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"STUDY OF WEIGHT GROWTH OF PIGS OF LARGE WHITE BREED, LANDRAS AND THEIR BREEDS"

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ABSTRACT

Crossing Landrace sows with large white breed boars helped to increase their fertility by 9%, compared with Landrace sows at purebred breeding. Uteruses of Landrace breed in combination with boars of large white breed were characterized by a higher rate of high fertility - 1.34 kg, and exceeded the analogues of group 1 by 8.2%.

When studying the growth rates of purebred and local piglets, it was found that the level of average daily gain in growing piglets up to 60 days of age were the best piglets from the breed combination of Landrace boars and sows of the Great White breed (325 g), which exceeded the control group by 31 g .

Economic analysis of research results showed that a more effective combination in the sale of piglets at 2 months of age were sows of large white breed and boars of Landrace breed, which gives the opportunity to obtain additional income of 45.75 UAH per 1 piglet.

Keywords: breed, crossbreeds, crossing, growth, growth.

Topicality. Providing the population with a sufficient amount of wholesome food, including meat, is not possible without the intensive development of the pig industry.

Pig farming is one of the most profitable branches of animal husbandry, because pigs are prolific and precocious animals. Compared to other livestock products, the maximum amount of nutrients a person absorbs from pork. Feed costs per unit of growth in pork production are 1.5-2.0 times less than in beef production. With intensive management of the pig industry from one sow per year receive 2.0-2.5 tons of pork, spending to obtain 1 kg of products 4-4.5 feed units. In modern conditions, the main technology in pork production is the principle of resource conservation, which can significantly increase production and increase the profitability of the livestock industry.

Successful pig breeding by 60-70% depends on the level and quality of feeding, 15-25% - on the gene pool and breeding work and 10-20% - on the conditions of animals. Increasing the profitability of pig farming depends on the biological value of feeding and feed costs per unit of growth, on the formation of a quality herd and intensive use of sows.

Creating a meat balance in the country primarily depends on increasing meat production of all kinds, including pork, which should account for more than 35% of the meat balance. Therefore, to increase pork production, improve its quality and bring the pig industry to the world level, maximize the potential of pigs for human needs, it is necessary to rationally use breeding resources of pigs in Ukraine and the world, strengthen the feed base and implement the latest technologies and achievements science.

Important measures that will increase pork production, as well as improve its quality, are the creation of new, improvement and combination of parent pairs in existing breeds, specialized types and lines.

Based on this, it should be considered relevant research that aims to study the dynamics of weight growth of piglets of the great white breed, Landrace and their crossbreeds, both when breeding "in itself" and in direct and reverse combinations.

Analysis of recent research and publications. Growth and development of purebred young breeds of great white and landrace.

The problem of providing the population with livestock products is a priority. Its solution in the coming years is possible only if special attention is paid to the rational development of such an industry as pig farming.

Pigs, as the most fertile and precocious, use food better than other animals and give the highest yield of meat and fat, as unsurpassed in calories, nutrition and taste. Pigs digest and use feed nutrients very well to produce meat and fat [36].

Feed costs per 1 kg of growth are 3.5 - 4.5 during intensive fattening of young animals, and 6 - 8 feed units during intensive fattening of adult animals. Pigs are omnivorous animals. They are able to assimilate plant and animal feeds, processed products and various food wastes. This feature allows you to breed pigs in different feed and climatic conditions [15].

Pigs are characterized by fertility and precocity. For one farrowing sow gives an average of 10-12 piglets. The short gestation period (average 114 days) allows you to get two farrowings in one year, which is 20 or more piglets from a sow.

The first time a pig can be inseminated at 9 -10 months of age, and at the age of 13 - 14 months to give birth. By 6 - 7 months of age the animals reach a weight of 100 - 110 kg and after slaughter give a carcass of 70 - 75 kg. Fertility and precocity provide from a sow with offspring 2 t and more meat in live weight per year. Young pigs have a high growth energy. This amount of meat cannot be obtained from other farm animals [39].

To increase the production of high-quality lean pork, a big role belongs to the proper use of existing breeds of pigs in different areas of productivity. This requires a more in-depth and comprehensive study of the peculiarities of growth, development and formation of their meat and fat qualities.

Creation of animals of the desired type is possible only when taking into account the patterns of individual development, taking into account the factors influencing the rearing of young animals [36].

Under growth is understood - the process of increasing the size of the organism, its mass, this is due to the accumulation of active, protein, substances. At the heart of growth - three different processes:

- cell division;
- increase in their mass and volume;
- increase in intercellular formations.

The relationship between growth and development is the relationship between quantitative and qualitative changes that occur in the body during ontogenesis.

Individual development of the organism (ontogenesis) begins with the formation of the zygote and lasts until the end of life. It is characterized by qualitative and quantitative changes that occur in the body due to heredity and living conditions.

In ontogenesis, the organism undergoes changes in growth and development. The organism develops as a result of a metabolism at which there is a growth and differentiation of bodies and fabrics, that is qualitative complication of structure and functions of an organism.

Individual development of an organism occurs unevenly. It is divided into certain periods, stages, qualitatively different from each other.

In the life of animals there are two periods of development: embryonic (from the moment zygote formation before birth) and postembryonic (from birth to death). In pigs, the embryonic period of development lasts 115 days. In the process of development, the animal acquires breed properties, as well as its inherent individuality, which is expressed in the peculiarities of the constitution, temperament and productivity [34].

The body develops as a single integral system. The genesis of the nervous system, endocrine glands and environmental conditions are crucial for its growth and development [41].

In the embryogenesis of animals there are three main - periods. Embryonic - from fertilization to complete implantation of the embryo, ie to the formation and functioning of the placenta. In pigs, it lasts - 25 days. Preterm - from the end of the embryonic period. Its duration in pigs is 7-12 days.

Fetal - from the end of the prenatal period to the birth of the animal. In pigs, it is 80-85 days.

In the prenatal and fetal periods, animals undergo intensive growth and complication of the organism through functional and morphological differentiation, specialization and integration, as a result of which by the end of the fetal period the animal has not only species but also breed features.

Throughout embryonic development, the increase in tissues, organs and live weight of the embryo is uneven.

Tissues and organs can be divided into three groups according to their growth rate. The group of tissues and organs with the greatest intensity of growth include skin, muscles, heart, intestines and pancreas; with an average growth rate - blood, spleen, stomach, kidneys; with low intensity - brain, lungs, liver, testes, ovaries and thyroid gland.

The rate of weight gain of the animal is greatest in the embryonic period. The zygote weighs less than a milligram, a month later the weight of the embryo increases several hundred times. In the future, the rate of weight gain decreases.

Pigs are characterized by the same growth rate of the axial and peripheral skeleton. Quantitative and qualitative changes and transformations that occur in the embryonic period, lead to the formation of a zygote of a complex organism that has all the basic species and breed characteristics and various functions, which allows it to exist after birth in new conditions [40].

Embryonic development of animals is divided into the following five periods.

1) The period of birth - from the birth of a piglet to the onset of its relative independence from the mother and the ability to exist independently.

At this time, the main food is mother's milk.

In the animal's body the intensity of metabolism sharply increases, physical thermoregulation develops, and the enzymatic functions of the organism change significantly. On the basis of unconditioned reflexes in young animals conditioned reflexes are produced, which ensure the unity and interconnection of the organism with the environment.

2) The lactation period lasts until weaning the young from the mother, on average up to 2 months. At this time, along with milk, they begin to eat a variety of plant foods, which promotes the development of their digestive system.

3) The period of puberty begins in the postmilk period and continues until the animals become able to reproduce and go into mating (9-10 months). By this age, animals form the main features of individuality. During puberty, piglets need full feeding, as it depends on their further productivity.

4) The period of maturity occurs when the animals begin to produce products, the size of which gradually increases and reaches its maximum value.

In pigs - it is from 2 to 5-6 years.

5) During aging, the reproductive capacity and productivity of animals gradually decrease [34]

The growth of pigs in the conventional sense is expressed in an increase in the mass of linear and volumetric indicators of their body. It is carried out as a self-regulating process that takes place as a result of the action of the relevant biological laws of continuity, non-uniformity and correlation [28].

The first important feature of growth is its continuous translational nature, which is manifested in an increase in body weight and size. There is a direct relationship between these indicators during the ontogenesis of the animal: the smaller they are at one stage of development, the greater at another.

The practical significance of this important feature lies in the need and feasibility of increasing growth

rates at each stage of breeding and fattening pigs. In pigs there are three features of growth:

the first feature is low growth rate in the embryonic and high post-embryonic period.

the second feature of pig growth is incomparable with animals of other species, extremely high growth intensity.

the third important species feature of pig growth should be considered a combination of high intensity with the duration of growth in the post-embryonic period.

The average live weight of a normal developed piglet at birth is 1.1-1.2 kg. It depends on many factors: breed, feeding and keeping conditions of sows, their age, etc. Boars weigh 10-12% more than lyoshki [39].

Piglets have different live weight at birth, which indicates their physiological maturity. The bigger the piglet is born, the better developed the cardiovascular, digestive, hematopoietic system, the more viable it is.

In the first months after birth there is a rapid growth of tissues and skeleton. From 4.5 to 5.5 months of age, the intensity of their growth changes, the formation of adipose tissue increases. In the body of newborn piglets, muscles make up 29.8%, bones - 15.1%, fat - 6.2%. At the age of 6 months, these figures are respectively 40; 6.3; and 15.2% [28].

Landrace piglets are born physiologically less mature than their peers of large white breeds. The blood of Landrace piglets at birth contains a significant number of young cell forms. This indicates that they lag behind large white piglets by 10 days. These breed features should be taken into account when raising piglets, creating an appropriate temperature, feeding, keeping, etc. Piglets are capable of high growth intensity (Table 1).

Table 1

Change in live weight of pigs, g

Age of embryos, days	big white	landrace
30	1,66	1,76
45	21,70	22,40
60	118,3	122,1
90	582,2	645,0
	1301	1500
At birth		

The development of pig muscle tissue after birth can be divided into three periods. The first - from birth to 80 days. This is the time when muscle growth is most intense. The second period - from 80-120 days. Muscle growth rate decreases, protein content remains unchanged, and fat deposition is more intense. The third period begins at about 4 months of age and lasts until puberty. At the same time, the protein content in the muscles decreases slightly, and the amount of fat increases sharply [28, 33].

For normal growth and development per 1 kg of growth in the first decade of life requires 0.02 MJ of digestible energy, by the end of the second - 0.02 - 0.021, the third - 0.022 MJ. At the age of 60 days, the need of piglets increases to 0.036 MJ per 1 kg of gain. The daily energy requirement of piglets with a live weight of 18 - 19 kg is approximately 15.9 MJ.

Blood in piglets in its composition differs sharply from the composition of blood in adult pigs. Thus, the serum of piglets contains 2.2 g of protein (100 ml). After 36 hours, life increases threefold (up to 6 g in 100 ml). In subsequent age periods, the protein content in the blood of piglets continues to increase, but at a slower pace [28].

Compared to adult animals, the blood of newborn piglets to a lesser extent provides protective functions of the body. Bactericidal serum of piglets at one month of age reaches 30-32%, at 2 months 36-37, at 4 months - 40, at 8 months - 50%.

In their blood there is almost no gamma - globulin fraction of protein, which is part of the immune body, protecting the body from various diseases, and much less white blood cells.

The volume of the stomach in newborn piglets does not exceed 25-30 ml, the small intestine - 100 ml, and the total volume of the entire gastrointestinal tract - 160 ml. The stomach of piglets from the first days of life functions very intensively [40].

In newborn piglets, gastric juice is excreted in small quantities and is of low quality. With age, its daily excretion increases.

The nature of this process is also changing. As piglets grow, so does the composition of gastric juice.

Scientists and practice have found that training piglets to eat grain early in dry and moist form helps to increase the secretion of gastric juice and improve its quality. Early feeding of piglets enhances the growth and development of digestive organs, almost halves the period of its age-related inferiority.

During the day it is filled with breast milk up to 14 -17 times or more. Under this load, the stomach grows vigorously, increases in weight and volume. By the end of the sucking period, its mass increases more than 40 times [28].

Piglets are born with 8 baby teeth. However, in the first days of life, they only defend themselves and only partially help the teeth to grind food, begin to develop in piglets at 15-30 days of age. During teething, piglets gnaw on hard objects, during which time they must be given roasted grain and mineral fertilizer [14].

The body of piglets at birth contains much more moisture and less protein and ash, compared to the young of other farm animals. In the process of growth, the moisture content in the body of piglet embryos decreases relatively quickly, and the dry matter (protein, mineral) increases [39].

Research has shown that the less biologically mature animals are born, the faster they grow and develop.

Piglets are capable of high growth intensity. At full feeding live weight of piglets in the first 30 days of life increases three times. This growth rate is due to the

high level of energy metabolism of nitrogen, minerals and other substances.

Genetically programmed productivity can be realized only under favorable conditions for raising animals. Numerous studies have shown and proven in practice that the various environmental conditions in which animals are during their growth and development, can both contribute to the formation of high productivity and suppress [41].

It was found that piglets from sows of large white breed in purebred breeding have: age of live weight of 100 kg - 180-200 days, the average daily gain in fattening - 800, at the expense of each kilogram of growth of 3.6-3.8 feed units. For pigs of large white breed is characterized by earlier fat deposition [1, 31, 44].

Landrace animals are different in meat and energy of growth. Animals have high growth, development and productivity. At control fattening purebred piglets showed high productivity indicators: age of reaching live weight of 100 kg - 172-180 days, average daily gain - 823 g, feed consumption per unit of production - 3.34-3.65 feed. from Animals of this breed are characterized by high meat in combination with good fattening qualities and the ability to give a lasting positive effect when crossed [13, 27, 42].

When studying the research, separately for the great white breed and landrace, we see that each breed is characterized by high growth and development. To achieve high performance in the cultivation of piglets and obtain from them in the future high-quality products must take into account the patterns of growth of tissues and organs [40].

Growth and fattening qualities of local pigs. The precocity of local young is 10-20% higher than purebred peers, live weight of 100 kg of local pigs is reached 10 - 15 days earlier and 1 kg of growth is spent on 0.4-0.6 feed units less than purebred animals of the original breeds [5].

In terms of height measurements at the withers and body length, the crossbreeds outperform their purebred peers. An even greater effect of heterosis is given by interlinear hybridization - crossing animals of well-selected lines [2].

Breeds of pigs in terms of fattening and especially meat qualities significantly exceed their purebred peers. Namely, the age of onset live weight of 100 kg, have larger average daily gains and lower feed costs per kilogram of live weight gain than their purebred peers. The yield of meat in pig carcasses increases by 2-7% compared to the original maternal breeds [4].

Purebred animals (Great White and Landrace) and their crossbreeds, being under the same conditions, give not only different growth rates, but also different dynamics of accumulation of major tissues in the body.

Pigs of individual genotypes differ in magnitude of growth, intensity and duration of growth, large stature, and hence precocity, which can not but leave an imprint on the level and direction of their productivity [3].

Fattening of local pigs obtained as a result of crossing animals of two factory breeds under the condition of their full feeding gives even better results than fattening of purebred original breeds [38].

The peculiarities of the influence of industrial crossing on the high fertility of sows of large white breed are established. Crossing sows of large white breed with boars landrace leads to increased fertility and average weight of piglets at 2 months. Increased resistance of young pigs does not affect the interior performance and improves the quality of meat and lard [44].

Under normal conditions, feeding and keeping the mixture are characterized by increased viability, better feed absorption, more intensive growth and development, high reproductive capacity and higher resistance to various diseases. The effect of crossbreeding averages 10-15% in weight gain and 8-10 percent in the payment for feed [19].

Biologically defective and insufficient protein feeding causes growth inhibition and reduced productivity in pigs. The fattener growth of young pigs decreases, the term is prolonged fattening, feed consumption increases by 25-30%, which leads to an increase in production costs [21].

There are the following periods in the rearing and fattening of pigs, which are associated with the intensity of development of their muscle fibers:

- rapid growth (up to about 80 days), when the fibers of the longest back muscle increase by more than 50%, which is mainly due to the development of muscle tissue;

- transient (80-120 days), characterized by constant protein deposition in the body, slowing down the growth of muscle fibers and increasing the intensity of fat production;

- obesity (from 120 days to maturation), when the growth of muscle fibers is 75% complete, the relative protein content in the body begins to fall, and the amount of fat increases almost rectilinearly [11].

Young meat of high genetic potential has the maximum meat productivity, which is realized only in the conditions of high-grade feeding and proper maintenance [16]. It is known that the main type of fattening pigs is meat fattening, which is widespread in all parts of our country. The advantage of fattening young meat is a significant saving of feed compared to fattening.

The main factors that ensure a high level of fattening are:

- high genetic potential of young animals;

- high concentration of energy in the dry matter of the diet;

- biological value of the diet;

- optimal housing conditions and appropriate microclimate;

- optimal age and final live weight of piglets at slaughter [26].

The scientific organization of intensive fattening is based on the skillful use of the age biological pattern of growth of young pigs. Its essence is the uneven growth and development of muscle and fat fabrics. Muscle tissue grows most intensively at the age of 2.5 - 3 to 5-6 months, in old age the intensity of muscle growth decreases and fat increases.

Fattening of local pigs obtained as a result of crossing animals of two factory breeds under the condition of their full feeding gives even better results than fattening of purebred profitable breeds [22].

But in conditions of insufficient feeding, according to some data Birta GO [8], local animals (WB x L) reduce growth by 24.5%, while purebred animals (WB) by only 15.7%.

The precocity of local young is 10-20% higher than purebred peers, live weight of 100 kg of local pigs is reached 10 - 15 days earlier and 1 kg of growth is spent on 0.4-0.6 feed units less than purebred animals of the original breeds . An even greater effect of heterosis is given by interlinear hybridization - crossing of animals of well-selected lines [20].

At the beginning of fattening gains may be lower, and at the end - higher. At low rates of average daily live weight gain (230–350 g), the duration of fattening increases, and feed consumption per 1 kg of live weight gain increases, as a result of which the cost of growth also increases [21].

On the recommendation of G.O. Bogdanova [11] 2.5-3-month-old piglets of meat, meat and fat breeds and their crossbreeds with a live weight of 25-30 kg are most suitable for meat fattening. Boars are monitored no later than 2 months of age. It is advisable to finish meat fattening in 6-8 months with a live weight of 100-120 kg. The thickness of the lard is 1.5 - 4 cm

According to Professor BP Volkopyalov [14] piglets at 2-2.5 months of age with a live weight of 15-20 kg are put for fattening. Fattening is underestimated when reaching a live weight of 100-110 kg. With proper feeding, pigs reach the specified live weight at the age of 7.0-7.5 months. The intensity of fattening is 500 - 600 g of growth per day, feed costs - 4.5 - 5.0 feed units per 1 kg of gain.

Local young animals, the parent form of which is meat breeds, should be fattened to a live weight of 120-130 kg, as feed costs increase slightly during this period [27].

Conducted research Petrovskaya NI [32], established the feasibility of using breeding boars of the Landrace breed, evaluated for fattening indicators of local offspring, as well as recommendations for the production of animals and their recommended for production rational use.

The use in the system of crossing boars of Landrace breed in sows of large white breed makes it possible to increase the fattening qualities of offspring by 9.5%, to reduce feed costs per 1 kg of growth within 0.76 feed. from [23].

This form of combination of parental forms had the most positive effect on the fattening qualities of pigs. High fattening qualities of local young animals were obtained. Economic efficiency of implementation during fattening per 100 heads per year - UAH 3947

In terms of fattening qualities, the highest productivity is shown by young pigs obtained from crossing sows of large white breed with boars of Landrace breed. During the fattening period, pigs of this group reached 100 kg of live weight in 193 days with an average daily gain of 669 g and feed costs per 1 kg of growth of 5.49 feeds. from

The use of Landrace boars in sows on sows of large white breed increases the fattening qualities of local young. The time to achieve a live weight of 100 kg decreased by 8 days, the average daily gain increased by 58.37 g or 9.5%, feed costs per 1 kg of live weight gain decreased by 0.76 feed. from [32].

As a result of Menchynska OS's research [29] it was established that the highest fertility - 11.9 piglets per farrowing, there were crossbreeds of large white breed and landrace. On this basis, they are dominated by purebred sows of Great White and Landrace by 7.2 and 4.5%, respectively.

The positive for purebred and local animals is the absence of stillborn piglets. It should be noted that local sows were characterized by higher fertility of piglets (12.2%). According to the weight of the nest at weaning at 30 days of age, the best indicators were local animals - 90.4 kg. This is due to the slightly higher weight of piglets at birth, as well as higher milk yield of sows.

The survival of piglets at 30 days was highest in local sows and large white breeds, was 92.4 and 92.2%, respectively, which is 6.3 and 7.5% more than in Landrace breeds.

Thus, studies show that during interbreeding, reproductive qualities of sows, such as fertility, high fertility, milk yield and nest weight at weaning increase on average from 4.5 to 7.2% relative to purebred breeding, with high preservation of young. But it should be noted that sows of large white breed are more adapted, have better reproductive qualities compared to the breed Landrace [24].

Only with sufficient feeding can achieve a significant increase in productivity of purebred and local animals, high live weight gain, quality of products and reduce feed costs for fattening.

Analysis of the literature shows that two-breed crossing allows to obtain highly productive young animals with a well-defined effect of heterosis [25].

Meat qualities of large white and crossbreeds.

The efficiency of the pig industry is determined not only by the level of fattening qualities, but largely depends on their meat productivity.

The introduction into the production of specialized meat breeds of foreign selection opens a wide opportunity to increase the production of high quality pork with increasing pre-slaughter live weight [37].

Long-term research shows the possibility of comprehensive targeted selection to increase the length of carcasses and their meat without compromising the quality of pork. Further increase in the production of high-quality pork is possible on the basis of the introduction of methods of mass improvement of existing breeds with widespread use of the phenomena of heterosis in industrial crossing and hybridization [26].

It is known that the main part of the carcass is muscle tissue. Meat qualities depend on its growth and development. During the embryonic period and in the first 5-6 months after birth, muscle tissue grows faster than other tissues and organs of pigs. At this time, the relative mass of muscle tissue increases.

In subsequent age periods, its growth rate slows down and, accordingly, the relative content in the body

of pigs decreases. Growth intensity and specific weight of adipose tissue, on the contrary, begin to increase.

The content of muscle tissue in pig carcasses depends on the growth and development of the muscles of the axial and peripheral skeletons. The intensity of growth and the relative mass of the muscles of the axial skeleton in the post-embryonic period increases, and the peripheral - decreases [41].

In order to rationally use breeds of pigs of different productivity (fat, meat-fat and meat) and to obtain high-quality pork, it is necessary to differentiate their weight at slaughter. Thus, pigs should be slaughtered when they reach live weight: meat and fat (large white) - 100-110, and meat (landrace) and their crossbreeds - 110-125 kg [5].

A number of works by Birta GO [6, 7, 8, 9, 10] are devoted to the study of meat qualities of crossbreeds, where he reveals the peculiarities of the formation of meat qualities depending on the genetic potential, completeness and levels of feeding.

Analysis of studies showed that crossbreeding had a positive effect on the yield of slaughter products. When slaughtering local white pigs and Landrace with a live weight of 100 kg, carcasses belonging to the category of meat are obtained. At slaughter in 100 kg the specific weight of meat makes 59,6-60,2%, at average and intensive level of feeding.

In crossbreeds, there is a relationship between the level of feeding and the meat content in the carcass at slaughter per 100 kg - 61.9%. Even when fattening to a live weight of 125 kg of a mixture of large white breed with landrace, meat carcasses with a relatively high meat content (58.3–59.7%) were obtained [10].

Pigs of the combination WB x L in the content of muscle tissue in the carcass are dominated by large white breed animals and landrace, but inferior in the amount of adipose tissue to purebred animals [9].

Longer at slaughter of 100 and 125 kg were half carcasses of piglets WB x L, due to the influence of the breed Landrace. They are superior to purebred analogues by 1.7 - 1.8 cm. The highest slaughter yield was observed in boars with a combination of WB x L - 71.1-72.7%.

From the crossbreeds get a thin lard, ham weight at slaughter of 100 kg at the level of 10.4 kg, with increasing slaughter weight to 125 kg ham weight increases by 1.3 kg. The greatest weight of ham is observed in boars, but they were more demanding to the conditions of feeding and keeping. At an intensive level of fattening, slaughter qualities were better than average and, especially typical, [7].

With an average daily gain of 250–350 g, the animals from the combination of WB x L breeds have the lowest fat content, both at slaughter at 100 and 125 kg: 31.5-34.1 mm. The thickness of the fat in the cross over 6-7 thoracic vertebrae, which is considered the main, is 34.6-37.3 mm.

The meat of WB x L crossbreeds has a lower caloric content - 126.3-128.4 kcal, this is due to the use as a parent form - Landrace breed. The meat index of crossbreeds is more than one: 1.04 -1.07.

Thus, by regulating the supply of nutrients with feed, it is possible to influence the growth and formation of the morphological composition of pig carcasses and obtain carcasses of the required quality [6].

Thus, we can conclude that knowledge of the laws of ontogenesis, knowledge of the factors that have the greatest impact on the development of animals facilitates the zootechnician to manage the process of ontogenesis in the interests of production. In this regard, the morphological, anatomical and physiological aspects of ontogenesis change. The viability of animals of various forms in the initial stages of their development is relatively increased; it is important to use in zootechnical practice to create animals of the desired qualities and type.

To increase the production of high-quality lean pork, a big role belongs to the proper use of existing breeds of pigs in different areas of productivity. This requires a more in-depth and comprehensive study of the peculiarities of growth, development and formation of their meat and fat qualities.

Creation of animals of the desired type is possible only when taking into account the patterns of individual development, taking into account the factors influencing the rearing of young animals.

Fattening of local pigs obtained as a result of crossing animals of two factory breeds under the condition of their full-fledged feeding gives even better results than fattening of purebred profitable breeds.

Precocity of local young is 10-20% higher than purebred peers, live weight of 100 kg of local pigs is reached 10 - 15 days earlier and 1 kg of growth is spent on 0.4 - 0.6 feed units less than purebred animals of the original breeds .

The analysis of literature sources shows that two-breed crossing allows to obtain highly productive young animals with a well-defined effect of heterosis.

The aim of the study. The aim of the research was to study the dynamics of weight growth of piglets in the comparative breed aspect using the breed Great White, Landrace and their crossbreeds.

Research methodology. Research was conducted during 2019 on a pig farm on animals of the great white breed, landrace and their crossbreeds (Table 2). The research was carried out by a selective method, by analyzing breeding records, as well as primary documentation of the uterine herd and logs of piglets.

Table 2

Методична схема міжпородних поєднань

Group animals	Genotype		Number of animals, ch	
	boars	Sows	boars	Sows
1 control	WB	WB	2	25
2 experimental	L	L	2	25
3 experimental	L	WB	2	25
4 experimental	WB	L	2	25

Notes: WB-large white breed, L - Landrace breed.

During the study period, we analyzed the following breed combinations of boars and sows: the first control group 25 sows of large white breed were covered with 2 boars of the same breed. The second group of 25 Landrace sows and 2 boars of the same breed. The third experimental group of 25 sows of large white breed were covered with boars of Landrace breed. The fourth experimental group of 25 Landrace sows were mated with 2 large white boars.

In these combinations, we studied the reproductive qualities of sows. Evaluation of reproductive qualities of sows was performed for generally accepted methods, taking into account the following indicators: fertility, ch .; high fertility, kg; number of piglets at weaning, head, live weight of piglets and nest weight at weaning, kg; safety of piglets,%.

Having received piglets from these combinations, we studied their growth dynamics. The dynamics of growth of piglets was studied by the change in live weight by weighing at birth, the 21st day of life, at weaning at 28 days and at 2 months age. The average daily and relative gains were determined by conventional methods.

The main research indicators were processed biometrically [35] The values of the Student – Fisher probability criterion were used at three probability levels: P = 0.95, P = 0.99 and P = 0.999, which give the probable value of the arithmetic mean and the probability of the difference of the studied indicators. with a small and large number of observations.

To indicate the probability level (P) of the difference probability criterion (td) the following symbols are accepted in the tables:

* P <0.05; ** P <0.01; *** P <0.001

When writing the work used, the materials of the annual reports of the production and financial plan, form № 24 s.-g., № 50-s.-g., Journal of mating and insemination; the book of the account of farrowings and offspring of pigs; suckling sow easel card.

Research results. Breeding properties of the uterine herd of pigs of large white breed.

One of the main components of the efficiency of the pig industry is a sufficient level of livestock productivity. Obtaining young animals of the appropriate amount with a satisfactory weight, its safety, as well as the weight of the nest at weaning in the future provide cheaper final products. The realization of the reproductive potential of pigs is possible under the conditions of effective use of breeding methods that provide a high level of heterosis.

This work was carried out by farm specialists together with scientists. As a result of this hard work, a herd of large white pigs has been created on the farm, which by its productive qualities meets the minimum requirements for the “elite” and “I” class.

According to the results of the evaluation of sows and boars of large white breed conducted in 2019, it is established that the animals bred on the farm, in terms of their productive qualities, meet the requirements set for animals of universal and meat direction of productivity. 186 sows and 11 boars were evaluated on the basis of a set of characteristics.

According to the results of grading animals in 2019, according to the instructions for grading, we present the main indicators of development of boars and sows of large white breed (Tables 3, 4).

Table 3

Development of boars

Availability		Live weight 1 head, kg			Body length, cm		
age, months	heads	average	Max	min	average	max	Min
12	2	185	193	167	162	166	157
24 andolder							
	6	295	315	274	176	182	174

As you can see, the live weight of sows corresponds to the class "elite", the age of the first farrowing was - 12.5 months. Given that the gestation period in sows is 115 days, the repair pigs were mated in 265 days at a live weight of 125-135 kg, and the average daily gain from birth to 125-135 kg was 450-500 g. These are the best options for breeding repair young growth.

Table 4

Development of sows

Number sows, naked.	Age of the first farrowing, months	Age of the first farrowing, months	Medium length torso, see
100	13	181	154

It should be noted that in pig breeding live weight is an indicator of the relationship of productive qualities of pigs, live weight of animals at a certain age reflects the products of the industry, and live weight of adult animals of the main herd are breeding traits that correlate with reproductive, fattening and meat qualities. (Table 7).

Analyzing the data in table 7, we note that sows are characterized by high reproductive qualities. Thus, according to the complex of traits (multiplicity, nest weight in 28 days) sows correspond to the class "elite" and I class.

Table 5

Productivity of sows

Groups of sows	Number of sows, ch.	Number of sows, ch.	Received piglets, Goal.		At weaning in 28 days				Saving,%
			total per group	on 1 farrowing	piglets in a group, ch.	piglets per 1 farrow, naked.	nest weight, kg	weight of 1 piglet, kg	
Uterus with a friend farrowing	22	22	242	11,0	392	10,6	82	7,7	96
Uterus with two and more farrowing	78	177	1969	11,1	3695	10,9	87	7,9	98
For everyone sows	100	199	2211	11,1	4087	10,9	85	7,8	98

Table 6

The best combination of boars and sows by live weight of weaned piglets and nest weight

Nickname and identification Number sows	Nickname and identification boar number	Mass nests at weaning, kg	Mass nests at weaning, kg	Average mass disconnected piglets, kg
The sorceress 04963	Dougal 11125	10	77	7,7
The sorceress 1260		10	79	7,9
Lisa 1286		10	84	8,4
Lisa 994	Dougal 10465	10	78	7,8
Lisa 992		10	78	7,8
Lisa 992	Norecord 1062	10	80	8,0

Regarding the assessment of fattening qualities, it was found that the age of reaching a live weight of 100 kg in young white breed - 180 days, with an average daily gain of fattening -767 g (720-790), respectively. Feed costs per 1 kg of growth are in the range of 3.4-3.6 feed. from

The best combinations of boars and sows in terms of fertility, live weight of weaned piglets and average weight of one piglet are presented in table. 8-9.

The data in the table show that the best indicators of reproductive capacity were obtained as a result of using sows of the Sorceress 1260 with a breeder Dougal 10465.

Live weight of newborn piglets is important as the initial value of body weight, from which the growth of animals continues in the postpartum period. Fertility of sows is one of the most important selection traits (r = from -0.28 to -0.36). This fact is confirmed by our research.

It was found that the number of newborn piglets was the same in all combinations and was 10 heads.

The indicator that integrates the number of piglets in the nest and the average live weight at the time of weaning is the weight of the nest. In our experiments, it was found that the best in this indicator is a combination of Lisa 1286 x Dougal 11125. By weight of the nest at weaning slightly lower values were obtained in the combination (Magician 04963 × Dougal 11125), which was 7.7 kg.

The best combinations of boars and sows by the number of born piglets are given in table 10. In the nests of all groups, the number of born piglets was 12 heads. Thus, a herd of large white breed pigs on the farm has a fairly high productivity:

• age of achievement of live weight of 100 kg - 182 days;

• feed costs -3.9 feed units per 1 kg of growth;

• meat yield is 50.2%.

The farm has a commodity direction of pork production, so the farm management uses two-breed industrial crossing aimed at obtaining a mixture of 1st generation effect heterosis, which is expressed in better precocity and higher productivity compared to animals of the original breeds. Large white breeds and landraces have been tested for compatibility by scientific studies and it has been found that such crossbreeding has the highest effect on achieving fattening qualities of animals.

Table 7

The best combination of boars and sows by number of piglets

Nickname and identification sow number	Nickname and identification boar number	Number of births piglets, naked
The sorceress 04963	Dougal 11037	12
The sorceress 1266	West 1395	12
The sorceress 1266	Dougal 1545	12
The sorceress 450	Norecord 106	12
The sorceress 1260	Dougal 11125	12
Lisa 476	Dougal 10545	
Lisa 994		12
Lisa 34	West 1395	12

From centuries of practice it is known that sows of large white breed should be widely used in industrial crossing with boars of meat breeds. One of these is the Landrace breed, which is characterized by high performance:

• age of reaching a live weight of 100 kg - 185 days;

• feed costs - 3.9 feed units per 1 kg of growth;

• the yield of meat in the carcass is 55.4%.

On the basis of researches it is established and checked in practice that such mixes of landraces with big white on fattening and meat qualities considerably exceed the purebred contemporaries. Precocity of local offspring due to heterosis increases by 5 - 12% while reducing feed consumption per 1 kg of growth by 0.3-0.8 feed units, increasing the yield of meat in the carcass by 2 -7% compared to the original parent breed.

Comparative evaluation of productive indicators of sows of different breeds and weight growth of piglets. The level of reproductive qualities of sows significantly determines the efficiency of the pig industry, as they determine the volume of breeding and fattening of young animals, so increasing reproductive traits is one of the urgent tasks at the present stage of selection work in pig breeding. Analysis of reproductive qualities of sows showed that all uteri were characterized by high reproductive qualities (Table 8).

Table 8

The level of reproducibility of various combinations

Indicator	Group			
	1	2	3	4 (♂ВБх♀Л)
	(♂ВБх♀ВБ)	(♂Лх♀Л)	(♂Лх♀ВБ)	
Multiplicity, ch.	11,9±0,5	9,5±0,3***	10,6±0,4*	10,4±0,4*
Large-fruited, kg	1,23±0,02	1,3±0,02***	1,3±0,02***	1,34±0,03***
Milk yield, kg	51,2±1,6	41,6±1,4*	46,2±3,2	44,9±2,5
	10,5±0,4	8,5±0,3*	10,0±0,4	
Live weight of 1 piglet at weaning in 28 days, kg	5,8±0,3	5,8±0,3	5,8±0,3	5,9±0,3
Preservation of piglets,%	88,1±2,7	89,1±1,9	94,6±1,9	88,3±2,7
Number of piglets in 2 months, Goal.	9,8±0,4	8,1±0,2***	9,5±0,3	8,9±0,3
Live weight of 1 piglet in 2 months, kg	18,9±0,3	19,4±0,3**	20,8±0,3***	20,3±0,3***
Preservation of piglets,%	82,4±2,6	85,5±2,1	89,7±2,3	85,6±2,6

But higher rates of fertility were characterized by the uterus of a large white breed with purebred breeding - 11.9 heads. Crossing Landrace sows with boars of large white breed helped to increase their fertility by 9%, compared with queens of Landrace breed at purebred breeding.

Uteruses of Landrace breed in combination with boars of large white breed were characterized by a higher rate of high fertility - 1.34 kg, and exceeded the analogues of group 1 by 8.2%. The highest indicators of milk yield were sows of group 1 - 51.24 kg, they exceeded this indicator of sows of groups 2, 3 and 4 by 18%; 10%; 12% respectively. According to the number of piglets at weaning, the animals of the first group were characterized by the highest rate - 10.5 heads. Comparing the live weight of piglets at 60 days in terms of control and experimental groups, we find that the highest live weight was observed piglets 3 experimental group, and they exceeded the control group by 10%. The highest percentage of surviving livestock had the uterus of the 3rd experimental group - 89.7%, the lowest value of this indicator was in sows of the 1st group and was equal to - 82.4%.

Under the same conditions of feeding and keeping purebred and local young animals were characterized by different growth intensities (Table 9).

Table 9

Dynamics of change of live weight of piglets (kg)

Age, days	Group			
	1 (♂ВБх♀ВБ)	2 (♂Лх♀Л)	3 (♂Лх♀ВБ)	4 (♂ВБх♀Л)
At birth	1,23±0,02	1,3±0,02***	1,3±0,02***	1,34±0,03***
21	4,9±0,2	4,8±0,3	5,2±0,2	5,1±0,3
28	5,8±0,3	5,8±0,3	5,8±0,3	5,9±0,3
60	18,9±0,3	19,4±0,3**	20,8±0,3***	20,3±0,3***

Local genotypes of groups 3 and 4 are characterized by higher live weight indicators for all age periods. At two months of age, their live weight was 20.8 and 20.3 kg, respectively, and exceeded the control by 1.9 kg or 10% and 1.4 kg or 7.4%, respectively.

Table 10

Growth rates of piglets

Group	Absolute gain, kg	Average daily increase, g	Relative increase,%
0-21 day			
1 (♂ВБх♀ВБ)	3,67	174,7	119,7
2 (♂Лх♀Л)	3,5	166,6	114,8
3 (♂Лх♀ВБ)	3,9	185,7	120,0
4 (♂ВБх♀Л)	3,76	179,0	116,8
21-28 days			
1 (♂ВБх♀ВБ)	0,9	128,7	16,8
2 (♂Лх♀Л)	1,0	142,8	18,9
3 (♂Лх♀ВБ)	0,6	85,7	10,9
4 (♂ВБх♀Л)	0,7	100,0	12,7
28-60 days			
1 (♂ВБх♀ВБ)	13,1	409,4	106,1
2 (♂Лх♀Л)	13,6	425,0	107,9
3 (♂Лх♀ВБ)	15,0	468,8	112,8
4 (♂ВБх♀Л)	14,4	450,0	109,9
for the whole period (0-60 days)			
1 (♂ВБх♀ВБ)	17,67	294,5	175,5
2 (♂Лх♀Л)	18,1	301,6	174,9
3 (♂Лх♀ВБ)	19,5	325,0	176,5
4 (♂ВБх♀Л)	18,96	316,0	175,5

Differences in live weight variable were confirmed by the level of absolute, average daily and relative gains because live weight is directly proportional to them (Table12).

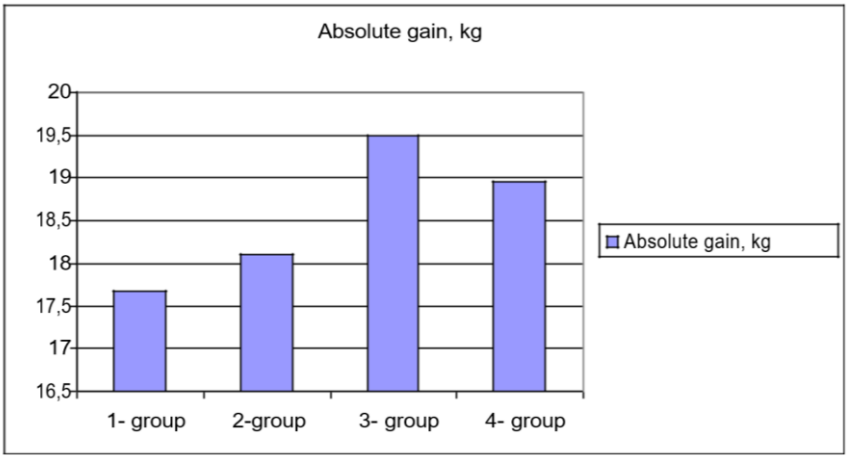

Fig. 1. Indicators of absolute growth of piglets (0 - 2 months)

When studying the growth rates of purebred and local piglets, it was found that the average daily gain in growing piglets up to 60 days of age were better piglets from a combination of Landrace boars and sows large white (325 g), which exceeded the control group by 31 g.

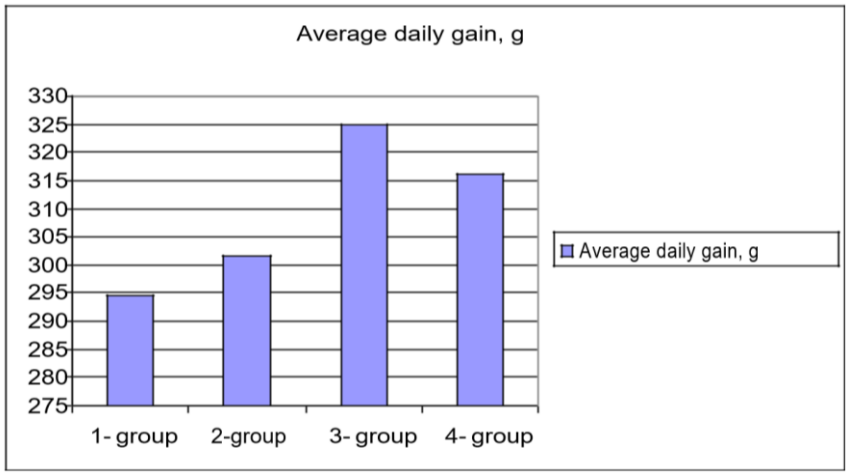

Fig. 2. The average daily gain of piglets (0 - 2 months)

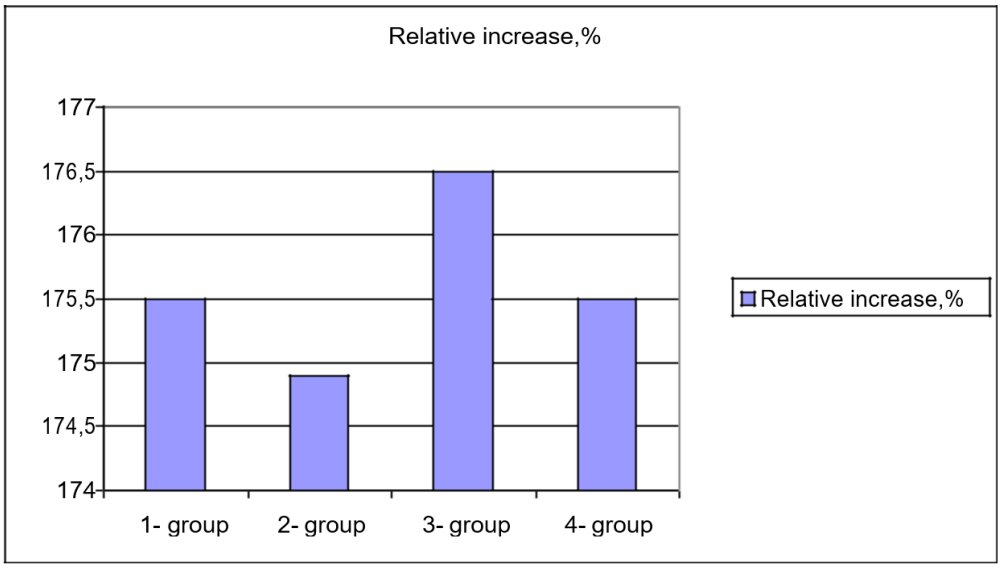

Fig. 3. Absolute growth of piglets (0 - 2 months)

The obtained results give grounds to make a generalized conclusion that in the conditions of a commercial breeder, along with purebred breeding, it is possible to successfully use crossbreeding of different breeds of pigs, namely: boars and sows of Landrace breed.

Economic evaluation of research results. The economic analysis of the conducted researches testifies that pedigree crossing of big white breed of pigs with breed landrace promotes improvement of reproductive qualities of sows and increase of intensity of growth of local piglets (tab. 11).

Table 11

Indicators of economic efficiency

Indicator	Groups			
	1 (♂ВБх♀ВБ)	2 (♂Лх♀Л)	3 (♂Лх♀ВБ)	4 (♂ВБх♀Л)
Average daily increase, g ± to control	294,5 -	301,6 +7,1	325 +30,5	316 +21,5
Additional increase 1 heads for the period cultivation, kg	-	0,426	1,83	1,29
The cost of additional increase, UAH	-	10,65	45,75	32,25

This makes it possible to obtain additional income from salespiglets at 2 months of age in the amount of UAH 45.75 per 1 piglet.

CONCLUSIONS

1. Analysis of the results of reproductive qualities of sows showed that the highest fertility had the uterus of a large white breed (11.9 heads) in purebred breeding.

2. Crossing sows of Landrace breed with boars of large white breed contributed to the increase of their fertility by 9%, in comparison with the rate of sows of Landrace breed at purebred breeding.

3. The uterus of the Landrace breed in combination with the boars of the large white breed had a higher fertility rate - 1.34 kg, and exceeded the analogues of group 1 by 8.2%.

4. The highest indicators of milk yield were sows of group 1 - 51.24 kg, they exceeded this indicator of sows 2, 3 and 4 groups by 18%; 10%; 12% respectively.

5. According to the number of piglets at weaning, the animals of the first group were characterized by the highest indicator - 10.5 heads.

6. Comparing the live weight of piglets at 60 days in terms of control and experimental groups, we find that the largest live weight was observed piglets 3 experimental group, and they exceeded the control group by 10%.

7. The highest percentage of surviving livestock had uteri of the 3rd experimental group - 89.7%, the lowest value of this indicator was in sows 1 group and was equal to 82.4%.

8. Local genotypes of groups 3 and 4 are characterized by higher indicators of live weight for all age periods. At the age of two months live weight was 20.8 and 20.3 kg, respectively, and exceeded the control by 1.9 kg, or 10% and 1.4 kg, or 7.4%, respectively.

9. When studying the growth rates of purebred and local piglets, It was found that the level of average daily gains in the rearing of piglets up to 60 days of age were the best piglets from the breed combination of Landrace boars with sows of the Great White breed (325 g), which exceeded the control group by 31 g.

10. Economic analysis of research results showed that a more effective combination in the sale of piglets at 2 months of age were sows of large white breed and boars of Landrace breed. Which makes it possible to get an additional profit of 45.75 UAH per 1 piglet.

To increase pork production in farms well equipped with fodder base, it is proposed to use the crossing of queens of large white breed with boars of Landrace breed, which will provide precocious fattening young without reducing the productivity of queens.

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ОПРЕДЕЛЕНИЕ ИНТЕНСИВНОСТИ ПОГЛОЩЕНИЯ КИСЛОРОДА И ВЫДЕЛЕНИЯ УГЛЕКИСЛОГО ГАЗА ВО ВСХОДАХ РАЗНЫХ КУЛЬТУР

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