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RESULTS OF HEREFORD AND SIMMENTAL CROSSINGS IN HUNGARY

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Introduction

Beef production, mostly for export purposes, was very important in Hungary during the whole history of our country. In the 14th through 18th centuries the Hungarian Grey had been a very popular beef cattle breed, much sought for on remote markets of western European countries even after driven there on foot. From the second half of 19th century - because of the increasing demands for milk production - cattle population in Hungary had been graded up by crossing with Simmental of Switzerland. The dual purpose Hungarian Simmental breed was the main breed of the country until the first part of the 1970s. Great number of slaughter cattle had been produced and sold abroad by this breed which resulted in great export income to Hungary. In 1972 the Hungarian Government decided on new direction for development of cattle breeding. According to this program of development milk production had to be increased first of all. On the other hand beef production was to be increased mostly for foreign markets. Specialisation was started in Hungarian cattle breeding. Hereford and some other breeds as the Aberdeen Angus, Charolais, Limousin, Blond d'Aquitaine, Belgian Blue etc. were imported to Hungary. Research was started and continued in Hungary for developing beef industry. The aim of our research was as follows:

- To study the herbage nutritive value and production yield from peat bog soil pastures of the monitored three farms.
- To study on the reproductive and weaning performance of the cows of beef cattle genotype of Hungarian Simmental, Hereford and crossbred and to evaluate the mature live weight of the cows.

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- To estimate the potential carrying capacity of the pastures for each of different genotypes based on the herbage yield estimates and the performance and nutrient requirement of the cows.
- To estimate fattening and slaughter results of bull recorded in the farms and at the central test station.

Material and Methods

The study was carried out in three farms (Farm A, Farm B and Farm C) in Hungary. The chosen farms have the similarity of the condition with respect to the pasture, herd genotype and management. Each farm deals with beef cattle farming on the same peat-bog soil type of pasture. Two of them have both planted and native and the third only native pasture. Neither fertiliser nor other chemicals were used on the pasture during the study period. Each farm started to deal with beef cattle farming in the same time and has a herd of the same age and genotype, pure-bred Hungarian Simmental (HS), Hereford (HE) and crossbred F_1(HSxHE) and R_1(HSxHExHE) cows. The average annual number of the cows of the mentioned genotypes were between as follows: In Farm A 190-210,195-215, 70-80, 295-305, in Farm B 65-75, 380-420, 75-85, 80-85, in Farm C 130-150,130-140, 30-35,130-160 respectively.

Beef cows in each farm were kept outdoors around the year on peat bog soil pastures. Their summer ration was completely based on grass, whereas in winter hay made on these pastures were available as a main source of nutrients for the cattle.

Cows and breeding heifers were mated through natural service using breeding bulk of pure-bred Hereford. The breeding season was in summer period in June, July and firs part of August. Calving season was in March, April and May. The spring calves were kept together with their mothers, creep fed on the pastures and were weaned in autumn. During the study reproductive and weaning performances of the mentioned genotypes were monitored during a five-year period. Calving rate in percentage of the mated number was evaluated annually and the five-year results were summed up. The total number of the calves born were registered, survival rate till weaning was evaluated in percentage of born calves. Weaning weight was scaled and adjusted to 205 days of age. Also mature size cows of the mentioned genotypes were weighed hi autumn period in order to calculate their maintenance nutrient requirement. Their requirement for milk production was also calculated based on the weaning weight of the calves.

The herbage yield of the pastures of different types in the mentioned farms was estimated during a five-year period. 10-12 m^2 of the pasture was separated, no grazed and cut and forage mass was weighed when the grazing period of the unit of the pastures was finished. Also herbage was sampled for chemical analyses. The number of the herbage samples was 6-7/year/nature of pasture.

The chemical composition (dry matter, protein, fibre and carbohydrate) of the herbage samples was analysed with the use of Weende method.

The animal carrying capacity of the pastures, that is the number of cows that can be maintained per unit of pasture area on the mentioned rangelands was estimated for Hungarian Simmental (HS), F_1, R_1 and Hereford (HE), and crossbred cows. Corresponding calf crop was calculated from the average reproduction and weaning results in the three farms.

For the evaluation of fattening and slaughter results weaned male calves of each genotype was fattened at farm B (no 77-190) and central test station (no 35-45). Animals were kept free in small groups. Daily ration was made up of 3.5-3,8 kg concentrate, 3.0-3. kg hay and 8-10 kg maize silage. Slaughter results were examined on the basis of pre-slaughter body weight, carcass weight, dressing and fat. The right halves of the slaughtered animals were deboned after previous cooling. Meat fat and bone weight was determined.

Concerning the differences with year, genotype and also farm as variability factors, and nature of pasture according to different type of data a "multifactorial" and a "chi square" model was used as a statistical analysis.

Results and discussion

The results for nutritive value and production yield of herbage for both native and seeded peat-bog soil pastures are given in Table 1. The average annual dry matter contents of herbage ranged from 222-231 g/kg fresh herbage, the metabolisable energy (ME) from 9.71 to 9.97 MJ/kg DM, and the crude protein contents from 132 to 197 g/kg DM. The differences among farms and pasture type are not significant for DM and ME contents, while the protein contents of herbage showed significant differences according to the farms and pasture type. The mean annual production yield per hectare ranged from 2.82 to 3.42 tons DM, from 27.8 to 34.4 thousand MJ for ME and from 3.58 to 6.15 kg CP.

The reproductive and weaning performance of four genotypes of beef cows have been compared form the overall results of the three farms over the five years. Average calving rate differed significantly between the different genotypes (Table 2). The mean positive heterosis effect in calving rate was

Table 1. - AVERAGE NUTRITIVE VALUE AND YIELD OF HERBAGE FROM VARIOUS PEAT-BOG SOIL PASTURE*

	Farm A		Farm B		Farm C		
	Seeded pasture	Native pasture	Seeded pasture	Native pasture	Native pasture	Average	Significance
Dry matter							
g/kg	231	222	232	227	225	222.5	NS
5-year ranges	223-241	216-229	225-239	219-235	221-229		NS
ton/ha	2.88	2.91	3.04	2.85	3.42	3.02	P<0.05
5-year range	2.54-3.22	2.59-3.29	2.54-3.32	2.47-3.23	3.13-3.72		P<0.01
Metabolizable energy (ME)							
MJ/kg dry matter	9.97	9.96	9.71	9.75	9.93	9.86	NS
5-year range	9.93-9.99	9.91-9.98	9.52-9.84	9.71-9.82	9.84-9.98		NS
MJ/ha	28717	28995	29529	27780	34429	29888.2	P<0.05
5-year range	28405-29398	28524-29467	28936-30102	27172-28443	34389-35052		P<0.05
Crude protein							
g/kg dry matter	157	132	178	135	179	156.2	P<0.05
range of years	145-169	124-141	162-187	128-142	163-191		P<0.05
kg/ha average	453	384	540	385	615	475.4	P<0.05
range of years	381-524	305-458	481-613	317-454	532-694		P<0.01

* Five years average, number of samples = 6-7/year/farm

NS = no significance

P<0.05 = significance at 5% level

P<0.1 = significance at 1% level

9.7% in the case of F_1 and 5.7% in the case of R_1 cows. Mean calf survival rate to weaning differed significantly among the genotypes. Heterosis effect were observed for crossbred calves (+6.3%,+3.5% and +0.7%, for F_1, R_1 and R2 respectively). Highly significant differences were observed in 205-day weaning weight of the calves. F_1 calves from HS cows reached the highest weaning weight (193.2 kg) and pure-bred HE calves the lowest (173.6 kg). At mature size the HS cows averaged 602 kg live weight and the HE cows 501 kg. The carrying capacity of peat bog soil pasture with respect to the various genotypes has been calculated from the average dry matter yield. The results are given in Table 3, together with corresponding expected weaned calf crop per unit of pasture area. There are quite big differences in the number of cows of different genotypes that can be maintained on the given pasture acreage (55,59,63,66 per 100 hectare for HS, F_1, R_1 and HE respectively). 20% more cows can be maintained with the HE breed than with the larger size HS. But

differences in calving and survival rate and heterosis effects result in a different ranking of the genotypes with respect to the calf crop per unit of pasture area. In that respect, crossbred cows have advantage over the pure-bred ones. F_1 cows provide the highest number of weaned calves (50.7/100 ha) and total weaning weight (9.6 tonnes/100 ha), i.e. respectively 19% more calves and 16.6% more total weaning weight than the HS.

Table 2. - CALVING AND WEANING RESULTS OF BEEF COWS OF DIFFERENT GENOTYPES IN THREE FARMS

Genothype of beef cows	Hungarian Simmental (HS)	HSxHE (F_1)	(HSxHE)xHE (R_1)	Hereford (HE)	Significance
Summarised number of cows during five years					
Farm A	1051	1047	371	1554	
Farm B	312	2029	384	392	
Farm C	745	679	166	765	
Total	2108	3755	921	2711	
Sire breed	Hereford (HE)	Hereford (HE)	Hereford (HE)	Hereford (HE)	
Genotype of calves	HSxHE F_1	HSxHExHE R_1	HSxHExHExHE R_2	Hereford (HE)	
Total calves born (5 years)	1672	3402	786	2239	
Calving rate, %	79.3	90.6	85.3	82.6	P<0.05
Heterosis in calving rate, %	0	+9.7	+5.7	0	
Total calves weaned (5 years)	1632	3225	737	2044	
Calf survival rate, %	97.6	94.8	93.8	91.3	P<0.10
Heterosis in calf survival rate, %	+6.3	+3.5	+0.7	0	
205-day weaning weight of calves, kg	193.2	189.4	181.3	173.6	P<0.05
cv%	15.2	11.8	10.6	12.4	
Number of mature cows weighed	113	124	47	103	
Average weight of mature cows, kg	602	561	532	501	P<0.05
cv%	18.1	14.3	12.4	13.5	

The comparative fattening slaughter results and carcass composition are shown in Table 4. Daily gain for Hereford under farm condition was by 12%, for R_1 by 15%, for F_1 by 10% lower than those at the central test station. Among the genotypes, the higher the proportion of Hungarian Simmental breed, the higher the daily gain. No differences were noted in the carcass weight results of the animals from the two fattening environments. Pectoral and abdominal fat in farm fattened animals was by 5-12% higher than those in central test station. Carcass composition data show that the animals fattened at

farm had by 6-9% higher lean meat ratio, 3-4% lower bone ratio and by 14-19% lower fat ratio than those fattened at the central station.

Table 3. - CALCULATION FOR PLANNED STOCKING RATE AND CALF CROP ON PEAT-BOG SOIL PASTURES*

Genotypes	Hungarian Simmental (HS)	HSxHE (F_1)	(HSxHE)xHE (R_1)	Hereford (HE)
Number of cows that can be kept per 100 ha of pastures	55	59	63	66
%	100.0	107.3	114.5	120.0
Weaned calves per 100 ha of pastures, head	42.6	50.7	50.4	49.8
%	100.0	119.0	118.8	116.9
Weaned calves per 100 ha of pastures, ton	8.23	9.60	8.75	8.65
%	100.0	116.6	106.3	105.1

*Based on dry matter yield of pasture and requirement of the cows of different mature size together with reproduction and weaning results obtained in the monitoring of farms

Table 4. - FATTENING, SLAUGHTER AND DEBONING RESULTS OF HUNGARIAN SIMMENTAL, HEREFORD AND CROSSBRED MALE PROGENY

Name	HE		(HSxHE)x HE R_1		HS x HE F_1		HS x HE x HS R_1	HS
	Central	Farm	Central	Farm	Central	Farm	Farm	Central
Number of animals	40	168	39	73	39	84	105	45
Final weight, kg	446	491	509	525	501	538	544	567
cv%	7.8	8.2	10.7	7.4	10.8	10.1	7.4	8.6
Daily gain g/day*	1010	886	1125	960	1159	1045	1073	1158
cv%	8.1	7.6	10.3	6.5	10.6	11.1	8.1	8.8
Number of slaughter animals	40	13	39	13	39	14	12	45
Dressing, %*	58.84	58.12	58.16	58.58	59.06	59.73	59.81	59.95
cv%	3.4	4.2	2.4	3.8	3.2	5.2	4.4	3.8
Pectoral and abdominal fat, %	4.18	4.68	4.08	4.33	3.83	4.01	4.20	3.37
cv%	4.2	5.3	3.9	4.6	3.7	4.8	6.2	3.5
Carcass composition								
Meat, %*	66.37	72.02	67.02	73.02	70.03	74.58	76.46	72.98
cv%	3.5	4.1	4.3	6.4	2.7	7.1	8.1	3.3
Bone, %*	15.84	13.76	16.41	14.06	16.27	14.07	15.09	16.54
cv%	6.4	7.1	9.9	10.3	7.8	8.9	9.6	7.5
Fat, %	14.08	12.04	12.56	8.95	10.17	7.50	5.01	6.41
cv%	11.8	12.1	25.0	18.2	20.2	13.7	20.2	24.4

(*=P<0.05=significance at 5% level)

REZULTATI KRIŽANACA HEREFORDA I SIMENTALCA U MAĐARSKOJ

Sažetak

Proizvodnja mesa, većinom u svrhu izvoza, bila je vrlo važna tijekom povijesti naše zemlje. Od 14. do 19. stoljeća Mađarska siva (Mađarski Grey) bila je vrlo popularna pasmina mesnog goveda, vrlo tražena na udaljenim tržištima zapadnoeuropskih zemalja, čak i kad je tamo tjerana pješice. Od druge polovice 19.stoljeća - zbog povećane potražnje za proizvodnjom mlijeka - populacija goveda u Mađarskoj poboljšana je križanjem sa švicarskim simentalcem. Mađarska simentalska pasmina dvostruke namjene bila je glavna pasmina u zemlji do prve polovice 1970-tih. Proizveden je velilk broj goveda ove pasmine za klanje i prodan u inozemstvo, što je donijelo Mađarskoj velik priljev novca iz izvoza. Godine 1972. Mađarska se Vlada odlučila za novi smjer u razvoju uzgoja goveda, Prema tom programu razvoja najprije je trebalo povećati proizvodnju mlijeka. S druge strane, proizvodnju govedine trebalo je povećati uglavnom za inozemna tržišta. Započelo je specijaliziranje u mađarskom govedarstvu. U Mađarsku su uvezene Hereford i neke druge pasmine kao Aberdeen Angus, Charolais, Limousin, Blond d'Aquitaine, Belgian Blue itd. Započelo je istraživanje u Mađarskoj za razvoj mesne industrije: Svrha našeg istraživanja bila je:

- Istražiti hranidbenu vrijednost paše i proizvodni prinos s pašnjaka tresetišta triju promatranih farma.
- Istražiti reproduktivne rezultate i rezultate odbića krava mesnog goveda genotipa mađarskog simentalca, Hereforda i križanaca te procijeniti živu vagu odraslih krava.
- Procijeniti potencijalni kapacitet pašnjaka za svaki genotip na osnovi procjene prinosa paše, rezultata i hranidbenih potreba krava.
- Procijeniti tovne i klaoničke rezultate bikova upisanih na farmama i u središnjoj stanici za testiranje.

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