FIRST COUNTRY REPORT ON ANIMAL GENETIC RESOURCES

REPUBLIC OF HUNGARY

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FIRST NATIONAL REPORT ON ANIMAL GENETIC RESOURCES

Contributing authors:

Ministry of Agriculture and Rural Development, Department for Production Sectors
(Dr. Mihály Pásztor, Sections 1.1 and 1.2)

Research and Information Institute for Agricultural Economics, Department of Structural Policy
(Levente Nyárs, Section 2.1)

Association of Hungarian Animal Breeders and Breeding Organisations
(Dr. János Demeter, Sections 2.2, 3.2 and 6.1)

Hungarian Central Statistical Office
(Péter Tóth, Section 2.3)

Research Institute for Animal Breeding and Nutrition
(Dr. István Györkös, Dr. Sándor Kukovics, Sections 3.1, 4.1 and 4.2)

National Institute for Agricultural Quality Control
(Dr. István Ács, Sections 4.3 and 5.1)

Editor:

Dr. Mihály Pásztor
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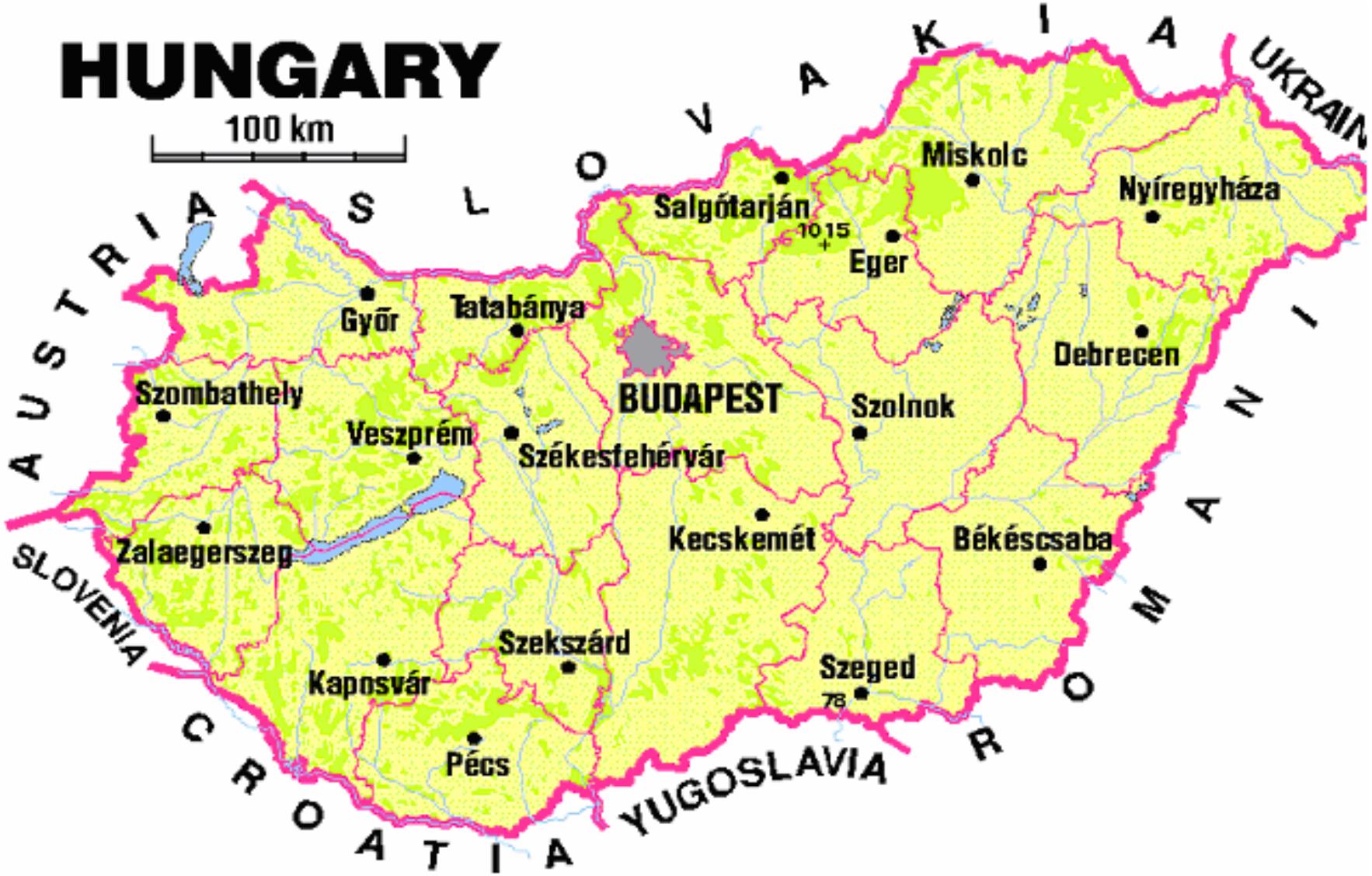
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1. Introduction of the Country

1.1. Introduction of Hungary and its Agriculture

Hungary is situated in the central part of the Carpathian Basin. Hungary's neighbours are Austria, Slovakia, the Ukraine, Romania, Yugoslavia, Croatia and Slovenia. Hungary's form of government is republic. Its total population is 10.3 million, showing tendencies of decrease in recent periods. Approximately 63% of the population live in the countryside. The country's climate is continental, therefore the four seasons are distinctly present. In the winter months, temperature can sink as low as -25 and - 28 °C, while in the summer, rise as high as 34-38 °C. The start of the vegetation period is the end of March. Average annual precipitation is between 500-900 mm, distributed unevenly. Summer droughts are frequent. The possibility of irrigating fields is limited. The country's soil conditions are favourable.

The area of arable land is 9.3 million hectares. In Hungary, a wide range of crops are cultivated (cereals, protein plants, sugar beet, oilplants, potato, maize, vegetables, fruits, grape and others). Animals kept at holdings are primarily dairy cattle and beef cattle, poultry, pigs and sheep, but horses, goats, rabbits, apiary, fishery and recently ostrich and emu are also important.

In line with tendencies seen in developed countries, the weight of agriculture within the national economy has gradually decreased over the last decades in Hungary. Of the gross domestic production (GDP), agriculture (including forestry and game management, as well as fishery) had a share of 3.7 % in 2000. The tendencies of decline, which started more than 10 years ago, did not continue in 2001. Preliminary calculations of the Hungarian Central Statistical Office (KSH) show that the contribution of agriculture to the country's GDP was – at ruling prices –3.9 %. This figure is close to the upper end of the range of figures (2-5 %) characterising of the Community Member States.

Within employment as a whole, the share of employment in agriculture was 6,2% in 2001 (**Table 1**). Investments in agriculture totalled only 3% of all investment in the national economy in 2001. The share of food economy in all exports of the national economy was 7.5% in 2001. The share of food products and hedonic goods in domestic consumption has been decreasing for years. In 2000, this rate was below 30%, as an ever decreasing portion of the increasing real income of population is being spent on food.

In the recent period, a large-scale transformation of the ownership structure has taken place. The share of cooperatives has significantly decreased, to approximately 28% (average land size is 3,200 hectares), while the area of agricultural land held by individual farmers, who, on the average, use 25 hectares of land, has increased to 45 %. Publicly owned businesses represent approximately 20-23 %.

KSH figures show that the area of agricultural land in the county – also taking into account the plantation census carried out in 2001 – was 5,865,000 hectares, 11,000 hectares more than one year earlier. Of agricultural land, 77 % is plough-land and 18 % is

grassland. Gardens, orchards and vinery together represented 5% of all agricultural lands (**Table 2**).

The area (4.5 million hectares) of plough-land, the dominant component of agricultural production, has increased by 16,000 hectares and the area of grassland by 10,000 hectares. The role of individual farmers has became dominant in agricultural land use, their acreage has increased by 207,000 hectares (5%), while the acreage used by farming organisations has decreased by 151,000 hectares (4%). Individual farmers use 45%, and farming organisations use 39% of the land used in Hungary. In 2001, gross agricultural output was 14% higher than in the previous year. Within that, the output from crop production and agricultural services increased, while the output from animal breeding remained at the 2000 level.

In 2001, output from crop production and horticulture exceeded the output in year 2000 by 27%. The growth was largely due to the exceptional yield figures for cereals in 2001. Output from animal breeding remained at the same level as in year 2000. The 12% growth in the poultry sector was not enough to compensate the 7% drop of output from the pig sector and the 15% drop from the cattle sector. The exceptionally abundant cereal harvest of year 2001 again drew attention to the unfavourable ratio of plant production and animal breeding. Animal husbandry represented only a 46% of gross output in 2001. In countries with an advanced agricultural economy, this figure is usually above 50%. In Hungary, the share of animal breeding in average terms for the period 1986-1990, is 50.6%.

Crop production on plough-lands

The sowing structure of arable crops in 2001 was hardly different from that of the preceding year. Cereals were grown on 73.5 % of all plough-land. The share of legumes, industrial and fodder plants decreased. Legumes were grown on 0.7% of all plough-land, industrial plants on 10.9%, and feedstuff plants on 6.5%. With respect to cereals, it was especially the growing area of wheat that increased significantly. Spicate cereals were grown on 1,803,000 hectares, an area 252,000 hectares larger than in the preceding year. Wheat was grown on 1,204,000 hectares, maize on 1,255,000. The total cereal-growing area in 2001 was 3,058,000 hectares. The total cereal harvest was 14,951,000 tons. 5.2 million tons of wheat and 7.8 million tons of maize were harvested. The harvested volume was not only due to the increased growing area, but the average yield of cereals was also better than in 2000. The average yield was 4.3 tons/hectare for wheat and 6.2 tons/hectare for maize. Of crops which are harvested in the autumn, sugar beet was grown on 67,000 hectares. Sugar beet yield was also favourable, 44 tons/hectare, amounting to a sugar beet harvest of 2.9 million tons. Sunflower was grown on 321,000 hectares, its average yield (1.96 tons/hectare), however, was 21% higher than in the preceding year. This is the highest average yield figure in recent years. The total sunflower seed harvest was 624.000 tons. In 2001, the crop area of potato continued to decrease. While in year 2000 47,000 hectares were used for potato growing, now the relevant figure was only 37,000 hectares. Average yield was 21.3 tons/hectare.

Horticultural production

In 2001, 101,000 hectares were used for field vegetable production. Indoors production (mostly under foil and in greenhouses) was carried out on approximately 6,000 hectares. The total vegetable production was 1,857,000 tons. Both the crop area and the production were higher for each vegetable than in the preceding year. Approximately 90% of all vegetables were grown by individual farmers. Farming organisations are mainly involved in the production of vegetables (green peas, green beans and table maize) intended for processing in the canning and freezing industry. Significantly more vegetables were on offer in 2001 than in 2000.

The area of fruit plantations amounted to 97,000 hectares, of which production area was 76,000 hectares in 2001. Approximately 5,000 hectares of new plantations were established. Due to the extreme weather conditions, total fruit production was 917,000 tons, 121,000 tons less than in 2000. In particular, the production of apple and pear dropped, while more stone and small fruits were grown than in the preceding year. Similarly to vegetables, approximately 80% of fruit production was produced by individual producers.

The total area of vine plantations continued to decrease. Of the 93,000 hectares of plantations, 82,000 hectares are production area. At the same time, approximately 1,700 hectares of new grape plantation have been established. Of the 811,000 tons of grapes produced, 541 million litres of wine was produced in 2001, 111 million litres more than in the preceding year. Approximately 90% of the wine-growing area is cultivated by individual farmers, while the major portion of processing and storage capacities are owned by farming organisations and cooperatives.

Animal breeding

The agricultural crisis, which lasted one and a half decades, has affected animal breeding even more seriously than plant production, causing, among others, a significant reduction of animal stocks. This was primarily due to the low level of profitability of stock breeding, but the forced elimination of large farms, as well as the fact that holdings experiencing a financial crisis eliminated and sold a significant portion of their animal stock also played a part.

Animal breeding was characterised by negative tendencies in 2001. Like in previous years, the number of cattle and pigs decreased, and the increase of sheep stock stopped. On 1 December 2001, the number of cattle was 783,000, 3% less than one year earlier. The number of cows in the country decreased at a similar rate. The reduction of animal stocks can be considered to result primarily from the worsening situation in foreign markets, but a reduction in the demand for beef could also be felt on the domestic market **(Table 3)**.

The market of pigs for fattening was in equilibrium, with demand continuously coming from both domestic and foreign markets. The sheep stock was basically the same as in the preceding year, while growth continued in the poultry sector, although at a somewhat lower rate than in the previous year.

Due to the reduction in the number of animals and the change in the structure of animal stocks, stocking density in Hungary in 2000 was only half of the value calculated at the end of the 1980's. Of animal products, beef cattle experienced the greatest drop in production, but pigs for slaughter production also decreased.

The conditions for quality improvement in animal breeding are essentially favourable. The competitive disadvantage evolved over the past fifteen years can be eliminated through intensive technological development and, for some species, improvement of the genetic value of stock. Modern varieties and hybrids are available for pig breeding. The range of varieties is world-class for gallinaceous birds and turkey. The quality of the variety spectrum of water-fowl is appropriate for the circumstances, but genetic capabilities need to be enhanced. The potential specific production of the dairy cow population is at a world-class level. With respect to beef production, the range of varieties available is not a factor which would inhibit increasing the production of beef cattle of excellent quality. Variety change is an indispensable precondition to the development of sheep farming.

Forestry and wood processing

Forestry activities are carried out as regulated under the Forestry Act. Forestry has a share below 0.3% in the total national economy. The output of forestry and the material value of forests, as well as any material proceeds gained from forestry are in many ways exceeded by the immaterial value of forests when considered as a community asset, serving society through its various uses for conservation of nature and the preservation of health. Of the area under forestry management in Hungary, 93% are covered by wood.

Recent years have been characterised by the stabilisation of the area of state-owned forests and an increase in the area of privately owned forests. For nearly half of the area of privately owned forests, establishing a functional forest management system is a challenge. Forest management is carried out in state-owned forests at a high professional level. The forested area in Hungary is increasing each year: in year 2001, more than 15,000 hectares of new forest were planted. Total wood asset is also increasing, its volume being 331 million m^3. Unlike the general situation in Europe, 85% of all forests are deciduous, and only 15% is covered in pine forests. The forest renewal obligation concerned more than 21,000 hectares in 2001.

Food industry

In year 2001, the sector's gross production increased by 0.5% in comparison with the 2000 figures. The gross production value was HUF 1,852 billion. This made food industry rank second among the 14 sectors of processing industry, with a share of 14.8% of the Hungarian industry structure (**Table 4**).

In the various subsectors, different production trends can be observed. The growth arte was greater than the average in the confectionery, alcoholic beverage, sugar, tobacco, fruit and vegetable processing subsectors, as well as in the processing of poultry meat. A decline characterised meat processing and conservation, the production of bakery

products, breads, feeds and dairy products, as well as the wine-making and beer-brewing subsectors.

The export of food industry amounted to HUF 375.2 billion in 2001, which is equal to 51-52% of the annual agricultural export volume. 155,900 people were employed in the food industry. In terms of the number of people employed, food industry ranks second among processing industry subsectors, and tenth in terms of gross average wage.

The goal and the technical nature of investments in the food industry are connected primarily to better adjustment to market needs, more effective production, acceleration of specialisation and concentration, and the improvement of competitiveness. The objectives in focus are compliance with quality, food safety, animal welfare, hygiene and environmental standards.

In recent years, food safety has become a dominant factor, one which is a prerequisite of entry into the market. Hungarian legislation – adopting relevant EU legislation – has made it mandatory for food producers to put in place HACCP systems for food safety. The issue of the use of brands, trade marks, geographical indicators and designations of origin (Apricot Spirit of Kecskemét, Brandy of Tokaj, Winter Salami of Budapest and Szeged, Red Onion of Makó, Ground Pepper of Kalocsa etc.) have gained importance both from the aspect of market security and public hygiene. These refer both to the ingredients of the product and the production technology applied.

1.2. Food safety and rural development

Food safety

Hungary's ecological conditions are favourable for plant production and animal breeding. The history of official registration of plant and animal varieties goes back to a century ago. Hungary is a founding member of the "Office International des Epizooties"(OIE). In Hungary, feeding ruminants with protein of animal origin has never been an established practice, and recommendations in force have always prohibited the use of proteins originating from mammals (except for milk and milk powder) as foodstuff.

In Hungary, the first acts on public hygiene and veterinary issues were adopted as early as in the 19th Century. The system of official inspection was also established at this time, and later evolved in the framework of a well-integrated system. The primary objectives are controlling the hygienic condition of foods, counteracting epidemics of animal diseases which may cause significant loss to the national economy, and preventing contagious human illnesses related to animal epidemics. An official inspection system of meats and other food products is in place. The privatisation of the Hungarian food market was finished in the 1990's. Currently there are nearly 8,000 food-processing plants, which process 26 foodstuffs of plant or animal origin.

Food producers have been required to apply an ISO quality assurance system or a HACCP system since 1996. The final deadline for introducing HACCP systems was 1

January 2002 for all establishments. High-capacity establishments need to comply with the relevant EU standards by 31 December 2003. Of the processed foods examined in 2000, 88.4% complied with the relevant requirements. Compared to the preceding period examined, the quality of food products – especially bread, bakery products and meat products – slightly deteriorated. The quality protection penalties levied had a positive effect. The Ministry of Agriculture and Rural Development operates a trademark scheme, whose essence is that high-quality Hungarian products are granted the title „Excellent Hungarian Food Product".

Food safety and food quality are related concepts, and are governed by legislation. In Hungary, three ministries (Ministry of Agriculture and Rural Development (MARD); Ministry of Health (MH); and the Ministry of Economy (ME) and their subordinated services are responsible for the safety of foodstuffs. In special cases, other authorities may also carry out food inspection activities. In Hungary, operation of the Advisory Board on Food Safety is based on the mandate granted in legislation. The Board is responsible for safeguarding the reputation of food products of Hungarian origin in the market, as well as the protection of the health of Hungarian consumers.

Regional Veterinary and Food Control Stations work according to a work plan approved by the MARD, but also carry out ad hoc inspections and hygiene and quality checks, such as milk and meat testing, or the assessment and classification of plants. In 2001, a total of 2,669 items were subjected to milk and dairy product testing. It was found that 89% of these met the requirements of the product sheets and the Codex Alimentarius Hungaricus. The following characteristic quality problems were found: ingredient problems (lower fat content), deficient marking, microbiological contamination, organoleptic defects etc. Quality protection penalties were levied due to product deficiency in 300 cases.

Under a joint decree of the MARD and the MH, all high-capacity slaughter-houses, dairy plants, milk collection facilities, bakeries and canned food factories needed to be assessed in 2001 with respect to the food hygiene conditions of production and marketing. The assessment classified the facilities in three categories: passed, partly passed and failed. Facilities which had failed were closed down (including, for example, 77 slaughter houses). Facilities which partly passed were required to draw up an action plan and remedy any deficiencies by 31 December 2003 at the latest.

These days, food safety is a very topical issue as a result of the series of food scandals (dioxine, BSE etc.). Hungary has avoided such scandals, as enhanced control is in place due to the country's open economy. The activities of official control authorities cover the entire food chain, and they have the authorisation to apply legal sanctions necessary to enforce compliance with regulations. There is a need for establishing an enhanced, higher level of food safety in order to prevent risks. For this purpose, the technologies used in agricultural production must be based on risk assessment and be suitable for eliminating hazards. Safe food production can be implemented well in the framework of the Total Quality Management (TQM) system. The aim is to make the entire process traceable and to be able to provide guarantees for the consumers. This may only be ensured in a closed, controllable system. Elaboration of a uniform legal regulatory and control system for food safety is in progress in Hungary.

Rural development

The countryside, which makes up over 95% of Hungary's territory, is strongly differentiated in various terms. 73.6% of the population live in rural areas, 36.7% live in rural communities. The living environment at the countryside, while endangered from many aspects, can be considered a basically healthy living environment, also suitable for tourism and leisure activities. Rural infrastructure is less developed, transportation conditions are unsatisfactory, making both accessibility of small settlements and the possibilities for the transport of goods inadequate.

Sewage coverage is significantly lower than the ratio of units provided with pipe water, and the existence of a sewage system is closely related to the size of the settlement. Energy production meets demands. In approximately 70% of the country's settlements, we find historical buildings – partly unused – which would be worth saving, and the majority of which could be used for agro-tourism. A significant portion of the communities living in the countryside, maintain the culture and traditions characteristic of a region or a settlement. It may be considered a positive tendency that small settlements, formerly forced to join under a common administration, have regained their independence and have started to establish their elementary education institutions. Rural NGO's have also been revived. Demographic conditions in predominantly rural areas are the least favourable, and the following can be observed: strong drop in natural reproduction rate, unfavourable age structure, increasing ageing index, negative migration difference. The rate of the permanently unemployed and the size of the unemployed population no longer receiving unemployment benefits are higher in the countryside.

Also, an unjustified disparity in terms of wage and income conditions can be seen. The most unfavourable situation – from all aspects – is the situation of small settlements and solitary farms. The level of available amenities (public utilities, services, infrastructure) is generally lower than in larger villages, and conditions of transportation and accessibility are especially inferior. In the future, tasks focusing on the diversification of sources of income in rural areas, on increasing the attractiveness of the rural environment, and on enhancing human capital are expected to rise in priority. There is also regional variation in terms of the agricultural economy. Conditions for agricultural production, as well as land use are differentiated mainly along regional lines, but there are also significant differences within individual regions.

Regional disparities may be mitigated through increasing the adjustment capacities of rural regions, with a special emphasis on the diversification of employment – including employment in areas not related to agriculture –, as well as the improvement of infrastructure, services and the quality of life.

The role (possible role) of agriculture in rural development far exceeds its weight in the national economy, expressed in terms of economic indexes (GDP, gross added value). The measures foreseen are intended to improve factors, which would help agriculture to retain – and in certain cases, increase – its role in rural development, the retaining of rural population, and in providing them with means of earning a living. One group of measures (land improvement, re-parcelling) serve to preserve and improve the means of production, while another group is intended to improve services and

infrastructure, aiming at improving the quality of rural life. Certain measures will focus on preserving the values and traditions of villages, on protecting local features and culture, and on preventing or remedying the negative effects of natural disasters. These measures together will result in the diversification of activities, leading to an improvement in the situation of the rural population in terms of the labour market, revenues and quality of life, and leading to a reduction of regional disparities.

The actions aimed at mitigating the unequal opportunities of the countryside will primarily build upon the following strengths of rural regions: natural lifestyle, healthy environment, diverse landscapes and great biodiversity, valuable water reserves, the cultural traditions, physical and intellectual values of rural communities. The measures serving this purpose will partly compensate for weaknesses such as the lack of jobs, underdeveloped infrastructure, low entrepreneurial potential and the over-dependence of rural settlements on agricultural production. Further capital will be introduced to mitigate the lack of capital of rural SMEs, to strengthen integration and promote market access for products with specific, individual characteristics. Infrastructural development will decrease the seclusion of rural communities. The risks faced by the countryside – namely the increasing depopulation of small settlements and the deteriorating of the rural style of life –will also be mitigated. When this objective is reached, the chance for preserving the healthy rural living environment will grow, the dependence of rural settlements on agricultural production will lessen, the countryside will have better capacity for adjustment and employment conditions, and living standards will improve.

2. Production Systems

2.1. Systems of production of primary animal products and of animal breeding

In the first half of the 1990's, the unfavourable economic conditions prevailing in the country had their effect on the position of the animal breeding sectors as well. The fast increase in prices of expenditure of industrial origin, the tax burdens on electricity usage, the relatively high interest rates, the high levies related to the use of live labour, the financial consequences of bad cereal harvests caused by bad weather, as well as inflation and liquidity problems took their toll on all phases of production. The most important factors influencing the costs and revenues related to the production of raw materials were the ability of producers to enforce their interests, the technologies of animal breeding, the quality of breeding stocks, the quality of stocks of animals for slaughter, feed and feedstuff prices (making up three fourths of production costs), the particulars of the bargaining positions and, last but not least, the selling price of the final product.

After the change of political system, production fell to 60-70% of the figures in the second half of the 1980's in nearly all sectors. Specific yields usually also decreased, or at best stagnated, and only in the last one or two years have we reached the levels seen in the second half of the 1980's again.

Variety composition in production systems

The pig sector

Pork production in the last 50 years has been based essentially on naturalized Hungarian varieties. At the beginning of the 1990's, 80% of pig stocks were pure varieties and 20% were hybrids. Since then foreign hybrids have appeared and together with the Hungarian hybrids, their share has increased. The following ratios can be observed in large farms (embodying 50% of all pig-keeping):

- 25 % pure basic varieties (Hungarian Large White, Hungarian Landrace, Duroc, Hampshire, Pietrain, Belgian Landrace) and crosses between them,
- 60 % Hungarian hybrids (Kahyb, hungahib, ISV Pannonhybrid),
- 15 % foreign hybrids (Seghers, Dalland, Pic, Rattlerow, Dumeco).

The other 50%, are held by small producers (1-2 sows or 4-5 porkers per holding) who mainly keep the varieties Large White and Hungarian Landrace. Ad hoc crosses between hybrids have recently also begun to appear.

The poultry sector

Domestic production of broilers is dominated by two varieties (Arbor Acres, Ross), which amount to more than three fourths of breeding pairs. Turkey fattening has by now become nearly equivalent to the production of large-bodied turkeys, also called "giant" turkeys. The keeping of broiler turkeys is rarer. Turkey breeding in Hungary is mostly controlled by a poultry production organisation created through the integration of four large turkey-keepers. All four produce the BUT Big-6 hybrid.

Intensive production of eggs for human consumption in Hungary is based on the traditionally well-known varieties (Tetra SL and Shaver Starcross). This is accompanied by the black Harco, Bovans and Hisex Brown Hybrids Laying Hens, bred and sold in addition to the TSL Hybrid Laying Hens of Bábolna, and also Tetra H hybrids, New Hampshire and Plymouth dual purpose varieties.

The cattle sector

A significant part of the cattle stocks in Hungary have partial Holstein Friesian blood proportion. Most widespread is the Hungarian Simmental crossed with the Holstein Friesian variety, kept for milk production. The major portion of Hungarian Simmental cows are held by small producers. Beef production primarily relies also on Hungarian Simmental, which provides excellent quality meat, and the dominant type is the Hungarian Simmental and crosses thereof (**Table 5**).
Source: KSH

The decisive portion of dairy cow stocks are consist of varieties for milk production or dual purpose, the number of exclusively beef cattle is low. The number of Hungarian Simmental cows, which are not used for milk production, which can therefore be considered as exclusively beef cattle is estimated around 5-6,000.

The sheep sector

Variety composition is unfavourable (approximately 95% of all sheep is Hungarian Merino). The rate of reproduction of the Hungarian Merino is considered to be in the upper medium range. According to its genetic ability, 100-110 weaned lambs could be expected from 100 ewes. Unfortunately, this level of reproductive performance is rarely realised in Hungarian holdings – although several holdings have provided proof that better results can be achieved.

Holding structure of animal breeding sectors

The pig sector

The uncertainty of sales, low profitability and deficits in production, have caused a large number of individual farmers to abandon pig-keeping. While in 1996, 540,000 individual farmers were fattening pigs, their number decreased by 30% by 2001. As for farming organisations, the animal stock per one holding was nearly identical in 2001 as in 1996. On the other hand, the stock/farmer figure for individual farmers showed a slight increase over the examined period. In 2001, the average number of pigs per holding was 3,900 at farming organisations and 6 for individual farmers, while the national average was 13 animals (**Table 6**).

The concentration of pig stocks is low in Hungary in individual holdings. Of the pig stocks held at individual holdings, 84% belong to holdings with less than 50 pigs (**Table 7**).

Concentration is high, on the other hand, in the case of farming organisations. Over 99% of all pigs held by these organisations are held in holdings with more than 200 pigs, and only a negligible portion of the pig stocks belong to holdings with less than 50 pigs.

The poultry sector

Since December 2001, the poultry stock held in Hungary has decreased by more than 4%, dropping to approximately 41 million in April 2002. The decisive majority of poultry are gallinaceous birds. In the period between 1995 and 2001, the number of gallinaceous birds fluctuated between 26 and 34 million animals. The nearly 2 million broiler breeding pairs established in 2001 give rise to a potential risk of broiler overproduction.

Between 1995 and 2001, the share of geese, ducks and turkey increased within the poultry stock. The share of gallinaceous birds dropped to 79% in 2001 from 88% in 1995, while the share of turkey increased from 4.6% to 9% in 1995.

Fifty percent of the poultry stock kept for meat production in Hungary is held in holdings with a stock of 5-50,000 animals. Small holdings (with less than one thousand animals) play a decisive role in broiler-fattening by individual holdings, of which they constituted 89% in 2000 (**Table 8**).

Of the broilers kept by farming organisations, nearly 80% is concentrated at holdings with more than 50,000 animals. The share of holdings with more than 10,000 fryers was 83% in 2000. In Hungary, 90% of -laying strain stocks are held in holdings with more than 20,000 animals (**Table 9**).

The cattle sector

Since December 2000, over one year, the number of holdings – both held by farming organisations and by private producers – where cattle is kept has decreased by 15%. The number of farming organisations keeping cows or first-calf heifers has decreased by 14%, and the number of similar individual producers has decreased by 10%. The average number of cows kept at a single holding in 2001 was 320 for farming organisations and 4 for individual farmers (**Table 10**).

With respect to holdings of individual farmers involved in milk production, the share of holdings with less than 10 cows was more than 95% in 2000. Of all cows owned by individual farmers, 71% belonged to holdings with less than 10 cows (**Table 11**).

The vast majority of dairy cows are held in dairy farms with 100 or more livestock. As a result of changes going back for a long time and focusing mainly on the demands of milk production, a significant part of the cattle held in the country are of Holstein Friesian blood proportion.

Data valid on 1 April 2002 showed that of the 370,000 cows, **the number of beef cattle is only 22,000**, while the number of dual purpose cattles was 60,000. Of the first category, 77% were held at farming organisations, and of the latter category, 78% were held at individual farmers. The number of beef cattle decreased by more than half in the period between 1997 and 2002 (**Table 12**).

The sheep sector

On 1 August 2002, the number of sheep was 1,103,000, of which 85% were held at small holdings. The number of ewes was 865,000, less than half of the stock 20 years before. Farmers with a sheep flock of over 100 animals hold 72% of all sheep, but holdings where less than 20 sheep are kept, represent nearly 73% of individual farmers (**Table 13**).

The goat sector

Less than 5 she goats are held by 33.6% of producers. Of members of the Hungarian Association of Goat Breeders, 87% keep less than 30 female goats. The ratio of members keeping 31-50 she goats is 8.5%. The share of holdings with more animals is only 4.5% **(Table 14).**

Input factors in the animal breeding sectors

In the first half of the 1990's, the price increase of cereals was rather balanced, with the only exception being year 1991, when good yields and decreasing demand led to a buyer's market, resulting in the annual average prices going below the level of the preceding year. The price of maize, for feedstuff, increased by 40.3%, wheat by 63.6%,

and barley by 46.4% between 1990 and 1995. The great price change occurred in 1996, when a significant reduction in the global wheat stocks and the relatively low yields caused price on the world market to rise significantly. The resulting effects on costs could be felt by the Hungarian animal breeding sectors already in 1997.

The cereal price boom in 1996 caused the price of feedstuff maize to increase by 60%, wheat by 139%, barley by 157% in comparison to 1995**.**

In the animal breeding sectors examined (cattle, pig, poultry), the costs, calculated at ruling prices, have practically quadrupled over the last decade. The prices of various products were affected differently, but in general we can conclude that changes in costs stemmed dominantly from changes in feeding costs. The price of technical equipment used for agricultural production increased by 4.5 times, which made the production of self-grown feedstuff significantly more expensive, and an even greater increase was experienced with respect to feedstuff purchased. These tendencies were especially strong at the beginning of the decade and between 1995 and 1997. By the end of the 1990's, the share of costs of feed and feedstuff within total expenditure grew further.

Tendencies in the costs of the major animal breeding sectors (dairy and beef cattle, pig, poultry and egg production) were examined on the basis of data from the former information system covering agricultural partnerships between 1990 and 1999. Changes in costs of partnerships in the period 2000-2001 were analysed on the basis of data from the test holding information system, which better reflects the current holding structure of Hungarian economy.

Due to the cost structure of pig for slaughter production, of all inputs, especially the change in feed prices influenced the competitive situation of the sector. Between 1990 and 1999, the specific costs of porker fattening – calculated at ruling prices – nearly quadrupled. Another factor contributing to the increase of costs – 5.2% at constant prices – was that the efficiency of fattening decreased. At the end of the decade, holdings used more feed to produce one kilogram of live weight than they had at the beginning of the decade (**Table 15**). In 2001, direct variable costs for one porker were 30% higher than in 2000 in the holdings examined in the framework of the test holding system. Production costs per a unit of live weight increased by 25% from 2000 to 2001 (**Table 16**).

As a result of its cost structure, the poultry sector was also fundamentally affected by feed price changes. As a result of the increase in prices, the production costs for fattened poultry grew by three times between 1990 and 1999 (**Table 15**). Due to the increased price of feed grains, feeding costs grew by nearly 17% from 2000 to 2001, resulting in a 10% increase in the production costs for a unit of live weight (**Table 16**).

With respect to egg production, the production costs per one laying hen increased 3 to 4 times between 1990 and 1999. Generally, however, producers have been mostly able to transfer the burden of egg production costs to the consumers. The fluctuation of cereal prices in the 1996-1999 period had a negative effect on the production of eggs for human consumption, thus increasing production risks (**Table 15**). Changes in the cost of keeping laying hens showed similar tendencies to the costs of broiler production in 2000-2001. Production costs of egg production, was nearly 3% higher in 2001 than in 2000

(**Table 16**). Despite the various degrees of fluctuation between the years, the sector's position has improved by the end of the decade.

Of the animal breeding sectors examined, the largest increase in costs occurred in milk production in the period between 1990 and 1999 (**Table 15**). The high increase in costs associated with the keeping of dairy cows resulted mostly from the increased price of input material and tools, with the price increase of feed and feedstuff having the dominant effect. Expenditure per one cow in 1999 exceeded HUF 300,000 in farming organisations, more than quadrupling in comparison to 1990, while costs calculated at constant prices increased only by 16.1% over the same period. In 1999, the production of one litre of milk cost somewhat over HUF 52 (at ruling prices) in the holdings examined. Data from the test holding system have shown that in 2001, costs per one cow were 10% higher in 2001 than in 2000 at holdings of farming organisations. In 2001, costs of production of one litre of milk was thus HUF 63/litre at the examined holdings, while expenditure was HUF 412,000 /animal (**Table 16**).

The other important production line of the cattle sector – beef production – has by now lost its former importance as an autonomous activity. These days, beef production is mainly restricted to the fattening of animals no longer used for milk production, which are then sold as quickly as possible, but their quality does not allow for higher prices. This is also reflected in the production costs per live weight unit. Of the farming organisations examined, expenditure on self-grown feedstuff has increased fourfold over the last decade, while expenditure on purchased feedstuff hardly doubled. This means that at ruling prices, costs have increased by a factor of 3.5, while costs at constant prices remained practically unchanged between 1990 and 1999 (**Table 15**). Thus, the production of one kilogram of beef cattle cost HUF 250 at the end of the decade, at the farming organisations examined. The average figure for production costs in 2001, calculated as the average of test holding figures, was nearly HUF 300 for companies (**Table 16**).

Costs and revenue in the sheep sector are greatly influenced by the fact that hardly 100 lambs are produced for 100 ewes. Technology and facilities are outdated, and the conditions of storing feedstuff – specially ruffage feedstuff – in modern facilities are hardly existent. The level of machinery used in the sector is very low; especially missing are the machinery for feedstuff harvest and for feeding. There is no milking technology of appropriate level, the machinery for milking ewes is missing, and technical conditions for protecting the quality of ewe's milk are often lacking.

Risk factors in the animal breeding sectors

The pig sector

There are huge differences between the accommodation of pigs in large holdings in terms of the quality, the level of technical facilities is heterogeneous. The technological conditions of operating holdings can be considered average. The number of truly modern holdings, which meet all requirements, is low. The most pressing issues (also for environmental reasons) are the modernisation of storage of feedstuff, of feeding and of the allocation of feedstuff, infrastructural development (heating, rainwater and sewage water, pipe water system etc.) as well as manure management and the deposition of manure. In some regions, the biological wear-down of holdings have been notified.

Pigsties of individual farmers give rise to significantly more concern. In this category, production is characteristically for self-subsistence, the rate of production for the market is relatively low. The conditions of existing facilities differ widely, but the technological conditions of animal breeding are usually worse in this category.

The poultry sector

In terms of technology, a significant portion of existing facilities, do not meet the relevant standards. In order to allow production to satisfy demand on the part of processors, significant investments are needed both for construction and technological renewal. On the level of the EU, poultry fattening shows weak production indexes and therefore relatively high costs. Vertical integration is lacking, vertical cooperation covers only certain phases.

The cattle sector

The technical and technological conditions of dairy farms are not satisfactory. The number of up-to-date holdings is low. Especially conditions of the storage of feedstuff, the allocation of feedstuff and the harvesting of ruffage feedstuff are deficient. Concerning feedstuff production, the harvesting and storage loss of ruffage feedstuff is high. Neither is the situation concerning reproduction bright: the average 420 days between births is very high.

The sheep sector

Lack of capital and revenues, forces farmers to limit the use of biological bases and other inputs. The profitability of wool production is very low, and therefore the breeding stock market does not need and cannot purchase the male and female animals which have been classified as high breeding value. With respect to the production of ewe's milk, milk yield is low. Inappropriate treatment of wool makes it low-quality, thus not meeting the requirements of domestic processing industry. The expertise of persons employed in the sector is often below what could be expected: the expertise and attitude of shepherds in Hungary is not always suited to the exploitation of opportunities and the introduction of new varieties and technology. Following the change of political system, the holding structure disintegrated, breeding and keeping conditions changed, and animals experienced even worse conditions than before. The concentrated nature of the sector has become a thing of the past, sheep holdings with a low number of sheep were established one after the other.

2.2. The country's most important animal products and secondary animal products for producers and regions

The pig sector

The composition of animal stocks in Hungary is dominated by grain consumer animal species (poultry, pig) over ruminant species. Pork production involves world breed, as well as the varieties thereof, which are bred in Hungary and adjusted to the conditions of domestic breeding. The two varieties on the top are Hungarian Large White

and Hungarian Landrace. Certain import varieties (such as Pietrain, Duroc and Hampshire) are involved in various crosses and domestic hybrid programmes (Hungahib 39, Kahyb hybridpig és az ISV Pannonhybrid) (table 17). Of the endogenous varieties, the Mangalitsa , as a lard pig plays only a subordinated role. This is especially suitable for the production of special products (various types of salami). The fat of Mangalitsa has gained popularity, as the fat contains unsaturated fatty acids. For this reason, the Mangalitsa stock has started to grow over the last years again.

Pig keeping is characteristic especially in area where cereals are grown. The willingness to keep pigs is lower in mountainous and woody regions. The distribution of pig keeping in Hungary is as follows:

- 40% of pig stocks are located in Western Hungary;
- 55 % in the Great Plain
- 5 % in the Northern Hungary

The freshest data available to KSH show that pork consumption reached the bottom in 1997. Consumption was in 1999 28.8 kg/person annually, nearly 7% higher than in the preceding year. The increase in the purchase and consumer prices, however, had a negative influence on the increase of consumption as of the second half of 2000: pork consumption in year 2000 was 28.5 kg/person, 1% lower than one year earlier. (**Table 18.**).

Annual pork export in the period between 1997 and 1999 stabilised at around 105,000 tons, amounting to 27-28% of total production. In 2000, exports exceeded the previous year's figure by 24.1%, equalling 33% of production. In 2001, however, lack of stocks caused exports to drop by 31.4% compared to the preceding year. As a result in the drop in domestic production, imports rose to 12.5% of domestic consumption by 1998. Due to the strong buyers market in 1999, however, pork imports decreased significantly, while private consumption increased. In 2001, a total of 30,000 tons of pork was imported (125% more than in 1999).

The poultry sector

Despite a slight recess in 1996, poultry meat production in Hungary increased in the period between 1995 and 1998. In 1998, production reached 433,000 tons, then it decreased by 12.5% in 1999. In addition to exports, domestic consumption increased nearly constantly in the period examined, except for years 1996 and 1999. Consumption per person peaked in 2000, at 34.4 kilogram. By the end of the decade, the share of poultry in meat consumption exceeded the share of pork. The level of self-subsistence with respect to poultry was 150-160% in Hungary between 1995 and 1999. In the period examined, nearly one third of poultry meat produced was exported. Import of poultry is very low, only 1-2% of production (**Table 19**).

The sector realised significant revenue from exporting 1300-1400 tons of table goose liver and significant amounts of duck liver annually, and also from exporting goose-quill and down.

Egg production decreased in the period 1995-2000 (**Table 20**). While in the years 1987-1989, an average of 4.5 billion eggs had been produced annually, the average annual production in the years 1995-1997 was only 75% thereof, 3.4 billion. The reduction in egg production in the period examined can be explained mainly by the changing consumption patterns and the decrease in effective demand. Within the 1995-2000 period, production was the lowest is 2000, when 3.230 billion eggs were produced.

Production in 2000 was 0,6% lower than in the preceding year. At the same time, domestic consumption increased by more than 7 %, and per head consumption by 9.3%, which compensated for the 70% drop in exports.

The cattle sector

The level of stock under production control is continuously decreasing, to the degree that it seriously endangers the Hungarian progeny-testing programmes. While animal numbers decreased, specific yields have increased significantly. The number of cows held by small producers is estimated to be around 100,000. The majority of this stock is used for dual purpose, currently being used mostly for milk production for family use and for the market. Only about one third of the farmers will be able, however, to produce milk for sale, which meets the EU requirements. It would be useful to change the use of a larger portion of the stocks to beef production. Of the registered dairy cow stock, 85% are pure varieties Holstein Friesian with high blood proportion, created through constant crossing in the sixth generation. In the last year, official production control figures showed a lactation production of 221 247 Holstein Friesian cows to be 7,367 kilograms of milk, 3.73 % milk fat and 3.26 % milk protein.

There is a tendency of growing polarisation within the milk production industry: the specific yield and the amount of milk sold by well capitalised companies is growing from year to year, while production units which were not able to carry out developments in the last ten years are unable to adjust to the competitive environment. There are now 11 holdings where lactation production exceeds 10,000 kilograms/cow, and 103 holdings where it exceeds 8,000 kilograms.

Official milk production control covers 68% of cows, which is an outstanding figure even by international standards. Milk production control is carried out in 911 holdings. Here, the average number of cows is 285. 75% of the cow stock covered by milk production control is kept at holdings with more than 300 animals, which may be a favourable from the aspect of the country's competitiveness in the international market. Dairy farms, which hold a large number of animals are located in various places of the country, and concentrated primarily in the southern part of the Great Plain and in the Transdanubian region.

The number of Hungarian Simmental cows used for dual purpose and covered by milk production control is estimated around 6,000, the decisive majority of which is also held at holdings with a large number of animals. Lactation production – an average of 5 968 lactations – was 4,997 kg milk, 4.02% milk fat and 3.43% milk protein. The production of the best holding was 6,454 kg milk, 4% milk fat and 3,61 % milk protein.

Of the rest of the dairy cow varieties, Jersey, Braun Vieh and Ayrshire are present. Their number, in the aggregate, is less than one thousand. They affect Hungarian milk production only locally, their influence is not significant. The number of milk producers registered with the Milk Product Board is 26,048, of which 831 are farming organisations and 25,217 are private producers. Further actors in the milk market are the milk collecting facilities, which purchase milk, and dairy plants. The number of milk collection facilities is steadily decreasing, currently standing at 745. There are 59 dairy plants, mostly multinational groups and Hungarian companies. There is a wide range of modern, competitive products in the market.

After the change of political system, **milk consumption was greatly reduced**. Among the factors influencing demand, the change in consumer patterns may be pointed out. In 1999, an average of 13% of the per capita food expenditure of Hungarian families was spent on milk and dairy products. Milk made up 49% of such expenditure, the share of cheese was below 18%, the share of other dairy products was 30%, and butter represented only 3%. In the 1995-1997 period, milk production stagnated, then, between 1998 and 2001, a steady increase was seen. In 1997, the per capita milk consumption in milk equivalent was 176 litres. Annually, domestic consumption was hardly 2% higher than production. As consumption started to decrease again, and production increased, the level of self-subsistence increased to 115% in 1998. Domestic per capita consumption in 2000 was nearly 8% higher than in 1995.

The issue of disposing in the foreign market of some hundred million litres of excess milk, which has been regularly produced in recent years, is becoming more and more difficult. In the period between 1998 and 2001, export of milk and dairy products – expressed in liquid milk – was 20-22% of total production. Imports made up approximately 10% of the quantity used domestically in 2000. The rate of export was the highest in 2001, our calculations show it to have been near 22% of total production. In 1995, imports made up approximately 5% of domestic consumption. In the period between 1995 and 2000, the significance of imports increased and came to nearly 10% of domestic consumption in 2000. In 2001, the value of the country's dairy products exports was USD 98,564,000, while that of imports USD 38,966,000.

In the last year, 1,725 billion litres of milk were purchased for industrial processing, 86% of which complied with the EU standards (belonging to the „extra quality" class in the domestic classification system). The volume of milk sold directly is estimated around 350-400 million litres. Export constitutes of mainly liquid milk exported to neighbouring countries, and cheese. Therefore, domestic production should be sufficient to meet the increasing domestic consumption, as well as any export opportunities. Of breeding stock, 3500-4000 young heifers, 100,000-150,000 doses of reproductive material and 20-30 young bulls for service are exported annually.

Beef cattle

The distribution of cow stock held in the country exclusively for the purpose of beef production, in terms of varieties, is shown in **Table 21**, based on the data of registration organisations.

A sectoral programme has been launched recently, aiming at crossing cows held at private houses and at small-holdings for the purpose of beef production. Breeders participating in this crossing programme use reproductive material mainly from Hungarian Simmental, Limousin and Charolais bulls for service. Most of the bull-calves of the dominant Holstein Friesian variety are exported to the EU member states or slaughtered domestically while still calf. The number of the autochthonous grey cattle variety is steadily increasing, being used mainly for conservation of nature and tourism, and to a lesser extent, consumption. Its meat is used to produce Hungarian specialty products. As the variety is under protection, animals of this variety cannot be exported as breeding stock.

Beef cattle production in recent years has been around 60,000 tons. Beef consumption in Hungary in the period between 1995 and 1999 was 4.2-6.9 kg per capita. KSH figures show that in 2000, per capita beef consumption was only approximately 4.4 kg, 36% less than in 1995. This consumption figure is **only 20-30% of that of the usual figure characteristic of the EU member states,** and can be explained by the significant change in consumption patterns and cooking habits of households, which took place in recent years. The appearance of BSE in several Western European countries, and the resulting lack of trust on the part of consumers led to a further reduction of the already low level of beef consumption in Hungary as well. Low consumption figures, however, are also the result of the fact that the high rate of export strongly limits the availability of quality beef in the domestic market. A large portion of good quality beef cattle is namely exported at a low weight, which practically means that only beef cattle unsuitable for export (mostly waste cow) are left for slaughter within the country (**Table 22**).

In comparison to the level of beef consumption (the volume used in Hungary), the share of import has been high, but showing a decreasing tendency: 28% in 1997, 26% in 1998, and 10% in 1999 (**Table 22**).

The sheep sector

On 1 August 2002, the number of sheep held in Hungary was 1,103,000, with 85% held in private, small-holdings. The number of ewes was 865,000 and is slightly decreasing, but is less than half of the stock held 20 years earlier.

A survey carried out by the Hungarian Association of Sheep Breeders in 2001 showed the national average to be 126.3 ewes. The average figure only exceeded 300 in Fejér and Veszprém counties. In three counties, it was between 200 and 300 (Zala, Komárom-Esztergom, Pest), in six counties between 150 and 200 (Vas, Somogy, Szabolcs-Szatmár-Bereg, Tolna, Bács-Kiskun, Baranya), in three counties between 100 and 150 (Borsod-Abaúj-Zemplén, Hajdú-Bihar, Győr-Sopron-Moson), and in the rest, between 48.5 and 97.1 (Heves, Nógrád, Békés, Jász-Nagykun, Csongrád). Counties with the most sheep are Bács-Kiskun, Hajdú-Bihar and Szabolcs-Szatmár-Bereg, with 17.97%, 17.41% and 15.67% of the national figure, respectively. There are four counties with the largest number of sheep holdings. Of the total number of sheep holdings in the country, 19.39%, 14.02%, 12.58% and 11.06% are located in the counties Hajdú-Bihar, Bács-Kiskun, Jász-Nagykun-Szolnok and Szabolcs-Szatmár-Bereg, respectively.

In the last three decades, the primary product has been mutton. In 2001, 1,031,4 thousand sheep were exported (including goats), whose average weight was 20.6 kilograms. This constituted approximately 21,253 tons. The primary product of the sheep sector is obviously meat, the large majority of which is exported. Export is directed primarily to the EU member states – in this regard, the Italian market is dominant with its share of 90%. The most sheep are kept in the regions east of the Tisza and in the region between the Tisza and the Danube. There are certain counties in the Transdanubian regions where hardly a few thousand sheep are kept.

Milk is an additional product only in holdings where ewes are milked. There are currently about 55-65,000 ewes in the country, which are milked. In year 2001, 1,424,000 litres of ewe's milk was bought and processed under controlled circumstances. It is estimated than the amount of ewe's milk actually produced cannot exceed this figure by more than 10%. This excess milk is processed privately and in small facilities not registered centrally, and is the basis of ewe-cheese and cheese. The dominant regions in terms of ewe's milk production are the eastern and central counties of the country. Ewes kept in the central and southern part of Transdanubia are practically not milked. A smaller portion (120-150 tons annually) of the ewe-cheese produced is exported, the rest is sold in domestic outlets.

Wool has become a by-product over the last ten years. The majority of wool produced is exported as raw (or washed) wool, and only a smaller portion is processed within the country. In 2001, 4,450 tons of wool was produced in the country, 4,172 tons were imported, and the volume of exports reached 4,000 tons.

In the recent period, average mutton consumption has decreased. It is currently about 0.3 kilogram. There are significant differences between various parts of the country: consumption in the regions east of the Tisza can be as high as 0.5-0.6 kilogram, while the per capita consumption in the Transdanubian region is less than 0.2 kg. The average consumption of products made of ewe's milk (especially cheese) is estimated around 0.05-0.08 kilograms, and its significance is greater in the eastern parts of the country.

The goat sector

Of the animal breeding sectors the goat sector operates under the least favourable conditions. It was practically ignored for decades, and therefore the sector's database is deficient. Its position can be tracked by examining figures in the database. KSH data show that there were about 50,000 she-goats in the country at the end of 2001. The database of the Sheep Product Board shows that at the end of the year, the number of goats was 27,705, of which 18,887 were she-goats. Of these, 15,000 she-goats belonged to the programme of the Association of Hungarian Goat Breeders. The Association estimates the total she-goat population to be around 60-70,000 animals – most off the goat are kept in sheep herds.

The primary product of goat as a domestic animal used for production is its milk and the products made from the milk. The meat and the animals for slaughter, have secondary significance. Accessory products are the skin, trophy and horn, which are currently hardly utilised at all. As a by-product, its manure is utilised locally. It is also

used in sheep breeding as a foster-nurse, and also for the cropping of unattended or shrubby areas, where grazing is applied as an agro-environmental method. Additionally, it is also kept as a pet, and this role may gain in importance in the future.

The National Association of Hungarian Goat Keepers and Breeders (together with its member associations) helps and coordinates the activities of more than 800 breeders of 15-16,000 she-goats. The largest portion of producers has less than 10 animals, although the number of holdings with 100-200 goats in breeding is increasing. The number of holdings registered per county varies: the counties with the most holdings are Pest and Szabolcs-Szatmár-Bereg, and the county with the least holdings is Vas county. The average number of animals per producer in a county varies between 8 and 31; the national average is 20 she-goats. The number of she-goats, kept at a holding ranges from a few animals to a herd of 5-600.

Almost the entire amount of goat's milk and the products made from it are sold on the domestic market. Of the kids for slaughter produced, less than 10% is exported (live or slaughtered), mainly to Southern Europe. The decisive majority of kids for slaughter remain within the country and used for own consumption, or sold through local channels.

Because of the differences in stock number, there can be only estimates of the amount of milk and the number of kids for slaughter produced. It is estimates that the total amount of milk produced in 2001 was about 5.5-6 million litres, of which only about 1.227 million litres were purchased and processed under controlled circumstances.

Most of the offspring born in this sector serves own consumption. If there are 50,000 she-goats, at least 80-100,000 kids must be born each year. Compared to this, the 8-10,000 kids exported annually is negligible. Per capita consumption in the country can hardly be expressed in grams, while in the case of people working with goats, goat meat is one of the most important meats consumed.

Horse breeding

The most important products „of animal origin" in the horse-breeding sector are:
Horse and colt for slaughter;
Work horse, horse for tourism;
Stock horse – sport horse.

Relative importance of the various products:

Horse for slaughter: in Hungary, about 6-8,000 horses of various age are sold for their meat, as demanded by the market; the tendency is clearly increasing.

Work horse – horse kept for tourism:

A stagnating destination, where the number of draft horses working in agriculture is decreasing and the number of horses kept for leisure is slightly increasing. The total number is 50,000.

Stock horse – sport horse:

This is one of the most valuable horse stock, both in terms of genetic and utilisation value. These horses are sold in accordance with international demand and on an international quality level. Their number is around 20.000, including traditional Hungarian horse breeds.

Horsemanship today is based on 11 national not-for-profit variety-breeding associations. Cold-blooded and „Twisted" (warm and cold blooded hybrid) horse breeds are used in the production of horses and colts for slaughter, more modern representatives of traditional Hungarian breeds are used in sports and tourism, and international breeds are used in the sport and race sectors. Hungarian breeds are less suited to the requirements of high-level sports and racing, foreign breeds are used more for this purpose. Traditional breeds play a greater role in extensive horse breeding and use.

Provided that recent tendencies continue, exports of horse and colt for slaughter will increase, and the continuing – or development – of the legal and support system of tourism can result in the further increase of horses kept for tourism (especially domestic tourism).

Bee-keeping

In Hungary, bee-keeping gradually abandoned the use of hive. Framed hives appeared at the middle of the 19th century. At the beginning of the 20th century, the spreading of larger frames (for example, 42 by 36 cm) and larger hives, intended for the better utilisation of the bee fields of the country, was promoted especially by Imre Boczonádi Szabó. The so-called Boczonádi's large lying movable hive is still the dominant form especially in the eastern part of the country, although the spreading use of machines causes the number of low-frame hives to grow.

A gradual concentration could be observed in recent years, with less bee-keeper looking after more bee families. The are currently about 17.000 bee-keepers with about 800,000 bee families. The acarus Varroa destructor appeared in the south-eastern part of the country in 1978, and caused serious damages to Hungarian bee-keepers in the 1980s. Means of protection have greatly improved, but special attention is still required with respect to the varroa acarus. Bee fields in Hungary are varied, but of special importance is the robinia tree (Robinia pseudo-acacia), which usually flowers from the middle of May, with regional differences of 1-2 weeks. Bee-keepers utilize these differences by moving their bees. Robinia honey is also the most important export product. About 10,000 tons of honey is exported annually, mainly to the EU members states. Of the field crops, autumn coleseed and sunflower are also very important source of nectar and flower. Locally, the importance of honey types made from specific plant species (eg. linden, asclepias) is also growing. Robinia is present as extensive forests, and it provides nectar and honey which is „environmentally clean", of a light colour, mild and specific flavour and which will not crystallize for years.

In addition to honey, a smaller amount of comb-honey, pollen, propolis and royal jelly is also produced. There are currently about fifty active, registered queen-bee breeders producing 30-40,000 queen-bees for sale. Breeding supervised by OMMI is

carried out in the framework of the National Association of Hungarian Bee Breeders. Based on the Act on the Breeding of Animals of 1993, the decree governing work at the queen-bee breeding sites was prepared in 1994, and the codex in 1995. In Hungary, the Pannonic variety of Apis mellifera carnica is commonly used, and the breeding of this variety is authorised. The variety was given state recognition in 2000.

Fishery

Fishery in fish ponds, and the production of its primary species, carp, has long-standing traditions in Hungary. Nearly 70% of the 20,000 tons of fish producer annually are carp, produced by fish producers using 22,000 hectares and working in 3-year cycles. A feature of this technology for producing fish is that it uses little energy input and with mostly extensive methods, it is effective in producing valuable, healthy food. In addition to carp (73%), fish ponds are populated with grass carp (5 %) and silver-and big-head carp (19%).

The market requirements and the development in production technology has, over the last years, created conditions favourable for the development of intensive fish production in Hungary. Intensive technologies are fish breeding systems where fish production is based entirely on input energy (food, ventilation, water filtration). The fish are kept in ponds with a high stocking density. There are two types of these systems:

- flow-through intensive fish breeding;
- recirculation intensive fish breeding.

In Hungary, eel, trout, and, in the largest quantity, African catfish is produced in such systems. The guarantees for carp production in fishponds to be profitable include modern means of production technology and the genetically improved high production capacity of the carp stock used.

2.3 Main tendencies and changes in the use of animals and the technology of animal breeding in Hungary

Pig breeding

Pig breeding is the most important branch of Hungarian animal breeding. By the 1980's, it gave nearly 40% of the gross production value of animal husbandry. In 1895, the number of animals kept in the same area as today's Hungary was 3,180,000. The increased demand for meat and fat which resulted from the fast increase in population at the beginning of the 20th century could only be met with pigs which developed quickly and to a large weight, and from which meat and fat could be obtained. The number of pigs increased by 5-6% by the outbreak of World War I. Between the two world wars, the number of animals fluctuated between 4-5 million, in accordance with the seasonal and cyclic changes characteristic of pig breeding.

The significant damages suffered in the war were already overcome by the pig stock in the country by 1949, and the number of animals returned to the level before the war. The tendencies of growth were not frustrated either by the measures introduced to the economy at the beginning of the 1950's, or the collectivisation of agriculture in 1959-1961. By the second half of the 1970's, the number of pigs in the country had reached 8

million, and in September 1980, it exceeded 10 million. From 1985, agricultural policy consciously decreased pig stocks. In the 1990's, pig breeding was fragmented, individualistic and subject to random influences. In recent years, the number of pigs in the country has been around 5 million.

The number of sows, especially first farrowing sows changes in direct proportion to changes in the general eagerness for pig breeding. When the interest in pig breeding increase, the number of first farrowing sows grows, when it decreases, farmers first slaughter sows and do not keep first farrowing sows. From the beginning of 2001, the number of sows has decreased much more rapidly than before, and the number of first farrowing sows has also dropped. Unbroken production in the meat sector, as well as steady sale of product would ideally require a stock number without much fluctuation. Business and biological factors have a strong influence on the seasonal and cyclic changes on pig numbers.

Due to traditional seasonal changes, the number of pigs is at peak in the autumn, and as private pig slaughter usually takes place in the winter month, it is the lowest at the end of the year. In the 1980's, the decrease from September to the end of December was approximately 1.0-1.3 million (10-15%). In additional to the seasonality of slaughter, breeding is also of a seasonal nature. Apart from fluctuations within one year, pig breeding is also characterised by multi-annual cycles of the business. The price of pig for slaughters, the price of feed, and the relative prices thereof have a significant influence on pig keepers, especially producers who sell smaller quantities. When profits are increasing, many start breeding and fattening, while when profitability is decreasing, they decrease the number of animals held or abandon pig keeping. The reaction of farmers follows price changes – with some delay, but in large numbers. Changes – increases and decreases – are first reflected in the number of sows, then the total number of pigs follows in the same direction.

Changes in the composition of pig stocks – both in terms of the type of economic management used at holdings involved in pig breeding, and in terms of the age and sex group of the animals – has been varied. Following former negative tendencies, the number of pigs held by companies and farming organisations has shown a slow increase over the last years. The number of pigs held by cooperatives dropped the greatest, while the number of pigs held in private holdings slowly increased to over 50%.

Hybrid pigs became widespread as of the 1970's, especially on large holdings. The most widespread hybrids are the Ka-hyb and the HUNGA-HYB. In 1972, the hybrids constituted less than one fifth of the entire pig stock in the country, while in 1991, more than half. Naturally, the replacement of old varieties with new will never be absolute, but the complete replacement of lard pigs can be considered almost final. Market, and especially the demands in foreign markets, require the creation of new and newer varieties and hybrids, causing pig production to occur faster, the age at which pigs are taken into breeding to drop, the number of offspring per farrowing to grow, and the age at which pigs are slaughtered to decrease. The change of varieties also brought with itself a significant improvement in the veterinary conditions of the pig stock.

Poultry breeding

The economic recession, which started at the middle of the 1980's affected almost only the gallinaceous birds. The majority of these had been held by small producers and their stocks, decreased by approximately 27% in the mid-eighties. The number of ducks stagnated. The number of geese, which are nearly all held in large holdings, increased by nearly 90% in the ten years after 1980, and the number of turkey increased by about 60%. Due to the significant increase in the number of other poultry, the share of gallinaceous birds dropped from 94-95% at the beginning of the 1980's to 90% at the end of the decade.

Cattle breeding

Apart from the recession at the end of World War II and in the mid-eighties, the total number of cattle held in the country has not changed significantly in most of the last century. The relative stagnation of the stock level is also indicated by the fact that at the turn of the century, the number of animals had been 2 million, which increased by some 100-150,000 by the outbreak of World War I and was around 1.8 million between the two wars, then, due to war demand, rose to 2.4 million. In 1945, the number of cattle in the country was 1,059,000, 57% of the corresponding figure before the war. In the following 30 years, the number of cattle was around 2 million, with slight fluctuations. After the decrease by more than 10%, which occurred in the 1980's, the number of animals dropped to nearly 50% at the turn of the millennium. Since 1994, less than 1 million cattle have been kept in the country. At the end of 2001, the number of cattle was less than 800,000

Also, the breeding indexes relevant to cattle breeding have deteriorated over the last ten years. The offspring has continuously decreased (74% in 1986, 63% in 1999), while the death rate increased from 3.4% to 5.2% in the same period.

Sheep breeding

Sheep breeding in Hungary is dominated by the same factors, which affect the breeding of merino. Accordingly, the system of production in sheep holdings is generally extensive. Intensive production systems are applied in only a few holdings, and the semi-intensive system of production is not widespread either. Semi-intensive and intensive holdings can be specialised either in meat or milk production. The number of sheep has been continuously decreasing since 1990, to hardly more at the end of 2001 than one third of the figure for 1965. Stock formerly belonging to large holdings, are gradually transferred to the ownership of various newly formed organisations, as well as private producers. While in 1990, nearly 70% of all sheep was owned by large holdings, the same figure at the end of 2001 was only 17%.

3. The situation with respect to genetic diversity

3.1. The information available about Hungarian animal genetic resources

In Hungary, a wide range of data are continuously registered about species of domestic animals which have an economic significance, are kept in the country and which are used for food production and/or agriculture. Data concerning the number and structure of the species are assessed annually. For large animals, this means an individual registration, while for small animals, sufficiently accurate estimates are available. One of these species of domestic animals is the **cattle**. Of the milking varieties, the dominant variety is the Holstein Friesian; of the beef varieties, the Limousin, Blonde d'Aquitaine, Charolais, Hereford, Belgian White-Blue, and the autochthonous Hungarian Grey Cattle are significant, while of the dual purpose varieties, the Hungarian Simmental is present in significant numbers.

Of **horse breeds**, genetic sources include the English Thorough Bred, Arabian Thorough Bred, Shagya, Lipizzan, Nonius, Gidran, Halfbred of Mezőhegyes, Kisbér Halfbred, Hungarian Cold Blooded, and, of the small horse breeds, the Hafling, Fjord Horse, Shetland Pony, Welsh Pony, Hucul.

The Hungarian **sheep stock** represents a significant genetic value. The Hungarian merino, which makes up the majority of stocks, is **multi-purpose breed**, while the Hungarian Booroola Merino is selected for prolificacy. Dairy varieties include the Awassi, British Milk Sheep, Lacaune, East Friesian (black and white), the milking Tsigai, and the milking crossed Hungarian Merino. The mutton sheep **varieties** are the German Mutton Merino, Landschaf Merino, Romney, Suffolk, German Black-head, Ile de France, Texel, Charolais, Pannonic Mutton Sheep and Bábolna Tetra. **Autochthonous varieties** include the Tsigai, Zaupel, Hungarian Zackel (white and black), and the Transylvanian Zackel.

The genetic value of the **pig stock** is provided in part by foreign world breed which were adapted earlier, by some which were brought to the country only recently but can be considered to have been adapted, as well as by hybrids bred within the country. These are the Hungarian Large White, Hungarian Landrace, Duroc, Petrain, Belgian Landrace, Hampshire, and, of the crosses between these, Large White x Landrace, Pietrian x Duroc, Belgian Landrace x Duroc, and the hybrid varieties Hungahib, ISV Pannon Hybrid and the Ka-hyb, and, of the traditional varieties, the Mangalitsa.

There are detailed registration data available on the stocks of cattle, sheep, goat, horse and pig varieties which are kept and bred in the country. The fundamental goal of the registration system is to keep and an accurate registration of the number of populations. The Ministry directly uses this registration database for various statistical tests and analyses, as well as inquiries and support policy objectives, and it is also used by the Product Boards and the actors in the agricultural market. A further significant area of the collection and keeping of data is the organisation of breeding, which includes individual registration of animals, performance testing, breeding value assessment,

conformation judging, parentage control, and the registration of data related to reproduction. The registration of data is growing in significance also in the field of veterinary issues; data specific to individual animals or to stocks are collected regularly for the elimination of diseases, control tests, epidemic control and the registration of the commercial transactions involving animal and products of animal origin.

Data pertaining to the breeding structure of the species listed above, and to the composition of holdings where they are held are kept in part in the central database, and in part in registers of the breeding organisations, associations of breeders of the individual animal species and varieties. Information pertaining to the lifetime productivity, special production characteristics and resistance to diseases are yet incomplete registered in the databanks of the species, but they are being supplied. There are cases when tracking frequent changes in stock numbers is a challenge. In addition to the registration of all production-related data, the range of, so-called secondary selection traits need to be expanded in the near future. The registration of various pet- animal species and varieties covers increasing amounts and details of data – these are not uniform groups of animals, but in certain areas, they increase the diversity of varieties. These species include the yak, rare horse varieties, camel, lama, ratites and small animals. Registration of data concerning the species and varieties, which is to be expanded in the future, will focus on the following: sustainability of the animal populations in the given area, the necessary environmental conditions, various factors of environmental security, the possibilities for providing area and feed, and compliance with veterinary and animal welfare standards.

Farms of a private, family nature usually keep a mix of livestock, that is, they keep or pasture horses, cattle, goats and sheep together. Data on the number of animals kept in small numbers in mixed groups are collected and registered by the local competent authorities. Data are aggregated and recorded centrally every year. The data on the breeding, production and reproduction of theses stocks are yet incomplete, but the registers allow for estimates to be made.

Surveys on the number, age structure and changes in the stocks of species and varieties of domestic animals bred in the country are available, but due to the deficiencies in the application of identification systems and the problematic nature of recording changes of ownership, they are still incomplete. The monitoring system for registering changes in stocks is now able to indicate stocks where stock number is dangerously low, or those, which are at risk. The system needs to be expanded to cover local breeds and local stocks held in least favoured rural areas.

The final stage of establishing the uniform national animal registration system which will allow for the full and detailed registration of data on varieties of productive livestocks of agricultural significance is in progress. Expanding the range of production and breeding data will also improve accurate and detailed provision of data with respect to holdings of a private, family nature.

Comparative studies and assessments on the domestic animal species bred in the country have recently been carried out and are currently being carried out. They summarise the suitability of the varieties for breeding, and their genetic traits. Such comprehensive studies have been prepared for autochtonous varieties and also for

varieties of single purpose cattle, horse, pig, sheep, poultry and small animals which have been recently introduced to the country, and can be considered to have adapted. Assessment of the goat varieties bred in the country in terms of reproduction and genetics is currently in progress. There are also economic assessments available, evaluating especially cattle, sheep, horse and pig kept for single purpose. Economic assessments on individual varieties are, however, not comprehensive.

Nearly comprehensive surveys have been carried out on the modern technologies of the keeping of the most important varieties. The surveys have analysed in detail the effects of various bound, unbound, closed, semiclosed and outdoor keeping, feeding, production and breeding technologies on the genetic potential of varieties, and on the realisation thereof. Significant results have been obtained especially with respect to the quality factors in milk and meat production of varieties of cattle, pig and sheep.

Significant comparative results are available concerning the evaluation of reproductive performance at both sexes of varieties. Similarly, results of the comparative performance assessments of different sport horse breeds can be very useful in breeding activities. The utilisation of the draft power of various large species has decreased in Hungary. There are an increasing number of studies examining resistance against various diseases and parasites. As a result of newly introduced feeding technologies and new feed additives, the significance of findings on the effectiveness of feeding and the selling of animal feed is increasing for nearly each species, although not for each variety. Rearing expenditure have increased for each species – in order to mitigate them, studies focusing on the lengthening of productive age, and on the evaluation of useful life and lifetime productivity are in progress for various varieties of each species of domestic animals. Similar assessments have been carried out in multiplier stocks, in the framework of university research and in research institutes.

Studies have been prepared to evaluate the production capacity of milking and meat varieties by comparing the genetic potential and the production - in terms of various breeding traits - of different varieties of domestic species. Also, studies have been carried out on autochtonous varieties of cattle, pig and sheep, as well as imported varieties which are now considered to have become adapted, and even on the several decade long process of adaptation. Stand-alone and comparative studies have been published on the productivity of pure varieties and crossed stocks of species of domestic animals. Detailed comparative studies have been carried out to assess the crossing arrangements concerning various species in terms of economic worth, breeding and production value. A portion of these studies covered one or two production cycles, individual lactation periods or rearing results, but another portion concerned the maximum age and the lifetime productivity of the specific varieties. It is a special feature of these studies – also supporting the reliability of the findings – that they covered stocks with a large number of animals and were carried out by research institutes, university departments or breeding associations. Summary studies are regularly published even today, in the form of various publications.

Selection of species of domestic animals is increasingly assisted by genetic and biotechnology methods. The application of such methods has revealed blood groups and major biochemical polymorphisms in Hungarian populations of cattle, pigs, sheep, horse, poultry, goat, rabbit and dogs. These research findings can be very useful in the parentage control. Significant correlations have been revealed between blood groups and

biochemical polymorphism on one hand, and certain production characteristics on the other hand of the species of domestic animals listed above, primarily with respect to the quality of the meat and the composition of body, for pigs, sheep, and poultry. Correlations between immunogenetic traits and reproductive performance have been detected in species of domestic animals. Population genetic studies based on blood group and polymorph biochemical trait tests have been successful in determining the frequency of phenotype and genotype, and that of genetic variability. These test methods are suitable for the measurement of genetic distances and allied relationships between varieties, as well as for the reliable estimation of heterosis.

Application of selection methods using molecular genetic markers yielded significant results concerning the inheritance and diagnosis of the **porcine stress syndrome** in Hungary. These tests contributed to the clarification of occurrence of the stress gene in various varieties, and determined its effects on production, the composition of the carcass and on breeding performance. The effects of the Ha blood group, Phi and 6Pgd enzyme types on meat quality, slaughter indexes and litter size have been determined, as well as the frequency values of the RYR1 gene in pig varieties and hybrids in Hungary.

Research is being carried out aimed at determining the frequency of occurrence of DUMPS (Deficiency of Uridine-5'-Monophosphate Synthase), weaver disease (Progressive Degenerative Myeloencephalopathy) and citrullinemia (Argininosuccinate Synthetase Deficiency) in cattle, and research is also being carried out concerning the mitigation of damage due to hereditary diseases.

Research on blood groups, biochemical polymorphism and chromosomes have also been carried out in **sheep** with the aim of improving reproductive performance, and FSH and molecular genetic marker testing has also been carried out in sheep populations in Hungary. Research has been successful in identifying the possibilities of applying genetic testing methods to identify individuals with the booroola Fec^B gene in Hungary.

Findings of research carried out in Hungary have contributed to revealing the effects of the type of α_{s1}-Cn casein in **goat's milk** on the composition of milk and on cheese formation, and in applying these findings in goat holdings in the country.

Research has been carried out in **cattle, sheep** and **pigs** on the detection with the help of markers of the three genes: myostatine, callipyge and myogenin determining the amount of muscle in these species, and on the effects they have on certain production traits.

Screening tests are being carried out on the Hungarian Holstein Friesian population for the **hereditary cattle disease** BLAD (Bovine Leukocyte Athesion Deficiency). Molecular genetic methods have been used for selecting from the bull population in Hungary those individuals, which carry the hereditary DUMPS disease. A survey has been successful in determining the frequency of occurrence of this disease in the Holstein Friesian population in Hungary.

There is also research being carried out in Hungary for finding the means of identification of the complex vertebra malformation (CVM) in the **Holstein Friesian**

variety and in using them in selection for the removal of affected animals. Findings of molecular genetic research carried out on various species and varieties have been published in Hungarian and international forums.

It seems useful to continue research aimed at determining the genetic potential and realised production of species and varieties of domestic animals, taking into account the findings of research in Hungary and abroad. The importance of testing for genetic markers is increasing with regard to speeding up the selection process and improving the effectiveness of selection. The effectiveness of traditional methods can also be improved by expanding individual and stock-level registers to also cover the so-called secondary selection traits. Increased utilisation of veterinary data concerning useful life, lifetime performance and resistance to certain diseases for the purposes of selection is gaining in importance. It is important to analyse various genetic, veterinary, economic and production-related databases together. Such information can only be used effectively for improving management is and selection efforts if breeders and owners of the various varieties directly or indirectly – through associations of breeders – participate to a greater extent in the tests described earlier. It is essential that comprehensive and new research findings reach breeders and those supervising breeding activities, through various communication channels.

3.2. Evaluating genetic diversity

Rules concerning the recognition, registration and publication of varieties are laid down in Articles 26-29 of Act CXIV of the year 1993, as well as in the MARD Decree 31/1994. (VI. 28.) on the implementation thereof. Publication is the responsibility of the National Institute for Agricultural Quality Control (Országos Mezőgazdasági Minősítő Intézet - OMMI). The list of varieties contains all recognised varieties, including autochthonous varieties and protected varieties. Pursuant to the law, these latter are determined by, the Ministry of Agriculture and Rural Development (MARD) and the Ministry of Environment and Water Affairs (MEW). This issue is currently covered by the joint decree 36/1994. (VI. 28.) of MARD and MEW.

Pig breeding

As of 31 December 2001, the list of varieties contained 9 pig varieties and 8 hybrids. There are six **world breed** in the list: Belgian Landrace, Duroc, Hungarian Landrace, Hungarian Large white, Hampshire, Pietrain. The list contained three **autochthonous varieties**: Swalow Belly, Blond and Red Mangalitsa. The following **hybrids were in Hungarian ownership**: Hungahib 39, ISV Pannonhybrid and Kahyb hybrid pig. The following **hybrids were in foreign ownership**: Dalland hybrid, Dumeco hybrid, PIC hybrid, Rattlerow hybrid and Seghers hybrid pigs.

By the 1970's, the stock size of the three autochthonous varieties became so low that they ceased to be considered domestic animals kept for farming purposes. For 15-20 years, their population was very low and they were threatened by extinction. After the Act on Animal Breeding came into force, the number of individuals increased, then as the market demand also grew (in demand as raw material for Serano ham), the number of animals increased as pure varieties and as the mother strain in Duroc crossing.

Mangalitsa, as a good variety for fat was created through the transformation of the varieties of Szalonta and Bakony kept in Hungary.

The varieties Hungarian Large White and landrace were created through selection for variety, involving the crossing of the mixed Hungarian stock with English and other large white and landrace varieties. These are still the dominant varieties. The rest of the varieties are from imports and maintained in nucleus multiplier stocks as crossing partners. These varieties are used as the basis of creation of lines through selection for specific traits, on which hybrid breeding is based.

The country was among the first in Europe where the breeding of hybrids started. Today, three Hungarian hybrids are recognised. In addition to the Hungarian ones, 4 foreign hybrids are authorised for trade. In the pig sector, Hungarian hybrids have the highest share of the market, and they can compete with the best foreign hybrids.

In addition to recognised varieties, especially private small farmers keep and breed a significant number of animals, which lack traits characteristic of a variety. In the years 1950-1970, the varieties Cornvall and Berkshire were also kept – by now, they have practically disappeared. Even today, the agricultural support system provides support for the so-called quality sow replacement, as well as the use of qualified sires.

There is a significant number of the wild variety of pig living in Hungary, especially in hilly, wooded regions. It is hunted for its meat and trophy, but wild boars are not used for the domestic varieties.

Poultry breeding

With respect to poultry species, there are registered varieties of **hens, guinea-fowl, goose, duck and turkey.** There are 37 varieties of **gallinaceous birds** in the list, of which 8 have been established in Hungary. There are 4 autochthonous varieties in the list, including three types of the Naked Neck.

Poultry species and varieties included in the autochthonous list:

Hen:

Hungarian Yellow, Hungarian Speckled, Naked Neck Speckled,
Hungarian White, White Naked Neck, Transylvanian Naked Neck.

Goose:

Freezly Feathered Hungarian Goose.

Turkey:

Bronze and
Copper Turkey.

These varieties are kept for the purpose of preserving their genetic stock, mainly in public institutes, education facilities and at some private breeders. Their keeping received public subsidy. These varieties serve as the basis for egg and meat production in a more extensive manner. Most of the varieties kept for trading purposes are hybrids created by multinational companies. These varieties have breeders in Hungary. The following are bred in Hungary: **Bábolna Hybrids**, **White Plymouth of Gödöllő**, **New Hampshire of Gödöllő**, and **New Hampshire of Hőgyész**. The frequency of occurrence of the various varieties and hybrids kept for trading (both for meat and egg production) depends on the

actual circumstances of demand and supply, as well as the production indexes of the given variety in comparison with that of its competitors.

There are three varieties of **Guinea-Fowl** being bred in Hungary
h l-5 Hungarian Hybrid Guinea-Fowl;
Hungarian Blue Gray Guinea-Fowl and
ISO ESSOR Guinea-Fowl.

Keeping of this species is based on a narrow foreign demand catering to specific requirements, and is almost entirely restricted to Eastern Hungary. Varieties are maintained in the Hortobágy.

Goose has a special place among poultry species in that of the 25 varieties bred in Hungary, the Freezly Feathered Hungarian Goose is autochthonous and as such, serves gene preservation purposes, so its keeping is subsidised. A further 15 varieties were established in Hungary. The main product from the keeping of geese is foie gras, which contributed to the development of a rather **wide selection of varieties**, including:

Giant White of Andocs (Andocsi óriás fehér), White Goose of Zagyvarékas (Zagyvarékasi fehér lúd), Gourmand SI 14 for liver (Gourmand SI 14 máj),
White Emden of bábolna (Bábolnai emdeni fehér), Improved Hungarian Goose of Babat (Babati magyar nemesített), Kolos Grey (Kolos szürke),
Hungarian White (Magyar fehér), Hungaviy Brown Goose Hybrid (Hungavis barna lúdhybrid); Kun Goose (Kun lúd),
White Kolos (Kolos fehér), Hungavis Combi (Hungavis combi), Maxipalm (Maxipalm),
Lippitsch Goose Hybrid (Lippitsch lúdhybrid); Kolos Pannon Goose (Kolos pannonlúd), Medioplam (Mediopalm),
Mezőhék DC (Mezőhéki DC), Improoved Goose of Komád (Komádi nemesített), Grey Goose of Orosháza (Orosházi szürke),
Ditmarsch (Moorho) (Ditmarschi (Moorho)), Liver Hybrid Goose of Babat (Babati májhybrid), Freezly Feathered Hungarian Goose,
Hungarian Goose of Orosháza (Orosházi magyar lúd), Grey Landes of Babat (Babati szürke landesi), White Goose of Szentes (Szentesi fehér)
Grey Landes of Bábolna (Bábolnai szürke landesi).

With respect to **ducks**, in addition to producing **roast meat**, the demand for **fattened liver** has increased in recent years, which led to the increase of the number of varieties and hybrids available, as well as selection work in the country. There are now 13 varieties included in the list of varieties, **dominated by varieties kept for their liver**. None of them have been identified as autochthonous or protected.

Varieties included in the list:
Cherry-Valley Super M-2 (Cherry-valley super M-2); Delaco Mulard (Delaco mulard); Pekingase Delaco (Delaco pekingi);
White Mulard (Fehér mulard); Pekingase Duck of hortobágy (Hortobágyi pekingi kacsa); Delaco barbarie (Delaco barbarie);

Pekingase of Sásd (Sásdi pekingi); White Mulard Hytop 42 (Hytop 42 fehér mulard); Seddin Vital (Seddin vital);
Barbarie of Sásd (Sásdi barbarie); K-94 of Szarvas (Szarvasi K-94); Liver Hybrid of Sásd (Sásdi májhybrid);
Barbarie ST 4 Compact (Barbarie ST 4 compact).

As there is no official survey, it is hard to estimate the market share belonging to individual varieties.

Turkey has been kept in the country for a long time. This is the reason why Bronze and Copper Turkeys are registered as autochthonous and serve gene preservation purposes, with public subsidy. The comeback of turkey meat has been the success story of the last ten years. Production has more than doubled, and the market is dominated by foreign hybrids (**BUT Big 6, Hybrid Euro FP, BUT 9, Large White Hybrid, Nicolas Turkey 900).**

Cattle breeding

The list of **cattle** varieties contained 11 varieties on 31 December 2001:
Hungarian Holstein Friesian, Hungarian Simmental, Aberden angus,
Blonde d'aquitaine, Charolais, Belgian White-Blue,
Hereford, Hungarian Simmental used for meat production
Limousin;
Lincoln red, Hungarian Grey Cattle.

Each of the varieties listed is present in production, but Hungarian Grey Cattle is registered as autochthonous and both subtypes of Hungarian Simmental are registered as an endangered variety. In addition to varieties officially registered and authorised, the Finnish Ayrshire, Jersey, Swiss Brown, and Piemont are also present, but are not involved in production.

Gene preservation is carried out under the responsibility of the breeding authority, is subsidized and involves breeding associations. A dominant portion of the Holstein Friesian stock in Hungary was formed through-crossing of the Hungarian Simmental stock developed at the end of the 19th century and at the beginning of the 20th century, between 1970 and 1999. This was assisted by the import of approximately 20,000 pure varieties animals.

The Hungarian Simmental stock was the result of crossing the autochthonous Hungarian Grey Cattle with the Simmental variety, typically for dual purpose (meat-milk). Until the mid-1970's, more than 90% of all cows in the country belonged to this variety, then, proportionately with the increasing specialisation, its significance diminished. As of the mid-1970s, several foreign varieties have been imported to the country, of which those listed are still present. Also, small populations of Swedish Red, Dutch Black and Red, Jersey, Kostroma etc. used to be kept formerly.

Today there are approximately 22-23,000 cows of the varieties used for meat production, about 4,000 Hungarian Grey Cattle, about 100,000 of the Hungarian Simmental with dual purpose, and about 250,000 cows of dairy Holstein Friesian.

Sheep breeding

Sheep keeping in Hungary is predominantly based on merino-type sheep. The survey of the Hungarian Association of Sheep Breeders in 2001 showed that 86.89% of all sheep belonged to the merino variety (Hungarian and Mutton Merino), 6.93% was varieties for meat production and 2.01% was dairy varieties. Also, autochthonous varieties made up 4.17% of the entire stock.

Autochthonous varieties are the following: black and Hungarian White Zackel; Transylvanian Zackel; Zaupel; Tsigai (but milking Tsigai is also autochthonous, irrespective of where it is listed). **Merino varieties** are the following: Hungarian Merino, Landschaft Merino, Hungarian Booroola Merino, Hungarian Prolific Merino. The Bábolna Tetra is a **prolific** variety. **Varieties kept for their meat** are the followings: Suffolk, Texel, Charollais, Ile de France, German Black-Head Mutton Sheep, German Mutton Merino, Pannon Mutton Sheep. **Dairy varieties** are as follows: Milking Tsigai, Awassi, East Friesian, Lacaune, British Dairy Sheep. **Mutton-wool** varieties are as follows: Corriedale, Romney.

The greatest majority of sheep kept in the country are a mixed population where individuals lack traits characteristic of a specific variety. The population is very heterogeneous in its appearance, with low average yields.

Goat breeding

In Hungary, only some imported and naturalised goat stocks show uniform traits characteristic of varieties (***Saanen, Alpine, Boer****, and some remains of* ***German Improved Dairy Goat, Toggenburg, Poitevin, Cameroons Dwarf Goat*****).** Selection for three Hungarian varieties started some years ago, where separation is aimed at three colours, and based on production-based selection of the existing mixed Hungarian stock, as well the use of foreign, nationalised varieties. Additionally, there are some hundred she-goats belonging to a highly resistant, low-production population showing mainly primitive traits (called by mistake a Hungarian primitive variety). Also, in the second half of the 1990s, creation of the improved Hungarian goat was also started.

The four Hungarian varieties are being developed intensively (*dairy white, brown and variegated Hungarian goat, Hungarian* improved), and similar development is seen at three foreign varieties (***Saanen, Alpeine, Boer***), while the stock of 1 naturalised variety has become fragmented and merged with a similar group of varieties *(German Improved Dairy Goat*). The variety recognition procedure has been started for five of the 7 varieties, which exist or are under development. The main production trait of varieties are summarised in **Table 23**.

The Hungarian primitive „variety", which can be considered autochthonous, is present in the country in the form of smaller isolated stocks not officially registered and not really explored. As a result of the development of varieties based on stocks existing in the country, the stocks described as primitive will sooner or later run out, especially because their yield is low and their keeping is not profitable.

There are no populations of wild or escaped goats in the current territory of the country. As there is no related wild species, the species has no significance for agriculture in this regard.

Horse breeding

The keeping and breeding of horses was the first to become the focus of purposeful human activities. Although none of the horse varieties are registered as autochthonous, there are several varieties which are tied to Hungarian breeding activities but which have lost their trade significance, and whose survival has been facilitated by their registration as endangered varieties.

The following varieties are **endangered** and as such, receive state support for their survival: **Gidran; Hucul; Kisbér Halfbred; Lipizzan; Furioso-North Star; Nonius; Shagyan Arabian.**

In addition to varieties **under protection**, the Hungarian list of horse varieties also includes the following: **English Thorough Bred; Fjord Horse; Trotter; Hafling; Arabian Thorough Bred; Shetland Pony; Hungarian Sport Horse; Welsh Pony; Quarter Horse; Hungarian Cold Blooded.**

These varieties are being bred, by breeding associations and official registration has been delegated to the Association of Hungarian Horse Breeders and Horse Organisation. The horse is a species with an exceptionally wide range of varieties: each continent and each country has its own variety for all uses.

Breeding in Hungary is very important for the world breed **Lipizzan, Shagyan Arabian and Furioso-North Star**. The focus has shifted to varieties used for sport, such as the English Thorough Bred, Trotter and various sport horse varieties. In Hungary, the variety most in demand is the Lipizzan, which provides excellent performance at coach-driving competitions. Also, horse breeding for purposes of tourism is developing satisfactorily. Here, less emphasis is placed on the variety – the animals kept are nearly always of a variety, which the owner likes better.

Fish breeding

Fish fauna in Hungary is very rich, with the lakes, rivers and dead channels providing them with appropriate habitats. Of the rich world, we will only specifically address Hungarian carp, which is endangered and protected, and the varieties listed in the list of varieties. At the end of the 19th century, several European carp varieties were brought to Hungary. By the 1950s, independent local varieties were developed by Hungarian pond managers through precise selection and local environmental conditions, and these enriched Hungarian fish production. The Scaly Carp of Tatai, Silverer Carp varieties of Hortobágy, Szeged, Varászló, Dinnyés and Szarvas originate from these varieties.

A carp genetic variety enhancement programme was launched at the Fishery and Irrigation Research Institute in Szarvas (Szarvasi Halászati és Öntözési Kutatóintézet - HAKI) in 1963. The most important carp varieties were collected into a living gene bank which is unique in the world (containing 17 Hungarian and 15 foreign varieties), and

which is the basis for genetic research and the preservation of varieties, as well as ensure genetic diversity for the future. As a result of research carried out at the HAKI, three hybrids were developed through the crossing of different genotypes whose production capacity is 15-20% higher than the original varieties.

Upon the initiation of the National Association of Fish Breeders, Carp Breeding Organisations were formed in 1995 in those fish holdings, which had an autonomous variety, with the aim of unifying the system of production and control of distribution with respect to carp production. There are currently 26 carp varieties recognised by the National Institute for Agricultural Quality Control (Országos Mezőgazdasági Minősítő Intézet - OMMI):

Silverer Carp of Attala (Attalai tükrös ponyt), Tapering Carp of Balaton (Balatoni sudár ponty), Silverer Carp of Biharugra (Biharugrai Tükrös Ponty)
Silverer Carp of Bikal (Bikali tükrös ponty), Silverer Carp of Dinnyés (Dinnyési tükrös ponty), Wild Carp of Danube (Dunai vad ponty),
Lank Carp of Gelej (Geleji nyurga ponty), Scaly Carp Hajdú P1 (Hajdú P1pikkelyes ponty), Silverer Carp Hajdú T1 (Hajdú T1 tükrös ponty),
Silverer Carp of Hajdúszoboszló (Hajdúszoboszlói tükrös ponty), Scaly carp of Hortobágy (Hortobágyi pikkelyes ponty) ,
Silverer Carp of Hortobágy (Hortobágyi tükrös ponty); Silverer carp of Móriczhely (Mórichelyi tükrös ponty);
Silverer Carp of Nagyatád (Nagyatádi tükrös ponty); Danube Stemcarp of Ráckeve (Ráckevei dunai tőponty);
Silverer Carp of Szajol (Szajoli tükrös ponty); Silverer Hybrid Carp 215 of Szarvas (Szarvasi 215 tükrös hibrid ponty);
Scaly Hybrid Carp P31 Szarvas (Szarvasi P31 pikkelyes hybrid ponty);
Scaly Hybrid Carp P34 (Szarvasi P34 pikkelyes hybrid ponty), Silverer Carp of szeged (Szegedi tükrös ponty);
Lank Carp of Tisza (Tiszai nyurga ponty); Silverer Carp of Varászló (Varászlói tükrös ponty);
Steely Lank Carp of Tata (Tatai acélos nyurga ponty), Golden Yellow Scaly carp of Tata (Tatai aranysárga pikkelyes ponty);
Back-Scaly Silverer carp of Tata (Tatai hátpikkelyes tükrös ponty); Slate-grey Scaly Carp of Tata (Tatai palaszürke pikkelyes ponty).

There are differences between the varieties both in terms of appearance and production performance. They include varieties bred especially for production in fish ponds and also representatives of primitive, undomesticated types.

4. Utilisation of animal genetic resources

4.1. Utilisation of animal genetic resources

The fundamental Act on Animal Breeding of 1992 has been a major contribution to the safe keeping and breeding of domestic animal species, which are considered genetic resources of economic significance in Hungary. The Act provided for the

payment of breeding contributions (from various sources) to a central fund from which various breeding activities can be supported. The Act on the Breeding of Animals, published in 1993, provided for the basic rules of handling, managing and controlling of various genetic resources, as well as for the system of interrelations. Organisation of breeding activities is managed by the MARD through a specialised breeding authority. Breeding activities and the use of genetic resources are organised by officially recognised breeding organisations. The MARD determines long-term objectives of the development of animal breeding, taking into account all species and varieties of economic significance. It provides for the direct management of animal breeding through rules and decrees, prepares and operates the support system for the various species, determines the fundamental breeding structure for species and within that, for varieties, grants official recognition to varieties and breeding organisations which operate under regulated and controllable conditions.

The breeding authority has created and operates the national databank where genetic resources are registered. It has also developed a single marking and registration system, carries out performance surveys and breeding value assessments through control tests, has the responsibility of managing the sire population of the different species and varieties, and acts as an animal breeding authority, including the performance of control, credit provision, authorisation etc. tasks. As a separate task, the breeding authority provides for maintaining autochthonous varieties.

There are breeding organisations for all species used for agricultural purposes. The **Cattle Breeding Association** has seven variety-specific associations, the **Sheep Breeding Association** breeds varieties for milk ,mutton and multi-purpose, the **Horse Breeding Association** has eleven variety-specific associations, the **Pig Breeding Association** has one association and three recognised breeding companies, the **Association of Goat Breeders** operates as a recognised breeding organisation, as well as the **Association of Bee Breeders**, the **Association of Fish Breeders**, and the **Association for Small Animal Breeding and Gene Preservation.** The work of these breeding associations is coordinated by the **Association of Hungarian Animal Breeders**. Poultry breeding, as well as the breeding of various small animals and pets – such as dogs, cats, pigeon, ostrich etc. – is carried out by autonomous enterprises, and is under similar official control. The **Association of Mangalitsa Breeders** is an autonomous company supervising the breeding and preservation of this autochthonous pig variety. The breeding and utilisation of the autochthonous local varieties are performed by autonomous breeding associations, and the situation is similar for the use of cattle, pig and sheep varieties imported to the country in the last 20 years and which are considered to have fully or partly adapted in Hungary.

Official registration of animals, as well as the assessment of own and offspring performance, evaluation of appearance, detailed registration, provision of sires, reproduction and animal trade is under the control of the breeding organisations for sheep, goat and horse varieties. The use of pigs and cattle is entirely under the management of and being coordinated by the relevant breeding associations. There are separate organisations for coordinating the dairy cattle and the beef cattle sector. **Importing and adapting new species or varieties is controlled by the MARD and the Association of Animal Breeders**.

A separate economic organisation controlled by the MARD operates the national performance assessment system, which focuses primarily on controlling milk production. The central databank is also operated by a separate economic organisation under the same control. It is constantly being expanded – currently, it contains basically the animal registers, breeding registers and fertilisation data. Fifty percent of the institutions involved in artificial insemination are under public control, while the other half are controlled by private companies of (partly) foreign ownership. For several species, breeding activities are not separated on the basis of the line of utilisation, but on the basis of varieties, but the breeding associations treat individual varieties separately with respect to utilisation. There are separate regulations for the utilisation of the beef cattle and dairy cattle stocks.

The elaboration, application and development of the various technologies of animal breeding is carried out by the authority controlling the use of individual species for agricultural purposes. This includes especially artificial insemination, as well as veterinary and health surveys and inspections, for which a national network of institutions exists. The technological systems for the keeping, accommodation and welfare of the individual species and varieties have been essentially provided for in laws, and the surveys and inspections required for the elaboration of technological recommendations have been started.

Development of the various product market standards is also covered by regulations, but the associated effective and fast information system needs improvement. Management of the individual breeding districts, specific regions with respect to environmental protection and conservation of nature is performed separately in the Ministry, and the use of autochthonous varieties and local varieties maintained in the relevant region belongs partly under the competence of the conservation authority, partly – with regard to more specific breeding tasks – the breeding association for the variety. Management – with respect to landscape protection – of populations of newer, partly adapted, imported sheep, pig and goat varieties, as well as the relevant regulatory system are under preparation.

Several studies have addressed the breeding traditions of different regions, especially information related to maintaining autochthonous or adapted species. This knowledge of traditional technology, however, could be only partially integrated in the new technologies in the course of further breeding of the varieties concerned. One of the tasks of the recently established Committee for the History of Animal Breeding is to explore this traditional animal breeding expertise. This effort is being promoted not only by the state authority, but also the breeding associations. There are a number of new animal breeding technologies, however, which have no long-standing traditions in the regions. Organisation actions have therefore been taken to preserve traditional farming technologies, but there are numerous deficiencies with respect to the utilisation of this knowledge.

In addition to the authority and the breeding organisations, the agricultural utilisation of the major species with economic significance kept in Hungary is assisted also by research institutes, including separate research institutes for the breeding and feeding of small animals, large animals and fish. Research activities are also carried out by relevant departments of universities and colleges. The **Department for Agricultural**

Sciences of the Hungarian Academy of Science and its scientific committees also represent a significant base of research. The growing network of extension advisors is controlled and funded by the authority. Specialised advisors are involved in the breeding tasks of all species, but the system of their professional development is not clear yet. The national system of practical training – which belongs partly to extension advisory work and partly to education – is undergoing transformation, and its new, effective and organised system has not emerged yet. Due to the significant changes of various forms of management (individual businesses and partnerships, cooperatives), only the framework for the new forms of cooperatives for farmers have been established. The operation of the various forms of cooperatives is not effective enough yet, production and sales activities are often unnecessarily separated instead of being integrated.

In many cases, agricultural proceeds from animal genetic resources are not distributed among users in accordance with their needs. Farers and breeders involved in the breeding of animals usually use a smaller portion, while trade usually uses a larger portion. Breeders fund the activities carried out by the various breeding associations partly directly through membership fees, and partly through the animal breeding funds to which they contribute. They receive support through various application schemes for exhibitions, transportation of animals, events and publications, special breeding tasks or the realisation of IT-related objectives.

Protection of the environment has a dominant role with respect to the sustainable development of animal breeding for agricultural purposes. A favourable development in this regard is the establishment of Hungary's various landscape conservation regions, which also cover maintaining of the populations of various species. However, most of the populations of these species and varieties are not integrant to the regions mentioned, with the only –partial – exception being populations of autochthonous species.

The issue of **disposing of the manure and sewage generated by cattle and pig holdings with a large number of animals** has not been fully resolved. The ownership and utilisation conditions concerning lands (plough-lands and pastures) belonging to the animal holdings are sometimes unclear. Environmental and landscape conservation concerns require the modernisation of a significant portion of animals holdings, as well as the infrastructure (roads, sewage canals) in the areas surrounding the holdings. It can also be pointed out, however, that the burden imposed by the animal stock in Hungary on the environment is significantly lower than in several agricultural exporter countries in Western Europe, as, over the last century, the animal units in Hungary has decreased by 45%, their number dropping disproportionately low compared to the number of animals the country could sustain.

With a view to sustainable development, the primary factor taken into consideration when assessing the utilisation of animal species kept and bred in Hungary for agricultural purposes is the country's **feed base**. Import is only justified for such low-volume feed components as protein feeds, amino acids, probiotic products, enzymes, certain minerals, premixes and their components. As the price of domestic and imported feeds increases and water prices have risen, the use of feeding technologies and varieties where feed is utilised more efficiently and where less water is required gains in importance. **In the future, aspects of animal welfare will be attached a greater weight with respect to the technological development of animal holdings**.

Operation of the veterinary control systems covering individual species is appropriate, but the veterinary system for the prevention of stock-level diseases needs improvement. In technologies focused on production, the genetic potential of species is often more valuable than the level or management of the technology. A significant portion of the varieties has world-class, excellent genetic potential, which frequently cannot be realised either at a private holding or at a holding of a farming organisation. Occurrence of the so-called alternative or natural keeping systems in Hungary is limited. In order to maintain high-quality mass production, the development strategy for animal breeding sectors considers milk production, pork production and nearly all subsectors of the poultry industry a competitive sector. The other group – which is not considered to belong to the competitive sector – includes animal breeding sectors significant in terms of environmental management, landscape management, tourism, employment and rural development – such as sheep, beef cattle, horse, goose, fish, rabbit, bee and game animals.

The primary objective of breeding is to supply the local population and to provide a safe and constant supply of goods for export. There are no significant differences in this regard between varieties kept in Hungary. Sometimes it is a problem that domestic consumption of products from certain species is too low, such as in the case of cow's milk, beef, horse meat and mutton. This situation is due partly to traditions and partly to the decline in substantial demand. Low consumption has a negative effect on production volumes and export volumes, especially in the cattle, sheep, goat and horse sectors.

The limited foreign market influences breeding activities through decreasing consumption, while changes in the export markets – for example in the export of rabbits, colts, or lambs – have decisive short-term effects on the preservation and development of certain sectors.

For certain species, such as beef cattle, sheep and goat, natural pastures located in regions less favourable for agricultural production – primary Northern Hungary and Northern Transdanubia – are an essential source of feedstuff.

Religious traditions do not have significant effects on the breeding structure of animals kept in Hungary, but traditional animal breeding culture plays an important role in the adoption and improvement of various animal breeding technologies, in adapting new varieties and in maintaining autochthonous varieties. Development of various types of leisure sports has had a positive effect on the horse breeding sector, and on increasing the number of varieties. The popularisation of riding, the use of race horses, horse-riding for children and for therapeutic purposes has given additional impetus to sport horse breeding instead of draft horse breeding.

The **traditional breeding areas** of certain varieties have somewhat changed over the last years. These changes included the significant decline of the number of **cold-blooded horse varieties** and **dual purpose cattle varieties** in the southern part of Transdanubia. A characteristic change occurred to the **autochthonous Hungarian Grey Cattle** as well, of which smaller populations have started to appear in regions other than its **traditional breeding region, the Great Plain**. Similar changes have occurred to the various cattle, sheep, pig and horse varieties imported to the country in the last 20 years. Smaller populations of these leading world breeds have been successfully used for

various crossing arrangements, utilisation technologies, but their share has significantly decreased and the purposes for which they are used have changed.

The different varieties imported to the country for breeding are mainly intended for the preservation of the existing small populations and for use as crossing partners in the future. Instead of the import of live animals, the amount of different types of reproductive material has increased, and the relevant institutional system is also expanding. There are also regional differences with respect to the use of species and varieties induced by agricultural conditions, availability of feed, availability of workforce and the distribution of market factors.

In addition to sectors of animal breeding which are traditional in Hungary, there are also varieties and species, which have been imported to the country for reasons of increasing variety, for sport or hobby activities. These species include the yak, lama, and some ratite birds such as the emu and the ostrich. These are present in small numbers, therefore both breeding and utilisation of these species is limited. Their numbers, however, are increasing. As a result of their competitive disadvantage compared to the Holstein Friesian variety, the number of jersey cows is low. Due to its productivity, heat tolerance and other good traits, its numbers can increase again. The population of the autochthonous Hungarian Grey Cattle has started to increase again, not only for reasons of maintaining the country's traditions, but also because modern criteria – meat quality, resistance – have made it a viable option.

Traditional breeding methods such as purebred breeding, line breeding and family selection , the various crossings are widely used in the Hungarian animal breeding sectors as well. Breeding methods are aimed at the genetically safe maintenance of populations of autochthonous and local varieties, at preserving their genetic pool, and through this, protecting genetic diversity. Methods of pure-bred breeding have been applied to recently imported varieties for partly similar reasons. In this regard, the significance of line breeding and family selection is growing, for several species and for both sexes.

Another breeding objective applies to crossing arrangements used especially for cattle, pig, sheep and horse varieties, where creation of a variety is focused on production of the final product. Research institutes and various breeding organisations have achieved significant results in terms of the quality and quantity of products through various crossing arrangements and utilisation of the heterosis effect. These crossing arrangements are characterised by variation possibilities and safer selection effect, resulting from the large number of animals.

Breeding methods supervised and coordinated by research institutes, Academy and university research establishments, as well as animal breeding organisations are applied in holdings specialised for animal breeding, where a large number of animals is kept. All significant production and productivity traits are used for selection, including quality traits of milk and meat production, reproduction-related traits, feed conversion, frequency of occurrence of various diseases affecting the entire stock, useful life, lifetime performance, and various other traits which have an effect on profitability. Newer breeding methods – e.g. immunity breeding or various molecular genetic methods – are being introduced continuously.

Interrelationships between the breeding methods applied and the various selection criteria are regularly assessed and evaluated in populations of autochthonous or partly adapted, as well as newly imported varieties. In varieties existing in smaller populations, the degree of inbreeding is assessed regularly, and proposals are made for eliminating the negative effects. Such assessments have been performed not only for autochthonous and local varieties, but also for cattle, horse, pig and sheep varieties which exist in smaller populations. Recently, molecular genetic methods have begun to be used to complement more traditional breeding methods.

The aim of crossing arrangements involving different varieties of domestic animals are aimed at maximising the benefits of hybridisation, generating certain heterosis and maternal effects, and thus improve the quality of products. A further objective of selection is the stabilisation and improvement of certain traits, the development of new, synthetic varieties, and improving the genetic traits of local varieties. One of the successful crossing programmes, among others, was the establishment of the Hungaro-Freesian cattle variety, the keeping of which is currently inhibited by economic factors narrowing the selection base.

Genetic assessment methods used in the course of breeding of agriculturally significant species include performance -and progeny-testing, as well as various selection indexes with different components and different weighting of the individual traits. The use of artificial insemination and various methods of embryo transplantation have become widespread, and preliminary experimental technologies are used for sperm and embryo sexing, for the deep-freezing of embryos and for cloning. Developments of embryo technologies which open up new possibilities for reproductive biotechnology are in an advanced experimental stage. Genetic research is being carried out with the aim of finding the gene for certain desirable traits, such as the genotype for BB kappa casein, for detecting and screening hereditary defects, and for the **introduction of pre-selection methods**.

Some of the breeding methods listed above are already being used by the breeders, while others are being researched by universities and research institutes. Gene mapping is being carried out mainly in pigs and sheep. Significant results have been achieved by the use of blood group and biochemical polymorphism **marker tests** in research carried out on species of domestic animals. Findings of molecular genetic marker tests could successfully be used in detecting **of porcine stress syndrome**, the hereditary **BLAD and DUMPS diseases in cattle**, as well as for tests for the milk protein polymorphism in **cattle and sheep varieties**. Programmes have been launched for the elimination of stress and BLAD in populations in the species mentioned. The significance of marker tests is expected to increase in breeding aimed at maintaining autochthonous populations, as well as in the parentage control.

A certain portion of new biotechnological methods have successfully been put into practice and are regularly applied by breeders. There are others whose introduction could be significantly facilitated if breeders could ascertain the economic benefits of their application, and if various conditions of their application are available.

Producers in the animal breeding sectors include farmers managing family holdings, associations of farmers, other breeders and breeding enterprises, as well as

commercial partnerships. The organisational framework for family holdings and associations of farmers has been established, but requires significant structural improvement. Similar development is necessary for the various production and sales associations, especially due to their insufficient integration with commercial channels. Users of breeding animals or their final products often receive inadequate information – also reflected in the low rates of milk and meat consumption –, but to a certain extent, the same is true for domestic trade in breeding stock. The various information, market research and sales systems – and their integration – need further development. Research capacities are available for research on the breeding of domestic animals, but they receive less than sufficient funding. Establishment of the extension advisory network is in its advanced stage, but its efficiency needs to be improved, especially with regard to the training of advisory specialists. The level of practical application of the various animal breeding techniques and methods, and the availability of practical training is inadequate and needs improvement.

The stocks of domestic animal species bred in Hungary have decreased significantly over the last decade, which also changed the relative size of populations of different varieties within the same species. This is true for cattle, pig and sheep stocks. After a significant decline, the growth in the number of horses can be seen as a positive trend. The number of breeders, farmers and businesses involved in animal breeding has also significantly decreased, while the existing ones have relatively quickly adapted to the necessary changes in varieties. This is true especially for the replacement of traditional cattle and sheep varieties used for dual purpose with varieties specialised for either milk or meat production. In addition to traditional world breed, several types of valuable hybrids have also appeared in the field of pig breeding. Their use is affected partly by the objectives of individual breeders and partly by market and other economic possibilities.

The significant decline in the size of animal populations in the country was the result of several factors – an the interaction of these factors – including transformation of the structure of ownership, strengthening of the market competition, the declining use of varieties for dual purpose and the growing importance of varieties specialised in the production of either, lowering of the subsidies provided to breeders, growing production costs in general, as well as the stricter environmental, animal welfare, veterinary, quality assurance and certification of origin requirements. These factors led to a significant increase of the risks attached to breeding domestic animals and producing and selling products made from them.

In addition to the unquestionable development of technology and methodology in the field of various sectors of animal breeding, changes in the labour market also affect utilisation of the species mentioned in agriculture. Improvement of the technical components of technologies results, for each sector of animal breeding, in the decrease of the staff needed to provide manual labour. This is true both for family holdings as well as the various forms of agricultural businesses. There is at the same time another tendency: improvement of the level of qualification of staff employed in animal breeding sectors, and the transfer of less qualified staff to other fields. New forms of education and training (both in-school and out of school) are slow to follow this movement of the labour force.

In addition to international, commercial, food safety, environmental, animal welfare and product quality standards applicable to the various sectors of production, the breeding of species of domestic animals is also significantly influenced by changes in the ownership, and the different profitability. In addition to the influence of these tendencies, the need for controllability of the various technologies, and the need for a more accurate registration of data on an individual level, as well as the increasing number of food safety measures must also be taken into account. Conflicts can be expected to arise from the increased costs of meeting animal welfare requirements, and the effects of the technological changes associated with the transition from keeping the animals in batteries to a more natural keeping system are not fully clear either. It will become necessary to be regularly updated about consumer habits and requirements. A separation can be foreseen between animal breeding sectors, which can enter quality mass production and which – for other rural development and local management reasons – cannot be considered to belong to the market competition sphere. The first category includes dairy cow breeding, pork production, chicken, turkey, duck and egg production. The further decreasing of production system expenses, as well as improving the work efficiency of sectors is essential to the development of animal breeding technologies.

4.2. Development of animal genetic resources

Development of the genetic resources available in Hungary is primarily affected by the small number of animals in comparison with domestic needs and the feed base. Therefore it is necessary to increase the size of populations of livestock, the conditions of animal husbandry and animal feeding must be improved, while animal breeding, veterinary, animal welfare and environmental aspects must be taken into account when carrying out newer investments. In the course of the development work, reorganisation of the integration of the production of animals for slaughter, the production-, processing- and trade of animal products has become important, as well as the establishment of SMEs and new types of cooperatives. The information system for animal breeding sectors is under development. In addition to breeding and veterinary activities, it will also serve the purposes of market regulation, market surveillance and marketing activities. Development of the **cattle sector** foresees a slight increase of milk production, with significant improvement in the quality of milk. The concentration of dairy stocks will continue, and the amount of milk produced by a single cow will increase. In the field of **beef cattle breeding,** the number of animals can b expected to slightly increase – in order to utilise labour, feed and other capacities. This category includes the cattle stock traditionally used for both milk and meat production, as well as – from the aspect of production – the population of autochthonous cattle.

In the **pig sector**, a smaller increase in the number of pigs is foreseen. The genetic value of pig varieties and hybrids must be improved, and farming technologies and feeding conditions must be modernised. **Approximately 45% of all pigs is owned by farming organisations and cooperatives**, the rest is kept at individual and family holdings. Integration of small producers is part of the development work.

Increasing **sheep stocks** in the country would be justified, as the country's grasslands could sustain three or four times the current number of sheep, and, among others, ensure the production of bio-products. **Development of sheep stocks must be**

based primarily on national studs and multiplier stocks. The use of better dairy and more reproductive mother lines is in progress, as well as the use of mutton rams for high-quality end products. The demand for increasing the range of varieties specialised in milk or meat production can be satisfied by imports of smaller volume.

Development of the **goat sector** is justified by the need to provide employment for rural population, as well as market demand. The population of approximately 30,000 she-goats can therefore be increased. **Development is expected to provide an increasing volume of bio-products of increasing quality also in this sector**. With respect to **horse breeding**, the dominant factors are the increasing demand for agro-tourism and horse riding. Export demand provides the basis for increasing the production of colts for slaughter.

The **poultry sector**, where competition is strong, represents a genetic pool where improvement must be carried out both in terms if numbers and composition. The improvement of **turkey, goose and duck stocks** has become important, primarily because of the **export opportunities**. **Egg production** is more fundamentally determined by domestic consumption. There is a need for the acquisition of modern breeding pairs, as well as the genetic enhancement of Hungarian varieties. Development of the **market surveillance and marketing systems for the poultry sector** is currently taking place.

The **rabbit sector** also has a significant role in **providing employment** and food **for rural populations**. Development tendencies are also facilitated by the **expansion of export opportunities**. A **similar** tendency can be observed with respect to the development of **bee-keeping and honey production**, **for which conditions in Hungary are favourable.**

The technologies supporting genetic enhancement of the various species also need improvement. The importance of these technologies is increasing more with respect to improving production efficiency than increasing stock levels. Of breeding technologies, artificial insemination is widely used for certain species of large animals, and pilot actions are being carried out for its introduction for several species of small animals. There are various technologies being developed for increasing the efficiency of **artificial insemination**. The experimental techniques of **embryo transplantation** and freezing, **embryo** and sperm **sexing**, as well as cloning are progressively integrated into the reproductive technologies. Research and development activities are being carried out with the aim of the applicability of genetic technologies such as gene mapping, **marker testing, marker selection, QTL analysis and the production of transgenes.** A central database is being constructed for veterinary data, and one of the major goals of development work is increasing the accuracy of data provided. Improvement of the technologies used for animal farming is justified for all species where modern veterinary and animal welfare requirements can be enforced progressively. The elaboration of this system of requirements has special influence on the keeping of dairy cow, and within that, the bound keeping of animals in short stalls, the transformation of floor covering, improving the climatic and lighting conditions of stables, and abandoning the keeping of calves in solitary cages. Some of the **pig farms** are also in need of modernisation. The goals of technological development include enforcement of the animal welfare and environmental standards, which are being elaborated. **With respect to poultry breeding, the share of cage management is expected to decrease, the ratio of area per animal**

will increase and arrangements will become more similar to free-range housing. Market standards for stock animals and animal products need to be amended in accordance with domestic and foreign requirements. In the course of development work, a better integration of various breeding technologies with the requirements for the upkeeping of the countryside and environmental protection is foreseen.

One of the objectives of development efforts is to make use of animal breeding expertise gained from genetic research activities in the form of new technologies. This tendency is very intensively present for both native species and species of small animals. The Hungarian Academy of Science, animal breeding research institutes, university research groups and animal breeding organisations carry out various research projects in this field.

Institutions forming a research network for facilitating the improvement of animal breeding are already in existence, but it would be useful to ensure their better involvement in determining the sector-specific development objectives. With respect to the extension advisory system, the most important task is to improve training of the advisory specialists and the effectiveness of advisory activities. Development efforts need to be aimed at technologies allowing the testing of professional expertise in practice, and also at the elaboration of the full information system and integration of various production and marketing associations.

In addition to efforts for genetic enhancement, **technologies for feeding and feedstuff farming should also be improved.** The former problems concerning energy supply through feeding make it necessary to increase the energy concentrated in the feeding ration, primarily through enrichment with fats, improving digestibility, and the application of enzymes. Improvement of the protein supply is of an even greater importance, mostly because of the decline in protein plant production. A protein programme is foreseen for increasing domestic protein production, which will also require the transformation of plant production structure. The protein assessment system introduced in 1999 made the protein and amino acid supply of ruminants more easily controllable. Application of the system is expected to decrease protein consumption by ruminants, and improve the efficiency of protein transformation. With respect to the feeding of monogastric animals, a progressive shift to ileal digestion is expected. Of the technologies for storing and preserving ruffage feedstuff, the packing variety of the large-bale technology, as well the foil tube siloing methods are rapidly gaining in popularity. Efficiency of these methods can be further increased by using biological preservatives. In this regard, improving the quality of mixed feeds is another important development task. Elimination of the various fungal toxins is very important.

Effectiveness of **veterinary programmes** is facilitated by the growing accuracy of data registration, and the growing rate of preventive measures covering animal stocks. Domestic varieties with excellent genetic potential require more modern technologies of animal farming, ones which better meet animal welfare and environmental standards. Technologies for animal farming therefore need various degrees of improvement. Thus, development must encompass a shift from technologies involving bound keeping, slatted flooring, cage management, and fully closed arrangements to ones where animals are kept unbound, on bedded floor , and which involve more open arrangements.

For most animal products, domestic consumption must be increased and the market expanded. The same is true for supplying markets of stock animals. In landscape preservation regions, the share of **bioproduction technologies** could increase. Various actions and campaigns will be introduced to promote the growth of domestic consumption. For most varieties, there are no significant differences in domestic and foreign requirements concerning quality, with the exception of special foreign requirements.

It can be concluded that the domestic population has become more demanding concerning the quality of various animal products: they require information about the origin of products, and demand healthy products which are free from residues of chemicals and free from harmful yield enhancers. Guarantees for these aspects can be expected to be integrated in the individual animal breeding technologies.

There are a number of domestic opportunities for the development of animal breeding sectors which are not yet exploited. **Of the possibilities for feeding, the most important are grasslands which are currently unexploited** – especially those in hilly regions – as well as the labour force capacities provided by the rural population, and the existing possibilities for animal keeping. Structures of animal breeding are greatly influenced by the changes in ownership structure, the popularisation of agro-tourism, and the deteriorating conditions for animal keeping for the rural population.

Development efforts of the authority cover the populations of each species which can be utilised for agricultural purposes in Hungary. Also, technologies have developed for species with no economic significance, which – if necessary – enable the growth of these genetic resources in accordance with market demand.

There are differences between family holdings and larger populations held by farming organisations in terms of the extent to which modern methods of animal breeding are applied. Most of the stock registration and veterinary programmes are already easily accessible to products. Results of the most advanced genetic research find their way to individual farmers and family holdings mainly by way of sires and reproductive material originating from these sires. Newest methods of intensive selection can be better applied to enterprises with a large number of animals, for both sexes. Family farms are also successful in utilising the various programmes for pure-bred breeding, and commercial crossing. There are a number of family holdings where the major breeding objectives and results of the genetic breeding value estimation are not yet fully available to farmers. For species of large animals, various targeted coupling programmes are being made available for the realisation of breeding objectives.

From time to time, the various programmes of family selection and line breeding assess the balance of production and adaptation traits. In addition to some improvement in production traits, the weight of secondary, adaptation-related traits has increased. Traits related to reproduction, resistance to diseases, the utilisation of feed, have become more significant, as well as useful life and life performance. The number of traits, which can form part of the selection indexes, has increased, just like the importance of selection indexes which determine the profitability of production. Methods of family selection and line breeding are practiced for most species of economic significance, but they can also be used for native varieties to improve favourable production traits. The genetic work for

preserving and maintaining autochthonous varieties needs to be further improved. In the framework of breeding programmes currently in operation, methods for conformation judging have become widespread. They are useful supplements for own performance and progeny testing. Improvement of the accuracy of data registration programmes and the introduction of selection indexes applying multiple varieties will improve the reliability of breeding value figures. Traditional selection methods are gradually complemented by molecular genetic procedures such as selection based on markers. With respect to the application of these methods, there is a growing tendency that not only the sire stock, but also the dam stock is increasingly tested.

Breeding programmes are managed and coordinated by the breeding association for the given variety. They determine the major breeding objectives from time to time, taking into account market needs and trends. The breeding programme and special objectives applying to individual stocks are, however, determined by their respective owners.

The system of institutions for the genetic enhancement of varieties is established. At the same time, breeders are increasingly demanding a more specific representation in the operation of enterprises involved in breeding value estimation, performance testing and artificial insemination. The importance of the forms of associations of breeders is also growing, in part focused on the representation referred to above, and in part on the enforcement of commercial interests. Family holdings – where different varieties and species are kept at the same time – are not sufficiently involved in the activities of animal breeding institutions. This would require the improvement of extension advisory activities, as well as the provision of information. The information systems monitoring the market for specific sectors are also in need of significant development.

Domestic sector-specific research institutes have a growing role in the genetic enhancement of species of economic significance and in the development and application of advanced methodology.

The primary use of quality control systems developed for specific species and groups of varieties, which provide the same products is genetic breeding. Registration and evaluation of data, however, is used more and more for controlling and correcting management. Performance tests and controls introduced for research purposes also represent a large volume. Data from the various performance tests are available to farmers at a discount price, while direct accessibility of the breeding database for research institutes is problematic.

Breeders have unfavourably little representation in the management of institutions and business organisations responsible for assessing the genetic performance of varieties, data registration, and artificial insemination. Implementation of the breeding programmes is carried out under the responsibility of the breeding organisations for the relevant varieties.

Improvements in breeding technologies and selection methodology may enhance genetic progress in certain species. It is important, however, for selection goals to be accurately tuned to domestic consumption and international market requirements. It is also important to ensure that the breeding objectives being pursued follow the relatively

fast-changing market requirements, both in terms of volume and the quality of stock animals and products.

As a result of technological improvements in the country, the utilization lines become permanently separated for most of the species, and the market position of varieties used for the production of more than one product deteriorate. Their significance may increase, however, from the aspect of maintaining genetic diversity, development of specific regions and the self-sufficiency of rural populations. The new methods may also contribute to increasing the security of the genetic stock of native and traditional varieties.

International animal breeding policy has a significant influence on the development of animal breeding sectors in Hungary. It accelerates the process of integration of producer and marketing associations, the development of market research and information systems, the application of various methods for genetic enhancement, and the improvement of integrative cooperation within specific sectors. It may improve the keeping and treatment – and therefore the welfare – of domestic animal, mitigate environmental pollution originating from animal farming, and expand the possibilities of ecologically sound utilisation of less favourable regions, mountainous areas and areas under protection. As the demand for healthy food increases, the quality – and selection – of food products produced in Hungary may improve, and it is expected that the origin of specific food products becomes better controllable. At the same time, businesses operating in the sector will have different interests, sometimes not or only partly coinciding with the objectives outlined above, but certainly comprising the interest for the raising of prices. Traditional forms of farming and self-sufficiency may become threatened in certain areas. The structure of workforce involved in animal breeding may significantly change in the different regions of the country. The level of professional qualification required for workforce working in various breeding sectors may increase – this is not necessarily true, however, for subunits supplying the various competitive sectors.

More effective measures would be needed for the genetic preservation of native varieties, still existing local varieties, and especially multi-purpose varieties (including varieties of cattle, pig, sheep, goat, horse, poultry and various small animal species). The populations removed from the competitive market should be better integrated partly in the regions where they were originally bred, and partly in certain areas of nature conservation or countryside upkeeping, as well in regions of significance for tourism. It would be useful to provide more effective assistance for their utilisation in various forms of family farms. With respect to development efforts, not only the role of research has gained in importance, but also different effective forms of theoretical education and practical training, which are involved in part in the training of professionals, and in part in the transformation of public opinion, consumption habits and requirements, and knowledge about animal welfare, nature conservation and environmental issues.

4.3. Obstacles, opportunities and needs of the use and enhancement of animal genetic resources of species

In Hungary, the recognised breeding organisations are responsible for the utilisation of varieties. The level of utilisation is determined primarily by market factors. There are 180 varieties, a large number of which are world breeds being bred in several countries, as well as varieties and hybrids which meet market requirements and which are distributed by large animal breeding companies.

Publicly subsidised utilisation programmes are only justifies for autochthonous and some long-time varieties under protection. Genetic enhancement is a fundamental interest of breeding organisations in order to survive in the market. The state provides support for performance testing and breeding value estimations. There is extensive cooperation especially with the EU Member States. The number of varieties and hybrids bred abroad is high, especially in the pig and poultry sector.

Locally adapted varieties usually belong to the group of world breeds, such as: Holstein Friesian, Hungarian Simmental, Hungarian Merino Sheep, Large White Pig and Landrace Pigs. These – especially the cattle and sheep varieties – are maintained in the framework of well-founded, internationally recognised associations. With respect to pigs, foreign hybrids represent strong competition, especially in intensive mass production. The demand for agro-tourism and special products, **Hungaricums** represent opportunities for native varieties, as well as certain other varieties, for example the **cornwall** pig.

Breeding organisations cooperate with researchers and groups of businesses to research the specific characteristics of these products, as well as to develop marketing strategies including the one for products from Hungarian Grey Cattle, and the „**Real Mangalitsa”** programme etc.

For products made from traditional varieties, traditional ways of feeding the animals – i.e. grazing and grain fattening, without protein additives and other feed supplements – are also important. A growing number of scientific findings are published, for example concerning the amino acid composition of Mangalitsa bacon, or the cholesterol content of products made from specific varieties of pigs.

A comprehensive research programme for the utilisation of native varieties has been adopted under the Széchenyi Plan. Especially the native varieties referred to in Section 5.1 have been selected for development, but Hungarian Simmental cattle and the Cornwall Pig are also to play a part. There are no preservation or naturalisation programmes for other varieties which are of foreign origin or which have long adapted top Hungarian conditions.

Based on data received from the breeding organisations, the OMMI annually publishes the list of varieties recognised in Hungary, together with the list of breeding organisations, and it also publishes the results of the tests for official registration, and the findings of performance tests. The publications provide information about each variety, thus potential users are able to select the most suitable variety for the production of specific product under the given production conditions.

Production systems are established only in the poultry and pig sector, each business wishes to spread their own protected variety. The list of varieties enables public authorities, researchers or producers to control changes in the number of certain varieties. Controversially, the greatest danger to the preservation of varieties is companies, which use traditional varieties for the establishment of protected lines, hybrids, with exclusive rights to their marketing. The aggressive market strategy of companies often leads to the marginalisation of breeding associations, which are less effective competitors. A typical example is the **Landes Goose,** which used to be a traditional, widespread variety in European regions, but which can now only be purchased from breeding companies as a protected hybrid. It plays a major role in production, but is has been practically eliminated as a variety.

When market requirements change, businesses will replace or cross varieties. For this reason, they embody the greatest threat of the elimination of species. Sometimes, preservation for a variety is endangered by the breeding association itself. This may include the intensive selection and blood cross of cattle varieties traditionally used for dual purpose (such as Braun Vieh and Hungarian Simmental) for milk production.. The once heavy variety, which used to have spherical udder and which used to be suitable for extensive keeping, is transformed into a light-boned, "Holstein Friesian -like" variety, and the variety – of which there are several tens of thousands registered in the registers – is eliminated and lost for the future.

Preservation of the "protected" varieties imported to Hungary is not among the objectives. It is also unfeasible legally, as the foreign owner has full control over the specific foreign variety. The description of varieties bred in Hungary is included in the attached "List of Varieties" on Hungary's domestic animals of economic significance.

Varieties which have adapted locally and which possess individual traits belong to the protected native or endangered categories. The competent state institutions and breeding organisations decide on foreign exchanges, and they ensure the preservation and naturalisation of these varieties.

Owing to the country's special history, Hungary closely coordinates the preservation of native varieties with the neighbouring countries in the Carpathian Basin. For this purpose, breeders in the countries concerned have established the International Association for Gene Preservation of Animal Varieties Along the Danube (Dunamenti Állatfajták Génmegőrző Nemzetközi Egyesületet - **DAGENE**), which also has Austrian, Slovenian, Croatian, Serbian, Romanian, Slovakian, Czech and Swiss breeders among its members.

5. The situation concerning the preservation of animal genetic resources

5.1. Issues of preservation

There are both in situ and ex situ preservation programmes in the country for the facilitation of the genetic preservation of varieties. Genetic preservation is of special importance for native varieties and endangered varieties. OMMI is responsible for the national coordination of genetic preservation, cooperating with recognised breeding organisations. Implementation of the national preservation programmes is governed by the Act on Animal Breeding.

The following species – bred in the field in stock sizes of economic significance – are covered by in situ gene preservation schemes: cattle, sheep, pig and some poultry species. Here, breeding is aimed at preserving the genetic conditions, which were established when the variety was formed, without changing them, but in a manner which ensures that keeping of the variety is sufficiently profitable for the producers.

The following species are subject to ex situ preservation programmes involving small, isolated stocks and possibly artificial insemination and the collection and preservation of deep-frozen reproductive materials (semen, embryo, egg): cattle, pig and, to some extent, sheep. Artificial insemination applies to cattle, sheep and pigs, the use of deep-frozen reproductive materials to cattle (semen, embryo) and – at the level of experiments – to pigs. DNS samples are routinely tested for the verification of origin of cattle, and experimentally, of pigs.

General acceptance and recognition of the value of gene preservation is good and widespread. Institutionalised preservation programme and state subsidisation of autochthonous varieties started as early as 1974. Articles 11 and 12 of Act CXIV on Animal Breeding of the year 1993 provides for the importance and state support of the preservation of protected native varieties, endangered varieties. Implementation, of the Act is governed by Decrees 36/1994 and 37/1994 of the Ministry of Agriculture. There is also an additional form of support: subsidies from the so-called Biological Funds. This is provided for in a Governmental Decree and provides for the support of further endangered varieties in addition to protected native varieties.

One means of enhancing gene preservation is wider distribution of products from native species. Current disadvantages in terms of their profitability may later be compensated through the introduction of new types of earmarked subsidies, as well as the increase in natural and bio-products.

A further important aspect of the preservation of native varieties is the possible utilisation of their traits, for example, adaptability to environmental factors and resistance to diseases, in the breeding of intensive varieties.

There are numerous opportunities for demonstrating the importance of gene preservation programmes in tourism, in national parks, collections of varieties and animal

fairs, through presenting autochthonous varieties. It is important that publications, books and technical journals presenting gene preservation efforts are regularly published.

Finding and exploiting market niches for products made from endangered, autochthonous varieties (**Hungaricums**) has an important role in providing economic funds for gene preservation.

The national strategy for the preservation of animal genetic resources is not focused only on the preservation of endangered varieties: it undertakes significant tasks in the safeguarding of social, cultural and economic values as well. Naturally, research and education objectives, as well as the safeguarding of environmental assets, are also important. Guarantees for the preservation of native varieties are provided for in legal acts and is connected to programmes for safeguarding environmental assets. It is also related to the preservation of cultural traditions (architectural details of facilities used for the keeping of animals, tools and clothing for animal farming, traditions in gastronomy, folk songs etc.)

The strength of the current gene preservation strategy is that native varieties have survived intact, and their numbers are constantly increasing. In the future, support funds would need to be increased in order to enable the preservation of native varieties despite the growing competition in the market

In Hungary, the organisation responsible – under the mandate given by the state – for programmes for the preservation of animal genetic resource is the OMMI. It carries out its organisation and management tasks involving the recognised breeding organisations (with members in each sector) for specific species on a contractual basis.

Here is a list showing the number of animals of specific indigenous varieties, as well as the relevant breeding organisation:

Cattle:

- Hungarian Grey Cattle; 2600 cows.
- Association of Breeders of Hungarian Grey Cattle.

Pig:

- Blond Mangalitsa; 800 sows, Swalow Belly Mangalitsa; 110 sows, Red Mangalitsa; 170 sows.
- National Association of Mangalitsa Breeders.

Sheep:

- Tsigai; 400 ewes, Zaupel; 210 ewes, Transylvanian Zackel; 50 ewes, Hungarian Zackel; 1600 ewes.
- Association of Hungarian Sheep Breeders and Sheep Breeding Organisations.

Hens:

- Transylvanian Naked Neck; 1200 hens, Hungarian White; 300 hens, Hungarian Speckled; 1700 hens, Hungarian Yellow, 1600 hens.
- Hungarian Association for Small Animal Breeding and Gene Preservation.

Turkey:

- Bronze Turkey; 200 hens, Copper Turkey; 100 hens.
- Hungarian Association for Small Animal Breeding and Gene Preservation.

Goose:

- Freezly Feathered Goose Hungarian goose; 500 hens.
- Hungarian Association for Small Animal Breeding and Gene Preservation.

Funding of the gene preservation programmes is carried out annually, under the conditions provided for in the relevant Act, and separately for each species. For scientific and research purposes, OMMI and the breeding organisations closely cooperate with universities and research institutes. OMMI and the Ministry of Environment carry out coordinated cooperation for the implementation of objectives (National parks, Countryside preservation areas, other areas under protection).

Replacement of the varieties kept in Hungary with varieties of foreign origin, and through crossing of local varieties occurred in two stages. The firs stage occurred at the end of the 19th Century and the first half of the 20th Century, when varieties universally kept in the country were crossed with the former-modern Western European varieties (Hungarian Grey Cattle with the Simmental, Mangalitsa with Large White Pig, and Zackel with Merino-type Sheep). In the second stage, technologies of production in large farms became widespread in the country, accompanied by the import of modern, intensive, specialised varieties and hybrids suitable for keeping in large farms, as well as the crossing of local semi-intensive varieties. Market pressure for importing new varieties, and especially hybrids, is still present, but the importance of preserving endangered and native varieties receives increasing emphasis.

Relevant developments in the field of tourism facilitate the preservation of animal genetic resources. Significant progress has take place in the country in agro-tourism, the establishment of internationally recognised tourism centres, as well as in national parks. However, the process of gene preservation is inhibited by veterinary concerns generated by the high rate of human movements.

The criteria for classification as indigenous and endangered varieties are specified under the relevant provisions of the Act on Animal Breeding. Of intensive domestic varieties, those varieties fall in this category where the number of female animals registered at the OMMI is below 1000.

For native varieties, there are state-funded preservation programmes, both in situ and ex situ. With respect to intensive varieties, gene preservation is carried out on the basis of the breeding programmes of the recognised breeding organisations. Of non-endangered varieties, collection and storing of genetic material is carried out for large species (cattle, pig, sheep and horse). The utilisation programmes are used by recognised breeding organisations, breeding companies if mixed ownership, and the private sector, under state control.

Gene preservation activities are being carried out by the recognised breeding organisations, commissioned by the state. Their work is authorised and controlled by the OMMI. The involvement of the private sector in preservation programmes is gradually

increasing. In the last 10 years, the amount of public contribution to the costs of maintaining native and endangered varieties stagnated (at real value, declined), and other supplementary form of support has existed since 1994. These two funding sources together are still insufficient to cover expenditure per animals. Preparation of schemes for further support is in progress.

In order to enhance production and food safety, individual identification and registration (I&R) systems have been introduced in the country. The I&R for cattle and sheep is already operational, while its introduction is in progress for pigs. Establishment of quality assurance systems in the animal breeding sectors is in progress. The OMMI undertakes significant tasks in the development of control and certification systems. The most important factors limiting the effectiveness of preservation programmes are the insufficiency of financial resources and the lack of human resources, especially the decline in workforce directly looking after the animals.

The OMMI fulfils its management and control tasks with respect to preservation of genetic resources as an official authority mandated by the MARD. The computer database is the basis for information and communication systems connecting theoretical and practical actors (universities, research institutes, breeding organisations and associations etc.) involved in preservation work. In order to ensure the preservation of traditional and local expertise, cattle herding and horsemanship competitions, as well as other similar events are organised.

6. Directions in the development of animal genetic resources, and the situation of relevant institutional systems

6.1. Issues concerning directions in development and institutional systems

Support for the gene preservation and maintenance of domestic animals is provided for under Act CXIV of 1993 on Animal Breeding. The joint decree of the MARD and the Ministry of Environment and Regional Development (36/1994. (VI. 28.)), which was based on the Act, determined the criteria for native and protected varieties. Preservation of autochthonous varieties is the responsibility of the animal breeding authority, National Institute for Agricultural Quality Control. Official registration activities are carried out by the associations for the specific varieties, on the basis of commissioning by the Institute. Practical work for the preservation of endangered and protected varieties is carried out, by breeders associations.

Under the Act, a separate piece of legislation provides for the gene preservation of protected autochthonous varieties, as well as the relevant support procedures. Pursuant to Paragraph 1(1) of Decree 37/1994 (VI. 28.) of the Ministry of Agriculture, the OMMI is responsible for supervising and managing activities aimed at maintaining the autochthonous varieties. Pursuant to Paragraph (2), breeding associations or unions may apply for recognition for implementing the breeding programme prepared by the OMMI.

Currently, the breeding programmes for practically all varieties are being implemented by breeding associations or unions. The statute referred to above provides for the recognition of organisations involved in the preservation of varieties and in the implementation of the programme, and also requires the signing of bilateral contracts.

The volume of and the practice related to subsidies

Article 4 of the Decree governs the volume and procedures related to the payment of subsidies. Payments are made by the OMMI. Since 1994 to the present days, the volume of subsidies and the criteria of eligibility have been as follows:

For autochthonous varieties

Hungarian Grey Cattle

Subsidy is paid for weaned Hungarian Grey Cattle calves born of parents meeting veterinary requirements, on the basis of a pairing plan, with descent verified by blood group testing, provided that the mother animal is of the quality classes I., II. or III., her descent is known for at least two lines of ancestry, is identifiable through permanent marking, and if weaning has been carried out for at least 80% of the stock in average. Subsidy is payable after the weaning of clean-bred calves born of Hungarian Grey Cattle heifers serviced in accordance with a targeted pairing plan, which meet veterinary requirements.

Mangalitsa

Subsidy is payable for Mangalitsa sows under official registration control and meeting veterinary requirements, provided that at least 3 clean-bred piglets born from the sow in question in accordance with a targeted pairing plan have been weaned in the subject year. Subsidy is payable for Mangalitsa stock gilts qualified for breeding purposes and used for breeding, provided that they meet veterinary requirements and have farrowed.

Tsigai, Zaupel, Zackel

Subsidy is payable for the maintenance costs of native sheep varieties for each weaned lamb – born from targeted pairing of officially registered parents, with the lamb's descent, verified by blood group testing and it being suitable for breeding and meeting veterinary requirements –, after the lambs of 80% of the ewes have been weaned.

Small animal breeds

State subsidies could be claimed for 5,600 Speckled Feathered-Neck Hens, Speckled Naked Neck Hens, Hungarian Yellow Layer Hens, Hungarian White Layer Hens, Hungarian White Naked Neck Layer Hens, 300 Freezly Feathered Hungarian Goose, 150 Bronze Turkey layer, 300 Hungarian Giant Rabbits annually penned in. The Act provided for the possibility of re-allocation, provided that the level of genetic protection is not compromised. The annul envelope managed by OMMI was HUF 13 million in 1991-2001. The funds available for the purchase of sires was HUF 4 million annually in 1991-94, HUF 5 million annually in 1994-98, and HUF 4 million in 1998-

2001. It is apparent that the amount of subsidy is very low, and other than ensuring sires, it has no other effects of merit on protected varieties. The subsidies provided for under annual decrees for the development and maintenance of biological resources is of a significantly higher volume (**Table 24**).

The share of this fund was different for the various species: cattle received 15.5%, horse 33.5%, pig 7.7%, sheep 16.2%, poultry 10.2%, fish 5.6%, and 11.3% was spent on other species, feed and instruments. The per-unit support figures for 2001 under MARD Decree 15/2001. (III. 3) are presented in **Table 25.**

Applications for support could be based on the number of animals owned at the time of submitting the application, comprising officially registered stocks, populations of female stock animals of known descent and, in the case of mammals, serviced in the preceding year in accordance with a targeted pairing plan, or, for poultry, breeding stocks of mixed sex penned in on the 1st of January in the subject year.

With respect to collections of horse varieties, a maximum of HUF 18000/mare could be obtained for maintaining the breeding stock of varieties listed in Annex 24 of the MARD Decree. Support could be claimed for breeding mares owned at the time of submitting the application, registered in the union's herd book, and serviced in the preceding year in accordance with a targeted pairing plan; as well as for 3-4-year-old mares introduced to the breeding stock in the year of submitting the application, and which are qualified as a brood-mare at the breed certification.

For the keeping of stud-horses, a maximum monthly allowance of HUF 4500 is payable for the rearing of colts selected by the national horse-breeding associations. For the keeping of Hungarian grey bulls, a maximum monthly allowance of HUF 4000 is payable for bulls kept by the OMMI and the Association of Breeders of Hungarian Grey Cattle in the subject year at the central holdings for bull rearing in accordance with the breeding programme and with the provisions of the breeding regulations, provided that the bulls are subjected to qualification and are qualified for breeding (for a maximum of 15 bulls).

With respect to dog breeds, subsidy is payable for female dogs of herding and hunting dog breeds, provided that they are used for breeding in accordance with the breeding objectives and which annually participate in surveys of breeding stock or in animal exhibitions. It can be seen that dog breeds kept in Hungary as domestic varieties are included in the group of subsidised breeds.

Both forms of support aim at maintaining the varieties listed in sufficient numbers allowing the preservation of the original traits specific to individual varieties. These stocks are to represent a genetic reserve, which may be utilised at any time in the future for the enhancement of specific traits of competitive varieties.

As it is apparent from the above description, management of gene preservation is controlled and funded by the state. Breeding activity under the programme is carried out by non-governmental organisations, associations for specific varieties. Universities and research institutes are also involved in the work:

- Research Institute of Small Animal Breeding and Feeding (Gödöllő);
- University of Debrecen, Centre for Agriculture;
- University of Szeged, College Division (Hódmezővásárhely);
- University of Western Hungary, Mosonmagyaróvár Division.

Most of the stocks are owned by public benefit organisations for nature conservation, state holdings and private breeders, who carry out breeding activities primarily as a not-for-profit activity.

Gene preservation efforts for some non-native varieties which were bred for 20-30 years but which have since become obsolete would be also justified. These include the Cornwal and Berkshyre Pig, Tetra hens of Bábolna and meat varieties etc. There is not allocation, however, in the budget for this purpose. Maintenance and preservation of the native varieties and those in need of protection is now an approach recognised and supported by the entire society.

It is recognised that the natural flora of areas under protection for nature conservation purposes may only be maintained through grazing.

The most important tool in maintaining genetic reserve stocks is to keep animals at their original habitats, while using breeding techniques, which allow traits specific to the variety to be preserved without being compromised. When animals are kept under natural conditions, however, the danger of an animal epidemic is always present; therefore, the deep-frozen storage of reproductive material is essential. Rules for addressing veterinary issues, for applying quarantine measures are provided for under the Veterinary Act, without differentiating between different species of domestic animals.

By the Hungarian practice, gene preservation programmes cover varieties, which do not produce meat and milk which would meet current market requirements. Food standards and qualification systems are developed for market varieties. For this reason, the currently applied EUROP classification cannot be applied to native cattle, Mangalitsa Pigs or Zackel Sheep.

Access to genetic reserve stocks and reproductive material is controlled. For individual varieties, the breeding association lays down regulations for both domestic and international trade, especially trade in stock animals. There is no restriction on trade for final products, only for stock animals. For this reason, as trade is not regulated by statutory provisions, moral justice is more frequent than legal proceedings.

The use of genetically modified organisms (GMOs), is governed by MARD Decree 1/1999. (I.14.). Under this decree, no living GMO, or GMO suitable for further reproduction can be imported to the country. Even the reproduction GMO's requires the approval of the Committee for Assessing Genetic Procedures. Bruised grain feed is not covered by the prohibition, but the obligation of providing information is provided for also in this case.

There is no autonomous programme for the gene preservation of domestic animals in agricultural education. As the Hortobágy has a special significance with respect to gene preservation, the Centre for Agriculture at the University of Debrecen has undertaken to become a centre for education in gene preservation. Registration of details relevant to genetic resources will be solved through the introduction of national animal identification and registration schemes, and the registration of data in central database.

List of the tables indicated in the main text

Table 1

The role of agriculture in economy

Figures in %

The share of agriculture					
Year	**IN GDP**	**In consumption**	**In export**	**In investment**	**In employment**
1994	6.0	34.0	20.6	2.6	8.7
1995	5.9	34.5	22.0	3.0	8.0
1996	5.8	33.1	18.4	3.5	8.3
1997	5.6	33.3	13.0	3.6	7.9
1998	5.2	33.1	10.5	3.6	7.5
1999	4.6	32.5	8.0	3.3	7.1
2000	3.7	29.2	6.9	2.9	6.5
2001	3.9	-	7.5	3.0	6.2

Source: KSH

Table 2

Distribution of land in terms of cultivation

thousand ha

Description	**1999**	**2000**	**2001**
Plough-land	4 708	4 500	4 516
Garden	108	102	98
Orchard	96	95	97
Vine	127	106	93
Grass	1 147	1 051	1 061
Agricultural land	**6 186**	**5 854**	**5 865**
Forest	1 775	1 760	1 772
Reed, fishpond	74	92	93
Cultivated land	8 035	7 706	7 730
Non-cultivated area	1 268	1 597	1 573
Total land area	**9 303**	**9 303**	**9 303**

Source: KSH

Table 3

Figures on animal stocks (on 1 December)

thousand

Description	1995	2000	2001
Cattle, total	928	805	783
of which cow	421	380	368
Pig	5 032	4 834	4 822
of which sow	430	348	343
Sheep	977	1 129	1 136
of which ewe	741	897	849
Gallinae	31 458	30 716	34 343
Goose	1 111	1 470	2 175
Duck	1 287	1 480	2 837
Turkey	1 665	3 350	3 924

Source: KSH

Table 4

Production of major food industry products

thousand tons

Description	average for years 1991-1995	1999	2000	2001
Unboned meat	391	346	308	277
Chitterlings	36	45	45	44
Poultry carcass	159	136	134	158
Drinking milk (million litres)	649	576	615	659
Cheese	50	58	65	71
Flour	1125	765	887	868
Sugar	463	361	280	366
Husked beer (million litres)	848	698	736	718
Soft drinks (million litres)	480	863	977	990

Source: KSH.

Table 5

Composition of the cattle stock in terms of varieties (1 August 2000)

Variety, variety group	Share (in %)
Holstein Friesian, for milk production	64.8
Beef cattle	3.7
Hungarian Simmental for dual purpose.	17.7
Crossed Black Pied	6.6
Other + unknown	7.2
Total	100.0

Table 6

Distribution of the pig stock in terms of forms of economic management of holdings *

Year	Farming organisations			Individual farmers			Total		
	Number of holdings	Pigs (1000)	Pig/ holding	Number of farmers (1000)	Pigs (1000)	Pig/ holding	Number of holdings and farmers (1000)	Pigs (1000)	Pig/ holding
1995	-	2 348.5	-	-	2 320.6	-	-	4 669.1	-
1996	652	2 501.2	3 836	540	3 021.3	5.6	540.9	5 522.5	10.2
1997	547	2 285.0	4 177	529	2 646.0	5.0	529.5	4 931.0	9.3
1998	531	2 440.0	4 595	539	3 039.0	5.6	539.5	5 479.0	10.2
1999	537	2 408.0	4 484	496	2 927.0	5.9	496.5	5 335.0	10.7
2000	736	2 483.0	3 374	456	2 351.0	5.2	456.7	4 834.0	10.6
2001	623	2 398.0	3 891	379	2 424.0	6.3	379.6	4 822.0	12.7

Source: KSH
Data as of 1 December

Table 7

Distribution of pigs held by private holdings and farming organisations in terms of holding size (2000)

(in %)

Size category (number of pigs)	1-49	50-199	200-399	>400	Total
Private holdings					
Share in the number of holdings	99.1	0.7	0.04	0.02	100
Share in the number of pigs	84.05	10.5	2.3	3.1	100
Farming organisations					
Share in the number of holdings	18.82	15.5	7.75	57.93	100
Share in the number of pigs	0.11	0.2	0.73	98.96	100

Source: ÁMÖ 2000

Table 8

Distribution of broilers held by private holdings and farming organisations in terms of holding size in Hungary (2000)

Number of animals	Poultry stock, %	Number of holdings, %
Private holdings		
1-999	4.9	89.2
1 000-4 999	13.8	5.9
5 000-9 999	14.1	2.4
10 000-49 999	36.1	2.2
>50 000	31.0	0.4
Farming organisations		
1-999	0.0	1.4
1 000-4 999	0.4	7.1
5 000-9 999	1.1	8.5
10 000-49 999	19.0	49.0
>50 000	79.5	34.0

Source: ÁMÖ 2000

Table 9

Holding structure concerning poultry stock in Hungary for the production of eggs (2000)

Size category, number of eggs	Poultry stock, %	Number of holdings, %
1-999	0.1	4.8
1 000-4 999	3.4	42.0
5 000-19 999	6.1	23.5
>20 000	90.4	30.3

Source: Poultry Product Board

Table 10

Distribution of the cow stock in terms of forms of economic management of holdings *

Year	Farming organisations			Individual farmers			Total		
	Number of holdings	Cows (1000)	Cow/ holding	Number of farmers (1000)	Cows (1000)	Cow/ holding	Number of holdings and farmers (1000)	Cows (1000)	Cow/ holding
1995	916	296	323	49	125	2.5	50	421	8.4
1996	890	290	326	43	124	2.8	44	414	9.4
1997	798	264	331	39	139	3.6	40	403	10.0
1998	741	266	359	36	141	3.9	37	407	11.1
1999	720	254	353	32	145	4.5	33	399	12.2
2000	847	261	308	34	119	3.5	35	380	10.9
2001	743	238	320	31	130	4.2	32	368	11.6

Source: KSH
* Data as of 1 December.

Table 11

Distribution of the milking cow stock of private holdings and farming organisations in terms of holding size (2000)

(in %)

Size category (number of cows)	1-9	10-19	20-29	30-99	>100	Total
Private holdings						
Share in the number of holdings	95.41	3.23	0.7	0.6	0.06	100
Share in the number of cows	71.21	12.64	5.0	8.43	2.72	100
Farming organisations						
Share in the number of holdings	7.6	3.0	2.9	12.5	74.0	100
Share in the number of cows	0.1	0.1	0.2	2.4	97.2	100

Source: ÁMÖ 2000

Table 12

Cattle stock and the beef cattle sector in Hungary

Description	June 1997	December 2001	April 2002
Cattle stock, 1000 animals	927	783	780
Cows for meat production, 1000 animals	46	23	22
Cows for dual purpose., 1000 animals	..	59	60
Beef cattle production, 1000 tons (unboned meat)*	66	1. 63	2. ..
Number of holdings where beef cattle is kept	48 835	39 804	38 819

Source: KSH
Note: official figures on beef cattle keeping were published by the KSH only in 1997, 2001 and 2002.

* Annual figures.

Table 13

Distribution of sheep held by private holdings and farming organisations in terms of holding size (2000)

(in %)

Size category (number of sheep)	1-19	20-99	100-199	>200	Total
Private holdings					
Share in the number of holdings	72.83	17.64	4.55	4.98	100
Share in the number of sheep	10.23	17.37	14.76	57.64	100
Farming organisations					
Share in the number of holdings	14.49	18.55	10.14	56.81	100
Share in the number of sheep	0.2	1.2	1.8	96.8	100

Source: ÁMÖ 2000

Table 14

Distribution of goats held in Hungary in terms of holding size (2000)

(number of animals)

Holding size	Number of holdings	Number of she-goats
1-10	340	2 058
11-30	170	3 329
31-50	63	2 603
51-100	57	3 618
101-200	20	2 658
201-	3	763
Total	653	16 031

Source: Association of Hungarian Goat Breeders, 2000

Table 15

Operating costs and prime costs of major sectors of animal farming and animal products at farming organisations (at ruling price)

Description	Unit of measurement	1990	1991	1992	1993	1994
Dairy farming	HUF/cow	70 682	86 093	88 646	102 646	129 656
Cow's milk	HUF/l	13.41	15.65	16.54	19.04	23.17
Hens	HUF/hen	724	887	1 044	1 178	1 396
Hen's egg	HUF/egg	2.71	3.40	3.94	4.09	4.67
Beef cattle	HUF/kg	72.40	88.32	90.31	103.02	120.76
Porker	HUF/kg	54.69	61.69	69.33	79.37	92.97
Fryer	HUF/kg	55.10	63.96	67.40	77.94	97.98
Description	**Unit of measurement**	**1995**	**1996**	**1997**	**1998**	**1999**
Dairy farming	HUF/cow	155 692	186 724	235 242	274 849	308 286
Cow's milk	HUF/l	27.05	33.71	40.38	44.84	52.23
Hens	HUF/hen	1 661	2 080	2 338	2 915	2 468
Hen's egg	HUF/egg	5.69	7.30	8.46	10.06	9.74
Beef cattle	HUF/kg	151.87	186.65	213.46	247.97	246.51
Porker	HUF/kg	120.18	152.32	182.38	196.87	196.80
Meat chicken	HUF/kg	108.73	157.88	164.78	170.71	168.30

Source: AKII Cost and Product Analysis Unit

Table 16

Costs of animals products in farming organisations

Sector	Unit of measurement	2000	2001	2001/2000 %
Direct variable costs				
Dairy cow	HUF/cow	244 551	256 985	105
Eggs for human consumption	HUF/hen	2 408	2 644	110
Beef cattle	HUF/animal	186 393	155 592	83
Porker	HUF/animal	55 226	71 590	130
Fryer	HUF/animal	2 269	2 639	116
Total costs				
Dairy cow	HUF/cow	375 208	412 573	110
Eggs for human consumption	HUF/hen	3 165	3 112	98
Beef cattle	HUF/animal	257 652	231 184	90
Porker	HUF/animal	65 250	87 766	135
Fryer	HUF/animal	2 629	3 015	115
Prime costs				
Dairy cow	HUF/cow	58,92	62,86	107
Eggs for human consumption	HUF/hen	11,95	12,31	103
Beef cattle	HUF/kg	282,93	298,55	106
Porker	HUF/kg	228,87	285,05	125
Fryer	HUF/kg	173,97	192,00	110

Source: AKII Cost and Product Analysis Unit

Table 17

Composition of the sow stock under central registration control in terms of varieties

Variety, hybrid	Animal	Share, %
Hungarian Large White (MNF)	5 138	13.87
Hungarian Landrace (ML)	3 878	9.93
MNF x ML) F_1	340	0.92
Duroc	231	0.62
Hampshire	-	-
Pietrain	135	0.36
Belgian Landrace	81	0.16
Pure bred, total	**9 583**	**25.87**
Hungahyb	7 070	19.09
ISV Pannon hybrid	8 045	21.72
Kahyb	7 821	21.11
Seghers hybrid	1 495	4.04
Dalland hybrid	1 591	4.30
Ratlerow hybrid	285	0.92
Pic hybrid	584	1.58
Mangalitsa	569	1.54
Grand total	**37 043**	**100.00**

Source: OMMI

Table 18

Changes in the production and use of pork

(1000 tons)

Year	Production	Export	Import	Domestic consumption	Per capita consumption, kg/person	Rate of self-sufficiency*, %
1995	332.9	72.7	19.1	280.1	27.4	118.9
1996	413.9	134.6	12.2	277.9	27.3	148.9
1997	358.3	103.1	20.4	269.5	26.5	132.9
1998	353.2	105.5	34.0	272.7	27.0	129.5
1999	393.7	105.7	13.4	289.5	28.8	135.9
2000	397.3	131.2	27.2	285.7	28.5	137.2
2001	**364.7	**90.0	**30.2	**297.6	..	122.5

Source: KSH, Food Balances 1970-2000
* Total production/domestic consumption.
** Calculated figures.

Table 19

Changes in poultry meat production and consumption (dead weight)

(1000 tons)

Year	Production	Export	Import	Domestic consumption	Per capita consumption, kg/person	Rate of self-sufficiency*, %
1995	374.0	106.9	0.3	247.4	24.2	151
1996	364.3	119.3	0.8	239.7	23.5	152
1997	383.1	133.1	2.4	242.4	23.9	158
1998	433.6	132.6	5.3	270.8	26.8	160
1999	379.5	123.5	4.3	247.4	24.6	153
2000	458.0	125.4	21.3	344.4	34.4	133

Source: KSH, Food Balances 1970-2000
* Total production/domestic consumption.

Table 20

Changes in egg production and consumption

(Million eggs)

Year	Production	Export	Import	Domestic consumption	Per capita consumption, kg/person	Rate of self-sufficiency*, %
1995	3 467	171	71	3 368	300	3. 103
1996	3 273	..	..	3 061	270	107
1997	3 442	..	..	3 090	269	111
1998	3 439	350	40	3 110	269	111
1999	3 251	353	51	2 929	256	111
2000	3 230	104	47	3 156	280	102

Source: KSH Food Balances 1970-2000
* Production/domestic consumption

Table 21

Composition of the domestic cow stock used for meat production

Description	Share, %
Hungarian Simmental, not milked	33
Hereford, angus, galloway	22
Charolais	17
Limousin, Blonde	15
Hungarian Grey Cattle – native	12
White-blue Belgian	1

Source: Association of Hungarian Animal Breeders

Table 22

Changes in the production and consumption of beef and veal

(1000 tons)

Year	Production	Export	Import	Domestic consumption	Per capita consumption, kg/person	Rate of self-sufficiency*, %
1995	73.4	29.0	21.7	70.5	6.9	104
1996	69.0	29.6	13.2	53.5	5.2	129
1997	65.7	30.3	14.1	50.2	4.9	131
1998	56.8	26.2	11.7	44.7	4.4	127
1999	58.2	19.8	4.3	41.9	4.2	139
2000	66.9	25.9	4.8	44.1	4.4	151.7

Source: KSH Food Balances 1970-1999

* Production/domestic consumption

Table 23

Major production characteristics of goat varieties in Hungary

Description	Number of days milked	Milk yield (litre)	Progeny (%)
Alpen	270	783	210
Alpen crossed	235	533	175
Saanen	253	721	186
Saanen crossed	213	563	179
Dairy white	150-210	400-450	150-180
Dairy brown	150-210	400	150-180
Dairy variegated	150-180	350-400	150-180
Other	180-200	400	186

Source: Research Institute of Animal Breeding and Feeding

Table 24

Aid figures, 1993-2001

(1000 HUF)

Year	Per unit	Development	Total
1993	38 734	18 360	57 094
1994	43 604	27 676	71 280
1995	44 717	6 742	51 459
1996	45 078	34 365	79 443
1997	51 392	25 993	77 385
1998	75 963	90 891	166 854
1999	83 912	60 480	144 392
2000	89 208	115 347	204 555
2001	92 127	105 892	198 019
Grand total	564 735	485 746	1 050 481

Source: MARD Decree 102/2001. (XII. 16.)

Table 25

Support for the maintaining of Hungarian indigenous and endangered varieties

Description	Total number of female animals	Max. aid HUF/animal
Cattle: Hungarian Grey Cattle	2 000	8 000
Horse: gidran	200	18 000
hucul	100	18 000
Hungarian cold-blooded	300	18 000
Lipizzan	300	18 000
shagya arab	300	18 000
nonius	300	18 000
kisbéri halfbred	300	18 000
furioso-north-star	300	18 000
Pig: Mangalitsa (blonde, red, Swalow Belly)	1 200	6 000
Sheep: Hungarian Zackel	3 000	3 000
Transylvanian Zackel	1 000	3 000
Tsigai	1 000	3 000
Zaupel	500	3 000
Rabbit: Hungarian giant	200	2 500
Dog: kuvasz	200	2 500
Komondor	200	2 500
Mudi	200	2 500
Puli	200	2 500
Pumi	200	2 500
Transylvanian kopó	200	2 500
Hungarian houn	200	2 500
Hungarian vizsla	200	2 500
Gallinae: (both sexes)		
Hungarian Yellow	2 200	700
Hungarian hempseeded	2 000	700
Hungarian White	700	700
Transylvanian Naked Neck (black, white, hempseeded)	2 000	700
Guinea-fowl	1 500	700
Freezly Feathered Hungarian Goose	1 000	1 500
Turkey: Bronze Turkey	800	1 500
Copper Turkey	600	1 500
Fish variety groups (both sexes)		
Carp	100 animals/variety	2 000
Acipenser	100 animals/variety	2 000
Catfish	100 animals/variety	2 000
Trout	100 animals/variety	2 000
Authorised keeping of grey partridge in the framework of game management, pairs	500 pairs	HUF 2000 /pair

Source: MARD Decree 15/2001. (III. 3.)