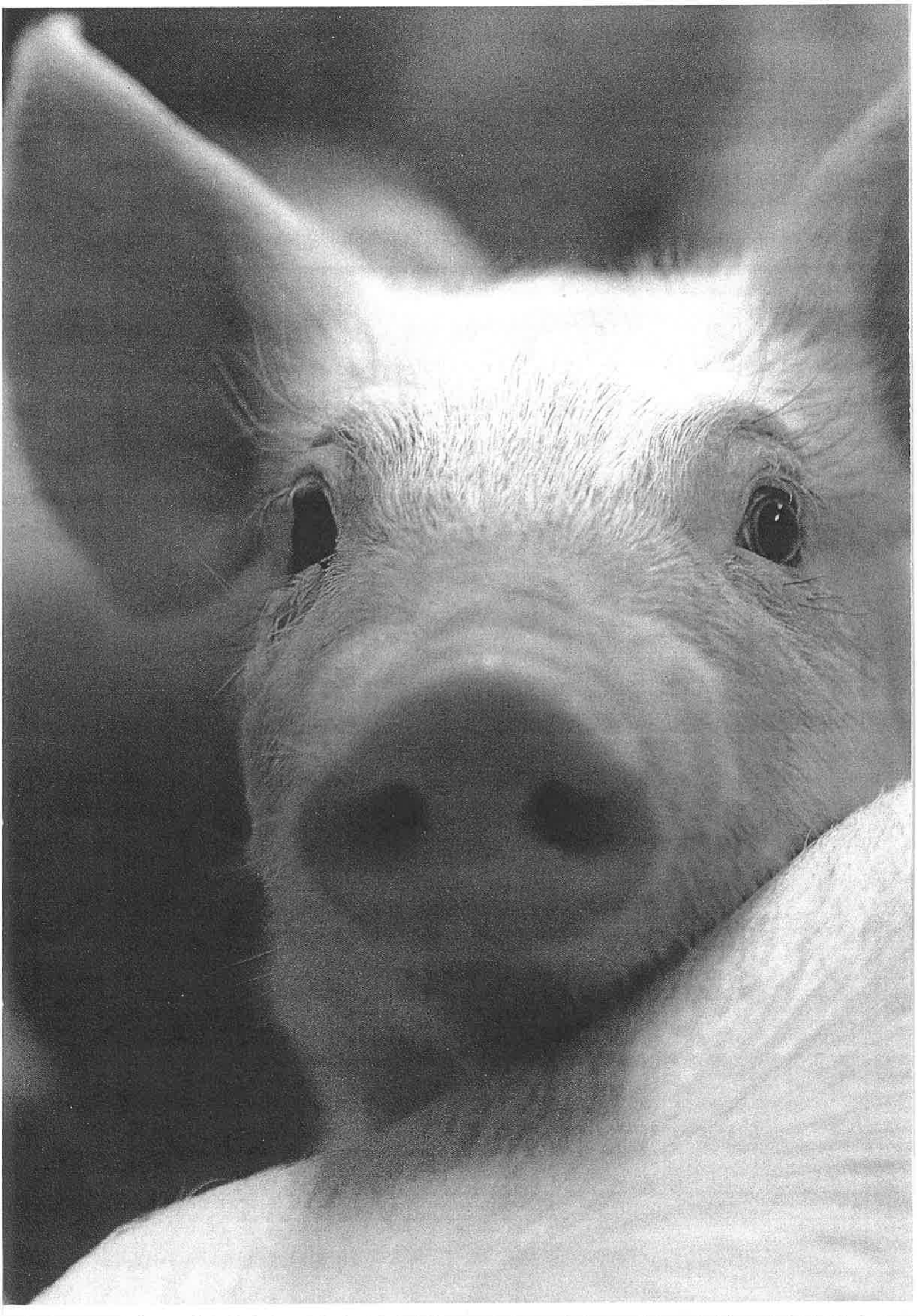
## CROP YIELD IN DENMARK

| | 1995-99 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| **Yield, 1,000 tons:** | | | | | | |
| Winter wheat | 4,705 | 4,768 | 4,482 | 4,979 | 5,897 | 4,996 |
| Spring wheat | 39 | 34 | 37 | 40 | 44 | 64 |
| Winter barley | 1,014 | 896 | 856 | 751 | 938 | 784 |
| Spring barley | 2,782 | 2,369 | 2,248 | 2,646 | 2,456 | 2,198 |
| Rye | 415 | 130 | 135 | 152 | 238 | 255 |
| Triticale | 154 | 156 | 150 | 185 | 229 | 177 |
| Oats and mixed grain | 154 | 274 | 312 | 322 | 315 | 274 |
| Cereal, total | 9,201 | 8,626 | 8,220 | 9,074 | 10,117 | 8,748 |
| Pulse, total | 300 | 33 | 19 | 14 | 22 | 34 |
| Gathered straw | 3,717 | 3,005 | 3,071 | 3,868 | 4,050 | 3,307 |
| Rape | 325 | 435 | 589 | 629 | 637 | 580 |
| Potatoes | 1,512 | 1,361 | 1,626 | 1,705 | 1,618 | 1,358 |
| Beets for production | 3,318 | 2,314 | 2,255 | 2,187 | 1,898 | 2,356 |
| Fodder sugar beets | 2,380 | 271 | 262 | 338 | 380 | 276 |
| **Yield, mill. crop units: 1)** | | | | | | |
| Grain, straw and pulses | 107.9 | 91.4 | 87.2 | 97.2 | 108.3 | 93.3 |
| Root crops | 15.3 | 8.7 | 9.3 | 9.4 | 8.6 | 8.8 |
| Beet top and silage | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Grass field crop | 27.1 | 26.3 | 26.8 | 27.7 | 31.9 | 29.1 |
| Maize for silage | 3.7 | 13.9 | 14.2 | 16.6 | 18.1 | 15.7 |
| Cereals for green fodder (including catch crops) | 5.7 | 4.3 | 4.1 | 3.1 | 3.5 | - |
| Rape | 5.3 | 7.4 | 10.0 | 10.7 | 10.9 | 9.9 |
| Crop yield, total 2) | 165.6 | 152.1 | 151.6 | 164.7 | 181.3 | 156.8 |

1) 1 crop unit = 100 feed units

2) Excl. seeds for sowing and horticultural products.

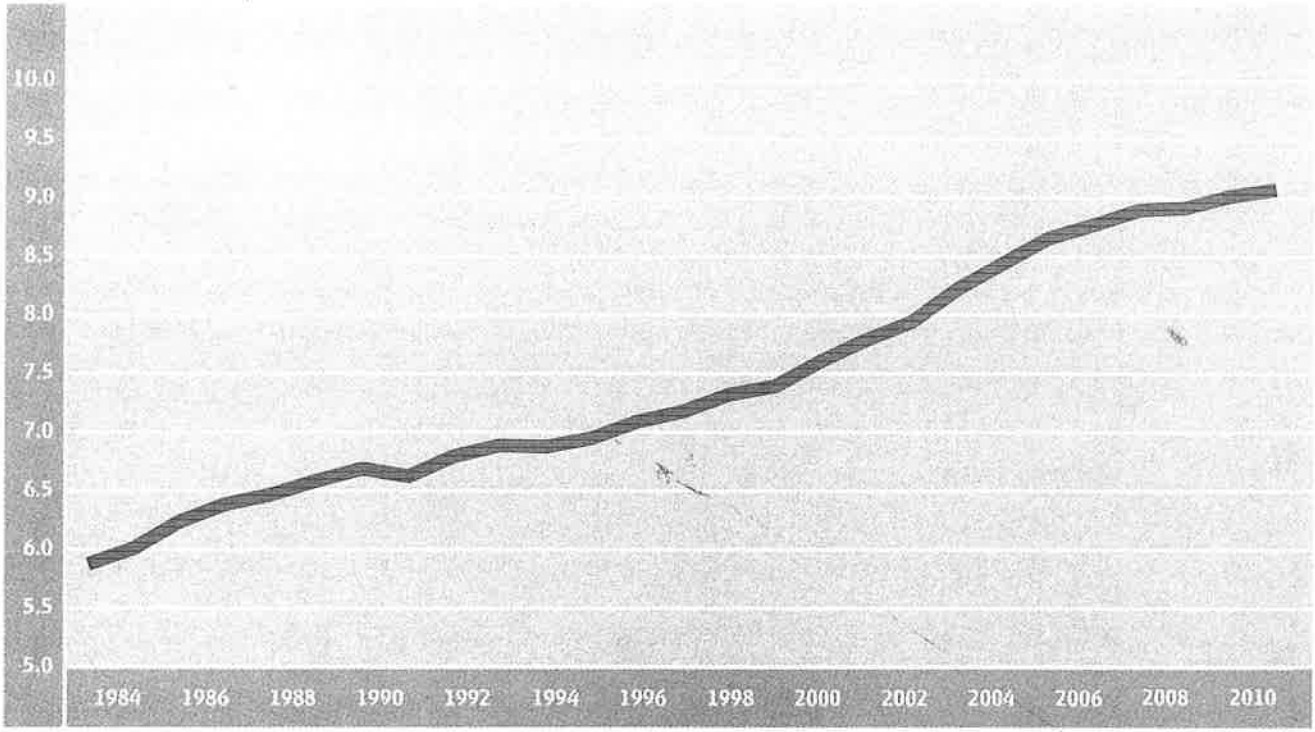
Source: Statistics Denmark



## Stable animal production

Around 80 percent of Denmark's grain and plant production is utilised as feedstuff in animal production, mainly for pigs and cattle.

**Figure 9** – Efficiency in animal production. Milk yield per dairy cow, 1,000 kg



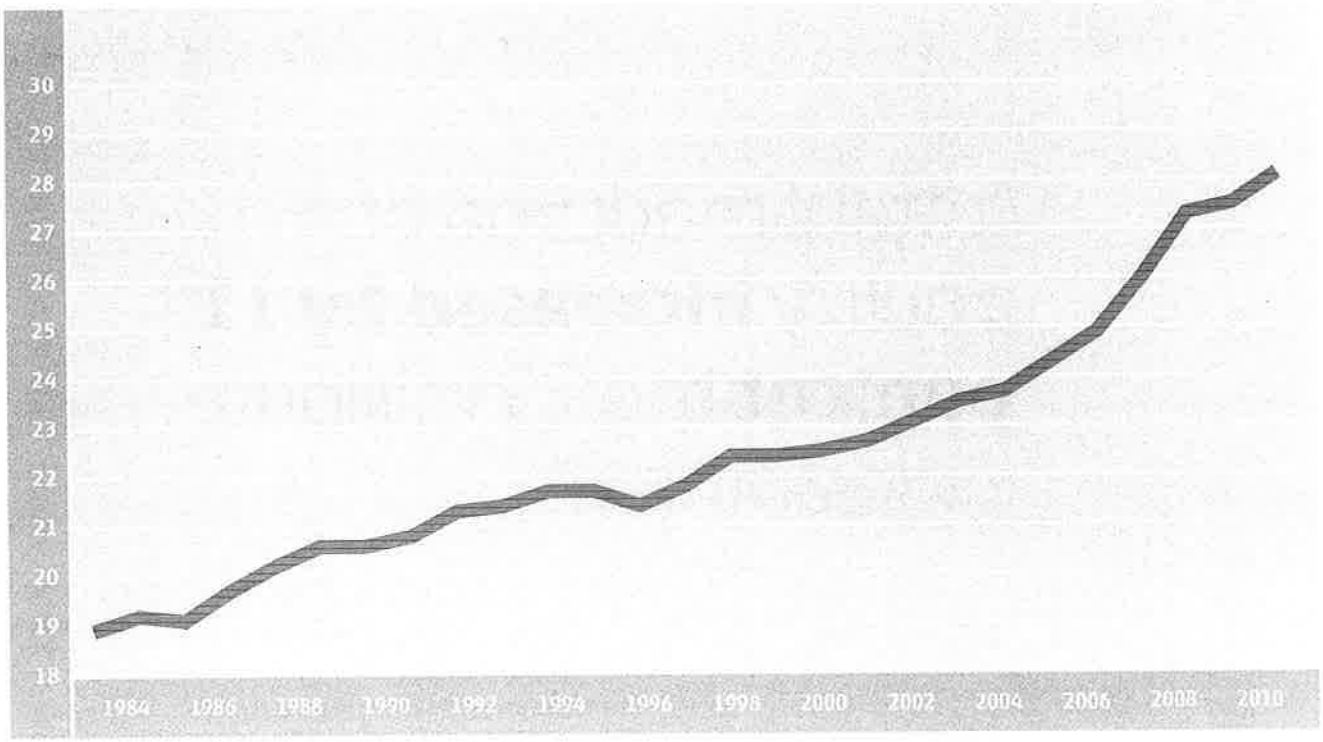

Source: Knowledge Centre for Agriculture

"Over the last three decades productivity has **almost doubled in the pig production.**"

Until 2015, the total milk production will be regulated by the EU milk quota. In 2010, milk production was 4,909 million kilogrammes. The Danish cattle stock has been approximately halved since the introduction of the milk quota in 1984 while yield per animal has increased. In 1984, a dairy cow produced an annual average of 5,900 kilogrammes of milk, whereas the yield today is 9,100 kilogrammes. Production of beef and veal was 142 million kilogrammes in 2010, up 5 million kilogrammes from 2010. The increase in yield per animal has led to a decrease in the number of slaughter animals over the years. This tendency reversed with a slight increase in 2010.

Pork production reached a total of 1,974 million kilogrammes in 2010, corresponding to an increase of 4 percent from 2009. Export of live pigs for slaughter increased by 29 percent to 1.1 million pigs in 2010.

**Figure 10** – Efficiency in animal production. Piglets per sow per year.




Source: Knowledge Centre for Agriculture

Increased productivity in pig production is evident in the increased production of piglets per sow per year. The average number of pigs produced rose from 27.5 in 2009 to 28.1 in 2010. Over the last three decades productivity has almost doubled, although there is a significant spread in producers' ability to increase productivity.

In 2010, total production of poultry increased by 11 percent to 219 million kilogrammes. Hens are no longer slaughtered in Denmark, but are sent to Germany or used for feedstuff in mink production. The production of eggs was 63 million kilogrammes in 2010, corresponding to an increase of 2 percent from 2009. Most eggs are sold to Danish consumers who prefer freshly produced Danish eggs for food safety reasons. Imported eggs are mainly used for industrial purposes.

Mink production is relatively stable with 14 million skins produced in 2010. More than 90 percent of Danish mink skins are exported, mainly to China where they are processed and reexported or sold domestically.

"total production of poultry **increased by 11 percent** to 219 million kilogrammes."

Table 11

**NUMBER OF SLAUGHTERING IN SLAUGHTERHOUSES AND EXPORT OF LIVE ANIMALS, 1,000**

| | 1995-99 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| **Slaughterings at slaughterhouses:** | | | | | |
| Adult cattle and calves | 689 | 492 | 489 | 481 | 494 |
| Sucking calves | 2 | 0 | 0 | 0 | 0 |
| Sows and boars | 437 | 428 | 414 | 411 | 437 |
| Porkers (young pics) | 17 | 14 | 14 | 11 | 9 |
| Hogs (bacon pigs) | 19,681 | 20,916 | 20,335 | 18,885 | 19,667 |
| Chickens | 119,141 | 103,236 | 100,304 | 100,132 | 108,204 |
| Hens | 1,091 | 0 | 0 | 0 | 0 |
| Sheep and lambs | 70 | 97 | 90 | 90 | 90** |
| Horses and foals | 3 | 3 | 3 | 3 | 3** |
| **Export of live animals:** | | | | | |
| Adult cattle | 4 | 9 | 1 | 2 | 1 |
| Calves | 53 | 5 | 13 | 18 | 17 |
| Hogs | *241 | 899 | 858 | 1,107 | 837 |
| Piglets | *1,001 | 3,833 | 5,280 | 7,044 | 7,530 |
| Sheep and lambs | 10 | 10 | 8 | 5 | 4** |

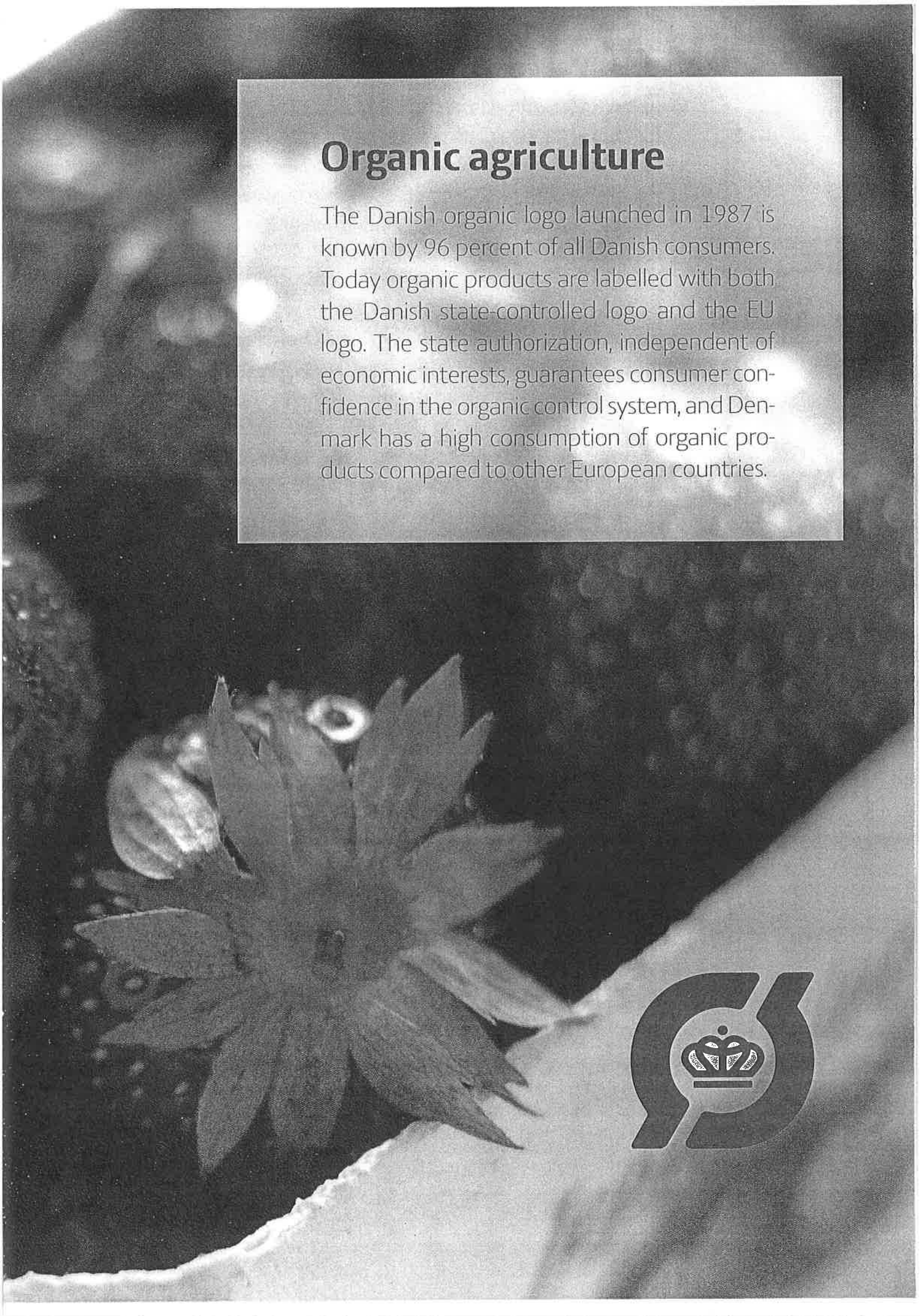
* Stock taken for the period of 1996-2000

** Estimate

Source: Statistics Denmark and Danish Agriculture & Food Council

## High ratio of production vs. consumption

For most agricultural products Denmark has a high degree of self-sufficiency. The ratio is highest for pork, but categories such as poultry, cereals and dairy products also represent far more that 100 percent self-sufficiency. Among all major categories only beef, veal and eggs represent consumption in excess of domestic production.



# Organic agriculture

The Danish organic logo launched in 1987 is known by 96 percent of all Danish consumers. Today organic products are labelled with both the Danish state-controlled logo and the EU logo. The state authorization, independent of economic interests, guarantees consumer confidence in the organic control system, and Denmark has a high consumption of organic products compared to other European countries.

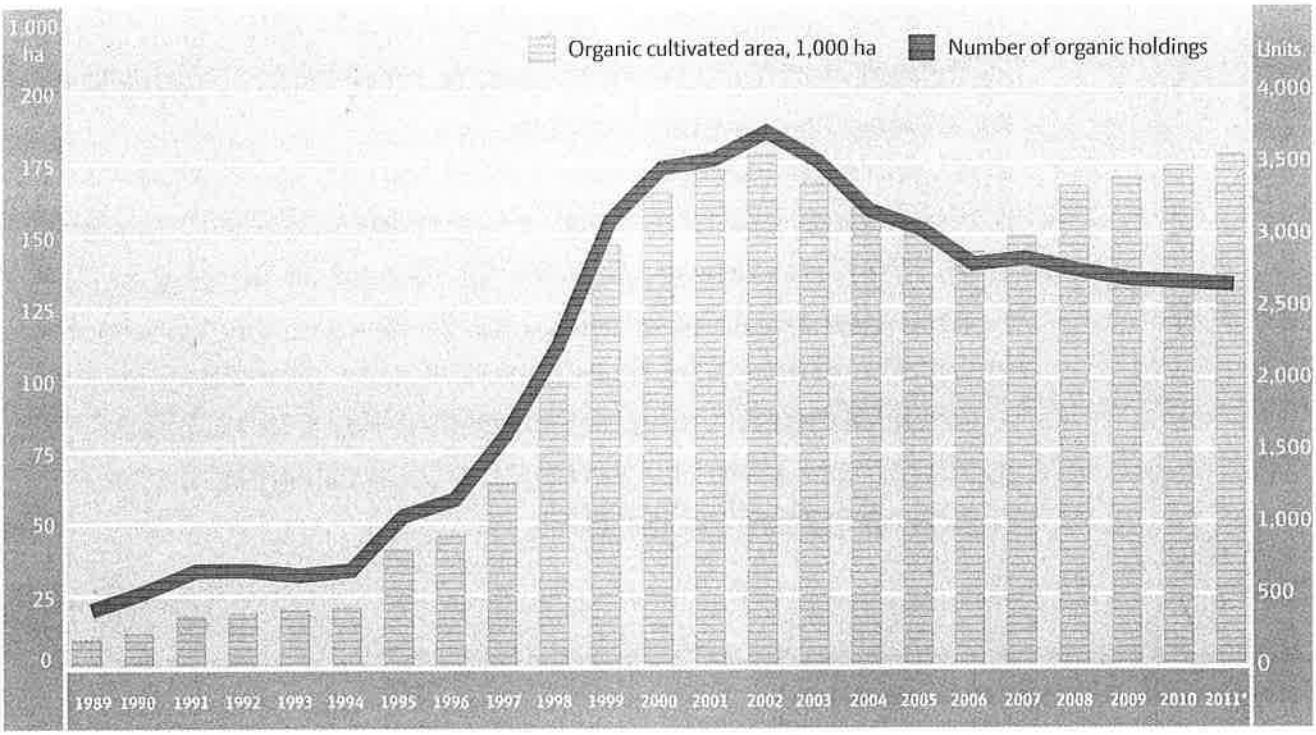
Retail turnover measured in value as well as quantity of organic foods has increased steadily in the past decade and the market share of organic food has risen to 7.2 percent in 2010. Dairy products and fruit & vegetables are the most widely consumed organic product categories. Annual organic consumption per capita was about 168 Euros in 2011.

In 2011, Denmark had 2,650 authorised organic farms. The area used for organic production was around 178,000 hectares (430,000 acres), which means that almost 7 percent of all agricultural area is cultivated organically. While the area increased by 4,000 hectares in 2011, the number of farms increased slightly with 25 fewer farms than the year before (provisional figures). While organic farming is subject to the general tendency towards fewer, larger farms, they deviate from the national average with a larger proportion of small (below 5 hectares) and medium-sized farms. This is partly due to the fact that organic farms often specialize in products with limited market potential compared to conventional products.

The largest organic sector is dairy products, with organic raw milk representing around 10 percent of the total milk production.

"Almost 7 percent of all agricultural area is **cultivated organically.**"

**Figure 12** – Development in number of organic holdings and organic area

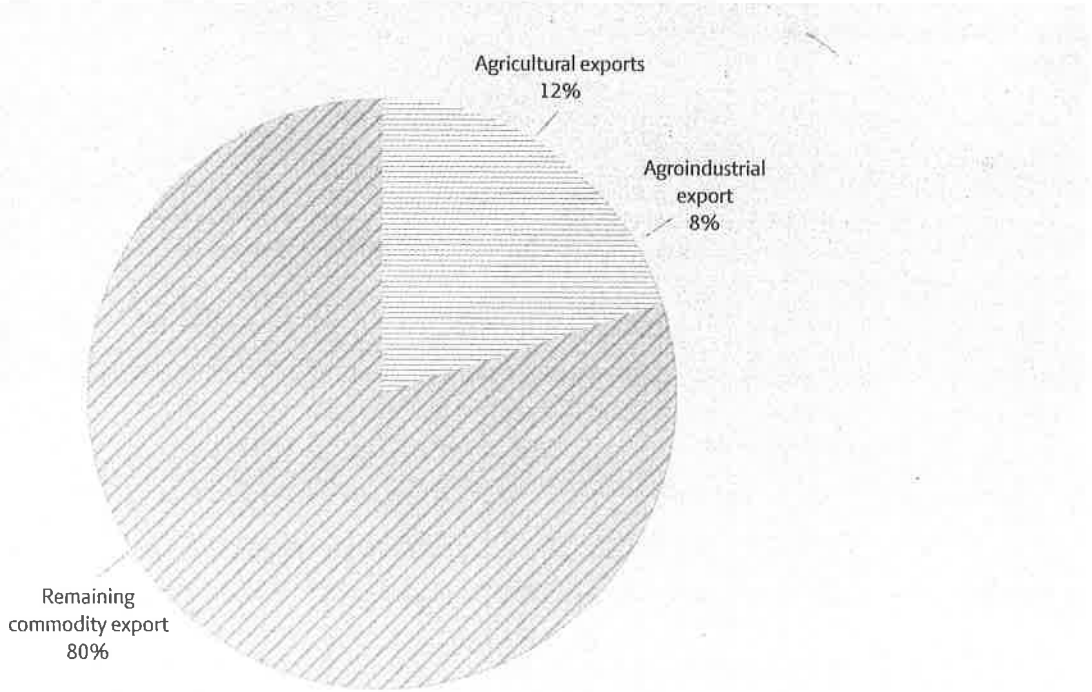



Source: The Danish Plant Directorate
* Estimate

The value of Danish agricultural exports has risen steadily in recent years and reached 9.7 billion Euros in 2011. Denmark's total export of commodities amounted to 81.3 billion Euros in 2011, out of which agricultural products including the agri-business sector accounted for 16 billion Euros. In other words, the agriculture and food sector as a whole represents 20 percent of total Danish commodity exports.

EU export subsidies have been phased out and account for only 0.2 percent of the value today, compared to nearly 12 percent in 1990. EU markets account for 68 percent of exports, led by Germany which alone accounts for 20 percent. High prices on fur skin in recent years have contributed to an increase in the value of exports to China including Hong Kong to 1.3 billion Euros. In terns of value China is now the second largest market for Danish agricultural products.

**Figure 13** **Distribution of exports from Denmark**




Source: Statistics Denmark

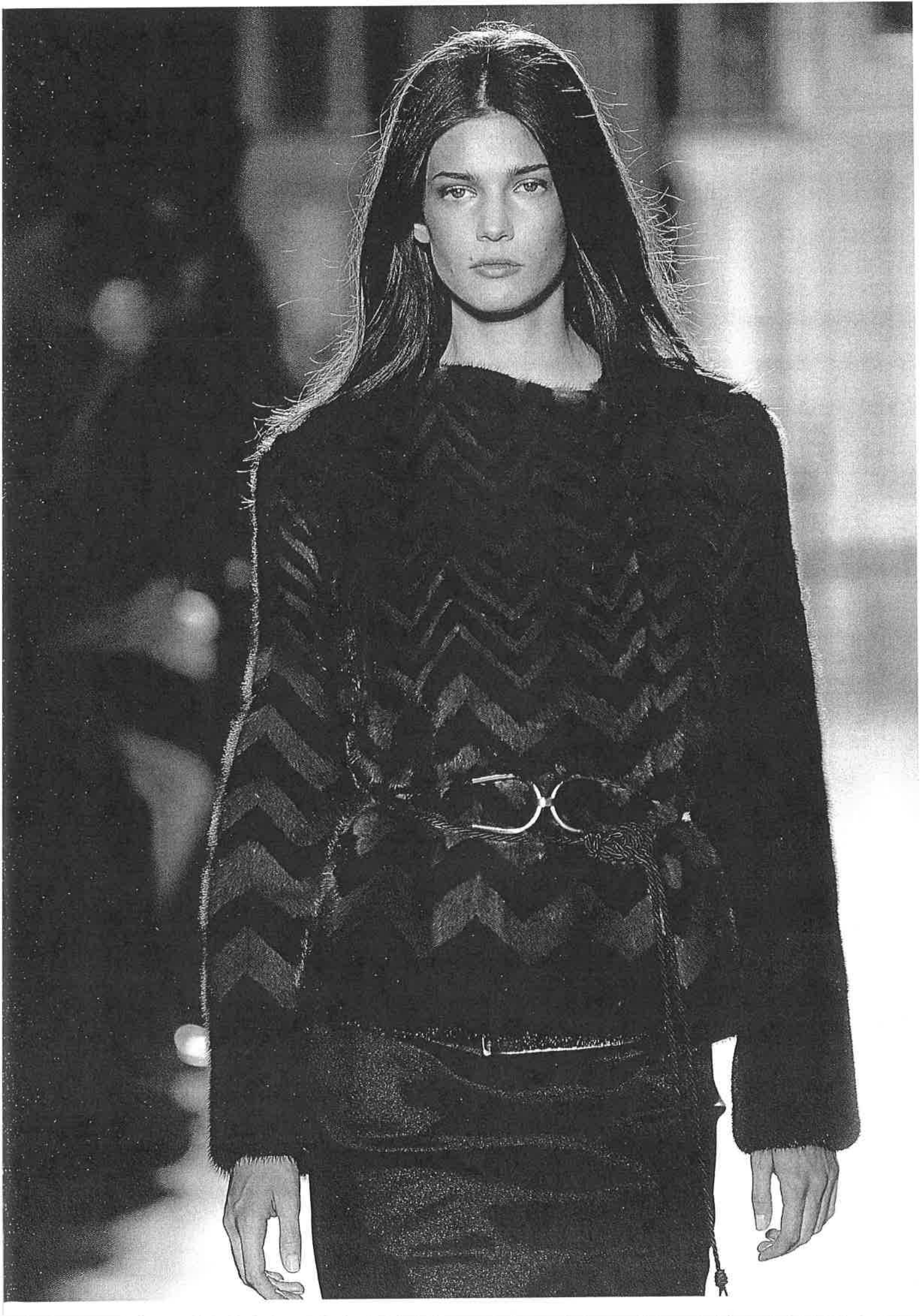
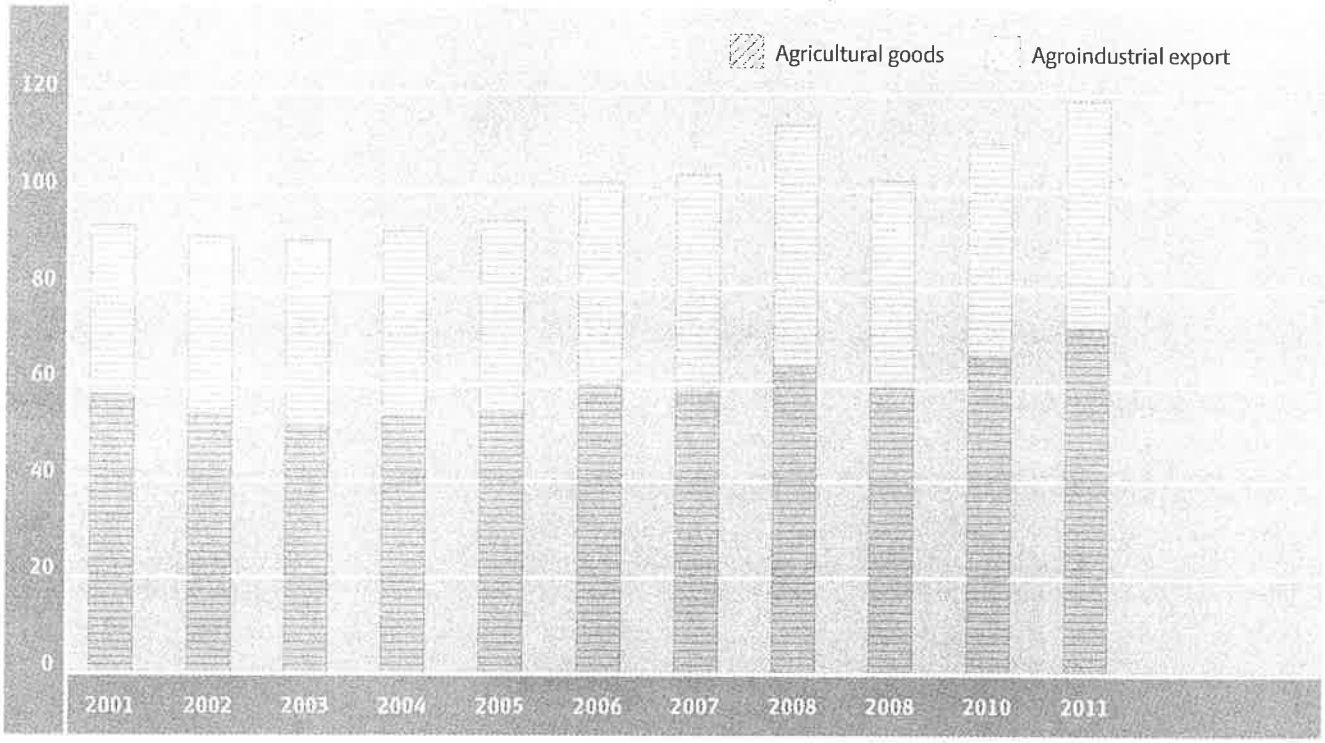
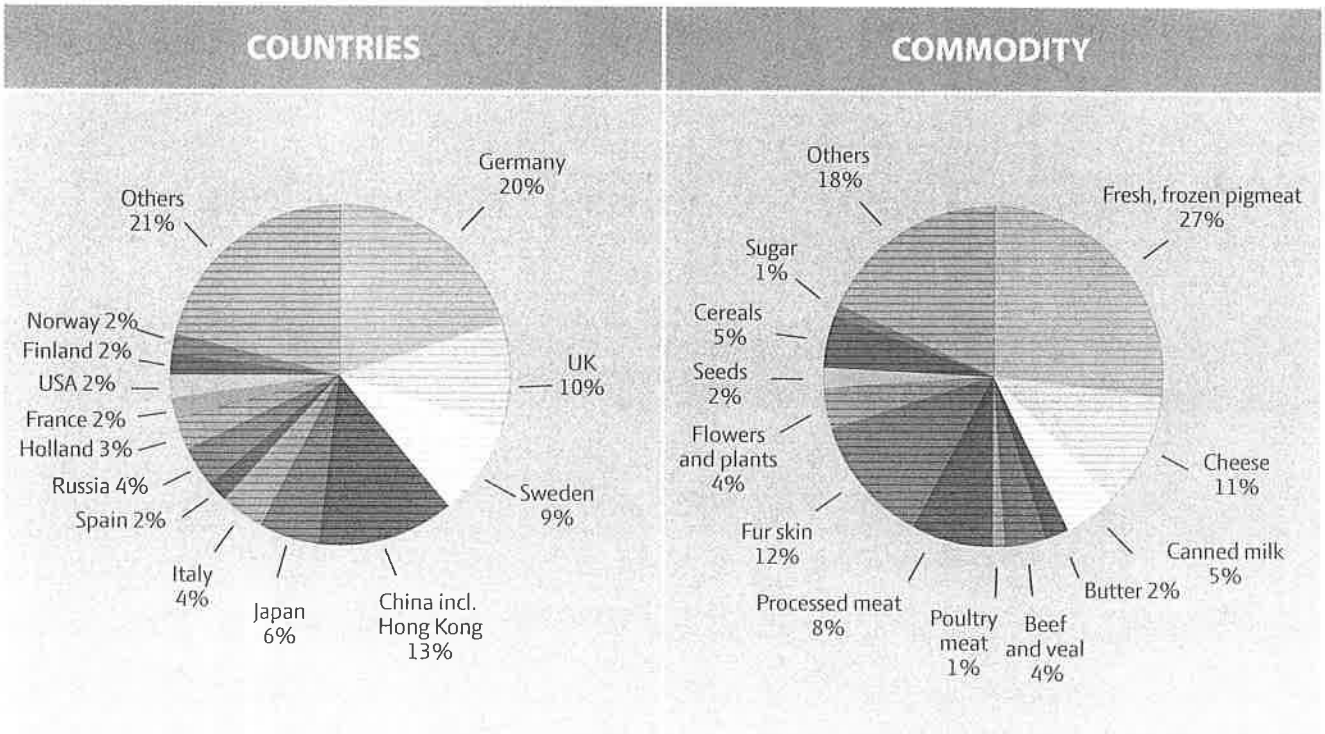


**Figure 14** – Denmarks export of agricultural and agroindustrial goods, in billion Danish kroner, 2001-2011




Source: Statistics Denmark

**Figure 15** – Agricultural exports by countries and commodity, 2011

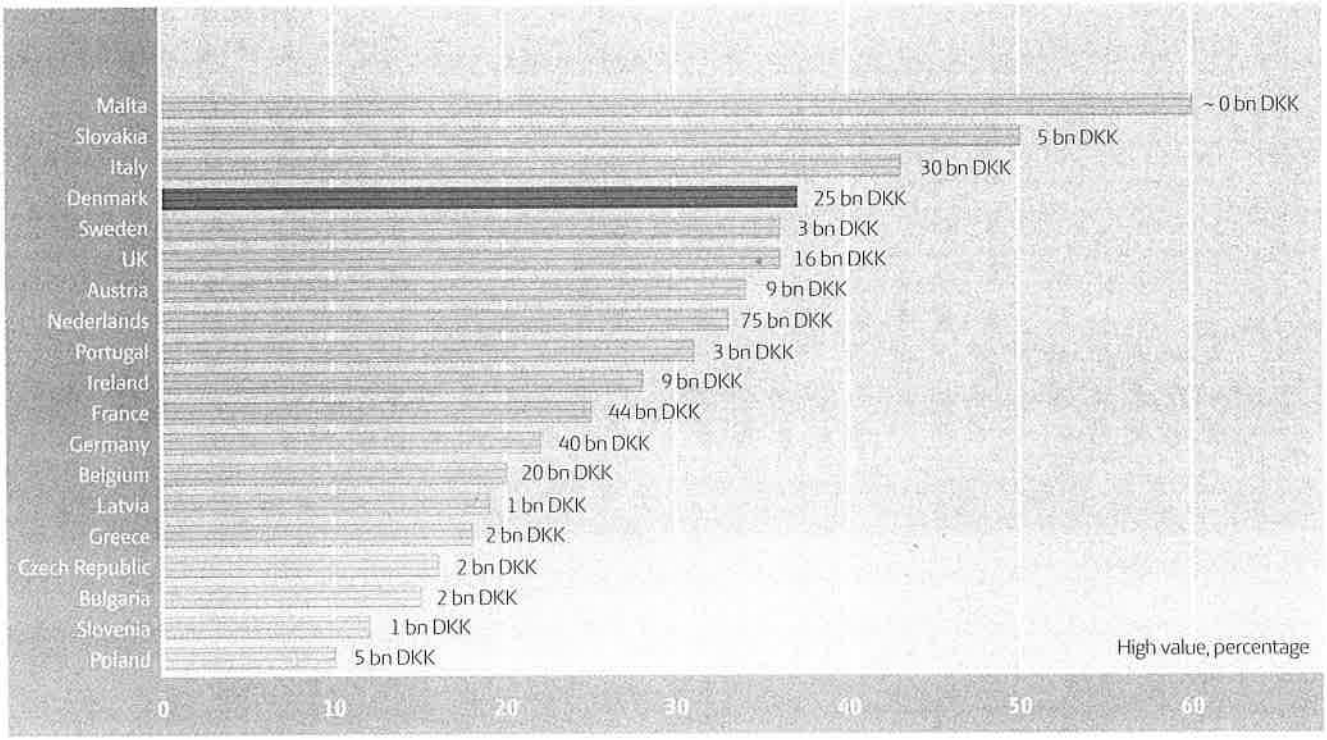



Source: Statistics Denmark

Denmark is among the top EU countries when it comes to up-market exports, defined as products that obtain a price at least 20 percent higher than the average price level.

"Denmark is **among the top EU countries** when it comes to up-market exports."

**Figure 16** – Percentage of high value products from agricultural exports

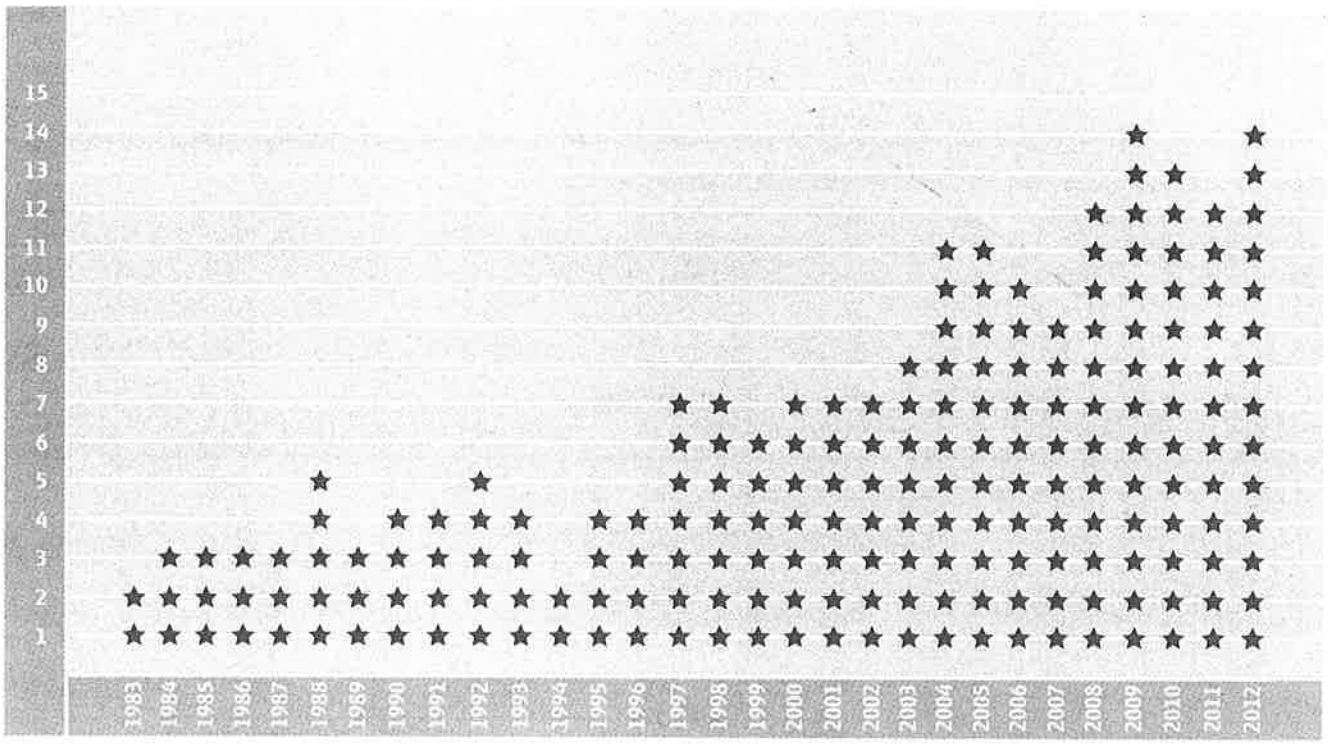



Source: Statistics Denmark

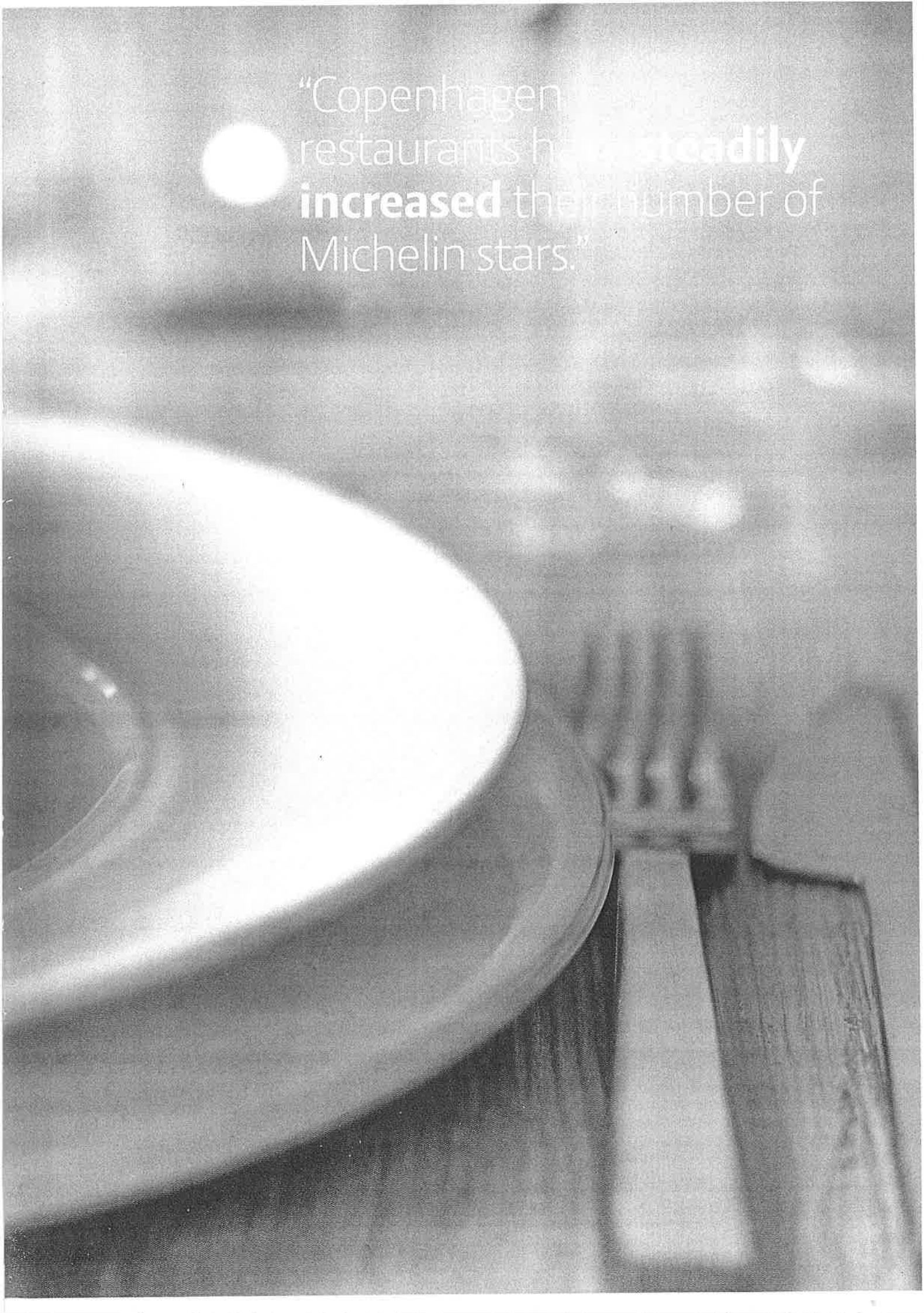
# Gastronomy

New trends in Scandinavian gastronomy have propelled Danish chefs and food products to international fame. In 2011, Restaurant Noma in Copenhagen was selected as the world's best restaurant for the second year in a row. Also in 2011 Danish chef Rasmus Kofoed won the Bocuse d'Or, widely recognised as the world's most prestigeous award for chefs. And although there is still no Michelin guide covering all of Denmark, Copenhagen restaurants have steadily increased their number of Michelin stars since the Danish capital appeared in the guide Main Cities of Europe 1983.

**Figure 17** – Michelin stars awarded to Copenhagen restaurants 1983 - 2012.




Source: Michelin Main Cities of Europe


"Copenhagen
restaurants h
increased the
Michelin stars."

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