INFLUENCE OF FATTENING OF YOUNG CROSSBREEDS OF MACEDONIAN BUSHA CATTLE ON YIELD AND MEAT QUALITY

A 33

B.Dzinleski, S.Smilevski, R.Ilkovski

The busha cattle is still the most numerous bred race in the SR Macedonia. This autohton type of cattle is characterized by very little live weight and low yield qualities.

If we begin solving the problem of cattle improving by correcting the busha cattle into a pure blood race, it would take a long time and it would cost much. Following the up-to-date dynamic development and transformation of our cattle-breeding, the only way corresponding to the needs of the SRM is to undertake busha cross-breeding with some cultural races. On one hand it would produce melioration of the busha cattle, and on the other hand, a part of the first generation could be used for getting higher meat quantities, which by intervention in breeding and feeding, would be characterised by far better qualitative properties than the meat of the pure-bred busha.

In order to get higher meat yield, some Yugoslav researchers worked on the busha crossbreeding in the areas where it exists. Mitrovic et al.,(6) worked on busha crossbreeds x hereford, and got dressing weight in the case of male 60,23 % and female 57,42 %. In an earlier paper Mitrovic et al.(7) found out dressing weight (warm sides) 55,9% in the male crossbreeds and 57 and 55,9 % in female ones.

Crossbreed with combined and fattened races give higher meat quantity than the primitive or milk races. Rostovcev (9) says that the average meat increase in the case of crossbreeds is usually 18-20 %, and sometimes to 60 %. Mitrovic et al.(6), concerning the crossbreeds busha x hereford, increased the meat yield for 44,5% in the male and 28,8% in the female ones. Milutinovic and Spahiju (5) found out dressing weight for the above mentioned crossbreeds, both sexes, at the age of 15 months, 46.26 %.

By crossing the different local and milk races with bulls of the fattened races, particularly with the hereford, it is possible to obtain bigger weight at different ages. Burlakov (1) gives report for the crossing between the milk cows and the hereford and aberdin-angus bulls, and Djakov (2), Popov(8), Rostovcev and Cherkashenko (10) for the crossing between the red steppe cattle and the hereford.

From the above mentioned it can be seen that crossing of the Macedonian bisha which is bred under special conditions and climate, is not carried out with the hereford and the montafon, and we have to say that there is no investigation carried out of the meat quality from such crossbreeds. That made us work on the necessary comparative investigations, especially, because we have already had similar investigations of the young beef cattle of the pure-bred busha (Dzinleski, Smilevski, 3). In this paper we are going to show only the results corresponding to the yield and some meat qualitative properties.

EXPERIMENTAL PROCEDURE

Crossing of 27 cows of the type of the Macedonian busha with the hereford and the montafon bulls is carried out in two cycluses, on the College estate near Skopje

Table 5. Shrinkage During Thermal Treatment

Methods of Thermal Treatment	Bulgarian Buffalo	Murrah Buffalo	Crosses F_1 Murr. x Bulg.
I. Dry Heating:			
1.In.weight /g/	115.72	117.10	125.45
2.Fin.weight /g/	68.27	65.36	74.34
Weight loss /g/	47.45	51.74	51.11
Weight loss /%/	41.01	42.02	40.74
II.Heating in Fat:			
1.In.weight /g/	42.73	48.91	45.22
2.Final weight/g/	26.35	30.54	29.05
Weight loss /g/	16.38	18.37	16.17
Weight loss /%/	38.34	37.74	35.73
III.Boiling in Water:			
1.In.Weight /g/	44.87	50.63	51.05
2.Final weight/g/	31.21	35.87	37.88
Weight loss /g/	13.68	14.74	13.17
Weight loss /%/	30.82	29.22	25.91

Table 6. Palatability Characteristics of Meat

	Bulgarian buffalo		Murrah buffalo		Crosses F_1 Murr. x Bulg.	
	A	B	A	B	A	B
1. Tenderness	2.3	2.1	1.7	1.9	1.8	1.9
2. Juiciness	2.6	2.6	1.6	1.6	1.4	1.8
3. Flavour	2.5	1.8	2.0	2.0	1.3	1.8
4. Texture	2.3	2.0	1.7	2.0	1.7	1.9
5. Gen.acceptability	2.1	2;0	1.5	1.9	1.8	1.9

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(the SRM). The 36 crossbreeds were obtained in total but the result will be shown for 8 male and 10 female crossbreeds busha x hereford and 7 male and 8 female busha x montafon (3 heads are not yet killed).

Results of feeding the cattle, the energy and protein value of the used mixture, we published in a special paper (Dzinleski et al.,1970).

The gain of animals is observed immedeately after the calving, every day till the age of 8 days, then in a period of 15 days and once in a month till the end of fattening,which lasted for 540 days.

After the slaughter, all organs and parts of the body are measured, and as for the sides - warm and cool. The left side (after 24 hours) is cut along the DLG scheme,and then the following parts have been measured: fillet, high rib, back, round shoulder, blade pot roast, neck, breast, flank and kidney-pelvic fat tissue. Dissection of the high rib (9,10 and 11) has been carried out and then the parts have been measured: m. longissimus dorsi,m. trapesius and latissimus dorsi (th e muscle and fat tissue), the other muscle and fat and bone tissue.

The following physical and chemical investigations have been carried on the MLD: pH (after 24 and 48 hours) using Taschen-pH-Meter,type 54.Weilheim i.OB., Germany; the water binding capacity using the hydraulic press, from the company "Jochan Steil Maschinenbau" Hannover, following the method of Grau-Hamm; the cross-section area of the MLD (between 8/9 ribs) was determined by planimeter, "Mahor 80 -Yean,Germany; the moisture following the standard method of drying on 105°C, during 24 hours; protein following micro-Kjeldahl; the fat (ether extract - Soxhlet) and the ash following the standard method of heating on 650 ° C. The panel includes 10 persons. The samples were served warm and estimated in scale ranged from +5 to -5, with descriptive terms, as follows: tenderness, very tender to very tough; juiciness, very juicy to very dry; flavour, like extremely to dislike extremely. The meat losses during one hour thermal treatment on 250 ° C were established, too.

The results are variation-statistically worked out and testing of the differences is carried out for the more significant elements of our research work (Snedocor G.).

RESULTS AND DISCUSSION

The weight of the crossbreeds immedeately by birth, after 12 months and at the end of fattening, is shown in the table 1. The mean value of the absolute birth weight of the crossbreeds (Table 1) is bigger than the one of the pure-bred busha. Shmalcelj and Raco (11) established the mean birth weight of the busha calves of 15 kg, but in our case it is bigger , from 29,5% to 35.8 %. The difference in the mean absolute birth weight between the two kinds of crossbreeds is slight. The variance analysis shows that the sex and the group do not have any statistical significance because the F-values are /.05,i.e. 0.01.

The final weight of the crossbreeds in relation to the pure-bred busha (Dzinleki and Smilevski,3) is bigger at the male for 37.9-40.1%, and at the female for 34.8 to 36.2 %. The total increase is better at the crossbreeds of the montafon than at those of the hereford, However, by the variance analysis we established that the sex, for the total increase, on the basis of the obtained F-value,shows statistic significance at P .001, while the group has no influence at all.

Weight losses of the cattle,during the rest before the slauter (18-24 hours) are in the known limites. The absolute mean values are a little bigger at the crossbreeds with the montafon than at those with the hereford. By the variance analysis and the obtained F-values for the sex (2.81) and the group (0.52) we concluded that they are far from the limit which is of some significance, and that they have no influence on the height of the losses in live-stock.

The obtained dressing weight is satisfactory in our experiment. It is better at the crossbreeds with the hereford than at those with the montafon. The females have better dressing weight than the male ones. In the relation to the young busha cattle during the intensive fattening (Dzinleski et al.,3), the dressing weight is bigger at the male for 3.2-4.1 % and at the female crossbreeds for 2.5-3.6 %. Mulitovic et al. (5) obtained low dressing weight of 46.26 % (warm sides) , and Mitrovic et al. (7) got high dressing weight of 60.23 % at the male ones and 57.42 % at the female crossbreeds of busha with the hereford. The authors (7) have obtained better dressing weight at the male, and we at the female animals.

The weight of the left side, between the groups and sexes, does not show any significant differences. The mean absolute values of the kidney pelvic fat tissue are a litel bigger at the female crossbreeds with the hereford than at those with the montafon. The mean absolute value of the most important parts of the side (round, shoulder) is much bigger at the male than at the female, which is quite understandable. It is a pity we cannot compare these data wuth those of other authors because they have not had such dissection ofthe side in order to investigate the busha crossbreeds (busha x hereford).

The physical composition of the carcass, on the basis of the high rib, after the dissection is shown in the table 2. The meat yield at the male crossbreed is for 23.2 to 25.3% and at the female ones for 20.6 to 24.0 %, bigger than at the pure-bred busha (Table 2). In our experiment, the yield is a bit bigger than the one given by Rostovcev (9), andless than the one given by Mitrovic et al.(6). We found out that the meat yield is high and that crossing of the Macedonian busha with the hereford in that sense is quite justified. The mean absolute values for the muscle tissue are bigger at the crossbreeds with the montafon than at those with the herefors, but as for the fat tissue composition it is opposite. By the variance analysis of the muscle tissue, it is confirmed that the sex is significant at P .001,while in the group, justified difference can be noticed only at the female ones because the obtained F-value shows some significance at P .05. The variance analysis for the fat tissue shows that the sex and the group, on the basis of the F-value, show some statistic justification on the level of P .001. As for bone by the variance analysis it is confirmed that the sex and the group, on the basis of the obtained F-values, which are far from the limits of significance, have no influence.

The physical and chemical results of the MLD investigations are shoqn in Table 3. The mean absolute value for the chamical compositition of the MLD is in the known limits. The moisture percentage is a little bigger at the crossbreeds (4-6%) than at the pure-bred busha. The fat tissue content is slightly bigger at the crossbreeds with the hereford than with the montafon, but as for the protein it is opposite, which is quite understandable. By the variance analysis for the moistire it is found out that the sex and the group, on the basis of the F-values (0.01-and0.22), which are far from the significant limits, have no influence. This refers to the fat content in the MLD, too,

where for the sex and the group the F-values are 0,38 i.e. 0,38.

The mean values of the cross-section area of the MLD in our investigations approach those of the cultural races for meat. The area in cm^2 is slightly bigger at the crossbreeds with the montafon than with the hereford, at both the male and female. By the variance analysis for the area of MLD we found out that the sex is very important, because the obtained F-value (16,43^{+++}) shows statistic justification at P .001. The group influence is of no significance because the obtained value (1,15) is far from the limits of significance.

As for pH, it can be said that by the variance analysis we have found outthat the sex and the group have no influence because the obtained F-values (1,00 i.e. 0,10) are far from the limits of significance.

It is interesting to remark that the water binding capacity is great abd that it is better at the crossbreeds with the hereford than with the montafon. The variance analysis has shown that the sex has no influence on this meat property. On the other hand, the group shows some influence because the obtained F-values have a statistic justification at P .005, at both the male and female. That makes us think that, eventually, the genetic factors might have some influence on this property.

The mean values of the losses during the thermal treatment are in the known limits as in the reference books. The variance analysis has shown that the sex and the group have no influence on these losses, because the obtained F-values are far from the limits of significance (0.06, i.e. 2,18).

Table 4

Mean Panel Scores for Beef

	Busha x Hereford		Busha x Montafon	
	Male n=8	Female n=10	Male n=7	Female n=8
Tenderness	+ 3,2	+ 4,2	+ 2,1	+ 2,6
Juiciness	+ 3,2	+ 4,3	+ 2,1	+ 2,8
Flavor	+ 3,8	+ 4,6	+ 2,3	+ 3,0

The results of the organoleptic evaluation show that better qualitative properties of the meat are confirmed at the meat of the crossbreeds with the hereford than at the meat of the crossbreeds with the montafon. Better quality meat is confirmed at the females than at the males. The meat quality of the crossbreeds is much better than that of the pure-bred busha (Dzinelski, 3). We suppose that the reasons for that are some genetic and paragenetic factors which influence the structure and the composition of the meat, the relation between the components and so on. If we want to improve only the meat quality, then we should have to recommend the crossbreeding between the Macedonian busha and the hereford.

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TOTAL GAIN, DRESSING WEIGHT AND CARCASS LEFT SIDE CUTS WEIGHT

Table 1

	Buša x Hereford				Buša x Montafon			
	Male n=8		Female n=10		Male n=7		Female n=8	
	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
Weight of the 1st Day (kg)	23,40	2,98	21,50	1,90	23,14	2,88	21,35	1,52
Weight - 12 Months (kg)	248,20	22,24	217,50	30,77	261,29	29,89	215,50	26,99
Final Weight (kg)	361,13	20,11	296,90	39,21	368,00	45,78	291,33	34,10
Weight Losses in Live Stock (%)	4,33	0,71	5,36	2,08	6,03	1,28	5,81	2,21
Dressing Weight - Cooled Meat (%)	58,51	1,83	59,82	0,70	57,61	1,54	58,74	2,14
Fillet (kg)	2,08	0,27	1,59	0,18	2,11	0,30	1,71	0,24
High Rib (kg)	2,24	0,26	1,94	0,30	2,59	0,67	1,94	0,27
Roast Beef (kg)	5,36	0,45	4,90	0,94	6,66	0,66	4,48	1,00
Round (kg)	31,59	3,82	24,11	3,53	31,81	2,98	25,14	2,38
Shoulder (kg)	15,91	0,89	11,63	1,59	16,54	1,51	12,26	0,87
Blade Pot Roast (kg)	8,75	0,93	5,93	1,08	9,16	1,47	5,78	0,92
Neck (kg)	10,73	1,44	6,59	1,31	10,47	2,16	6,38	0,85
Breast (kg)	11,28	1,04	9,06	1,61	11,71	1,38	8,69	1,06
Flank (kg)	11,03	1,64	10,08	2,01	10,73	1,04	9,28	1,38
Kidney - Pelvic Fat Tissue (kg)	2,01	0,45	3,66	0,94	2,13	0,44	2,96	1,07

PHYSICAL COMPOSITION OF HIGH RIB

Table 2

Parts of High Rib	Busă x Hereford				Buša x Montafon			
	Male n=8		Female n=10		Male n=7		Female n=8	
	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
M. Longissimus Dorsi (kg)	0,779	0,11	0,643	0,07	1,016	0,15	0,678	0,13
M. Trap. and M. Latiss. Dorsi-Lean(kg)	0,103	0,03	0,068	0,03	0,112	0,04	0,071	0,03
M. Trap. and M. Latiss. Dorsi-Fat(kg)	0,124	0,05	0,178	0,05	0,107	0,04	0,123	0,03
Other Lean (kg)	0,568	0,07	0,409	0.04	0,612	0,07	0,409	0,05
Other Fat (kg)	0,203	0.03	0,330	0,10	0,250	0,04	0,225	0,05
Bone (kg)	0,298	0,03	0,216	0,03	0,336	0,04	0,251	0,03
Total Weight of High Rib (kg)	2,124	0,24	1,900	0,24	2,524	0,23	1,950	0,41
Total Separable Lean (kg)	1,449	0,18	1,120	0,12	1,747	0,19	1,170	0,14
Total Separable Fat (kg)	0,326	0,09	0,508	0,12	0,357	0,02	0,346	0,09
Lean (%)	68,27	4,71	59,02	2,53	69,13	3, 61	63,97	3,49
Fat (%)	15,30	3,66	25,56	4,27	14,20	2,53	18,84	3,72
Bone (%)	13,98	1,28	11,50	2,06	13,29	0,76	13,93	2,86

MEAN OF PHYSICAL AND CHEMICAL INVESTIGATIONS DATA OF M. LONGISSIMUS DORSI

Table 3

	Buša x Hereford				Buša x Montafon			
	Male n=8		Female n=10		Male n=7		Female n=8	
	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
Moisture (%)	76,75	1,65	75,80	3,29	75,32	2,43	76,22	2,55
Ether Extract Content (%)	1,90	0,53	1,84	0,66	1,84	0,51	1,66	0,50
Protein (%)	17,98	0,61	17,66	0,66	18,34	0,50	18,37	0,95
Ash (%)	1,03	0,19	1,03	0,12	1,06	0,50	0,98	0,17
Cross-Section Area (cm^2)	51,76	5,83	41,43	4,90	54,93	9,70	43,64	7,72
pH (After 24 h)	5,88	0,39	5,67	0,21	5,70	0,16	5,76	0,16
pH (After 48h)	5,78	0,49	5,45	0,27	5,61	0,13	5,61	0,28
W.B. Capacity (%)	47,31	5,09	42,62	9,46	41,49	5,18	37,25	5,15
Losses During Thermal Treatment (%)	44,47	6,60	42,63	5,40	39,58	9,18	40,34	6,03