

# **Republic of Poland**

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## **Country Report**

### **on the State of Animal Genetic Resources**

**Minister of Agriculture and Rural Development**  
**Warsaw, October 2002**

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## SUMMARY

Polish agriculture is characterised by dispersed agricultural structures and traditional character of family farms. The economic conditions of agricultural production in Poland have deteriorated since 1990 when the market economy was introduced. A downturn in the demand for food products was noticed, while the costs of their production grew rapidly. As a result, agricultural incomes decreased and their relation to other sources of income deteriorated. All agricultural activities, including all types of animal production, were affected by declining profitability.

Poland has attained self-sufficiency in food production. The domestic agricultural production is sufficient to fulfil demand for agricultural products, and there are difficulties in selling some types of produce. Over the past ten years concentration, higher standards of production and a major increase in the range of goods produced have been observed in the agri-food industry.

Semi-intensive production is the primary production system in agriculture; high-input systems are expanding rapidly, particularly with regard to poultry and pigs. Extensive production is used in harsh environmental conditions and also in small farms.

Cattle are mainly kept for dairy production and the aim of breeding is to improve the yields of milk, protein and fat, as well as functional traits. Beef production based on beef breeds has been developing since the early 1990s. Further improvements in lean content of pig carcasses and sow reproduction are the key issues in pig husbandry. Continued intensification and concentration of production are expected in the poultry sector. The efforts in sheep husbandry are mainly aimed to stop the decline in population size and to conserve genetic resources so as not to waste the basis for reconstruction and development of the population in the future, when sheep will be used on a larger scale for vegetation control and landscape management. Goats are kept mainly for dairy production. If goat breeding is to expand, it is necessary to ensure better promotion of goat milk and generate higher demand for goat dairy products. The use of horses will see further changes: draught horses will be gradually replaced by horses used for recreation and amateur sports.

Poland has very rich and diverse farm animal genetic resources. Each of the species is represented by several to a dozen or so breeds or varieties, up to 27 in the case of sheep. The dynamic changes taking place in farm animal populations over recent years pose a threat that genetic diversity will be considerably reduced. This refers both to the native breeds of farm animals and to individual genetic variability within breeds of international importance which are commonly used and undergo intensive selection.

Poland has a long tradition of activities to conserve genetic resources of farm animals. The majority of native breeds have been included in conservation activities from the beginning of 1980s, when conservation herds and genetic reserve herds started to receive state financial support. Acting in accordance with the objectives of the Convention on Biological Diversity ratified in 1996, Poland began to implement the FAO Global Strategy for the Management of Farm Animal Genetic Resources and set up a National Focal Point according to the FAO recommendations. Since 1 January 2002 the tasks in this area were entrusted to the National Research Institute of Animal Production in Kraków. In May 2000, the Minister of Agriculture

and Rural Development approved breeding programmes for the conservation of animal genetic resources involving 75 breeds, varieties and strains of farm animals and fish.

Animal breeding legislation addresses practically all the basic issues concerning the utilisation of farm animals. However, there is no separate legislation to support and promote the conservation and sustainable use of native species and breeds and to support the relevant activities. Legal regulations and financial mechanisms are also necessary to support animal husbandry in harsh environmental conditions, for instance in mountainous areas, and in areas requiring reclamation, like degraded set-aside lands.

Breeders and their organisations, i.e. breeders' and producers' associations, have the largest impact on the utilisation of active animal populations and on the conservation of their genetic resources. Their activities and decisions will shape the future development of domestic animal husbandry. The weak organisational structure of the producers coupled with the relatively low activity of breeders' associations make it difficult to carry out genetic improvement programmes and programmes of conservation of animal genetic resources. The role of the state in the production and breeding management is still substantial.

Human resources in the Polish research and development centres as well as in educational institutions represent a high potential; however, their activities are largely underinvested. Research and development work on defining management conditions which ensure animal welfare standards will be given a high priority; there is also a vital need to extend research on specific functional traits and qualitative characteristics of products obtained from utilised and conserved animal species, breeds and varieties. Modern animal production technologies in Poland are on a similar level to OECD other countries. In the future, biotechnological methods will increase in importance in the efforts to maintain a diversified genetic pool of conserved breeds as well as those commonly used in production.

The basic factors slowing down the development of animal production in Poland are dispersed agricultural structure and low profitability. In some species it is difficult to carry out modern, effective breeding programmes, due to the small size and dispersion of the active population. The knowledge and professional qualifications of farmers and breeders have to be continually improved. It is essential that farmers are aware and understand the special impact of agriculture on the environment, on the preservation of natural assets of rural areas and on the biodiversity of wild species associated with agro-ecosystems, if agriculture is to fulfil its multifunctional role to the society. It is necessary to increase public awareness and appreciation for the conservation of animal genetic resources and to highlight the importance of safeguarding native breeds.

The list of national priorities for the use and conservation of farm animal genetic resources includes the following: the effective production of safe and functional food of animal origin; establishment of an efficient data collection and processing system for animal breeding and production; enhancement of the professional qualifications and educational level of breeders and farmers and reinforcement of support for producer organisations; development and promotion of Polish brand-name animal products originating from Polish livestock including organic production; improvement of health status of animal populations and sanitary conditions of animal husbandry; development and use of biotechnological methods for animal biodiversity conservation; development of legislative measures for agricultural biodiversity conservation activities, including animal genetic resources; allocation of separate financial resources from the state budget for activities related to conservation of agricultural

biodiversity, in particular those supporting the implementation of conservation programmes for genetic resources of domestic breeds and varieties; support for animal production in areas with particularly difficult environmental conditions (highlands) and in areas where vegetation control is required (e.g. by controlled grazing); stabilisation of the agricultural product market, particularly the market of animal products.

## **Introducing the Country**

### **Geographical Location**

Poland is the ninth largest country in Europe with an area of 312 685 km<sup>2</sup>. Situated between 49°00' and 54°50' north latitude and 14°07' and 24°08' east longitude, it is bounded to the north by the Baltic Sea and to the south by the Sudeten and Carpathian Mountains. Poland borders seven countries: Russia, Lithuania, Belarus, Ukraine, Slovakia, the Czech Republic and Germany.

Poland is a typical lowland country. More than 75% of its territory in the north and centre is 200 m above the sea level, and just 2.9%, in the south, is 500 m above sea level, with an average altitude of 173 m above sea level. The location as well as physical and geographical conditions are conducive to the clash of air masses coming from the Atlantic and from interior of the Continent. This phenomenon has a considerable influence on the climate and weather conditions. Poland's climate is changeable, from maritime to continental, with a high rate of fluctuations and irregular length of the seasons. In January, the coldest month, average temperature ranges from -1°C in the south-west to -4°C in the north-east, whereas temperatures in the hottest month, July are +20°C and +17°C respectively. The annual rainfall averages 600 mm, exceeding 1000 mm in the mountains and reaching 400-500 mm in the lowlands. Many lowland areas experience water deficiencies, particularly in the years with snowless winters and reduced rainfall. Most of Poland's territory is located in the basins of the Vistula and Oder Rivers. There are 9300 lakes in Poland with an overall area of 3200 km<sup>2</sup>, most of them situated in the northern part of the country.

Soils of medium and low quality (62.7%) are predominant in Poland; they require high inputs of organic and mineral fertilisers and scrupulous agricultural techniques. Very good and good soils (class I and II) account for just 3.3%, whereas very poor soils (class V and VI) account for 34% of the total soils. The vegetation season in Poland is 180 to 210 days long. The longest day in the year has 16 h and 46' of the daylight and the shortest 8 h 43'.

### **Administrative Division**

On 1 January 1999 a new administrative system comprising 16 voivodeships was introduced in Poland. The political system of the Republic of Poland is based on the separation of the legislative (the Sejm – Lower House and the Senate), executive (the Sejm and the Council of Ministers, Voivodes) and judicial (Courts and Tribunals) authority. The administration of local self-government acts at voivodeship, powiat and community levels.

### **Population**

In the year 2000, Poland had a population of 38 644 200, with women (19 871 200) accounting for 51.4% of the population. A continuous growth of the population was observed during the post-war period, reaching its peak of 38 667 000 in 1998. The trend has been reversed over the past two years and by 2010 the population is expected to stabilise at about 38 788 900 according to demographic forecasts by GUS (the Central Statistical Office).

### **Employment in Agriculture**

Despite the diminishing contribution to the GDP (8.4% in 1990 against 3.7% in the year 2000), agriculture is still a major sector of national economy and an important target of the state social policy. In the year 2000, 4 304 600 people (about 28.4% of the total employment) were employed in the agricultural sector, including 28.0% in the private sector and 0.4% in the public sector. In 2002, of the total number of 2 703 000 unemployed, 1 181 000 (43.7%) inhabited the rural areas.

### **Primary Farming Systems**

Agricultural land covers 18.4 million hectares (58.9%) while forests 28.8% of the country's area. Arable land and perennial plantations constitute 78% of agricultural land. The dispersed farms carry out diversified production and often employ extensive farming methods. The use of mineral fertilisers averaged 163.9 kg per 1 ha of agricultural land in the 1989/1990 season and decreased to 85.8 kg of NPK in the 1999/2000 season, with a very low use of pesticides. The supply of pesticides was 51.5 kg of active substance per 100 ha of arable in 1990 and 61.7 kg in the year 2000. Reduction in the use of artificial fertilisers and plant protection chemicals over the last decade was associated with the economic crisis and very low profitability of the agricultural sector.

The farming system in Poland has made it possible to preserve the natural assets of rural areas. Agriculture in Poland had no significant negative impact on the environment and landscape, which, combined with substantial labour resources, enables development of labour-demanding farming production, in particular organic farming.

### **Agriculture and Animal Production**

Poland is an important agricultural producer both in Europe and in the world, ranking high in the production of various agricultural and food products. For instance, in the year 2000 Poland was the world's third largest producer of rye and potatoes and ranked eighth in the production of rape and apples as well as in the size of pig population. In the 1990s agricultural production experienced high fluctuations. The substantial reductions of agricultural production resulted not only from unfavourable climatic conditions including severe floods of 1997, but also from the progressing system transition and changes in the economic conditions over that time. This period was characterized by rapidly declining both demand and prices for agricultural products, which reduced profitability of the sector and led to a breakdown of production. A public sector went through a deep restructuring process, which considerably restricted its contribution to domestic production.

In the year 2000, the value of global agriculture production totalled PLN 55 985.4 million, of which 53.2% accounted for plant production. The majority of plant products, especially cereals, potatoes and fodder crops, is used directly on farms for animal production, leading to significant differences in the structure of global and commercial crop production. The commercial agricultural production is traditionally dominated by animal production (as shown in Table 1).

Based on current prices, agricultural products in the year 2000 totalled PLN 22 388.5 million in value including animal products, which accounted for PLN 14 899.6 million. In the same year, the overall value of imported animal products was PLN 2 316.2 million, while the value of exported products, PLN 2 860.8 million.

**Table 1** Value and structure of commercial agricultural production, current prices  
(Agricultural Statistical Yearbook, the Central Statistical Office 2001)

Products	Value in the year 2000 (million PLN)	Structure of production (%) in years	
		1990	2000
<b>TOTAL</b>	<b>33 491.4</b>	<b>100</b>	<b>100</b>
<b>Plant production</b>	<b>12 541.0</b>	<b>33.1</b>	<b>37.4</b>
Cereals, including:	4 014.8	8.7	12.0
Wheat	2 962.7	5.2	8.8
Rye	427.2	1.9	1.3
Barley	222.9	1.1	0.7
Potatoes	1 339.9	2.5	4.0
Industrial, including:	2 375.2	8.6	7.1
Sugar beets	1 337.7	5.1	4.0
Other	1 037.5	3.5	3.1
Vegetables	2 261.6	7.0	6.7
Fruits	1 836.7	4.1	5.5
Other	712.8	2.2	2.1
<b>Animal production</b>	<b>20 950.4</b>	<b>66.9</b>	<b>62.6</b>
Slaughter animals <sup>a</sup> , including	12 667.4	47.6	37.8
Cattle	1 694.7	10.4	5.1
Calves	333.6	1.5	1.0
Pigs	7 885.7	29.2	23.5
Sheep	18.4	0.8	0.1
Poultry	2 499.3	5.0	7.5
Milk	6 725.4	13.5	20.1
Eggs	1 376.5	3.6	4.1
Wool	6.4	0.6	0.0
Other	174.7	1.6	0.6

<sup>a</sup> Cattle, calves, pigs, sheep, horses, poultry, goats and rabbits.

The slaughter horses export continues to have a large share in commercial production, reaching US\$ 80 million (70,000 horses) in the year 2000 in comparison with US\$ 100 million and 136,000 horses in 1990. The value of commercial production of fish was PLN 140 million in 1990 and PLN 210 million in the year 2000.

Animal production in Poland is characterised by low concentration; it is mostly based on farm-produced feeds including utilisation of permanent grasslands. In the year 2000, among all individual farms involved in dairy cattle production 68% kept 1 - 4 cows and only 3.5% had herds of 20 or more cows. However it is worth noting that herds of more than 20 cows account for 22% of cattle kept in individual farms.

The production of slaughter animals per 1 ha of agricultural land amounted to 240 kg/ha in 1990 compared to 233 kg/ha in the year 2000. The drop in production is even more noticeable in the case of milk, from 821 kg/ha of agricultural land in 1990 to 627 kg/ha in the 2000 and extremely drastic in the case of wool with decrease from 0.79 kg to 0.07 kg respectively. The production of eggs increased from 528 eggs per 1 ha of arable land in 1990 to 542 in the year 2000.

Per capita animal production has generally decreased over the past decade, although considerable differences in trends regarding some products were observed. The total per capita production of slaughter animals dropped from 87.2 kg in 1990 to 80.7 kg in the year 2000. A drastic decrease in beef production from 20.8 kg to 8.6 kg per capita was partially compensated by the increase in pork production from 48.3 kg to 50.5 kg and poultry meat production from 8.1 kg to 15.1 kg, respectively. Production of milk decreased from 403 kg to 299 kg per inhabitant and that of wool from 0.39 kg to 0.03 kg, while egg production remained stable (199 and 197 eggs respectively).

### Organisation of Animal Production

Individual farms form the basis of national agriculture. According to the year 2000 figures they owned 83.9% of agricultural land and 84.2% of arable land and the crop area of individual farms accounted for 89.3% of the overall crop area in Poland. The share of individual farms in the production of cereals and potatoes amounted to 83.6% and 97.6% respectively. Individual farms kept 94.3% of the cattle population and 90.2% of the pig population, providing 90.6% of slaughter animals and 94% of milk production.

**Table 2** Structure of farms in Poland in the year 2000  
(Agricultural Statistical Yearbook, the Central Statistical Office 2001)

Agricultural land (ha)	Farms in total		Share of total agricultural land %
	Thousands	%	
1-2	448.4	23.8	4.0
2-3	269.1	14.3	4.1
3-5	344.9	18.3	8.4
5-10	448.0	23.8	20.0
10-15	185.8	9.8	14.1
15-20	84.0	4.5	9.1
20-30	62.4	3.3	9.3
30-50	27.3	1.4	6.3
50 and more	15.8	0.8	24.7
<b>Total</b>	<b>1 885.7</b>	<b>100</b>	<b>100</b>

Polish agriculture is characterised by high dispersion: 56.4% of farms does not exceed 5 ha, 33.6% of farms range between 5 and 15 ha in size, and only 0.8% exceed 50 ha, with average farm area of 7.2 ha of agricultural land (Table 2).

### State of Food Safety

Poland has attained the state of food safety and experiences neither deficiencies nor regional or seasonal differences in supply of food goods. At present, many domestic agricultural products face marketing problems. The demand for food products depends on the income and prosperity of people. In some poorer regions, low incomes make it difficult to fulfil complete daily diet requirements, resulting in poorer nutrition. The structure of demand for food products, especially in the high-income groups, varies according to changing consumption patterns.

Over the past decade, the concentration, enhancement of production standards and a major increase in the range of products have been observed in the agri-food industry.

### **Development of Rural Areas**

In the year 2000 the rural population accounted for 38.2% of the national population (14 767 700 people), with a 50% share of women (7 389 000). Among the rural inhabitants a significantly higher share of children up to 14 years old and of elderly people is observed in comparison with urban population.

A comparison of the Human Development Index (HDI) shows that all parameters of social development in rural areas are inferior to those in urban areas when evaluated separately or as joint index (National Human Development Report, Poland 2000, UNDP). According to 1997 figures, average life expectancy of rural inhabitants was 0.2 year shorter than of urban inhabitants, with the national average of 72.8 years. The overall schooling ratio at all levels of education was 72.8% for rural areas and 81.9% for urban areas. The literacy rate was 98.7% and 99.4% respectively. Just 3% of rural inhabitants had a higher education compared to 11% in towns. The per capita value of GDP was US\$ 6116 in rural areas and US\$ 8892 in towns, the national average being US\$ 7320. In 1997, the HDI of Poland was 0.809, ranking the country 44th among the developed countries. The HDI for rural inhabitants (0.794) remained significantly lower than for the urban population (0.828), showing a distance to be covered in social development of the rural areas.

## Chapter 1. Assessing the State of Agricultural Biodiversity in Farm Animal Sector of the Country

### 1.1. Overview of Country's Animal Production Systems and Related Animal Biological Diversity

#### 1.1.1. Production Systems

Polish agriculture is characterised by a high degree of dispersion. Individual farms are small with an average size of approximately 7.2 ha, the majority (90%) specialize in various types of production and keep several species of animals. With the falling demand and lower profitability of production, this approach reduces the risk of overproduction and economic losses.

When considering the number and size of farms, full-time employment in the agricultural sector (2120 hours of work annually) and the value of commercial production, the following three sub-sectors can be distinguished:

**Sub-sector 1** includes subsistence farms producing exclusively or chiefly for their own consumption, and farms which do not cultivate their land. This sub-sector encompasses 70% of farms and is characterized by a high proportion of farms managed by pensioners and people with incomes from non-agricultural sectors, a large share of fallow land, high labour demand and very low level of production.

**Sub-sector 2** covers farms reflecting the average statistical situation of Poland's agriculture. In the future, these farms will need to be re-orientated and intensified, otherwise they may have to withdraw from agricultural production. The presence of this sector stimulates the existence of local markets for agricultural products and food of local origin and also contributes to maintaining the economic viability of many small towns.

**Sub-sector 3** includes farms with production value exceeding PLN 15 000, which generate in total more than 70% of market production. It is characterised by good adaptation to market economy, high farming efficiency, innovation drive and willingness to face challenges. The expansion of this sub-sector will be fostered by introduction of new technologies and most of all abandonment of traditional multi-directional production. Integrated systems including production, processing and trade of farm products need to be introduced in this sub-sector.

The profile of sub-sectors is shown below:

Characteristics	Sub-sector 1	Sub-sector 2	Sub-sector 3
Number of farms (%)	69.0	22.4	8.6
Farm area (%)	28.2	30.9	40.9
Employment (%)	46.8	33.7	19.5
Value of production (%)	4.7	21.8	73.5

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## CATTLE

Most cattle producers (over 85%) carry out both dairy and beef production. About 84% of cattle is kept by individual farmers, about 8% of cows is owned by private companies and the remaining 8% is found in the public and co-operative sectors. In the year 2000, individual farms kept a total of 5 734 000 cattle, including 2 955 000 cows. About 22% of the cattle population is kept in farms smaller than 5 ha, almost 70% in farms up to 15 ha and just over 2% in farms larger than 50 ha of agricultural land.

**Table 3.** Structure of cattle herds kept at individual farms in the year 2000 (94% of cattle population) (Mały Rocznik Statystyczny, the Central Statistical Office 2001)

Number of cattle per farm (heads)	Percentage of farms %	Percentage of cattle population %
1	25.0	5.0
2	21.7	8.5
3-4	21.3	14.8
5-9	18.9	24.2
10-19	9.6	25.5
20-29	2.4	11.2
30-49	0.9	6.8
50-99	0.2	2.4
100-199	0.0	0.6
more than 200	0.0	1.0

The average number of cows in herds kept in the individual farms varies from 2 to 7 in southern Poland and 7 to 12 in northern Poland. In the public sector herds usually comprise 100 – 200 animals. In the areas where former state-owned farms were operating, lessees and new owners established several hundred dairy farms with 80 – 300 cows each. Also, the newly set up dairy units aimed at large-scale production, are milking from 60 to 240 cows. Small herds (1 – 2 cows) producing for self-supply are gradually disappearing.

The economic criterion for production intensity is based on relation between inputs and outputs. Polish farmers generally believe that level of animal production intensity is related to the use of concentrates per production unit (head, kg, stand, etc.). In milk production three levels of intensity can be distinguished: **I – Extensive** with minimum use of concentrates and milk yield up to 3000 kg, **II – Semi-intensive** with concentrate use up to 10 dt per year per cow and milk yield of about 4500 kg and **III – Intensive** with high use of concentrates providing about 50% of nutrients and cow performance exceeding 5000 kg of milk.

It is estimated that the semi-intensive system plays a major role, providing about 75% of commercial milk production. The intensive system accounts for about 15% and the extensive system for 10% of the raw milk purchased. More than 70% of the intensive dairy production is located in the northern and western parts of Poland. In the intensive production system most common are dairy farms holding 100 – 200 cows, which account for about 70% of high performing commercial herds. At farms carrying out extensive dairy production, a substantial part of milk is used for self-consumption.

**PIGS**

In the year 2000 there were 17 122 000 pigs in Poland, which were kept in approximately 750 000 farms with an average herd size of about 20 pigs. Most common herd size is 10-19 pigs and this concerns 21% of pig farms. The share of bigger farms rearing 20-49 pigs is smaller (18.5%) but they manage the largest part of the pig population, about 27%. Swine production in Poland is relatively dispersed – about 68% of the population is held in herds up to 100 animals and just 24% in herds with more than 200 animals. 16 830 000 pigs, which accounts for 98.3% of the pig population are kept in the private sector, with a major part belonging to individual farms (15 477 000, i.e. 90.2%). The pig herd structure at individual farms is shown in Table 4.

**Table 4.** Structure of pig herds kept at individual farms (90.2 % population) in the year 2000 (Mały Rocznik Statystyczny, the Central Statistical Office 2001)

Number of pigs per farm (heads)	Percentage of farms (%)	Percentage of pig population (%)
1	8.2	0.4
2	14.6	1.4
3-4	12.1	2.0
5-9	16.1	5.4
10-19	21.4	14.2
20-49	18.5	26.8
50-99	6.0	19.4
100-199	2.3	14.7
200-499	0.7	9.3
more than 500	0.1	6.4

Also pig reproduction is characterised by substantial stock dispersion. In 2000 as much as 67.6% of farms involved in reproduction kept 1 or 2 sows, but only 1.1% had herds of more than 20 sows. Further intensification and concentration is necessary in the pig sector.

In Poland pigs are kept in a stall system in group pens on deep-litter or slatted floor. The feeding system is based on concentrates fed on the restricted or ad libitum basis. Feeding system depends on availability of farm-produced grains and relation between the prices of cereals, concentrates and slaughter animals. About 30% of pig producers use concentrates which cover from 40% to 60% of the diet requirements, while all the others use mainly farm-produced feeds, which are supplemented by concentrates or premixes and protein components. The large scale commercial pig production is based on high-inputs and independent of own feed resources. Some farms depend exclusively on feeds from purchase.

Local tradition, soil condition and the crop structure resulted in regionalisation of swine production in Poland. The highest stock rate per 100 ha of agricultural land is typical Wielkopolskie, (236.6), Kujawskie (174.1) and Opolskie (118.8) voivodships while the lowest production intensity of pig production is found in Lower Silesia Podkarpackie Lubuskie and Małopolskie (40.6, 40.8, 52.7, 54.1 respectively).

**POULTRY**

Three systems of poultry production are found in Poland: high-input, medium-input and farmyard production that provides for self-supply and the local market. In the recent years a

significant progress was observed in production of eggs and poultry meat. Egg production is fostered by the shift from litter pens to cage rearing technology. It is estimated that about 70% of laying hens is presently kept in cages. In the 1990s a significant concentration in eggs production was observed. At present, the biggest farms keep approximately 1 – 2 millions of laying hens. At the same time the number of farms with several thousand of hens is constantly increasing. Rapidly expanding major retail networks are forcing producers to cooperate to be able to provide a large number of fresh eggs. The supply of eggs from small farmyard flocks has fallen dramatically. At present overall farmyard production does not exceed 1 billion eggs per year, what accounts for about 25% of the domestic production.

In slaughter poultry products, there is a clear prevalence of commercial production, which in 2000 reached about 830 thousand tons, having increased over 2% compared to 1999. The share of farmyard husbandry is continuously declining and its contribution to slaughter production dropped to 75 thousand tons in 2000. Compared to 1990 the farmyard production of poultry for slaughter dropped almost 3 times.

### **SHEEP**

Due to marginal role of sheep husbandry the production systems are adjusted to opportunities and needs of farms and they are based mostly on traditional practises which do not require substantial inputs. In 2000 the sheep population consisted of 336.8 thousand heads, where 87% was kept by individual farmers and the remaining 13% by companies, co-ops and stated-owned farms. About 50% of sheep population is maintained in flocks of small size.

Extensive system of sheep utilisation is common in the highland and mountainous areas and based on natural feed resources. The system has got an important ecological impact as the grazing of sheep supports the landscape management and natural environment. The semi-intensive system is applied mainly in lowlands, in regions of intensive farming and functions as mixture of a stall and pasture system with a limited share of concentrates. In farms of intensive crop production, sheep are kept to utilize waste products from the fields.

### **GOATS**

The goat husbandry in Poland has an old tradition. Goats used to be kept in small farms and their production was mainly for family needs. Commercial interest in goats began at the outset of the 1980s when the goat population was estimated as 40 – 50 thousand heads. Since then the goat population has been increasing rapidly to reach 176.5 thousands in 2000, with 174.8 thousand goats kept at individual farms. The majority of goat population almost 70% has been maintained in small farms up to 5 ha.

Most goats are maintained in a farmyard system. The herd consists of single or several animals kept in adapted facilities. In the summer they are grazing in orchards and backyard gardens usually tethered, and in winter are kept under roof. Farms involved in commercial production of milk apply the stall or semi-stall system. Considering production inputs, the goats rearing of most farms is extensive, while commercial production is conducted in medium-input system.

### **HORSES**

The domestic horse population totalled 549.7 thousand heads in 2000, where 98% was kept by private owners. The size of studs ranges from several mares up to several dozens of mares. In few cases stud farms own more than 100 mares.

The stable and stable-grazing system prevails in most of the small farms. Small private stables which are developing in the recent years and own several horses as well as bigger stables mainly use the stable-grazing system. In some areas during the grazing season horses are kept exclusively on pastures, to save hay and straw and to reduce labour costs.

### **FUR ANIMALS**

Fur animals are usually maintained in medium size farms: most fox farms have 50 – 250 breeding females and only 8 – 10 farms have flocks of about 300 – 2000 females. In mink breeding over the past two years the establishment of modern farms has been observed, usually with foreign capital investment and size of about 10 000 females in the breeding flock. The farms included in recording scheme consist of 50 – 300 females.

In the year 2000, the female population of the breeding stock of carnivorous fur animals, in case of common foxes, had 16 000 heads, polar foxes – 38 000 heads, minks – 90 000 heads, polecats – 300 heads and raccoon dogs – 1500 heads.

In the year 2000, the rabbit population had about 1 million breeding females and produced about 20 million of progeny. The rabbit husbandry is based on small backyard flocks, with 2 – 9 females which represent about 84% of the total production; and use of own feeds (grains, green fodders, farm waste). Only several rabbit farms have flocks with more than 200 females. Also coypus are held mainly in small flocks of 20 – 50 females and only a few farms have 200 – 400 breeding females: in total the coypus breeding stock included 10 000 females. Chinchillas are kept in flocks of 50 – 200 females, except for a few farms which have up to 1000 females; in total there are about 12 000 females of the breeding stock of this species.

### **FISH**

Fish breeding is managed both in a low-input system, which is based solely on natural feed (about 30% of the production) and in a high-input system based on easily digested artificial feeds. The intensity of production varies depending on the species. The production level in an extensive system ranges from 200 to 600 kg/ha. Farms producing Salminid fish (stocking material of rainbow trout, sea trout, salmon, speckled trout, and whitefish) in more than 90% are private. Poland has about 160 such aquaculture farms which produce from 20 to 600 tons of Salminid fish annually. About 20 fish farm keep own stock of spawners. Carp breeding is to a large extent managed by private farms. Carp farms usually keep a small number of spawners (from few to several dozen) and very seldom as much as 100 – 200 individuals. Most of fish farms are not involved in reproduction but buy the stocking material from specialized suppliers.

### **BEEES**

There are about 1 million bee families in Poland in about 30 000 apiaries, including about 600 bigger apiaries with some 80 – 150 families and 200 professional apiaries with more than 150 bee families. Small homeyard apiaries with less than 20 bee families account for 62% of the total number. These are usually smallholder farms, which produce honey mostly for their own needs and sell the surpluses on the local market. Both medium-intensive and extensive production systems are applied in bee-keeping and majority of apiaries is private. Some state owned apiaries with about 1500 bee families play a special role in bee breeding, education, training and research.

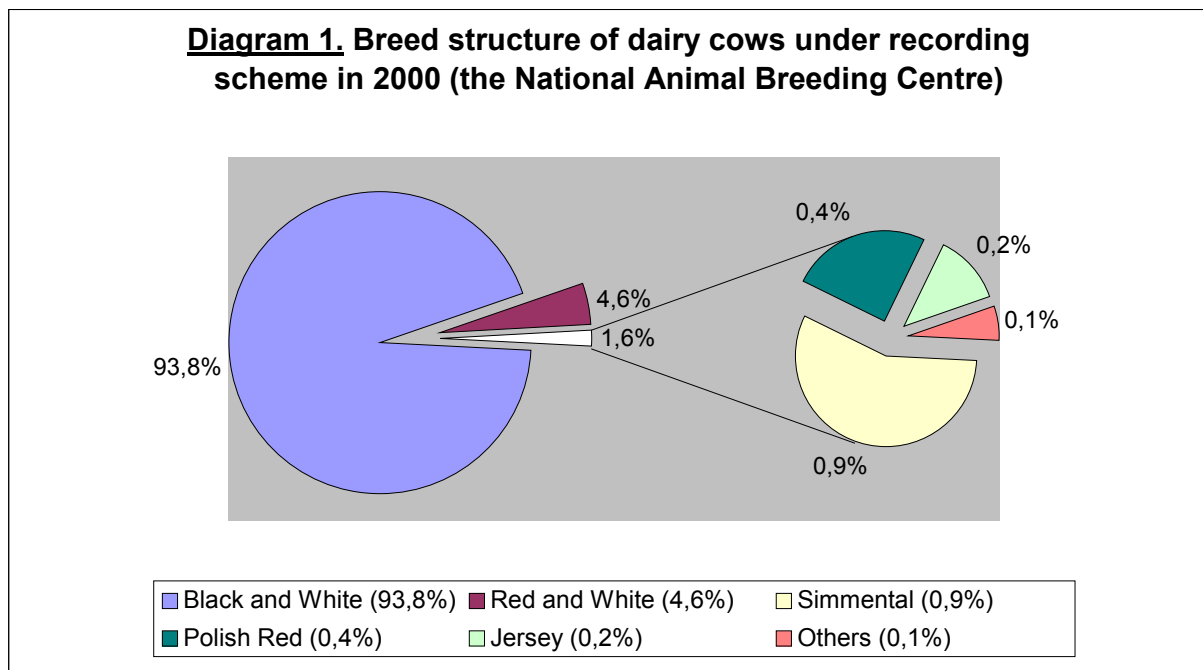
### 1.1.2. The State of Farm Animal Genetic Resources

There is no system presently in place in Poland which allows for definite assessment of the breed structure of various farm animal species used in commercial production. Estimates can be obtained by various methods, usually by transferring the structure of an active population to a mass population, analysing the utilization of the breeding material or by evaluating the population size of a given species in the region where breed in question is traditionally kept.

In exceptional cases, for instance for a very precious material, the entire population of a particular breed is under recording scheme, so the evaluation of population size is very accurate.

#### CATTLE

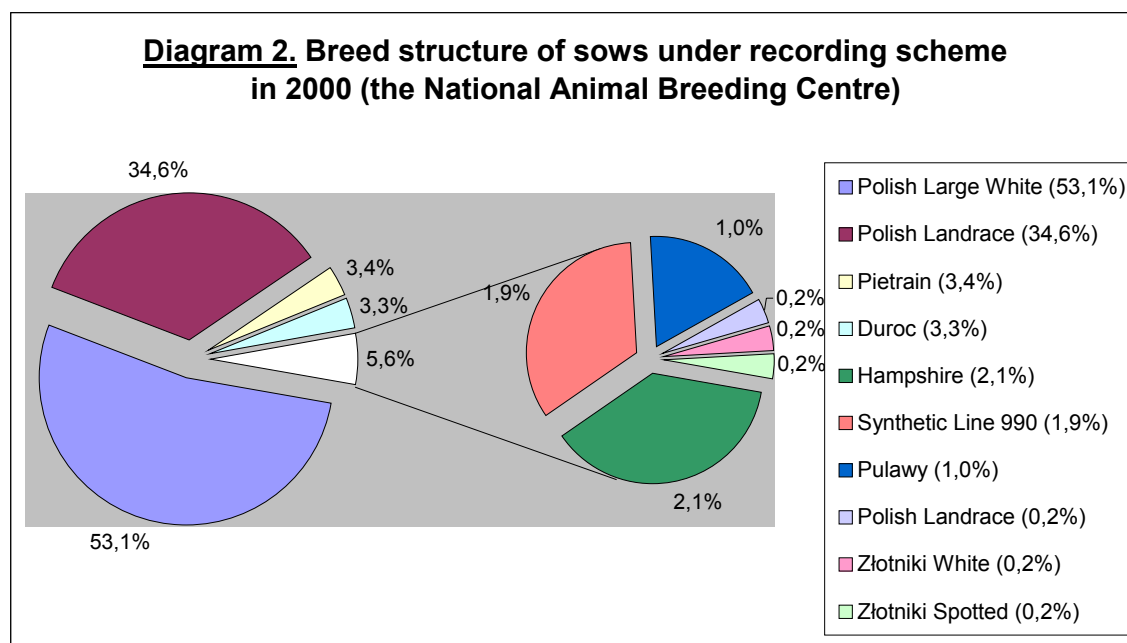
Over the past 20 years the number of dairy breeds utilized in Poland did not change significantly. The Black and White breed accounting for more than 90% of the total population (Diagram 1) has a dominant position and it can be found across the whole country. In the Dolnośląskie, Opolskie, Śląskie, Małopolskie and Podkarpackie voivodeships, other breeds beside the Black and White breed such as Red and White, Simmental and Polish Red are being used.



The beef cattle breeding does not have a long tradition in Poland. Until 1989 only several hundreds of cows of Charolais and Hereford were kept to produce bulls for commercial crossing in dairy herds. In the past 10 years, the numerous imports of various beef breeds have taken place. At present, pure beef population consists of approximately 10 000 heads and is of the same size as their crossbreds population. Limousin, Hereford and Charolais have the biggest population size; other beef breeds which are utilized include: Angus, Piemontese, Salers, Simmental and Welsh Black.

## PIGS

At present, nine breeds and one line are being used in Polish pig breeding. In terms of population size and impact on commercial production two dam breeds are of the greatest importance, i.e. Polish Landrace and Polish Large White. Among sire breeds Pietrain and Duroc are favoured in commercial crossbreeding.



## POULTRY

Most of poultry genetic resources utilized in Poland is being imported. Only a small part of mass rearing is based on domestic breeding material. Parental flocks of laying hens, meat hens and turkeys were first imported to Poland in the 1970s. Soon it turned out that the productivity of imported commercial crossbreds was much higher than that of the domestic material, therefore demand for domestic material has begun to decline.

### Laying Hens

The egg production in Poland is based on commercial chicken crossbreds provided by international breeding companies. They constitute 70% of the entire population of laying hens and include: Hy-Line Brown and White, Hisex Brown, Tetra SL, Shaver 579, ISA Brown, Lohmann Brown and White LSL, ISA Babcock B-380 Brown and B-300 White and Bovans Gold Line. The domestic breeding stock of laying hens is located in three pedigree farms which conduct genetic improvement of 15 strains. The strains are used for production of parental crossbreds as well as commercial crossbreds, providing farms with remaining 30% of the total population of laying hens. At present, six commercial sets of Astra crossbreds, three sets of Messa and four sets of Rosa are available for egg producers.

### Meat Hens

The entire reproduction of meat hens is based on imported material of renowned international breeding companies. At present the following commercial chicken boilers are being used: Starbro, ISA 215 and 220, Cobb 500, Ross 308, Hybro-G, Hybro N, Minibro, Arbor Acres Classic, Hubbard Classic and HI-Y x HI-Y. A diminishing interest of producers in domestic genetic material resulted in cessation of the breeding work on Astra-B and Petra meat hens.

### Turkeys

From 1997, the entire turkey production in Poland is based on imported reproduction and commercial material. Among turkeys of heavy type Hybrid Converter and Euro FP, BIG 6 and Nicholas 700 are utilized most often, while Hybrid Grade Marker, Nicholas 300 and BUT 9 and BUT 8 prevail among medium heavy type turkeys.

### Ducks

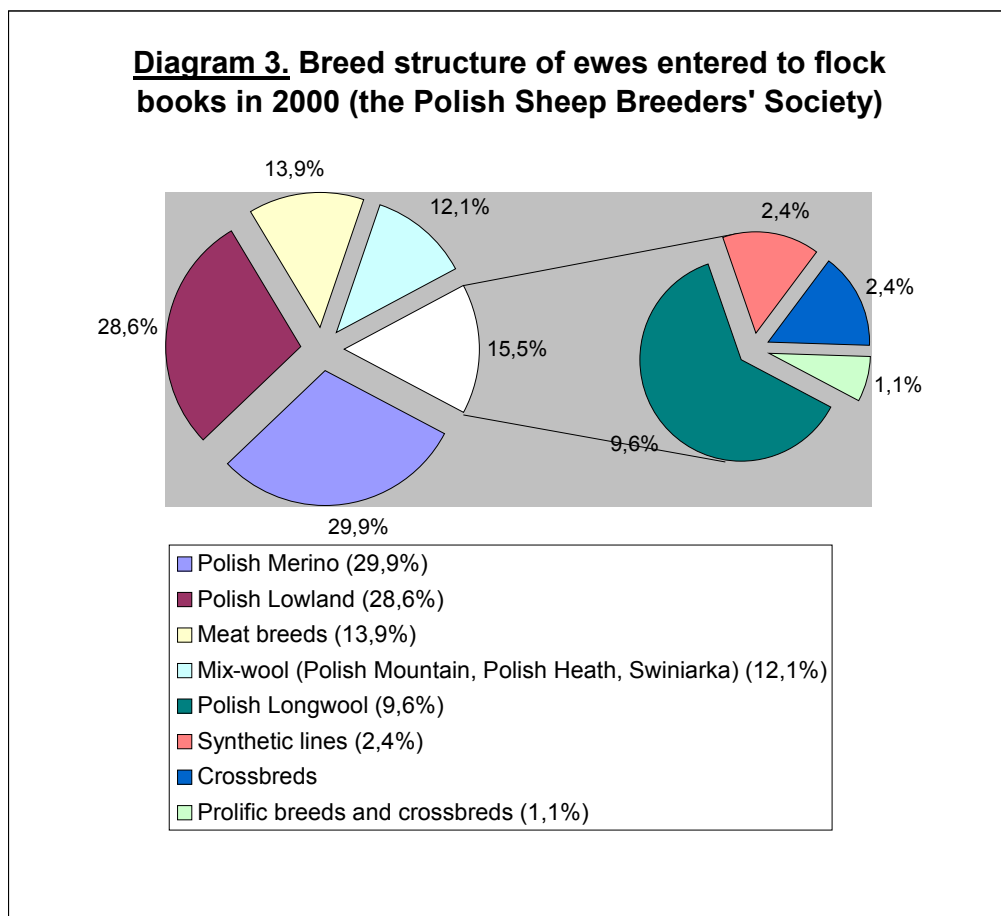
The duck breeding in Poland is based on 7 strains of Pekin (A44, A55, P44, P55, P66, P77 and K11), 5 among them are included in the genetic improvement programme carried out at by Dworzyska farm belonging to the National Research Institute of Animal Production. These strains are used for production of three commercial crossbreds of ducks: Astra K, K-1 and P54, and “Dworka” ducks that are most suitable for farmyard rearing.

### Geese

The only commercial goose crossbreds available known under the trade name “Biała Kołodzka” have been developed using sire strain W33 and dam strain W11, in the breeding farm in Kołuda Wielka of the National Research Institute of Animal Production.

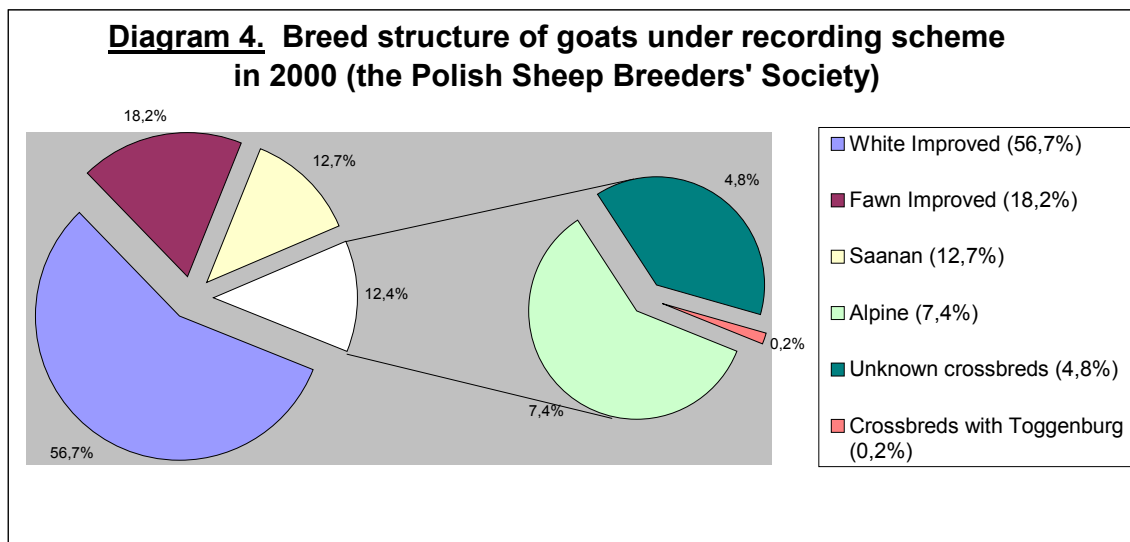
### **SHEEP**

The diversity of genetic resources of sheep maintained in Poland is higher than that of other species. There are 27 breeds and varieties, 7 synthetic lines and 11 backcrosses and prolific crossbreds. Significant changes have been observed in the sheep population over the past years. The state in the year 2000 is shown in Diagram 3.



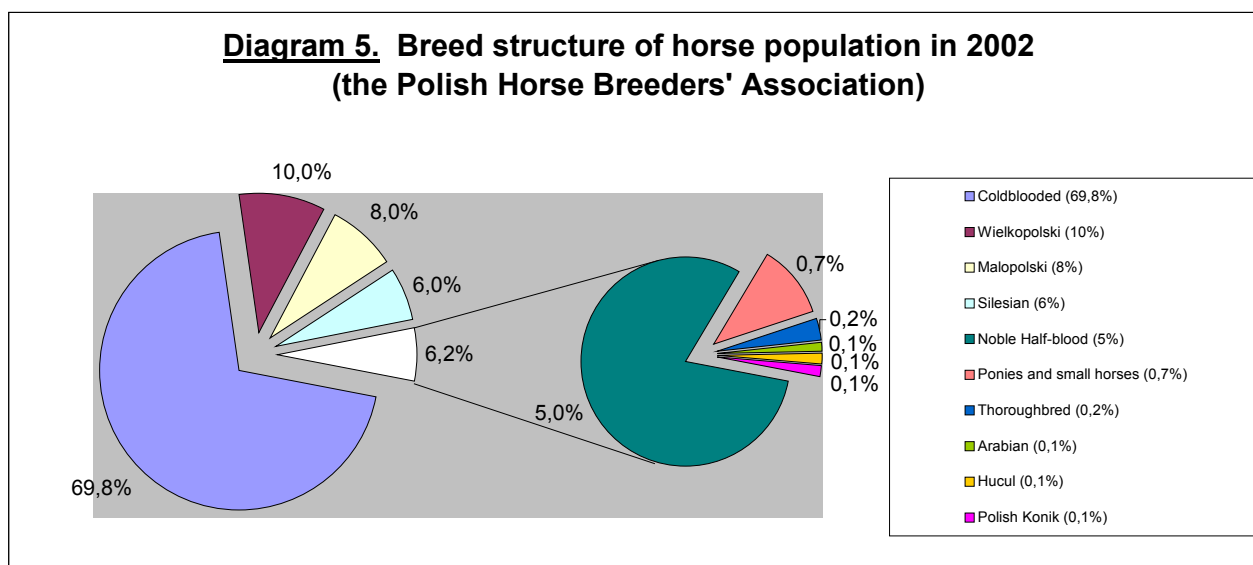
## GOATS

The goat population in Poland consists of several breeds: White Improved, Fawn Improved, Saanen, Alpine and small populations of Toggenburg, Bur and Nubian breeds. A large share in the overall population is constituted by goats of local populations and their crossbreeds. The share of respective breeds in performance recording programme is shown in Diagram 4.



## HORSES

The breed structure of horses varies depending on the region. Cold-blooded horses are dominant in the northern-west and northern-east parts of the country, cold-blooded and noble horses are bred in central Poland, whereas the southern-east part of the country is dominated by Malopolski horses with the increasing number of cold-blooded horses. Bigger size breeding studs of Hucul horses are found in the mountainous regions. The Silesian, cold-blooded and noble horses are kept in the southern west region of Poland.



Cold-blooded horses account for the majority of the horse population in Poland (Diagram 5). They were developed by backcrossing of local mares with imported Belgian, Breton and Arden stallions and to a small extent with Boulogne stallions. At present, the population

became uniform and regional varieties disappeared. The inflow of cold-blooded horses in the areas, where noble horses used to be bred so far, and uncontrolled crossing between noble and coldblooded horses to produce slaughter horses for export has been recently observed.

### **FUR ANIMALS**

There are 8 species of fur animals bred in Poland: common fox, polar fox, mink, polecat, raccoon dog, nutria, chinchilla and rabbit. Numerous colour varieties are found within these species, and in the case of rabbits – both breeds and colour varieties are distinguished. 17 rabbit are included in the genetic improvement programme

Substantial changes, in both diversity and population size of fur animal species have been observed in last decade due to the fashion trends and changeable profitability of the sector. For instance the number of nutrias decreased dramatically, whilst the diversity of colour varieties of mink (in particular brown), chinchillas as well as fur breeds of rabbits have increased. During the same time, farms of angora rabbits were liquidated.

### **FISH**

Genetic resources of fish include numerous species; breeding work focuses in particular on carps (more than 20 lines) and trout (two strains). The list of species produced on a semi-industrial scale in ponds, pools or net pools, like African Sheatfish, European Sheatfish, Nile Tilapia, Sturgeon, Whitefish and species reproduced for re-stocking of inland water reservoir, such as Sea Trout, Salmon, Whitefish, Vendace, Pike, Pike Perch is rapidly increasing.

### **BEES**

The bee population has been reduced almost by half over the past decade, which resulted in a decrease of the total bee production, even though the average size of apiary and the average productivity of bee family has been increased. In Poland, four bee breeds are being used, and genetic improvement programme is carried out for three of them, i.e. Carnica (32 lines), Caucasian (10 lines) and Black Bee (5 lines). As a consequence the number of breeding lines within each breed has been increased in the past few years. The commercial production is based on crossbreds of locally adapted breeds, Carnica and Caucasian ones in particular. Performance of their crossbreds is adjusted to local conditions, especially the type and structure of nectar flows.

## **1.1.3. Animal Products**

### **CATTLE**

In the year 2000, the total milk production amounted to 11 500 million litres, with the share of commercial production of 8 200 million litres. The annual production of calves for slaughter reached 86 000 tons. The slaughter cattle production amounted to 635 000 tons, with 415 kg as an average weight of slaughter animal (Meat Market Review No. 21/2001). Beef production has been decreasing gradually since the year 1989, when it surpassed 1400 million tons. The majority of beef production is based on fattening calves from dairy herds. A considerable part, about 25%, of dairy cows population is crossed with beef bulls.

In total all cattle products, i.e. milk and slaughter cattle account for 20.5% of the global agriculture production and for 26.3% of the commercial production. Milk has a substantial share of 16.5% in the global agricultural production and 20.2% in commercial agricultural production. Bovine products play an important role in providing food for human population.

In the year 2000, average monthly milk consumption per inhabitant was estimated at 5.39 litres, milk beverages at 0.56 litres and cheese at 0.83 kg. In average monthly meat consumption of 5.47 kg beef accounts for just 0.6 kg. Poland is an exporter of milk, dairy products and slaughter cattle. In export of dairy products, powdered milk accounts for 50%, whereas calves dominate in the slaughter cattle export.

### **PIGS**

Pork has the biggest share, about 60-70%, among all types of consumed meat. Its annual consumption is estimated as 39 kg per inhabitant. In the year 2000, 22 658 000 pigs of the total live weight of 2 501 000 tons were slaughtered in Poland, ranking Poland as one of the major European pork producer. The production of slaughter pigs accounts for approximately 25% of the value of agricultural commercial production.

High pork production and consumption supports development of the international trade. Poland is one of the biggest exporters and importers of pork. In the year 2000, export included 59.6 thousand tons of pork meat, 46.5 thousand tons of cured meats and 35.3 thousand tons of other pork processed products. At the same time import amounted to: 35.6, 1.2 and 4.2 thousand tons respectively. Pork prices depend on periodical market fluctuations, and other factors which are influencing the supply and demand of the pig meat.

### **POULTRY**

The domestic production of eggs fulfils demand of the internal market. In recent years, the domestic production of eggs has been systematically growing and reached 7.6 billion in 2000 which represents at average 197 eggs per inhabitant.

In the year 2000, the production of slaughter poultry amounted to 834 000 tons and poultry meat to almost 584 000 tons. The share of turkey meat is gradually increasing in the production structure. In 1990, the production of turkey meat did not exceed 18% of the overall production but after ten years it has reached 22%. After several years of declining duck meat production a slight increase, reaching 2% of the overall production of poultry meat has been observed. The goose meat production remains stable amounting to 15 – 16 thousand tons annually and is directed mainly for export.

### **SHEEP**

In the year 2000, the slaughter sheep production amounted to 6.8 thousand tons in comparison with 8.1 thousand tons in 1999, whereas the slaughter sheep sale reached 4.2 thousand tons in 2000 and was by 20% lower than in 1999. The past ten years had shown a dramatic reduction of the sheep population, which was accompanied by a decline in production and export of slaughter sheep. In the year 2000, the wool sale totalled 333 tons and its prices fell once again. In five years' time the real prices for wool dropped by 60%.

The production of slaughter lamb is intended mainly for export and also for self-supply. Polish sheep husbandry is characterised by lack of an internal market and the considerable differentiation of the quality of sheep products. The slaughter animals sale amounted to 2.8 thousand tons in the year 2000 and was almost exclusively produced at individual farms (2.7 thousand tons). Traditional dairy products from Polish Mountain sheep, such as *bundz*, *bryndza*, *oszczypek* are mainly of local importance.

## **GOATS**

Figures regarding production of goat milk, meat or hides are not included in any official statistics. Total milk production, estimated on the basis of average milk yield and the size of goat population, is presumed as 15 million litres. The market of goat dairy products is unstable. At present, apart from goat milk, cheese and yogurts are gaining popularity. Milk is purchased usually for children with albuminous diathesis and for this reason there will always be demand for such type of goat products.

## **HORSES**

In horse production, mainly slaughter horses of the cold-blooded type, intended for export, are of commercial importance. Over the past ten years, about 800 000 horses were exported as both live animals for slaughter and horse meat; however, export was higher at the beginning of the decade. Slaughter horses are mainly exported to Italy and to a smaller extent to France. Export of sports horses was insignificant, whereas among the breeding material only pure Arabian horses and a small number of horses of other breeds, including Polish Konik and Hucul, were sold.

## **FUR ANIMALS**

In the production of fur animals the rabbit husbandry has the highest development potential, as rabbit meat has got a very high nutritional value. The total annual production amounts to 2000 tons of carcasses. At present the production of hides is not of a significant commercial importance. Recently, fur animals are becoming more and more popular as pet animals (miniature varieties of rabbits, polecats and chinchilla).

## **FISH**

The consumption of fish in Poland has not changed much over the last years and it remains at a relatively low level, below 6 kg. It includes fish of natural catch rather than produced in aquacultures. The domestic production of carp amounts to some 20 000 tons annually, i.e. little below 0.5 kg per capita. The consumption of carp, once highly seasonal, being a part of Polish Christmas tradition, shows more and more uniform distribution throughout the year. About 40% of the trout production is intended for export.

The fish breeding, sale “from the catch” as well as river and lake re-stocking have a considerable impact on tourism development, particularly important in the northern and southern regions of the country. The traditional technology of rearing carps in ponds supports maintaining of about 60 000 ha of fish ponds in Poland, which, besides their production functions, play an important role in ecology and biodiversity conservation, water retention and recreation.

## **BEES**

In the recent years, the global yearly production of honey averaged to 14 000 tons. During the same time the number and quality of bee products, propolis, royal jelly, bee venom and wax, used in the pharmaceutical and chemical industry as well as in medicine (api-therapy), veterinary medicine and cosmetology has increased. Most of bee products are sold on the domestic market. Honey is the main export and import bee product (177 tons and 1309 tons in 2000, respectively).

### 1.1.4. Major Trends and Significant Changes

The size of livestock population in Poland in years 1990 – 2000 and the dynamic of changes of the population size over the past decade are shown on Diagrams I and II in Annex IV.

The **cattle population** in 2000 had consisted of 6 083 000 heads, including 3 098 000 cows. The cow population has been gradually decreasing since 1989 when it amounted to about 5 millions. As a result the cattle stock rate per 100 ha of agricultural land is low and amounts to 33 cattle and 17 cows only. The decline of the cattle population was due to the abolition of subsidies to market prices of milk and meat, the opening of the market to cheap subsidized import from the EU countries, and lower consumption, resulting from the decreased purchasing power of the Polish people. With the introduction of higher requirements regarding milk quality standards a clear division of producers into two groups is observed: small herds producing for self-consumption and larger herds delivering good quality raw material to dairy plants. The second group of farms invests in milking and milk storage equipment, improves the quality of feeds and management conditions as well as enlarges the herd size. Milk yield is also noticeably increasing, and reached an average of 3 669 kg per statistical cow in the year 2000.

The process of withdrawal from **swine production** was observed not only in the case of the smallest farms, but affected the large farms as well. In recent years, the pig production has been considerably decreased from 19 464 000 heads in 1990 to 17 122 000 in the year 2000. However, the decline in pig number did not result in the decrease of the total pork production, which has grown from 2 341 000 tons in 1995 to 2 501 000 tons in the year 2000. Consumption of pork has shown a similar increase from 1 433 000 tons in 1990 to 1 494 000 tons in the year 2000. The reduction of pig population affected the entire sector of agricultural supplies and services. The demand for feedstuffs decreased, especially for cereals, leading to reduction of their prices and lower profitability of cereal production. Considering all market factors, global economic recession, development trends of medical sciences and increased activities towards rehabilitation and protection of environment, it can be presumed that if the production and consumption of pork increases, the increase will be slight.

From 1990, the concentration of **laying hens** production has been growing noticeably. While at that time farmyard production provided almost half of all eggs consumed (48%), in the year 2000 it supplied just 24.6% of the internal market and its share is expected to drop to 17.8% in 2002, with a stable downward trend in the future.

Since 1986, when the highest sheep number, almost 5 million, was recorded, the **sheep population** has been constantly decreasing and since 1991 the decline is dramatic. In December 2000, the sheep population constituted 336 762 heads, with 228 628 yearlings and older ewes. The number of ewes registered in the flock books was accounted for 47% of the overall population of ewes. In 1990, at average there were 22 sheep, 13 ewes kept per 100 ha of agricultural land, while in 2000 the stocking rate fell to 2.0 sheep (1.2 ewes) per 100 ha.

The future development of **goat** husbandry will depend of the pace and direction of transition in the agriculture structure as well as the demand for goat dairy products, especially cheese.

Population of **horses** is gradually decreasing – in 1990 there were 941.1 thousand horses and that number fell down almost by half in the year 2000 to 549.7 thousands. Over the past

several decades the importance of horse, as complementary draught power in field works, agriculture and delivery transport dropped substantially. With the increased opportunities to export slaughter horses, some farmers, like in the northern-east regions of the country, re-oriented to production of a larger number of young horses, keeping from a few to several mares of the heavy built, cold-blooded type.

The importance of classical equestrian sport disciplines such as jumps, three-day event, dressage, carriage contests, flat and obstacle races has remained unchanged level for many years and includes just 2-3% of the horse population. There is a growing interest in horses of various breeds and types for recreation and amateur use, like agro-tourism, cross-country rallies, horseback holidays and hippotherapy. New riding styles like the western style, recreational and sports disciplines unknown earlier in Poland are becoming more and more popular. The role of horses in the landscape management is increasing due to opportunities of free-range grazing of areas where farming production has been abandoned.

In carnivorous **fur animals** husbandry farms with small breeding stock number are being closed down, while at the same time large farms are set up. An increased interest in rearing of rabbits has also been noted.

## **1.2. Assessing the State of Conservation of Farm Animal Biological Diversity**

Poland was one of the first countries, which implemented protection of wild species, having launched in the 1920s a programme for European bison protection, and soon afterwards a programme for conservation of Polish Konik, based on unique system, where horses were kept, in a forest preserve.

Poland has also a long tradition of activities supporting the conservation of native breeds of farm animals, what was proved by successful restitution of Polish Konik, Polish Heath and Swiniarka sheep. The fundamental factor of such activities was the extensive involvement of research centres and academic institutions. From 1980s, concurrently with the first initiatives in this field undertaken by the European Association for Animal Production, Poland has initiated the conservation of most native breeds, assuring financial support for conservation and genetic reserve herds from the fund assigned by Ministry of Agriculture for organizations involved in agriculture development. The state subsidies cover only part, usually 30 – 50% of the maintenance costs of the breeding stock. In many cases conservation of native breeds is possible only because herds are owned by research organizations and therefore receive funds also from other sources, like research grants. For example most breeds and varieties of water and gallinaceous fowl are kept at farms belonging to the National Research Institute of Animal Production.

Conservation and genetic reserve herds are also eligible for pedigree breeding subsidies, and they are entitled to breeding services related to the performance recording and herd book keeping which are partially financed by state budget through target subsidies for institutions entrusted with relevant tasks.

Following the important message of the Convention on Biological Diversity regarding specific role and need for conservation of agricultural biodiversity (decisions II/15 and III/11), Poland joined countries implementing the FAO Global Strategy for the Management

of Farm Animal Genetic Resources. In this respect, in July 1996 the Minister of Agriculture and Food Economy established an organizational structure that was recommended by the FAO; delegating coordination of activities for conservation of farm animal genetic resources to the Central Animal Breeding Office. From January 2002, the National Focal Point for AnGR operates as an internal division of the National Research Institute of Animal Production in Cracow.

Performance of so wide-ranging tasks requires close cooperation and effort of all stakeholders, breeders and experts as well as institutions and organizations involved in animal breeding and production. The Advisory Board and Working Groups for respective species and groups of animals (cattle, horses, sheep and goats, pigs, poultry, fur animals, bees and fish) provide a platform for such interaction and cooperation. The experience in the operation of the National Focal Point for AnGR confirmed importance of such a structure, since many initiatives were implemented thanks to the engagement and commitment of members of Working Groups and Advisory Board, and the institutions they represent.

In 1999, a development of the National Programme for Conservation of Animal Genetic Resources was initiated. In May 2000, the Minister of Agriculture and Rural Development approved breeding programmes for conservation of genetic resources of indigenous animal populations. These programmes contain information about the origin and development of a particular breed and rationale of its conservation, set the conservation goals, action plan and time table along with the scope of implementation of *in-situ* and *ex-situ* conservation measures. They also determine rules and methods of breeding work and indicate organizations responsible for programme implementation. **In total 32 programmes for conservation of genetic resources have been approved, which include 75 breeds, varieties and strains of farm animals and fish** (Table 1, Annex IV).

The genetic resources conservation programmes are based on *in-situ* conservation method, which facilitates utilization and improvement of specific and valuable traits of a particular breed. Some of native breeds can also contribute in particular production systems on a broader basis, like Pulawy pigs can be used for the crossbred gilts production for commercial herds, while Green-Legged Partridge and Yellow-Legged Partridge for small scale farmyard rearing. The production of labelled products originating from native breeds is still small in scale, though various initiatives in this respect are more and more frequent. They are mainly undertaken by non-governmental organizations keen on promoting the conservation of agricultural biodiversity as an accompanying measure in wildlife and habitat protection.

Native breeds of farm animals are not just a living heritage and testimony of the Polish breeding. The expanding agro-tourism recreation encourages utilization of native breeds on a larger scale not only to obtain high quality animal products in natural rearing conditions, but also to make native breeds a vital element of the rural landscape.

In future herbivorous animals would play a greater role in vegetation control and landscape management. This aspect is of a special importance in some high nature value areas and protected areas where grazing is essential for maintaining specific ecosystems and associated wildlife biodiversity. The examples include permanent grasslands of mountainous and highlands regions, river valleys, meadows and woodland meadows. In Polish conditions vegetation control is especially important in the areas, where agriculture production has been suspended (fallow areas). For such type of environmental services native breeds seem

specifically suitable being perfectly adapted to local environmental conditions and extensive production systems. This, however, requires relevant legal regulations.

To legalize activities already undertaken, as regards *ex-situ* conservation in November 2001, the Ministry of Agriculture and Rural Development identified institutions responsible for collecting and storing of biological material of farm animals and fish populations included in animal genetic resources conservation programmes: the National Research Institute of Animal Production in Krakow (for cattle and sheep), Horse Reproduction Centre with Stallion Herd Ltd. in Łąck (for horses), Institute of Animal Reproduction and Food Research of Polish Academy of Sciences in Olsztyn (for rainbow trout) and Institute for Ichthyobiology and Aquaculture of Polish Academy of Sciences in Gołysz (for carp).

At present, *ex-situ* banks are carried out for Polish Red cattle, Polish Heath sheep and Swiniarka sheep, rainbow trout and carps. The National Research Institute of Animal Production within the framework of the previous programmes for conservation of farm animal genetic resources collected 40 850 doses of semen and 1923 embryos of Polish Red cattle and 1460 doses of semen and 36 embryos of Swiniarka and Polish Heath sheep. The bank for rainbow trout set up in 1999 stores about 40 thousand doses of semen while established in 2001 bank for carp has got 10 thousand doses of semen.

## CATTLE

The programme for conservation of the cattle genetic resources includes **Polish Red cattle**, which is one of the oldest breed amongst autochthon cattle in Europe. It is characterised by good adaptation to harsh environments, modest feed requirements, high resistance to diseases and good health, longevity, very high fertility and calving ease, which is connected with high survival of calves and good rearing results. Lower milk yield of Polish Red cows is compensated by its very good quality: high protein, fat and dry mass content; such milk is useful for cheese-production. Long term efforts to increase milk yield by upgrading Polish Red cattle with other red breeds, mainly Angler, led to dramatic decrease of purebred Polish Red population.

## PIGS

Three native pig breeds are included in genetic resources conservation programme. **Pulawy** pigs are spotted, black and white, with domination of black colour. They are resistant to diseases and stress, well adapted to unfavourable environmental conditions and have high litter size reproduction performance. Pulawy is an early maturing breed with high capabilities to intramuscular fat deposition, producing meat of a very good quality. **Zlotniki Spotted and Zlotniki White** are characterised by good adaptation to poor rearing conditions, resistance to diseases and stress, their meat is of high quality with large intramuscular fat deposition. Fatteners of these three breeds both purebred and crossbreds, although have higher carcass fat content, produce meat of exceptional taste merits, in particular suitable for the production of durable smoked products.

## POULTRY

The programme for conservation of genetic resources of **laying hens** includes three native breeds: **Green-Legged Partridge, Yellow-Legged Partridge** and **Polbar** and three locally adapted breeds which were imported to Poland in the 1960s (Leghorn, Rhode Island Red and Sussex). The studies on egg content and quality have shown that eggs of Green-Legged Partridge and Yellow-Legged Partridge have a low content of total cholesterol in yolk (below 12 mg/g of yolk) and highly beneficial HDL - LDL ratio.

At the beginning of 1970s, a Waterfowl Division of the National Research Institute of Animal Production in Dworzyska initiated a unique **collection of endangered breeds and varieties of ducks and geese**, which includes not only Polish ducks but also ducks of foreign origin. Concurrent works have commenced conservation Green-Legged Partridge (ZK strain) and Polbar hens in the Agriculture University in Lublin and Bilgoraj geese in the University of Agriculture and Technology (currently the Warmia and Mazury University) in Olsztyn and Zatorska geese in the Agricultural University in Krakow.

## **SHEEP**

The conservation programmes include 13 breeds and varieties, mostly native. One of the oldest native breeds is **Polish Mountain** sheep with rearing dated back to the 15<sup>th</sup> century (known as *cakiel*). This breed is closely tied with the history and tradition of the Carpathian region and its people. It is perfectly adapted to the climate and traditional systems of rearing in highland areas. It has multi-purposed performance – it provides wool, hides, milk and very tasty lean meat. Dairy utilisation of the breed is an old, long-established tradition of the Carpathian highlanders. Worth particular attention is the **Coloured Variety of Polish Mountain** sheep of a small and highly dispersed population. **Polish Heath** was popular in the northern–east regions of Poland already in the 18<sup>th</sup> century. The breed is characterised by good adaptation to diverse climate and environmental conditions, modest feeding and rearing requirements, longevity and resistance to diseases, early maturing, non-seasonal and uniform level of ovulation and litter size (ewes usually give birth to twins). In addition, Polish Heath sheep has a very good quality hides, thin but durable, very light and warm, excellent for production of wool furs and meat of exceptional and specific taste. **Swiniarka** is a primitive sheep which used to be common in the whole Central Europe. Its beneficial traits include exceptional resistance to harsh environmental conditions, very low feeding requirements and ability to use poor quality feeds, as well as resistance to diseases, especially limping. **Olkusz** sheep is characterised by exceptionally high litter size (ewes give birth to triples, but there are larger litters – even up to seven lambs), high milk yield and good maternal ability. Bred is adapted to rearing in small herds with several heads, based on pastures and farm feeds.

## **HORSES**

Two native breeds are included in conservation programmes. **Polish Konik** is an indigenous Polish small horse breed originating directly from wild horses – tarpans – characterised by mouse-grey coloured hair with a dorsal stripe. Excellent adaptation to harsh environmental conditions, non-discriminatory in feeding and good food conversion, high fertility and resistance, an active yet balanced temper and docile nature and high intelligence are typical for Polish Koniks. They are very good for use, both in charts and for saddle (recreational horse-riding, cross-country, hippotherapy). Part of Konik's the population is maintained at large in natural conditions in forest reserves. **Hucul** is one of the oldest breeds described in Poland, originating from the eastern areas of Carpathians, where it had developed in harsh highland climate under hard working conditions. These are small, well-built robust horses of diverse colour, characterised by exceptional longevity, perfect health and high endurance, and a very good feed conversion. Traditionally Hucul horses were used as pack animals and for work in charts but also as saddle horses. Presently, Huculs are being used mainly for recreation, they are especially suitable to hippotherapy, and horse-riding training because of their extraordinary patience, intelligence, gentle temper and obedience.

## **FUR ANIMALS**

Worth special attention are conserved native varieties of **common fox: Polish White Necked and Polish Pastel**; and **Polish Beige Recessive Chinchilla**. These varieties were established

in a result of spontaneous mutations. The conservation programmes include also **Popielno White** the only one native rabbit breed as well as population of **Polecats**.

#### **FISH**

Programmes for conservation of genetic resources through *in-situ* and *ex-situ* methods involve six lines of carp, including four native lines: **Golyski, Zatorski, Starzawski** and **Knyszynski**, and two native strains of rainbow trout: **strain of autumn spawn** and **strain of spring spawn**.

#### **BEES**

The black bee *Apis mellifera mellifera* is a native bee breed, once found in the whole country, except for the Sub-Carpathian region. The import of exotic bees over the past 40 years resulted in hybridization of the native population and replacing local bees which have lower honey yield, but excellent resistance to winter and unfavourable environmental conditions as well as very a good ability to utilize of various melliferous crops. Two black bee lines: **Kampinos** and **Augustow** were conserved in their primary form in regions of their natural habitats (Kampinowski National Park and Augustowska Forest) and two other: **North** and **Asta** lines were genetically improved with preservation of the most valuable traits of native bees.

### **1.3. Assessing the State of Utilization of Farm AnGR**

#### **CATTLE**

**In the milk production** of cattle the basic role is played by the Black and White and Red and White cattle, which has for many years been improved in this single direction. The goal of improvement efforts is to enhance milk, protein and fat yield and functional traits. Genetic material from the US, Canada, the Netherlands, France and Germany is used for cattle improvement.

The Simmental breed is of minor importance in Poland, maintained locally in the highland areas of Beskid Niski and Bieszczady. The population is improved through the import of semen and bulls from Bavaria and Austria. It is characterised by good milk performance, high leanness and higher than in lowland breeds protein content in milk. It is perfectly adapted to mountainous grasslands grazing. Purebred calves and crossbreds by Simmental bulls are willingly purchased as a good material for further fattening. The semen of Simmental bulls is used for commercial crossing with cows of dairy breeds. There are also suckling herds of Simmental cows for the single-purpose meat production.

The native Polish Red cattle form a small population, whose size has remained unchanged for many years. Within the breed a population was separated and included in the programme of conservation of genetic resources, and this group is maintained as purebred. The remaining part of Polish Red cattle is improved mainly using the Angler breed, what brings positive effects as regards the improvement of milk performance traits.

There are also single herds of the Montbeliarde breed; however, they do not play an important role on the national scale.

**The beef production** is based mainly on the population of dairy cows, for the population of beef cattle breeds does not exceed 20 thousand females. Purebred cows and crossbreds with a

varying share of beef breed genotype (from 50 to 94%) are used in beef herds. An average beef herd consists of about 35 cows.

In 2000, the semen of beef bulls was used for the insemination of about 600 000 cows and heifers in dairy herds. For the production of crossbreds mainly bulls of Limousin (33.3%), Simmental (30.4%), Charolais (12.9%) and Piemontese breeds (10.4% of inseminations) were used. The programme of commercial crossing with bulls of beef breeds includes almost 25% of cows and heifers.

### **The role of the native breeding material and import of genetic resources**

The large number of small farms had an adverse effect on the structure of the active population of dairy cattle in the country. In 2000 only 13% of the cow population was covered by the milk performance recording (398 615 cows in 20 895 herds) and the average herd included in this system consisted of 19 cows. In 2000, performance recording involved 363 711 Black and White cows, 17 788 Red and White breed cows, 3170 Simmental cows and 1456 Polish Red cows and 641 Jersey cows. The milk performance recording of dairy cattle is conducted by the National Animal Breeding Centre. About 61% of the costs of milk recording are paid by breeders, while the remaining amount is covered by the state budget.

The Polish breeding programmes for insemination of bull dams mainly use imported semen of Holstein bulls from the world population. In 2000, in total more than 133 500 portions of semen were imported from the USA, Canada, Germany and the Netherlands, and 265 embryos of the Holstein breed (USA). There moreover 32 young bulls of Holstein breed and 8 Simmental bulls were imported to Poland.

In the past years, over 50 000 heads of female breeding material were imported, mainly from the Netherlands, Germany and France. The import of pregnant heifers accelerated the process of building larger herds specialized in milk production. Similarly, beef cattle herds were established on the basis of import of heifers from the EU countries, which was partially subsidised from the state budget.

The number of inseminated cows and heifers reached 1 842 477. The insemination coverage is insufficient and includes only 59% of cows. In consequence the active population is not large. In 2000, the average number of cows and heifers inseminated with the semen of test bulls was as follows: for the Black and White breed – 538, for the Red and White breed – 581, whereas for Simmental and Polish Red cows 226 and 153 females, respectively. In both breeds the small size of the active population to a large extent restricted the possibility of precise evaluation of bulls and the development of effective breeding programmes.

In 2000, breeding and insemination stations purchased 235 bulls, including 211 bulls of the Black and White breed, 12 Red and White, 4 Polish Red, 7 Simmental and 1 Jersey. In the same year the testing of 264 bulls was completed (241 Black and White, 12 Red and White, 4 Polish Red and 7 Simmental). The number of dairy breed bulls in animal breeding and insemination stations in 2000 totalled 1388. The average milk yield of cows under recording in the 1991 – 2000 period increased by 1297 kg and reached 5379 kg in 2000.

Black and White and Red and White cows are characterised by similar milk yield. The production progress of the population of dairy cows under recording scheme is considered satisfactory. This production progress was achieved as an effect of the genetic improvement of cattle and upgrading of management conditions, in particular the nutrition of animals. The

quality of roughage was also improved, and it became a common practice to use maize and hay silage. Also, the use of concentrate feeds and mineral supplements increased.

**Table 5** Average performance of dairy cows under recording in 2000 – all sectors  
(the National Animal Breeding Centre, Warsaw, 2001)

Breed	Average number of cows	Average yield				
		Milk (kg)	Fat		Protein	
			kg	%	kg	%
Black and White	363 711.1	5 404	223	4.13	177	3.28
Red and White	17 788.9	5 328	221	4.14	174	3.27
Simmental	3 710.6	4 068	160	3.94	135	3.32
Polish Red	1 455.9	3 653	154	4.21	121	3.32
Jersey	641.2	4 468	268	5.99	180	4.02
Other breeds	337.2	4 924	225	4.57	171	3.47

The breeding value of bulls and cows is estimated with the use of BLUP - Animal Model method. In the selection index the protein yield has economical importance twice higher than the fat. The results of the breeding value evaluation of bulls over the past years show that genetic progress was achieved in the case of both the: Black and White and Red and White breeds.

## PIGS

The improvement of pigs in the commercial production in Poland is based on genetic progress accomplished through breeding work carried out in the pig pedigree population covered by performance recording and breeding value evaluation. The national breeding programme involves the utilization of purebred populations to design crossbreeding systems. It is based on a two-stage system, i.e. breeding and commercial production. There are no distinguished elite herds, though such plans are under preparation.

In 2000, the performance control included 31 237 sows (2.0% of the population), where 87% were sows of dam breeds. In recent years an improvement has been observed of the structure of breeding herds, a decline in the number of herds producing boars and gilts and a concurrent increase of the number of herds authorized to produce gilts only. Within the past 10 years breeding herds have been undergoing a continuous concentration process. In 1990, the average number of sows in a herd was 8.4, in 1995 – 12.5 and increased to 27.2 in 2000.

The basic goal in the swine production is to increase the number of piglets obtained per sow in a year by increasing the litter size and shortening the farrowing interval period. The level of reproduction performance of local breeds, especially dam breeds, recorded in breeding herds can be deemed adequate for the implementation of the breeding and production programme (Table 6). More attention must be given especially to the improvement of management conditions to facilitate earlier weaning of piglets.

**Table 6** Average results of reproductive performance evaluation for sows in 2000 (the National Animal Breeding Centre, Warsaw, 2001)

Breed	Average number of sows recorded	Number of litters recorded	Number of piglets born	Age at first farrowing (days)	Farrowing interval period (days)
Polish Large White	11 758	20 925	11.56	355	185
Polish Landrace	17 919	31 605	11.59	348	186
Belgian Landrace	76	130	10.14	389	197
Duroc	1 232	2 198	10.36	365	189
Hampshire	738	1 325	10.14	377	190
Pietrain	1 192	2 046	10.87	380	193
Synthetic Line 990	742	1 534	9.31	356	160
Zlotniki White	61	105	9.69	363	197
Pulawy	309	513	11.12	330	203
Zlotniki Spotted	56	84	8.87	423	226

Improvement of leanness of pigs has been playing a significant role in the breeding and production programme for several years. Low lean meat content in the commercial population, presently estimated to be at to 51%, results from deficiencies in management conditions and too slow transmission of genetic progress to production. It is confirmed by the inadequate - compared to the needs - number gilt sold for replacement. In the year 2000, 139 104 replacement gilts were sold, including about 68 770 crossbred gilts against the annual replacement level about 400 000 heads. The evaluation of breeding performance carried out in Poland for fattening and slaughter utilization is based on the own in-vivo performance of boars and gilts in breeding herds. The individual breeding value is defined on the index basis and from 1998 also with the use of BLUP method. The evaluation of the fattening and slaughter performance of boars is also done through progeny testing in four control stations, where the breeding performance of controlled individuals is estimated using of a special index.

It must be said, that while the information flow in the breeding sector is efficient, there is no feedback information from commercial production to the breeding system. Therefore, in cooperation with meat processing plants, implementation of boar evaluation based on after-slaughter appraisal of their progeny reared at commercial farms was initiated. This method aims also to help gather and use information about the impact of boars kept in the Sow Insemination Stations on commercial production.

It should be emphasized that much higher quality of carcass traits was achieved in the pedigree breeding (Table 7) by including percentage lean meat content in carcass in the selection index since 1995.

Performance recording results show that higher leanness must be achieved in the Duroc and Hampshire breeds; in particular in view of the expected decreased interest in the Pietrain in favour of other sire breeds. The results of station-based evaluation confirm such conclusions – in 2000 the average leanness of Duroc gilts accounted for just 57.8%, of Hampshire – 60.5%, and Pietrain – 65.1%, with average daily body weight gain of 749, 778 and 785 g respectively. Gilts of the Polish Large White breed achieved body weight gain of 828 g and 56.1% of lean meat content, not much less than the Polish Landrace breed (840 g and 57.2% respectively).

**Table 7** Average results of in-vivo performance recording of purebred boars in 2000 (the National Animal Breeding Centre, Warsaw, 2001)

Breed	Average backfat thickness (mm)	Daily body weight gain (standardized) (g)	Lean meat content in carcass (%)	Loin eye depth (mm)
Polish Large White	11.0	626	57.7	50
Polish Landrace	11.0	633	57.7	50
Belgian Landrace	9.0	577	59.8	51
Duroc	10.6	605	57.5	48
Hampshire	10.3	598	58.4	50
Pietrain	8.7	612	60.5	54
Synthetic Line 990	10.1	625	58.7	51
Zlotniki White (1998)	12.5	525	55.6	47
Pulawy	12.6	657	56.0	49
Zlotniki Spotted	17.4	518	52.2	50

Progress as regards the leanness of Polish Large White and Polish Landrace breeds can be considered satisfactory. However, special attention needs to be paid to the improvement of the leanness level in sire breeds (except for Pietrain). Certain groups of boars are imported to our country every year, in particular Landrace and Large White, which are included in the breeding of the Polish Landrace and Polish Large White breeds. The import originates from the Scandinavian countries and from England and France. The import of boars also takes place systematically in the case of sire breeds, though it is limited and insufficient to improve the leanness considerably.

From 1987 a gradual increase of the number of inseminated sows is observed. It is estimated that about 38% of sows were inseminated in 2000. In Sow Insemination Stations at the end of 2000 there were about 1601 boars of the following breeds: Polish Large White - 242, Polish Landrace - 511, Belgian Landrace – 11, Duroc – 38, Hampshire – 27, Pietrain – 129, line 990 – 29 and crossbreds – 614.

### Breeding Programmes of International Breeding Companies

Apart from the genetic material, under the National Breeding Programme in Poland, crossbred breeding stock from international breeding programmes are also available. According to data provided by breeding companies (Top Agrar Poland 5/2001) they had the following potential:

<b>Hypor</b> – a Dutch company, member of the Nutreco Group, operates in Poland since 1999	In 2001 the company had a herd of 800 sows.
<b>JSR-Eco Pig</b> – a company operating mainly in Great Britain, in Poland since 1998	The grandparental herd in Poland had 120 sows in 2000. Multiplication herds maintained 1000 sows.
<b>Pen Ar Lan</b> – a France-based company, operating in Poland since 1998	According to data from 2001 the reproduction herd had 1500 sows.
<b>Pig Improvement Company</b> – is active on the Polish market since 1994	There are 6000 sows in reproduction herds.

The Polish legislation is compliant with European legal standards and enables international breeding companies to open and maintain their own registers. Limited sales of hybrid material result mainly from its relatively high prices. The undoubted supremacy of commercial

companies is that they offer large groups of gilts for stocking large farms. It seems that in terms of performance pigs from the commercial programmes are only slightly superior, or not at all, to pigs of the national breeding programme.

## **POULTRY**

The husbandry of gallinaceous fowl is mostly based on imported breeding material. The productivity of commercial crossbreds of laying hens is very good. The average laying performance of hens kept in intensive cage rearing exceeds 300 eggs/hen and in litter pens it reaches 270 – 280 eggs/hen. Chicken crossbreds from national breeding programmes Astra S and Messa P lay more than 300 eggs/hen in cage rearing and in litter pens - 270 eggs/hen, whereas in farmyard - about 200 eggs/hen.

At present, the chicken broiler Cobb 500, Ross 308, ISA 220 and Hybro G are most popular; however producer preferences vary from year to year. The broiler chicken production performance is very good. The average weight of the birds in a 42-day growing period, depending on the type of crossbred, ranges from 2.3 to 2.6 kg using of 1.8 kg of feed per 1 kg of body weight gain.

Presently production results for turkeys do not differ from values achieved worldwide. The average weight of heavy type turkey males in the 22<sup>nd</sup> week of life amounts to 20.1 kg, and 16-week old turkey hens – 12.2 kg, whereas turkeys of medium-heavy type 15.0 and 8.0 kg respectively.

Pekin drakes from domestic breeding within a 7 – 8 week growing period achieve weight of 3.0 – 4.0 kg and ducks 2.5 – 3.0 kg, with a very good feed utilisation, both concentrate and roughage, and splendid health status (mortality below 4%). The average laying performance of ducks in reproduction flocks ranges from 123 to 160 eggs depending on the type of crossbred.

Production results of the White Koluda geese are among the best in the world. The average weight of 17-week ganders is 7.3 kg and geese - 6.0 kg with the use of 4.7 kg of feed per 1 kg of body weight gain. Worth noting is the large weight of breast muscles reaching on average 735 g for both sexes. One goose in a reproduction flock lays on average 67 eggs during a year, which hatch about 46 healthy geese. High quality feather and fly is an additional source of income from the white-feathered geese rearing, intended almost in 80% for export to Western Europe and Japan.

The Random Sample Test method is applied in the performance recording of laying and meat hens since 1968 in the Hen Test Station of in Wroniawy of the National Research Institute of Animal Production, and the Field Testing of Poultry Performance conducted since 1987 by the National Animal Breeding Centre, which also includes parental flocks of geese, ducks and turkeys. Family selection is carried out in breeding flocks, based on the selection index value. In 1970, the National Research Institute of Animal Production developed a SELEKT system, which is continuous improved - as cost-effective and less time-consuming compared with the BLUP- Animal Model - and used with success in most poultry breeding flocks in Poland.

Producers, in choosing the reproduction and commercial material of laying hens and meat poultry, usually rely on their own experience. Efforts are undertaken to reduce the import of commercial nestlings, while increasing the import of parental and grandparental flocks what would allow to carry out crossbreeds' production in Poland.

## **SHEEP**

In view of the new conditions of sheep farming and a shift of production priorities, a programme for prolificacy improvement of the sheep population in Poland was developed in 1994. The Programme, based on the use of upgrading with prolific breeds assumed that there breeds would have 25% share in the population of Polish Merino, Polish Lowland and Polish Long wool sheep. In 1996, the program for improvement of sheep population till 2010 was developed and is effective since 1997. The main goal was the meat production, and four breeding targets had been set: high growth rate of lambs, high prolificacy and maternal abilities of ewes, high quality traits of lamb carcasses and good utilisation of feed.

Since 1995, the performance recording, flock-books keeping and the entire breeding work are carried out by the Polish Sheep Breeders' Society, while the breeding value evaluation is done by the National Research Institute of Animal Production. In a period of reduction and then rapid decrease of sheep population in Poland there is a little chance for adequately organized, fully effective work. The main efforts focus on minimizing losses resulting from non-profitability of sheep husbandry and on the conservation of genetic resources so as not to lose the basis for restoration and development of the population in the future. In 2000, the performance was controlled in 1510 flocks, covering 125318 ewes, i.e. 54.8% of ewe population. In the flocks covered by the performance recording, there were on the average 83 ewes, with the biggest flocks located in the region of Bydgoszcz, Poznań and Olsztyn. The average fertility of the ewes recorded reached 96.6% which considering a prolificacy of 139.5% and 92.9% rearing rate gave reproduction performance of 125.2%.

## **GOATS**

Goats are used in Poland mainly for milk. The production potential depends on the breed and oscillates around 500-600 kg of milk per lactation of White and Fawn Improved; 600 – 1200 kg for Saanen; 600 – 1000 kg in the case of Alpine goats. Goats of native populations are characterised with lower milk yield but a high litter size, good adaptability to harsh conditions and higher fat content in milk. Starting from 1983 the milk performance recording of goats (performed at first in the Opole region only), began to spread over the whole country. In 2002, milk yield recording involved 3689 goats in 86 herds. The average goat concentration in herds under recording schemes was 43 heads.

The milk recording and reproduction performance of goats is carried out by Regional Associations of Sheep and Goat Breeders which also supervise all the breeding work. The selection is carried out on the basis of a method of independent culling levels. The following traits are taken into consideration: coat colour, 300-day lactation yield, weight of adult goat, kid body weight. When choosing the herd buck the dam performance is considered and such buck must be born in twin litters. In order to improve the domestic goat population, breeding stock from various European countries and Africa have been imported to Poland since 1986.

## **HORSES**

Over the past 20 years, the percentage of horses registered in stud books increased from 1.6% to more than 5% of the entire population. This was mainly the result of the decline of the total

horse population. The percentage of horses registered in stud books ranges from about 2.5% for the cold-blooded breed to about 98% for pure breeds. At the beginning of the decade, cold-blooded mares accounted for 43% of the total number of mares entered into books, and for 34% in 2001. The number of mares in the population increased at the expense of gelded horses, used previously as horse-power in agriculture. About 70% of commercial horse population are crossbreds of the cold-blooded type. Mares in commercial rearing are mainly used for reproduction, in order to obtain slaughter foals, and are not used in field work and in transport to a significant extent.

The objective of Arabian horses breeding (oo) is to maintain a specific type of Polish Arabian horse, of substantial nobleness and beauty and suitable courage and, therefore guaranteeing a leading position in the world markets. Owing to a coherent breeding programme and a tradition of more than 200 years, Poland is considered a world leader in Arabian horse breeding. The genetic resources of Thoroughbreds (xx) allow achieving similar results as in most European countries. It is a commonly shared view that the husbandry conditions in Poland (management and the limited gene pool) make it difficult to breed outstanding Thoroughbreds of international class, therefore the domestic breeding of such horses is largely based on stallions imported from England, Ireland and France.

Half-blood horses are mainly used in recreation and sports. Malopolski horses are appreciated in a three-day event, and used mainly as universal recreational horses for people familiar with the basics of horse-riding. Wielkopolski horses (with a bigger height and body frame) are often used for recreation and all equestrian sport disciplines. In the past years they have often been upgraded with Thoroughbreds. Genetic resources of Noble Half-blood horses used for sports are based primarily on utilization of imported stallions. The Silesian horses, the heaviest type of Noble horses, are useful in particular for carriage sports, while their crosses with English Thoroughbred are used for horse dressage and jump competitions. The elder tractive-draught type of Silesian horse, with a larger body frame, provides valuable genetic resources for horses of the Oldenburg-origin.

In pure breeds, the official performance control is done through participation of horses in flat races on tracks in Warsaw and Wrocław. Racing performance of horses is judged on the basis of the number of races won, the sum of financial awards and the general handicap. Stud stallions and dam mares are evaluated also on the basis of the racing performance of their progeny. So far, the breeding value evaluation using modern genetic and population methods like BLUP - Animal Model is not carried out. In half-blooded breeds, station performance tests of young stallions are conducted in training centres, there are also station and field performance tests of mares. For cold-blooded breed only the stallions undergo obligatory performance testing. Such tests include carriage trials performed in field conditions. Native primitive breeds undergo specific performance tests in the field.

## **FUR ANIMALS**

Fur animal farms are included in performance recording, which together with breeding value evaluation is performed by the National Animal Breeding Centre. The assessment includes reproduction performance, animal phenotype and hides evaluation (except rabbits). It is a common practice to apply pure mating in all species of fur animals and breeds of rabbits. In particular cases, different colour varieties within a breed are crossed, in order to achieve new varieties, or because of lethal gene presence (for instance in case of Black velvet Chinchilla and Wilson White Chinchilla). Crossing of various breeds of rabbits for the improvement of production traits is applied only in commercial farms. Import of animals of some species

(common fox, polar fox, mink, raccoon dog and chinchilla) has a positive effect on the improvement of hides quality and the increase of body weight in domestic carnivorous animals.

## **FISH**

There are two carp breeding centres in Poland - Institute for Ichthyobiology and Aquaculture of the Polish Academy of Science in Golysz and the Research Station of Inland Fisheries Institute in Zator, and one breeding centre for rainbow trout – Inland Fisheries Institute, Department of Salmonid Research in Rutki. Some breeding lines of carp and all strains of trout are selected in terms of economically important performance traits (growth rate, exterior, life expectancy, resistance to diseases). Breeding work is based on family selection performed on the basis of a multi-trait selection index.

In the commercial carp production inter-line hybrids are used, previously obtained as the result of crossing domestic and imported lines. Hybrids with high life expectancy, good growth rate and exterior are used for production purposes. Many years of tests have shown that inter-line hybrids produced from domestic lines and lines from Hungary, France and Israel are characterised by a good growth rate and high life expectancy. At present, they form the basis for putting together sets of spawners to be sold to fish farms and also for production of stocking material. In the breeding of trout, the import of spawn from South Africa, the USA and Denmark is substantial, especially outside the reproduction season.

## **BEEES**

In bees, station and field performance testing, and breeding value evaluation are carried out. The station evaluation (carried in breeding apiaries) is used to select the most genetically valuable queens. The field evaluation (carried in commercial apiaries) is used to verify the selection of queens for reproduction and to choose the best crossing sets for various environmental conditions (productivity, nectar flow utilisation, adaptability to climate, behavioural traits, etc.). Performance tests and breeding value evaluation (honey yield, spring development, resistance to winter, gentleness, non-swarming, resistance to fungus) is performed by the National Animal Breeding Centre. Improvement programme is carried out of three breeds important for the bee production. The work is concentrated in breeding apiaries, which include about 0.05% of all apiaries in Poland. The most important technology applied in the mating system is the insemination of queens.

In the queen production purebreed mating, inter-line crossing within a breed and inter-breed crossing are used, of which a valuable component are lines of Central European bees. Crossing programmes aim to upgrade specific traits, to utilize the heterosis effect of hybrids, and to produce bees capable of better adaptation to the ever changing environment.

## **1.4. Identifying Major Features and Critical Areas of AnGR Conservation and Utilization**

The dispersed agrarian structure and low profitability are the basic factors slowing down the development of animal production in Poland. In the present conditions, breeders have no possibility of generating funds which are necessary to modernize and upgrade animal production methods. Producer organizations and breeder associations are still weak. Breeders have not yet shown enough interest in joining breeding programmes. The public interest and

awareness of the activities undertaken to conserve genetic resources and to promote the values of native breeds continue to be very low.

The basic factor hindering the implementation of modern and effective breeding programmes in case of cattle, goats, horses and pigs, is the active population, which is too small and dispersed. In case of cattle rearing the population under controlled reproduction, in particular insemination, is insufficient.

It is possible to increase effectiveness of dairy and beef cattle genetic improvement, if the intensity of bull selection is increased, the estimates of breeding values are more accurate (increase in the number of daughters), and the scope of evaluation is extended (functional traits), while the time of evaluation of bulls is shortened. The importance of improving the functional traits will grow together with the increase of selection intensity. It will be necessary to identify QTL and candidate genes which are responsible inter alia, for the health of animals. Income from milk production can be increased by improving fertility, health status and the length of herd life. For the same reason, higher economic importance will be attributed to improvement aimed at increasing resistance to metabolic disorders and fitness and ease of handling. It ought to be expected that with the increase of milk yield the population of dairy cattle will decrease but the concentration of animals in a herd will increase.

A key element in pig breeding is the improvement of lean meat content of pig carcasses, and reproduction performance of sows. The accomplished progress, as regards the improvement of carcass quality, is considerable, since the average leanness of controlled fatteners (slaughtered in large meat processing plants) increased from about 43% in 1993 to about 51% in 2000. The share of sows in the population is too high, which should cause concern because it indicates unused potential.

The national evaluation and selection programme of breeding pigs as well as the expected production outputs, concerning commercial breeding with the use of double-stage crossing, are adequate and ensure the possibility of genetic improvement of pure breeds and the use of heterosis effects (individual, maternal and paternal), mainly in the improvement of reproduction performance of sows. The effects of the programme are smaller than expected, mainly due to the insufficient use of the results of farm evaluation, station evaluation and BLUP, in selection and mating programmes, and to the limited use of insemination and lack of the efficient mating systems in some of the breeding herds.

**In poultry breeding** the globalization of breeding programmes with a gradual reduction of the number of breeding companies is a real threat for genetic diversity of species and utility types. This process is clearly evident in recent years, both in Poland and worldwide, which creates an obvious need for establishing effective measures for the conservation of these genetic resources.

**Sheep breeding** is undergoing deep crisis caused by the dramatic decrease in the prices for wool after 1989 and lately also for prime lambs, accompanied by lack of internal market for sheep products and their proper marketing. Reduction of the sheep population makes it difficult to carry out breeding programmes for a large number of too small populations, especially in the case of imported breeds. The possibility of performing common programmes for breeds and varieties representing a similar type and origin should be considered. In present economic situation sheep husbandry can be profitable only in case of low-input production,

carried out in a semi-stall system. Sheep grazing, especially in mountain pastures additionally involve a certain risk of losses caused by predators. The use of sheep for landscape management also needs regulating.

Over the past few years **the breeding of goats** in Poland has revived. However the size of active population which is covered by breeding work is still low. In effect, there is no programme in place for evaluation of the breeding value of bucks. Such evaluation is performed for experimental purposes only, but it has not become a routine. The importance of milk use of goats is going to increase, which indicates the need to develop a good programme for genetic improvement of this species.

**The breeding of horses** for the most part is based on the import of reproducers of sport horse breeds. There are about 24 000 mares registered in stud books, which accounts for just 4% of the total horse population in Poland. This hinders the implementation of genetic improvement programmes. A significant novelty is the introduction of the requirement to test saddle use for half-blood stud-horses previously evaluated according to multi-purpose criteria. Performance tests of mares have also been introduced. The aim of these tests is to evaluate the usefulness of these horses for sport purposes before they are included in breeding. The selection, in the initial phase, is based on phenotype appraisal as there is no data yet for the evaluation of breeding value of stud-horses.

In order to speed up the improvement of sport horses stallions imported mainly from Germany and the Netherlands are used widely for reproduction. Hence, the old type of half-blood multi-purpose horse, once used for both farm work and recreation, is quickly disappearing, which poses a threat for the gene pool of the following horse breeds: Małopolski, Wielkopolski and Silesian.

As a result of the direct impact of the world economy and changing fashion on the profitability of the production of **fur animals**, it is necessary to increase the scope of *in-situ* conservation of the sparse populations of native breeds.

At present there are not enough **bee families** compared with the need of pollination of entomophilous crops, especially considering the uneven distribution of apiaries across the country. The programme of bio-fuel production on the basis of rape opens up new perspectives for the development of bee husbandry. The bee populations are recently threatened by the recurrent cases of poisoning caused by improper use of plant protection chemicals.

The dynamic changes occurring over the past years in the populations of farm animals create a threat of considerable **limitation of biological diversity in agriculture**. This refers both to the conservation of native breeds of farm animals and to the maintenance of individual genetic variability within breeds commonly used and intensively improved at present.

Knowledge about the genetic background of traits and the production potential of the native breeds is still insufficient. It is necessary for the Ministry of Agriculture to initiate interdisciplinary scientific research on the genetic analysis of local breeds populations and the identification of the genetic distancing in order to map genes which determine the specific features of these breeds. On the basis of the scientific research the possibilities to use protected native breeds and varieties of farm animals in sustainable agriculture should be

investigated, taking into consideration organic production, environmental protection and preservation of natural landscape.

It is necessary to establish legal framework for actions for the conservation of genetic resources of farm animals and link them more strongly to actions for the conservation of broadly understood biological diversity. An increase of the scope of the current *in-situ* conservation is indispensable. This will require in particular more effective and broader cooperation with farmers maintaining native breeds as well as support for actions leading to improvement of the profitability of their production. Possibilities in this field include the support for production and marketing of brand products and broader use of local breeds in organic farming as well as preferences for native breeds in agri-environmental programmes.

One of the most effective methods for securing the reserves of the genetic material is systematic semen collection of males in controlled reproduction. Therefore, efforts will be undertaken to create an efficient system of gathering and storing semen in *ex-situ* banks, as reserves for the future use.

It is indispensable to implement training programmes for farmers on a broader basis as regards effective animal husbandry, good agricultural practices and conservation of biological diversity. It is necessary to stimulate a broader civic dialogue, assure more effective communication of issues concerning multi-functional character of agriculture, its role in preserving environmental values and biodiversity, in particular the importance of conservation of indigenous breeds of farm animals. Non-governmental organizations should play a key role in all these actions.

## **Chapter 2. Analyzing the changing demands on national livestock production and their implications for future national policies, strategies and programmes related to AnGR**

### **2.1. Reviewing past policies, strategies, programmes and management practices (as related to AnGR)**

The use of genetic resources of farm animals is regulated in Poland under various legal acts regarding broadly understood husbandry and breeding of farm animals. These are in particular:

- Act of 20 August 1997 on the organization of breeding and reproduction of farm animals with later amendments
- Act of 21 August 1998 on the Animal welfare with later amendments
- Act of 24 April 1997 on combating contagious diseases, examination of slaughter animals and Veterinary Inspection,
- Act of 16 March 2001 on organic agriculture,
- Act of 1989 on associations,
- Act of 1982 on social and professional agricultural organizations.

The Act on the organization of breeding and reproduction of farm animals identifies species which are considered farm animals in Poland. The Act regulates issues regarding animal breeding and conservation of genetic resources, performance recording and breeding value evaluation, maintenance of books and registers of breeding animals as well as supervision over breeding and reproduction of farm animals. A regulation of the Minister of Agriculture and Rural Development issued pursuant to the Act, concerning detailed rules on keeping books and registers of breeding animals and setting requirements to be met by breeding programmes envisages implementation of breeding programmes, aimed at conservation of genetic resources of breeds and varieties of farm animals.

The said acts and regulations have a direct impact upon the use of AnGR. They do not establish separate models for the utilization of native breeds and those breeds which have been imported in the past or will be imported in the future. National legislation does not impose any restraints in the distribution of breeds across the country. However, native breeds tend to show certain regional patterns of distribution, mostly resulting from tradition.

The Act on the animal welfare includes restraints and exclusions for the use of certain methods of animal production and breeding in conditions that do not ensure animal well-being. Also provisions regarding the protection of natural environment regulate the start-up and operation of concentrated high-input animal production units by requiring that an environmental impact assessment must be done and administrative permits must be obtained prior to initiation of such production (Regulation no. 589 of the Minister of Environmental Protection, Natural Resources and Forestry of 14 July 1998 regarding the definition of types of investments particularly dangerous for the environment and health of people or potentially worsening the state of environment and requirements to be met by impact assessments on natural environment, Journal of Laws No. 93, item 58). However, there are no regulations

supporting and promoting specific technologies or systems of animal management, hence all legally recognized systems and technologies are treated equally.

Legislation on animal breeding addresses almost all fundamental issues related to the use of animals. Nevertheless, there are no specific regulations supporting and promoting conservation and sustainable utilisation of native species and breeds and encouraging actions to this effect. This is a gap which needs to be addressed with the next amendment of the breeding law, especially as obligations in this respect also stem from international law.

Poland signed the *Convention on Biological Diversity* during the Earth Summit in Rio de Janeiro. By ratifying the Convention in 1996 it became a legal party thereto and assumed all obligations resulting from the Convention. The national strategy for the conservation and sustainable use of biological diversity, which is being developed pursuant to Article 6 of the Convention indicates as its priority the following objective: **„To maintain the entire richness of natural resources and to ensure sustainability and opportunities of development for all levels of its organization (intraspecies, interspecies and supraspecies)“**. The conservation of biological diversity must involve the nature of the whole country, regardless of its utilisation (protected areas and economically active areas) and the extent of its transformation or degradation. The Strategy and Action Plan give much attention to Agriculture, Rural Development and Agricultural Markets. Operational targets for the whole sector assume that a national strategy of conservation of agricultural biological diversity (agri-biodiversity) should be formulated which will include the conservation of agro-ecosystems, genetic resources of crops and farm animals as well as wildlife species and their habitats which constitute a functional element of agro-ecosystems. The National Strategy and Action Plan are presently undergoing inter-ministerial consultation and their endorsement is expected soon.

The conservation of domestic animal genetic resources should be supported also by increased and intensified actions promoting organic agriculture, the development of which is supported by the state budget since 1999. While the number of organic farms increased rapidly (by 55% in 2001 against 2000), it is still small: only about 1800 farms (0.1% of the overall number of farms). The total area of ecological crops in 2001 was over 35 000 ha (0.2% of total agricultural land) where 11 500 thousand were crops in farms already certified. The agri-environmental programme, presently developed by the Ministry of Agriculture and Rural Development, includes activities for *in-situ* conservation of native breeds as well as the use of animals for environmental services. Animal husbandry and breeding in harsh environmental conditions (for instance highlands) and in areas requiring rehabilitation (set-aside) also call for legal regulation.

## **2.2. Analyzing Future Demands and Trends**

### **2.2.1. Profitability of Agricultural Production and Anticipated Trends in 1990 - 2010**

The economic conditions of agriculture have deteriorated significantly with the introduction of market economy rules in Poland in 1990. The demand for food products dropped noticeably, while the cost of credit increased rapidly and support for agriculture from the state budget fell down. Since 1990 the price relation between agricultural products and agricultural

inputs was unfavourable for agriculture. This was reflected in low incomes and declining ratio to non-agricultural incomes. The income disparity (the ratio of agricultural income against income in non-agricultural sectors) which was 92% in 1990 dropped to nearly 55% in 1991 – 1992 then increased to 60% in 1993 – 1994 and 70% in 1995 – 1996 to fall once again to 53% in 1997 and just about 40% in 1998 – 2001. The drop of profitability affected all types of agricultural production, including animal production. The biggest decline of profitability affected sheep production and resulted in a rapid decrease in the sheep population. Other types of animal production were also badly affected by the falling profitability, which varied in respective years and was the outcome of the situation on the relevant markets for agricultural products. High fluctuations of profitability occurred in the sectors of slaughter pigs, poultry and eggs and were carried by changes in the volume of domestic production and prices of feeds due to varying harvest and the scale of cereal import. Milk producers enjoyed comparatively the most favourable situation, though they also went through periods of lower (in the first half of 1990s) and higher (in the second half of the 1990s) profitability. Difficulties in selling domestic agricultural products were additionally deepened by the negative foreign trade balance in agriculture – food products.

In view of changes of prices of agricultural products in 1990 – 2000, only prices of milk increased (by 28%) in 2000 compared with 1990, whereas prices of other agricultural products dropped substantially (fruits by 56%, slaughter pigs and poultry by 54%, vegetables by 53%, eggs by 49%, sugar beet by 41%, wheat by 38%, rye and rape by 35% and slaughter cattle by 33%). These changes explain to a large extent the difficulties in the functioning of farms. Nevertheless, a large part of farms – due to adaptation processes – manages to survive in the more and more demanding conditions of the market economy.

Poland's accession to the EU is going to involve further changes of conditions for agriculture and farms. Experts differ in their opinions about the effects of joining the EU. It is universally accepted that in the longer term benefits stemming from membership in the common European market will be greater from the costs of integration. Since negotiations over agricultural issue have not been finalized yet, it is difficult to estimate definitely all the economic effects of integration for farms. However, it is reasonable to assume that farms with larger share of animal production might be in a somewhat better position than farms focusing on plant production.

In order to achieve competitive advantage on the uniform European market, it is necessary to increase production effectiveness and enhance product quality, whilst satisfying requirements regarding animal welfare and the protection of environment.

### **2.2.2. Trends in Consumption and Volume of Animal Production**

The volume of animal production in Poland in the forthcoming years will be to a large extent determined by integration processes with the European Union and general changes on the domestic and world market of animal products.

The consumption of milk and dairy products has fallen over the past years, as a result of the dropping demand. Unfavourable market conditions combined with high unemployment reduce the demand for food products, including milk and dairy products. This fact will have an adverse effect on the profitability and increase of livestock population of cattle.

The present domestic production of milk is above 11 billion litres. Considering the growth tendency of milk yield per cow - the number of dairy cows is expected to decrease even to about 2 million heads by 2010. The domestic demand for milk and its products is anticipated to increase to about 13 billion litres during the same period.

According to the estimates of EU experts, Poland may expect an increase of the production of slaughter pigs and poultry over the next few years. The production of pigs in Poland is expected to remain on the level of about 2.1 million tons of slaughter weight by 2010. It is further assumed that consumption will not change very much (and is going to increase from 1.8 million tons in 2000 to 1.9 million tons in 2010). Given that consumer preferences in Poland have changed, an increase in per capita consumption of pork is not being expected in the near future.

A systematic increase of production and consumption of poultry meat is expected. However, the scale of such increase may vary. Forecasts show that the production of slaughter poultry will increase from 830 000 tons in 2000 to about 1 050 000 tons in 2002. Certain possibilities of increasing the production of poultry meat will result from the continued consumer preferences in favour of this meat. It is assumed that between 2000 and 2005 the total share of poultry in consumption of meat will increase from 20.5% to 23.6%.

Some increase can be expected in the production of eggs. It is assumed that in the period 1999 – 2005 per capita consumption will increase from 210 to 240 eggs. This will not be reflected in the increase of poultry population, but will rather be connected with higher laying performance. In addition, some increase of consumption of waterfowl meat can be expected owing to its health and taste qualities.

The Polish poultry industry is chiefly domestic market oriented. Rising of prices of pork improve the profitability of poultry meat production and vice versa. Traditionally, pork dominates on the domestic market – the preferences of Polish consumers to consume pork prevail, regardless of the economic and market situation. In the future, apart from poultry, pork products will continue to dominate in consumption. The development of consumption and production of meat in Poland will be to a great extent determined by the income level. In Poland the demand flexibility for meat is very high and reaches 0.47 (for poultry it varies from 0.33 in groups of high income to 0.46 in low-income groups).

To conclude, by 2010 the livestock population of individual species will not undergo significant changes compared to the present state. According to forecasts, the population of pigs and poultry will be maintained at the current level, whereas the population of dairy cows may fall to about 2 million head - unlike beef cows, which will increase to 0.5 – 1 million depending on the number of subsidies granted for beef cattle. It cannot be excluded that on Poland's accession to EU, sheep production may be revived and the number of sheep population may increase following legal regulation of the role of sheep in environmental protection. At the same time an increase of per capita output of animals can be anticipated, related to the on-going genetic and technological progress and the need to increase production efficiency. The population of native Polish breeds can increase owing to the development of organic methods of production, which are less intensive and require animals to be more resistant to diseases and adapted to use own feed resources of farms.

The increased consumption of high value rabbit meat is linked to enhancement of standard of living. However, it is expected that rabbit production in Poland will still be based on backyard

rearing and may become one of the alternative sources of income in regions of structural unemployment.

### **2.2.3. Trends in Production Systems**

There has been a significant increase in the concentration of animal production over the past 10 years, while at the same time the number of farms producing animal products diminished and the production methods gradually shifted to intensive systems using advanced technologies. This process calls for changes in the organization of production allowing for better use of the genetic potential in breeding and production. The main reason for specialization, concentration and intensification is the profitability decline of farm production, in particular animal production. Smaller unit profitability of animal production requires increased scale of production and promotes more efficient rearing methods and technologies. Lower production profitability has, however, negative impact on investment potential and in case of small farms practically hinders development. This leads to an even more apparent separation of producers into two groups of different development capability – i.e. large and economically strong farms with good chances to obtain credit and development prospects and small subsistence farms without investment potential. Concentration, specialization and commercialization are most apparent in the production of poultry and pigs. In case of dairy cattle the pace of changes is much slower, but it is steady. Sheep husbandry will become more and more extensive due to low profitability and the possibilities of linking it with programmes to protect the environment. No changes in the systems of goat and horse production are expected.

### **2.3. Discussion of Alternative Strategies in the Conservation, Use and Development of AnGR**

It is difficult to ascertain to what extent **cattle husbandry** will make use of sustainable ecological production systems, based on farm-produced fodder, mainly on grassland. Poland with its natural uncontaminated grasslands and traditional production systems could produce “out the pasture” high quality milk and beef for direct consumption.

There are no changes expected in the **pig husbandry** in Poland as further efforts will be undertaken to produce slaughter pigs of high quality. Breeding work will be focused on increasing the content of lean meat in carcass, whilst maintaining its high quality. There will be efforts to introduce evaluation based on the BLUP method for reproduction, fattening and slaughter performance, with economic weight taking into account the separation between dam and sire breeds, and also to use genetic markers in selection work on a broader basis and in defining diversity and genetic distancing. Native breeds included in genetic resources programme will be subject to conservation. It is crucial to assess their genetic diversity and to ensure adequate population size and number of herds. It is expected that such breeds will be used in organic farms which will be associated in producer groups to facilitate production and sell of brand products. If the objective of effective conservation of pig genetic resources is to be met, it is necessary to develop health programmes based on appropriate legal framework.

Large areas of natural permanent grassland free of chemical contamination together with traditional production systems open up development prospects for **sheep production**. It is

impossible to overestimate the importance of sheep farming for local societies as an element of diversification of animal husbandry. Sheep are also important as a cultural factor in preserving local tradition and as a method of combating structural unemployment in agricultural regions with no possibilities of animal production other than sheep husbandry.

As regards **poultry production** a systematic limitation of cage rearing of laying hens is expected, whereas the share of alternative rearing and in open yards rearing is to increase. The production of poultry meat over the next ten years in the *label rouge* system will not exceed 10% of total production.

It is expected that draught **use of horses**, especially of half-blood breeds, will continue to fall. The development of cold-blooded slaughter horses for export will require effective solutions to be found with regard to ethical considerations concerning the transport conditions. The use of horses in sport will most probably remain unchanged, while all forms of their recreational use are expected to grow, in particular in agro-tourism, amateur sports (cross country, skill contests, jump and dressage contests of lower classes, carting shows, amateur shows of old forms of horse use) and the development of hippotherapy. The importance of horses kept to satisfy human emotional needs will increase. This, however, will largely depend on the level of income. Due to low management requirements and easy rearing, the breeding and husbandry of domestic native breeds (Konik, Hucul) is expected to expand. These breeds can also be used in a landscape management in high nature value areas.

#### **2.4. Outlining Future National Policy, Strategy and Management Plans for the Conservation, Use and Development of AnGR**

The Ministry of Agriculture and Rural Development (through specialised services) supervises the implementation of provisions of the Act on the organization of breeding and reproduction of animals of 20 August 1997. This involves the process of decentralization of the management of breeding, insemination and animal production by delegating rights and obligations to organizations representing animal breeders and producers. Control functions over breeding will remain within the remit of state authorities. It is assumed that the information system and databases, necessary for breeding value estimation, will be operated by a state institution subordinated to the Ministry of Agriculture and Rural Development.

The approval of the National Strategy for Conservation and Sustainable Use of Biological Diversity will speed up and formalise the implementation of tasks concerning the conservation of genetic resources of farm animals. The strategy involves the preparation by the Ministry of Agriculture of a strategy for the conservation and sustainable use of biological diversity in agriculture. Work on this document should be carried out in parallel with the allocation of State Budget funds to support the costs of conservation of agricultural biodiversity, in particular of farm animal genetic resources. The allocation of a separate fund to finance the conservation of agricultural biodiversity would make it possible to establish long-term cooperation with breeders taking part in the *in-situ* conservation programmes, and facilitate the use of emergency funding in cases when the existence of valuable resources is threatened and there is a need of prompt response, e.g. in the case of herd relocation. The strategies currently developed will be taken into account in the amendments of the relevant legal acts.

## **Chapter 3. Reviewing the State of National Capacities and Assessing of Future Capacity Building Requirements**

### **3.1. Assessment of national capacities**

From 1975 the state policy on breeding and insemination of farm animals was executed by a state budget organization, i.e. the Central Animal Breeding Office and its branch units: Regional Animal Breeding Offices responsible for performance recording and keeping herdbooks of pedigree animals as well as the Breeding and Animal Insemination Stations implementing programmes on evaluation and selection of bulls and providing insemination services, mainly for cows and sows. At the end of the 1980s studbook keeping and breeding of horses were excluded from the structure of the Central Animal Breeding Office and delegated to the Polish Horse Breeders' Association and in 1995 the same decision was made with reference to sheep and goats, whereby relevant authorizations were delegated to the Polish Sheep Breeders' Society.

Starting from 1 January 2002, the Central Animal Breeding Station was closed down and the National Animal Breeding Centre was established to keep herdbooks and registers, and to carry out performance recording of animals of all species, except for horses, sheep and goats. At the same time four sole shareholder companies of the State Treasury were set up to operate on a countrywide basis and perform services previously provided by the Breeding and Animal Insemination Stations. In 2001 the maintenance of herd books and in July 2002 also the realization performance recording scheme for Zlotniki White and Spotted pigs was entrusted to the Agricultural University in Poznań; and to the Polish Association of Pig Breeders and Producers POLSUS for Pulawy breed. Also, in July 2002 similar authorization, regarding beef cattle was granted to the Beef Cattle Breeders' Association. The animal breeding value evaluation is performed by the National Research Institute of Animal Production and National Animal Breeding Centre (Table II, Annex IV).

The Polish Horse Breeders' Association is responsible for keeping stud books of Malopolski, Wielkopolski, Polish Noble Half-blood, Silesian, Coldblooded, Hucul and Polish Konik breeds and a register of ponies and small horses. For these populations the Polish Horse Breeders' Association carries out performance recording. In recent years grass-roots initiatives focus on setting up Breed Societies and transforming Polish Horse Breeders' Association into a federation of these societies. Stud books of Arabian and Thoroughbred horses are kept by the Polish Horse Racing Club.

Activities regarding keeping herd books and registers and performance recording and breeding value evaluation are supported by the state budget. The amount of financial support as well as titles and numbers of required tasks are defined each year by Regulations of the Minister of Agriculture and Rural Development. In accordance with the Act on organization of breeding and reproduction of farm animals of 20 August 1997 all activities related to the books keeping and performance recording will be transferred to relevant breeders associations. With the current changes regarding competence over breeding work breeders will be able to directly influence and implement breeding programmes and also to define breeding objectives, both on the national and regional scale.

In the year 2002 the National Animal Breeding Centre has initiated its new mission control activities over breeding and reproduction of horses, sheep and goats as well as part of breeding work performed outside the National Animal Breeding Centre, such as artificial insemination, evaluation and selection of reproducers, use of reproducers in natural mating units. The National Animal Breeding Centre is also getting prepared to initiate control over other species of farm animals with the ongoing decentralization, privatization and socialization of management of animal breeding and recording and progressing process of handling over responsibilities over breeding by the Minister of Agriculture to breeders associations or other units.

The structure of breeders associations differs depending on species: Polish Cattle Breeders' Federation groups 18 regional associations of dairy cattle breeders; there is also a separate Beef Cattle Breeders' Association. Pig breeders are associated in the Polish Pig Breeders' Federation in Poznań (11 regional units) and the Polish Association of Pig Breeders and Producers POLSUS (24 regional units). The Polish Sheep Breeders' Society brings together 12 regional associations of sheep and goat breeders and the Polish Horse Breeders' Association has 15 voivodeship associations. There are three countrywide poultry associations, such as: National Chamber of Poultry and Feeds Producers, National Poultry Council – Chamber of Economy and Polish Association of Poultry Breeders and Producers. Breeders and producers of herbivorous fur animals have established five associations, whereas breeders of carnivorous fur animals are associated in the Polish Association of Fur Animal Breeders and Producers, which is a federation of non-governmental and independent district associations (5) as well as other organizations gathering breeders and producers. The Polish Beekeepers' Association groups regional and voivodeship beekeepers' associations. In addition, there are three nationwide beekeepers' societies.

Breeding information and advisory services are provided mainly by organizations responsible for herdbooks keeping and performance recording, by breeding and insemination stations, research and development institutions and breeders' associations and also by veterinary services. Extension services operating in the country are subordinated to the Ministry of Agriculture and include the National Advisory Centre for Agricultural and Rural Development with its 7 regional centres and 46 advisory centres for agriculture. Extension services regarding animal management technologies are increasing in importance. They are provided by commercial breeding companies, feed companies and supplier companies, producing specialist equipment.

There are three state agencies directly involved in agriculture:

- State Treasury Agricultural Property Agency
- Agency for Restructuring and Modernization of Agriculture
- Agricultural Market Agency

**The State Treasury Agricultural Property Agency** acts towards setting conditions that would support the use of production potential of state treasury agricultural resources. The Agency groups pedigree breeding farms which have significant impact on the performance of breeding programmes.

**The Agency for Restructuring and Modernization of Agriculture** supports, through national and foreign funds, investment and modernization initiatives in agriculture and food processing industry, advocates improvement of the agrarian structure and supports enhancement of professional qualifications of rural inhabitants, develops technical and

production infrastructure of rural areas and agriculture and last but not least supports investments relating to establishment of agricultural stock exchanges and wholesale markets.

**Agricultural Market Agency** performs state intervention policy to stabilize the market of farming and food products.

### **3.2. Information systems**

Information systems in Poland have been developed to respond to the current needs of relevant institutions and organizations. Among the most important institutions/organizations comprising the current agricultural information system are the Central Statistical Office, Customs Head Office, Ministry of Agriculture and Rural Development together with their subordinate agencies and other governmental agencies and research and development institutes. Information gathered thereby can be divided into two groups: statistical information and market information. The frequency and scope of information distribution are highly diversified: from annual reports to daily reports.

In connection with preparations to Poland's integration with the EU, extensive work is being undertaken to expand and enhance the information systems, so as to adapt them to EU systems. These include the system of obligatory identification and registration of farm animal, integrated management and control system at farm level and monitoring system of respective agricultural markets both in Poland and abroad. A substantial body of information in this field has already been gathered while additional information will be collected once complex information systems are in place.

A broad scope of gathered information relates to rearing and breeding of respective species of farm animals. Depending on the species, the collection and processing of performance and breeding data is either the responsibility of the National Animal Breeding Centre and its branch units – for such species as cattle, pigs, poultry, bees; or breeder associations in the case of horse and sheep, some competence in this area belong to the National Research Institute of Animal Production. There are three running information systems applied for appraisal and breeding work at the moment: SYMLEK for evaluation of performance and breeding value of dairy cattle; BUHAJE – for registration of bulls and evaluation of their breeding value, and INSEMIK which collates data regarding the production of semen, its trade and insemination. With reference to pig breeding all of the data is gathered and stored in OSHZ-Trzoda system, which functions in regional branches of the National Animal Breeding Centre. The performance data stored by OSHZ-Trzoda are transferred twice a year to OSHZ-Trzoda central database, and to SEPIT system in the National Research Institute of Animal Production in Krakow for further analysis. The computer database on active sheep populations, maintained simultaneously in the National Research Institute of Animal Production and the Polish Sheep Breeders' Society is based on the OWCE system initiated in 1993.

In order to monitor endangered native populations, a national database was set up at the end of 1990s, to gather information about genetic resources of farm animals included in a conservation programme coordinated by the National Focal Point for animal genetic resources (National Research Institute of Animal Production). Information stored in the national

database includes description, performance data and population size of respective breeds, varieties and lines.

The following governmental agencies are also involved in gathering specific data on animal production: Agricultural Market Agency, Agency for Restructuring and Modernization of Agriculture, Main Veterinary Inspectorate, Main Inspectorate for Purchase and Processing of Agricultural Products and Agricultural and Food Quality Inspection. The Agricultural Market Agency collects information about the market prices of pork half-carcasses, skimmed milk and butter. The Main Inspectorate for Purchase and Processing of Agricultural Products – apart from control functions in purchase and processing organisations – maintains a register of purchase and selling prices of meat and milk products.

So far there had been no structural links between organizations gathering and processing various types of information. Efforts to change this situation are already undertaken in order to ensure consistency of methods of data collection and processing and also to facilitate adaptation to information systems being used in the EU.

### 3.3. State of Modern Technologies in Animal Production

#### 3.3.1. Biotechnology of Reproduction

Artificial insemination and cryopreservation of semen, which date back in Poland as far as the second half of 1940s, are now applied in cattle breeding on a large practical scale. The use of such reproduction method for other species of farm animals, i.e. sheep, pigs, horses and rabbits is much smaller, due to lower reproduction performance of males of these species and difficulties connected with preservation, mainly freezing of the semen. Current state of art in cryopreservation of male semen for respective animal species in Poland is shown in table below:

<b>Cattle</b>	The freezing method is mastered very well and applied in practice.
<b>Sheep</b>	The fertility of frozen semen is about 60% when rams and ejaculates are pre-selected (elimination of about 30% of males and of about 25% of ejaculates). The use of intra-uterus insemination increases results to 65%.
<b>Goats</b>	The method applied allows to obtain fertility results ranging from 50% to 70%. Elimination of both bucks and ejaculates is small (about 10%).
<b>Pigs</b>	High selection of boars (75% of males) and ejaculates (about 50%) allows for obtaining about 50% of conceived sows. If such intensive selection is not applied, the fertility of frozen semen is much lower, and the litter size is also reduced. If intra-uterus insemination instead of intra-cervical insemination is applied (justified in special cases), the effectiveness of the used frozen semen of boars can increase considerably.
<b>Horses</b>	The current methods of cryopreservation allow to obtain a similar fertility to that with fresh semen. However, selection and elimination of about 20% of both stud-horses and ejaculates is necessary.
<b>Rabbits</b>	In case of 50% selection of males, 75% of frozen ejaculates can be expected to have fertility comparable with fresh semen with litter size decreased by about 20%.
<b>Poultry</b>	Fertility of frozen semen of cocks is about 30% lower than that of fresh semen. However, owing to the specificity of poultry reproduction the conservation of poultry breeds through cryopreservation of semen seems of a little use.

### Sexing semen and embryos

The National Research Institute of Animal Production carries out studies concerning the use of flow cytometry for sexing semen of males of farm animal species. It is planned that first inseminations with the sexed bull semen will be performed in the second half of 2002. The applied method (polymerase chain reaction) allows sex identification of cattle embryos in all stages of pre-implantation development. In addition, this method assures a very high level of reliability of sex analysis, conducted on the basis of several cells of trophoblast.

### Increasing the use of reproduction capacity of females

The embryo transfer is used on a little practical scale in Poland. Embryos are obtained from both domestic and imported female donors. Several teams perform more than a thousand such treatments each year. The ET method was used in the Polish MOET dairy cattle breeding programme.

### In vitro production of embryos

The first calf in Poland coming from a complex *in vitro* procedure was born in the National Research Institute of Animal Production in 1990. The use of that method for cattle allows to achieve 30-40% blastocysts. If oocytes are obtained *in vivo* (the OPU method), the efficiency of this method is two times lower. Studies regarding IVF of sheep, goats and horses are also conducted. IVF method was found highly effective with reference to goats.

### Conservation of embryos

Cryopreservation facilitates practical implementation of embryo transfer programmes, established of genetic reserves and realisation of the conservation programme for endangered breeds. The effectiveness of embryo cryopreservation methods accomplished in Poland is shown in the table below:

<b>Cattle</b>	Efficiency of cryopreserved embryos transfer is about 50 – 60% and is lower by 10- 20% compared with fresh embryos.
<b>Sheep</b>	Efficiency of embryo cryopreservation is about 50-60% and is lower by 10-20% compared with of fresh embryos.
<b>Goats</b>	Efficiency of cryopreserved embryo development is about 50-60% and is lower by 10-20% compared fresh embryos.
<b>Pigs</b>	So far no piglets were born through transfer of cryopreserved embryos. The National Research Institute of Animal Production carries out a research programme regarding vitrification of pig embryos.
<b>Horses</b>	There is a possibility of freezing horse embryos. In cooperation with the Institute of Animal Genetics and Breeding of the Polish Academy of Sciences in Jastrzębiec and Agricultural University in Krakow one of the first foals in the world was obtained with the use of this method in the 1980s.

### Cloning of farm animals

The first monozygotic sheep and bovine twins in Poland were produced through embryo bisection in the National Research Institute of Animal Production and in the Institute of Animal Genetics and Breeding of the Polish Academy of Sciences in Jastrzębiec in the 1980s. In addition, the Institute of Animal Genetics and Breeding and the National Research Institute of Animal Production conduct studies about farm animal cloning, including somatic cloning using nucleus transplantation method (rabbits, sheep, goats, pigs and cattle). *In vitro* development of several to several dozen percent of reconstructed embryos is successfully accomplished. In the Institute of Animal Genetics and Breeding sheep from transplantation of

embryonic nucleus, and rabbits coming from serial cloning have been obtained. The first pregnancies in sheep and goats were already achieved after transfer of embryos obtained from somatic cloning. Moreover experiments to obtain lines of stem cells and their use in cloning and production of transgenic animals have been carried out for last few years.

### **Transgenic animals**

Studies on transgenesis are conducted in several scientific centres in Poland.

The main areas of interest include: modification of milk composition and production of pharmaceuticals in milk and other body fluids (rabbits, goats and pigs), the use of genetic constructs regulating growth (cattle, pigs, hens and fish), and finally, production of disease resistant animals (rabbits). Moreover, there are plans to initiate research regarding xenotransplantation.

### **3.3.2. Molecular Genetics**

Laboratories in research institutes are prepared to test possible carriers of well-known genetic bovine defects such as BLAD, DUMPS or CVM syndrome. Also, the genotypes of milk protein are identified. The laboratories verify the origin of animals based on the analysis of DNA microsatellites. Routine tests to confirm pedigree are supervised by the National Animal Breeding Centre and conducted with the use of traditional methods i.e. blood groups and polymorphism of certain proteins and enzymes. Research institutes perform routine tests in order to eliminate RYR1 gene mutation closely linked with PSE meat defect from the pig population in particular from parental breeds. As regards official control of horse origin there are three nationwide laboratories, which perform, by breed, immunogenetic analyses and tests of genetic markers and issue certificates, confirming compliance of horse origin with pedigree data.

### **3.4. Research**

Scientific research concerning animal breeding and production is conducted by research institutes, laboratories of the Ministry of Agriculture and Rural Development, agricultural universities and units of the Polish Academy of Sciences. Research projects are financially supported by the State Committee for Scientific Research, which allocates funds for statutory activities, and for special research activities of eligible institutions. Scientific studies are also supported through research grants for individual projects, targeted projects and through grants undertaken on request of governmental organisations. The funds allocated for science in the state budget are insufficient, and they accounted for just 0.34% of GDP in 2001.

The need for scientific research regarding animal genetic resources is tremendous. Many conserved native breeds have not yet been subject to a complex assessment. It is important to undertake extensive studies which will allow identification of specific unique features of indigenous breeds that are distinguishing them from other breeds used in the commercial production. It is necessary to determine to what environmental conditions and production systems conserved breeds are best fitted, and what specific products they can deliver. Research should facilitate a broader utilization of native genotypes in the organic farming or sustainable production. Taking above into consideration, the opportunities to produce crossbreds between native breeds and commonly used breeds should be also examined.

### **3.5. Education**

There are nine public Agricultural Universities operating in Poland with faculties providing education in the field of breeding and animal production. These faculties offer bachelor and master-of-science education in a regular and extramural system, post-graduate and PhD studies and professional courses. Almost 1700 students are enrolled for regular studies at animal breeding faculties each year in Poland. Some private universities are also offering bachelor-degree studies in animal production.

The education in vocational agricultural schools (vocational schools, technical schools vocational high schools and post-graduate schools) comprises 21 occupations within the field of agriculture and food economy. According to the Central Statistical Office reports in the 2001/2002 academic year 97 665 students were studying in 1208 vocational schools (both public and private) and 12 605 attendants participated in courses carried out in 201 schools for adults. Agricultural schools are organized in teams (about 350) or function as individual units (approx. 100). As a result of implementation from 1 September 2002 of a new high school educational system, agriculture schools are re-examining and broadening their educational programme by introducing non-agriculture directions.

### **3.6. Promoting Conservation of AnGR**

One of the weak areas in activities towards conservation and sustainable use of animal genetic resources is insufficient dialogue and interaction with the society. In general, the knowledge of the public about agriculture and animal production issues is very small. More aware part of the society perceives these problems either in terms of threats for human health, or in the lights of animal welfare. This situation reflects general lack of environmental background of the public in Poland, inappropriate attitude and behaviour relating to various aspects of nature and biological diversity protection. Public media have to play a crucial educational role in this field creating public awareness, nevertheless, it does not relieve the Ministries of Environment and Agriculture of the duty to formulate strategies for communicating these very important issues to the society.

Valuable initiatives as regards exchange and promotion of scientific information are undertaken by scientists and breeders. National and international conferences on animal breeding, health and management are organized every year. Many of them are organized under the auspices of the Polish Association of Animal Production and other scientific associations. The National Animal Breeding Shows, that present and promote Polish animal breeding, in the recent years had included separate expositions of native breeds, highly appreciated and enjoyed by visitors. Most of promotional actions are conducted by horse breeders, who each year are organising numerous regional and international events such as Breed Championships, Young Horses Championships, horse races, horse breeds, International Auction of Arabian Horses in Janów Podlaski, Arabian Horses Championships, Days of Hucul Horses, Tarpaniada (devoted mainly to Polish Konik), International Horse Fairs, etc.

## Chapter 4 Identifying National Priorities for the Conservation and Utilization of AnGR

On ratifying the *Convention on Biological Diversity* in 1996 the government of the Republic of Poland assumed all obligations under the *Convention* and declared its will to implement main objectives of the *Convention*, i.e. conservation and sustainable use of biological diversity and fair distribution of related benefits. Poland actively participates in the work of the Conference of the Parties to the *Convention*, as well as in other initiatives and international cooperation in this field, especially in the activities of the Commission on Genetic Resources for Food and Agriculture of FAO. Within cooperation with FAO on implementation of the Global Strategy for Management of Farm Animal Genetic Resources, Poland established a National Focal Point for Animal Genetic Resources and relevant internal structures, Advisory Board and Working Groups.

The Government of the Republic of Poland attaches a great importance to the development and strengthening of interdepartmental cooperation in implementation of activities on biological diversity conservation, as reflected in the presently consulted National Strategy for Conservation and Sustainable Use of Biological Diversity, which formulates operational targets for eleven sectors of national economy, presenting a vision of Poland in 2025:

**„The whole area of Poland will be characterised by high quality of the natural environment – valuable areas will be subject to legal protection and most deteriorated land will be reclaimed. At the same time legal, organizational and economical mechanisms will be set to ensure preservation of biodiversity and its sustainable utilization. For a major part of the country local natural assets will become one of the basic driving forces for a social and economic development, thus stimulating improvement of the living conditions of inhabitants. Also, environmental consciousness and pro-ecological awareness of the society will considerably increase and be reflected in enhanced activities of non governmental organizations.”**

Agriculture will play a vital role in implementation of this vision, as it is the main user of the land. The farming systems and practices have substantial impact upon the state of the environment and landscape. Further actions are necessary to mitigate potential threats, which agriculture may impose upon environment, whilst in the same time promoting its positive role in preservation of the traditional landscape, conservation of biological diversity and natural values of rural areas.

The special merits of Polish agriculture despite all its deficiencies and difficulties, form our valuable contribution to the uniting Europe. It is due to multi-functional character of our agriculture and in particular its role in preservation of the natural environment and conservation of biological diversity. The vision of environmentally friendly agriculture providing services for both the environment and the society becomes one of the most important issues during discussions over the future common agriculture policy of the European Union.

The vision of Poland in 2025 will be accomplishable, providing all sectors of the economy are involved and committed. In particular, close cooperation between the Ministry of Environmental Protection and the Ministries of Agriculture and Education accompanied by

enhanced activities of pro-ecological non-governmental organizations are of a crucial importance.

The strengths and weaknesses of the sector as well as opportunities and threats that will affect over the next decade development of animal production in Poland are shown in Table III (Annex IV).

Breeders and animal owners as well as their organizations – professional associations of breeders and producers have the major impact on the state of utilization of active animal populations and conservation of their genetic resources. Their activities and decisions will shape the further development of the animal breeding sector.

Priority shall be given to research and development work focused on identifying management standards that ensure animal welfare. At the same time it is necessary to expand studies on specific functional traits, as well as quality merits of products obtained from commercially utilized and conserved breeds, varieties, and types of animals.

## **National Priorities for the Conservation and Utilization of AnGR**

### **1. Effective production of safe and functional food of animal origin (of high quality and cooking values)**

Animal production, which used to focus on performance enhancement and supplying sufficient quantities of food of animal origin, is facing nowadays much more difficult challenges. The food quality and safety have become one of the key criteria influencing decisions of consumers, who, in their choices, are more apt to focus on health concerns, and to reject products perceived as potentially dangerous (drop of consumption of beef due to BSE and pork because of mouth-and-foot disease threat; lack of confidence towards imported poultry etc.). The food market in Poland is a consumer market whose requirements beyond the price also regard health standards as well as quality and taste of food product. Quite often the consumer is interested to learn about production system the food comes from.

### **2. Establishing an effective system for collecting and processing data on animal breeding and production**

An effective information system is the key element in animal breeding and production. Identification and registration of animals is an indispensable element of systems for monitoring the end product, which with increased threats of animal-origin diseases is crucial for building consumer confidence. Performance recording, and systems of efficient data processing for estimating breeding values in active populations, have considerable impact on the effectiveness of genetic improvement programmes. There is a need for institutional regulation regarding information system in animal breeding and improvement of the availability and use of data by breeders themselves. Monitoring of production systems, management conditions and profitability of animal production should be implemented on a broader scale.

### **3. Enhancing professional qualifications and education of breeders and agricultural producers and strengthening self-governmental organizations**

Professional knowledge of farmers and their better understanding of the specific impact of agriculture on the environment, on maintenance of nature values of rural areas and biodiversity of wild species associated with agro-ecosystems are necessary for agriculture to proceed with non-production functions assigned to it. Effective actions in capacity building area are of a key importance to achieve of all the goals identified in the agricultural policy of the state. It is of also important in the context of implementation of EU policy.

Despite legal regulations supporting the establishment of non-government organizations, including producers groups, the state of organization of farmers and cooperation between producers are still insufficient. Producer self-organisation and effective horizontal cooperation are necessary to develop satisfactory relations between producers, suppliers and the processing sector.

### **4. Creating and promoting Polish labelled products of animal origin based on domestic animal breeds and varieties, taking into account organic production**

In the past, Poland enjoyed a stable position on the world market, and a number of Polish products like bacon or canned ham were widely recognised and appreciated. To support coming back to the world market, Polish products have to be well marketed and promoted and their quality high and consistent. Brand-name organic products market and products obtained from native breeds and varieties, can attain a special market position.

Promotion of the Polish product including, but not limited to, brand-name and organic products is also very important on the domestic market, which presently offers a wide range of imported food products. It is also necessary to build trust of the Polish consumer in Polish food product. This could be achieved by convincing consumers about its safety and high quality, and by creating awareness on the need to buy Polish products in order to support the national economy.

### **5. Improving the health status of animal populations and sanitary conditions of animal husbandry**

Dispersion of a substantial segment of animal production and its multi-directional character can cause difficulties in assuring proper conditions of rearing, and obtaining products of animal origin and necessary use of veterinary prophylaxis.

At the same time, small farms production does not impose such a threat of disease spreading as high-input and concentrated production. The livestock population is characterised by substantial resistance to diseases, not weakened yet by the common prophylactic programmes as it as observed in many cases in high-efficient breeds, also those imported to Poland.

Although the health status of livestock population is considered good, it is necessary to pursue its further improvement, in particular by enhanced cooperation between breeders and veterinary services in order to set and implement standards of prophylactic practices in changing production systems and to improve rearing conditions. It is necessary to increase the insemination level, which will reduce the incidence of sexual transmitted diseases.

**6. The development and use of biotechnological methods such as cryopreservation of gametes, embryos and cell lines, supported reproduction technologies and cloning, for maintaining of animal biodiversity and conservation of endangered breeds and species**

*Ex situ* methods such as: preservation of gametes and embryos, collection and conservation of stem cells (including also first embryonic cells), development of banks of tissues and cell lines biologically characterised as sources of genetic material for cloning and DNA isolation will have a growing impact for conservation of a diversified gene pool of breeds both included in the conservation programme and commonly used in commercial production. It is necessary to conduct further research focused on the development of modern biotechnological methods and their wider implementation in the breeding practice.

**7. Creating of legal framework supporting activities on conservation of agricultural biological diversity, including animal genetic resources**

The Ministry of Agriculture anticipates development of an agro-biodiversity strategy within the framework of the National Strategy for Conservation and Sustainable Use of Biological Diversity. It is expected that during another amendment of the Act on organization of breeding and reproduction of animals, issues regarding conservation and sustainable use of animal genetic resources will be addressed in a more comprehensive manner. Efforts are undertaken to incorporate provisions regarding genetic resources for food and agriculture in the Act on environment protection.

**8. Separating from the state budget funds directed to support activities related to conservation of agricultural biological diversity, in particular:**

- **Supporting programmes for conservation of animal genetic resources of native breeds and varieties, in particular to cover maintenance costs of animals in herds participating in conservation programmes, to purchase valuable breeding material from herds threatened by liquidation and to collect and store biological material,**
- **Preserving the most valuable genetic resources of farm animals**
- **Initiating new programmes and promoting programmes already underway for conservation of genetic resources of farm animals,**
- **Implementing a system for collecting and storing biological material of highly performing breeds to preserve their genetic diversity.**

Native breeds are characterised by lower productivity and resulting lower economical profitability than breeds used in high-input commercial systems, which presently leads to decreased interest in their keeping. The successful implementation of the conservation programmes requires permanent state support on a level allowing to maintain and develop *in-situ* populations and to collect *ex-situ* biological material according to the objectives of the programmes.

It is also necessary to create a warning and response mechanism to address threats of closing down herds of conserved populations and also to facilitate actions towards conservation of breeds, which are not currently covered by the programmes.

A large part of the valuable genetic material of active populations is presently kept in pedigree herds, which are owned by state institutions (Warsaw Branch of the State Treasury Agricultural Property Agency, research and development institutions, public universities, etc.). This also concerns genetic resources of native breeds included in conservation programmes which to a large extent are maintained by scientific institutions. The Minister of Agriculture and Rural Development maintains control over most valuable animal genetic resources.

The currently observed progressive decrease of variability in intensively improved breeds (dairy cattle) justifies the urgent need to maintain their present gene pool. There are plans to initiate collection of limited amount of semen of all bulls included in progeny testing.

Allocating separate funds for the conservation of agro-biodiversity will facilitate their effective use as financial support can be better adjusted to address current needs and priorities of the programme. It will also allow better integration of activities on conservation of all elements of agricultural biodiversity (promotion and popularization of genetic resources of crops and farm animals).

#### **9. State support for animal production in areas of particularly difficult environmental conditions (highlands) and areas that require vegetation control**

Animal husbandry in particularly difficult conditions, both environmental and climatic, is little profitable by nature, due to limited natural feed resources and resulting low stocking rate. It requires more labour cost to produce feed for winter. However abandoning of grazing and mowing utilisation of these areas has an adverse effect on the environment and landscape. Financial support for animal husbandry in such areas will be vital for the development of animal production maintaining agricultural activities and providing livelihoods for local communities.

In many areas of high nature value, such as National Parks and Landscape Parks, and areas where agriculture activities have been suspended, and at risk of degradation, farming animals, and especially native breeds of cattle, sheep and horses could play an important role in landscape management. Animal rearing in these areas is extensive, whereupon production cannot be profitable. As the main task of animal rearing is to provide landscape management service, the compensation for such service should be provided from the state budget.

Controlled grazing is the most effective tool in vegetation control, indispensable for conservation of biodiversity of nature rich areas.

#### **10. Stabilizing of agricultural product market, in particular animal products market**

The market of agricultural products requires stabilization-oriented activities, both due to the production volume and profitability. The special nature of animal production, long-term returns of inputs and impact of production cycles justify necessity for intervention measures, mainly regarding purchase of production surpluses. However, due to the high employment in the agriculture, the protection of income of agricultural producers is an important social issue.

## Chapter 5 Formulating Recommendations for Enhanced International Cooperation in the field of Farm Animal Biodiversity

Poland declares its readiness to further actively participate in international cooperation for the conservation and sustainable use of genetic resources of farm animals within the FAO framework, as well as within other international organizations and through multilateral and bilateral cooperation with interested countries.

### Recommendations

1. To extend and animate international cooperation (as regards conservation (*in-situ* and *ex-situ*)), and development of populations, in particular of the following breeds:
  - Polish Red Cattle – with Ukraine, Belorussia, Lithuania and Germany
  - Polish Mountain Sheep – with Slovakia, Ukraine and Hungary
  - Polish Heath Sheep – with Lithuania, Ukraine and Belorussia
  - Zlotniki Spotted Pig – with Lithuania and Belorussia
  - Hucul Horses – with Romania, Slovakia, Austria, Hungary, Czech Republic and Ukraine
  - Polish Konik Horses – with the Netherlands, Germany and France
  - Black Bee – with Central European Countries
2. To initiate (on an international scale) studies aimed at identifying the genetic distancing and production differences between Polish native breeds and similar breeds maintained in neighbouring countries (e.g. back-fatted pig from Lithuania and Belorussia, Hucul horses from Slovakia, Hungary, Romania and Austria and sheep from Slovakia)

Should genetic relationship be proven, efforts ought to be undertaken to formulate and implement common conservation programmes, involving populations of several countries.

3. To initiate international research programmes within the EU framework programmes focusing on the effective use of AnGR, whilst taking into account organic production, environmental protection and preservation of natural landscape.
4. To undertake common actions in order to promote and popularise native breeds in the European region – to prepare educational materials and films, to cooperate with the media.
5. To undertake actions to work out international regulations setting forth the rules and scope of access to genetic resources of farm animals – both livestock and stored genetic material.

## **Chapter 6. Other Elements of the Report**

### **6.1. How the Country Report was prepared**

In June 2001 the Minister of Agriculture and Rural Development approved Poland's participation in the process of preparing the First Report on the State of the World's Animal Genetic Resources, and appointed the National Animal Breeding Centre as the leading institution responsible for preparing the Country Report and dr Elżbieta Martyniuk - as the person in charge of the preparation of the said Report. Following the decision of the Minister of Agriculture and Rural Development about delegating as of 1 January 2002 to the National Research Institute of Animal Production in Krakow all activities related to implementation of the Convention on Biological Diversity in the area of animal genetic resources, the Institute was obliged to prepare the Country Report on the State of Animal Genetic Resources. The Minister of Agriculture and Rural Development assigned prof. dr hab. Jędrzej Krupiński, Director of the National Research Institute of Animal Production to personally supervise the preparation of the Report.

In December 2001 the Minister of Agriculture and Rural Development established the National Consultative Committee (NCC) for the preparation of Country Report on the State of Animal Genetic Resources (its composition is set out in Annex I). The process of preparation of the Country Report was based on collecting and analysing information, provided by a broad range of institutions and persons dedicated to animal breeding and production and conservation of animal genetic resources. On the 17 December 2001 the First National Workshop attended by 55 persons was held in Warsaw. The objective of the Workshop was to acquaint the stakeholders with the undertaking and to identify the procedure for collecting data and information required for preparing the Report. At the end of the Workshop, participants submitted a declaration of participation in the work over the Report. Background questions for the Country Report based on FAO guidelines were sent to 59 persons representing various institutions and organizations, related to the use of genetic resources of farm animals and fish, as well as the National Animal Breeding Centre and the Department of Animal Production, and Veterinary Service of the Ministry of Agriculture and Rural Development. Papers and studies were received from 30 persons and employees of the National Animal Breeding Centre.

At its first meeting, the NCC appointed prof. dr hab. Zygmunt Reklewski as their chairman and selected the editorial team, and persons responsible for preparing materials regarding the individual species and topics. The NCC held six meetings to identify the basic areas and issues to be covered by the Report, to define its structure and content to supervise the processes of information and initial data collecting, and their further analysis, and thereafter discuss the elements contained in respective chapters of the Report and agree upon their content.

The initial draft of the Country Report was presented and discussed during the Second National Workshop organized on 2 – 3 July 2002 in Balice near Krakow. The Workshop was attended by 59 persons listed in Annex II. During that meeting recommendations contained in the draft Report were discussed and needs and priorities for further actions regarding conservation and sustainable use of animal genetic resources were defined.

The Country Report on the State of Animal Genetic Resources was edited in the National Research Institute of Animal Production, on the basis of papers prepared by members of the National Consultative Committee.

## 6.2. Annexes

### Annex I

#### The National Consultative Committee

prof. dr hab. Zygmunt Reklewski	Institute of Genetics and Animal Breeding of the Polish Academy of Science in Jastrzębiec
mgr Bogusław Pardo	Department of Animal Production and Veterinary Matters of the Ministry of Agriculture and Rural Development
mgr Aleksander Merecki	National Animal Breeding Centre
prof. dr hab. Jędrzej Krupiński	National Research Institute of Animal Production in Krakow
prof. dr hab. Stanisław Węzyk	National Research Institute of Animal Production in Krakow
prof. dr hab. Tadeusz Jezierski	Institute of Genetics and Animal Breeding of the Polish Academy of Science in Jastrzębiec
dr Tadeusz Blicharski	Institute of Genetics and Animal Breeding of the Polish Academy of Science in Jastrzębiec / Polish Association of Pig Breeders and Producers POLSUS
prof. dr hab. Henryk Runowski	Warsaw Agriculture University
dr Elżbieta Martyniuk	National Research Institute of Animal Production in Krakow / Warsaw Agriculture University
prof. dr hab. Marian Rózycki	National Research Institute of Animal Production in Krakow

### ANNEX II

#### List of Attendants of the Second National Workshops

Mgr Hanna Babirecka-Tomczak, Ministry of Agriculture and Rural Development; dr Paweł Bielański, National Research Institute of Animal Production in Krakow; prof. dr Krzysztof Bieniarz, Agricultural University in Krakow; dr Tadeusz Blicharski, Institute of Genetics and Animal Breeding of the Polish Academy of Science in Jastrzębiec / Polish Association of Pig Breeders and Producers POLSUS; dr inż. Władysław Brejta, National Research Institute of Animal Production, Research Centre in Rymanów; mgr Maria Bzowska, National Animal Breeding Centre in Warsaw; prof. dr hab. Julian Ciuruś, National Research Institute of Animal Production, Research Station for Mountain Sheep in Bielanka; dr inż. Katarzyna Cywa-Benko, National Research Institute of Animal Production in Krakow; prof. dr hab. Hanna Czaja, National Research Institute of Animal Production in Krakow; inż. Ewelina Cześnik, Polish Horse Breeders' Association in Warsaw; inż. Danuta Dąbrowska, National Animal Breeding Centre in Warsaw; dr Robert Eckert, National Research Institute of Animal Production in Krakow; mgr Andrzej Galli, Inland Fisheries Institute in Żabieniec; prof. dr hab. Krzysztof Goryczko, Inland Fisheries Institute, Department of Salmonid Research in

Rutki; prof. dr hab. Eugeniusz Herbut, National Research Institute of Animal Production in Krakow; dr Ilgiz Irnazarow, Institute for Ichthyobiology and Aquaculture of Polish Academy of Science in Gołysz; prof. dr hab. Zygmunt Jasiński, Warsaw Agriculture University; mgr Maria Jaszczyńska, National Research Institute of Animal Production in Krakow; dr inż. Zbigniew Jaworski, Research Station for Ecological Agriculture and Preservation of Native Breeds of Polish Academy of Science in Popielno; mgr Mirosława Kaczmarek, National Animal Breeding Centre in Warsaw; dr hab. Ewa Kapkowska, Agricultural University in Krakow; prof. dr hab. Marian Kaproń, Agricultural University in Lublin; doc. dr hab. Lucyna Kańska, National Research Institute of Animal Production in Krakow; dr Wojciech Kieć, National Research Institute of Animal Production in Krakow; mgr Hanna Kostrzewska, Ministry of Agriculture and Rural Development; mgr Piotr Kowol, National Animal Breeding Centre, Krakow Inspectorate; prof. dr hab. Jędrzej Krupiński, National Research Institute of Animal Production in Krakow; doc. dr hab. Juliusz Książkiewicz, Research Station for Water Fowl Breeding (NRI) in Dworzyska; dr Elżbieta Martyniuk, National Research Institute of Animal Production in Krakow / Warsaw Agriculture University; mgr Aleksander Merecki, National Animal Breeding Centre in Warsaw; prof. dr hab. Jacek Modliński, Institute of Genetics and Animal Breeding of the Polish Academy of Science in Jastrzębiec; mgr Rafał Morawski, National Animal Breeding Centre in Warsaw; dr inż. Maciej Murawski, Agricultural University in Krakow; Wioletta Naruszewicz, Animal Breeding and Insemination Station in Bydgoszcz; prof. dr hab. Marian Niespodziewański, Agricultural University in Lublin; doc. dr hab. Piotr Nowakowski, Agricultural University in Wrocław; prof. dr hab. Roman Niżnikowski, Warsaw Agriculture University; prof. dr hab. Adam Okólski, Agricultural University in Krakow; dr Andrzej Pilarczyk, Institute for Ichthyobiology and Aquaculture of Polish Academy of Science in Gołysz; prof. dr hab. Jarosław Prabucki, Agricultural University in Szczecin; prof. dr hab. Helena Puchajda, Warmia and Mazury University in Olsztyn; doc. dr hab. Maciej Roborzyński, National Research Institute of Animal Production in Krakow; prof. dr hab. Marian Różycki, National Research Institute of Animal Production in Krakow; mgr Stanisław Różyński, Advisory Centre for Agriculture in Końskowola; doc. dr hab. Rafał Rzepecki, National Research Institute of Animal Production in Krakow; prof. dr hab. Zdzisław Smoraż, National Research Institute of Animal Production in Krakow; prof. dr hab. Stanisław Socha, Agricultural University in Siedlce; mgr Ryszard Stopyra, Biotechnology Center in Małopolska, Ltd., Krasne; dr Jerzy Szymula, Research Institute of Pomology and Floriculture in Puławy; prof. dr hab. Ewa Świerczewska, Warsaw Agriculture University; dr Iwona Tomczyk-Wrona, National Research Institute of Animal Production in Krakow; prof. dr hab. Jan Trela, National Research Institute of Animal Production in Krakow; mgr Joanna Troszkiewicz, National Animal Breeding Centre in Warsaw; prof. dr hab. Krzysztof Walawski, Warmia and Mazury University in Olsztyn; prof. dr hab. Stanisław Wężyk, National Research Institute of Animal Production in Krakow; prof. dr hab. Jerzy Wilde, Warmia and Mazury University in Olsztyn; prof. dr hab. Ryszard Ziemiński, Agricultural University in Wrocław, dr Andrzej Zoń, Experimental Station of National Research Institute of Animal Production, Chorzelów Ltd.; prof. dr hab. Maciej Żurkowski, Research Station for Ecological Agriculture and Preservation of Native Breeds of Polish Academy of Science in Popielno.

### **Annex III**

#### **Source Materials used in preparation of the National Report**

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## Annex IV

## Tables and Diagrams

Table I. Populations included in farm animal genetic resources conservation programmes (state as at the end of 2000)

Name	Origin <sup>1)</sup>	Time of production	Total population	Number of herds recorded	Number of recorded (entered into books*)		Trend in population size 2)	Conservation priority	Target number of females 5)	
					females	males				
1	2	3	4	5	6	7	8	9	10	
<b>Cattle</b>										
Polish Red Purebred	N	19 <sup>th</sup> century	1000	34	280	20	I	1	750	
<b>Pigs</b>										
Pulawy	N	Beg. of 20 <sup>th</sup> century	1000	24	307	21	I	1	500	
Zlotniki Spotted	N	1950s	165	6	55	9	I	1		
Zlotniki White	N	1946-62	30	2	67	8	I	2		
<b>Horses</b>										
Hucul	N	18 <sup>th</sup> – 19 <sup>th</sup> century	600	ca 30 <sup>d)</sup>	402*	90*	I	1	250	
Polish Konik	N	19 <sup>th</sup> – 20 <sup>th</sup> century	600	ca 30 <sup>d)</sup>	494*	109*	I	1		
<b>Sheep</b>										
Polish Heath	N	18 <sup>th</sup> century	2000	9	1491*	25	S	1	1500	
Swiniarka	N	18 <sup>th</sup> century	174	2	163	13	I	1		
Olkusz	N	L1930	100	6	101*	16	S	1		
Booroola	I	1988	35	1	28*	5	D	1		
Coloured variety of Polish merino	D	1980-90	200	1	97*	25	D	1		
Coloured variety of Polish Mountain	N	15 <sup>th</sup> century	c.a. 1000	4	100	6	I	1		
Leine	I	1950s	500	2	323*	28	D	2		
Uhrusk	D	1957	700	8	500*	30	D	2		
Wielkopolska	D	1948-77	7900 <sup>3)</sup>	32	4388*	133	D	2		
Zelazna	D	1954	269	1	189*	10	D	2		
Polish Corriedale	D	1955	2000 <sup>3)</sup>	7	274*	6	D	3		
Kamieniec	D	1965	2400 <sup>3)</sup>	16	1625*	68	D	3		
Pomeranian	D	1970s	8000 <sup>3)</sup>	86	5760*	218	D	3		
<b>Laying Hens</b>										
Polbar Pb	N	1946	660	1	600	60	S	1		550

Name	Origin <sup>1)</sup>	Time of production	Total population	Number of herds recorded	Number of recorded (entered into books*)		Trend in population size 2)	Conservation priority	Target number of females 5)
					females	males			
Green-legged Partridge ZK	N	1923	660	1	600	60	S	1	

1	2	3	4	5	6	7	8	9	10	
Green-legged Partridge Z-11	N	End of 19 <sup>th</sup> century	581	1	525	56	S	1	550	
Yellow-legged Partridge Z-33	N	1960	590	1	534	56	S	1		
Leghorn G99	D	1960	608	1	552	56	S	1		
Leghorn H22	D	1960	588	1	532	56	S	1		
Rhode Island Red R11	D	1974	593	1	537	56	S	1		
Sussex S66	D	1950	585	1	529	56	S	2		
Rhode Island Red K22	D	1984	972	1	764	208	S	2		
Rhode Island White A33	D	1984	1136	1	929	207	S	2		
<b>Ducks</b>										
Polish Pekin P33	N	1978	103	1	75	28	S	1	200	
Mini Duck K2	D	1982	132	1	96	36	S	1		
Khaki Campbell Kh1	D	1971	108	1	80	28	S	1		
Danish Pekin P8	D	1978	100	1	90	10	S	1		
Pekin P11	N	1970	253	1	205	48	S	1		
Pekin P22	N	1962	240	1	191	49	S	1		
English A1	D	1977	100	1	90	10	S	2		
English A2	D	1977	108	1	80	28	S	2		
English A3	D	1977	100	1	90	10	S	2		
French Pekin P9	D	1978	100	1	90	10	S	2		
Orpington O1	D	1979	108	1	80	28	S	2		
KhO1	D	1970	108	1	80	28	S	2		
LsA	D	1992	312	1	240	72	S	3		
<b>Geese</b>										
Zatorska ZD-1	N	1961	289	1	222	67	S	1		200
Biłgoraj Bi	N	1971	266	1	173	93	S	1		
Lubelska Lu	N	1972	196	1	136	60	S	1		
Kielecka Ki	N	1972	205	1	140	65	S	1		
Sub-Carpathian Pd	N	1972	213	1	146	67	S	1		
Kartuska Ka	N	1972	207	1	132	75	S	1		
Rypinska Ry	N	1972	196	1	137	59	S	1		
Suwalska Su	N	1972	189	1	122	67	S	1		
Garbonosa Go	N	1977	157	1	114	43	S	1		
Pomeranian Po	N	1981	168	1	128	40	S	1	200	
Roman Ro	D	1978	170	1	124	46	S	2		
LsD-01	D	1977	182	1	133	49	S	2		
WD-02	D	1977	71	1	40	31	S	2		
ND-12	D	1977	192	1	152	40	S	2		

Slovak Sl	D	1981	215	1	114	50	S	2		
Gorkowska Go	I	1978	127	1	156	59	S	2		
<b>Fur Animals</b>										
Polish Pastel	N	1972	80	1	20	8	S	1	200	
Polish White Necked	N	1970	35	1	26	10	S	1		
Polecats	N	1960s	350	1	30	6	D	1	150	
	1	2	3	4	5	6	7	8	9	10
Popielno White Rabbit	N	1950-85	180	1	32	11	S	1	100	
Polish Beige Recessive Chinchilla	N	1957	65	5	48	12	S	2	100	
<b>Bees</b>										
Augustow	N	Initial	1400 families	4	97 families		D	1	200 families	
Kampinos	N	Initial	1400 families	2	95 families		D	1		
North	N	End of 1950s	36 families	3	22 families		D	1		
Asta	N	End of 1960s	150 families	2	100 families		D	1		
<b>Carps</b>										
Zatorski	N	1955	150	1	100	50	S	1	100 spawners or selectors	
Starzawski	N	1976	202	2	85	34	S	1		
Golyski	N	1954-56	730	2	219	131	S	1		
Knyszynski	N	1966	243	1	6	11	S	1		
Lithuania	I	1995	480	1	-	82	I	2		
Ukraine	I	1986	360	1	12	23	I	2		
<b>Trout</b>										
Strain of autumn spawn	I	1962	1000	1	500	458	S	1	100 spawners or selectors	
Strain of spring spawn	D	1986	1544	4	2800	860	I	1		

<sup>1)</sup> Origin: N-native, D – developed, I – imported

<sup>2)</sup> Trend in population size: D – decreasing, S – stable, I-increasing

<sup>3)</sup> A programme for prolificacy improvement involves upgrading with prolific sheep breeds

<sup>4)</sup> Centres having a minimum of 5 mare dams

<sup>5)</sup> Participating in the programme of conservation of animal genetic resources

**Table II. Division of tasks regarding breeding services in respective species of farm animals (according to the National Animal Breeding Centre)**

	<b>Breeding</b>	<b>Herd book keeping</b>	<b>Evaluation of breeding value</b>	<b>Performance recording</b>	<b>Extension</b>	<b>Breeding services (insemination, supply of breeding material)</b>
<b>Dairy cattle</b>	Breeders	National Animal Breeding Centre	National Research Institute of Animal Production	National Animal Breeding Centre	Advisory Centres for Agriculture, dairy plants; National Animal Breeding Centre; scientific centres	Breeding and artificial insemination stations; associations of breeders of dairy cattle
<b>Beef cattle</b>	Breeders	National Animal Breeding Centre	National Research Institute of Animal Production	National Animal Breeding Centre	National Beef Cattle Breeders' Association; National Animal Breeding Centre; scientific centres	Breeding and artificial insemination stations; National Beef Cattle Breeders' Association
<b>Pigs</b>	Breeders; National Research Institute of Animal Production	Zlotniki breeds – Agricultural University in Poznań Pulawy breed – Polish Association of Pig Breeders and Producers; Other breeds - National Animal Breeding Centre	National Research Institute of Animal Production	National Animal Breeding Centre	Advisory Centres for Agriculture; Associations of pig breeders and producers; scientific centres, feed companies, National Animal Breeding Centre	Sow insemination stations, Associations of pig breeders and producers
<b>Poultry</b>	Breeders	National Animal Breeding Centre	Breeder under supervision of the National Animal Breeding Centre	National Animal Breeding Centre	Scientific centres, National Animal Breeding Centre	
<b>Sheep and goats</b>	Breeders	Polish Sheep Breeders' Society	National Research Institute of Animal Production	Polish Sheep Breeders' Society	Polish Sheep Breeders' Society; scientific centres	National Research Institute of Animal Production (insemination); Polish Sheep Breeders' Society

	<b>Breeding</b>	<b>Herd book keeping</b>	<b>Evaluation of breeding value</b>	<b>Performance recording</b>	<b>Extension</b>	<b>Breeding services (insemination, supply of breeding material)</b>
						(trade in breeding stock)
<b>Horses</b>	Breeders	Polish Horse Breeders' Association, Polish Horse Race Club, Polish Society of Shetland Ponies, Association of Breeders and Users of Trotters	At present in Poland the breeding value of horses is not evaluated; Methodology is being prepared	Polish Horse Breeders' Association, Polish Horse Race Club, Polish Society of Shetland Ponies, Association of Breeders and Users of Trotters	Polish Horse Breeders' Association, Scientific centres, Stud-Horse Herds	Copulation Units, Stud-Horse Studs, Horse Breeders, „Feldpol”, Ltd. Kiekrz
<b>Fur animals</b>	Breeders, National Research Institute of Animal Production, Institute of Genetics and Animal Breeding of the Polish Academy of Science	National Animal Breeding Centre	National Animal Breeding Centre	National Animal Breeding Centre	National Animal Breeding Centre, Scientific centres, Breeders associations, Advisory Centres for Agriculture	
<b>Bees</b>	Breeders, Advisory Centres for Agriculture, Institute of Pomology and Floriculture in Pulawy	National Animal Breeding Centre	National Animal Breeding Centre	National Animal Breeding Centre	Scientific centres, Advisory Centres for Agriculture, Institute of Pomology and Floriculture in Pulawy	Insemination in breeding bee yards

**Table III. SWOT analysis for animal production in Poland**

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<ul style="list-style-type: none"> <li>• Sufficient feed resources for animal production, including feeds for ruminates</li> <li>• Low BSE risk and rather high natural resistance to diseases</li> <li>• High genetic potential of animals</li> <li>• Low environment contamination</li> <li>• Low labour costs in agriculture</li> <li>• Existing examples of modern animal production</li> <li>• Ecological value of Polish animal products</li> <li>• Developed infrastructure for insemination</li> <li>• High scientific potential</li> </ul>	<ul style="list-style-type: none"> <li>• Low output of crops intended for feeds, including feeds from permanent grasslands</li> <li>• Old technologies of own feeds production, with exception for some part of farms</li> <li>• High labour-demanding management of animals</li> <li>• Old-fashioned, hardly functional housing facilities, except for specialized farms</li> <li>• Considerable deficiencies regarding facilities and infrastructure related to protection of natural environment</li> <li>• Low level of organization of producers</li> <li>• High costs animal production</li> <li>• Dispersed agrarian structure</li> </ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<ul style="list-style-type: none"> <li>• Broader possibilities for export of animal products upon accession to EU</li> <li>• High potential of production of slaughter animals resulting from set-aside permanent grasslands and availability of housing facilities and low production costs</li> <li>• High income-related flexibility of demand for animal products and anticipated increase of domestic demand related to improvement of the income increase</li> <li>• Export tradition, diversity of products</li> <li>• Improvement of the organization of producers and use of related benefits</li> <li>• Implementation of biological and technological progress in the production of feeds and in animal production</li> <li>• Facilitated access to new technologies with the use of aid funds from EU</li> <li>• Development of the contract system for supply and payment for animal products, taking the quality standards into account</li> </ul>	<ul style="list-style-type: none"> <li>• Competition resulting from globalization of the world economy and joining the EU</li> <li>• Low technical, technological and economical efficiency of the food and processing industry</li> <li>• Poor competitive power of agriculture producers owing to small scale and dispersion of production and lack of organized forms of cooperation</li> <li>• Lack of integration with the processing industry, in particular the meat industry</li> <li>• Lower than in the EU countries level of support for animal production from EU budget upon accession, leading to lower competitiveness of Polish producers</li> <li>• Limitation of production quotas for Poland upon accession to EU</li> <li>• Low profitability of animal production and strong seasonal fluctuations</li> <li>• Low activity of associations of breeders and producers</li> <li>• Imperfect system of intervention on animal product market</li> <li>• Weakness of the food processing industry</li> <li>• Insufficient level of protection of the domestic market</li> </ul>