

**EFFECT OF BREED AND NUTRITION ON CARCASS AND
BEEF QUALITY TRAITS**

**G. Holló, Z. Andrásy, Cs. Abrahám, J. Seenger, R. Zándoki,
J. Seregi, Repa Holló, I. Holló**

Summary

The effect of feeding extensive (E) vs. intensive (I) diets on carcass and meat quality was compared using Holstein-Friesian (HF) and Hungarian Grey (HG) growing-finishing bulls (N=40) in this study. Means of initial weight and age of HF and HG were 293±36 kg and 321±69 day, resp. Half of the breed groups were fed either grass silage/grass and low concentrate (E) or maize silage and high concentrate (I) based rations. Higher slaughter weights were recorded in I groups in comparison with that of measured in groups E (P<0,001) After a 24hr chilling longissimus samples were taken from the right half carcasses. Data processing made by SPSS 10.0. Carcass weight and length, amount of perinephric and trimmed fat were higher in groups I (P<0.01). Higher lean meat content in carcass was recorded in HG breed (E: 71.0 and I: 67.5%, respectively). The dry matter and crude fat content of the longissimus of the E groups are significantly lower, and contain from the minerals less Na, Cu, but more Fe, P, than the I groups. In conclusion, the different feeding methods have a significant effect on the slaughter value and beef quality. The utilization of the native HG breed on development of novel beef cattle production systems especially on roughage-based diets seems to be justified.

Introduction

Hungary will expectedly be a member of European Union in 2004. This means a big challenge for the Hungarian agriculture. Concerning the joining, the definition of a new strategy was necessary in the livestock production, so in the cattle breeding, as well. Nowadays 75% of Hungarian cattle stock belongs to the group of dairy cattle, but to the dual purpose and beef cattle groups only

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G. Holló, Z. Andrásy, J. Seregi, Repa Holló, I. Holló, University of Kaposvar, Kaposvar, Hungary; Cs. Abrahám, J. Seenger, R. Zándoki, St Istvan University Gödöllő, Hungary.

25 %. According to our capacities and possibilities the development of beef cattle breeding is justified. In the course of the improvement of beef cattle production the following aims should be realised: on the one hand producing slaughter cattle with high quality, on the other hand grassland farming. This one is also justified, besides the environmental points of view by the presently weak usage of our green fields.

The suitability for the changed consumer needs (low fat content and favourable fatty acid composition of beef) can be seen as new requirements. Those beef cattle breeds are present today in Hungary, which play a considerable role in cattle breeding of the world. For example: Hereford, Angus, Charolais, Limousine, Blue Belgian.

However, during the last decades the native Hungarian breeds - Hungarian Simmental, Hungarian Grey - were pushed into the background. Nowadays these breeds, especially the Hungarian Grey, get into the centre of interest, as they can be the base of the production of specially Hungarian products, the hungaricum,

Taking all this into consideration our aim is the examination of fattening performance, slaughter value and meat quality of Hungarian Holstein-Friesian and Hungarian Grey bulls under different feeding practise.

Materials and methods

For the purpose of the examination 20 and 20 growing bulls were raised, which were divided according to their breeds into 2 groups. In addition from both breeds 10 head of each were included an intensive feeding system, which were fed with maize silage, hay and high concentrate diet, whereby the animals in other groups belonged to the grass silage or grass based extensive fattening system, with a low 2 kg concentrate/day. Only in the last month they were given 6 kg linseed supplement concentrate, which contained more, than 40 % linolenic acid. Information about amount, type of roughage and concentrate was recorded daily, furthermore the individuals were weighted every month. In intensive groups they were fattened until 550 kg. The preslaughter conditions were similar for all groups. The slaughter was performed in Zalahús abattoir in Zalaegerszeg. The following slaughter data were recorded: the live weight prior to slaughter, the hide, head, four feet weight, the amount of perinephric and internal fat, carcass length and hot carcass weight. The pH and the colour measurements took place in the M. longissimus dorsi (LD). The right half carcasses after 24 h chilling were separated according to Hungarian Standard,

in addition LD samples were taken from the right half carcasses, of which dry matter, crude protein, crude fat, crude ash proportion were analysed. The statistical models included the main effect of breed and diet, and the breed and diet interaction (SPSS 10.0).

Results and discussion

The main fattening and slaughter traits can be seen in the Table 1. and Table 2., respectively. The final live weight such as the daily weight gain of intensive fed groups was significantly higher, than that of the extensive fattened animals. Between the feeding intensities significant differences were found in the relative weight gain and dressing percentage. The better relative growth rate of the Hungarian Grey deserves attention. The effect of different diets ie. the better energy supply had significant influence on the fat content of the carcass. This means that both the perinephric fat and the trimmed fat content were significantly higher in the intensive groups. The lean meat content of carcass was favourable in the case of Hungarian Grey Bulls (Table 3.). Summing up the slaughter and dressing results it was observed, that the extensive feeding resulted as less fat deposition and more lean meat in the animal body.

Table 1. - FATTENING RESULTS

Item	Intensive		Extensive		P value
	HF	HG	HF	HG	
n	10	10	10	10	
Initial age (day)	273.30 ±14.83	350.97 ± 77.62	273.40 ±19.53	385.00 ±56.24	***
Initial live weight (kg)	307.00 ± 5.37	278.00 ±42.20	303.00 ±9.19	281.05 ±50.19	NS
Length of the fattening period (day)	201	201	222	222	
Age at slaughter (day)	474.30 ± 14.83	544.9 ±55.49	495.40 ± 19.53	607.00 ± 56.24	***
Final live weight (kg)	564.20 ± 11.52	545.80 ±4857	472.60 ± 20.34	466.90 ± 60.52	***
Daily live weight gain during the fattening (g/day)	1279.6 ±59.37	1332.3 ±114.5	764.0 ±91.10	837.2 ± 102.1	***
Relative growth rate (g/day)	824.8 ± 44.32	983.4 ±175.9	551.5 ±70.81	674.7 ±119.9	***

Analysing the chemical content of the LD (Table 4.) can be seen, that the dry matter and crude fat content of the meat of the extensively fed animals are significantly lower, and contains less calcium, sodium, copper, more iron, than the intensively fattened ones.

Table 2. - SLAUGHTER RESULTS

Item	Intensive		Extensive		P value
	HF	HG	HF	HG	
Live weight prior to slaughter (kg)	536.90±13.32	508.20±42.44	442.10±19.20	429.60±56.18	***
Carcass weight (kg)					
- Hot	298.60±9.22	284.60±34.46	233.60±12.04	226.40±30.84	***
- Cold	293.30±9.65	279.30±34.08	228.20±1.72	221.60±30.66	***
Dressing percentage (%)	55.61±0.86	52.83±0.84	55.87±2.61	52.68±1.11	***
Four feet (kg)	11.19±0.46	9.81±0.47	10.24±0.60	8.56±1.02	***
Four feet (%)	2.09±0.08	1.94±0.14	2.32±0.12	2.00±0.10	***
Perinephric fat (kg)	8.59±1.48	8.80±1.61	4.58±0.62	4.72±0.87	***
Perinephric fat (%)	2.87±0.46	3.09±0.43	1.96±0.26	2.10±0.39	***
Internal fat (kg)	3.41±0.95	3.79±0.51	1.73±0.47	1.50±0.58	***
Internal fat (%)	1.14±0.30	1.35±0.22	0.73±0.18	0.65±0.22	***
Head with horns (kg)	16.08 ±0.61	19.14±1.92	14.59±0.66	18.39±2.03	***
Head with horns (%)	3.00±0.12	3.77±0.21	3.30±0.11	4.29±0.26	***
Length of carcass (cm)	136.20±2.44	134.20±3.97	132.40±3.63	131.50±4.72	*
Hide (kg)	39.73±1.54	47.92±4.78	31.64±3.38	41.28±5.03	***
Hide %	7.40 ± 0.23	9.44±0.65	7.14±0.50	9.63±0.58	***

Table 3. - RESULTS OF THE RIGHT HALF CARCASS DRESSING

Item	Intensive		Extensive		P value
	HF	HG	HF	HG	
Weight of right half carcass cold (kg)	148.40±5.36	140.4±16.50	114.50±6.06	111.70± 15.29	***
Weight of meat (kg)	97.67±4.88	95.01±14.55	77.98±4.85	79.43±12.58	***
Ratio of meat in right cold half carcass (%)	65.80±1.80	67.45±2.80	67.85±1.41	70.96±1.85	***
II. meat (%)	55.68±4.58	58.06±5.62	55.54±3.97	54.90±3.28	NS
III. meat (%)	37.87±5.00	36.72±5.10	38.06±3.62	39.58±3.45	NS
IV. meat (%)	6.45±0.70	5.28±1.05	6.45±0.70	5.52±0.55	***
Weight of bone (kg)	29.19±1.33	24.77±2.69	26.36±1.29	22.53±2.58	***
Ratio of bone in right cold half carcass (%)	19.71±1.46	17.69±1.22	22.96±0.91	20.24±1.14	***
Weight of fat (kg)	13.66±2.87	14.66±1.45	4.86±1.01	5.34±1.16	***
Ratio of fat in right cold half carcass (%)	9.17±1.75	10.60±1.76	4.23±0.87	4.82±1.04	***
Weight of tendons (kg)	7.89±1.89	5.96±1.03	5.71±0.95	4.40±0.42	***
Ratio of tendons in right cold half carcass (%)	5.32±1.27	4.26±0.75	4.96±0.72	3.98±0.44	**

Table 4. - CHEMICAL COMPOSITION OF M. LONGISSIMUS DORSI

Item	Intensive		Extensive		P value
	HF	HG	HF	HG	
Dry matter %	25.13±0.48	25.77±0.46	23.25±0.61	23.81±0.75	***
Crude protein %	21.87±0.65	21.87±0.27	20.83±0.55	21.02±0.70	***
Crude fat %	2.10±0.29	2.78±0.51	1.34±0.39	1.55±0.49	***
Crude ash %	1.13±0.08	1.09±0.02	1.06±0.03	1.07±0.03	**
Ca mg/kg	41.73±7.82	49.93±8.91	38.86±4.75	32.68±17.37	**
P mg/kg	1734.80±69.25	1768.60±37.17	1901.10±76.57	2000.50±43.70	***
Mg mg/kg	180.90±19.59	203.90±11.79	214.60±14.52	191.80±14.91	***
K mg/kg	3384.00±321.89	3107.80±193.72	3179.00±270.04	3506.00±193.80	**
Na mg/kg	739.20±122.72	624.20±72.58	581.10±42.44	553.70±48.03	***
Cu mg/kg	1.37±0.67	1.34±0.93	0.94±0.32	0.79±0.39	NS
Zn mg/kg	36.42±3.06	33.84±3.71	33.67±3.25	34.66±2.59	NS
Fe mg/kg	14.71±2.82	14.19±2.98	15.61±1.80	18.20±2.86	**

Conclusions

The different feeding methods have a significant effect on the fattening performance and the slaughter value.

The beef quality favourably can be modified by feeding grass and concentrate supplementation rich in unsaturated fatty acid.

The utilization of the native HG breed on development of novel beef cattle production systems especially on roughage-based diets seems to be justified

DJELOVANJE PASMINE I HRANIDBE NA POLOVICE I OSOBINE KAKVOĆE GOVEDINE

Sažetak

U ovom je radu uspoređivano djelovanje ekstenzivne (E) i intenzivne (I) hranidbe na polovice i kakvoću mesa Holstein-frizijskih (HF) i Mađarskih sivih (MG) bikova u porastu i na završetku (N = 40). Prosjeci početne težine i dobi HF i MG bili su 293 ± 56 kg odnosno 321 ± 69 dana. Polovica skupina pasmina hranjena je obrocima na bazi travnate silaže (trave i niskog koncentrata ili kukuruzne silaže i visokog koncentrata (I)). Više klaoničke težine zabilježene su u skupinama I u usporedbi s onima izmjeranima u skupinama E (P < 0,001). Nakon 24 sata hlađenja uzeti su uzorci longisimusa desnih polovica. Analiza podataka obavljena je primjenom SPSS 10.0. Težina i dužina polovica te količina obrezane masnoće i oko bubrega bile su veće u skupinama I (P < 0,01). Veći sadržaj mršavog mesa u polovicama zabilježen je u pasmini Hg (E:71,0 odnosno I:67,5%). Sadržaj suhe tvari i sirove masnoće longisimusa u skupinama E znatno je niži a od minerala sadrži manje Na i Cu ali više Fe i P nego skupine I. Konačno, različite metode hranidbe djeluju značajno na klaoničku vrijednost i kakvoću govedine. Korištenje domaće Hg pasmine čini se da je opravdano za razvoj novih sustava proizvodnje mesnog goveda s obrocima na bazi grube krme.

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