

ROLE OF RUSTIC PIG BREEDING IN RURAL DEVELOPMENT AND EVALUATION OF THE MORPHOLOGICAL CHARACTERISTICS AND PRODUCTIVITY OF CERTAIN INDIGENOUS BREEDS

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Abstract

Belonging to the natural environment for the sustainable use of animal resources in the environmental conditions of our country, but also in the context of climate change, requires prospects for the growth of these breeds in the current picture of consumer demand for high-quality meat and of breeders for disease resistance and reasonable maintenance costs. The present research aims to highlight the genetic diversity and morpho-productive characteristics of some native pig breeds, their importance in the country's sustainable economy, and their reintroduction into traditional breeding systems. The first part of this presentation will describe the primitive pig breeds of Asia and Europe, their origin, and their contribution to the formation of new breeds. Classification and description of Romanian breeds and populations by geographical area, presentation of the origin of each breed and population, growth prospects, and their role in Romania's sustainable economy. The role of genetic conservation and its usefulness in improving, in particular, organic resistance and the organoleptic and preservation qualities of meat for the production of traditional Romanian food products. The estimation of production costs, taking into account the hardiness of native pig breeds (use of pastures, pigsties, food scraps). The research is based on morphological analysis in the field of local pig populations, followed by the collection of biological samples (blood) to establish genetic identity and diversity using molecular genetics laboratory methods (PCR – polymerase chain reaction) to demonstrate the spatial and temporal sustainability of individuals.

Keywords: *origin, phenotype, diversity, conservation, sustainability.*

INTRODUCTION

With the almost exclusive industrialization of pork production, there has also been a shift away from what we today call a “traditional product,” namely the savory taste of the meat and of the final processed product. In addition to this aspect, imports from the European Union and from outside it also play a role, where industrial production is itself a tradition and a defining characteristic of modern society.

The effects of the intensive production system, the transformation of the Romanian village through the abandonment of household livestock raising, epidemics

affecting poultry, pigs, and small ruminants, along with the migration of the workforce, have led to the disappearance of many indigenous breeds from all livestock species of zootechnical interest.

Indigenous breeds and rustic populations within the swine species are, unfortunately, no exception to these human-driven transformations, as they relate directly to people's food and livelihoods. Hence the frequent use in everyday language regarding both animal and plant products of terms such as “traditional,” “modern,” “bio,” “ecological,” “Romanian,” “processed,” which describe

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food products and raw materials but are often used strictly for commercial purposes.

Traditional pork-based foods-whether we refer to dishes (such as stuffed cabbage rolls, roast pork, aspic, smoked pork knuckle with cabbage, soups, etc.) or to semi-prepared products (sausages, bacon, cracklings, liver sausage, head cheese, etc.) - must necessarily meet two essential conditions besides processing technology: flavor (taste, smell) and preservation qualities (in the case of semi-prepared products).

The taste and preservation qualities of pork depend on several factors: the production system, the animals' diet, the processing technology used, and, not least, genetics (hereditarily transmitted traits).

When speaking about genetics in this context, we refer to the exceptional traits of rustic pig breeds and populations-both with respect to the organoleptic qualities of their products and their suitability for long-term meat preservation-qualities that have delighted the Romanian people for centuries.

Alongside these nutritional advantages are several biological and even economic benefits, such as the use of easily obtainable feed, grazing ability, innate resistance, and others-all of which will be detailed throughout this presentation.

Fieldwork and bibliographic materials from the specialized literature form the foundation of this exposition. Bibliographic sources provide data on the phylogenetic evolution of swine and the formation of old, new-type, and improved breeds.

Fieldwork consists of collecting biological samples (blood) from Mangalița and Bazna pigs at the Agricultural Research and Development Station Turda (SCDA Turda), Cluj County, as well as from populations of Alb de Banat and Negru de Strei in Hunedoara and Sălaj counties. Samples were also collected from several individuals located in Iași County. In practice, this activity represents the phenotypic analysis and identification of

genetic markers with a conservation role, which can demonstrate the phylogenetic and spatial classification of these individuals.

RESULTS

Primitive swine breeds in Asia and Europe, their origin, and their contribution to the formation of new-type breeds

Paleobiology studies (gr. *palaios* – ancient; *bios* – life; *logos* – word, science) present, based on archaeological discoveries, two fossil forms belonging to the superfamily Suoidea (Cojocaru, 2004), from which the family Suidae originates. This family includes two subfamilies: Dicotylinae (Tayassuinae – peccaries) and Suinae (pigs) (Valenciuc, 2003).

If dentition is used as a criterion, two forms are defined:• one with the upper canines (tusks) pointing downward and not growing continuously (fig. 1), the present form being the Pecari pig (Perchoerus), subfamily Dicotylinae (Tayassuinae), genus *Dicotyles*-found in Central and South America (*New World suids*); the other form has upper canines curved upward and outward, very strong and three-edged: the wild boar, subfamily Suinae, genus *Sus*. This is the representative (*of Old World suids*), known from the Upper Miocene of Eurasia-23.7 million years ago (Cojocaru, 2004). From this species derive today two types of wild boar, each specific to the two separated continental environments: the european wild boar (*Sus scrofa ferus*) (fig. 2) and the asian wild boar (*Sus vittatus*).

The subfamily Suinae (with upward-oriented canines) also includes:• the river pig or brush pig, or tasselled-ear pig (*Potamochoerus porcus*)-found in Africa and Madagascar;• the warthog (*Phacochoerus aethiopicus*)-in Africa (from the Cape of Good Hope to Abyssinia, and from Somalia westwards to Congo);• the babirusa (*Babirusa babirusa*)-living on the Sulawesi and Maluku Islands of

Indonesia, called “deer-pig” by locals because of its upward-curving tusks (*babi* = pig; *rusa* = deer) (Valenciuc, 2003).



Fig. 1 Fossil Pecari pig (Perchoerus)



Fig. 2. Skull and fossil wild boar skull

The European Wild Boar

The European wild boar has a carp-shaped arched back, a compact body, a narrow, long, straight head, and well-developed tusks. It is a strong animal, with a body supported by four long, strong, thick legs. Its coarse, dense coat is made of long, harsh hairs of dark brown or dark gray coloration, and it has an undercoat that sheds in summer. Piglets are born with light-colored stripes that fade with age. The European wild boar is the founder of two groups of European pigs: long-eared and short-eared (Redchin, 1950).

The Asian Wild Boar

The Asian wild boar is much smaller than the European one, both in height and in live weight. It differs mainly by head shape, which in the Asian form is much broader, shorter, and higher, with a slightly concave

profile. It is often called “striped,” because it has a light-colored stripe running from the cheek to the neck. This species lives and reproduces in Eastern and Southeastern Asia. It is the ancestor of several Asian breeds: Indian, Chinese, Siamese, dwarf Chinese, etc.

Origin of the Domestic Pig

The origin of domestic pigs has been widely debated, but the generally accepted view is that European pigs derive from the European wild boar (*Sus scrofa ferus*), while Asian pigs derive from the Asian wild boar (*Sus vittatus*). Hybrids of these forms have been used since the beginning of the 19th century in crosses that formed the basis of modern pig breeds (Dinu et al., 2002).

The evolution of swine, from the earliest wild forms to current domestic breeds, progressed through different stages, closely

linked to environmental changes. Some wild forms disappeared, while others still exist in certain regions of the world.

Chronologically, *Sus scrofa ferus* (Europe) and *Sus vittatus* (Asia) gave rise, after domestication, to new types of swine that resulted in the first category of pig breeds: primitive breeds. From the primitive breeds, the old-type breeds later developed.

In a natural sequence of events, starting from the 18th century, old-type swine breeds gave rise to new-type breeds, which in turn produced the improved (modern) breeds, which include all “modern” pig breeds, even though some of them are quite old (new-type breeds that became improved breeds and truly modern/improved breeds).

We can summarize the above as follows: From the two fossil types that were discovered came the wild forms with downward-pointing canines (Tayassuinae, the Pecari pig with a three-compartment stomach) and the wild forms with upward-curved canines (Suinae, the European and Asian wild boars). From these, after domestication (4000 î.e.n in Asia; 3000 î.e.n in Europe), four chronological categories of domestic pig breeds emerged: primitive forms, old-type breeds, new-type breeds, improved (modern) breeds.

Primitive swine

Primitive Asian swine – derive from the Asian wild boar (*Sus vittatus*), which has several wild forms to which Asian domestic pigs are very similar in appearance. According to the criteria mentioned above, there are two groups: those with long, drooping ears (small to medium size) and those with short, erect ears (small size). The most important representative of the first group is the Chinese masked pig. It is characterized by good body development and by the presence of skin folds in the forehead region, from which its name (“masked”) originates, and by very good prolificacy (18–20 piglets per farrowing). This breed played a very important role in the formation of European

breeds, contributing significantly to the improvement of prolificacy and precocity. In the second category—those with short, erect ears—we find the Siamese pig, which is encountered especially in Southeast Asia. It is small in size, has low prolificacy, but displays good precocity.

Primitive European swine – were more homogeneous than the Asian ones due to more uniform environmental conditions and because they originated from a single wild form—the European wild boar (*Sus scrofa ferus*). They were classified according to the same criteria as the Asian ones, also comprising two groups: large-sized with long ears and small-sized with short ears. In both groups, the ears could be carried in various directions, from short and erect to long and drooping, oriented forward.

Large-sized primitive swine with long ears – were characterized by a weight of 160–180 kg, tall and strong limbs, a laterally flattened trunk, a sloping croup, long, coarse, dense hair of variable color. Prolificacy was 7–9 piglets per farrowing, the meat was lean but tasty, and the lard was dense and of good quality. They used pasture very efficiently and had very good organic resistance. The representative of this group is the primitive pig from Germany, also called the “marching pig” (northern and central Europe).

Small-sized primitive swine with short ears – these pigs were more uniform and very similar to *Sus scrofa ferus*. They had smaller body size and weight, a narrow, flattened trunk, tall and strong legs, abundant and thick hair of various colors. Sows had mediocre prolificacy (6–8 piglets per farrowing).

This category includes: the indigenous pig from Poland and that from Ukraine (with a long snout), the Bavarian pig, and, not least, the pig that dominated the territory of Romania, especially during the Middle Ages and still present today—Stocli—with its two varieties: the mountain variety and the delta variety (Bălăreț).

In addition to primitive long-eared or short-eared swine in Europe, on Romanian territory, as in Russia, a group of monodactyl or soliped swine has been identified (I. Dinu et al., 2002) (with a single toe-similar to the horse). In Romania, single-hoofed swine have been identified in the Bârlad and Videle areas, although at present they hold relatively low scientific interest.

Old-type breeds – these are all the breeds that were formed from Antiquity up to the 18th century. Their place of formation was the Roman Empire, which is why they are known as the group of Roman breeds (from Mediterranean countries) and the group of curly-haired breeds (from Balkan countries).

They resulted from undirected and complex crossbreeding between primitive European swine and Asian swine brought by the Romans from their expeditions in Asia.

The Roman breed group – depending on the country, includes the Neapolitan breed and the Portuguese breed.

They have a satisfactory prolificacy of 8–10 piglets per farrowing. The highly valuable Neapolitan breed, in a more improved form, is still found today around the Mediterranean Sea under various names: Romagniola, Mora, Cinta.

Portuguese breeds are currently found as promising native breeds and are undergoing extensive genetic conservation efforts: Malhado de Alcobaça, Bisaro, Alentejano.

The curly-haired breed group – originated in the Balkan region. The most typical representative is the Mangalița breed, which is raised in Romania, but also has representatives in other countries: Yugoslavia, Hungary, Bulgaria.

This group includes: the Šumandija breed from Yugoslavia, Bakony and Šiška from Hungary, Smajadova from Bulgaria, the Albanian breed, etc.

Few changes have occurred over time; they are considered local breeds, well

adapted to the specific environmental conditions of each region.

New-type breeds – selection, improvement of feeding, directed breeding, and breeding based on lines and families, applied scientifically, led to substantial changes in the morphological and productive traits of the new pig breeds. These breeds were formed starting in the 18th century and continued with great success in the 19th century, through crossbreeding between primitive European swine and Asian swine on the one hand, and with old-type European breeds (the Roman and curly-haired groups) on the other hand.

Breeds from the Romanic group (Neapolitan, Portuguese), the primitive Asian breeds-especially the Chinese masked pig-imported into England and crossed with local breeds gave rise to new breeds: Leicester, Essex, Small White (from which Middle White and Large White originate).

These newly emerged breeds differ greatly from the breeds involved in their formation. Several traits were improved, such as precocity and prolificacy. Conformation changed, meat production and dressing percentage increased, specialization for ham, bacon, and meat-fat production began, and improvement capacity also increased. Many new-type breeds have served and continue to serve as the basis of improved breeds, becoming improver breeds.

New-type breeds expanded into numerous countries throughout Europe and other continents.

Improved breeds – following those described previously, the new-type breeds become improver breeds as a result of the work carried out by humans and, of course, through the improvement of environmental conditions, being used in breeding programs.

Alongside improver breeds, “refined” or “specialized” breeds gradually appeared, as a result of consumer demand for pork

carcasses with a higher meat-to-fat ratio, lower feed consumption per kilogram of meat, higher average daily gain, etc.

Therefore, two categories of pig breeds emerge here as well: new-type breeds that have become improver breeds, and improved or modern breeds.

Improver breeds – these include most English pig breeds that were formed at the beginning of the 19th century: Small White, Middle White, Large White (the most widespread), Large Black, Berkshire, Wessex, etc. They are good improver breeds. The Large White breed is the most widely used in breeding as a maternal breed due to its outstanding qualities in this respect.

Modern (improved) breeds – these were formed starting from the interwar period and continuing to the present.

Across various regions of the world, these include: Landrace in Denmark, Piétrain in Belgium, Edelschwein in Germany, the Soviet Large White and the Ukrainian Steppe White obtained in Russia, and, in the United States of America – Hampshire, Duroc, Minnesota, Montana, Chester-White, etc.

These breeds show very good body development, with a well-developed hindquarter, thin and uniform backfat, a meat-to-fat ratio clearly favoring meat production, and high precocity.

Native pig breeds and populations

We can state that Romanian native breeds are found in all four categories described above, thus having as a primitive breed-derived directly from the European wild boar-the Stocli breed. An old-type, curly-haired, Balkan breed-Mangalița. Breeds that fall into the group of new-type breeds, formed through undirected crossbreeding-Bazna-and the indigenous swine populations Negru de Strei and Alb de Banat. The Alb de Rușetu pig appears as an intermediate form that creates the “transition” toward improvement work, being a population formed through directed

breeding, to which the new improved lines from industrial production are added.

In the following, we will describe the aforementioned breeds up to the improved lines used in industrial pig farming.

Breeds:

Stocli – is the oldest pig breed in Romania, and also in Europe (especially in the East). It is a breed that descends directly from the European wild boar, which explains its clear resemblance to it. The conformation of this pig is typical of wild forms, namely: the forequarters are more developed than the hindquarters, the body is covered with dense, coarse hair forming the characteristic “mane” in the neck area, the color is gray or brown in various shades typical of wild boars, and the piglets display light-colored stripes up to 4 weeks of age. In winter it also has an undercoat with finer hairs that are shed in summer. The snout is long and strong, the head profile straight, the ears short and carried upright. The limbs are long and thin but resistant. The croup is sloping, the hams are flat and poorly covered with muscle. It possesses high resistance to disease and harsh weather, is unpretentious regarding feed and shelter, and makes good use of pastures and the Danube Delta. It is a late-maturing breed characterized by very slow growth, which usually ends toward the end of the third year (36 kg at 6 months, 140 kg at 2–3 years), with a high feed conversion – 7 kg mixed feed per kg gain. Prolificacy is low, 5–6 piglets per farrowing.

On the territory of our country, it prospered during the Middle Ages, being the autochthonous pig and raised almost exclusively by the Romanian population. Thus, two varieties were defined: in mountainous areas, keeping the name Stocli, with poorer feed resources and therefore weaker body development, and in the Danube marshes and the Danube Delta known as Băltăreț, with a richer diet.

Crossed with local pigs from various regions, it contributed to the formation of

several populations, especially in Eastern Europe, and within Romania in Moldova, the Eastern Carpathians (mountain variety) and in the Curvature Carpathians, southern Moldova (Galați and Brăila counties), and Dobrogea (delta variety). It also participated in directed crosses with the Large White and Landrace breeds, from which the Alb de Rușetu pig was produced at the Zootechnical Research Station in Rușetu.

At present it is found in very small numbers, only in a few isolated nuclei.

Mangalița – is an old-type breed that originated in the Balkan Peninsula from the crossbreeding of large-bodied primitive European pigs with long, curly hair (the Serbian Šumadija pig) and primitive Asian pigs brought by the Romans from their expeditions in Asia.

The Mangalița breed was not formed in Romania, as we can see, but it is considered a local breed because it has been raised on Romanian territory for over 160 years (over 200 years according to some authors – since the year 1803), especially in Transylvania. It has adapted perfectly to our environmental conditions and, although it is an old-type breed, it is specialized in fat production (quantitatively, qualitatively, and organoleptically).

The first nucleus was brought from Serbia (Dinu et al., 2002). The animals imported and crossed with local pigs (Salonta region) gave rise to the Mangalița breed adapted to the climate and conditions in our country.

Within the breed, several color varieties appeared: the blonde variety is the most widespread and shows a somewhat higher degree of improvement (Păsărin, 2007). There are also the red, black, “swallow-bellied” (black with a white belly), and “Bariș” varieties, but they do not differ in productive traits, the breed being very well genetically consolidated.

During the Second World War, in Romania, the Mangalița breed represented

approximately 25% of the pig population, being highly appreciated by locals for the quality of its meat and especially its lard.

It falls into the fat-type morpho-productive category, medium in size, with a relatively short but wide and deep body, having a barrel-like appearance especially in fattened pigs. The head is medium-sized, with a conical, fairly long, and strong snout, moderately large, semi-drooping ears with the tips slightly raised. The neck is short, thick, and muscular.

The topline is slightly convex, the croup is oblique, and the hind hams are poorly developed. The limbs are of medium size, with a fine skeleton and long pasterns. The body is covered with wavy or curly, abundant hair, also provided with an undercoat that sheds during the warm season.

The productive traits of the breed are low. Prolificacy is 5–6 piglets per farrowing, and besides their weak nursing ability, the sows also have poorly developed maternal instinct.

It is a semi-precocious breed, suited for mixed fattening (meat-fat) or late fattening (for fat), having very tasty, marbled meat with remarkable juiciness, suitable for producing the famous Sibiu salami – the specific taste of Sibiu salami results only from processing Mangalița meat; what is now found on the market is only an “imitation” without the specific flavor.

The Mangalița breed is rustic, hardy, and little demanding regarding feed and management. It is excellent for extensive grazing, requires dry shelters, and due to its long (soft) pasterns, sometimes showing “bear-step,” it requires soft flooring and outdoor movement. It makes very good use of corn (480–520 g average daily gain), with a feed conversion ratio of 5.2–5.9 kg mixed feed per kg gain.

A valuable nucleus is maintained in the town of Turda as a gene reserve, due to the undeniable qualities of this breed.

Bazna – is a breed formed in Romania, in the locality of Bazna, Sibiu County,

beginning in the year 1872, through undirected and gradual crossbreeding between the Mangalița breed (blonde variety) and the Berkshire breed, with Large White being introduced later. It is a pig specific to Transylvania, but it also spread into Moldova with very good results in household farming.

After the years 1950–1955, infusion crossbreeding was performed with the Sattelschwein and Wessex breeds, aiming to improve precocity and prolificacy.

Bazna pigs are medium-sized and belong to the mixed productive type, meat–fat. Body length is moderate, and they have a particularly harmonious conformation; the croup is well covered with muscle. The head is small, with a slightly concave profile, the ears are medium-sized and oriented forward. The trunk is well covered both in muscle and in lard. The lard is of superior quality, and the meat is exceptionally tasty.

The color is characteristic of the breed: black with a white belt covering the shoulder region and the forelegs. The hair is sufficiently abundant, smooth or slightly wavy, matching the color of the area where it grows.

It belongs to the category of semi-precocious breeds, the age at which it is introduced into reproduction being between 9–10 months, full development being achieved at the age of 3 years. The average daily gain ranges between 500–550 g, with a specific consumption of 5.0 feed units, but it efficiently utilizes low-cost feed (kitchen scraps) and pastures, as well as potatoes, beet, and corn. Prolificacy is good, 9–10 piglets per farrowing.

Like the Mangalița, it is not suited to industrial farming but is recommended for household-level breeding.

At the experimental station in Turda, there is also a nucleus of the Bazna breed kept as a gene reserve, being increasingly requested by breeders. With this breed, the

presentation of genetically consolidated indigenous breeds concludes.

Populations:

Negrul de Strei – formed as a pig population in the Hațeg Depression, along the banks of the Strei River, starting around the year 1870, through undirected crossbreeding between the local Stocli breed and the black Mangalița, Cornwall, and Berkshire breeds (Dinu et al., 2002).

These pigs are medium to large in size (fairly massive), with a narrow head, long snout, and a straight or slightly concave profile. The ears of this breed are very large and drooping, oriented forward. The topline of the trunk is convex, the trunk is poorly covered in muscle, the loin and croup are narrow, but the overall body is long. The limbs are long and strong, ending with sturdy hooves. The hair is smooth, and the coloration, as the name suggests, is black. Sometimes the pasterns may be white (pintenog) or extended up the cannon bone (înciorăpat). The morpho-productive type is mixed (fat–meat).

Prolificacy is satisfactory for a rustic type, with 8–9 piglets per farrowing, and the sows are good mothers. Precocity is rather low, with the age of first reproduction at 12 months.

It makes very good use of pasture, kitchen scraps, corn, and pumpkins. Negrul de Strei is appreciated for its rusticity and high organic resistance, as well as for the quality of its meat and especially its lard.

Improvement with the Large Black breed is planned (especially to improve precocity), with which it shares some morphological traits.

Banat White Pig – was formed in the western part of the country, in the counties of Timiș and Caraș, between the two World Wars, through complex crossbreeding between local breeds (Mangalița, especially the blonde variety) and English breeds: Small White, Middle White (to which it closely resembles), Berkshire, and later Edelschwein (for precocity, prolificacy, and

constitution). To increase meat production, Large White and Landrace were also introduced.

In terms of exterior appearance, it is distinguished by a concave head profile and a short snout, the head being small. The ears are medium-sized, carried forward and slightly sideways. These pigs are medium-sized, with a harmonious conformation, a cylindrical trunk of moderate length, and a straight topline. The croup is slanted and well covered with musculature, and the hams are well developed.

The hair is smooth and white, while the skin is white-pink.

The production type of this population is mixed, meat-fat. As with Negrul de Strei, prolificacy is fairly good, with 8–10 piglets per farrowing, and the sows have good nursing ability. Precocity is characteristic of rustic animals, with slow growth; fattening to 140–150 kg takes up to 12 months with a specific feed intake of 4.2–4.5 FU, but the meat, lard, and rendered fat have exceptional organoleptic qualities.

Ruşetu White Pig – also known as “Românesc de carne” – was created through directed crossbreeding at the Animal Breeding Research Station in Ruşetu, Buzău County, beginning in 1950.

As societal demand for pork increased, the goal was to develop a pig population with high meat production, adapted to the harsher environmental conditions of the Bărăgan Plain, with good precocity and strong disease resistance.

Crossbreeding was performed between Stocli sows of the Băltăreţ variety and Ukrainian Large White boars. The resulting offspring were strictly selected for meat type and then crossed again with Large White to consolidate the desired traits. Finally, infusion crosses with Landrace and Yorkshire were carried out, improving precocity and carcass quality (Păsărin, 2007).

The Ruşetu White Pig is represented by large animals, similar to the Large White

breed, but with more abundant white-grey hair and slightly pigmented skin, which confers resistance to sunlight.

The trunk is well developed, the skeleton strong, and the general conformation robust. The head has a straight profile and a long snout; length and width measurements are similar to those of the Large White, and the limbs are fairly long and resistant.

Prolificacy is good, around 10 piglets per farrowing, and nursing capacity is very good, over 40 kg. Precocity is good, though lower than in the Large White; the average daily gain is 550–600 g, with a relatively high specific feed intake of 4.2 FU.

Although suitable for semi-intensive production and for rising climatic temperatures, the Ruşetu White population developed at SCZ Ruşetu unfortunately disappeared after 1995.

Below are several industrial pig lines from Romania, created through directed breeding in research stations: the Gorneşti Large White Line, the Synthetic Line 345 Periş, the Synthetic Line LSP-2000, the “Perhib” Hybrid, and the Dobrogea Pigmented line (Palas, Constanţa).

Genetic markers involved in genetic conservation in pigs and the polymerase chain reaction (PCR) laboratory method

Molecular analyses carried out to evaluate the genetic diversity, demographic and spatial expansion of the studied pig breeds and populations, aiming to demonstrate the spatio-temporal sustainability of individuals, represent a key element supporting the process of reintroducing these breeds into production and valorization. Thus, through the polymerase chain reaction technique, known as PCR (polymerase chain reaction), relevant genetic markers can be highlighted for advanced studies of genetic diversity, phylogeny, molecular phylogeography, identification of taxonomic relationships, as

well as estimation of intra- and interpopulation genetic diversity.

The PCR technique involves collecting blood samples from the analyzed specimens, transporting the samples in refrigerated containers to the laboratory, isolating and quantifying total DNA, sequencing (fragmenting) it with restriction enzymes, electrophoretic separation of the fragments, and their identification.

The collection of biological samples from the field, from certain local pig populations, for estimating genetic identity and diversity, involves visiting the Agricultural Research and Development Station (SCDA) in Turda, Cluj County, for the Mangalița and Bazna breeds; for the Alb de Banat and Negru de Strei populations, traveling to Hunedoara and Sălaj counties; and in the northeastern part of the country, specifically Iași County, for phenotypic and genotypic evaluation of local pigs.

The sequencing technique results in identifying the order of nitrogenous bases (adenine, guanine, cytosine, and thymine) within the genes of interest, an order that influences the development and functioning of living organisms. Thus, a specific chromatogram is obtained for each analyzed sequence, as well as the specificity coefficient based on the A+T/G+C ratio.

Genetic conservation plays an essential role in the promotion, preservation, and use of indigenous breeds, closely linked to contemporary development models and traditional farming practices.

Biological and genetic diversity in agriculture constitutes an indispensable factor for the development of agricultural production and rural areas. Consequently, the necessary measures must be taken to ensure the conservation and sustainable use of the resources associated with this diversity.

The importance of genetic conservation for domestic breeds and populations that have coexisted in close harmony with the Romanian people is reinforced by the

disappearance of certain wildlife species that once belonged to Romania's ecosystem, such as the great bustard, the European bison, the beaver, the tarpan, the Alpine ibex, and the steppe antelope. However, this idea of nature conservation and protection is not new in Romania, as actions in this regard were recorded as early as the early Middle Ages (Primack et al., 2008). These actions did not directly aim at nature protection in the modern sense, but rather at preventing resource exploitation by outsiders and creating optimal conditions for game regeneration, which represented an important food resource for human communities of those times.

The analysis of phenotypic parameters and genotypic profiles of each individual ensures the preservation of the genetic structure of current populations, for which an unaltered gene pool is necessary to create new genotypes capable of performing under new technologies imposed by market demands and climate change.

The risk of disappearance of certain native populations and breeds may appear imminent at first glance; however, with optimism and confidence in the progress of Animal Science as a discipline, and in the revival of the authentic Romanian village and people's care for native breeds, we can be certain that zootechnical biodiversity will regain its fullness through practically sustainable and viable population examples.

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