

BEEF MEAT PRODUCTION AND QUILTY OF THE LITHUANIAN RED CATTLE AND THEIR HYBRIDS

Vigilijus Jukna

Lithuanian Veterinary Academy, Tilzes 18, Lt-3022, Kaunas, e-mail: vjukna@lva.lt

Summary. Tests were carried out with the Red Lithuanian cattle and their hybrids with the cattle of Limousine, Charolais and Hereford breeds. Tests showed that compared to pure-blooded young bulls, hybrids used 7,7 – 10,8% less fodder for every kilogram of increased weight. Charolais hybrids had the biggest body mass. 15 months age Charolais, Hereford and Limousine hybrids exceeded in their weight the pure-blooded red Lithuania's young bulls by 7,1%, 6,5% and 4,5% respectively. Control slaughters indicated the biggest carcass mass for Charolais hybrids, which was 37,3 kg, or 16,1 % bigger than the carcass mass of the pure-blooded red young bulls. Carcass mass of Limousine and Hereford hybrids was 32,5 – 23,1 kg, or 13,9 – 9,9 % bigger than the carcass mass of the pure-blooded cattle. The highest carcass output was marked for Charolais hybrids – 57,4 %. Carcass yield of Hereford hybrids (54,2 %) and Limousine hybrids (57,2 %) also exceeded carcass output of pure-blooded red Lithuanian cattle, which was 52,5 %. After carcass deboning there was indicated that output of edible parts of hybrids was 1,5 – 3,2 % higher than the same output of the pure-blooded young bulls. Chemical beef analysis showed the highest protein content in the meat of Charolais hybrids (20,82%) and the lowest - in the meat of the pure-blooded red Lithuania's young bulls (19,74%). All the hybrids were marked with slightly higher beef protein content, compared to the pure-blooded young bulls, though differences were not large here. Fat content was similar in the meat of all compared cattle. Meat of the hybrids was softer (2 - 3%) and had better water bindeness (2 - 4%), compared to the meat of the pure-blooded cattle. Protein value (tryptophane/hydroxiprolin content) was also slightly better of the hybrids, compared to the pure-blooded young bulls.

Keywords: cattle, crossing, quality of meat, hybrids, Charolais, Limousine, Hereford

LIETUVOS ŽALŪJŲ GALVIJŲ IR JŲ MIŠRŪNŲ SU MĖSINIŲ VEISLIŲ BULIAIS MĖSOS PRODUKCIJA BEI KOKYBĖ

Santrauka. Bandymai buvo atlikti su Lietuvos žalaisiais ir jų mišrūnais su Limuzinų, Šarolė ir Herefordų veislių galvijais. Bandymai parodė, kad mišrūnai buliukai 1 kg priesvorio sunaudojo 7,7–10,8 % mažiau pašarų nei grynaveisliai buliukai. Mišrūnai buliukai gimė 14,1–26,8 % didesnės masės nei grynaveisliai Lietuvos žalieji buliukai. Didžiausia masę turėjo Šarolė veislės mišrūnai. 15 mėnesių amžiaus Šarolė mišrūnai buliukai svėrė 7,1 %, Herefordų 6,5 % ir Limuzinų 4,5 % daugiau nei grynaveisliai Lietuvos žalieji buliukai. Atlikus kontrolinius skerdimus, nustatyta, kad to paties amžiaus didžiausia skerdenos masė buvo Šarolė veislės mišrūnų, ji buvo 37,3 kg arba 16,1% didesnė nei grynaveislių Lietuvos žaliųjų buliukų. Limuzinų ir Herefordų mišrūnų skerdenos masė buvo 32,5–23,1 kg arba 13,9–9,9 % didesnė negu grynaveislius. Skerdenos išėiga taip pat didžiausia buvo Šarolė mišrūnų—57,4 %, Herefordų 54,2, Limuzinų –57,2, o grynaveislių Lietuvos žaliųjų ji siekė 52,5 %. Atlikus skerdenų iškaulinimą, nustatyta, kad mišrūnų valgomų dalių išėiga buvo 1,5–3,2 % didesnė negu grynaveislių buliukų. Ištyrus mėsos cheminę sudėtį, nustatyta, kad daugiausiai (20,82 %) proteinų buvo Šarolė veislės mišrūnų mėsoje, o mažiausiai (19,74 %) grynaveislių Lietuvos žaliųjų buliukų mėsoje. Tačiau šie skirtumai nėra dideli, tačiau visų mišrūnų mėsoje proteinų buvo šiek tiek daugiau negu grynaveislių buliukų mėsoje. Riebalų kiekis visų gyvulių mėsoje buvo panašus. Mišrūnų mėsa buvo minkštesnė (2-3 %) bei turėjo didesnę vandens rišlumą (2-4 %). Baltymų pilnavertiškumas (triptofanas/hidroksiprolinas) buvo šiek tiek didesnis irgi mišrūnų buliukų.

Raktažodžiai: galvijai, kryžminimas, mėsos kokybė, mišrūnai, Šarolė, Limuzinai, Herefordai

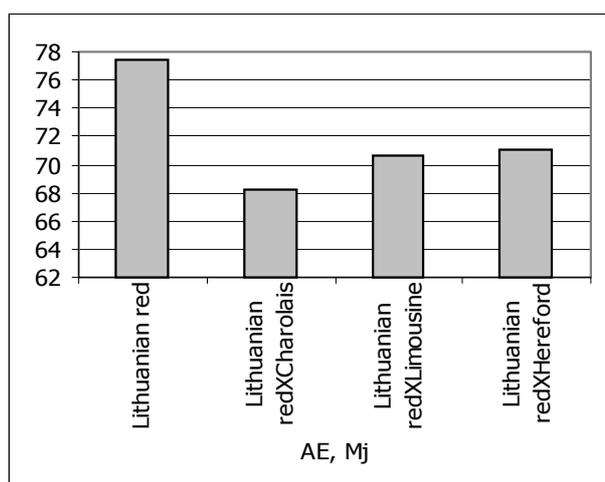
Introduction. Increasing effectiveness and quality of beef production, insemination of lower bred cows with the beef bull's semen is widely used in developed dairy cattle breeding countries. In this way it is trying to produce more quality, higher biological value and more competable production. Of later years in Europe and in many other countries and also in Lithuania achieving to reduce prices of beef production and to improve the quality of it there is widely used various crossing variants of dairy and dairy with beef cattle. It was indicated that the crossing effectiveness mostly depends from compatibility of which had been crossed and the keeping as well as feeding conditions. If the breeds are properly selected for crossing the effect of heterosis manifest it self

in the larger degree. Therefore the hybrids is crossing more rapid and the weight of them are 3–10% bigger, than pure blood cattle's and they used 7–13% less fodder for increased body weight than pure blood cattle's (Heinreich et al,1998; Manfred et al,1997; Wheeler et al 1996). The cross output of hybrids is 1–4% bigger, also their meat is marked better quality (O'Connor et al, 1997). Trying to reach heritable genetically potential it should be made properly keeping and feeding conditions for hybrids young bulls. If the keeping and feeding conditions are bad the hybrids do not exhaust their genetically potencial therefore they growth worse and their increased weight of day is smaller and the quality of meat is bad (Jenkins et al, 1997).

The purpose of this research is to test the meat production and quality of the Lithuanian red cattle and their hybrids with Limousine, Charolais and Hereford.

Materials and methods. The four groups were selected by 10 cattle for experiments. The first group—pure blooded Lithuanian red young bulls, the second group—Lithuanian red and Limousine hybrids the third group—Lithuanian red and Charolais and the fourthly group—Lithuanian red and Herefords hybrids young bulls. Cattle of all groups were fed and kept in the same conditions. In the all experiments period there was done control of fodder, that was eaten. Born cattle and 12 and 18 month aged cattle were weighted for meat dynamic control. 18 month aged cattle were measured. 18 month age cattle were slaughtered. The control slaughters and researches of meat quality was done according to confirmed methods. Obtained datas were washed up by Microsoft Excel program.

Results. The fodder expenditure for one kilogram of increased body weight of Lithuanian red cattle and their hybrids with the cattle of Limousine, Charolais and Hereford breeds is presented in picture 1.

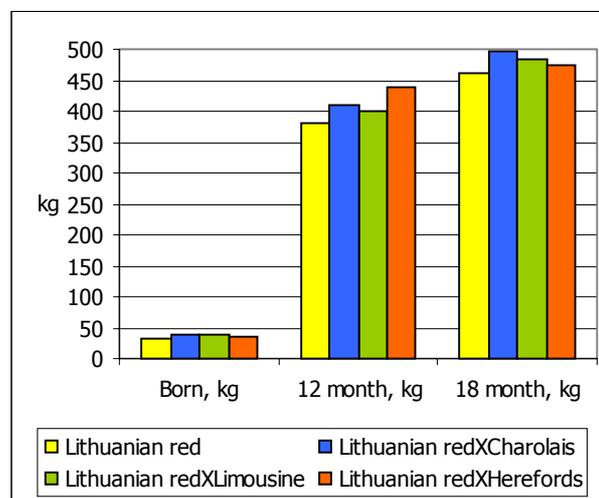


Picture 1. Fodder expenditure for the kilogram of body weight

From data that are represented in picture 1 we can see that the hybrids of Charolais young bulls used lowest amount of fodder for kilogram of increased body weight. They used 13,3% less fodder than pure-blooded Lithuania's red young bulls. Hereford and Limousine hybrids used 8,9 % and 9,6 % less fodder for the kilogram of increased body weight than pure blooded Lithuanian red young bulls.

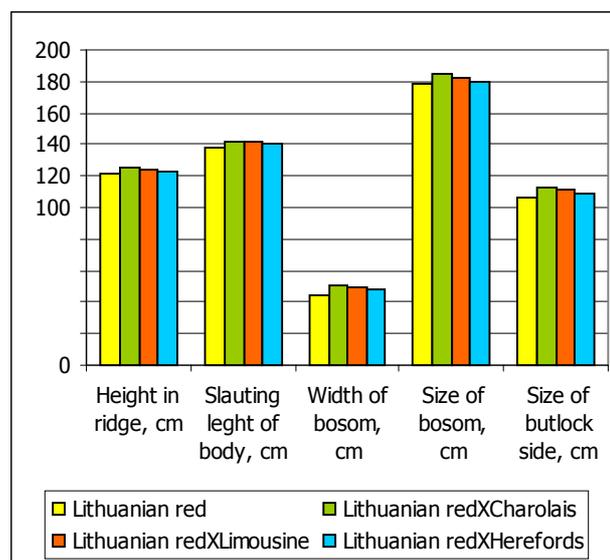
The data of weighted cattle (picture 2) showed that born and 12 and 18 month aged Charolais hybrids had the biggest body mass. When they were born the body mass was 25,9% ($P < 0,01$), when they were 12 month aged—7,6% ($P < 0,05$) and 18 month aged 7,1% ($P < 0,05$) more than counterparts Lithuania's red young bulls. The mass of Limousine hybrids bulls and Hereford hybrids was bigger than pure blooded young bulls. Born Limousine hybrids weighted 19,2% ($P < 0,05$), the Hereford hybrids—16,3% ($P < 0,05$) bigger than pure blooded Lithuania's red

young bulls. 12 and 18 month aged Limousine hybrids weighted 4,6% ($P < 0,05$), and 4,5% ($P < 0,05$) more than counterpart pure blooded hybrids. The mass of Herefords hybrids was accordingly 15,1% ($P < 0,05$) and 2,6% ($P < 0,05$) bigger than pure blooded young bulls.



Picture 2. Dynamic of body's mass

The measures of body of Red Lithuania's cattle and their hybrids with the cattle of Charolais, Limousine and Hereford breeds are represented in the picture 3.



Picture 3. The body measurements

From data of pictures 3 we can see, that hybrids bulls were 2-3cm higher, their bodies 4-5cm longer, their bosoms 5-7cm wider, sizes of bosoms 3-5 cm bigger and of buttocks was 4-7 bigger compared to their pure blooded counterparts.

Control slaughtering indicated (table 1) that the biggest carcass mass for Charolais hybrids, which was 15,5% ($P < 0,05$) bigger than the carcass of Lithuania's red bulls, carcass mass of Limousine and Hereford hybrids was 13,5% ($P < 0,05$) and 9,6% ($P < 0,05$) bigger than

carcass mass of pure blood Lithuanian red bull. The biggest carcass yield was marked for Charolais hybrid—57,4%. The carcass output of Limousine hybrids was a little less—57,2% and the carcass output of Hereford—54,2%. Pure blooded Lithuania's red bulls had a carcass output—52,5%. After carcass deboning there was

indicated that output of edible parts of Limousine hybrids was the biggest—82,5%, the output of Charolais and Hereford hybrids was slightly less—82,1% and 80,8%, also the least output of edible parts was in carcass of Lithuanian red bulls.

Table 1. Data of control slaughters and researches of meat quality

Index	Lithuanian red	Lithuanian redXCharolais	Lithuanian redXLimousine	Lithuanian redXHerefords
Preslaughtering weight, kg	459,0	484,5	477,8	486,9
Carcass weight, kg	240,8	278,1	273,3	263,9
Carcass yield, %	52,5	57,4	57,2	54,2
Output of edible parts, %	79,3	82,1	82,5	80,8
Chemical content of musculus longissimus dorsi, %:				
D.M.	22,94	23,15	22,58	24,00
protein	19,74	20,82	19,96	20,30
fat	1,37	1,27	1,59	1,58
ash	1,07	1,06	1,03	1,04
Tenderness, kg/cm ²	1,48	1,18	1,06	1,06
Colour, EK	310	290	320	298
Cooking loss, %	29,98	28,65	29,13	28,87
Water bindeness, %	65,81	69,30	68,94	69,51
Tryptophane, mg%	338,25	365,26	351,47	349,20
Hydroxiprolin, mg%	69,80	71,50	69,87	66,00
Protein value (tryptophane/hydroxiprolin)	4,84	5,10	5,03	5,29

The analysis of *musculus longissimus dorsi* (table 1) showed that the biggest amount of dry materials was mostly 24,0% in meat of Hereford hybrids, in meat of Limousines it was leastly—22,58%. The amount of dry materials in meat of Charolais and Lithuanian red hybrids was not considerably different. There was indicated that the highest protein content was in the meat of Charolais hybrids (20,82%) and slightly less—in the meat of Hereford and Limousine hybrids and the least content was in meat of Lithuanian red. Fat content was similar in the meat of all compared cattle. Meat of the hybrids was softer (2,0—3,1 %) and it had better water bindeness (2,2—4,0 %) than compared to the meat of the pure-blooded bulls. Protein value (tryptophane/hydroxiprolin) was also bigger for the hybrids young bulls compared to the Lithuanian red young bulls. Other quality factors (pH, cooking loss, colour, ash amount, colorific value) were not considerably different.

Conclusions. 1. Hybrids young bulls use 13,3—8,9% less fodder for kilogram of body growth, also mass of body of the 18 month aged hybrids was 7,1—4,5% bigger than the mass of pure blooded Lithuanian red young bulls. Charolais hybrids used leastly fodder for unit of increasing weight and they achieved the biggest mass.

2. Crossing with Charolais, Limousine and Hereford bulls increased 3,0—2,5% carcass output of Lithuania's red cattle and the output of edible parts was increased 2,0—3,0%. The biggest carcass output was for Charolais bulls.

3. The crossing don't have considerable influence for meat chemical content, but the meat of hybrids had some better biological and culinary characteristic.

4. All tested breeds bulls can be used for successful

crossing. Heavy-set cows should be inseminate with the Charolais and Limousine bull's semen, and small cows with Hereford breed's semen, because Charolais and Limousine hybrids are born with large body mass.

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