THE MEAT QUALITY OF TIROLEAN BERGSCHAF AND WEISSE ALPENSCHAF AND THEIR CROSSBREEDS WITH POLISH MOUNTAIN SHEEP

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Background

Sheepbreeding in the mountains is that the branch of animal production which bears the strongest relationship with the natural enviroment. In the natural sense, the separateness of sheep breeds farmed in the mountains is imposed by harsh natural conditions characterized by a shorter period of vegetation, more rainfall, higher daily temperature amplitudes, steepness of slopes and poorer soil. In the sociological sense, the decisive factor is the breeders' mentality grounded upon centuries-long passion for milking utilizaion of sheep (Trzebińska 1997, Skrijka 1998).
The present economic conditions caused the lamb production to be concentrated upon the slaughter lambs of high meat efficiency.
Polish Mountain Sheep is the dominant sheep breed in Poland's mountainous areas.
Previous experiments on improvement of meat traits in sheep were carryied out by Ciuruś et al. (1996) and Drożdż and Ciuruś (1996).
The present studies assess the possibility of useing Bergschaf (Austrian Mountain Sheep) and Weisse Alpenschaf Sheep (White Alpine Sheep) for the production of slaughter lambs in Poland's mountainous regions.

Objective

The objective of the study was to estimate the meat quality of Bergschaf and Weisse Alpenschaf lambs and their crossbreeds with Polish Mountain Sheep.

Methods

The experiment was carried out at the Sheepbreeding Research and Implementation Centre in Piorunka, near Krynica. The meat testing was performed at the Department of Food Science of the University of Economics in Kraków.
The experimental material included ram lambs of the following genotype groups: Bergschaf (BF)- 10 animals, Weisse Alpenschaf (WAS)- 10 animals, Bergschaf x Polish Mountain Sheep (BF x PMS)- 10 animals, Weisse Alpenschaf x Polish Mountain Sheep (WAS x PMS)- 10 animals.
The lambs were slaughtered at the age of 170 days.
The meat quality tests were carryied out on longissimus dorsi and semimembranosus muscles.
The performed tests of chemical composition and physical properties of meat included: water content by the dryer method (Polish Standard 1973a), protein content by the Kjeidahl method (Polish Standard 1975), fat content by the Soxhlet method (Polish Standard 1973b), pH using the Radelkis-type apparatus (Polish Standard 1977), colour brightness using the colorimeter Momcolor (Koziołowa 1993), water-binding capacity by the Grau-Hamm method (Tyszkiewicz 1969), thermal drip, i.e. losses of the meat juices during meat preparation for sensory assessment (cooking until the temperature of 85° C is reached in the centre of the sample). Sensory test of flavour, juiciness, tenderness and palatability according to a 5-point scale was performed by a team of proven sensory sensitivity (Baryłko-Pikielna 1975).
The results were analysed statistically using analysis of variance. Means with different letters differ significantly ($P < 0.05$).

Results and discussion

Table 1 shows chemical composition, physical and sensory properties of the meat.
Mean water content in the meat of the experimental groups ranged from 76.33% - 77.17% with no significant differences. On the other hand the differences were found in fat and protein content. The BF ram's meat was characterized by the lower content of intramuscular fat, while the meat of WAS and their crosses with PMS demonstrated higher intramuscular fatness. The influence of crossing PMS with meat-type breeds on fat content in meat was found in the studies of Roborzyński (1984). The results also pointed to the stable water content along with variable effect ofthe breeding components on the protein content in the muscles. Fat content in the meat of tested lambs was similar to the protein content. Muscles with the lowest fat content were characterized by the highest protein content. Protein content in Bergschaf lamb's meat and their crosses with PMS was higher than follows from the studies of Ciuruś et al. (1996) carried out on the meat of F_1 crosses (PMS x Fresian rams) and three-breed-crosses (PMS x Fresian rams x Blackface rams).Otherwise protein content in the meat of WAS x PMS crossbreeds was lower compared to the results of the work quoted. Results of other studies, on the bread and crossbreeding influence on the chemical composition of meat, pointed to the stable protein content (Kędzior 1991,Pieniak-Lendzion et al. 1996) and its variable content, too (Gruszecki, Borkowska 1996). Mean pH values varied from 5.5 in the group of purebred WAS lambs and BF x PMS crossbreeds to 5.7 in the group of WAS x PMS crosses. These values are typical of normal meat. Genotype was found to haved significant effect on colour brightness.The value of the trait

Table 1. Chemical composition, physical traits and sensory properties of lamb

Traits	Genotipe group								F
	BF		BF x PMS		WAS		WAS x PMS		
	n = 10								
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	
Water (%)	77.07	1.40	76.33	0.58	76.56	0.89	77.17	1.81	1,005
Fat (%)	1.88[a]	0.24	1.91[a]	0.40	2.26[b]	0.68	3.19[b]	1.44	5,470*
Protein (%)	20.61[b]	0.81	20.53[b]	1.06	20.27[b]	0.12	18.99[a]	0.93	8,540*
pH	5.62[ab]	0.21	5.55[a]	0.09	5.53[a]	0.07	5.74[b]	0.24	3,302*
Colour brightness (%)	11.07[a]	1.46	11.39[a]	1.17	13.38[b]	2.83	13.84[b]	2.30	4,622*
Water holding-capacity (%)	25.50	4.40	26.33	2.85	27.77	4.52	26.33	5.45	0,46
Thermal drip (%)	41.70	3.80	42.37	2.84	44.90	1.01	43.22	2.22	2,699
Flavour intensity	4.57	0.31	4.69	0.16	4.71	0.29	4.65	0.38	0,408
Flavour quality	4.43	0.38	4.59	0.17	4.54	0.43	4.61	0.29	0,622
Tenderness	4.32	0.38	4.,45	0.40	4.38	0.36	4.71	0.33	2,098
Juiciness	4.40[b]	0.39	4.40[b]	0.27	3.92[a]	0.38	4.53[b]	0.34	6,012*
Palatability intensity	4.44[b]	0.43	4.41[b]	0.27	3.99[a]	0.31	4.56[b]	0.30	5,470*
Palatability quality	4.43[b]	0.48	4.44[b]	0.30	4.02[a]	0.27	4.57[b]	0.31	4,765*

ranged from 11.07% and 11.39% in BF lambs and their crosses to 13.38% and 13.84% in WAS lambs and their crosses, respectively.The differences between Alpine breeds and their crossbreeds were statistically significant. It is supposed that brighter colour of the meat of WAS rams and their crosses resulted from the higher content of intramuscular fat in the meat. Significant differences in colour of the meat between PMS lambs and the crossbreeds with Suffolk lambs (at the weight of 19 kg) were found in the studies of Drożdż and Ciuruś (1996). The meat of the experimental groups showed no significant differences in terms of water-binding capacity (ability of holding water under pressure) and thermal drip. Sensory analysis demonstrated that both palatability and juiciness of meat of WAS lambs was given lower scores (3.9-4.0 pts.) than the meat of other genotype groups (4.4-4.6 pts). Higher scores for the meat of WAS x PMS crosses indicate a favourable effect of the PMS breed. The values of other sensory traits (flavour, tenderness) ranged from 4.3 to 4.7 pts. and showed no significant differences.

Conclusions

1. Crossbreeding PMS with WAS resulted in higher palatability, juciness and tenderness scores of the crosses' meat.
2. The meat of BF rams and their crosses with PMS was darker than the meat of the other breed groups.
3. The meat of BF rams was characterized by the lower content of intramuscular fat while higher fat content was found in the meat of WAS rams and their crosses with PMS.
4. The studies showed out the genotype to have a significant effect on fat and protein content, pH, colour brightness and sensory values of the meat.

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