# THE INFLUENCE OF THE BOARS GENOTYPE ON THE CARCASSES AND MEAT QUALITY IN SWINE HYBRIDS

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**Abstract**

*The quality of carcasses and meat has been studied in hybrid pigs obtained by using Duroc, Pietrain and Pietrain x Duroc boars of French origin, but also of Large White x Landrace x Pietrain breeders of local origin. A higher carcass weight of 83.67 kg was formed in hybrids resulting from racial combinations, where the paternal form was the Pietrain x Duroc boar. The tests performed showed that the length of the carcasses was 13.96 cm longer and the hams were more globular compared to the control group. The thickness of the bacon layer on the back was 20 mm at a weight of 114 kg, being reduced by 2 mm. The amount of protein in the meat of hybrid pigs in the experimental groups varied between 19.91 and 20.28%, which indicates that significant differences have not been detected. The obtained results show that the quality of the carcasses is under the influence of the genotype of boars, and the potential of hybrids depends on the combinatorial capacity of the maternal and paternal breeds in the hybridization process.*

**Key words:** hybrid, boar, carcass, ham

## INTRODUCTION

The process of intensifying of pig growth is largely ensured by the use of hybridization and the phenomenon of heterosis, which contributes to increased production in pigs based on the effects of selection and crossbreeding [4]. Currently, this biological phenomenon is not based on an illicit explanation, and it detains its widespread use in animal science, where the recognized basic practical methods for achieving the phenomenon of heterosis are considered crossed breeding production and hybridization. However, the information in this field cannot be considered complete and their procedures for using them are not most relevant.

Hybridization is based on the effect of raising purebred pigs and depends on the methods and efficiency of selection and this being the fundamental link of any hybridization system [6]. The heterosis effect largely depends on the genetic distance between the races [2]. In order to valorize it within the breeds, specialized lines are created, which after testing have demonstrated the efficiency of using hybridization in order to increase the swine production. Fewer tests have been performed on the use of hybrid boars, but many researchers have demonstrated the effect of using crossbred sows that are characterized by greater prolificacy and hybrid boars, being more resistant to technology-intensive conditions. However, the variety of economic conditions, the creation of new breeds and lines of pigs, the implementation of modern technologies, require further systematic research regarding breed combinations and lines in order to maximize the effect of crossbreeding for an optimum growth and hybridization.

## MATERIALS AND METHODS

The research was carried out at the Department of Animal Science of the State Agrarian University of Moldova and in the production unit for raising and fattening pigs SC "Agroseminvest" SRL from Burlăceni village, Cahul district.

In order to achieve the proposed objectives, the Large White x Landrace females (purebred form) and purebred boars and hybrids consisting of two or three breeds (paternal form) were used as objects of investigations (tab. 1)

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Table 1 The scheme of valorization of hybrid swine

| Group | Peternal forms | | Number of sows | Number of young pigs | |
|---|---|---|---|---|---|
| | Maternal | Paternal | | gilts | boars |
| I | Large White x Landrace | Pietrain | 6 | 15 | 15 |
| II | Large White x Landrace | Large White x Landrace x Pietrain | 6 | 15 | 15 |
| III | Large White x Landrace | (Large White x Landrace x Pietrain) x Pietrain | 6 | 15 | 15 |
| IV | Large White x Landrace | Duroc | 6 | 15 | 15 |
| V | Large White x Landrace | Pietrain x Duroc | 6 | 15 | 15 |

In order to determine the degree of influence of hybrid boars on the growth and development of the descendants, 5 experimental groups were formed, consisting of 6 sows and 30 young pigs (15 gilts and 15 boars) each. In total, 30 Large White x Landrace sows and 150 young hybrids were obtained in the experiment using the Great White x Landrace sows, the Pietrain and Duroc purebred boars, and the hybrid boars Pietrain x Duroc and Large White x Landrace x Pietrain. The experiments followed the growth rate and the degree of development in the selected swine youth. The body weight of the animals was determined monthly using an electronic scale. Afterwards, by calculating the average daily increase, the growth rate was assessed. The data obtained were used to assess the development of young pigs throughout the evidence period. At the weight of 114-115kg from each batch, three pigs were slaughtered to assess the quality of the carcasses. The carcasses and ham`s weight were determined by using the electronic scale, but to measure the large and small length of the carcasses, the length and perimeter of the hams, the thickness of the bacon layer at the withers, back, loin and rump, a measuring tape has been used. The quality of the meat was assessed by determining the protein, water and fat content. The experimental results were statistically processed by Microsoft Excel Office programs.

## RESULTS AND DISCUSSIONS

By efficiently growing pig hybrids, important productions of good quality meat and fat can be obtained with low feed consumption. Due to this fact, the expenses in order to increase them recover faster, and the profit enters the production circuit in a shorter time. To achieve these goals, it is necessary to implement modern technologies for intensive growth of young pigs, which will help to reduce the fattening period and the amount of compound feed consumed to achieve weight gain, with a structure that meets consumer requirements. The degree of influence of boar genotype on carcass weight in young pigs is shown in the Table 2.

Table 2 The influence of boars genotype on the carcass weight at the young pigs, n=3

| Group | Genotype | Raw meat, kg | Carcass weight, kg |
|---|---|---|---|
| I (control group) | L x MA x P | 112.66 ± 1.45* | 83.76 ± 1.17 |
| II | L x MA x (MA x L x P) | 114.33 ± 2.40* | 80.30 ± 0.62* |
| III | (L x MA) x (MA x L x P) x P | 114.00 ± 2.08 | 82.70 ± 1.78 |
| IV | L x MA x D | 113.67 ± 2.02 | 81.20 ± 2.41 |
| V | L x MA x (D x P) | 114.00 ± 1.15 | 83.67 ± 0.97* |

The data presented in the table show that the carcass mass obtained by slaughtering pigs weighing 114-115 kg varies depending on the genotype of the boars used to produce the hybrids and the ability to combine the breeds in the pig genotypes formation. Young pigs in group V had the carcass weight significantly higher by 3.37 kg (B ≥

0.95) and 2.47 kg compared to experimental groups II and IV. Significant differences between lots II, III, and IV have not been established regarding the carcass weight of pig hybrids. The results obtained show that the choice of hybridization type depends largely on the structure of the increase process that is expected to be achieved.

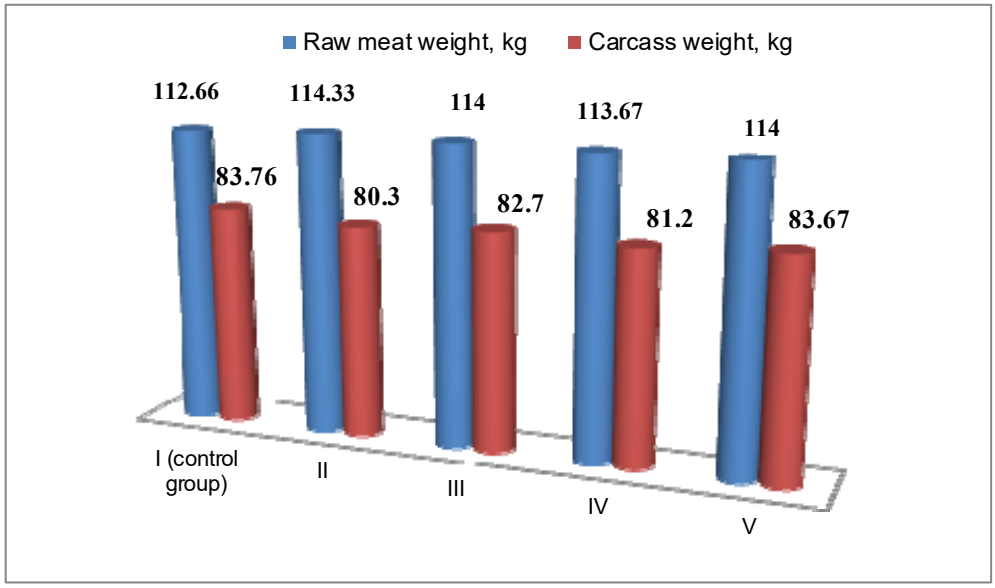


Fig. 1 The influence of the genotype on the carcass quality at young pigs

Table 3 The influence of boar genotype on carcasses` length and ham development in pigs, $\overline{X} \pm S\overline{x}$, n=3

| Group | Carcass lenght, cm | | Ham development | | |
|---|---|---|---|---|---|
| | Long | short | Weight, kg | Lenght, cm | Perimeter, cm |
| I (control group) | 101.37 ± 0.37* | 96.10 ± 0.55 | 10.07 ± 0.07 | 43.00 ± 0.12 | 93.23 ± 0.45 |
| II | 114.33 ± 0.33* | 96.00 ± 0.57* | 11.33 ± 0.03* | 57.67 ± 0.33* | 92.00 ± 1.15 |
| III | 112.67 ± 0.33 | 97.33 ± 0.33* | 9.27 ± 0.09* | 43.27 ± 0.23 | 92.20 ± 0.47 |
| IV | 110.00 ± 1.55 | 95.67 ± 0.88 | 9.93 ± 0.18 | 41.00 ± 2.51* | 85.00± 4.04* |
| V | 104.00 ± 0.58 | 96.67 ± 0.88 | 9.63 ± 0.09 | 44.33 ± 0.33 | 93.67± 0.67* |

To assess meat production in youth hybrid, it is important to know the value of the characters, which positively correlates with the proportion of meat in the carcass. This allows us to accelerate the process of assessing the quality of carcasses, establishing the morphological structure and effects of hybrid production. This can happen when genotypic combinations are put at the base, which ensure significant accumulations of muscle mass and the formation of a high quality meat [1]. The data from the table above confirms that there are differences between the groups of hybrids regarding the carcass length and the ham development which were formed in the period of growth and development of the young pigs. In the experimental groups where the carcass`s long

length varies between 104 cm and 114.3 cm, the differences compared to the control group were 2.63-12.96 cm, and the highest degree of authenticity (B≥0.999) was reported between experimental groups II and I, fact which shows that good results can also be obtained in the case of the use of boars resulting from combinations between three breeds, thus accelerating the hybridization process by reducing the period of hybrids production. In units with modern technologies, where pork is produced by intensive methods, this technological element has a particular importance, as it reduces the costs of breeding young pigs used for fattening. The short length of the carcasses reached values, which ranged between 96.00 and 97.33 cm, and has a very low degree of significance, a result that certifies the possibility of choosing the convenient and efficient hybrid for bacon production [3] .The degree of ham development has a significant influence on the proportion of meat in the carcass. The obtained results confirm that hams with a longer length were made by hybrids from group II, and a smaller one by those from group IV, the differences being significant (B ≥0.999) and equal to 16.67 cm. The most globular hams, which have massive accumulations of lean meat, formed the pig youth of group V, where the hybrids resulted from the combination of the Large White x Landrace sows and the Pietrain x Duroc hybrid boars, obtained by using the Pietrain breed as a maternal form. The differences between groups IV and V were 8.67 cm.

Table 4 Obtaining the thickness of the bacon layer in young pigs according to the boars genotype used to produce hybrids, mm, $\overline{X} \pm S\overline{x}$, n=3

| Carcass position | Groups | | | | |
|---|---|---|---|---|---|
| | I (control group) | II | III | IV | V |
| Wither | 27.6 ± 0.15 | 37.3 ± 0.39* | 30.0 ± 0.11 | 31.3 ± 0.68 | 23.3 ± 0.18* |
| Back | 20.6 ± 0.07 | 30.3 ± 0.03* | 22.0 ± 0.11 | 21.0 ± 0.20 | 20.0 ± 0.06 |
| Loin | 27.3 ± 0.12 | 32.3 ± 0.14* | 26.3 ± 0.08 | 19.3 ± 0.067* | 21.7 ± 0.12 |
| Rump | 10.7 ± 0.07* | 19.0 ± 0.30 | 10.7 ± 0.06* | 15.0 ± 0.25 | 14.0 ± 0.32 |

Depending on the body weight at slaughter, multiple researches were performed aimed at identifying the peculiarities of carcass quality formation in different genotypes. Under intensive operating conditions, has been demonstrated the superiority of hybrids regarding the reduction of fat layer [5] and the extension of the period of intensive growth of muscle tissue. Table 4 presents results that certify the ability to form the thickness of the bacon layer depending on the region of the carcasses in different hybrids. The data in the table show that there are differences between the experimental groups regarding the thickness of the bacon layer and its uniformity on the upper line of the carcasses. The most uniform carcasses with a thinner layer of bacon in the spinal region were obtained in groups V and IV of hybrids, where the thickness of the bacon did not exceed 20-21 mm, and the differences compared to group II were equal to 8.7-9.7 mm, the degree of significance (B ≥ 0.999) being quite high. In all experimental groups of hybrids, the layer of bacon was higher in the region of the withers with a variety from 23.3 to 37.3 mm. In loin, a layer of bacon thinner than 19.3 mm was recorded in group IV of pigs, and the difference from group II was within the limits of 13 mm (B≥ 0.99). The amount of protein in the meat of hybrid youth varied between 19.91 and 20.28%, which indicates that no significant differences were recorded.

## CONCLUSION

1. Following the analysis of experimental results, we can conclude that the quality of carcasses depends on the boar's genotype and also on the genetic distance between genotypes, but the productive potential of

hybrids is formed under the influence of the combined capacity of maternal and paternal breeds included in the hybridization process.

2. There are differences between the experimental groups of hybrids regarding the length of the carcasses and the development of the hams. The young pigs had carcasses where the long length showed significant variations and the highest degree (B≥0.999) was reported between groups II and I.

3. Hams with a longer length were produced by the hybrids from group II and a shorter length by those from group IV, the differences being significant (B≥ 0.999). The most globular hams were produced by the young pigs from group V, where the hybrids resulted from the combination of the paternal form Pietrain x Duroc.

4. The most uniform carcasses with a thinner layer of bacon in the spinal region were obtained in groups V and IV of hybrids, where the thickness of the bacon did not exceed 20-21 mm, and the differences compared to group I had a rather high degree of significance (B ≥0.999). Large variations regarding the amount of protein in the meat of hybrid pigs were not identified, the differences being insignificant.

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