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Conference paper

EFFECT OF DIFFERENT CROSSINGS IN A HUNGARIAN GREY (HG) HERD INTO THE LEAN MEAT CONTENT OF CARCASSES

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Summary

HG cows were crossed with Belgian White Blue (BWB) and Charolais (Ch) bulls, or mated with HG bulls. Bull calves (7 BWBxHG=BF1, 10 ChxHG=CF1 and 9 HG=control) were put into fattening with the same feeding conditions. After 344 days of fattening, average cold carcass weight of groups was 351.0, 318.8 and 254.9 kg, respectively. Boning was carried out according to the commercial way in Hungary. Lean meat of cuts was seperated from bone and fat. Both: lean meat content and quantity of valuable parts were significantly increased in crossed bulls. Superiority of forequarters was expressed at BF1. Meat of the neck was more by 56.0, shoulderclod by 41.4, roll of beef by 62.7% than the corresponding data of control. Thighs and rump containing muscles of high commercial value, were heavier by 45.3 and 10.9%, as compared to the control and CF1 groups respectively. The less different meat content of dorsal sirloin cut out at the lumbar region was 32% more at BF1. CF1 was near to it with 28.9% as compared to control. Differences between the groups in proportion of lean meat within the carcass are less expressed. Quantitative differences were partly resulted in by larger sloughter weights and dressing percentages, and favourable changes in proportions of regions.

Introduction

The ancient breed of Hungarian Grey (HG) cattle belonging to the Podolian group is re-evaluated by beef cattle breeders. This breed demonstrates some outstanding qualities missing in the so called modern breeds. Cows with excellent constitution can live for a long time even under the extreme conditions of the dry hot summer periods and cold winters of

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saline lands, have reliable seasonal reproduction, show easy calving, excellent nursing abilities and strong herd instinct. Typical economically negative characteristics of natural breeds are the slow growth, late maturation, and the poor fattening and slaughter results of pure-bred young cattle.

The extremely high longevity (up to 20 years) of the breed allows the wide-scale use of commercial crossing with terminal breeds providing an economical use of the steppes of Eastern-Hungary. The most up-to-date terminal breeds are also bred in Hungary today. In this study we examined the lean meat content of carcass in the HG population when crossed with the "viande" type of Belgian White-Blue (BWB) and Charolais (Ch) bulls.

Material and methods

HG cows were inseminated with the semen of three BWB and three Ch bulls in a herd of 600 in the Kiskunság National Park between the Danube and Tisza rivers, and HG bulls were serving at the same time. Barns and fences were prohibited to build according to the rules of the National Park. Calves were born on the pasture in February and March without any human aid, they got no fodder, and were weaned by the end of November.

Weaned bull calves [7 BWB x HG (BF1), 10 Ch x HG (CF1) and 9 HG] of similar age were fattened in tied housing systems with the same feeding. They were fed with a wheat-corn based fodder supplemented with premix in a daily dose of 1% of the actual liveweight, hay ad libitum, and wet sugar beet slices with 16% dry matter in the first 5 months of fattening, and later a 1:1 mixture of hay and alfalfa hay.

Animals were evaluated after a slightly intensive fattening period, in accordance with local traditions. The evaluation was based on the results of experimental slaughter and boning.

Boning was carried out according to traditional Hungarian boning system. Carcass was cut to 4 regions to ease the evaluation: 1. shoulder and legs (including: foreshank, shoulder top, thick shoulder, blade file, two parts of shoulder clod) 2. vertebral column (including: neck, chuck, regular roll off beef, striploin or dorsal sirloin, sirloin fillet). The evaluation of three meat cuts (regular roll of beef, striploin, sirloin) representing high quality in the 2. region got a high priority. These quality meat cuts were classified in region 2/A.) 3. other parts of the trunk (including: brisket, rib, sirloin ventral and cut between the 12 and 13 rib), 4. thigh and rump together with the leg (including: fore-, medial, hind cut of the beef round, eye round, ball round, silver side, steakpiece, hind shank). Linear correlation matrices were calculated within the

4 cut regions to study the supposed relationships (Table 1.). Highly close correlations were found between the meat cuts within all regions, so we compared the effect of each genotype (control and two terminal genotypes). Three parameters were compared: 1. absolute weight of the lean meat, 2. lean meat ratio of the regions in the percentage of the commercial cuts, 3. lean meat ratio of each regions in the percentage of total lean meat content of all of the studied regions. On the basis of the results of F-test (most cases showed homoscedatic relationship) significance of differences was controlled by Student's test.

Results and discussion

As the intra-region correlation matrices show, larger commercial meat cuts obviously have higher significance and influence. The r values were between 0.92 and 0.98 in 17 cases out of 28 matchings. Correlation coefficients of 8 matchings were between 0.8 and 0.89 and results of the r coefficient were between 0.78 and 0.79 in 3 cases. Matrices showing identical tendencies are represented in Table 1. by the hip-thigh-leg matrix.

Table 1. - CORRELATION MATRIX OF LEAN MEAT CONTENT OF THE "RUMP, THIGH, LEG" (4.) REGION, REPRESENTING THE CORRELATION OF OTHER CARCASS REGION

		9	h	i	j	k	l	m	n
Medial cut of beef round	g								
Fore cut of beeef round	h	0.71							
Eye round	i	0.95	0.67						
Ball round	j	0.96	0.66	0.92					
Silverside	k	0.97	0.76	0.96	0.95				
Hind cut of beeef round i	l	0.96	0.71	0.89	0.95	0.94			
Hind shank	m	0.87	0.56	0.79	0.80	0.81	0.84		
Steakpice	n	0.94	0.83	0.89	0.90	0.94	0.92	0.77	
Rump, thigh, leg	0	0.94	0.78	0.96	0.96	0.99	0.96	0.84	0.97

Differences in lean meat weight were significant ($p<0.001$) in all cases (Table 2). Weight of the 4. region was significantly higher (25.2 kg, +45.3%) in BF1 group and in CF1 group (17.2 kg, +31%) than in the control HG group. The increase was the highest in these region in CF1 group. However the weight of the 2/A region was higher by 34.8% than in control HG group. In case of BF1 group, the increase of all region (mainly 3. region) but region 1 exceeded the increase of the 4. region.

Table 2. - DIFFERENCES IN LEAN MEAT WEIGHT (KG) OF THE CARCASS REGIONS OF STUDIED GENOTYPES Rump+ thigh-Heg

Genotype		Carcass	Shoulder+legs	Vertebral coloumn	Regular roll+ striploin+sirloin	Trunk, other	Rump+thigh +leg
HG	N	9	9	9	9	9	9
	$\bar{x}$	254.9	29.6	56.8	25.3	36.0	55.6
	CV%	11.2	11.3	13.3	8.1	11.6	9.7
CF1	N	10	10	10	10	10	10
	$\bar{x}$	318.8	35.6	70.7	34.1	46.1	72.8
	CV%	10.4	12.8	13.3	11.6	10.9	9.7
	diff CF1-HG	63.9	6.0	14.0	8.8	10.1	17.2
	%	25.1	20.1	24.6	34.8	28.0	31.0
	P<	0.00015	0.0024	0.0012	0.000013	0.000090	0.000008
BF1	N	7	7	7	7	7	7
	$\bar{x}$	351.0	41.8	83.6	37.3	54.3	80.8
	CV%	6.7	6.9	8.7	7.7	5.1	7.1
	diff BF1-HG	96.1	12.2	26.8	12.1	18.3	25.2
	%	37.7	41.4	47.3	47.8	50.9	45.3
	P<	0.0000024	0.0000011	0.0000024	0.000000060	0.000000049	0.00000017

Table 3. - DIFFERENCES IN LEAN MEAT RATIO (%) WITHIN THE BONED CARCASS REGIONS OF STUDIED GENOTYPES

Genotype		Carcass	Shoulder+legs	Vertebral coloumn	Regular roll+ striploin+sirloin	Trunk, other	Rump+thigh +leg
HG	N	9	9	9	9	9	9
	$\bar{x}$	254.9	69.0	75.6	72.7	68.2	74.9
	CV%	11.2	2.7	1.7	2.5	3.6	2.3
CF1	N	10	10	10	10	10	10
	$\bar{x}$	318.8	69.6	76.1	74.7	70.5	72.6
	CV%	10.4	2.5	1.2	1.2	2.3	3.0
	diff CF1-HG	63.9	0.7	0.5	2.0	2.3	-2.2
	%	25.1	1.0	0.7	2.8	3.4	-3.0
	P<	0.0002	0.2139	0.1642	0.0056	0.0160	0.0110
BF1	N	7	7	7	7	7	7
	$\bar{x}$	351.0	73.1	79.1	76.4	74.8	74.3
	CV%	6.7	1.0	1.2	2.0	2.3	1.9
	diff BF1-HG	96.1	4.2	3.5	3.7	6.6	-0.6
	%	37.7	6.1	4.6	5.1	9.7	-0.7
	P<	0.0000024	0.000040	0.000015	0.00035	0.000016	0.251469

Table 3 shows the 2. comparision. Surprisingly, lean meat ratio in the 4. region was identical in HG and BF1 group, but BF1 group significantly ($p<0.001$) exceeds the HG group by 4.6 - 9.7 % in case of region 1., 2., 2/A and 3. Lean meat ratio in the 4. region was lower by 3% ($p<0.05$) in CF1 group compared to the control group, while there was no significant differences in case of region 1. and 2.; and the values of region 3. and 2/A improved significantly compared to the HG group. Differences in the ratio of other tissues (bone, fat) may explain the above-mentioned results.

When the influence of the lean meat ratio of the regions on the total lean meat ratio was studied (3. comparision) (Table 4), the role of the 4. region remained unchanged and the other regions neither showed remarkable changes in spite of the extremely low CV% values.

Table 4. - DIFFERENCES IN LEAN MEAT RATIO (%) OF CARCASS REGIONS IN THE PERCENTAGE OF TOTAL LEAN MEAT

Genotype		Carcass	Shoulder+legs	Vertebral coloumn	Regular roll+ striploin+sirloin	Trunk, other	Rump+thigh +leg
HG	N	9	9	9	9	9	9
	$\bar{x}$	254.9	16.6	31.9	14.2	20.2	31.,3
	CV%	11.2	3.3	3.5	3.6	3.4	3.0
CF1	N	10	10	10	10	10	10
	$\bar{x}$	318.8	15.8	31.4	15.1	20.5	32.,4
	CV%	10.4	5.5	5.0	3.8	5.2	3.6
	diff CF1-HG	63.9	-0.9	-0.5	0.9	0.2	1.1
	%	25.1	-5.2	-1.5	6.2	1.2	3.5
	P<	0.000	0.009	0.220	0.001	0.277	0.017
BF1	N	7	7	7	7	7	7
	$\bar{x}$	351.00	16.06	32.05	14.33	20.89	31.00
	CV%	6.7	2.9	3.1	3.3	4.8	1.7
	diff BF1-HG	96.1	-0.6	0.2	0.1	0.7	-0.3
	%	37.7	-3.5	0.6	0.6	3.3	-0.9
	P<	0.000002	0.020917	0.359643	0.373254	0.070735	0.242450

Table 5. shows the results of the 2. comparision of fat ratios as well, to clarify the data of the 2. and 3. comparision. Ratio of the intermuscular fat was changed (decreased) within the regions ($p<0.001$). In case of CF1 group, only fat ratio of the 3. region decreased and non of the differences was significant. Fat ratio values of BF1 group decreased significantly ($p<0.001$) by 20 - 32 % compared to the control. The highest degree decrease of fat ratio was found in the 3. region in both genotype (BF1, CF1).

Table 5. - DIFFERENCES IN FAT RATIO (%) WITHIN GENOTYPES THE BONED CARCASS REGIONS OF STUDIED

Genotype		Carcass	Shoulder+legs	Vertebral coloumn	Regular roll+ striploin+sirloin	Trunk, other	Rump+thigh+ leg
HG	N	9	9	9	9	9	9
	$\bar{x}$	254.9	9.6	7.9	7.4	17.0	9.5
	CV%	11.22	14.52	12.17	13.70	13.85	11.81
CF1	N	10	10	10	10	10	10
	$\bar{x}$	318.8	10.3	8.5	7.8	15.7	9.3
	CV%	10.4	11.6	7.9	11.3	9.2	13.4
	diff CF1-HG	63.9	0.8	0.7	0.4	-1.3	-0.2
	%	25.1	8.0	8.3	5.4	-7.6	-2.4
	P<	0.0002	0.1092	0.0548	0.1862	0.0901	0.3389
BF1	N	7	7	7	7	7	7
	$\bar{x}$	351.0	7.7	5.9	5.4	11.6	7.5
	CV%	6.7	6.6	6.9	13.9	12.9	13.0
	diff BF1-HG	96.1	-1.8	-2.0	-2.1	-5.4	-2.1
	%	37.7	-19.0	-24.9	-27.9	-31.9	-21.6
	P<	0.0000024	0.002139	0.000089	0.000242	0.000057	0.000870398

Conclusions

The Hungarian Grey (*Bos taurus primigenius podolicus*) can compete even with the best worldwide used breeds in the carcass quality, if it is used as a mother cow in commercial crossings with bulls of the best terminal breeds.

If the terminal breed is properly chosen, lean meat content of the crossbred may increase by 100% compared to the purebred HG. Especially lean meat content of the hindquarter shows significant increase.

Ratio of lean meat content of the commercial regions compared to the total lean meat content of the whole carcass was not influenced by the studied genotypes.

Lean meat content of the commercial regions:

- increased significantly in the forequarter,
- remained unchanged in the "hip, thigh, leg" region of the hindquarter,
- and significantly increased in the "regular roll beef, striploin, ventral sirloin" high quality region compared to the control.

These changes was found likely as the effect of the different degree decrease of fat ratio in the studied regions.

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DJELOVANJE RAZLIČITIH KRIŽANJA U STADU MAĐARSKOG SIVOG (HG) NA SADRŽAJ MRŠAVOG MESA U POLOVICAMA

Sažetak

HG krave su križane s bikovima Belgian white Blue (BWB) i Charolais (Ch) ili parene s bikovima HG. Mladi bikovi (7 BWBxHG=BF1, 10 ChxHG=CF1 i 9 HG=kontrola) stavljeni su u tov u istim uvjetima hranidbe. Nakon 344 dana tova, prosječna težina hladnih polovica skupina iznosila je 351.0, 318.8 i 254.9 kg. Odvajanje od kosti učinjeno je prema komercijalnom običaju u Mađarskoj. Mršavo meso odijeljeno je od kosti i masti. Sadržaj mršavog mesa i kakvoća vrijednih dijelova znatno su porasli u bikova križanaca. Prednost prednjih dijelova bila je izražena kod BF1. Meso vrata bilo je bolje za 56.0 plećke za 41.4, goveđi savitak (roll of beef) za 62.7% od odnosnih podataka za kontrolu. Butovi i stražnji dio (rump) koji sadrže mišiće visoke komercijalne vrijednosti bili su teži za 45.3 i 10,9% u usporedbi s kontrolom i skupinom CF1. Manje se razlikovao sadržaj mesa dorsalnog bubrežnjaka (sirloin) izrezanog u lumbalnom području i bio je 32% viši u skupini BF1. CF1 je bio blizu s 28.9% u usporedbi s kontrolom. Razlike između skupina u omjeru mršavog mesa u polovicama manje su izražene. Kvantitativne razlike djelomično su bile veće klaoničke težine i postotak randmana te povoljne promjene u omjerima područja.

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