Transformation Of Nutrients And Feed Energy Into Meat Products In Farm Animals.

Vostroilov AV[1], Syarova LN[2], Pelevina GA[3], Sutolkin AA[4], and Kurchaeva EE[3].

[1]Doctor of agricultural Sciences, doctor of Voronezh State Agrarian University named after Emperor Peter I.
[2]Department of private animal husbandry, Voronezh State Agrarian University named after Emperor Peter I.
[3]candidate of technical Sciences, Voronezh State Agrarian University named after Emperor Peter I.
[4]candidate of agricultural Sciences, Voronezh State Agrarian University named after Emperor Peter I.

ABSTRACT

Meat productivity of animals is characterized not only by the output of the most valuable meat parts of the carcass, but also by the transformation of nutrients and feed energy into meat products. Chemical analysis of the average meat sample indicates a moisture content of 71.96 %, protein 18.86%, fat 7.99 %, in purebred animals, and reduction the amount of moisture to 71.63%, fat to 7.98%, and an increase in protein to 19.15% in hybrid animals. In the long muscle it is accumulated in groups, respectively, more protein (22.03% and 22.34 %), and moisture (75.5 and 75.2 %) and fat (1.35 and 1.36 %) less than in the average sample of meat. In 1 kg of flesh of hybrids it is concluded 6460, 2 Kj, purebred 6418,3 Kj. Per 1 kg of live weight gain at hybrids crude protein 51 g of feed and energy 6.0 MJ is spent less than that at the purebred animals. In 186, 7 kg of flesh of hybrids there is 35.8 kg of protein and 14.9 kg fat, representing an advantage in the accumulation in 176, 6 kg of flesh of purebred animals, protein 2.5 kg, and fat by 0.5 kg. At the age in 18 months of hybrids, the conversion rate of feed protein into food protein of carcass flesh is 0.81 % higher than that of purebred contemporaries. The greatest profitability of 34.8% was observed in hybrids, which is 5, 8 % higher than in the control group.

Keywords: bulls, breed, carcass, protein, energy, bioconversion

*Corresponding author

INTRODUCTION

Meat is the main source of essential amino acids and polyunsaturated fats in human nutrition, and therefore the need to consume high-quality and safe meat requires knowledge from its producers about the impact of zoo technical factors on its composition and technological properties.

The search for ways to increase beef production, improve its quality through intensive use of livestock breeding resources is important for zoo technical science. It is undeniable that the productivity of livestock, the quality of meat depends on the breed, the level of feeding, the age of the animal, the technology of content and other factors [12-15].

The aim of our research was to study the chemical composition of meat obtained from purebred black – and-white bulls of local selection and crossbred animals obtained by crossing with Holstein. Another task of the research was to show the transformation of nutrients and energy of feed into meat products, as well as the economic feasibility of growing the studied animals in Transdniestria.

Scientific and production experience in the study of this issue was delivered in 2016 and 2017 in terms of the OOO "Fialt-agro", Rybnitsa district, at Parkinson factory, Slobodzeya district, Transdniestria**.**

OBJECTS AND METHODS OF RESEARCH

For the experiment it was formed on the principle of pairs – analogues two groups of bulls of 18 heads each: control consisting of purebred local selection and experienced, consisting of a crossbred bulls (½PB (pure breed) x ½ Holstein).

Slaughter of animals in the study groups was carried out at 18 months age.

Animals were in equal conditions of keeping and feeding, with the rations of feeding made according to the norms of «All –Russia Institute of Animal Husbandry» from the forages which are available in economy.

Studies were carried out after the slaughter of animals in three carcasses in each group.

Cutting beef was performed directly before the beginning of the study. To determine the chemical composition of the average meat sample, the right half-carcasses were used, and for the long muscle of the back muscle in the region of 9-12 ribs.

Moisture in meat samples was found by drying at a temperature of 150 0C, crude fat-in the Soxlet apparatus, by Kendal protein, ash-by burning in a muffle furnace.

Water binding capacity and tenderness was determined by the "press method" of R. Grau R. the Gamma in modification of VNIIMP, the intensity of the color – Fusano and Kuromeru using the PEC (photo-electro-calorimental).

The conversion of protein and energy feed in dietary protein was determined according to the method of agricultural Sciences (1983). Economic efficiency by calculation.

RESULTS AND THEIR DISCUSSION

According to N. Bayranova, N. Melnikova [3] the nutritional value of meat is determined by the content of basic nutrients necessary for human life, as well as its taste.

In their work, many researchers [1,4,7] showed that water in cattle meat can be from 55 to 85 %.A number of scientists [8,10] note a decrease in moisture with age.

The authors [2,5,9] note the differences in the quality of meat and the formation of meat productivity between animals of different breeds.

We have conducted studies of the chemical composition of the average sample of minced meat.

The results of the studies are presented in table 1.

Table 1: Chemical composition of average sample of meat of black-and-white and crossbred bulls

Indicator	Group		experienced ± to control
	control	experienced	
Number of animals, heads	3	3	
Moisture in meat, %	71.93±0.15	71.63±0.09	-0.3
Dry matter, % including:	28.07±0.15	28.37±0.09	0.3
Protein, %	18.86±0.11	19.15±0.17	0.29
Ash, %	1.21±0.02	1.24±0.01	0.03
Fat, %	7.99±0.10	7.98±0.17	-0.01
The ratio of protein - fat	2.36	2.40	0.04
TheratioProtein-dry matter	0.67	0.68	0.01
The coefficient of "maturity" of meat, %	11.11	11.14	0.03

It is noted that the moisture in the meat of purebred and crossbred animals in 18 months. age, with difference of 0.3 percent is contained respectively 71,93 % 71,63 %. The amount of protein (18.86 %)in the first group is less by 0.29 %, ash is more by 0.03 %, and fat is accumulated almost the same amount, about 8 %. The difference in indicators is not statistically reliable.

The quality of muscle tissue and its nutritional value depend to a certain extent on the ratio of protein and fat[11].Bulls of both groups at the age of 18 months had approximately the same coefficient of "maturity", with a slight advantage in cross-bred animals of 0.03 %. It is established that animals of both groups are able to accumulate a sufficient amount of valuable protein by this age, which gives grounds to attribute the meat of beef of the studied animals to high-quality raw materials.

We have studied the long back muscle in two groups of animals.

It was found that in animals of both groups the content of the main chemical components have minor deviations. The amount of moisture in the long back muscle was 75.5 %, which is 0.3% more than in cross-bred animals.The superiority in crude protein (22,34 %) in the hybrid animals amounted to 0,28 %.

The content of crude fat in the meat of long muscle of back of black and white animals is 1.38 %, which is 0.03 % higher than that of cross-bred animals.

For total nitrogen (3.49% and 3.57 %) and crude ash (1.06% and 1.11%), the advantage of cross-breeding animals.

Bulls of the experimental group differ by 0.3 %, a more intensive process of accumulation of dry matter (24.80 %).According to the coefficient of "maturity" of meat, there was an advantage of 0.03 % in favor of purebred animals.

It should be noted that confirmed the opinion of A. F. Shevkhuzhev, D. A. Makeeva [11] that in the longest muscle in the back contains more moisture, protein and less fat compared to the average sample of meat.

Meat is a product of protein nutrition, and therefore its nutritional value is determined by the protein complex.

Table 2: Physico-chemical and technological parameters of the longest back muscle of black-and-white and crossbred bulls at the age of 18 months

Indices	Breed		experienced ± to control
	control	experienced	
Number of animals, heads	3	3	
pH, unit	6,41	6,29	-0,12
The color intensity, units of the extinction	279,33±2,73	285,67±1,67	6,34[*]
Juice losses during heat treatment, %	33,37±0,54	33,27±0,58	-0,1

[*] ($p < 0,05$)

In the evaluation of meat are also important physical and chemical parameters that determine the technological properties of the products. The analysis of the data obtained by us testifies to certain interbreed differences in these indicators in the longest back muscle of experimental bulls (table.2).

There were no statistically significant differences in the pH value between the meat of the animals of the studied breeds. The acidity of the meat in the groups was within the limits characterizing the normal quality of the meat.

A statistically significant difference in the intensity of muscle tissue staining between the animals of the two groups at the age of 18 months was established. age. So the superiority of the crossbred animal over the purebred contemporaries was of the 6.34 units of the extinction, which indicates greater maturity first.

One of the nutritional advantages of meat is its tenderness (hardness). This indicator has a slight deviation in favor of cross-breeding animals in 0.02 %, which also indicates their precocity.The loss of moisture and, consequently, nutrients during heat treatment affects the yield of the finished product

The meat of bull-calves of black – motley breed at age 18 months lost 0.1 percent more moisture than meat obtained from cross-bred bulls.

The productivity of animals is invariably linked to the metabolism in the body of the animal, and the body's ability to accumulate nutrients.

We have studied this process in the studied animals(table.3). The calculation of the amount of energy deposited in the body was made taking into account the amount of energy contained in 1 g of protein and fat.

Table 3: Energy value of the edible part of the carcass of experimental animals

Group of animals	Content in 1 kg of pulp, g		Enclosed energy in 1 kg of pulp, Kj			Gross energy in pulp mascara, MJ
	protein	fat	total	Including		
				protein energy	fat energy	
Control	188.6	79.9	6418.3	3238.3	3180.0	1134.1
Experienced	191.5	79.8	6460.2	3288.1	3172.1	1206.1

It is established that crossbred animals have accumulated in the muscles 1.53% more protein. There was a slight superiority in fat content in purebred animals. In 1 kg of flesh of cross-bred animals it is concluded on 41,9Kj more energy, than in flesh of purebred animals. The superiority of the gross energy of the flesh of carcasses of cross-bred animals was 72.0 MJ.

We have studied the transformation of feed energy into animal muscle tissue. The results of the studies are shown in table 4.

Table 4: Conversion of feed nutrients into the flesh of cross-bred animals

Indicator	Animal group	
	control	experienced
Spent raw protein per 1 kg of live weight gain, g	713	662
Spent energy feed per 1 kg of live weight gain, MJ	84,2	78,2
The contents in carcass flesh: protein, kg	33,3	35,8
fat, kg	14,1	14,9
Yield per 1 kg of pre-slaughter live weight: protein, g	73,5	74,0
fat, g	31,1	30,8
energy, MJ	2,50	2,49
Conversion rate of feed protein to food protein of the flesh of the carcass,%	10,78	11,59
The conversion rate of feed energy to energy of the flesh of the carcass, %	3,11	3,30

For cultivation and fattening of experimental bull-calves till 18 monthsageit was spent on 1 kg of growth of 51.0 g more crude protein (713g) in the group of purebred animals. At 1 kg of live weight gain, spent 82.4 MJ and 78.2 MJ, respectively, in groups. During the period of growing and fattening, the crossbred bulls accumulated 35.8 kg of protein and 14.9 kg of fat in 186.7 kg of flesh, which was the advantage in the accumulation of 176.6 kg of flesh of purebred animals, protein by 2.5 kg, and fat by 0.5 kg. Conversion rate of feed protein to food protein of the flesh of the carcass, indicate an increase in the bioconversion of protein in the food protein from the hybrid animals with a difference of 0.81 %.

The conversion of energy of a feed in energy of the flesh of the carcasses in the second group with a difference of 0.19 percent, higher. This affected the improvement of meat productivity of cross-bred animals, due to the increase in available energy for the exchange and dry matter feed on the synthesis of edible meat products. This fact is confirmed in the works of a number of researchers [6].

The conducted researches naturally lead to calculations of economic expediency of cultivation of breeds of a dairy orientation for receiving high-quality beef.

According to the costs of the enterprise for the cultivation of experimental bulls, the calculation of the cost of 1 metric center of gain was made.

For two groups of animals, the cost of feeding and other costs are identical.The cost of feed was 67.9%. However, taking into account the animals gain, the cost of the first group was 1904 TMR (7617,3 RUB RF), which is 7.6% more than centner of gain of the crossbred animals.

Calculation of economic efficiency of growing young animals, (table.5) showed an advantage in terms of profitability, with a difference of 5.8 %, in favor of cross-bred animals.

Table 5: Economic efficiency of bull breeding

Indicator	Animal group	
	First	second
Removable live weight, kg	474,9±5,4	508,2±4,8
Pre-slaughter live weight, kg	453,3±7,5	483,7±13,5
Slaughter weight, kg	252,1±4,4	263,1±4,6
Growing costs, RUB TMR/ RUBRF	8255,3/33021,2	8255,3/33021,2
The proceeds from the sale, rubles/rubles of the Russian Federation	10652,6/42608	11125,1/44500,4
Profit from sales, RUB/RUB of the Russian Federation	2397,3/9589,2	2869,8/11479,2
Profitability, %	29,0	34,8

CONCLUSION

Studies have shown that both groups of animals are able to produce high-quality meat

Economic efficiency of cultivation of dairy purebred and crossbred animals in the conditions of Transdniestria at the developed expenses is profitable irrespective of breed. The highest profitability (34.8 %) was obtained from cross-bred animals.

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