

N. I. Marchenko. Forming economically useful traits of meat productivity, intramuscular fattening of bull-calves of different genotypes and at different age period

Introduction. In 1997, Valeriy P. Burkat proposed by one of the methodological and organizational approaches to creating Simmental Beef cattle, to launch a series of experiments to study effectiveness of Simmental crossing with other breeds and to study the best combination for interbreed industrial crossing. The studies of comparative determination of meat quality at crossing of Simmental with specialized beef breeds found that these hybrids were well fattening and they had highly meat productivity.

The methods of studying fattening and meat qualities of cattle recommend to conduct slaughtering and processing animals at meat processing plants, because under these conditions the standards for assessing meat productivity of animals and quality of their carcasses can be followed exactly. Compliance with instructions, recommendation for processing animal carcasses under such conditions and obtaining research results will be comparable with the slaughter of animals of different breeds, because all technological methods and sampling are conducted by specialists.

General rules for testing laboratories for determination of quality parameters of agricultural raw materials and products under market conditions require the following: availability of specialists, a plan of sampling and the fastest transportation of them to place of laboratory testing, determination of research methods and conducting specific research, identified according to program (task) with followed analysis.

Materials and methods. Experimental samples were the longest back muscle sampled from refrigerated right half-carcasses of bull-calves at the age of 12 months and 16 months. The animals were obtained from Black-and-White cows (BW) and bulls of Ukrainian Beef (UB), Volyn Beef (VB), Polesian Beef (PB), Simmental (S) breeds, grown in "Polesia", Ovruch district, Zhytomyr region. The control slaughter of experimental animals, followed deboned half-carcasses, was conducted by experts of Ovruch slaughterhouse, Zhytomyr region. The samples of the longest back muscle were taken at 9-12 ribs of refrigerated half-carcasses of clinically healthy bull-calves. The samples of muscle were labelled and fixed in a 10% solution of neutral formalin, cross sections were obtained using freezing microtome, histological specimens were produced by the method of colouring the muscle fat, performing a series of research works to enhance and improve existing methods for obtaining excellent results.

Microscopy, morphometry and microscopic photography of histological sections of the longest back muscle were carried out using biological research microscope (MBI-6), division of muscular fibers by their size was conducted via ocular grid. Analysis of research results was statistically processed on a PC.

Results. Based on the results of the experiment the higher live weight before slaughter was at bull-calves obtained from crossing with Simmental and Polesian Beef bulls, 304 kg and 285 kg, respectively in these groups, which was 53 kg and 72 kg more compared with animals of the same age of Black-and-White dairy breed. It is obvious that the formation of meat productivity from early age is associated with belonging to breed, specific soil and climatic and economic conditions at that time.

All the cross-breeds of the research groups had better live weight before slaughter and weight of pair and chilled carcasses. But the greatest bone weight had animals of the same age of two research groups – $\frac{1}{2}$ PB $\frac{1}{2}$ BW and $\frac{1}{2}$ UB $\frac{1}{2}$ BW, respectively 16,8 kg and 15,8 kg. It is because of blood of Charolais bulls and consolidated trait of angularity during the selection.

The highest live weight before slaughter had half-blooded genotypes with Simmental and Polesian Beef – 354 and 343 kg; it was slightly below compared with the target breed standard. The largest weight of pair carcasses had genotypes $\frac{1}{2}$ S $\frac{1}{2}$ BW and $\frac{1}{2}$ PM $\frac{1}{2}$ BW – $194 \pm 6,2$ and $193 \pm 5,0$ kg, the highest meatiness index had Volyn Beef counterparts at the level of 4.3 units.

Medium muscle fibers (21-40mkm) had the highest share, from 72.4 to 43.6%, at the investigated bull-calves at the age of 12 months. Morphological structure of muscle of bulls at 16 months of age showed that average diameter of fine fibers at the animals of meat productivity was greater – 18.1mkm in combination with Simmental, 18.3 and 18.5 mkm – with Ukrainian and Polesian Beef against 17,9 mkm – at the counterparts of Black-and-White breed. The share of fine fibers was very high (15.3%) at the bull-calves of genotype with Ukrainian Beef against 7.3% and 7.2% – with Polesian Beef and Simmental. Some fat deposition and the small number of fat cells, located mainly around blood vessels, were observed in the longest back muscle of Black-and-White dairy bull-calves at the age of 12 months. Such changes in the number of fibers and size of their diameters, to some extent, affect the quantitative (meatiness index) and qualitative (the number of intramuscular fat) productivity characteristics of the investigated animals.

Conclusions. Trend towards more intense growth and accumulation of muscle and fat was revealed at the researched bull-calves of meat productivity. Formation of economically useful traits on meat productivity of bull-calves depends on age, breed, genotypic and phenotypic factors. The results of histological studies indicate that internal structure of the longest back muscle and the ratio of different types of muscle fibers (thin, medium, thick), show breed and age features of meat productivity formation at bull-calves.

Keywords: **cattle, domestic beef breeds, different genotypes, bull-calves, meat productivity, histochemical method, intramuscular fat, microphotography**