

Possibilities of improving slaughter quality by crossbreeding

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Introduction

Possibilities of increasing the production and improving the quality of meat by crossbreeding has since long ago been made use of in pig- and poultry-breeding, while recently it has been spreading more and more also in cattle-breeding. Economic conditions demand on the one hand an ever faster development of genetic capacities for milk production, which on the other hand bring about a deterioration of slaughter quality of fattening cattle.

The greatest step in the improvement of fattening and slaughter traits was made with specialized European beef breeds, the best known of which are Charolais and Limousin. This is understandable, since the progress of selection is faster in improving the production capacity for milk or meat only than in parallel improvement of both production traits.

The best effects in the improvement of slaughter quality were reached in crossing of specialized dairy breeds with beef ones. Already in 1973 and 1974 Bergström offers very favourable results of crossing between the Dutch black and white with Charolais and Limousin breeds. Similar results can be found also about crossing of the German black and white breed with Charolais bulls (Ernst 1967, 1970); but at the same time he states that the number of difficult calvings has grown by 9 % and warns therefore against insemination of heifers by Charolais bulls.

The extremely favourable results of crossing between dairy and beef breeds caused a very fast spreading of this crossing with all cows with calves which for different reasons were not intended for race breeding.

Numerous researches of authors (Candiff, 1970, Končar et al., 1970, Osterc et al., 1972, 1978, Bergström, 1973, Otto and Tilsh, 1976, Leunberger et al., 1977, Čepin, 1977, 1978, 1979, Handjić et al., 1977, Neumann, 1977, etc.) have shown very favourable results of crossing with beef breeds as well. The most important effect of such crossing was a larger portion of meat in carcasses of crosses and thus a better ration meat : bones and meat : tallow. This paper will show the most important results of our studies of crossbreeding and its influence on the improvement of the crosses' slaughter quality.

Material and methods of work

The research comprises the most important slaughter results of six different experiments where the fattening and slaughter traits of Charolais, Limousin, Aberdeen angus, Simmental, Brown, and Holstein-Friesian breeds and their crosses were studied. 214 bulls were slaughtered experimentally which had been fattened medium intensely to intensely up to the optimal fattiness of animals. Their right halves were cut into separate pieces where meat, easily separable tallow, bones and tendons were separated. Their dressing percent per weight of warm carcasses and the percentage of lean meat per live weight before slaughter were calculated as well.

Table 1: Data about experimental groups of animals

Mother's breed	Father's breed	No. of trials	No. of animals
Simmental	Simmental	4	56
Brown	Brown	4	62
Charolais	Charolais	1	8
Holstein-Friesian	Holstein-Friesian	1	8
Simmental	Limousin	1	6
Brown	Simmental	1	8
Brown	Charolais	2	16
Brown	Limousin	3	27
Brown	Aberdeen angus	2	15
Brown	Holstein-Friesian	1	8

Research results

Table 2 presents the most important slaughter results of four groups of pure breeds and six groups of crosses. The mean weight of bulls before slaughter after fasting and transport was 505 kg and the differences between separate groups were comparatively great, due to the different sizes of individual breeds. With regard to the way the animals were slaughtered when they had reached the optimal fattiness their highest weight at slaughter was with pure Charolais breed (572 kg), followed by that of Charolais crosses, while the lowest mean weight was that of crosses between Brown and Aberdeen Angus (445 kg).

The mean weight of warm carcasses was 304 kg; it was the highest (355 kg) with Charolais breed like live weight and the lowest (269 kg) with crosses between Brown and Aberdeen Angus.

The dressing percent which is a good objective measure of slaughter quality was on the average high and amounted to 60,2 %. The highest dressing percent, that is 62 %, was again that of pure Charolais breed; it was only slightly lower with Charolais and Limousin crosses with Brown breed and much lower with pure specialized dairy Holstein-Friesian breed (57,2 %).

The most objective indicator of slaughter quality is the composition of carcasses with regard to the percentage of meat, easily separable tallow, bones and tendons. The most favourable composition of carcasses with more than 75 % of meat, less than 9 % of easily separable tallow and less than 14,5 % of bones is that of pure Charolais bulls and crosses between Charolais and Limousin. The highest percentage of meat and the lowest percentage of tallow was, as can be seen from table 2, established with crosses between Simmental and Limousin breeds. The composition of carcasses is somewhat worse with combined breeds and a lot worse with pure Holstein-Friesian breed.

A very good objective indicator of slaughter quality is the percentage of lean meat per live weight before slaughter; it comprises the dressing percent and the composition of carcasses. This indicator shows again that the best slaughter quality can be established with pure Charolais breed and with Charolais and

Table 2: Slaughter results of individual breeds and their crosses

	Charolais	Brown x Charolais	Brown x Limousin	Brown x A. Angus	Brown x Simmental	Simmental x Limousin	Simmental	Brown	Brown x H. Fries.	Holstein Friesian
Weight of animal before slaugh., kg	572	557	496	445	491	509	531	504	572	473
Weight of warm carcasses, kg	355	344	305	269	296	308	317	300	275	271
Dressing percent	62,0	61,8	61,4	60,4	60,2	60,6	59,7	59,5	58,3	57,2
Composition of carcasses in %:										
- meat	75,8	75,3	75,7	74,3	74,7	76,1	74,1	74,3	71,0	69,6
- tallow	8,8	8,7	8,9	9,8	8,8	8,3	9,2	8,8	10,6	10,7
- bones	13,9	14,4	14,5	14,2	15,2	14,1	15,1	15,3	16,9	18,1
- tendons	1,5	1,6	1,8	1,7	1,3	1,5	1,6	1,6	1,5	1,6
% meat per weight before slaughter	47,0	46,5	46,5	44,9	45,0	46,0	44,2	44,2	42,1	39,9
Meat : bones	5,5	5,2	5,2	5,2	4,9	5,4	4,9	4,9	4,2	3,8
Meat : tallow	8,6	8,7	8,7	7,6	8,5	9,2	8,1	8,4	6,7	6,5

Limousin crosses, where the percentage of pure meat per live weight was between 46 and 47 % and the lowest with pure Holstein-Friesian breed (only 39,9 %).

This order is similar also with the ration between meat and bones and between meat and tallow in carcasses.

The results of the research prove that our two combined breeds, brown and Simmental, have satisfactory slaughter traits; though their slaughter quality can still be improved considerably by crossing with beef breeds. Crossing of combined breeds with beef breeds is particularly important for those parts of breeds have, due to our wish for a faster increase of milkness, been crossed with dairy types of bulls, which worsens the slaughter quality of their descendants.

Conclusions

The conclusions of the study of slaughter traits of specialized beef, combined and dairy breeds are the following:

1. The best dressing percent within the limits of 60 and 62 % was attained with bulls of pure Charolais breed and with Charolais and Limousin crosses with combined breeds. With combined breeds the dressing percent varies between 59 and 60 % and with dairy breeds between 57 and 58 %.
2. The most favourable composition of carcasses with more than 75 % of lean meat, less than 9 % of tallow and less than 14,5 % of bones was established with bulls of pure Charolais breed and Charolais and Limousin crosses; it was somewhat worse with pure Simmental and Brown breeds which almost do not differ and the worst with specialized dairy Holstein-Friesian breed.
3. The order is similar also with the percentage of pure meat, calculated with regard to the animal's live weight before slaughter; it is the highest again with pure Charolais breed (47 %); the lowest (39,9 %) is that of pure Holstein-Friesian breed.
4. Crossing with beef breeds improves mostly the slaughter quality of dairy types of animals.
5. Even if our two combined breeds, that is Simmental and Brown, have satisfactory slaughter traits, the slaughter quality of their descendants can still be improved considerably by crossing with beef breeds.
6. The extremely favourable results of economic crossing between dairy and combined breeds with beef breeds offer us a great possibility of increasing the production of meat and improving its quality.

Literature

1. Bergström, P.L., 1973: Gebruikskruising voor vleesproductie bij rundvee. Rapport B 117, I.V.O. Schoonoord, Zeist.
2. Bergström, P.L., 1974: Slacktkwaliteit bij runderen. Centre for Agric. Publ. and Docu., Wageningen.
3. Candiff, L.V., 1970: Experimental Results on Crossbreeding Cattle for Beef Production. J. Animal Sci. 30, 5, 694-705.
4. Čepin, S., 1971: Kvalitet klaničnih polutki mladih goveda. Dokumentacija za tehnol. i tehniku u poljoprivredi, 4-5.
5. Čepin, S., 1977: Dosadašnja istraživanja kapaciteta naših pasmina goveda za proizvodnju mesa i mogućnosti za njihovo poboljšanje. Kvalitet mesa i standardizacija. Zbornik V. jugoslov. savj. o problemima kvaliteta mesa, Sarajevo.
6. Čepin, S., 1978: Pitovne in klavne lastnosti nekaterih govovjih pasem in njihovih križancev. SK, 11.22-26.
7. Čepin, S., 1979: Pitovne in klavne lastnosti rjave in lisaste pasme. SK, 3, 132-235.
8. Ernest, K., 1967: Erfahrungen mit Charolais-Kreuzungen. Der Tierzüchter, 19, 14, 465-467.
9. Ernst, E., 1970: Die Effektivität der Einkreuzung von Charolais - Bullen und Deutsche Schwarzbunte Rinder aus züchterischer und ökonomischer Sicht. Züchterischer und ökonomischer Sicht. Züchtungskunde 42, 1, 12-23.

10. Handžić, R. et al., 1977: Efekat ukrštanja grla u tipu buše sa šarole pasminom na prinos i kvalitet mesa. Radovi poljoprivred. fakulteta univ. u Sarajevu 24, 27, 101-107.
11. Leuenberger et al., 1977: Gebrauchskreuzungen mit Fleischrassen. Ergebnisse und vorläufige Schlussfolgerunge, Schweiz. landwirt. Monatshefte 55 5/6, 138-150.
12. Končar, L. et al., 1970: Efekat ukrštanja domačeg šarenog goveda sa charolais pasmom na tovne in klanične osobine. Savremena poljoprivreda 1.
13. Neuman, A.L., 1977: Beef Cattle. Seventh Edition. John Wiley Sons, New York.
14. Osterc, J., 1972: Prirasti in klavnost SL bikcev in križancev charolais s SL govedom. Zbornik BF univ. v Ljubljani, Kmetijstvo, 19, s.187-192.
15. Osterc, J. et al., 1978: Prireja mesa in klavna kakovost bikcev rjave (R) in lisaste (L) pasme ter njihovih križancev s charolais in limousin. Znanost in praksa v govedoreji 2. zvezek.
16. Otto, E., Tilsch, K., 1976: Schlachtwert von Fleischrinderbullen. Tierzucht 3.