



## ИСТОРИЧЕСКИЕ АСПЕКТЫ ПОРОДООБРАЗОВАНИЯ СВИНЕЙ В СИБИРИ (ОБЗОР)

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Представлены в историческом описании исчезнувшие или находящиеся на грани исчезновения сибирские породы свиней с целью лучшего понимания пороодообразовательного процесса в отечественной системе разведения и гибридизации свиней, определяющего улучшение продуктивных и породных качеств. Обзор пород свиней в Сибири дан с точки зрения истории их выведения, использованных селекционно-генетических методов и полученных достижений. Отсутствие живых представителей исчезнувших пород не позволяет изучить более глубоко их физиологические, морфологические особенности, потенциал продуктивности на высоком уровне кормления как в условиях современных промышленных комплексов, так и с использованием современных генетических методов селекции. Для обзора использованы литературные источники, в которых достаточно полно описаны породы и типы, приведены данные по продуктивности в условиях существовавшей в то время системы содержания и кормления. Освещены аспекты становления, развития и современного состояния свиноводства, а также существующие в отрасли проблемы. Дано описание следующих пород: сибирской северной, кемеровской, скороспелой мясной (СМ-1), новосибирского типа крупной белой породы, ачинского типа крупной белой породы, кемеровского заводского мясного типа свиней (КМ-1), чистогорской породы, алтайской мясной. Показаны методические подходы и селекционные достижения в выведении новых пород и породных типов в Сибири. Отмечено важное практическое значение селекционно-генетических методов в системе промышленного производства в современных условиях. Рассмотрен вопрос о возможности использования генетического потенциала отечественных пород свиней в условиях импортозамещения на основе прогрессивных технологических и методических подходов ученых и практиков в условиях Сибири.

**Ключевые слова:** породы свиней, селекция, типы, линии, методы, показатели продуктивности

## HISTORICAL ASPECTS OF PIG BREEDING IN SIBERIA (REVIEW)

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Historical descriptions of extinct Siberian pig breeds or those on the verge of extinction are presented for a better understanding of the breeding process in the domestic pig breeding and hybridization system, which determines the improvement of productive and breed characters. An overview of pig breeds in Siberia is given in terms of the history of their breeding, the breeding and

genetic methods used and the achievements obtained. The absence of living representatives of extinct breeds does not allow to study more deeply their physiological, morphological features, the potential of productivity at a high level of feeding both in conditions of modern industrial complexes and using modern genetic breeding methods. Literature sources used for the review describe in sufficient detail breeds and types, and give data on productivity under the conditions of the then-existing system of housing and feeding. Aspects of the formation, development and the current state of pig breeding, as well as the existing problems in the industry are highlighted. The following breeds are described: Siberian Northern, Kemerovo, Early Maturing Meat (EM-1), Novosibirsk Large White Breed, Achinsk Large White Breed, Kemerovo Factory Meat Pigs (KM-1), Chelyabinsk Breed, Altai Meat Breed. Methodological approaches and breeding achievements in the breeding of new breeds and breed types in Siberia are shown. The important practical significance of breeding and genetic methods in the system of industrial production in modern conditions is noted. The issue of the possibility of using the genetic potential of domestic pig breeds under conditions of import substitution on the basis of advanced technological and methodological approaches of scientists and practitioners in the conditions of Siberia was considered.

**Keywords:** pig breeds, breeding, types, lines, methods, performance indicators

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The authors declare no conflict of interest.

By the beginning of the 1980s there were 24 pig breeds in Russia, among which only the Large White breed was widely distributed in all regions of the former USSR due to its high productivity and good adaptation properties. Other breeds, despite some advantages in meat and fattening qualities, were bred locally, and their adaptability to local conditions gave them an advantage over the Large White Breed. In Siberia, such breeds included the Siberian Northern, Kemerovo, and Early Maturing Meat (EM-1), as well as the later types created with the participation of these breeds, which were not widespread, but remained a valuable source of genetic diversity.

Stiff competition in industrial pork production in the conditions of large livestock complexes brought to the fore the use of breeds with high genetic potential for productivity, which led to the displacement of domestic breeds inferior to the imported ones, which led to their near extinction.

Currently, due to the problems of import

substitution, it is of great interest to study the experience of creating domestic breeds and types of pigs and the history of their improvement. Unfortunately, the absence of living representatives of extinct breeds does not allow to study more deeply their physiological, morphological features, the potential of productivity at a high level of feeding both in conditions of modern industrial complexes and using modern genetic breeding methods. Literature sources were used for the review, in which the breeds and types are described in sufficient detail, the data on productivity under the conditions of the then existing system of housing and feeding are given.

The purpose of the work is to present Siberian breeds of pigs that are extinct or on the verge of extinction in a historical description for a better understanding of the breeding process in the domestic system of breeding and hybridization of pigs.

One of the most famous Siberian pig breeds is the *Siberian Northern Breed*, registered as

a breeding achievement in 1942. The authors are M.O. Simon, A.I. Ovsyannikov, I.T. Skorik, P.I. Ternitsky, E.T. Savina, A.F. Lysakov. The scientists had the task of creating a breed with the productive characteristics of the Large White Breed and the survival ability of native pigs. Native pigs were small, late maturing animals with a live weight of 60-70 kg and small (6-8 piglets) fecundity. At the same time, they had such valuable qualities as unpretentiousness, endurance and strength of the constitution. The work on creation of the new Siberian breed was based on the method developed by the prominent Soviet breeder academician M.F. Ivanov. The essence of this technique was that the first- and second-generation crossbreds (depending on the degree of inheritance of desirable traits) were bred "in themselves" in good feeding and housing conditions<sup>1</sup>. The selection of breeding stock was very strict, rejecting animals that did not meet the desired requirements. Annual rejection reached up to 80%. Particular attention was paid to the selection of boars of the Large White Breed, giving preference to animals of those lines that had the best acclimatization to Siberian conditions and had high productivity indicators. Animals of the second generation were bred "in themselves" and crossbred with boars of the Large White Breed and the third generation of crossbreds were bred "in themselves". When the first lines of boars and maternal families were created, a considerable number of Large White boars were used to "loosen up" the hereditary basis of local pigs and to select the best combinations of parental pairs<sup>2</sup>.

The result of the work was animals that

were not inferior in size and fecundity to the Great White breed of pigs, but much better adapted to Siberian cold<sup>3</sup>. The breed was constantly in the process of improvement, especially during the 70s-80s. From 1968 to 1973, the Siberian Research Institute of Animal Husbandry (SibNIPTIZh) breeders managed to increase gestation rate by 2.3 days to 202.3 days (the age of reaching 95 kg live weight)<sup>4</sup>. In the best boar line Kedra this indicator was 199,6 days, which is higher than in other lines by 7,0-7,8 days. Carcasses were characterized by high meat qualities. The carcass length of boars of the leading lines was 93,23-95,7 cm, the thickness of the fat at the level of the seventh rib was 3,53-3,55 cm. The carcasses contained on average 55.63-57.11% muscle tissue.

To improve the meat qualities and to increase early maturity, the pigs of the Siberian Northern breed were crossed with animals of other breeds with higher growth energy (such as Lacombe). The length of half carcasses of the animals increased by 1.3-2.7 cm. The meat of pigs of the Siberian Northern breed and their mixtures with Lacombe breed had better taste qualities compared to Landrace and purebred Lacombe pigs, probably due to the higher content of fat in it<sup>5</sup>.

Further breeding of the Siberian Northern breed was conducted in the direction of improving early maturity, meat qualities and payment for feed. The breed was evaluated by the traditional method based on the results of control fattening.

Young animals of the Siberian Northern breed on fattening, depending on the lineage, reached 100 kg live weight in 187.3-197.0

<sup>1</sup>Simon M.O. Siberian Northern pig breed. State pedigree book of the pigs of the Siberian Northern breed and the Siberian Black-and-White breed group. Novosibirsk, 1951. 292 p.

<sup>2</sup>Kryuchkovsky A.G., Podletskaya N.N., Belenkov E.P., Burlak Z.K., Bakhmutova R.Y., Zhulidov V.A., Samodurov E.K., Zubova L.I. Pig breeding in Siberia. Moscow: Kolos, 1981. 159 p.

<sup>3</sup>Frolova V.I., Bekenev V.A. History of scientific transformation of pig breeding in Siberia. 85 years of the Siberian Institute of Animal Husbandry: collection of scientific papers, RAS. FASO. SibNIPTIZh. Novosibirsk, 2015. pp. 32-44.

<sup>4</sup>JLIsitsyna L.V. Fattening and meat qualities of the pigs of the Siberian Northern breed. Intensification of animal breeding in Siberia: collection of scientific works of SibNIPTIZh. Novosibirsk, 1978. Is. 25. pp. 68-73.

<sup>5</sup>Bekenev V.A. Meat and fat qualities of the pigs obtained from industrial crossing of the Siberian Northern breed mothers with Lacombe and Landrace boars. Livestock breeding in Siberia for 50 years. Novosibirsk: West Siberian Book Publishing House, 1963. pp. 327-339.

days<sup>6</sup>. At the same time, it was noted that the potential of the Siberian Northern breed may not have been fully revealed due to the insufficient level of feeding not fully balanced in terms of protein<sup>7</sup>.

Selection of the Siberian Northern breed to improve the early maturity and reproductive ability of the animals made it possible to achieve a good genetic potential at that time. In 1989 the best animals of the Kedra 25 line had the growth energy at the control fattening of 804 g which was 124 g higher than the average in the herd. Thus, the genetic potential of the Siberian Northern breed (SN) was comparable to the newly bred pig breeds<sup>8</sup>.

At the same time, it should be noted that the Siberian Northern breed has long been used at the "Kudryashovsky" pig complex in purity, as well as in crosses with other breeds. Its most successful combination, as experiments have shown, was with an early-maturing beef breed (EM-1) in a comparative evaluation with the Large White [1]. Siberian Northern breeding sows × EM-1 had a higher multiple birth rate by 8.2% and milk yield by 10.1% in comparison with Siberian Northern sows × Large White. The SN × EM-1 yelts had a lower back fat thickness (by 13.4%), a higher weight of the hind quarter (by 5.2%) and the area of the "loin eye" (by 14.0%) compared to the crossbreeding of Siberian Northern with Large White breed.

Creation of an Early-Maturing Meat breed (EM-1) was caused by the need to have a breed of animals satisfying the technologies of large complexes, which began to be actively created in the 1980s. Old domestic breeds did not fully meet the requirements of intensive production, and imported breeds such as

Landrace were not adapted to our natural and economic conditions and could not provide breeding material for the rapidly developing pig breeding. Large-scale pedigree testing of 15 breeds and two types, carried out under the control of the Main Directorate of Animal Husbandry of the USSR Ministry of Agriculture together with the Animal Husbandry Department of VASKHNIL, showed that the breeds bred in the country have relatively high productivity, but the genetic potential of fattening qualities requires improvement. Creation of the breed was simultaneously held in 73 large state and collective farms of Russia, Ukraine, Belarus and Moldova under the guidance of scientists from 20 scientific research institutes and higher educational institutions of agriculture. After the collapse of the USSR, two breeds were tested in 1993 on the basis of a single breeding material - the Early Maturing Meat breed (EM-1) in Russia and the Ukrainian Meat breed in Ukraine [2].

When creating the breed EM-1 different variants of crossing were worked out. For example, when crossing boars of Poltava Meat type PM-1 with the breeding sows of Kemerovo factory type KM-1 progenies that reached 100 kg in 180 days, animals of Sputnik line - in 178,8 days with the hairpin thickness of 27,7 mm, weight of the hind leg 10,7 kg, body length 95,5 cm were obtained [3]. Further breeding work with EM-1 breed was carried out on traditional methods of evaluation of mothers, their daughters, determination of genetic correlations between productive indices of mothers and daughters, as well as studying the coefficients of repeatability of traits [4].

<sup>6</sup>Khan P.A., Zabolotsky A.P. Meat and fattening qualities when combining different lines of boars and families of sows of the Siberian Northern breed on the stud farm "Cherepanovskoe". Breeding and pedigree work in industrial animal husbandry: scientific-technical bulletin. Vol. 12 / SB VASKHNIL, SibNIPTIZh. Novosibirsk. 1985. pp. 34-37.

<sup>7</sup>Lisitsyna L.V. Control breeding - the main method of improving pigs. Breeding and pedigree work in industrial animal husbandry: scientific and technical bulletin. Issue. 12. VASKhNIL, SibNIPTIZh, Novosibirsk. 1985. pp. 32-34.

<sup>8</sup>Lisitsyna L.V. Improvement of genetic potential of pigs of the Siberian Northern breed. Breeding and pedigree work in the intensification of animal husbandry in Siberia: collection of scientific papers, SB VASKHNIL, SibNIPTIZh. Novosibirsk, 1989. pp. 46-52.



To improve the fattening and meat qualities of the created breed EM-1 breeders used introductory crossbreeding with KM-1 type (Kemerovo Factory Meat type of beef pigs). The most successful combination was noted in the crossing of the breeding sows of EM-1 type and boars of KM-1 type which resulted in the youngsters' maturity coming to the age 172,4 days which is 16,5 days less than the purebred animals of EM-1 type. Reducing the proportion of the factory type KM-1 blood decreased the growth energy of the young and slightly worsened the meat quality of the progeny [5].

In order to create hybrids for fattening at industrial complexes, crossing of different breeds and identification of the best among them was carried out. Among six crossing variants of the Large White Breed and its first-generation hybrids and EM-1 (maternal basis) with German Landrace (GL) it was found that reproductive capabilities (milk yield of the breeding sows, litter weight at weaning) were higher in the Large White Breed (LB) with Landrace boars and in the three-way cross variant  $(LW \times GL) \times EM-1$ . Milk yield was 65.5-66.9 kg, litter weight - 172.7-181.1 kg. However, higher early maturity was observed in the cross  $LW \times EM-1$  - 204 days, which is higher by 10-26 days compared to other variants [6].

*The Kemerovo pig breed* is one of the best domestic breeds, which originated from local pigs improved by boars of the Large White breed in the 1930s. The main purpose of selecting this breed was to produce early maturing animals for cross-breeding with Large White pigs. The management of this project was entrusted to Professor A.I. Ovsyannikov, Doctor of Science in Agriculture and Professor I.I. Gudilin, Doctor of Science in Agriculture. Active creation of the breed began much later, when it began to be improved by complex reproductive crossing with the Berkshires and the Large Black Breed. In the

formation of several lines and families the Siberian Northern breed and the Siberian Black and White breed were used. The Kemerovo breed was registered as an independent breed in 1960.

At the first stage, a Kemerovo breed group of fat type pigs was created. These mixtures were covered with Berkshire boars. The half-blooded Berkshire breed mother stock with black and white color was covered again with Berkshire or crossbred boars (3/4 of the blood of the Berkshire breed). The result was animals with 60% Berkshire blood. The breeding nucleus consisted of four lines with five related groups of boars and eight families with 10 related groups of mothers.

At the second stage, a single "admixture of new blood" of local improved pigs (third to fifth generations), Large Black, Siberian Northern and Siberian Black-and-White breeds were carried out.

The pigs of the Kemerovo breed differed by the high indices of development and reproductive qualities: multiple births - 10-11 piglets, milk yield - 50-55 kg, weight of the litter at the age of 2 months - 170-180 kg. The animals had high precocity and growth rate, the average daily gain during fattening period was 730-780 g, weight of 100 kg was 175-180 days old, hairline thickness over the 6th-7th thoracic vertebra was 27-29 mm.

It should be noted that the improvement of existing at that time breeds and types of pigs was continuously carried out on the breeding farms of the complexes, new improved forms of animals were created. For example, as a result of selection for improvement of reproductive and fattening qualities the factory universal type of the Kemerovo beef breed (UKM) was formed at the CJSC APC "Chistogorsky", which showed 176,7 days early maturity, which was 24,9 days fewer than the yelts of the Kemerovo breed, which had a thinner (10,8 mm) back fat<sup>9</sup>. A successful combination of the Kemerovo breed with

<sup>9</sup>Ryavkin O.V. Economically useful and biological qualities of pigs of the Universal factory type (UKM) Kemerovo breed: Ph. Novosibirsk, 2012. 18 p.

other breeds was noted in the experiments on crossing it with Landrace, Duroc, Pietrain pigs to obtain hybrids and subsequent fattening [7]. The use of half-blooded breeding sows (Kemerovo × Landrace) crossed with the Pietrain boars ensured better fertility, growth of offspring during the suckling and fattening periods, as well as less fat deposition along the backbone.

In 1968, work on the creation of specialized synthetic lines of bacon and meat direction began in the Kemerovo Region under the leadership of VASKHNIL academician A.I. Ovsyannikov and a senior researcher of VIZh Candidate of Science in Agriculture I.A. Tarasov. The animals of the Kemerovo and Landrace breeds were chosen as the parent stock. First-generation mixtures served as source material for creating Siberian bacon pigs of the *Kemerovo factory beef type of pigs (KM-1)*. The type was registered in 1978. The patent holders are OJSC "Yurginsky" Breeding Plant, LLC APC "Chistogorsky", Novosibirsk State Agrarian University.

When obtaining EM-1, the following scheme was used: first generation cross-breeds were covered again with boars of the Landrace breed. From the resulting progeny crossbred boars (3/4 Landrace + 1/4 Kemerovo) were selected, which with half-blood sows (1/2 Kemerovo + 1/2 Landrace) gave the parent material to create a factory type (5/8 Landrace + 3/8 Kemerovo) suitable for breeding "in itself". Cross-bred animals of the first and second generations (1/2 Landrace + 1/2 Kemerovo and 3/4 Landrace + 1/4 Kemerovo) were also included into the alpha-line. As a result of "in-house" breeding, especially half-blooded crosses, animals of black and white color were excluded from the alpha-line, selecting only white pigs. The desirable type was obtained from the breeding of high-blooded "in-house" pigs for three

generations. The breeding work was carried out in the direction of increasing early maturity, meat qualities, and feed efficiency<sup>10</sup> [8].

Animals of the Kemerovo meat type are well adapted to the conditions of Siberia, have strong limbs and bones, good fattening and high productivity of fattening and meat qualities - the average daily gain on control fattening is 800 g at the age of reaching 100 kg 165 days of live weight, the thickness of the fat 28 mm [9].

*The Achinsk type* of the Large White Breed pigs were bred at the Achinsk breeding farm in the Krasnoyarsk Region. The authors are N.M. Bashkirova, V.A. Bekenev, I.P. Belozero, V.A. Dudarev, V.G. Mantikova<sup>11</sup>.

Animals of the Achinsk type are characterized by high reproductive qualities. Breeding was based on purebred breeding with strict selection and homogeneous selection of animals with high productivity. At the same time herd genealogical structure was created by lines, families and related groups. Animals of the Achinsk type are well developed, with a strong constitution, long body and high productivity, adapted to the harsh climatic conditions of Siberia. The reproductive rate of sows in the last 5 years has averaged 11,5-11,6 pigs per farrowing, the milk yield was 64,3-66,7 kg, the yield of litters per weaning was 10,1-10,2 pigs, the average live weight of one piglet at 2 months of age reached 20,1-20,6 kg. Boars belonging to four genealogical lines - Samson, Drachun, Svat, and Stalactite - and nine related groups were used in the breeding facility.

Pigs of the Achinsk type differ from other types of Large White Breed by their exterior - original structure of mammary gland, prominent lobes; by high and stable reproductive quality - multiple reproduction, milk yield and live weight of the litter at 2 months of age and especially by reproductive qualities

<sup>10</sup>Grishkova A.P., Tarasov N.A., Nechaeva E.V. Selection of KM-1 type pigs for high meat and fattening qualities. Intensification of pig breeding in the Kemerovo region: collection of scientific works, Novosibirsk, 1990. pp. 42-45.

<sup>11</sup>Bekenev V.A., Bashkirova N.M., Belozero I.P., Dudarev V.A., Mantikova V.G. Breeding achievement in animal breeding - type of pigs of the large White breed "Achinsky". Patent № 1994, application № 9811316. Application. 17.07.2001.2001a.

[10].

Genetic diversity in the breed was maintained by breeding by type, but inter-type crossing was studied to increase fattening qualities. The comparative evaluation of the productivity of pigs of the Achinsk and Katun types and their crosses showed that the animals of the Achinsk type had higher average daily gains and reached 100 kg live weight faster by 7.5 days compared to the Katun type. At the same time, animals obtained from intertype crossing, where the breeding sows were of the Katun type and the boars of the Achinsk type, occupied a middle position in terms of precocity. They reached a live weight of 100 kg in 189 days, while the opposite selection (Achinsk type sows and Katun type boars) had a precocity of 191.7 days, i.e. at the level of the Katun type [11].

Under the requirements of intensive pig breeding and market conditions, the *Large White breed* also developed in Siberia. The selection and genetic parameters of the target standard of new lines for natural-economic conditions of Siberia were established as follows: multiple density of breeding sows - 11-12 piglets, milk yield - 52-55 kg, weight of the litter at weaning at 2 months - 190-200 kg, young immaturity - 180-185 days, feed expenses - 3,6-3,8 fodder units per 1 kg of growth, average daily fat gain - 750-780 g, thickness of the fat layer - 30-31 mm. Using various selection methods during the period of 13 years (1981-1993) the efforts of SibNIPTIZh scientists on the basis of CJSC Breeding Farm "Bolshevik" and SAE EPF Breeding Plant "Borovskoye" a new breeding type of *Novosibirsk Big White* Breed Pigs (NBW)<sup>12</sup> was created and tested. The authors of the type were V.A. Bekenev, E.F. Grishina, A.G. Kryuchkovsky, G.I. Mazanova, Z.I. Moreva, V.I. Frolova, G.P. Yudina<sup>13</sup>. Selection

of the animals by complex evaluation and at high selection pressure was mainly aimed at improving the early maturity of parental groups and genealogical lines which had a good reserve of hereditary variability within the closed populations as well. Homogeneous selection by pedigree and intensive breeding work had a positive effect on the reproductive performance of mothers. At the age of 3 months, 20 boar piglets were selected for each boar introduced into the main herd and 6 pigs for a breeding sow introduced into the main herd. The NBW-1 line yelts ranked first by their precocity (weight reached 120 kg at the age of 212 days) among other breeds and types of pigs of domestic stud farms at the comparative fattening event held at the All-Union Agricultural Exhibition and Convention Centre in 1985. Further work was focused on the breeding of line-populations to obtain outstanding economically useful traits. The progeny of the boar Samson 7021 had an average daily gain of 1018 g and feed consumption of 3.18 fodder units per 1 kg of gain.

The progeny of the boar Samson 7295 had early maturity of 156.8 days. Both boars are related to each other (second to third generations), and their ancestor Samson 2507 was the best in the herd by the fattening qualities. At the time of testing, the NBW type outperformed all other breeds and types of pigs bred in Russia in terms of early maturity and average daily gain, and was almost as good as the breeds bred abroad in the countries with a developed pig breeding industry [12]. The NBW type has the following productivity indices: multiple pregnancy - 11 piglets per farrowing, milk yield - 57 kg, weight of the litter at weaning at 2 months - 194 kg, early maturity - 173,5 days, average daily gain on fattening - 842 g, feed consumption per 1 kg of

<sup>12</sup>Бекенев В.А., Гришина Е.Ф., Фролова В.И., Крючковский А.Г., Мазанова Г.И., Морева З.И., Юдина Г.П. Селекционное достижение в животноводстве – тип свиней крупной белой породы «Новосибирский». Патент № 1032, заявка № 9353386. Заявл. 1.1.1993.

<sup>13</sup>Фролова В.И. Выведение и совершенствование типа свиней Новосибирский крупной белой породы: автореф. дис.... канд. с.-х. наук. Новосибирск, 2007. 26 с.

gain - 3,5 fodder units, carcass length - 95,1 cm, hairline thickness - 31 mm, the weight of the back third of the half carcass - 10,4 kg. The genetic potential of early maturity is 156 days, the average daily gain is 1017 g [13].

Further intensification of pig breeding and competition with foreign producers has changed the requirements for breeding material in general: an increase in early maturity, increased carcass meatiness, multiple sows and boneflesh strength. The *Chistogorsky* breed was created on the basis of CJSC APC "Chistogorsky" in 2016. The authors are A.A. Arishin, V.A. Volkov, N.L. Tretiakova, A.P. Grishkova, and N.A. Chalova<sup>14</sup>. The breed was bred based on introductory crossing of the Large White Breed of domestic selection (sows) with Large White Breed boars of English (PIC, Poland) and French selection (France Hybrid, France) as well as Yorkshire boars ("Yubileyny" stud farm, Tyumen Region). The breed is well adapted to the conditions of industrial technology. The animals are of white color. The fecundity of mothers is average - 13,2 pigs. The age at which boars reach 100 kg is 161,3-166,7 days, the average daily gain during the period of growth is 851-894 g, the fat is thin - 16,1-16,5 mm, the fodder cost is 2,75-2,68 kg. The age of reaching 100 kg of piglets averaged 178.5 days, the thickness of the fat was 17.3 mm [14].

According to the same scheme, the Altai Meat pig breed was bred under modern conditions on the basis of the Large White Breed, Landrace breed and boars of the Maxgro breed. It was included in the State Register in 2017. The authors of the breeding achievement are N.I. Strekozov, N.A. Zinovieva, B.L. Panov, A.M. Yugan, A.N. Lukyanov, V.N. Sharnin, A.I. Kichigin, A.I. Rud, A.P. Kosarev, N.A. Glazkova, L.V. Khripunova.

#### CONCLUSION

During the twentieth century dozens of breeds of farm animals were bred in Russia. The achievements of Siberian scientists-

breeders also made a significant contribution to this. All of the pig breeds listed above, excluding the early maturing beef breed and, possibly, some others, have disappeared, but in the last years of their existence geneticists have managed to conduct research on animal identification, revealing their genetic profile by STR analysis and microsatellites, using any biological material, including museum skull samples [15]. For example, a high affinity of EM-1 pigs with Landrace breed and estrangement from Duroc and Yorkshire breeds was established, which is consistent with the historical origin of the breed [16]. When studying the genetic diversity of some domestic and foreign breeds in a comparative aspect, it was found that the Kemerovo breed is characterized by a relatively low level of genetic diversity, but it is higher than that of other local breeds. Cluster analysis allowed us to experimentally prove a high degree of genetic consolidation of the studied breeds, which indicates the uniqueness of their allelofond [17, 18]. General scientific and technological progress in biology, engineering, information technology has a great impact on methods and techniques of the breeding work in modern conditions. Systems of large industrial production in cattle breeding dictate the conditions for maximizing the manifestation of productive qualities, setting the boundaries at the limit of biological species capabilities. In this regard, local and including domestic breeding achievements, based on natural adaptive advantages, are in contradiction with the economic ones. The logical result is the replacement of domestic breeds by the imported ones. This problem exists all over the world. Under current conditions, we see the need to create farms in technological parks at scientific centers for the breeds of farm animals, new, rare, as well as endangered, with the best gene pool and using all modern methods of marker, genomic breeding, reproductive and information and statis-

<sup>14</sup>Аришин А.А., Волков В.А., Третьякова Н.Л., Гришкова А.П., Чалова Н.А. Селекционное достижение в животноводстве – порода свиней «Чистогорская». Патент № 8750, заявл.13.12.2016.



tical technologies [19].

The above historical evidence of the effectiveness of domestic breeding shows the potential possibility of improving the available Russian pigs or creating new forms of pigs with a world-class level of productivity and preserving genetic diversity and uniqueness.

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