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EFFECT OF COMMERCIAL CROSSING OF ŠUMAVSKA SHEEP WITH SELECTED MEAT BREEDS ON CARCASS CHARACTERISTICS OF LAMBS

Koutná Svatava[1], Kuchtík Jan[1], Šťastník Ondřej[2], Konečná Leona[1]

Mendel University in Brno
[1]Department of Animal Breeding
[2] Department of Animal Nutrition and Forage Production
Zemědělska 1, 613 00 Brno, Czech Republic
kuchtik@mendelu.cz

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Abstract

Evaluation of the effect of commercial crossing of Šumavska sheep (S) with selected meat breeds (Suffolk (SF) and Texel (T) on basic carcass and non-carcass traits of lambs was carried out on an organic farm in Proseč in the Pardubice region. Four different genotypes were included in the experiment: SF x S (n = 9), S (n = 11), SF x (T 75 S 25) (n = 12) and S x (T 75 S 25) (n = 14). All lambs in the study were males. The highest daily gain (0.166 kg/day), carcass yield (43.96 %) and proportion of muscle and fat in the left leg (79.25 %) were found in crossbreds SF x (T 75 S 25) while in this group was the highest proportion of meat breeds. In contrast, in purebred lambs of Šumavská sheep the lowest daily gain (0.122 kg/day), carcass yield (37.71 %) and proportion of muscle and fat in left leg (74.47 %) were found. The best conformation score and the lowest fatness score (2.22) were found in crossbreds SF x S. On the other hand in purebred lambs of Šumavska sheep the worst conformation score (4.91) was found. However in this group relatively very favorable fatness score (2.27) was also found. The results of the experiment indicate that use of commercial crossing of ewes of Šumavská breed with rams of meat breeds had a positive effect on the most of the monitored carcass traits.
Key words: carcass and non-carcass traits, males, Šumavská sheep, Suffolk, Texel,

Introduction

The main product of Czech sheep husbandry is currently so called „heavy lamb“, which is the lamb with carcass weight higher than 13 kg. For production of these lambs mainly meat breeds are used. However for this production are also very often used lambs originating from commercial crossing of dual purpose breeds in maternal position and meat breeds in sire position. One of the most important mixte breeds reared in the Czech Republic is Šumavská sheep. This breed is currently included also among European animal genetic resources. Due to adaptability to unfavourable climatic conditions the sheep of this breed are primarily reared in mountain areas. On the other hand relatively low daily gains and worse conformation are also specific for this breed. Due to the above mentioned, to improve the growth and carcass value (mainly the meatiness) of lambs the ewes of this breed are very often crossed with males of meat breeds.

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The daily gains and carcass characteristics of lambs are affected by a lot of different factors while the most important are breed, nutrition, sex, management and health. Effect of commercial crossing of mixte breeds with selected meat breeds on basic carcass and non-carcass traits of lambs were evalated in the studies which were carried by *Kuchtík and Horák* (2001), *Shaker et al.* (2002), *Teixeira et al.* (2004) and *Gutiérrez et al.* (2005).

The main aim of our experiment was to evaluate the effect of commercial crossing of Šumavská sheep with selected meat breeds (Suffolk and Texel) on daily gains and basic carcass traits of male lambs. An integral part of the study was the evaluation of commercial crossing on weights and proportions of non-carcass traits and individual tissues in the left leg.

Material and Methods

Evaluation of the effect of commercial crossing of Šumava sheep with selected meat breeds on basic carcass and non-carcass traits of lambs was carried out on an organic farm in Proseč in the Pardubice region (altitude 520 m, average annual temperature 6.1 °C, precipitation 800 mm). An integral part of the study was also the evaluation of weights and proportions of individual tissues in left leg. Four different genotypes were included in the experiment: SF x S (n = 9), S (n = 11), SF x (T 75 S 25) (n = 12) and S x (T 75 S 25) (n = 14). **A**ll lambs in the experiment were males. Lambing was carried indoors, during March and April. In the period from parturition till the end of April the daily feed ration (DFR) of ewes consisted of meadow hay (*ad libitum*) and organic mineral lick (*ad libitum*). The DFR of the lambs during the same period consisted of mother's milk (*ad libitum*), meadow hay (*ad libitum*) and organic mineral lick (*ad libitum*). Since May 1st till the end of the experiment the DFR of ewes consisted of grazing on permanent pasture (*ad libitum*) and organic mineral lick (*ad libitum*). The DFR of lambs in the same period consisted of mother's milk (*ad libitum*), grazing on permanent pasture (*ad libitum*) and organic mineral lick (*ad libitum*). At the age of about 5 months the weaning of lambs was carried out. All animals were reared in one flock under identical conditions without any discernible differences regarding nutrition or management.

All lambs were weighed at birth (LW0) and before slaughter (LWS). Daily gain (DG) was calculated in grams (g) in the interval from LW0 to LWS. At the end of the experiment, after 24 hours of starvation, the slaughters of lambs were carried out. On the day of slaughter live weights, age of lambs and weights of skins were recorded. On the following day, after a chilling period of approximately 24 hours, the evaluation of conformation and fatness of all carcasses were carried out. Simultaneously the weights of cold carcass, leg, shoulder, kidney, kidney fat and all non-carcass traits (heart, lung + trachea, liver and spleen) were determined. On the same day the weights of individual tissues in the left leg were also recorded. From the above mentioned data were subsequently calculated individual proportions. The conformation score (an extent of the scale from S = exceptional to P = poor conformation) and fatness score (the scale from 1 = very low to 5 = very high fatness) were assessed according to the S.E.U.R.O.P. (Commission Regulation EEC 461/93). For the purpose of statistical analysis, the scale of the conformation score was quantified from the grade S = 1 to the grade P = 6.

A statistical analysis was carried out using STATISTICA software, version 12. To study the differences in the basic carcass traits, non-carcass traits and individual tissues in left leg in all groups of genotypes ANOVA analysis was used. Sheffe's test was used by post-hoc analyses to identify individual significant differences between means. The differences were considered significant if $P \leq 0.05$.

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Results and Discussion

Effect of commercial crossing of Šumavská sheep with selected meat breeds on basic carcass characteristics of lambs is presented in *Table 1*. All groups of crossbreds had significantly higher daily gains compared to purebred lambs of Šumavská sheep which is in line with *Macit et al*. (2001) and *Shaker et al*. (2010) while in SF x (T 75 S 25) the highest daily gain was found. On the other hand it is necessary to complete that in all groups of lambs the daily gains were relatively low. However in our opinion relatively low daily gains in all groups were affected by extensive nutrition of lambs and relatively hard climatic conditions during pasture period. All groups of crossbreds had also significantly higher carcass yield compared to purebred lambs of Šumavská sheep which is in accordace with *Kuchtík and Horák* (2001) while the highest value of this trait was found in SF x (T 75 S 25). As for carcass yield, it is necessary to state that in all groups of lambs their levels were relatively low, but comparable with data published by *Teixeira et al*. (2004) and *Rodrigues et al.* (2006). As expected all groups of crossbreds had also significantly better conformation score than purebred lambs. On the other hand, purebred lambs of the Šumavska sheep had a lower fatness score than the crossbreds SF x (T 75 S 25) and S x (T 75 S 25) while both of these trends are in line with *Kuchtík and Horák* (2001).

The purebred lambs of the Šumavská sheep had the highest weight and proportion of the skin compared to all groups of crossbreds. The proportions of kidney fat, leg and shoulder in all groups were very balanced and in all above mentioned cases no significant effect of commercial crossing was found. On the other hand *Abdullah et al*. (2010) in purebred lambs found out lower proportions of shoulder and leg compared to crossbreds.

***Table 1*: Effect of commercial crossing on basic carcass characteristics of lambs**

Trait	Sign.	Genotype											
		SF x S n = 9 (A)			S n = 11 (B)			SF x (T 75 S 25) n = 12 (C)			S x (T 75 S 25) n = 14 (D)		
		L.S.M.	S.E.M.	Sign.	L.S.M.	S.E.M.	Sign.	L.S.M.	S.E.M.	Sign.	L.S.M.	S.E.M.	Sign.
LWS (kg)		33,07	1,21		31,05	1,29		34,71	0,45		32,83	0,89	
AS (days)	**	223	7,12	c	228	7,47	C	186	8,13	a, B	212	6,95	
DG (kg)	**	0,131	0,01		0,122	0,01	C	0,166	0,01	B	0,137	0,01	
CCW (kg)	**	12,74	0,77		11,71	0,84	C	15,26	0,44	B	13,28	0,63	
Skin (kg)	*	3,11	0,16	b, d	3,82	0,14	a	3,29	0,12		3,78	0,15	a
Skin (%)	**	9,40	0,43	B, d	12,30	0,37	A, C	9,48	0,35	B, D	11,51	0,48	a, C
CY (%)	**	38,52	1,09	c	37,71	1,06	C	43,96	0,90	a, B	40,45	1,20	
Kidney (kg)		0,09	0,00		0,08	0,00		0,09	0,00		0,08	0,00	
Kidney (%)	**	0,71	0,02	c	0,68	0,04	C	0,59	0,02	a, B	0,60	0,02	
Kidney fat (kg)		0,10	0,01		0,11	0,02		0,12	0,01		0,13	0,02	
Kidney fat (%)		0,78	0,07		0,94	0,11		0,79	0,05		0,98	0,12	
CS (body)	**	3,00	0,17	B, D	4,91	0,16	A, C	3,58	0,23	B, D	4,71	0,27	A, C
Fatness score	*	2,22	0,15	d	2,27	0,19	d	2,75	0,18		3,07	0,20	a, b
Leg (kg)	**	4,11	0,23		3,76	0,25	C	4,82	0,17	B	4,18	0,19	
Leg (%)		32,26	0,33		32,11	0,40		31,59	0,40		31,48	0,22	
Shoulder(kg)	**	2,48	0,11		2,28	0,15	C	2,87	0,08	B	2,63	0,11	
Shoulder (%)		19,47	0,47		19,47	0,22		18,81	0,22		19,80	0,28	

DG = daily gains from birth to slaughter AS = Age at slaughter, LWS = live weight at slaughter, CCW = cold carcass weight, CY = carcass yield, CS = conformation score,
* - a, b, c, d - $P \leq 0.05$; **- A, B, C, D - $P \leq 0.01$

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The highest weights and proportions of non-carcass traits (*Table 2*), with the exception of proportion of lungs and trachea, were found in crossbreds SF x (T 75 S 25). In contrast the lowest values in most of these indicators were found in purebred lambs of Šumavska sheep. In context with the above mentiond it can be therefore stated that commercial crossing had a positive effect on these traits. Similar trends were also recorded by *Shaker et al.* (2002) and *Peraza-Mercado et al*. (2010).

***Table 2*: Effect of commercial crossing on weights and proportions of non-carcass traits**

Trait	Sign.	Genotype											
		SF x S n = 9 (A)			S n = 11 (B)			SF x (T 75 S 25) n = 12 (C)			S x (T 75 S 25) n = 14 (D)		
		L.S.M.	S.E.M.	Sign.	L.S.M.	S.E.M.	Sign.	L.S.M.	S.E.M.	Sign.	L.S.M.	S.E.M.	Sign.
Heart (kg)	**	0,15	0,00		0,14	0,01	C	0,18	0,00	B, d	0,15	0,01	c
Heart (%)	**	0,45	0,01		0,45	0,01	C	0,52	0,01	B	0,46	0,02	
L + T (kg)		0,45	0,03		0,41	0,01		0,46	0,02		0,43	0,02	
L + T (%)		1,36	0,04		1,32	0,03		1,33	0,05		1,31	0,05	
Liver (kg)	*	0,43	0,02		0,39	0,02	c	0,49	0,02	b	0,41	0,02	
Liver (%)		1,30	0,03		1,26	0,03		1,41	0,05		1,25	0,06	
Spleen (kg)	**	0,05	0,00		0,04	0,00	C	0,06	0,00	B	0,05	0,00	
Spleen (%)	*	0,15	0,01		0,13	0,00	c	0,17	0,01	b	0,15	0,01	

L + T = lungs and trachea,
B, C, - ** - P ≤ 0.01; b, c, d - * - P ≤ 0.05

***Table 3*: Effect of commercial crossing on weights and proportions of tissues in left leg.**

Trait	Sign.	Genotype											
		SF x S n = 9 (A)			S n = 11 (B)			SF x (T 75 S 25) n = 12 (C)			S x (T 75 S 25) n = 14 (D)		
		L.S.M.	S.E.M.	Sign.	L.S.M.	S.E.M.	Sign.	L.S.M.	S.E.M.	Sign.	L.S.M.	S.E.M.	Sign.
Left leg (kg)	**	2,06	0,12		1,88	0,13	C	2,41	0,08	B	2,09	0,09	
Muscle + fat (kg)	**	1,54	0,10		1,40	0,11	C	1,91	0,08	B	1,61	0,09	
Muscle + fat (%)	**	74,76	1,16	c	74,47	0,89	C	79,25	0,79	a, B	77,03	1,05	
Bones (kg)		0,52	0,02		0,48	0,02		0,50	0,02		0,48	0,02	
Bones (%)	*	25,24	1,25	c	25,53	0,79	c	20,75	0,79	a, b	22,97	1,05	

B, C, - ** - P ≤ 0.01; a, b, c, - * - P ≤ 0.05

A positive effect of commercial crossing was found also in the case of the proportions of muscle and fat in left leg (*Table 3*), because in all groups of crossbreds were found higher proportions of these tissues compared to purebred lambs of Šumavská breed. This finding is consistent with results published by *Kuchtík and Horák* (2001). The highest weight and proportion of muscle and fat were determined in crossbreds SF x (T 75 S 25). However, it is necessary to mention that in crossbreds SF x S a comparable proportion of muscle and fat with purebred lambs was found which was not expected.

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Conclusion

The commercial crossing of Šumavská sheep with selected meat breeds (Suffolk and Texel) had a positíve effect on most of the monitored carcass and non-carcass traits. The highest daily gain, carcass yield and proportion of muscle and fat in left leg were found in crossbreds SF x (T 75 S 25) while in this group was the highest proportion of meat breeds. On the other hand the best conformation score, the lowest fatness score and the highest proportion of leg were found in SF x S crossbreds which was not expected.

References

Abdullah, A.Y., Kridli, R.T., Shaker, M.M., Obeidat, M.D. (2010): Investigation of growth and carcass characteristics of pure and crossbred Awassi lambs. Small Ruminant Research, 94. 167-175.

Commission Regulation (EEC) No 461/93 of 26 February 1993 laying down detailed rules for the Community scale for the classification of carcases of ovine animals; Brussels, 1993.

Gutiérrez, J., Rubio, M.S., Mendez, R.D. (2005): Effects of crossbreeding Mexican Pelibuey sheep with Rambouillet and Suffolk on carcass traits. Meat Science, 70. 1-5.

Kuchtík, J, Horák, F. (2001): Growth ability, carcass and meat quality of lambs of the German long-wooled sheep and their crosses. Czech Journal of Animal Science, 46. 439-448.

Macit, M., Karaoglu, M., Esenbuga, N., Kopuzlu, S., Dayioglu, H. (2001): Growth performance of purebred Awassi, Morkaraman and Tushin lambs and their crosses under semi-intensive management in Turkey. Small Ruminant Research, 41. 177-180.

Peraza-Mercado, G., Jaramillo-Lopez, E., Alarcon-Rojo, A. D. (2010): Breed effect upon carcass characteristics and meat quality of Pelibuey and Polypay×Rambouillet lambs. American-Eurasian Journal of Agricultural & Environmental Sciences, 8. 508-513.

Rodrigues, S., Cadavez, V., Teixeira, A. (2006): Breed and maturity effects on Churra Galega Bragancana and Suffolk lamb carcass characteristics: Killing-out proportion and composition. Meat Science, 7. 288-293.

Shaker, M.M., Abdullah, A.Y., Kridli, R.T., Bláha, J., Šáda, I., Sovják, R. (2002): Fattening performance and carcass value of Awassi ram lambs, F1 crossbreds of Romanov x Awassi and Charollais x Awassi in Jordan. Czech Journal of Animal Science, 47. 429-438.

Shaker, M.M., Kridli, R.T., Abdullah, A.Y., Malinová, M., Sanogo, S., Šáda, I., Lukešová, D. (2010): Effect of crossbreeding european sheep breeds with Awassi sheep on growth efficiency of lambs in Jordan. Agricultura Tropica et Subtropica, 43. 2. 127-133.

Teixeira, A., Cadavez, V., Delfa, R., Bueno M. S. (2004): Carcass conformation and joints composition of Churra Galega Bragançana and crossbred lambs by Suffolk and Merino Precoce sire breeds. Spanish Journal of Agricultural Research, 2. 217-225.

10.17205/SZIE.AWETH.2017.2.081