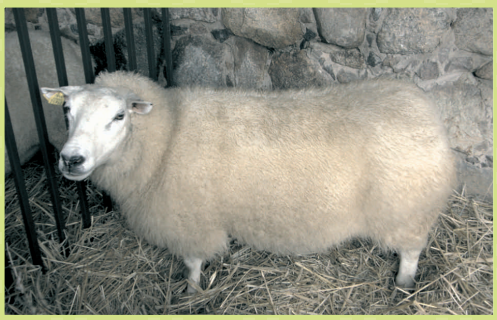

Animal Breeding in Estonia

2004–2011

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Tartu 2011

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FOREWORD

In Estonia the first breed registry for livestock – a cattle herd book – was established in 1885. Herdbook registration and recognition of other farm animal species and breeds dates back to the 20th century. Throughout the century, Estonia has undergone different political regimes, and survived shorter and longer periods of occupation by other nations. However, despite changes in the country's political landscape and ownership rights, a strong commitment to professional work has enabled the Estonian breeders make the most of every opportunity to move ahead with breeding activities aimed at improving the performance of pedigree animals through genetic improvement. As Estonia is a small country, nucleus breeding herds are usually small in numbers, and several breed populations are considered endangered. Nevertheless, maintenance and improvement of even the smallest breeds has been a success over the years.

A more detailed and comprehensive historical overview of the changes that have occurred in the breeding work and the breeders' organisations through time is presented in our previous 2004 (English version) and 2005 (Estonian version) editions of *Animal Breeding in Estonia*. The present publication only briefly highlights the history of livestock breeding. The focus is on the years from 2004 to 2011, following Estonia's accession to the European Union. New markets have been opened up, while competition has become tougher than ever before over these seven years.

Successful livestock holdings across Estonia have benefitted from EU subsidies despite the fact that the new members have been receiving several times lower rates of support from the EU compared with some of the old member states. Farmers have managed to renew their machine stock and equipment, and to build new livestock units equipped with the latest technologies. In dairy production both the cold loose-housing system and the total mixed ration feeding system were rapidly adopted. Better feeding, management and housing facilitated the expression of the genetic potential of dairy cattle. The annual milk yield of performance tested cows has increased by 2,000 kg over the past seven years. Milk output exceeded the 7,000 kg milestone in 2007, and reached 7,713 kg per cow in 2010. Along with the increase in milk productivity, however, the dairy cattle numbers have declined. On the other hand, the population of beef cattle shows rapid growth.

Due to the extensive use of high quality breeding material, artificial insemination and effective crossing programmes in pig breeding, the pork carcasses yield more lean meat and less fat. Positive trends can also be observed in breeding of other species of farm animals.

Estonian pedigree animals have gained a good reputation in different EU countries as well as in other markets, thus exports have shown a substantial increase in recent years. This helps livestock breeders pay back their loans and cover the losses they have made during the years of recession.

Prof. Emer. Olev Saveli
Compiler

ROLE OF STATE IN ANIMAL HUSBANDRY

Prof. Haldja Viinalass
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Size and location of the country

The Republic of Estonia is one of the Baltic countries in the northern part of Europe. It is bounded by the Gulf of Finland in the North and by the Gulf of Riga in the west. The three closest neighbours of Estonia are the Russian Federation in the East, the Republic of Latvia in the South and the Republic of Finland in the North (less than 90 km from the northern coast) Estonia extends from 57° 30' N to 59° 40' N and from 21° to 28° 15' E. With the total area of 45,200 km^2 Estonia is one of the smallest countries in Europe locating on the eastern coast of the Baltic Sea. Estonia has 14,421 Baltic Sea islands with a total area of 4,130 km^2. There are 1,150 lakes with a total area of 2,015 km^2. The distance between the eastern and western borders is approximately 370 km and between the northern and southern borders approximately 240 km.

Through centuries Estonia has been under the reign of different countries. Estonia was declared an independent republic in 1918. In 1940 it was occupied by the Soviet Union and became one of the 15 union republics of the Soviet Union. The democratic movement for free Estonia started at the end of the 1980s. The independent Republic of Estonia was reestablished on 21 August 1991.

Climatic and geographical features

The average annual air temperature in Estonia is 5.1 °C. The air temperature in summer is somewhat lower than the average for the latitude, but considerably higher in winter.

The vegetation period generally lasts for 170-185 days, the period of active plant growth is 120-130 days. The annual amount of precipitation (550-650 mm) exceeds evaporation approximately twofold. Nevertheless, there may be especially severe draughty periods in the western part of Estonia in spring and in the first half of summer.

Winter in Estonia *(H. Viinalass)*

Estonia is rich in forests – forest land comprises 48% of the land use. The total agricultural land in usage comprises ca 21% of the country's territory.

Human population and trends

The population of Estonia is 1.340 million people, 68.8% of them being of Estonian nationality. According to Statistics Estonia, the population of rural municipalities was 473 300 in total, as of 1 January 2011 (35.3% of Estonian population). The population density in 2010 was 30.9 inhabitants per km^2. Estonia has 47 towns and 194 parishes, and is divided into 15 counties.

In 1992, 50.6% of the rural working population was employed in agriculture and hunting. The number of people engaged in agriculture, forestry and fishing (primary sector) has decreased steadily and accounted for 11.8% of the employed people in rural areas and 3.0% of all employed people in Estonia in 2010. This has brought about several restructuring difficulties for labour market in rural areas, such as structural and long-term unemployment and lower incomes.

According to Statistics Estonia, the added value created in the fields of agriculture and hunting was 249 billion euros in current prices in 2010, which accounted for 2.0% of total added value created in Estonia (Table 1).

Table 1. Relevance of agriculture in added value and employment in the years 2004–2010

Indicator	2004	2005	2006	2007	2008	2009	2010
Added value of agriculture and hunting in current prices, million euros	201	215	239	298	233	178	249
Percentage in added value, %	2.3	2.2	2.0	2.2	1.6	1.5	2.0
Engaged in agriculture and hunting, thousand	24.3	22.6	22.6	20.4	17.2	17.4	17.2
Percentage in employment, %	4.1	3.7	3.5	3.1	2.6	2.9	3.0

Source: Statistics Estonia

Overview of the production systems

Agriculture is an important economic sector that supplies the population with domestic foodstuffs and ensures employment in rural areas and landscape maintenance. Great changes have taken place in Estonian agriculture since the beginning of the 1990s.

According to the preliminary data of the agricultural census carried out by Statistics Estonia in 2010, there were 19.7 thousand agricultural holdings in Estonia, which were using at least 1 ha of agricultural land or where agricultural products were mostly produced for selling. Compared to the data of 2003, the number of holdings has almost halved (decreased by 46%), but the usage of agricultural land has increased by 18%. Land usage of a single holding has increased over two times compared to 2003 – from 21.6 hectares in 2003 to 47.6 hectares in 2010. The structure of Estonian agricultural holdings is very diverse – more than half (54%) are holdings with up to 10 ha of land, but they only use 5% of the total agricultural land and their average size is 4.3 hectares. Around a tenth (9%) are holdings with over 100 ha of land and they use 73% of the total agricultural land and their average size is 404 hectares.

The most common area of livestock farming is dairy farming. Milk is forming around one third of the value of total agricultural production after the accession to the EU. Despite of fact that the number of dairy cows has decreased steadily, the total production of milk has stayed stable due to the increase in the productivity of cows. In 2010, 676.0 thousand tons of milk with the average content of 4.1% fat and 3.3% protein were sold to the dairy industry. In 2010, 63% of the sold milk belonged to the elite class – it is the highest indicator of recent years.

According to the Ministry of Agriculture the Estonia's milk self-supply rate is 150–160% and of meat is around 80%. However, it would be possible for the self-supply level to be almost 100% in case of pork, 80–85% in case of beef and 50–60% in case of poultry.

Organic farming has developed actively over the past years. In 2004 there were 810 acknowledged organic producers in Estonia, whereas the number has increased to 1,278 in 2009. In the same time, organically farmed land has increased from 46 to 103 thousand ha. Despite of fact that organic production has grown over the past years, the processing and marketing of organic products has not developed with the same pace and in most cases organically produced products are sold as regular products.

According to the Ministry of Agriculture around two thirds of organic farmers engaged in livestock farming in 2010 (848 producers). Mostly sheep (42 464 animals, i.e. 58% of the total number of sheep) and bovine animals (25 174, i.e. 10% of the total number of bovine animals) were farmed. Compared to 2009, pig and poultry farming expanded remarkably in 2010 (33 and 36%, respectively).

Kalmer Visnapuu's Simmental herd *(H. Viinalass)*

The purposeful breeding in Estonia was started in the 19th century and boomed during times of the first Republic of Estonia. The breeders gathered into breed societies and other unions. The main motive for gathering was to arrange better exchange of breeding material and information to organize performance recording. During the 1920s and 1930s the farmsteads developed successfully due to joint activities resulting in high-level breeding herds. Butter, eggs and bacon produced in Estonia were appreciated in the European market.

The production systems in Estonia have pervaded different stages in their development. Up to the post-war period until 1947 small-scale production in small family farms dominated. During the consecutive period great changes took place. Small family farms were dissolved and large-scale collective farms (kolhozes) and state farms (sovkhozes) were established. The best pedigree animals were given to collective farms. In 1947, the existing breeding societies were abolished and state breeding stations were founded. Pedigree breeding was coordinated by breed councils. Political and economic changes in the end of 1980s influenced greatly the situation in agriculture.

The Agricultural Reform Act was adopted in 1992. This Act established the grounds for the abolishment of collective farms and the establishment of new farms and agricultural enterprises – private and public limited companies – on the basis of their assets and land. The assets of 360 former collective farms were used to establish 11,700 commercial farms and 709 agricultural enterprises.

Estonian Holstein calves of Voore Mõis OÜ *(H. Viinalass)*

Most beautiful ewe competition *(H. Viinalass)*

In the beginning of the 1990s, agricultural policy changed abruptly, going from highly subsidized agricultural production to agricultural production with no subsidies backed by liberal price development policies. The restructuring of agriculture has been made more difficult by the loss of former Soviet markets – formerly the outlet for approximately one half of the production volumes – but also because of the rapid rise in the cost of production. The problem was aggravated by unfair competition in the beginning of the 1990s, when Estonia opened its markets and applied a liberal trade policy while its main trade partners continued to subsidize their exports. In addition, Estonia had no access to the EU market. Due to liberal market and dumping prices, lot of farms founded in the beginning of the 1990s finished their farming. Currently all agricultural units are privately owned.

Estonia has been a member of European Union since 2004. The experience so far has shown that EU Common Agricultural Policy (CAP) and the common market have had a beneficial influence to the Estonian agriculture, rural life and the environment.

Currently there is a tendency to form larger farms. The old generation of farmers is retiring and young people are not interested in continuing their work. The young people would like to use high-input/ high-output breeds or the exotic ones.

The state of utilization of farm animal genetic resources

The first Farm Animal Breeding Act was launched in 1995. The regulations for animal breeding as well as the Act itself has been constantly amended according to the new requirements (EU, ICAR). Rules and regulations for breeding (including performance recording) were released in 1996. In 1997, the Farm Animal Breeding Act was improved and harmonized with EU legislation.

At present the management of farm animal genetic resources in Estonia is regulated by Farm Animal Breeding Act launched on 1 January 2003 (last amendment on 1 January 2011), and by the regulation of the Minister of Agriculture “List of Endangered Animal Breeds” since 2005, amended in 2009.

The Farm Animal Breeding Act provides the bases for the breeding of farm animals in order to ensure that the performance ability and genetic value of farm animals improves, that the gene pool of farm animals is preserved and that livestock production is economically efficient. The Act is regulating the maintenance of herdbooks and animal breeding registers; performance recording and genetic evaluation of farm animals; preservation of endangered breeds; collection, preservation handling and marketing of semen, ova and embryos obtained from breeding animals.

At present, Ministry of Agriculture is responsible for the development of legislation in the field of animal breeding.

The pedigree breeding was co-ordinated by the Estonian Animal Breeding Inspectorate (1992–2002, Director General Ago Kööp). At the present the State inspection of compliance with the requirements of this Act is conducted by the Veterinary and Food Board (Vice-director Katrin Reili). The main tasks of Veterinary and Food Board are:

1) organizing and achievement of supervisory proceeding from requirements of regulations concerning farm animal breeding;
2) organizing the recognition of breeding society, being implementer of performance testing and preserver of endangered breeds;
3) organizing the preservation of biological diversity and genetic resources;
4) collaboration in preparation of regulations concerning farm animal breeding.

The state provides funding for animal breeding since 1993. The amount of funding is determined every year by the state

Analysing the genotyping results at the laboratory of Animal Genetics of Estonian University of Life Sciences

Judges have made their decisions *(H. Viinalass)*

Awards of the Pedigree Animal Show will be given by Estonian Veterinary and Food Board *(A. Tänavots)*

budget on the basis of a request by the Ministry of Agriculture (Table 2).

Table 2. State support to animal breeding

Year	Euros	Year	Euros
1993	283 001	2003	934 163
1994	479 305	2004	957 906
1995	638 938	2005	958 675
1996	698 235	2006	958 657
1997	777 645	2007	1 406 055
1998	721 230	2008	1 406 053
1999	630 872	2009	1 406 056
2000	766 940	2010	1 533 702
2001	766 940	2011	1 640 206
2002	958 675	Total	17 923 254

Source: Estonian Agricultural Registers and Information Board

The state of knowledge on animal genetic resources

The information about breeds is being monitored continuously. The availability of information is influenced by the significance of the species in agricultural production. The following information sources are available:

1) state institutions (Estonian Agricultural Registers and Information Board, Estonian Animal Recording Centre, Ministry of Agriculture, Veterinary and Food Board, Statistics Estonia),

2) breed organizations.

Information on Estonian breeds has been included in the Domestic Animal Diversity Information System (DAD-IS), European Farm Animal Biodiversity Information System (EFABIS) and Nordic Baltic Farm Animal database.

Animal registers

Cattle, sheep, goats, pigs and horses are registered by the Estonian Agricultural Registers and Information Board (ARIB), which is a governmental institution subordinated to the Ministry of Agriculture. The national register of agricultural animals was founded on 1 October 2000. The main purpose of the farm animals register is to establish sound basis for prevention of dissemination of farm animal zoonoses. The data on animals' ear tags are registered upon the written application of the owner of the animals. Since 1 January 2000, it is obligatory to register and ear tag all bovine animals, sheep and goats. The central register for horses is operational since 1 May 2010.

Farm animal performance recording is carried out by the Estonian Animal Recording Centre (EARC), which is a govern-ment institution under the administration of the Ministry of Agriculture. The main task of EARC is the improvement of the efficiency of animal husbandry by performing animal perfor-mance recording and independent testing of the quality of raw milk. EARC records the perfor-mance of dairy and beef cattle, pigs and goats; performs genetic evaluation of dairy cattle. Estonia has been a member of ICAR and INTERBULL since 1995.

The state of policy development and institutional arrangements for farm animal genetic resources

In Estonia, biodiversity became relevant in the beginning of the 1990s. The Convention on Biological Diversity (CBD) was ratified in Estonia in 1994. With ratification of CBD, Republic of Estonia took a responsibility to protect its biological diversity and to use its biological resources sustainably.

The state of knowledge concerning animal breeding in Estonia is at good level due to legislation and financial support. The legislation meets EU requirements. The used measures are in accordance with international standards and commitments. The state support helps to increase the genetic value of animals, improve the management and competitiveness of animal production.

The legislation provides requirements for health (Veterinary Activities Organisation Act, Infectious Animal Disease Control Act), protection of animals (Animal Protection Act), special regimes of utilization (Organic Farming Act, Feedstuffing Act) and subsidies (Rural Development and Agricultural Market Regulation Act).

There are two types of subsidies – to breeding/ conservation organizations and directly to the farmers. Several subsidies have been paid to the owners as dairy cow, ewe and doe, young and beef cattle subsidies, and subsidies for endangered breeds.

ANIMAL PRODUCTION, IN 2004–2010

Liina Jürgenson
Head of the Bureau of Animal Products
Ministry of Agriculture

Livestock numbers

The number of cattle, including dairy cows, decreased by 18% over the period 2004 to 2010 (Table 1), as several small-scale producers stopped dairy farming. Pig numbers have been growing slightly in recent years driven by an increase in demand in the Eastern European markets. The number of sheep and goats has been increasing steadily over recent years and has more than doubled since 2004. This is due to ewe subsidies, including subsidies for raising organic sheep (58% of the total number of sheep) and goats (27% of the total number of goats). Poultry numbers showed a decrease between 2005 and 2007 that can be partly attributed to disease outbreaks. A remarkable increase in poultry population followed over the past two years.

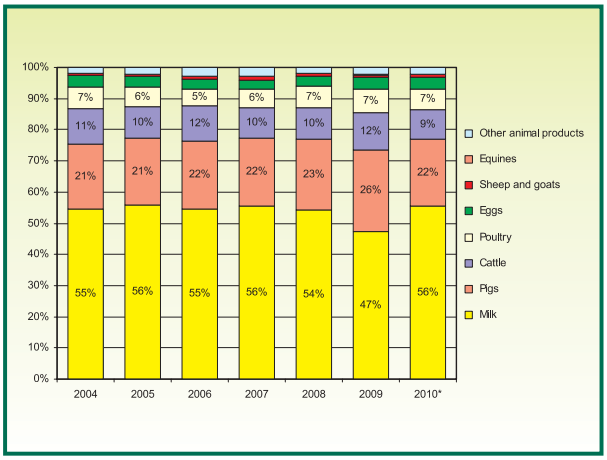


Figure 1. Output value of animal products, 2004–2010

Structure of animal production

The share of animal husbandry in the total agricultural output has been more than 55% during the period 2004 to 2010. In 2010, milk accounted for 55% of the total animal production, whereas it has comprised almost a third of the total agricultural production over recent years. Based on the net value, pork made up 22% of the total animal production in 2010 (Figure 1), while beef has comprised 9 to12% over the past seven years.

Milk production

The total number of holdings with dairy cows has decreased from 9,210 in 2005 to 6,121 in 2007. Almost half of the dairy cattle were kept on holdings with more than 300 cows in 2007, whereas the percentage of such farms has been rising from year to year. On the other hand, the share of smaller dairy holdings with 1 to 50 cows has dropped from 26% in 2005 to 21% in 2007.

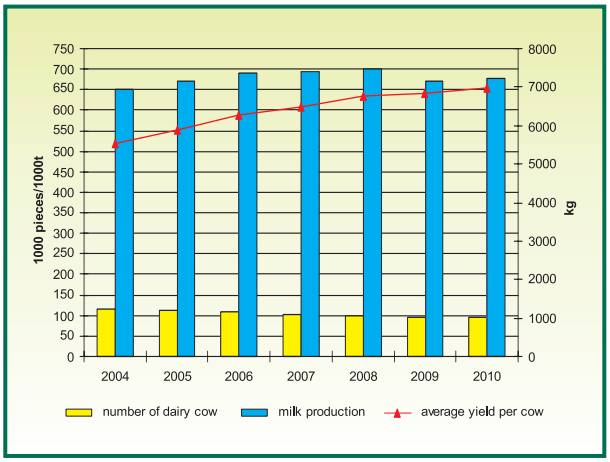


Figure 2. Milk production data, 2004–2010

Table 1. Number of livestock and poultry as of December 31 (10^3)

Animal species	2004	2005	2006	2007	2008	2009	2010
Cattle	249.8	249.5	244.8	240.5	237.9	234.7	236.3
incl. dairy cows	116.5	112.8	108.4	103.0	100.4	96.7	95.5
Pigs	340.1	346.5	345.8	379.0	364.9	365.1	371.7
Sheep and goats	41.0	52.4	66.0	76.4	81.8	80.4	82.7
Poultry	2183.0	1878.7	1638.7	1477.6	1757.3	1792.2	2046.4

Source: Statistics Estonia

Table 2. Meat production in 2004–2010 (tons)

Species	2004	2005	2006	2007	2008	2009	2010
Pork	40,853	39,521	41,593	42,863	46,196	46,118	45,783
Poultry meat	14,816	13,778	12,535	11,520	13,180	14,882	15,997
Beef	15,242	13431	14,829	15,422	14,277	14,172	12,926
Sheep and goat meat	310	333	451	623	864	778	666
Total meat production	71,262	67,104	69,449	70,466	74,555	75,988	75,410

Source: Statistics Estonia

Although the number of cows has shown a slight decrease in recent years, the total milk production has increased as a result of a steady improvement in productivity (Figure 2). The year 2009 was unusual, as due to the global economic recession the demand for dairy products was down and dairy industry suffered from low milk prices, which resulted in the decrease in milk output. In 2004, the total production was 652,400 tons of milk, while the average yield per cow was 5,528 kg. By 2010, the total production reached 676,000 tons, and the average production per cow was 6,977 kg. The milk quota system, applied since Estonia joined the EU, has not had any negative effect on milk production. Moreover, the output of milk has not yet reached the quota limits. Milk production figures were the closest to the delivery reference (94.08%) in quota year 2005/2006.

A typical cowshed in Estonia *(A. Tänavots)*

Over the past seven years, the milk with 4.1% fat content and 3.3% protein content made up 82–91% of the total milk sold to the dairies. From 2004 to 2010, the quality of milk has been improving. In 2004, 58% of milk was sold as elite grade and 38% as high grade milk, while in 2010 the corresponding figures were 61 and 37%, respectively.

The average contract prices have seen a slow but gradual increase between 2004 and 2010 (Figure 3). Dairy farmers were paid 245.29 EUR per tonne of milk in 2004, and 277.13 EUR in 2010. In this respect, the year 2009 was different, as prices dropped dramatically (-29%) after the steady rise that had started at the end of 2007, and continued through 2008. Along with applying the EU management measures opened by the EU Commission, some extraordinary measures were taken to handle the problems.

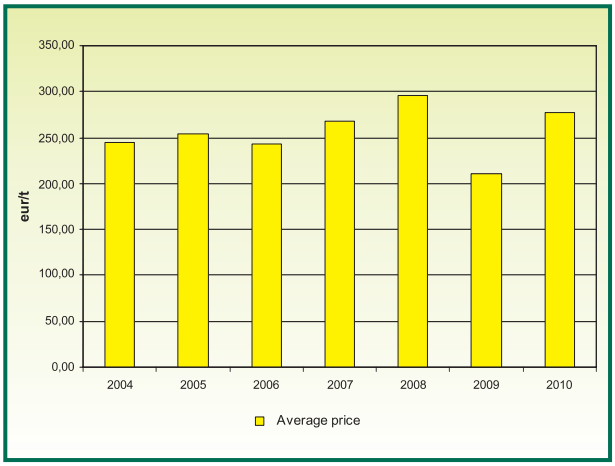


Figure 3. Average contract prices of milk, 2004–2010

Meat production

Meat production has generally been increasing since 2006 (Table 2), and has exceeded 74,000 tons over recent years. The growth can mainly be attributed to poultry meat the production of which has reached the level of the years preceding the major disease outbreaks of 2004. In years 2008–2009 the sheep meat production has grown, while the total sheep population is still quite small. In 2010, the production of beef and pork decreased compared to 2009, whereas one of the reasons was a substantial increase in live cattle exports.

Consumption of meat increased from 69.5 kg to 70.1 kg per capita between 2004 and 2009. The most popular type of meat is pork that accounts for 50% of all the meat consumed in Estonia. Poultry meat consumption, after a considerable decline between 2004 and 2006, has returned to its pre-decline level (32% of the total meat consumed). In 2010, beef consumption dropped again to the 2004 levels (16% of the total meat consumed). The share of sheep meat in the total meat consumption is relatively small, but it increased from 0.3 to 0.7% between 2004 and 2010.

Domestic production has not been able to meet the growing demand since 1993, even though the total meat output has been increasing since 2006.

Pork

Over the past seven years the pig numbers have increased The number of holdings keeping pigs, however, has been decreasing (from 4,707 in 2005 to only 2,888 in 2007). The average number of pigs per holding has increased from 75 in 2005 to 128 in 2007. Most of the pigs (80%) are kept on holdings with 2000 pigs or more.

Pork carcass quality has been improved *(A. Tänavots)*

A total of 654 thousand piglets were born in 2004, whereas the birth rate was the highest in 2006-2007 when the number of births increased by 22 to 30 thousand. After a decline in the years of economic recession, the number of births recovered by 2010, when 755,000 piglets were born, which is 31,000 more than in 2009. Pork output started to increase in 2005 (Figure 4) and reached its highest level of 46,196 tons in 2008. The average carcass weight of pigs has been 77 to 80 kg. The share of pork in the total meat production has shown a slight increase over the past seven years, and it accounted for more than 60% in 2008–2010.

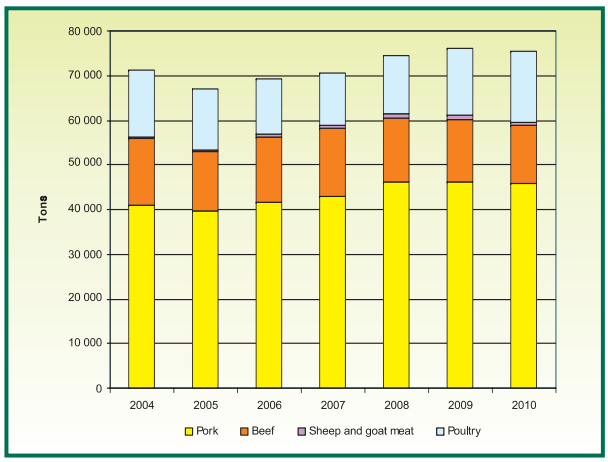


Figure 4. Meat production, 2004–2010

Beef

Since 2005, the total number of cattle has declined. Certain growth occurred in 2010 which was due to the increase in the number of beef cows. During the past seven years the number of holdings keeping beef cattle has also risen. According to the Estonian Agricultural Registers and Information Board, beef cows, including crossbreds, were kept on 612 holdings in 2005, 844 in 2007 and 1,108 in 2010. The overall numbers of beef cattle have also increased. A total of 14,266 heads of beef cattle (including crossbreds) were registered in 2005, 22,774 in 2007, and 39,214 in 2010. By 2010, 13 different breeds of beef cattle were registered the most numerous being Aberdeen-Angus, followed by Hereford and Limousine cattle.

Beef cattle have gained popularity *(R. Toi)*

Beef production declined from 15,422 to 12,926 tons between 2007 and 2010. Purchase of beef cows has also decreased, mostly due to a gradual increase in live cattle exports. Cows comprise 60% of the total purchases of beef cattle. The average weight of carcasses has been growing, and reached 235 kg in 2010. The share of beef in the total meat output has decreased from 21% in 2004 to only 17% in 2010.

Sheep and goat meat

Sheep population has almost doubled during the past seven years, while the number of sheep holdings showed a sharp decrease from 3,185 in 2005 to only 2,470 in 2007. Almost a half of the sheep are reared in flocks with 100 heads or more. The number of households with goats has declined from 1,164 in 2005 (a total of 5,132 goats) to 823 (4,359 goats) in 2007.

Sheep and goat numbers have increased

Sheep and goat meat production has grown from 310 tons in 2004 to 666 tons in 2010. The average sheep and goat carcass weight is 19 kg. The share of sheep and goat meat in the total meat output is low, but it has increased two times during the past seven years (from 0.4% in 2004 to 0.9% in 2010).

Poultry meat

The number of holdings with poultry flocks has decreased from 12,511 in 2005 to 8,322 in 2007.

Poultry meat production fell during the years of disease outbreaks in 2005–2007, but it has shown growth again since 2009. In 2010, poultry meat production reached 15,997 tons. Over the past seven years the share of poultry meat in total meat output was the lowest in 2007 (16%) and the highest in 2010 (21%).

Egg production also decreased between 2005 and 2008, and began to recover in 2009. The total production of eggs over the past seven years is shown in Table 3. Egg output was the lowest in 2008 (146,483 thousand eggs) and the highest in 2004 (230,894 thousand eggs). The average yield has exceeded 263 eggs per hen over the past three years.

Table 3. Egg production in 2004–2010

Indicator	2004	2005	2006	2007	2008	2009	2010
Eggs, in thousands	230,894	209,010	182,624	157,561	146,483	173,264	184,469
Average per hen (eggs)	255	260	256	245	269	263	265

Source: Statistics Estonia

ESTONIAN ANIMAL BREEDING ASSOCIATION

Prof. Emer. Olev Saveli
President of the Estonian Animal Breeding Association

The practice of purposeful animal breeding in Estonia dates back to the 19th century. Animal keepers took an active role in breeding work during the first Republic of Estonia in the 1920s and 1930s. The relatively poor farmers joined their efforts to keep herdbooks and collect animal recording data. Breeding centres for sires were founded to organize purchase and use of breeding material. As a result, pedigree herds of high quality were formed. Estonian butter, eggs and bacon soon became well-known in the European market.

After World War II, cooperative breeding societies were liquidated. In the 1960s, strong solidarity of breeders contributed to the establishment of breeding councils. These were non-governmental voluntary co-operative organizations uniting leading specialists of collective farms, scientists as well as enthusiasts in breeding.

In April 1990, a serious discussion about reorganization of state institutions into co-operative and privately owned organisations was started. The author of the present article suggested a new structure for consideration at a meeting chaired by the Deputy Minister of Agriculture Jüri Kulbin on 10 April 1990. This proposal was unanimously accepted, and on 30 October 1991, under the jurisdiction of the Minister of Agriculture, the Animal Breeding Inspectorate of the Republic of Estonia was established.

The first step was to legally separate the breeding units from collective farms; for this purpose breeding centres were founded starting from 1 January 1992. By the autumn a decision was made to establish breeding co-operatives. An animal breeding association "Estonian Red Cattle" was founded in Tartu on November 10th, and an animal breeding society for Estonian Black-and-White cattle in Rapla on November 11th. Constitutional documents of these organizations were ratified in December. The breeding associations were registered in January and March 1993, respectively.

Registration was followed by complicated negotiations between the associations and the Estonian Privatisation Agency aimed at concluding purchasing contracts of the assets of the breeding centres. This approach of the government was obviously not fair, as the fixed assets of the AI centres had actually been built up using the cash obtained from the sales of sperm. Terms of the contracts proposed by the parties involved differed greatly.

The Estonian Bacon Breeding Society was set up on 10 December 1992. Its foundation agreement was concluded on 26 January 1993, after which the Society was entered into register. The way the Estonian Large White Breeding Society was established, was somewhat different. Initially, a breeding co-operative was founded under the same name on 20 December 1991, which actually was a private limited company. Later on, after vigorous debates at a meeting on 6 May 1994, the co-operative was terminated and the breeding society founded.

On 19 August 1993, seven breeding organisations gathered at Märja on the initiative of late Tõnis Soonets to found the Estonian Animal Breeding Association (EABA). The constitution of the Association was adopted, whereas it was decided that the President of the Association will also act as the managing director of the organization. Afterwards, the Estonian Native Cattle Breed Society (established 1993) and Association "Estonian Fur" (established 1996) also decided to merge with EABA.

EABA board in Estonian Agricultural Museum *(M. Viires)*

The President and Vice-President of EABA are elected for a three-year term. Since 1993, the President of EABA has been Prof Emer Olev Saveli. Cand Agr Aavo Mölder is currently the Vice-President and Chairman of ABAE, acting also as a representative of animal owners. President and an administrative assistant are the only salaried employees of the Association. EABA's budget is composed of membership fees, and is approved by the General Meeting. EABA has received financial support from the Rural Development Foundation and the Estonian Agricultural Registers and Information Board.

The major tasks of EABA involve coordinating the activities of breeding societies, participating in negotiations and legislation discussions with the government, organising public events and workshops to disseminate research perspectives and practical advice to animal breeders.

We can therefore acknowledge that a co-operative breeding organization has been working in Estonia for about 20 years.

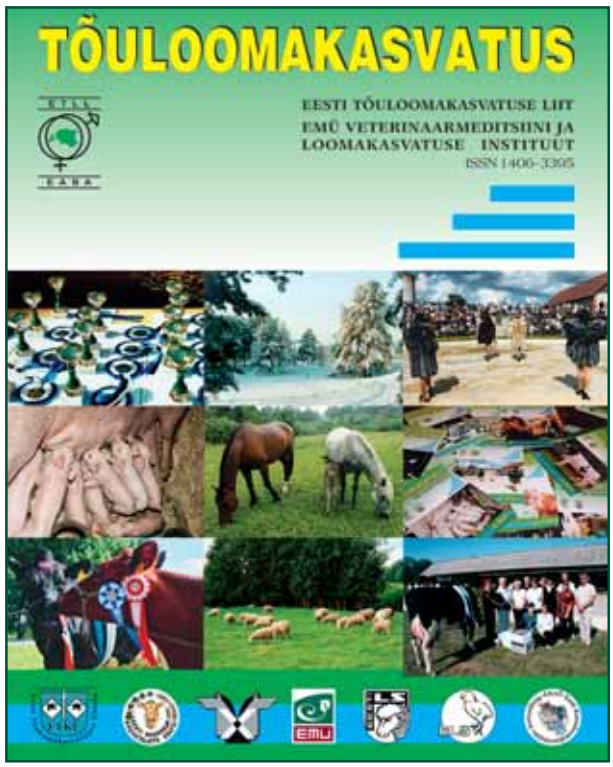
There have been changes in the name and structure of different breeding societies within the past ten years. Merger processes were often very complicated. Negotiations for merging pig breeding societies and cattle breeding societies, split into different organizations based on animal breeds, were conducted almost simultaneously. The breeders of Estonian Black-and-White Cattle and Estonian Bacon united to found the Estonian Animal Breeders' Association with a joint budget on 1 January 1998. Later, the breeders of Estonian Native Cattle joined them, whereas the Native Cattle Breed Society continued its activities. The Estonian Large White Pig Breeding Society was renamed the Estonian Pig Breeding Association. As government allocations to support pig breeding were granted only to the latter, other pig breeders have also opted for this organization. The breeders of Estonian Red Cattle joined the Animal Breeders' Association of Estonia on 1 January 2003.

The best sheep breeder Ell Sellis receives an award from Katrin Reili (right), Aavo Mölder and Olev Saveli *(A. Tänavots)*

Horse breeders had to face serious organisational problems for several years. The Estonian Horse Breeders' Society was founded in 1992 to promote developing of all breeds of horses. The board of this society, however, was much more concerned about its power and privileges rather than horse breeding. The government tried to force the affiliate societies to become independent, as a result of which the Estonian Sport Horse Breeders' Society was founded. The latter is mostly engaged in breeding cross-bred horses. The Estonian Native Horse Conservation Society was founded, followed by the Society for Preserving and Breeding of Estonian Horse (2002). All these four organizations were interested in breeding Estonian Native Horse. Why so? Just because the preservation programme of the Estonian Native Horse, recognized as an endangered breed, receives funding from the government. Each organization was struggling for this money, which harmed the relationships between the managerial staffs. Luckily, the former two were officially acknowledged in 2003, and the Estonian Native Horse Conservation Society is participating in the preserving activities as well.

The Estonian Pedigree Pig Breeding Association officially left EABA in 2003 due to disagreements, while it is still interested in participating in EABA's activities. Thus, despite different opinions and objectives, animal owners are provided with good service, the productivity of farm animals is increasing, and the quality of livestock products is improving.

In 1990, Estonia's first pedigree animal show and competition was organised at Luige, near Tallinn. Since 1997, in cooperation with the Estonian Agricultural Museum, pedigree animal shows have been held at Ülenurme, a village near Tartu**.** The culmination of this popular event, which takes place on the first Saturday of September, is the demonstration of top breeding animals, the champions of each breed raised in Estonia. The fair always attracts thousands of visitors.



A journal *Tõuloomakasvatus* (Pedigree Husbandry) has been issued for 14 years *(EABA)*

EABA's journal of animal breeding *Tõuloomakasvatus*, issued quarterly since 1998, is the only Estonian-language publication of its kind. EABA's calendar *Tõuloom* (Pedigree Animal) is in great demand. President of EABA has judged national shows of Estonian Native Cattle as well as those of different horse, sheep and goat breeds. EABA organizes seminars, training sessions and conferences.

Prof Dr. Dr. h.c. mult. Ernst Kalm (in the middle) from the Christian-Albrechts-University of Kiel has been frequent speaker at the seminars *(A. Tänavots)*

It also renders assistance to breeding societies in managing issues, preparing and revising statutory documents and improving co-operation between the organizations. The year 2010 marked the 125th anniversary of the publication of the first herd book in Estonia.

ANIMAL BREEDERS' ASSOCIATION OF ESTONIA

Tanel-Taavi Bulitko, Director of ABAE
MSc Tõnu Põlluäär, Breeding manager of ABAE
Ilmar Kallas, Specialist of beef breeds of ABAE

A. Association

Animal Breeders' Association of Estonia (ABAE) is a private organization founded in 1993 to serve cattle breeders. The association was founded after Estonia regained independence. After liquidation of governmental institutions dealing with herdbooks and AI stations that produced bovine semen, ABAE had to buy property from the state to continue the breeding work. Today, ABAE is the only association which is co-ordinating the cattle sector.

In the beginning, only Estonian Black-and-White cattle breeders were the members of ABAE. In 1998, pig breeders joined, but since 2001 they have had their own association. At the same time the negotiations were held with Red Cattle breeders for cooperation. In 2002, it was decided that Red Cattle breeders joined ABAE. The decision was made based on the fact that the population of Red Cattle was decreasing quickly and the existence of the Red Cattle Association as an independent company was questionable. So the association joining cattle breeders all over Estonia was founded. 90% of active farmers are members of ABAE. Only the farmers who breed cattle and use services offered by ABAE can be the members. In 1993–2000, Enno Siiber was the general manager and since 2000, Tanel-Taavi Bulitko. The managing board consists of three people: the general manager; Peeter Padrik, the AI lab manager and Tõnu Põlluäär, the herdbook and breeding department manager. This staff has been working since 2003. There have been three presidents of ABAE: 1993–1999 Peeter Kibe; 1999–2002 Hillar Pulk and since 2003, Aavo Mölder who has also been the president of the Red Cattle Association since 2001.

The main income of ABAE comes from the sale of breeding materials, mainly semen. The AI station of ABAE is located in Kehtna, Rapla county, and consists of four modern bull barns. In addition to them, there are two separate barns for young bulls and a quarantine stable. In 2002, the AI station was approved by EU and meets the requirements of the regulation EEC 88/407. The lab is equipped with modern technology to guarantee production of high quality frozen semen and delivery of it to the farmers. There are more than 200 breeding bulls. Most of them are Holsteins (77%) as the most popular breed. In addition, Estonian Red and different beef breeds bulls are producing semen.

The AI station is in close cooperation with the Department of Reproductive Biology of the Estonian University of Life Sciences, doing research on the fertility of bull semen. The bulls of the AI station are under strict veterinary supervision. They are regularly checked for infectious diseases like leucosis, brucellosis, TBC, BVD, Johne´s disease, leptospirosis, trichomonosis and campylobacteriosis.

Annually, 500,000 doses of semen are produced. About 240.000 doses are realized in total, 200,000 doses of them produced in Estonia. The classical grouping system of bulls is used: testbulls, waiting bulls and proven bulls. With the implementation of the genome selection in the future, the number of bulls in AI stations will decrease but the selection population will increase. To be sure in the quality and origin of feeds, the silage and hay is self-produced on 200 hectares of land owned by ABAE.

In 2011, 330 AI technicians were employed. ABAE certifies and gives permission to inseminate. The AI technicians have to participate in seminars and courses. Usually AI technicians are private entrepreneurs, veterinarians or farm managers. 8% of farm owners inseminate their herds themselves. The average workload per technician is about 300 first inseminations per year.

Herdbook keeping has a long history in Estonia. Already in 1885, the first Estonian Baltic-German Herdbook was established. Fortunately, the wars and the occupation years could not destroy the traditions of the herdbook. The aim of the herdbook is to collect pedigree information and register cattle. Estonian herdbooks have 2 sections: A and B. Purebred cattle with 4 generations of ancestors are registered in section A. The percentage of such animals is 75%. ABAE issues also pedigree certificates for all animals sold on domestic market or exported to the EU or the third countries. The initial registration of exported cattle is also done by ABAE. One of the functions of the herdbook (HB) department is the evaluation of exterior and classification of the bulls´ daughters. The HB department coordinates annual cattle shows and auctions. The national championships for Holstein and Red Cattle are held and the shows are judged by

In 2010, herdbook celebrated 125th anniversary

The President of the Republic of Estonia Toomas Hendrik Ilves visiting the AI station of ABAE (picture of Estonian 305 days production champion (18,935 kg milk) Jacqueline EE 2211534 on the backround), right director of ABAE Tanel-Taavi Bulitko

The visit of Turkish Minister of Agriculture Mehmet Mehdi Ekeri to ABAE was a great opportunity for opening Turkish market for Estonian cattle

international experts. Different agricultural exhibitions are held in several regions (Luige, Ülenurme, Jäneda) where specialists of ABAE present cattle collections and introduce them to quests from Estonia and abroad.

For better communication, Estonia is divided into service regions where regional specialists deal with the members of ABAE. Assistance is provided in all the activities of ABAE. There are 8 regional breeding specialists to serve farmers.

One of the important activities of ABAE is **cattle trade** on the domestic and foreign markets. If farmers wish, cattle will be exported from foreign countries through ABAE. 3,000 animals are annually sold, half of them are exported. After Estonia regained independence in 1991, cattle have been exported to former Russian regions, Europe and the third countries. Russia, Uzbekistan, Kazakhstan, Ukraine and Latvia were the main customers till 2000. Prior to becoming a member of the EU, Estonia sold a lot of cattle to Poland. Since 2004, it has been possible to export cattle to Spain, the Netherlands, Italy, Lithuania, Romania and Malta. The third countries Moldova and Belarus were added and in 2010 export to Turkey started. Estonia was the first European country where the Turkish started to buy cattle. The good veterinary status of Estonian cattle has become an advantage. Our country is officially free from tuberculosis and brucellosis. There have been no cases of BSE at all and no cases of FMD and BT in the last decade.

The low density of farms avoids close connections between herds. Our herd structure is perfect to offer animals with very equal quality from one farm. The average herd size is 95 dairy cows. Most of the dairy cattle and young stock are kept in the free stall barns and such animals resist stress better if they get to new environment. 50% of Estonian dairy cattle are kept in new or reconstructed barns. There are 80 milking robots. The genetic level of our cattle is high and the milk production of ancestors acceptable for clients. An advantage for the demand for our cattle is that 93% of the cattle are under milk recording and the existence of pedigree data helps to plan the sale. Farmers use sexed semen to increase the birth of female calves and to have the possibility for expanding the sale.

Co-operation with **international breeding organizations** is one of the activities of the ABAE. Since 1990 the ABAE has been a member of the European Holstein and Red Holstein Confederation (EHRC), since 1992, a member of the World Holstein-Friesian Federation (WHFF). In 2006, the ABAE organized the EHRC managers´ meeting in Tallinn. We are also a founder member of Association of Red Breeds and member of the IRCC – International Red Cow Club. The ABAE is represented in the World Hereford Council.

Beef sector has been developing quickly during the last decade. Before 2000, the main beef breed was Hereford. Today, the beef population increases 15% per year and has exceeded 45,000. There are total of 13 different beef breeds in Estonia. The increase of beef cattle will expand the export potential of live cattle in the future.

The ABAE is in close cooperation with the leading breeding organizations worldwide in **exchange of breeding materials**. The main cooperation is in the field of frozen semen and embryos, but also young and proven bulls are purchased. There is close cooperation between the ABAE and the OHG and the GGI from Germany; the CRV from the Netherlands; the Viking Genetics joining Scandinavian breeders; the CRI – Cooperative Resources International and the WWS – World Wide Sires from the USA; the Alta Genetics and Semex from Canada; Cogent from UK. The ABAE works close with cattle trade organizations like Vion Livestock, Schaap Agro, the ALH Genetics from the Netherlands; the ZVE from Germany and Bovidenmark from Denmark. The ABAE is grateful for having cooperation with organizations from other countries thanks to whom we have managed to improve the traits of our local breeds.

There is a nice tradition to organize **study tours** to different countries for our members. Usually there are farm tours, show visits and sightseeing. Our farmers´ delegations have visited European Holstein Championships several times.

It is very important to train and advise our farmers. Various specialists from different countries come to hold seminars about the modern trends in breeding, genetic evaluation, feeding, management, welfare, veterinary services, overall agriculture and politics influencing cattle breeding.

The ABAE introduces Estonian cattle breeding to foreign delegations, some of them have been high officials (ministers and deputies). Several study tours to present the Estonian breeding and dairy sector and farm visits have been organized for many international farmers´ groups.

The ABAE is in close cooperation with **scientific and research institutions**. Together with the Estonian University of Life Sciences, a modern experimental farm was founded for research work in the field of feeding, fertility, metabolism and behavior. The experimental farm is an important centre for training the new generation of specialists in animal husbandry and active farm managers.

Today´s model of the breeding association is the best for a small county providing all necessary services for the farmers. It is very convenient for the farmers that herdbook keeping, production and marketing of breeding materials, cattle import-export are offered by one association owned by farmers themselves. It is not impossible that animal recording and genetic evaluation would also be the functions of the ABAE and this would increase the importance of the company.

Since 1993, the costs of the herdbook have been partially supported from the governmental budget and it has helped farmers to understand the importance of the herdbook and most of the farms are under milk recording and use the offered services. The governmental support has been essential for the formation, survival and development of the national breeders´ association of our country with small cattle population.

Cattle breeding, especially dairy farming has been the flag-ship of Estonian agriculture. The knowledge of our farmers, favorable natural preconditions (lots of grassland and enough rain), new modern dairy farms, farm structure etc. have created a competitive and effective sector. Estonia is today in the top-10 among the 27 EU countries with average milk production per cow and the ABAE has contributed to this as well.

B. Estonian Holstein Breed

Breeding of Estonian Holstein breed goes back to 1838 when the first Black-and-White Dutch-Friesian cattle were imported from the Netherlands to the North-Estonian manors. They are considered the heralds of today´s Holsteins. Later, cattle were exported from Germany. Dutch-Friesian cows were remarkable for their high production. They had low feet and legs, compact body and weighed over 500 kg.

Nowadays, Black-and-White and Red-and-White dairy cattle are Holsteins. Holstein is the most popular dairy breed worldwide due to the high milk production.

Development of Estonian Holstein breed started in the middle of the 1970s. The genetic component of Estonian Black-and-White cattle of the old type was not oriented to Dutch-Friesian. In the 1975, the first purebred Holstein bulls were imported to the AI station of the ABAE. Grandboy EHF 3299 out of Paclamar Bootmaker improved Estonian Black-and-White and was very popular among our farmers. Cows became bigger in type, the udder improved and most important – milk production increased, but there was a slight decrease in fat content. In the 1970s were imported 12 bulls from North America. Bulls were imported also from Canada and Germany. Although bulls imported from Germany at the Soviet time did have so high genetic value as American bulls, they had a good influence on Estonian Black-and-White anyway.

Holstein breed became more and more popular and it spread over Estonia. Estonian Black-and-White cattle were popular across the territory of the former Soviet Union. A lot of heifers, breeding bulls and semen were exported there. Estonian milk production was the highest in the USSR.

In the beginning of the 1990s, the percentage of Holstein breed had increased up to 50%. Unfortunately, huge amount of valuable breeding stock was taken to the slaughterhouses with liquidation of the large farms after Estonia regained independence, because small farms could not manage with returned cattle or did not want to keep dairy cattle. In the 1990s, the number of dairy cows and milk production per cow decreased because of the low raw milk price and lack of interest in developing and supporting the agricultural sector.

After Estonia regained independence, the ABAE had to start finding new contacts in European and North American countries. In 1993, import of young bulls for parallel testing begun and the first proven bulls were leased to improve the genetic level of our cattle. Farmers started to use imported semen on bulls´ dams. There were no market barriers anymore and it became possible to select breeding materials from breeding organizations worldwide.

The population of Estonian Holstein cattle has increased 25% in the last 20 years (1991–2011) and makes 77% of the dairy cattle. In 1998, Estonian Black-and-White breed was renamed as Estonian Holstein. The genetic origin of Estonian Holstein cows according to their sires´ native country today is: Estonia (49.4%), Germany (20.5%), the Netherlands (20.2%), USA (4.6%), Scandinavia (2.7%) and Canada (1.9%). In the end of 2010, 88,984 cows were registered in the database of the Estonian Animal Recording Centre, 68,685 (77.2%) of them were Holsteins. The percent of Holsteins has been increasing for 1% annually in the last decade, but the number of Holsteins has gone down as the

Holstein youngstock on the pasture

Top bull Berlingo EHF 6375 (De Crob Bingo x Etazon Addison) enjoying Estonian snowy winter. Berlingo is the most used bull who improves his daughters production and longevity traits

Table 1. Milk yield of Estonian Holstein cows 1965–2010 (EARC, 2010)

Figure	Control years								
	1965	1985	1995	2005	2006	2007	2008	2009	2010
No. of cows	50,750	112,643	79,767	73,261	72,894	70,816	69,599	68,058	67,904
Milk,kg	3280	4332	3915	6722	7069	7273	7582	7614	7778
Fat,%	3.06	3.94	4.03	4.17	4.13	4.11	4.08	4.09	4.07
Fat, kg	118	170	157	280	292	299	309	312	317
Protein,%	x	x	3.14	3.31	3.32	3.33	3.34	3.35	3.35
Protein,kg	x	x	123	223	235	242	253	255	260
Fat + Protein, kg	x	x	280	503	527	541	562	567	577

total cow population has decreased. New free stall barns have been built and old farms reconstructed due to the investments into the dairy sector, feed quality has become better, total mixed ratio is used. This has lead to the increase of the average milk production per cow for one ton. Improvement of feed quality and using total mixed ratio helps to realize the genetic production capacity of Holstein breed.

In 2010, the average milk production of Holstein cows was 7778 kg with 4.07% of fat and 3.35% of protein content. We predict the ongoing increase and crossing 8,000 kg is just a matter in 2011. Cows in the best herds produce over 11,000 kg of milk in average.

In 2009, a new 305 days record was established by Tartu Agro AS cow Jacqueline EE2211534 (sire Jaco NL, paternal grandsire Jabot NL) who produced 18,935 kg milk and 1,365 kg fat and protein in her 4th lactation. She is still in herd milking her 6th lactation and will soon reach 100,000 kg lifetime production. The best testday result belongs to Torma POÜ cow Tare EE5640614 (sire Eastland Impuls NL, paternal grandsire Etazon Lord Lily NL) who gave 84.6 and 83.7 kg of milk per day for two months consecutively.

In the future, the focus will be on longevity of cows in addition to production. The most important production trait will be protein gross production. The importance of feet and legs and udder health traits will increase.

The testing capacity is 30 Holstein bulls per year according to the breeding program. Young bulls are selected among the best dams´ sons. The ABAE gives mating advice and imports semen from the top bulls worldwide. North American embryos give valuable addition to the bulls in the AI station. There is parallel testing of bulls with European countries. Proven bulls are imported for semen collection. 30% of inseminations are done with imported semen.

The type of a modern Holstein cow has changed: cows are higher (sacrum of 1st lactation cows is 145 cm), the body has become longer and deeper, the weight has increased and adult cows weigh over 700 kg. Holsteins are calm and have good appetite.

Holstein heifers are historically imported from Germany, the Netherlands and Denmark to improve the local breed and increase population. After becoming an EU member in 2004, Estonian dairy farmers had to increase the total milk production to fulfill the milk quota. Extra animals were needed to complete new and reconstructed barns. 1,900 Holstein heifers were imported mainly from Germany and the Netherlands.

The result of the long-time mission-oriented breeding, usage of international breeding materials, the type of cows is good and their milk production high. Our cattle originate from herds free of infectious diseases and of good breeding structure. Annual Holstein championships are held to find out the best cows. Usually foreign experts judge these shows.

The best milk producers are awarded at the annual meetings of ABAE in 2011 (in the middle head of board Aavo Mölder) *(T. Bulitko)*

C. Estonian Red breed

The development of Estonian Red breed started together with other European breeds more than 100 years ago. Danish Red has had a great influence. Continual crossing with Angler, North-Schlesswig and Danish Red cattle has been used in developing Estonian Red breed. Red cattle has survived recoveries and setbacks. During the World War I, lots of valuable cattle were liquidated. Big setback was the 2nd World War and collectivization after that. It took time to restore the milk production.

1989 was a good year, when the average 3919 kg milk with 4.07% fat and 3.39% protein content per cow was achieved. Thanks to the cooperation with breeding organizations worldwide and usage of top-bulls, the lag of Estonian Red cattle has stopped and it can compete even with Holstein breed. The milk yield improves every year. During 2005–2010, several breeding components have been used, but mostly it has been Angler and Danish Red as before. A huge impact on Estonian Red breed was by the bull FYN Rosen 42683 leased in 1992 from Denmark. He improved the exterior and udder of Estonian Red cattle. Denmark, like Estonia, uses the system of combining bloodlines, which has lead to success in selection and the average production of Danish Red breed has been over 8,000 kg for years. During the last years, Estonia has also managed to increase the milk production (Table 2).

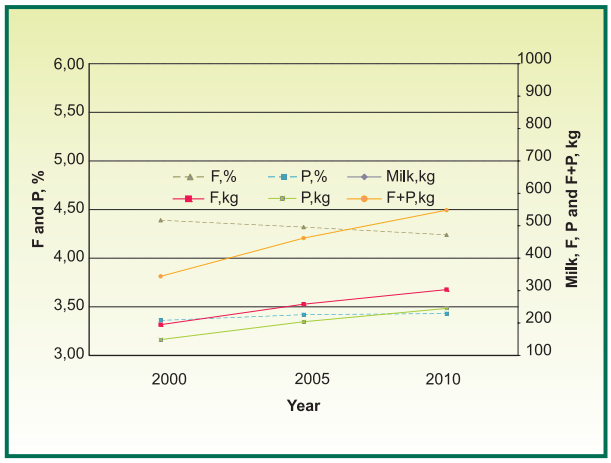


Figure 2. Dynamics of milk yield of Estonian Red cows 2000–2010

Cows milking more than 10,000 kg per year are not rarities any more. The record belongs to AS Tartu Agro cow Neti EE3980484, who got 16,051-3.80-3.12 in her 3rd lactation. There are many herds where the average milk production exceeds 8,000 kg (1.2% of herds, 30% of cows). However, there are still several herds with the yearly average only about 3,000–4,000 kg.

Table 2. Number and milk yield of Estonian Red cows 1965–2010

Figure	Year						
	1965	1985	1995	2005	2008	2009	2010
No. of cows	116,184	146,781	49,285	26,607	22,357	20,578	19,724
Milk, kg	2976	3853	3272	5962	6891	6995	7152
Fat, %	3.69	4.10	4.17	4.32	4.25	4.28	4.24
Fat, kg	110	158	136	258	293	300	303
Protein, %	x	x	3.23	3.42	3.22	3.44	3.43
Protein, kg	x	x	106	204	237	241	245
Fat + protein, kg	x	x	242	462	530	541	548

The milk production breeding value (SPAV) has increased according to the birth year, which shows mission-oriented breeding. For example, if daughters of bulls born in 1988 had the average SPAV 78, then bulls born in 2000 had SPAV 101 and bulls born in 2004 had SPAV 103.

The same tendency is observed on cows: according to the first genetic proofs in 2011, the SPAV of cows born in 1993, 2000 and 2008 were correspondingly 80, 89 and 105 points. The test herds, where the future breeding bulls will be selected, improve their production level continually.

Malcoloured Estonian Red herd *(T. Põlluäär)*

Estonian Red calves *(T. Põlluäär)*

Estonian Red young stocks *(T. Põlluäär)*

Table 3. Milk production in test herds 2005–2010

Year	No. of cows	Milk, kg	F, %	F, kg	P, %	P, kg	F+P, kg
2005	15,957	6068	4.32	262	3.41	207	469
2006	14,677	6320	4.32	273	3.43	217	490
2007	14,437	6328	4.29	271	3.42	216	487
2008	13,992	7010	4.29	301	3.42	240	541
2009	13,305	6628	4.35	288	3.42	227	515
2010	13,324	7306	4.08	299	3.43	250	548

Dams of young bulls bought to AI station improve their milk yield.

Table 4. SPAV and SSAV (milk and somatic cells breeding values) of bulls bought to AI station 2005–2010

Year	Milk, kg	F,%	F, kg	P,%	P, kg	F+P, kg	SPAV	SSAV
2005	10,187	4.40	448	3.38	344	793	124	116
2006	10,025	4.09	410	3.45	346	756	125	99
2007	11,061	4.09	452	3.39	375	827	124	105
2008	11,199	3.92	439	3.25	364	803	122	109
2009	11,797	4.20	495	3.38	399	894	128	99
2010	12,365	3.92	485	3.43	424	909	126	101

During the last years, more attention is paid to improving reproduction. A healthy cow that calves every year, milks properly, stays in herd for long, gets pregnant without problems is a dream of each farmer.

Estonian Red cows at the local shows *(T. Põlluäär)*

Show winner 2011 KUPI EE9094987 from Tartu Agro AS – the sovereign leader herd with Managing Director Aavo Mölder and breeding manager Maie Mölder, and judge Orla Kastrup Kristensen from Denmark *(T. Bulitko)*

Table 5. Reproduction figures of Estonian Red cattle

Year	Days dry	Days open	AI index	Age of 1st calving	Average age
2005	76	123	1.8	29.3	5y 2m
2006	75	126	1.8	29.0	5y 1m
2007	76	128	1.8	28.7	5y
2008	76	128	1.8	28.5	4y 11m
2009	74	125	1.8	28.0	4y 11m
2010	72	123	1.9	27.6	4y 10m

Estonian Red cattle is peaceful and friendly. Usually they are healthy, have better longevity than Holsteins, however everything depends on breeding components. The progeny with the above mentioned components are named Estonian Red (ER or EPK in Estonian). The separate rate of each component is not counted. Females calve easily and stillbirth rate is low. The main trait is the red color which according to the breeding material from different countries can vary from red to red-and-white or to brown colors (both light and dark tones are allowed). Black color is not recommendatory, however if Brown Swiss is used then black is accepted.

The goal of milk production is 8500 kg with 3.5% protein content per cow in 305 days lactation. Fat % should not be below 3.8. The height of sacrum of adult cows should be

The udder quality getting better *(T. Põlluäär)*

145 cm and the weight at least 650 kg. The udder must have capacity, have good fore and rear attachment, be easy to milk, the feet and legs strong (too posty and too sickled are excepted). Dark hoofs are preferable in exterior. The aim is to pay more attention to the health of cows to improve their longevity, that cow should stay in a herd at least 5 lactations with average lifetime of 7 years. The age of the first calving has to shorten from 28 months to 26 months. Purebreeding will be the priority. Danish Red and Angler will be the relative breeds continually. According to the breeding program, the following breeds are allowed to be used: Angler, Danish Red, Brown Swiss, Montbeliarde, Red Holstein, Norwegian Red, Ayrshire and Swedish Red-and-White.

D. Beef Cattle Breeding

The population of beef cattle has been increasing in the last years (Table 6). There were 11,872 beef cattle in Estonia in 2005 but on 1 Januar 2011 this number was 39,279 already. This growth has been due to increasing of the existing herds, also some small dairy farms have switched to beef breeding.

The number of beef breeds has also increased, it has reached 13. Aberdeen-Angus and Hereford from extensive breeds and Limousine from intensive breeds are the most represented. In 2010, Aubrak was added to the list, when six pregnant heifers and one bull were imported from Lithuania. Aubrak originates from the mountains in central France where their milk is used for producing cheese. Good feed intake, excellent suckler traits are common to that breed and weaned young bulls weigh

Margus Keldo and Merle Laas exhibiting their Hereford bull Cimon at the show *Tõuloom* 2010 in Ülenurme *(R. Toi)*

Table 6. The number of beef cattle and breeds

Breed	1.01.05	14.02.07	1.01.08	1.01.09	1.01.10	1.01.11
Hereford - Hf	3,878	5,238	6,239	7,319	8,537	10,072
Limousin - Li	3,603	5,087	6,189	6,832	7,915	8,976
Aberdeen-Angus - Ab	3,629	5,215	6,623	7,779	9,269	10,208
Charolais - Ch	301	607	816	1,160	1,646	2,226
Highland Cattle - Hc	171	474	650	942	1,191	1,568
Piemontese - Pi	108	292	344	439	395	383
Blonde d'Aquitaine - Ba	123	299	561	941	1,281	1,564
Belgian Blue - Bb	15	344	575	1,052	1,573	1,620
Simmental - Si	38	284	691	1,335	1,890	2,588
Dexter - De	6	5	10	11	10	17
Galloway - Ga	–	4	4	5	18	42
Shorthorn - Sh					6	4
Aubrak - Au						11
Total	**11,872**	**17,849**	**22,702**	**27,815**	**33,731**	**39,279**

Source: Estonian Agricultural Registers and Information Board (EARIB)

Table 7. Number of suckler cows per breeds (EARIB)

Breed	6.06.06	14.02.07	1.07.08	1.01.09	1.01.10	1.01.11
Hf	1,609	1,773	2,651	2,623	3,015	3,591
Ab	1,069	1,400	2,400	2,464	2,941	3,466
Li	980	1,255	2,161	2,170	2,592	3,071
Ch	136	163	301	284	402	502
Hc	121	149	277	284	388	547
Pi	42	54	94	106	148	166
Si	35	37	95	104	207	515
Ba	11	22	91	101	173	303
Bb	4	6	48	64	105	173
De	–	2	2	2	3	7
Ga		2	2	2	2	2
Au						4
Total	**4,007**	**4,863**	**8,122**	**8,248**	**9,976**	**12,347**

360 kg on average. The number of suckler cows has reached 13,900 already. In 2006, it was only 4007 in Estonia (Table 7).

The biggest beef population is in Saare county where more than 5,000 animals are registered, but on the other hand the number of beef cattle in traditional dairy regions (Tartu and Jõgeva counties) has stayed modest (Table 8).

Table 8. Number of beef cattle per counties (ARIB)

County	23.02.06	14.02.07	01.01.08	01.01.09	01.01.10	01.01.11
Saare	1,696	2,000	2,622	3,436	4,331	5,169
Lääne	2,238	2,668	3,061	3,553	4,067	4,655
Rapla	1,455	1,696	2,206	2,889	3,332	3,971
Pärnu	1,285	1,634	2,119	2,596	2,984	3,586
Lääne-Viru	1,212	1,576	1,838	2,206	2,746	3,332
Hiiu	1,116	1,633	2,023	2,092	2,562	2,931
Harju	953	1,501	1,909	2,191	2,445	2,767
Viljandi	995	1,176	1,266	1,675	2,092	2,527
Võru	976	1,046	1,444	1,790	2,297	2,222
Valga	738	812	1,034	1,322	1,724	1,896
Järva	230	313	599	1,005	1,466	1,913
Põlva	339	457	587	805	1,101	1,252
Ida-Viru	334	481	599	831	991	1,216
Jõgeva	396	452	727	759	957	1,163
Tartu	300	404	668	665	636	679
Total	**14,263**	**17,849**	**22,702**	**27,815**	**33,731**	**39,279**

1358 beef cattle were imported to Estonia in 2005–2010 (Table 9). The number was biggest for Highland Cattle who are very good in taking care of natural landscapes and able to survive in our climate. Aberdeen-Angus (imported 398) is well accepted for their good feed intake, born calves weigh 35–38 kg, easy calving and beef quality are noted. 40% of cattle have been imported from Denmark (Table 10) and mostly Highland cattle. In 2010, 47 Aberdeen Angus heifers were exported to Belarus, 38 of them were from the best beef herd of 2009 – Aberdeen Top Genetic OÜ.

292 herds with 20,239 beef cattle are under performance testing, 19% of them are purebred, 1450 suckler cows and 1229 heifers. 40% of the total beef population are performance tested. Beef cattle breeding is co-ordinated by Animal Breeders´ Association of Estonia, who also keep the herdbook. 12,602 beef cattle are registered in the herdbook, 18.7% in section A, 5.5% in section B and 75.9% in section R (since 1 Januar 2010). Numerally, most of beef cattle registered in the herdbook belong to Aberdeen-Angus, Limousine and Hereford breeds. However, in section A the Highland Cattle comprises 84.8%.

The number of members of the Estonian Beef Breeders´ Association (founded 21 June 2000) has been increasing and currently there are 285 members. Leino Vessart led this association since its foundation to 1 June 2011, when Aldo Vaan continued his work. The symbolic hat of the manager of the association was handed over at the annual meeting. Several seminars, courses and study tours abroad have been held to improve the knowledges and practical skills of the

Jane Mättik with Aberdeen-Angus bull Fantasti *(R. Toi)*

beef farmers. The study tours were organized as follows: Ireland (2006), France (2007), Scotland (2008), Denmark, Russia (2009) and Switzerland (2010).

There is close cooperation with Lithuanian and Latvian beef breeders. The tradition of Baltic beef breeders´ annual meetings was started in 2004.

The Association of Estonian Food Industry awarded the set of beef products under the trademark *Eesti Lihaveis* of Rakvere Meat Processing Plant the quality label “The Best Food for Health 2011”.

The longtime manager of Estonian Beef Breeders´ Association Leino Vessart (on the right) handing the job over to Aldo Vaan *(R. Toi)*

Study tour to Switzerland *(R. Toi)*

Table 9. Number of imported beef cattle per breeds

Breed	2005	2006	2007	2008	2009	2010	Total
Li	16	7	26	3	25	79	156
Hf	4	2	66	17	1	42	132
Ab	61	181	102	26	16	12	398
Ch	7	1	4	57	1	6	76
Si	8	6	7		4	111	136
Ba		3	5			6	14
Hc	72	46	62	123	22	96	421
Bb		6	8				14
Ga		3					3
Pi			1				1
Au						7	7
Total	**168**	**255**	**281**	**226**	**69**	**359**	**1358**

Table 10. Number of imported beef cattle per years from countries

Country	2005	2006	2007	2008	2009	2010	Total
Sweden	28		1	55		32	116
Finland	16	**1**	18	8	24	50	117
Switzerland	20	46	47	26	12		151
Germany	23	68				75	166
Denmark	78	57	153	132	31	87	538
Latvia	3					1	4
Scotland		80	62		2		144
Belgium		3					3
France				5			5
Lithuania						14	14
Czeck						100	100
Total	**168**	**255**	**281**	**226**	**69**	**359**	**1,358**

BREEDING OF ESTONIAN NATIVE CATTLE

MSc Käde Kalamees
Director of Estonian Native Cattle Breed Society

Estonian Native Cattle has developed from the local aboriginal herd throughout centuries, but purposeful breeding began in 1909, when newspapers started to publish the writings of Aleksander Lilienblatt. He started the measuring and evaluation of the cows of the native cattle and the purposeful selection of bulls. A lot of local specialists were in favour of pure-breeding of the native cattle, but as it was difficult to find very good bulls in local herds, better bulls of West-Finnish breed were also bought.

- In the autumn of **1913**, purposeful study of Estonian Native herd began when Prof. J.F. Liskun initiated the measurement of more than 200 cows from the Native breed, experimental herds were formed.
- In **1914** registration of cows from the native breed in the herdbook began.
- On 20 April **1920**, the Estonian Native Cattle Breed Society was founded, where Peeter Kallit started to work. The breeding goal was a pale red polled herd, of low or medium weight, with strong conformation and longevity, very productive with especially high fat percentage, a profitable dairy cattle. Bull associations and -stations were founded.
- In **1925** the tradition of competitions between breeding farms began.
- In **1939** there were 59 breeding farms for Native Cattle: 4 first class, 24 second class and 31 third class.
- Statistics in **1938/39** according to the Estonian milk recording yearbook: Estonian Native Cattle produced 4.8 kg of milk fat with 100 feed units, surpassing Estonian Red breed by 0.4 kg and Estonian Black-and-White by 0.5 kg.
- In **1947** the breeding society was liquidated and the improvement of Estonian Native cows was to be coordinated by other breeding centres. As it was difficult to fulfil the meat plan by rearing native cows of small body weight, their number decreased.

Estonian Native Cattle was about to die out due to inbreeding.

- In **1956** Jersey bulls Lasse and Abild were imported. They were used extensively as artificial insemination was spreading. Their offspring surpassed their counterparts of native cattle by type traits, milk productivity and milk fat content.
- In **1961** 3 Jersey bulls were bought from Denmark and 2 bulls from Finland (Sultan and Iiro).
- In **1965** 20 pregnant heifers and 2 bulls (Mahti and Tolari) were brought from Finland.
- In **1967** 50 pregnant heifers were imported from Finland.
- In **1982** artificial inseminations were carried out using the sperm of American Brown Swiss, Ayrshire and Red-and-White Holstein bulls, but the rise in milk productivity was minimal and milk fat content decreased.
- In **1983** 23 pregnant heifers and 2 bulls were imported from Finland.

Pärivere state farm became the breeding centre for Estonian Native Cattle, the director was Mihkel Kallaste (1957–1987). At the end of the 1980s, the sperm of Red-and-White Holstein bulls was used in order to avoid inbreeding.

- On 14 October **1989** the Estonian Native Cattle Breed Society was re-established on the initiative of Ain-Ilmar Leesment.
- In **1990**, the sperm of Jersey bulls was used for single insertive cross-breeding (Kei, Jakob, Henry, Tanic).
- In **1994,** the sperm of the Swedish Red Polled bull Frippe was used.

Table 1. Semen import of West-Finnish bulls

Year	Doses	Year	Doses	Year	Doses
1995	300	1999	300	2002	900
1997	550	2001	300		

- Since **1995** Käde Kalamees has registered Estonian Native cattle in the herdbook.
- In **1999** the sperm of the Swedish Red polled bull Quatro was used.
- In **2003** "Breeding and Conservation Porgramm of the Estonian Native Cattle breed for 2004–2012" was worked out.
- From **2004** only the Estonian Native Cattle herdbook bulls have been used.
- In **1990–2010** the 117 local Estonian Native Cattle herdbook bulls were used.

The membership of the Estonian Native Cattle Breed Society was increasing until 2005 and has stabilized at ca 175 by now, but the numbers of "cows of the year in recording systems" are fluctuating (Table 2)

In order to become a breeding farm for Estonian Native Cattle one has to own 4 native breed cows and meet the conditions

Breeding bull Numpul EK 301, born 20.02.2009, owner Rein Möldre from Lääne-Virumaa *(K. Kalamees)*

Estonian Native breed in Ülenurme, *Tõuloom* 2008 exhibition *(K. Kalamees)*

Table 2. Herds of members of Estonian Native Cattle Breed Society, January 1.

Indicator	1990	1995	2000	2005	2011
Members	68	70	157	196	175
Cows in recording	566	555	443	538	468
Households in recording	7	63	135	172	107
Incl. >4 cows	4	6	24	24	31
Breeding farms	4	6	12	22	25
Cows	523	260	176	303	328
Sales of breeding animals	50	26	75	95	89

Table 3. Number and productivity of Estonian Native cows in milk recording

Year	No. of cows	Body weight, kg	Milk productivity					
			milk, kg	fat, %	fat, kg	protein, %	protein, kg	F+P, kg
1920/21	245	326	1619	3.91	63			
1938/39	1940	407	3123	4.14	129			
1945/46	1496	400	2165	4.13	90			
1970	1131	456	3003	4.28	129			
1980	984	468	3394	4.27	145			
1990	566	467	3430	4.43	152	3.32	114	266
2000	443	x	3936	4.78	188	3.49	137	325
2005	537	x	4524	4.59	207	3.44	156	363
2010	461	489*	4850	4.55	221	3.38	164	385

** - in 2009*

provided in the evaluation guidelines for breeding farms. Since 1990 the number of breeding farms has risen from 4 to 25. In 2011 Estonian Native cows were mainly kept in order to get milk and dairy products for the family. Only few farms have increased the number of cows.

Source material for breeding is kept in breeding farms. As Estonian Native cows are mainly kept for family use, the content of dry matter is most important, which leads to the mean milk yield of 4850 kg (Table 3). In a farm, where the feeding conditions are good, Estonian Native cows are capable of producing 7000–10 000 kg of milk in a lactation and 600–860 kg protein and fat (Table 7)

Liia Sooäär and Estonian Native breed *Saarte Viss* 2009 Kelli, born 2005 *(K. Kalamees)*

Estonian Native breed cow Lillik; 5th lactation: 10,393 kg–4.28%–3.48%–806 kg; owner Massiaru POÜ *(P. Alfhtan)*

Table 4. Elite breeding farms of Estonian Native cattle in 2011

Herd owner	No. of cows	Per cow					Total score
		milk, kg	fat, %	fat, kg	prot,%	prot,kg	
1. Eerika Farm OÜ	6	6716	4.91	330	3.65	245	134.3
2. Palu farm, J. Simovart	11	6398	4.69	300	3.38	216	123.6
3. Uustla farm, L. Sooäär	21	5842	4.68	273	3.54	207	120.2
4. TÜ Mereranna. PÜ	30	6225	461	287	3.44	214	119.5
5. Massiaru POÜ	4	5694	4.69	267	3.63	206	107.5

Table 5. Body measurements of Estonian Native cattle in 1910–2009

Indicator	1910–12	1935–39	1948	1968	1988	1997–99	2009
No.of cows measured	200	559	1325	507	377	218	279
Sacrum height, cm	117	121	121	122	122	128	132
Chest depth, cm	61	65	64	66	67	69	71
Rump $width_1$, cm	43	48	46	50	49	48	50
Rump $width_2$,cm	38	42	41	42	40	x	44
Rump lenght, cm	45	50	48	51	52	49	52
Body lenght, cm	x	160	157	x	x	162	167
Chest girth, cm	162	174	165	179	183	176	182
Body weight, kg	320	424	380	456	496	436	489

Year by year, the sacrum height and chest depth of cows have increased, but the other measurements fluctuate. The biggest measurements were in 2009, except chest girth and body weight (Table 5).

Among the cows with the highest lifetime milk fat yield the first place is held by Mirdi who stayed in the herd for 13 lactations and had stable milk productivity in all lactations (Table 6). Mirdi had 7 female calves and 6 male calves, 2 of the latter became pedigree bulls (Lembo EK 187 and Töll EK 200).

Table 6. Cows with the highest lifetime milk fat yield

No.	Reg. no	Name	Owner, county	Birth date	Milk, kg	Fat, %	Fat, kg
1.	2557	Mirdi	V. Sooberg, Pärnu	6.02.1982	65,119	5.01	**3264**
2.	1201	Eha	J. Eentalu, Pärnu	26.03.1926	67,931	4.47	3034
3.	2037	Miia	Vahenurme kolh, Pärnu	8.04.1969	55,081	5.45	3003
4.	42	Ürdi	L. Sooäär, Saare	26.12.1997	59,625	5.02	2993
5.	293	Roosi	A. Rungi, Pärnu	24.08.1926	**68,199**	4.38	2988
6.	21	Ebe	M. Reinem, Rapla	27.03.1990	59,152	5.00	2959
7.	4	Belinda	A. Loit, Viljandi	15.06.1992	53,254	**5.39**	2872
8.	150	Nanna	L.Lüüs, Valga	31.05.1997	61,995	4.48	2777
9.	4674	Õõda	Ä. Leesment, Pärnu	10.05.1982	60,977	4.44	2707
10.	151	Kõla	M. Siim, Pärnu	22.01.1924	67,574	3.97	2679

Table 7. Top cows of the Estonian Native breed by milk fat and protein production (01.06.2011)

Name and HB No.	Sire, HB No.	Owner	Birth year	Lact. No	Milk productivity			
					milk kg	fat %	prot. %	F+P kg
1. Aafrika 5596584	Napero EK226	Sadala Piim OÜ	2004	3	10,696	4.55	3.53	864
2. Lillik 4778646	Poisu EK 219	Massiaru POÜ	2003	5 3	10,393 10,126	4.28 4.30	3.48 3.61	806 801
3. Uiu 635467	Töll EK 200	Põlula KF	1999	1	8552	4.90	3.72	737
4. Armas 6943387	Ulvar EK 222	Sadala Piim OÜ	2005	2	8755	4.65	3.45	709
5. Mari 1416664	Jerti EK 198	L. Puur	2000	5	7894	5.29	3.66	706
6. Bullat 3395479	Vako EK 214	Küüniniidu OÜ	2002	4	9343	3.97	3.45	693
7. Taisi 1493450	Töll EK 200	I. Goshovski	2000	4	8211	4.88	3.47	686
8. Põnna 1487725	Ulari EK 208	Sarapiku Piim OÜ	2000	4	9395	4.00	3.31	686
9. Nunnukari 6281885	Jerti EK 198	TÜ Mereranna PÜ	2005	3	8494	4.65	3.34	679
10. Uuni 635464	Fram EK 189	Põlula KF	1999	2	9502	3.87	3.22	674
11. Sudukari 741535	Kei EK 160	TÜ Mereranna PÜ	1999	7 5	7046 7485	5.99 4.75	3.37 3.60	659 625
12. Tinda 635457	Töll EK 200	A. Veidenberg	1998	3	7991	4.47	3.76	657
13.Sirgukari4115755	Vako EK 214	TÜ Mereranna PÜ	2002	4	9598	3.69	3.09	651
14. Pipi 8299833	Virvak EK 262	L. Puur	2008	1	8554	4.09	3.46	646
15. Miina 5736805	Nuki EK 230	Massiaru POÜ	2004	2	7112	5.09	3.95	644
16. Üpsi 3782095	Uku EK 218	L. Sooäär	2002	5	7171	5.14	3.79	640
17. Helde 8581808	Nummi EK 248	Eerika Farm OÜ	2007	2	7734	4.62	3.60	636
18. Teelikari2018638	Akku EK 207	TÜ Mereranna PÜ	2000	4	8251	4.14	3.53	633
19.Nirgikari 6120870	Näppara EK224	TÜ Mereranna PÜ	2004	4	7889	4.56	3.45	632
20. Kenakari7165818	Jerti EK 298	TÜ Mereranna PÜ	2005	2	8050	4.50	3.35	632

Lea Puur and her granddaughter at a milking contest in Ülenurme, exhibition *Tõuloom* 2010, Käde Kalamees on the right
(M. Kalamees)

Winner of Estonian Native Cattle Silver Cup 2011 from Mereranna at the statue of Estonian Mother *(K. Kalamees)*

Table 7 gives a survey of the best cows of the Estonian Native breed at all times. The analyses made in 2011 showed that among the best 20 cows (they produced more 630 kg fat and protein) there were born in 1998 and later. This fact should reveal better breeding and better feeding. Two Estonian Native cows are producing over 10 000 kg of milk. Aafrika from Sadala farm produced 10 696 kg in 3 lactations. Lillik from Massiaru farm produced 10 126 kg of milk in 3 lactations and 10 393 kg of milk in 5 lactations. So although it is not a numerous breed, there is enough notable good milk production capability.

POULTRY BREEDING

PhD Matti Piirsalu
Board member of Estonian Poultry Society

The numerous contemporary breeds of poultry have been developed from their domesticated ancestors through multiple selection and crossing procedures under different environmental conditions. The diversity within domestic chicken is extensive, whereas more than 100 crosses are grown commercially all over the world. Poultry breeding is a highly specialised industry. There are only around 10 major poultry breeding companies worldwide which produce almost 90% of the breeding material.

In Estonia, the most well-known foreign companies for breeding egg-layer chicken are Lohmann, ISA, De Kalb, and Hy Line. The top breeding companies for producing meat-type chicken include Cobb, ISA, and ROSS, also Eubrid from earlier times. The breeding goals have been focused on improving feed conversion, productivity and liveability.

Until 1960, there was only one farm in Estonia concentrating on breeding elite chicken – the Kurtna Poultry Breeding Experiment Station in Harju County, where White Leghorn, New Hampshire, and Australorp breeds were raised. In 1961, the other breeding centre was established at the Järlepa Poultry Breeding Farm in Rapla County, which started its breeding work using Sussex, Cornish and White tailed red chickens, imported from England. In the early 1960s, the farm for elite Embden geese existed at Kurtna as well.

In 1963, besides the above two, there were 118 reproduction farms for hens, five for geese and one for turkeys.

In 1965, a pedigree poultry breeding system was adopted and applied for both egg and poultry meat production. Three enterprises were designated as specialized poultry breeding institutions: the Kurtna Poultry Breeding Experiment Station, the Järlepa Poultry Breeding Farm, and the Sakala Poultry Breeding Farm. The duties of the enterprises included developing specialized lines for obtaining high performance poultry, improving the existing lines, introducing new combinations (crosses) suitable for combining and crossing lines, and preserving the most valuable traits of the imported lines.

Prior to its commercial use, the breeding material was evaluated at the Kehtna Poultry Testing Station where performance testing of laying hens was carried out from 1966 till its liquidation in 2000. The results obtained were distributed to all poultry farms, whereas the pedigree breeding farms arranged for delivering the suitable initial lines or parent forms of hen crosses to reproduction farms. The latter were responsible for preserving the breed value of chicken originating from breeding lines of high quality via mass selection and granting favourable feeding and keeping conditions.

Between 1968 and 1972, the system of breeding and reproduction farms was restructured to fully meet the requirements of Estonian poultry breeders, but also to permit export sales of pedigree chicks and hatching eggs to neighbouring countries.

The professional organization of poultry breeding was set up in Estonia by 1968 when the Poultry Breeding Board was founded that co-ordinated poultry breeding until 1989. From December 1989, its functions were delegated to the Estonian Poultry Society, a poultry breeders' organization originally established on 21 December 1919. The Society was liquidated during the Soviet regime, and re-established on 21 December 1989.

In 1991, Estonia regained its independence, whereas state-controlled economy gave way to the free market system. Poultry breeding enterprises were privatised, which significantly broadened the opportunities for sourcing high quality pedigree material. The step-by-step shift towards free market prices and competition brought along major changes in poultry breeding. It was impossible to reach the productivity standards set by leading European producers, using only domestic pedigree material.

Extensive use of imported pedigree chicken for renewing pedigree flocks provides a good opportunity for Estonian poultry breeders to maintain the high productivity levels of poultry production. Currently, pedigree material from the stock flocks of´the best foreign breeding companies is being imported to be used for reproducing flocks of both egg- and meat-type chicken. This enables Estonian poultry industry to keep up with the increasing competition in the European market.

Table 1 comprises data on chicken numbers as well as production capacitiy/volumes and productivity for 2005 to 2010.

As a result of using high-performance imported chicken crosses, the yearly average egg production per hen has increased from 255 eggs in 1995 up to 265 in 2010. Within the same period of time, the daily weight gain of chicken broilers has increased from 27 g to 59 g, i.e. over two times. It can be concluded, that breeding success has really been impressive.

Ross 308 is currently the only cross of chicken being used in breeding meat-type chicken.

As of 1 May 2011 the percentage composition of the breeding material of egg-type crosses of hens was as follows: Hy-Line brown 48%, Hy-Line white 45%, Hisex brown 4%, Hisex white 1%, and Lohmann LSL 2%.

Chicken farming is the leading branch of poultry industry *(A. Tänavots)*

Nandus at Jaaniraotu Farm *(H. Tikk)*

The first ostriches in Estonia (Vilsandi, 1999) *(H. Tikk)*

Hungarian geese for Christmas sales in Estonia ***(H. Tikk)***

In 2011, there are three certified pedigree flocks in Estonia. Over the recent years the best parent stock of meat-type chicken has been kept by Estonia's leading poultry farming company AS Tallegg. Their cross of meat-type chicken Ross 308 scored 91,5 points of the possible 100 from the evaluation commission.

Table 1. Annual poultry numbers and production in 2005–2010, as of December 31

Indicators/Year	2005	2006	2007	2008	2009	2010
No. of hens, thousands	1,879	1,639	1,478	1,757	1,796	2,023
Egg production, million pcs	209.0	182.6	157.6	146.5	172.8	184.5
Eggs/hen, pcs	288	287	245	269	264	265
Eggs/ inhab. pcs	173	163	176	175	184	185
Poultry meat production, thous. tons	13.8	12.5	11.5	13.1	15.1	15.5
Poultry meat, kg/inhab.	18.7	17.5	17.7	19.4	20.8	22.0

Source: Statistics Estonia; Estonian Poultry Society

ESTONIAN QUAIL – AN ENDANGERED BREED

Prof. Emer. Harald Tikk
Institute of Veterinary Medicine and Animal Sciences, Estonian University of Life Sciences

The first quails were introduced to Estonia in 1966. In 1976 Pharaoh-type quails were imported from a farm near Moscow, Russia, and in 1977 research into the breeding, feeding and housing of quail was started. The Estonian quail of meat and egg type, developed by Prof. Harald Tikk, Valeri Neps, Reet Laur and Prof. Rein Teinberg, was recognised as a breed in 1988. Estonian Quail is the only breed of farm fowl created in Estonia.

The years 1985-1992 were the most intensive period in quail farming, breeding and research: the annual production of quail eggs reached 7 million (Table 1); Matjama quail farm with annual capacity up to 10 million eggs was built in Tartu County; World Quail Conference was held in Estonia; three new family farms, owned by Ülo Pullisaar, Tiit Kollist and Rene Treier, were established; line breeding was initiated.

Due to adverse effects of agricultural reforms on quail farming, only R. Treier´s farm managed to continue operating, thus the breeding stocks of Estonian quail were concentrated on this farm. Unfortunately, since the farm was not capable of proceeding with adequate breeding work due to financial problems, deterimental effects of inbreeding incurred: exterior disorders, lower hatchability, lower survival rate and decreased egg production.

To minimize inbreeding, egg and meat type Estonian quails were crossed once with meat type Pharaoh quails in 1997. In 2001, the Estonian Ministry of Agriculture awarded research funding for selection at R. Treier´s farm. Prof H. Tikk and M. Piirsalu developed a scheme to improve production traits of quails over the periods 2002–2006 and 2007–2012. As the Estonian quail was included in the list of endangered breeds in 2001, government funding was granted to cover its maintenance and breeding expenses.

Quails with top productive traits were selected to guarantee increase in productive trait performance across 18 quail generations using family and line breeding as well as line crossing. The close correlation observed between egg production in the 3rd and 13th month enabled breeders to make decisions about selection for the next generation 10 months earlier. In family breeding, the quails whose progeny would form lines with different traits were selected. The high level of quail egg production of 1988 was exceeded in 2002. Along with an increase in egg production, the average egg mass increased, which facilited the sale of diet eggs. The considerably increased live weight of quails (Table 2) has promoted sale of young quails broilers. The latter are substantially heavier than mature Japanese quails. Due to bigger eggs and higher body weight, feed consumption of Estonian quails is somewhat higher.

Onset of hatching quail eggs at Järveotsa Farm *(H. Tikk)*

Researcher Viive Tikk weighing quail eggs *(H. Tikk)*

By 2003, thanks to individual hatching, marking and performance recording, breeding was taken to the next level – family selection. Yearly egg production of quail hens of the families created on the basis of the F_3 generation was by 37 eggs higher than that of F_0 quails, whereas hatchability increased by 3.3 per cent.

Innovative techniques and the newest technologies offered by poultry research have always posed a challenge for selection and quail egg production. For instance, Estonian Quail is the only quail in the world being used to produce omega-3 diet eggs. In 2010, the Järveotsa Quail Farm launched its brand new broilerhouse. The yearly production capacity of the farm is 300 tons of smoked, chilled or freezed quail carcasses. Excellent genetic material – the Estonian Quail with a heavier carcass – is currently readily available, so quail broilers should shortly be introduced to the food retail market.

Selection carried out over the past ten years aimed at improving Estonian Quail has been highly successful due to the rational use of funding from the Estonian Ministry of Agriculture, the Estonian Poultry Society, and the Estonian Science Foundation, but also thanks to the initiative and systematic work of enthusiastic quail breeders like Rene Treier, Ülo Pullisaar, Olli Reimand, Matti Piirsalu, Harald Tikk and Viive Tikk.

Table 1. Quail egg production in Estonia, 1977–2010

Year	Egg production		Year	Egg production	
	total, 10^3	per quail hen		total, 10^3	per quail hen
1977	86	164	2000	1474	282
1988	5176	306	2001	1870	293
1990	7100	310	2002	2080	298
1991	5015	309	2003	2210	310
1992	944	301	2004	2420	311
1993	650	294	2005	2460	311
1994	570	300	2006	3100	312
1995	933	307	2007	4080	312
1996	753	294	2008	5340	314
1997	747	283	2009	5810	316
1998	1015	291	2010	6130	316
1999	1180	291			

Table 2. Productive traits of Estonian quails

Year	Body weight of adult quails, g		Average egg mass, g	Eggs from breeding quail per year
	♀	♂		
2000	205	187	126	288
2001	221	196	132	310
2002	230	211	135	322
2003	232	213	134	335
2004	238	217	136	329
2005	238	213	136	328
2006	241	212	137	331
2007	242	213	136	328
2008	240	214	136	330
2009	243	216	135	332
2010	244	215	135	332

SHEEP AND GOAT BREEDING

MSc Külli Vikat
Director of Estonian Sheep Breeders' Association

The Estonian Sheep Breeders' Association (ESBA) was founded on 29 November 1928 in Tallinn, and after a 62-year break re-established on 25 May 1990 on the initiative of Enhard Musto, Director of the State Breeding Centre for Estonian Meat and Wool Sheep. Musto was elected as Managing Chairman and Peep Piirsalu became Secretary of ESBA. On 12 April 1991, at a joint general meeting of ESBA and the Breeding Council for Estonian Meat and Wool Sheep, a decision on the termination of the activity of the Breeding Council was made, and all its legal members joined ESBA. Kalju Hallik was elected as President of ESBA.

Table 1. Number of sheep and goats in Estonia, as of January 1

Year	Number of		
	sheep and goats	sheep	goats
1938/1939	695,700*		
1995	61,500	60,000	1,500
2000	30,900	28,200	2,700
2005	44,500	41,500	3,000
2006	52,500	49,600	2,900
2007	61,500	58,100	3,400
2008	59,684	57,710	1,974
2009	64,791	62,633	2,158
2010	73,781	71,310	2,471
2011	77,156	74,177	2,979

In 1995–1997, the position of Managing Director of ESBA was held by Taivo Hirsnik. Hillar Kalda served as a chief specialist from 1997 to 2003, and Kaie Zarenz as a consultant from 1997 to 2000. PhD Peep Piirsalu acted as President of ESBA in 1995–1997, and later on, until 2003, as Chairman of the Managing Board. Taimi Logina, Elga Kask and Enhard Musto have worked for the Association for many years. Enhard Musto was also the editor of 10 issues of the journal *Lammas ja kits* (Sheep and Goat) published in 1994–2001. From late 2003 till the elections in 2006, Ell Sellis served as Acting Chairman and afterwards as Vice-Chairman of the Board of ESBA. In 2005, the post of Managing Director of ESBA was restored and Külli Vikat took responsibility for the day-to-day running of the organization. Since 2006, Hillar Kalda has been the Chairman of the Managing Board of ESBA.

The major goal of sheep breeding in Estonia is to improve meat performance of local breeds and develop highly fertile, early maturing sheep suitable for this geographical region. Two breeds of sheep have been approved in Estonia, both in 1958 – the Estonian Blackhead and the Estonian Whitehead.

Breeding of the Estonian Blackhead (EB) sheep dates back to 1926 when Estonian native sheep were crossed with Shropshire breed as the main breeding component. In the breeding process, alongside with pure-breeding, Latvian Blackheaded, German Blackfaced, Oxford Down, and Suffolk breeds have been used to improve the Estonian Blackhead sheep. EB is an early maturing meat and wool type sheep of high meat quality, good health, and excellent feed conversion rate. Head and legs are covered with black hairs, fleece all over the body is thick and white. Mature rams weigh 90–100 kg, and ewes 70–80 kg. Litter size is 1.54 lambs born per ewe lambed.

Estonian Blackhead rams *(K. Vikat)*

Most beautiful Estonian Blackhead ewe 2010, owner Lilien Veske. Liina Veske on the photo *(U. Sellis)*

Estonian Whitehead ewe *(K. Vikat)*

Most beautiful Estonian Whitehead ewe 2010, owner Rehekivi OÜ, breeder Hugo Vaino *(U. Sellis)*

The Estonian Whitehead (EW) sheep has been developed by continuous crossbreeding of local native sheep with Cheviot rams. Over the years the Ile-de-France, Finnish Landrace, Texel, Dala, and Dorset breeds have also been used for breeding purposes. The distinguishing features of Estonian Whitehead sheep are early maturity, high muscularity, and white semi-fine wool. Head and legs are covered with white hairs. EW has a broad forehead, often a short convex nose, and ears slightly pointing back. Mature rams weigh 85–90 kg, and ewes 60–70 kg. Litter size is 1.6 lambs born per ewe lambed.

The breeding programme for Estonian sheep encompasses the Estonian Blackhead and the Estonian Whitehead sheep improvement scheme according to which local sheep will be crossed with other meat type breeds.

Breeding objectives for EB and EW are as follows:

* increase growth rate of lambs;
* improve carcass quality;
* increase litter size of ewes;
* increase ARR allele frequency in sheep flock, reducing the incidence of alleles enhancing suceptibility to TSE.

Major breeding criteria include:

a) lamb weight at 100 days of age;

b) litter size;

c) rams belonging to the TSE risk groups 1 and 2, and ewes of the risk groups 1 to 3 are exclusively used for breeding purposes;

d) selection of breeding flocks according to approved criteria.

In 2011, a total of 31 flocks of sheep are engaged in performance recording, thereof eleven breeding flocks oficially registered in 2010 – five EB and six EW flocks (Table 2).

Table 2. Distribution of performance recorded flocks by county, 2011

County	Owners of performance recorded flocks*	
	EB breed	EW breed
Harju	**Lenne Kaivo**	
	Väino Veersalu	
	Vahur Agar	
	Ivo Kruusenberg	
	Tiiu Mürk	
	Lembit Laurent	
Lääne	Peep Hallik	
Lääne-Viru		**Rehekivi OÜ**
		Kaire Veskilt
Põlva	Tiit Järv	**Ell Sellis**
	Urmas Nõmm	**Liidia Kängsepp**
	Jaan Veski	
	Laire Käis	
Pärnu	Alo Sinimäe	**Urmas Aava**
		Maa-Investeeringud AS
Rapla		Imme Neare
Saare	Saaremaa Ökoküla AS	Atla Mõis OÜ
Tartu	**Janika Mirka**	Nils Niitra
	Leonid Kirss	
	Latika Talu OÜ	
Valga		**Tsura Talu OÜ**
Viljandi	**Lilien Veske**	**Aavo Arm**
		Olav Pilv
Võru	Ants Schmidt	Eve Puustusmaa
Total	18	13

**** Registered breeding flocks written in bold.***

A recording system has been established to implement the breeding programme. Pedigree, performance and lambing data are constantly registered, and the genetic merit or breeding value of breeding animals estimated (since 2009). Performance recording of sheep has been carried out since 1928. During the years of Estonia's regained independence, performance recording has been controlled by the Estonian Sheep Breeders' Association. EB and EW sheep numbers and their performance recording data obtained since 2005 are presented in Tables 3 and 4. The owners of the best breeding flocks are listed in Table 5.

Table 3. Number of performance recorded EB and EW sheep, as of December 1

Year	No. of performance recorded sheep			No. of farms			No. of sheep in flock book
	total	EB, %	EW, %	total	EB	EW	
2002	2,934	59.3	40.7	46	26	20	952
2003	3,584	53.4	46.6	45	23	22	2,045
2004	4,045	47.9	52.1	48	24	24	2,602
2005	5,714	45.3	54.7	45	26	19	3,092
2006	5,420	53.4	46.6	43	25	18	3,109
2007	6,517	55.4	44.6	44	24	20	3,652
2008	5,991	55.1	44.9	41	23	18	3,583
2009	5,707	52.1	47.9	36	19	17	3,632
2010	5,892	55.1	44.9	33	19	14	3,695

Table 4. Performance recording data of sheep, 2005–2010

Year	No. of flocks	Breeding stock				Lambs born			Litter size	100-day weight of weighed lambs			Daily gain, g
		No. as of	ewes mated	ewes lambed		total	alive						
		Dec. 1st	No.	No.	%	No.	No.	%	No.	No.	%	kg	
Estonian Blackhead breed													
2005	26	2,079	1,473	1,359	92.3	2,156	2,007	93.1	1.59			25.1	223
2006	25	2,525	1,805	1,591	88.1	2,428	2,310	95.1	1.53			27.3	233
2007	24	3,134	1,994	1,747	89.9	2,572	2,303	92.1	1.51			26.4	222
2008	23	2,822	2,023	1,817	89.8	2,778	2,498	89.9	1.53			26.8	228
2009	19	2,353	1,851	1,668	90.1	2,538	2,322	91.5	1.52	1,691	79.0	24.9	207
2010	19	2,316	1,913	1,616	84.5	2,518	2,375	94.3	1.56	1,675	76.0	24.2	200
Estonian Whitehead breed													
2005	19	1,436	1,066	1,005	94.3	1,661	1,563	94.1	1.65			25.6	216
2006	20	1,806	1,348	1,203	89.2	1,865	1,710	91.7	1.55			27.0	229
2007	20	2,090	1,522	1,410	92.6	2,321	2,168	93.4	1.60			26.2	221
2008	18	2,008	1,554	1,416	91.1	2,280	2,097	92.0	1.61			25.8	219
2009	17	2,202	1,569	1,427	90.9	2,268	2,109	93.0	1.59	1,893	91.3	25.5	215
2010	14	1,879	1,486	1,324	89.1	2,129	1,966	92.3	1.61	1,651	88.0	25.2	207

On-farm data collection from a breeding flock of sheep *(K. Vikat)*

Estonian local goat at a milking competition at Ülenurme *(K. Vikat)*

Table 5. Top performance recorded small, medium-sized and large flocks of EB and EW sheep

Year	No. of ewes in breeding stock		
	up to 50 ewes	51–100 ewes	over 100 ewes
Breeding stock owners of Estonian Blackhead sheep			
2005	Ivo Kruusenberg	Lenne Kaivo	Leonid Kirss
2006	Avo Melk	Urmas Nõmm	Alo Sinimäe
2007	Ivo Kruusenberg	Janika Mirka	Lilien Veske
2008	Inga Asmer	Väino Veersalu	Ants Kuks
2009	Tiiu Mürk	Tiit Järv	
2010		Väino Veersalu	Lilien Veske
Breeding stock owners of Estonian Whitehead sheep			
2005	Jaan Pool	Ell Sellis	Aavo Arm
2006			
2007		Jaan Aru	Imme Neare
2008	Kaja Aadusoo	Ell Sellis	Urmas Aava
2009	Eve Puustusmaa	Urmas Aava	Aavo Arm
2010	Ell Sellis	Imme Neare	Rehekivi OÜ

In 2010, loin eye area and fat thickness (min/max) of 1,213 lambs from 11 breeding flocks were estimated and measured using Aquila Vet ultrasonic apparatus. The 612 ram lambs and 611 ewe lambs studied belonged to five EB breeding flocks (35% of the lambs measured), and six to EW breeding flocks (65%). Average loin eye area was 19.6 mm for EB, and 22.5 mm for EW population. Average minimum and maximum fat thickness was 0.5 and 0.7 mm for EB, and 0.7 and 1.0 mm for EW breed of sheep, respectively.

Long-term selection by goat owners in Estonia has resulted in the development of a unique population of native milk and meat type goats that is well adapted to local conditions. The goats are usually horned, and white or grey in color. Black or spotted individuals may also occur. The Estonian Sheep Breeders' Association has set a goal to develop a high milk yielding Estonian goat that perfectly matches to the local environment.

Table 6. Winners of the competitions for the most beautiful ewe and goat, 1996–2010

Year	Owner and county of origin of the most beautiful ewe	
	Estonian Blackhead sheep	Estonian Whitehead sheep
1996	Piret Mihkelson	Raivo Jõgiste
1997	Ivo Siska	Maret Suik
1998	Peep Hallik	
1999	Ivo Siska	Andres Vahtra
2000	Lenne Kaivo	Raivo Jõgiste
2001		Ell Sellis
2002		
2003		
2004		
2005		
2006	Urmas Nõmm	
2007	Lenne Kaivo	
2008	Ants Kuks	
2009	Lenne Kaivo	Tsura talu OÜ
2010	Lilien Veske	Rehekivi OÜ
	Owner and county of origin of the most beautiful goat	
2004	Tarmo Lohv	
2005	Merike Bakhoff	
2006	Tarmo Lohv	
2007	Merike Bakhoff	
2008	Jaanila OÜ	
2009		
2010		

Most beautiful goat 2010, owner Jaanila OÜ, breeder Julika Roos *(U. Sellis)*

In Estonia, animal recording services are currently very few used by goat breeders. Performance testing of goats, which involves monthly collection, storage and transport of milk samples to the Estonian Animal Recording Centre, is a costly procedure not affordable for many goat owners. Terefore, ESBA has no registered performance data of goats in recent years.

Most beautiful ewe competitions have annually been organised already since 1996, and most beautiful goat competitions since 2004 in C.R. Jakobson Farm Museum at Kurgja. The results of the competitions are presented in Table 6. Over the past 15 years, ewes from the flock owned by Lenne Kaivo have been chosen Estonia's most beautiful EB ewes for 6 successive years (8 times in total). For 8 successive years the most beautiful EW ewes have originated from the flock owned by Ell Sellis. For the past three successive years, the winner of the most beautiful goat competition has come from the flock owned by Jaanila OÜ.

ESTONIAN FUR BREEDING

Can agr Liia Taaler
Director of Estonian Fur Breeders' Association

Fur animals, animals raised mostly for fur production, were introduced in Estonia in 1925. The first fur animals imported to Estonia were silver foxes. Blue foxes, minks, polecats, raccoon dogs and nutrias were introduced during the following years. During fur farming history in Estonia the production has changed in many ways. The farmed spices for skin production have changed from foxes and minks produced in large-scale farms to chinchillas and rabbits raised in small family businesses.

Standard chinchilla

(EFBA – European Fur Breeders Association)

During first Estonian Republic time fur farming was popular in Estonia and recognised both nationally and internationally. The first Estonian fur breeders' own organization was founded in 1936. Fur farming was an important source for currency in the Soviet Union also. The quantity of produced skins increased year after year being about 350 000 skins at 1980s. The quality of produced skins was secondary. Estonian fur farmers were valued in the Soviet Union. After the Soviet Union collapsed and the Estonian farms were privatised and left to survive in the world rough competition, most farms went bankruptcy after some years of business. A couple of farms managed to find foreign investors and make investments to achieve the necessary quality level to compete in the world skin market. At the same time family business fur farming started and has increased since. Several fur breeders' societies were founded to share the necessary knowledge and know-how about chinchilla and rabbit farming.

In 2011 three societies joining rabbit and chinchilla breeders are active. A non-profit Estonian Fur Breeders' Association (EFBA) has been active since 2002. It mostly comprises practising chinchilla and rabbit breeders. In 2010, the members of the Association raised a total of 989 fur bearing animals in the breeding herd, including 17 breeds and 66 coat colour mutants of rabbits.

For a short period at the end of the 90s Rex type rabbits were popular and skin demanded at fur auctions. Later the world demand for Rex Rabbit's skins and the prices have been very unstable. In 2006-2009 the number of sold rex rabbit skins was about 200 per season at Kopenhagen Fur. The Rex Rabbit skins sold were of high quality. In 2010 no Estonian produced rabbit skins were sold at auctions. All production was sold to furriers in the national market. At the moment there is no demand for Rex Rabbit skin, it is mostly due to the cheap regular rabbit skins produced by China in large quantities.

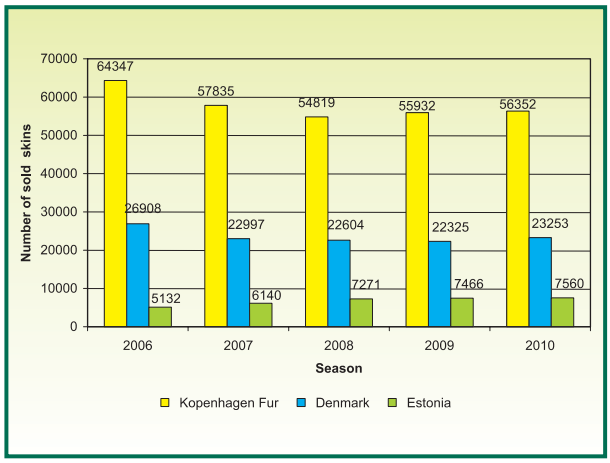


Figure 1. Number of standard chinchilla skins sold in 2006–2010

Table 1. Mean price of standard type of chinchilla skins sold at Kopenhagen Fur auctions by producing countries, seasons 2006–2010

County	2006	2007	2008	2009	2010
Denmark	346	398	448	293	355
Estonia	344	385	411	272	318
Poland	310	354	395	261	314
Germany	316	357	386	251	301
Latvia	352	399	404	240	286
Lithuania	274	286	354	230	272
Kopenhagen Fur	316	358	409	267	322

** Prices are given in Danish crowns*

Table 2. Quality of standard chinchilla skins sold at Kopenhagen Fur 2006-2010

Indicator	2006	2007	2008	2009	2010
Regular skins, %	55	51	47	58	62
Lowgrade skins,%	45	49	53	42	38

** Skins are of Estonian origin*

There is only one large-scale fox and mink farm left in business in Estonia, having 32 000 breeding animals in the herd, and there is stable increase in number of produced chinchilla skins every year. Chinchilla is continuously popular and valued by consumers all over the world. The number of sold skins at auctions in Copenhagen has increased from 200 to 7 560 during ten years. It is a small number compared with Denmark produced skins (around 25 000), but it is important side production and income for chinchilla breeders (Figure 1).

The average price paid for sold standard chinchilla skins is the second best after Denmark produced skins (Table 1). Estonian standard type chinchilla is generally slightly lighter and thinner as compared to the Danish skins, which are dark, dense and with clear coloration. Danish breeders have managed to breed dark chinchilla with pure colours, which is quite difficult to achieve without losing quality. Danish breeders have raised the standard for high quality skin - which is more difficult to reach. The trend of Estonian chinchilla skin quality is presented in Table 2.

The proportion of lowgrade skins was decreasing during the last season. This is influenced by sales of fresh skins (prior dressing not stored in freeze) and also by knowledge from grading courses at Kopenhagen Fur. Regular training and studying in courses and attending animal exhibitions is vital for keeping or reaching the necessary quality level to stay in competition. The world fur market is dictating the breeding trends in fur farming. The trend for last years has been the high quality skin, which sets also high pressure to the breeding work in farms. Skin quality improvement is based on the judging results at exhibitions as well as those obtained at the Kopenhagen Fur.

To improve skin quality the breeding animals are imported mostly from Denmark and in lesser extent from Germany and other countries. The interest in breeding colour mutants is increasing in Estonia. Skin market has not shown interest in natural colour mutants, skins are sold at low prices because of the small number of skins for sale at auctions. Colour mutants are sold at pet market and the demand for rare colour mutants is high. Increase in the number of farmed mutants leads to growing skin market in the future. Presently it is still very exclusive production.

The best chinchilla skins at Skin Exhibition 2011 at Herning

(EFBA)

Standard type chinchilla skins at Kopenhagen Fur

(EFBA)

ESTONIAN HORSE BREEDERS' SOCIETY

Krista Sepp
Director of the Estonian Horse Breeders' Society

Purposeful horsebreeding dates back to 1856, when Tori Stud was established, also improving of native Estonian horse with foreign breeds was initiated. Besides purebreeding of Estonian Native Horse, the Tori Horse and the Estonian Ardennais Horse (or Estonian Heavy Draught Horse, as it was called later) were developed, and the breeding organisations and the General Stud Books of the abovementioned breeds were established in 1920 and 1921. Today Estonian Horse Breeders' Society keeps also the Trakehners breed horses' studbook (since 2004) and Arabian horses' studbook (since 2009). The number of horses in Estonia is nearly 8000 (in 2011), but the number was highest in 1927, when there were 229,530 horses.

Estonian Horse Breeders' Society – 20 years

Estonian Horse Breeders' Society was restored in 1992 for the breeding of Estonian Native Horse, Tori Horse, Estonian Heavy Draught Horse, Trakehners, Arabians and other breeds. The Society has 385 members.

The main functions are:

1. Studbook keeping
2. Performance testing and breeding value estimation
3. Managing breeding, breeding and conservation programs coordinating according to breeds (Estonian Native Horse, Tori Horse, Estonian Heavy Draught Horse) and breeding programs for Trakehners and Arabian horses
4. Foreign assistance

The work is based on branches of the Society. In 2011, Estonian Horse Breeders' Society has 5 branch societies:

1) Estonian Native horse
2) Tori horse
3) Estonian Heavy Draught horse
4) Trakehners
5) Arabians

Characterization of breeds

Estonian Native Horse is an aboriginal breed coming back from islands and West-Estonia to saddle clubs for children and young people throughout Estonia. In recent years Estonian Native breed was subsidized by the government. Estonian horse is a popular horse for ponysport, the average size of Estonian Native Horse is 144 cm. The most important day for breeders is the young stallions and mares performance test every year in August. The total number of horses is 2000, including 580 breeding mares and 53 breeding stallions in 2011. 206 foals were born in 2010.

Estonian Native stallion Raksel 725 E, breeder Pihtla Stud, owner Estonian Horse Breeders' Society *(K. Sepp)*

Estonian Heavy Draught Horse belongs to the group of cold-blooded horses. The population is a located mainly in North-East Estonia. They are mainly used in home gardens and only a few of them for work in the forests, also the new field of usage is hobby horses. Estonian Heavy Draught horse is popular among young breeders and every summer they organize the Heavy Draught Horse day. The total number of horses is 290, including 95 breeding mares and 8 breeding stallions in 2011. 43 foals were born in 2010.

Estonian Heavy Draught mare Natalja 6275 ER in animal breeding show *(K. Sepp)*

Tori stallion Hamadeus 13 743 T, breeder and owner Hillar Kald *(K. Sepp)*

Tori Horse is a universal horse with extensive usage. Tori Horse is of middle size (height 160–166 cm), mostly chestnut colour, desired is dark chestnut with few white margins. Tori Horse has good characteristics and has great will and spirit to work.

Tori Horses studbook is in two parts since 2008:

* Tori Horses breeding program (used component breeds Hannoverian, Holstein, Trakehner, English Throughbred), the horses have letters TB in UELN (Universal Equine Life Number)
* Tori Horses conservation program, population based on Tori breed mares and stallions included in the program, the horses have letters TA in UELN

The total number of horses is 1360, including 125 breeding mares in the breeding program (TB) and 15 breeding stallions in 2011, and 46 foals born in 2010. In Tori horses conservation program (TA) there are 245 breeding mares and 14 breeding stallions in 2011, 28 foals were born in 2010.

President 13 755 T – Tori breed awarded stallion, breeder and owner Liis Ira *(L. Ira)*

Trakehner Horses are mainly originated form the Russian Trakehner horses. The biggest Trakehner Stud is Heimtali stud. Estonian Trakhenes have very good results in riding sport. Estonia has sold Trakehners all over Europe and some in America. We have good teamwork with Trakehner societies, especially with German Trakehner Union. The total

Best Trakehner mare 2009 – Princelle, breeder Heimtali Stud, from left Peep Puna, Jukka Kallunki (Finland) and Hans-Werner Paul (Germany) *(K. Sepp)*

number of horses is nearly 380, this including 78 breeding mares and 11 breeding stallions in 2011. About 30–35 foals are born in every year.

The Arabian Horses studbook in Estonia got approved in 2009 and the total number of Arabian horses in the studbook is 55. Since 1970 Estonians have imported Arabian horses, stallions in addition to breed, from Russia. The first of them were Posol ox and Põl ox. Arabian horses are used in Trakehner breed. Arabian horses branch society organises an Arabian horse day every year and awards the best Arabian Horse in Estonia „Best in show" title. About 5–7 Arabian foals are born in a year.

Best in show 2011 – Arabian mare Nolita, owner Jaanika Tomingas *(K. Sepp)*

The Estonian Horse Breeders' Society co-operates with the Estonian Animal Recording Centre to keep an electronic studbook and for horses' data information publishing for breeders and others (www.jkkeskus.ee/hobu). In teamwork with the Estonian Agricultural Registers and Information Board horses' register has been opened in http://neptuun.pria.ee/hb-avalik/hobused.faces.

It is most important that all events are published on Estonian Horse Breeders' Society homepage www.ehs.ee and in cooperation with other breeding organizations in the magazine *Tõuloomakasvatus* www.etll.ee.

ESTONIAN SPORT HORSE BREEDERS' SOCIETY

Raigo Kollom
Chairman of the Board

The Estonian Sport Horse Breeders' Society (ESHBS) was founded in 2000, and Estonian Sport Horse Studbook (ESH) in 2001, based on the example of several similar European sport horse and warmblood studbooks. The members of the Society (25 in 2000; 179 in 2010) gave up traditional breeding for type, and focus on breeding for performance, especially for jumping.

To accelerate development in this direction, members of ESHBS have imported stallions as well as semen from the best breeds and top stallions in Europe. Many of the licensed stallions have competed internationally in show-jumping, dressage, and three-day eventing. The Society's breeding programme accepts all European sport horse and warmblood breeds as component breeds. All sport horse stallions, licensed in any European country, are approved for breeding also in Estonia.

ESHBS has growingly been introducing genes of the best European stallions to Estonia – in 2001 semen from only three stallions was imported, over the years 2007–2010 semen from 57 internationally known stallions has been used, among them Darco, Heartbreaker, Concorde, Voltaire, and Quidam de Revel from the top 10 of stallion rankings, and also rising stars Blue Hors Romanov, Clinton, Florencio, Balou du Rouet and others. Among the imported sport horses some exceptional stallions suitable for breeding purposes have been found. For example, BWP stallion A Pikachu de Muze (born 2000, Kannan x Chin-Chin) was trained and competed successfully in Estonia, then sold to Paul Schockemöhle, after which it won the World Championships for 6-year-old horses. The horse has many excellent descendants also in Estonia. Another stallion Spartacus (Hanoverian, born 2003, Stakkato x Grannus) was first licensed in Estonia, and in 2010 it became the most popular stallion in the Netherlands, having been licensed in Hanoverian, Zangersheide, Holstein, and KWPN studbooks.

To breed the best sport horses using the Estonian population of mares, the Society plans crossing Thoroughbred and Trakehner stallions with Toric mares, and Holstein-KWPN-BWP stallions with Trakehner mares.

ESHBS has initiated recording all horses in Estonia in an Internet-based database, using a server at the Estonian Animal Recording Centre. In the years 2001-2010, a total of 2,426 foals (including Estonian Riding Ponies) have been registered. At the age of 2 or 3 years young horses must pass at least one inspection or test. Every year the ranking of all Estonian-born horses in equestrian sports is being published. To facilitate co-operation with its customers, ESHBS has joined the Estonian Riding Federation to jointly organize competitions for young horses.

The Society also issues an annual yearbook, and in co-operation with other horse organizations the Estonia's only horse magazine *Oma Hobu*. Information about ESHBS's activities can be found on its web site at: www.estsporthorse.ee

Spartacus Junior, born 2008, son of Spartakus (Stakkato x Grannus), a Hanoverian stallion, competed and licensed first in ESH, then in HOLST, HANN, KWPN. Spartacus JR dam's sire is Verso de Paulstra (Alme x Furioso xx) *(R. Kollom)*

Mare Chamanta (Chance x Liman xx), the winner of the final test of 3-year-old mares, 2010. From left: judges Kristi-Liis Koppel and Maria Möller (Finland), rider Margit Mägi *(R. Kollom)*

Judging young horses in the final test, 2005. From left: Raigo Kollom, Henk Nijhof (the Netherlands), Svend Sörensen (Denmark), Sibylle Veigel-Holmann (Lithuania), Ulrika Danziger (Estonia) *(R. Kollom)*

2-year-old mare Picacha jumping at a local inspection. Picacha father is A Pikachu de Muze (Kannan-Chin-Chin, born 2000 in Belgium) *(R. Kollom)*

ESHBS is grateful to all the well-known specialists, who have kindly assisted and supported the organization, especially judges at young horse tests and stallion approvals, but also experts who have given lectures and provided valuable advice, or carried out practical studies. Among these people are the owners of the famous Nijhof Stud Jeannette Nijhof and Henk Nijhof sen., the owner of the de Watermoelen Stud Jan Greve, the former president of the Finnish Riding Federation Christopher Wegelius, many breeders and specialists: F. Koehman, the Netherlands; R. Drouin, A. Chiurmel, C. Bichet and P. Balsan, France; K. Lehtonen, A.-M. Bernard, M. Möller, J. Kallunki and H. Wahlman, Finland; S. Sörensen, Denmark, and Prof. I. Fredricson and L. Berglund, Sweden.

Even before Estonia's EU membership, ESHBS had followed the directions of EC pertaining to horse breeding, and had good partners in Europe as well as in Russia. At the General Assembly of the World Breeding Federation for Sport Horses (WBFSH) held in Brussels on 4 December 2005, the Estonian Sport Horse Breeders' Society was accepted into WBFSH as an Associate Member, and on 30 September 2010 it became a full member of WBFSH.

PIG BREEDING AS A TOOL TO SERVE PORK PRODUCTION

Anne Lilleorg
Adviser to the Estonian Pig Breeding Association

In a market economy, pig-breeding trends are reliant on consumer demand. In a situation in which we have a number of clients expressing different requests, we need to ask ourselves: which consumer's requests should serve as the grounds for determining the trends of raising pigs in Estonia?

The meat processing industries are interested in uniform carcases with high lean meat content, which have as much spinal muscle as possible, a thin layer of back fat plus large hams. Regular consumers, however, would prefer the savoury meat of pigs that have been raised in natural conditions, while the price of such meat should also be acceptable. Pig breeders appreciate the economic profitability in pigs – particularly, feed conversion, growth speed and fertility.

Breeding trends are determined by solvent clients. In Estonia, the meat processing industry is influencing pig farmers to breed with lean meat content as high as possible, using the SEUROP system to pay for the meat delivered. In 1995, the base price of meat with 51% lean meat content was the starting platform; in 2004, the base price was raised to 57% lean meat content, where it has remained until 2011. A surplus price is paid to pig breeders for lean meat content above the basic level, while the price is deducted for carcases with a higher fat content. As the SEUROP system was launched, the average lean meat content of batches of pork barely reached the required 51% level. The carcases that are sold today mostly belong to classes S and E and have 59–60% lean meat content.

How did pig breeders reach such results and what is the situation for producers today?

Until the 1970s, mostly purebred pigs were raised in Estonia. Estonian Landrace (L) pigs were common on the islands and in western Estonia – phlegmatic, slender animals with large floppy ears. In other parts of Estonia, pigs of a Estonian Large White (Y) breed were bred – perky pigs with a short body and cocked ears. The raising of purebreed pigs was facilitated by a practically bottomless market for breeding pigs in the Soviet Union (up to 27,000 pigs with certificate of parentage were sold every year) and state-owned breeding stations were established for both breeds: the National Breeding Centre for Large White Pigs (1948) and the National Breeding Centre for Estonian Lop Eared Pigs (1951), which was renamed as the State Breeding Centre for Estonian Bacon Breed Pigs in 1961.

Research in the sphere of pig breeding confirmed the presence of hybrid power in the first generation of crossbreeds; this is shown by better daily weight gain and better fertility rates. In pig breeding, the crossing of these two breeds was heavily promoted in the 1980s. Such a combination resulted in castrated pigs with good weight gain,

Estonian Large White pigs *(P. Kütt)*

yet carcases with large fat content. Selling fatty pork was not a problem in the huge markets of the Soviet Union. When these markets disappeared, the lean meat content of pig carcases began to bring better pork prices.

The pig breeders who had formed the Estonian Pig Breeding Association, started to develop a breeding programme for crossbred pigs (combinations of the four breeds), called "Marble Pork", in 1995, which provided the pre-requisites for raising crossbred fattening pigs in Estonia. In 1995, the first sows and boars of the Hampshire (H) breed were imported from Sweden. In addition, the Pietrain (P) breed was imported from Austria in 1999. An extensive pig artificial insemination programme was launched and an artificial insemination station was established in Vasula, Tartu County, in 1997. A testing system for young pigs was launched in Estonia, following the example of Finland: the exterior of pigs was assessed and the PIGLOG-105 ultrasound equipment was used to measure the thickness of back fat and loin eye. Support from the PHARE programme was used to acquire a computer software db-Planer to record performance information; the software was later developed into the "Possu" programme. A centralised system for the collection of centralised performance records facilitated the calculation of the performance and fertility values of pigs (Table 1).

Table 1. Changes in fertility indicators over 10 years

Year	Average	Y	L	YxL/LxY
2001	10.7	10.5	10.7	11
2010	11.3	10.8	11.3	11.7

Unfortunately, high lean meat content works against the flavour of pork, turning it flat and giving it a stiff structure. The solution is to raise the intra-muscular fat content. Pig breeders must find a way of hiding fat between bundles of muscles. The Duroc breed, which is widely used all around the world, and has many other good features, has such meat properties. The Duroc pigs are more stress resistant and their descendants have good fattening performance characteristics, combined with excellent growth rates, compared to other crossbreeds. The last characteristic is highly valued by pig breeders, who decided in favour of the Duroc pigs of Canadian origin (Table 2).

The meat technology and breeding specialist of the Estonian Pig Breeding Association, Aarne Põldvere, has assessed the carcases of different crossbred pigs. Crossbred fattening pigs are differentiated by their different growth rates and the lean

Pietrain Breed *(P. Kütt)*

Estonian Landrace pigs *(A. Juus)*

Estonian Large White and Duroc piglets at Hinnu Pig Farm *(U. Märtson)*

Table 2. Characteristics of carcases of descendants of boars from the AI station

Characteristic	Combination					
	PxLY	LxY	YxY	DxLY/YL	DLxYL/LY	PHxLY
Number of carcases	202	25	106	91	38	47
Age at slaughter, days	181	182	173	164	169	184
Carcase weight, kg	75.6	76.5	76.5	79.2	75.7	77.8
Carcase length, cm	96.4	97.4	97.2	98.3	98.4	97.5
Back fat above 6^{th}–7^{th} rib, mm	19.7	17.6	19	20.4	16.9	19.4
Average back fat, mm	18.4	16.2	17.5	19	16.4	18.2
Daily weight gain, based on carcase weight, g/day	418	420	442	483	448	423
Lean meat %	59.2	59.8	59.4	57.9	59.6	59.1
SEUROP classes, % of carcases						
S	47	52	41	22	47	43
E	48	48	59	74	53	57
U	5			4		4

Table 3. Changes in meat performance indicators over 10 years

Year	Number of tested pigs	Daily weigh gain, g	Back fat thickness, mm	Diameter of spinal muscle, mm
2000	12,055	540	13.6	49.3
2010	7,978	557	10.1	62.7

Crossbreed fattening pigs at Pihlaka Farm OÜ *(R. Laanemaa)*

meat content of carcases (Table 3). Pig breeders, who are aware of the preferences of consumers, can choose between the semen of boars of different breeds that are available from the artificial insemination station of the association.

History has a tendency to repeat itself. Today, pigs raised in Estonia are reaching the Russian markets again: more than a hundred thousand fattening pigs are sold abroad each year. Indirectly, pig export volumes allow us to conclude that the state subsidies for breeding – purchasing breeding stock – and the strategy prepared by pig breeders have served their purpose well.

Annual study tours to European companies that excelled in the pig-breeding sector had an important influence. The first pig-breeding farms visited were in Denmark (1995), followed by study tours to Germany, Belgium, the Netherlands and France. These tours helped to change the ways of thinking of Estonian pig-breeders and expanded their horizons.

THE HISTORY OF ANIMAL RECORDING

Külli Kersten, Inno Maasikas, Aire Pentjärv and Mart Uba,
Estonian Animal Recording Centre

Estate owners started to carry out herd-recording in 1903, following the example of Denmark and Scandinavian countries, which was disrupted by the 1905 Revolution. In 1909 a herd control department was established at the Vändra Farmers' Society and the first set of animal performance data was recorded, which marks the beginning of systematic animal recording in Estonia.

In Estonia, performance recording services are currently provided by the Estonian Animal Recording Centre (EARC), a governmental agency under the administration of the Ministry of Agriculture. Performance recording services are offered to the owners of dairy and beef cattle, pigs, and goats. Other functions of EARC involve testing of raw milk quality and selling ear tags.

Some key events in the history of the development of animal recording in Estonia and of EARC are:

1964 The beginning of electronic data processing of cattle performance on the mainframes and at the university and research centres. The beginning of milk protein content testing for breeding herds at the university.

1971 A milk analysis laboratory for the purpose of animal recording is established at the Estonian Research Institute of Animal Breeding and Veterinary Science. The beginning of routine milk protein content testing.

1979 The beginning of determination of somatic cell count in milk.

1983 The beginning of electronic data processing of pig performance records.

1991 The animal recording database and data processing functions are transferred to the Estonian Research Institute of Animal Breeding and Veterinary Science.

1993 The EARC of the Animal Breeding Inspectorate of the Republic of Estonia is established.

The number of performance indicators is increased in connection with a new pig quality rating guide.

1994 An introduction of milk analysers System 4000.

A field service department is established at EARC to undertake the tasks of the developing services, organising trainings, counselling, testing and selling ear tags.

The beginning of testing of pigs with PIGLOG-105 and collecting testing data into the database of the EARC.

PDAs are used for data capture *(K. Ilves)*

1995 The EARC becomes a member of International Committee for Animal Recording (ICAR) and INTERBULL.

1998 Performance data processing is transferred from the mainframe to PC-type servers and a relational database (ORACLE) becomes the working environment.

BactoScan 8000SH is acquired to determine bacteria count in milk.

The Milk Analysis Laboratory joins the international ring tests of CECALAIT' and ICAR.

The first direct aids are paid to cattle farmers based on the performance records.

The beginning of collecting pig performance data with personal computer software db-Planer.

1999 The Milk Analysis Laboratory is accredited as a testing laboratory for milk analysis by the Estonian Standards Board.

The software is created for the breeding societies and farmers to help them use the animal records database via the Internet.

2000 In addition to animal recording, the tasks of implementing the state direct aid schemes and preparing the SAPARD programme are carried out.

The EARC begins to offer performance testing for beef cattle.

An introduction of pig mating software.

Milk samples are analyzed in the laboratory of Animal Recording Centre *(E. Ulmas)*

EID tags are widely used in Estonia *(T. Remmel)*

2001 2001 Agricultural Registers and Information Board (ARIB) is founded based on the EARC.

The registers and subsidies schemes were separated from the EARC.

2003 The software *Vissuke* is created for the cattle farmers to forward information to the EARC via the Internet.

2004 Introduction of AM-PM method as the first alternative test-milking method.

The *Possu* programme for the boars AI station is completed.

2005 Software for performance testing of sheep and maintaining the horse stud-book is developed. Changeover from db-Planer to *Possu* software in pig farms is commenced.

2006 ICAR awards an international quality mark *ICAR Special Stamp* to the EARC.

The first milking robots arrive in Estonia – processing of robot milking data at the EARC.

2008 The EARC creates a tool for the cattle farmers to help them report herd movements to the ARIB through the EARC.

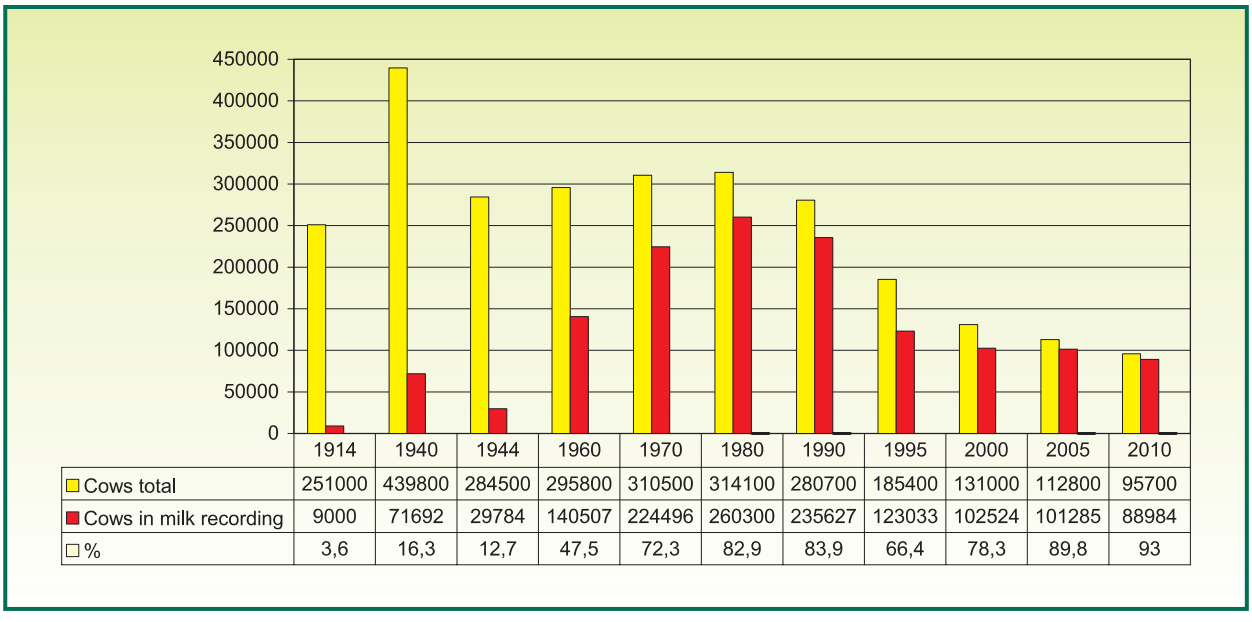
2009 ICAR awards an international quality mark *ICAR Certificate of Quality* to the EARC.

2010 The introduction of identification of the mastitis causing bacteria using a real-time PCR.

2011 The beginning of introduction of a paper-free animal recording system.

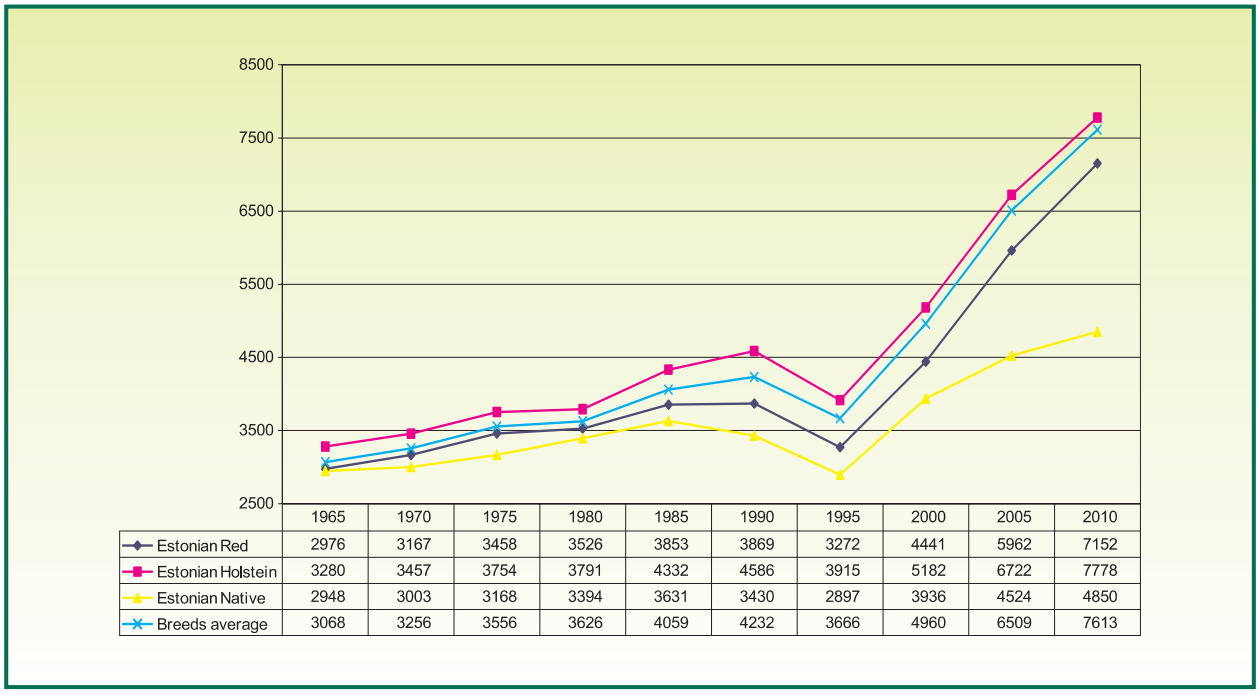
In Estonia, animal recording is governed by the Farm Animals Breeding Act and rules approved by the Veterinary and Food Board, which are based on the rules set down by the International Committee for Animal Recording (ICAR). In Estonia, animal recording activities are carried out using method B where the responsibility to record and forward initial data to the person responsible for animal recording lies with the cattle farmers.

As of 1 January 2011, there were 931 herds with 88,984 cows under milk recording, accounting for 93.0% of the total number of dairy cows. The average size of a herd was 95.6



	1914	1940	1944	1960	1970	1980	1990	1995	2000	2005	2010
Cows total	251000	439800	284500	295800	310500	314100	280700	185400	131000	112800	95700
Cows in milk recording	9000	71692	29784	140507	224496	260300	235627	123033	102524	101285	88984
%	3,6	16,3	12,7	47,5	72,3	82,9	83,9	66,4	78,3	89,8	93

Figure 1. Number of cows in milk recording



	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010
Estonian Red	2976	3167	3458	3526	3853	3869	3272	4441	5962	7152
Estonian Holstein	3280	3457	3754	3791	4332	4586	3915	5182	6722	7778
Estonian Native	2948	3003	3168	3394	3631	3430	2897	3936	4524	4850
Breeds average	3068	3256	3556	3626	4059	4232	3666	4960	6509	7613

Figure 2. Annual milk yield per cow by breeds

cows. The number of cows in the herd by breed was 68,685 (77.2%) Estonian Holsteins, 19,481 (21.9%) Estonian Red, 480 (0.5%) Estonian Native and 338 (0.4%) cows of other breeds.

During the past decade, the number of herds has declined more than three times (there were 3,211 herds on 1 January 2001) and the number of dairy cows declined during the same period by 13,540 cows.

The milk yield of recorded cows has continued to grow in recent years. Where in 2000 the indicator was 4,960 kg per cow a year, the same was 7,613 kg per cow in 2010.

As of 1 January 2011, there were 35 herds with 14,052 sows and boars under pig performance recording. An average herd size was 309.5 sows. The number of herds has decreased 66% (there were 53 herds on 1 January 2001) in ten years. Of the pigs under performance recording, 40.9% were purebred, 49.9% first generation crosses from two breeds, and the rest 9.7% were backcrosses or other crosses. Several indicators have improved during the past ten years, e.g. sow fertility has increased by 0.8 piglets, it takes 16 days less to produce a litter, the lactation period has reduced by six days and three more piglets are weaned per sow in a year.

As of 1 January 2011, there were 273 herds with 17,394 beef cattle and one herd with 6 goats under performance recording.

Genetic evaluation

Dairy cattle

Regular genetic evaluation of dairy cattle was started at the beginning of the 1980s with evaluating bulls based on the performance data of their female offspring, using the comparative method of female offspring and their contemporaries.

The key events in the history of the further development of dairy cattle genetic evaluation are:

Software *Vissuke* is developed for dairy farmers. In addition to its main functions *Vissuke* contains the specialised sections of veterinary and mating program *(K. Pedastsaar)*

1992 Implementing the BLUP sire model to evaluate performance traits.

1996 Implementing the BLUP animal model to evaluate performance traits.

1997 Genetic evaluation for conformation traits by the BLUP animal model.

1998 Participating in the INTERBULL evaluation with the performance traits of Estonian Holstein.

Introduction of the BLUP test-day animal model to evaluate the udder health traits.

1999 Introduction of the BLUP test-day animal model to evaluate performance traits.

2001 Participating in the INTERBULL evaluation with the udder health traits of Estonian Holstein.

2004 Participating in the INTERBULL evaluation with the performance traits and udder health traits of Estonian Red.

2006 Participating in the INTERBULL evaluation with the conformation traits of Estonian Holstein.

Introduction of the relative total breeding value (SKAV) on the basis of performance, udder health and conformation breeding values.

2008 Genetic evaluation for reproduction traits with the BLUP animal model.

2009 Genetic evaluation for longevity with the *Survival Kit* software.

2010 Genetic evaluation for calving traits with the BLUP animal model.

Genetic evaluation of dairy cattle is conducted three times a year and the evaluation results are concurrently published with the publication of international sire evaluation results. The relative breeding value of each breeding trait is given in points by setting an average of the base at 100 points with a standard deviation of 12 points.

Pigs

Starting from 2000, genetic evaluation for pig performance and fertility is conducted once a week. The performance traits evaluated are the breeding value of backfat, muscle depth and daily gain and the reproductive trait evaluated is the breeding value of the number of alive born piglets per litter.

Sheep

Starting from 2009, genetic evaluation for sheep performance and fertility is conducted three times a year. The performance trait evaluated is the breeding value of the daily gain and the fertility trait of the number of live born lambs per litter.