

# Swine genetic improvement programs in Eastern Europe

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## 1 Introduction

Pig production in Eastern Europe is quite diverse. The main common characteristic was establishment of large, industrial units in early 60's and 70's. These farms owned by state ran breeding programs and supply other producers with breeding stock. The importance of the second sector, named family farms, was different among countries. Cooperatives were well developed for example in Yugoslavia where they presented around one third of supply, while they were seldom in Soviet Union. Cooperatives were usually run by public organizations, which assisted farmers with breeding stock and other inputs, offered extension service, as well as organized production and trade of slaughter pigs. The third group of pig producers raised pigs for home consumption. For example, the proportion varies from 13% of total production in Hungary to one-third of slaughter pigs in Slovenia. It may be larger in some other, less developed regions with more small farms. In many countries, these farms kept traditional breeds, practiced traditional farming habits, and produced local products. The exception is Poland, where almost all slaughter pigs are produced in small herds.

Political changes also launched a transition in pig production toward a market economy. Uncertainty about privatization process and negative attitude of society against state owned industrial units has left unreparable damage. They were not developing for almost two decades, but rather demolished due to lack of investment. On the other hand, these changes were not pushing development on family farms, due to low and large fluctuations in pig prices in the market which has made pig production unattractive. Land privatization program has created large numbers of very small farms, which are not big enough to start prosperous family businesses. The transition reflected in significant reduction of pig production in most countries. At the same time, there were large changes in pig breeding as well.

The aim of the paper is present genetic improvement programs in Eastern Europe. Because of diverse production systems, it is hard to present this topic sufficiently.

Table 1: Pig numbers in Eastern Europe

Country	1992 (in millions)	2004 (in millions)	Sow Numbers (in thousands)
Poland	19464.2	18100.0	1705
Hungary	5992.9	4913.0	422
Czech Republic	4598.8	3126.5	371
Slovakia	2269.9	1149.2	144
Lithuania	2179.8	1057.8	94
Latvia	1246.5	444.4	49
Estonia	798.6	344.6	36
Bulgaria	3141.4	1031.0	
Romania	10954.1	5145.5	
Albania	90.3	109.0	
Slovenia	529.0	620.5	62
Croatia	1182.6	1489.0	
Macedonia	170.9	158.2	
Bosnia and Herzegovina	300.0	300.0	
Serbia and Montenegro	3844.0	3463.0	
Belarus	4703.0	3287.0	
Ukraine	17838.7	7321.5	

## 2 Population size and structure

The importance of pig production in different countries varied due to tradition and natural resources. Nevertheless, pig production was quite important even in regions with less arable land. Large industrial units might not have their own food production, especially protein components. Thus, they were established also in regions with less favourable conditions for pig production.

Most countries from Eastern Europe have showed large decrease in pig production. In some countries, reduction started already before or soon after political changes and reached the lower point around year 2000. Pig production was even halved. Smaller decrease was observed in former Yugoslavia countries. With exception of Slovenia, it is hard to believe that the number showed the real situation. The war and bad economic situation caused the large units to be destroyed or closed down to such extend it should be demonstrated in statistics as well.

In most countries, they have also reported the reduction of the number of households. These changes are connected in some countries with the increased average herd size, while others showed large decrease in pig production.

## 3 Breeding schemes

Before political changes in 1990, breeding was practiced on large, industrial units. The production systems were intensive usually based on proved crossbreeding schemes. The large units had usually good possibilities to conduct performance testings both in test stations as well as under production conditions. The nucleus was on the same place, thus reducing the need for mixing of animal and large influence of various effects which needs to be taken into account by genetic evaluation. The same farms reproduce F1 gilts as well as commercial production. Thus, the farm tested efficiency of breeding animals in the lower levels of selection pyramid. Large units employed educated and trained management staff. However,

the workers were less trained and often unmotivated due to low income. "Intensification" worsen working conditions as well as animal welfare because of increased animal density and inappropriate husbandry. The most serious problems was connected to environment pollution. Under pressure of public pressure and legislation, conditions on large farms have been improved.

In many countries, commercial production was based on reciprocal crossbreeding schemes, thus reducing animal exchange only to boars. Countries closer to Western Europe practiced static crossbreeding scheme based on three or four breeds. In larger populations such as Poland and Hungary, the list contained more breeds while small countries used simple schemes with limited choice of breeds.

Since 1990, we have seen a decrease in pig production in many countries. The negative trend was observed due to significant reduction of production on large units and small private farms were not able to replace the loss. The changes reflect also in breeding schemes. Many large units have decided for commercial production, reduced breeding work to female site or even abandoned it. The breeding sows have been chosen quite often among fatteners. Some owners started to buy breeding animals from foreign breeding companies and later often mixed them with their previous stock getting a large number of different genotypes. This hunt for new genotypes has had a bad influence on other farmers which had earlier obtained breeding stock from those large units. The pressure of foreign companies have been quite large. The productivity of pigs were still low regardless of genotype, while husbandry was not improved according to animal requirements.

Artificial insemination (AI) has had a large impact within breeding herds since it was practiced on industrial units in large extend but much less on family farms. The priorities of AI are the same as elsewhere. Weaknesses are related to the lack of estrus and puberty stimulation, inadequate estrus detection and insemination techniques. In order to cover bad management, hormone treatment was regularly used to control estrus or induce puberty on many large farms, except in Slovenia.

#### **4 Breeding objectives**

All breeding programs focused on fattening and carcass traits obtained in different testing schemes. Traits included may have different definitions as well as strategies, but they are used to improve growth, feed conversion, and meatiness. The economic importance of different traits is not reported for most countries. Testing stations are established on the same farm and are used for performance test of boars. Gilts as well as boar in smaller herds are raised in on-farm test and kept in groups, very often under fattening conditions. In some countries, on-farm test is combined with Sib test on central test stations where slaughter traits are obtained. Litter size is also used as breeding objective for maternal breeds/lines in the new EU countries. Some difficulties connected with breeding objective is discussed in the following section.

#### **5 Information systems and genetic evaluation**

The breeding work was moved to family farms. However, there was lack of basic infrastructure in most countries. Central testing stations have to be built up in large populations while on-farm tests are preferred in smaller populations. Additionally, there were no trained personnel and no equipment to measure traits for genetic evaluation.

Availability of information technology for agricultural sector is very different among countries. While countries joined in EU may exploit the newest information technology on farms or at least in the center, the others have difficulties to get any information on paper

forms. Almost in all countries outside the current EU, an inefficient data recording system could be seen. Data are still collected on paper form, typed into computer by ad hoc applications without logical control of consistency. Data quality is low for measurements and pedigree. Measurements are not always measured but just made up which can be seen well on trait distributions. Records contain a lot of missing values. The breeding values (PBV) and selection indices are not always estimated on time. Thus, breeders have to take decision without knowing PBV.

This is different in countries that joined EU. The first genetic evaluation using mixed model methodology was done in 1987 for Slovene population. Since 1990 it was initiated in other countries. The beginning was difficult because farmers have to be convinced the new total indices were worthwhile to use. Disbelief might be caused by uncertainty of data quality and the lack of knowledge. When data were collected for the first genetic evaluation, a lot of data were incorrect or missing. Routine on-time evaluation increase awareness of farmers about data quality which has been improved consequently. Furthermore, introduction of computerized information system helped to improve recording system. Some countries have been focused mainly on computing centers, the others equipped also farms, in the first place large herds. By moving computer to the farm, the data quality becomes better. Consistency checks can be performed on-farm, incorrect records might be corrected. The data is used for management support and farmers become more interested for keeping records. The improvement was also seen in genetic evaluation.

Genetic evaluation is different among countries, too. In EU countries, mixed model methodology was implemented and used for at least 10 years. There are differences how breeding values are prepared for use. In Slovenia, animals are ranked and the best ones are suggested for selection by assigning them into classes. Breeders may change the suggested class on the basis of exterior appraisal, pedigree or other criteria. Animals are seldom assigned by breeder into another class. Breeders in other countries received estimates of breeding values and total merit index and they are free to use it. Selection intensity may be lower, because breeder would choose the best animals in his herd not over the whole population.

Situation is worse for countries outside EU. As we mentioned before, they do not have appropriate recording system. Their genetic evaluation, if any, is based on selection indices. There is no genetic evaluation in eastern part of former Yugoslavia, Bulgaria, most probably also in Romania. Croatia and Ukraine are in the process of implementation genetic evaluation using mixed model methodology. The basic obstacle is lack of educated people to run genetic evaluation. On the other hand, most data were lost during transition, thus recording system must be built from start.

## **6 Conclusions**

Pig breeding in the Eastern part of Europe is quite diverse because of different developments before and after transition. Transition caused increased trade of breeding stock from different breeding companies, which is often used inappropriately. There were little investments in housing systems, equipment, waste manipulation in order to improve animal welfare, working conditions, and to reduce environment pollution. In most countries, pig production was reduced significantly despite good conditions for keeping them.

There are mainly two groups of countries. The new EU countries are running breeding programs, although most of them had to change organization schemes. In other countries, the breeding must be set up from scratch. They have to renew recording systems, build information systems and apply genetic evaluation.