

CARCASS TRAITS FOR THE KIDS OF TWO INDIGENOUS GOAT BREEDS IN BULGARIA

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Abstract

The Kalofer longhaired goat (KLG) and the Bulgarian screw-horned longhaired goat (BSLG) are indigenous goat breeds in Bulgaria, reared in some mountainous regions of the country. 12 male kids (6 of KLG and 6 of BSLG), born as singles, were slaughtered immediately at weaning at 90 days of age, without a period of intensive fattening after weaning. Based on the results of slaughter analysis of suckling kids from the two local goat breeds, it can be concluded that the average weight of the cold carcass was 9.88 kg for male suckling kids of KLG and 9.79 kg for kids of BSLG. Dressing percentage of chilled carcass, without the offal was 48.87 % and 50.5% for KLG and BSLG, respectively. The linear measurements of the carcass of male suckling Kalofer longhaired kids at 90 days of age were as follows - big carcass length - 49.50 cm, length of ham - 32.16 cm, circumference of ham - 32.83 cm. The area of m. longissimus at 11th ribs was 10.39 cm². The ratio meat:bones in the carcass of suckling Kalofer longhaired kids at 90 days of age was relatively high - 2.99:1. For males Screw-horned kids, the linear measurements of a carcass were as follows - big carcass length - 56.66 cm, length of ham - 30.16 cm, circumference of ham - 30.18 cm. Area of m. longissimus at 11th ribs was 10.0 cm². The ratio meat:bones was 2.87:1.

Key words: indigenous goat breeds, local goat breeds, slaughter characteristics, carcass traits

INTRODUCTION

The meat from suckling kids, slaughtered at early age, is a highly valuable product, with marked dietary and taste qualities (Rubino et al., 1999; Arias and Alonso, 2002; De Gea et al., 2005; Zimerman et al., 2008; Bonvillani et al., 2010). The studies of a bulgarian authors on this problem are few, especially the researches on the meat characteristics of local goat breeds in Bulgaria. At the beginning of the 19th century, the different local populations of the native goat breeds in Bulgaria, was united by the researchers in a common group called "local goats". They were defined as a low-productive, without a pronounced breed type, and were recommended to be improved by cross-breeding with imported, high-yielding goat breeds (Kadiyski, 1952; Kadiyski, 1958; Balevska and Tyankov, 1971; Solomonov et al., 1984). The integration of all local populations of native goats into a common group, was detrimental to indigenous goat in the country. Undoubtedly, the breed has a high impact on productivity, and especially on some meat characteristics in goats (Dhanda et al., 2003; Monte et al., 2007; Ekiz et al., 2010; Sanudo et al., 2012).

The Kalofer longhaired goat (KLG), and the Bulgarian screw-horned longhaired goat (BSLG) are indigenous goats breeds in Bulgaria, endangered by extinction (Vuchkov et al., 2011), (Figure 1 and Figure 2). In the contemporary aspect of the problem related to the preservation of genetic resources in livestock breeding, the establishment of the status "threatened" by the local Bulgarian goat breeds - Kalofer longhaired and the Bulgarian screw-horned longhaired goats, it is imperative to carry out more in-depth studies on their productive qualities (milk and meat production), and the possibility of increasing the economic effect of keeping the local breeds of goats in our country.

The farmers traditionally growing these breeds mainly in mountainous and semi-mountainous regions of the country. The possibilities for its sustainable preservation and development over time, is inevitably linked to the diversification of products and raw materials derived from these native breeds. KLG and BSLG are typical breeds with combined productivity - grown for meat, milk and fur. In traditional technology of rearing in Bulgaria, the kids are slaughtered immediately after weaning at three months of

age, without a period of intense fattening after weaning (so-called “milk kids”). In all farms with KLG and BSLG, the meat from young kids, slaughtered at early age is the main income for the farmers. This requires a detailed study of the meat characteristics of kids at an early age, and the possibility for obtaining meat with high taste and dietary qualities.

MATERIALS AND METHODS

The purpose of this study was to investigate some meat features and qualities of carcass from kids of two indigenous goat breeds in Bulgaria, slaughtered immediately at weaning in 90-days of age.

For the purpose of the study, was carried out a complete slaughter analysis on 6 Kalofer longhaired and 6 Bulgarian screw-horned longhaired kids, born in farms in the Kresna region. The experimental groups were aligned by sex and type of birth for the two breeds - male, single.

During the suckling period the kids were traditionally grown together with their mothers, the mother's milk was the main food, and after the 20th day of birth, the kids had free access to lucerne hay and concentrated fodder (corn, barley and sunflower meal - 40:40:20).

The age at slaughter of the kids - 90 days, immediately after weaning. The goats, mothers of the kids, were selected according to their age, 2-4 years of age. The daily ration of goats consisted mainly of grazing. The individual slaughtering judgment was carried out of the

carcasses, after 24 - hour's refrigeration. Linear dimensions of the carcass and its separated parts were made. The slaughter analysis was done according to the method of Zahariev and Pinkas (1979). The data were processed by a variation-statistical method.

RESULTS AND DISCUSSIONS

The results of the slaughter analysis of males kids from KLG and BSLG, at 90 days of age, and the linear dimensions of some parts of carcass, and the bones-meat ratio are presented in tables 1-5.

Within the sample, the live weight before slaughter (after 24 hours of starvation) was 20.16 kg and 19.40 kg, for kids from KLG and BSLG, respectively (Table 1). The formation of a relatively high live weight after a 90-days suckling period in both local goat breeds were representative. To a large extent, during this early period of its development, the growth of the kids was directly depends on the quantity and quality of the milk produced by their mothers. The high dry matter content of the milk of the local long-haired goats, significantly determines a high growth rate of their kids at an early age, and relatively higher live weight at weaning in 90 days of age.

Compared to the others local kids, in studies by Bulgarian authors, the Kalofer kids shows the highest growth rate at an early age, and significantly higher live weight for a 90-days suckling period (Tsonchev, 1974; Zunev and Uzunov, 1994).

Table 1. Carcass traits of Kalofer longhaired and Bulgarian screw-horned longhaired kids at weaning in 90 days of age (n = 6 kids/breed)

Signs/breeds	Kalofer longhaired kids				Bulgarian screw-horned kids			
	SX	SD	max	min	SX	SD	max	min
Live weight before slaughter, kg	20.160	0.683	21.0	19.5	19.400	1.799	23.0	18.2
Weight of cold carcass, kg	9.883	0.762	10.8	9.1	9.799	0.960	11.7	9.1
Dressing percentage of cold carcass, %	48.970	2.671	52.5	45.5	50.503	1.988	52.1	49.5
Skin, kg	1.775	0.147	1.9	1.5	1.316	0.147	1.7	1.1
Legs (no skinned), kg	0.633	0.121	0.7	0.4	0.650	0.063	0.75	0.6
Head (skinned), kg	0.883	0.116	1.0	0.7	0.850	0.070	0.95	0.75

The higher live weight of kids from KLG at 90-days of age, is indirectly a prerequisite for

better meat production, compared to the others goat breeds in Bulgaria.

Carcass weight is an important sign of the meat production in the small ruminants, as well as a key indicator for the classification of the carcasses by the SEUROP system. The average weight of chilled carcasses (excluding internal fat) was 9.883 kg and 9.799 kg for kids from KLG and BSLG, respectively. Lower scores cite Markovic et al. (2011) in 90 days old male kids of Balkan goat breed in the Republic of Montenegro. The kids of KLG and BSLG outperform by weight of the chilled carcass, kids of some Turkish local goat breeds - Gokceada, Maltese, Hair Goats (Yalcintan et al., 2010).

The dressing percentage of cold carcass was relatively high - 48.9% in the kids from KLG, and 50.5% in the kids from BSLG. Account the early age at slaughter (90 days of age), and that the kids were still in a suckling period, the high values of dressing percentage could be attributed to the lower losses of tissue fluid at slaughter, and underdeveloped digestive system in young animals.

The abomasum had a priority in development of the various parts of complex stomach in the young ruminants.

With age, and increasing the share of plant foods in the ration, as well as the early weaning

and habituation to plant foods, stimulating the earlier development of the digestive tract, in particular the stomach and intestines.

This fact influences the calculation of the dressing percentage in cold carcass. In kids of KLG, slaughtered at 90 days of age, we found that the weight of the empty stomach and intestines were 0.550 kg and 0.941 kg, respectively (Table 2).

Expressed in % to the live weight before slaughter, empty stomach and intestines constitutes 2.727% and 4.651%, respectively. Similar values were also found in kids from BSLG. The values which we have established for empty stomach and intestines are lower than those cited by Markovic et al., 2011) at the Balkan goat from Montenegro.

Undoubtedly, with increasing age, as well as with the early weaning of the kids, their transition to whole plant ration (concentrated and coarse feed, without fresh milk) increases development of the different parts of digestive system. For comparison, in early weaned local kids and subsequently fattened up to 110 days of age, weighing 23.40 kg, Stankov et al. (1999) found a higher percentage of stomach and intestine to the live weight before slaughter.

Table 2. Weight of offal and fat tissue in chilled carcass of Kalofer longhaired and Bulgarian screw-horned longhaired kids at weaning in 90 days of age (n= 6 kids/breed)

Signs/breeds	Kalofer longhaired kids				Bulgarian screw-horned kids			
	SX	SD	max	min	SX	SD	max	min
Lunges, kg	0.408	0.020	0.45	0.4	0.391	0.049	0.45	0.3
Liver, kg	0.433	0.025	0.45	0.4	0.508	0.066	0.6	0.45
Heart, kg	0.106	0.010	0.12	0.1	0.103	0.08	0.12	0.1
Spleen, kg	0.048	0.004	0.05	0.04	0.048	0.004	0.05	0.04
Kidneys, kg	0.113	0.020	0.14	0.08	0.111	0.018	0.14	0.09
Internal fats (omentum, sweetbread), kg	0.701	0.055	0.8	0.63	0.658	0.153	0.85	0.45
Intestines (empty), kg	0.941	0.107	1.3	0.93	0.733	0.075	0.8	0.6
Stomach (empty), kg	0.550	0.077	0.65	0.45	0.541	0.058	0.6	0.45

The thinner skin was also important for the relatively high dressing percentage in 90 days old kids from the two indigenous goat breeds in Bulgaria. The raw skin of the Kalofer kids was 1.775 kg. For Bulgarian screw-horned longhaired kids, the skin was significantly lighter – 1.316 kg. Expressed as % of the live weight before slaughter, raw skin was 8.80%

for the kids of KLG, and only 6, 399% for the kids of BSLG. The lighter skin gave a logical explanation for the higher dressing percentage on the Screw-horned, compared to the dressing percentage on the Kalofer kids.

During the suckling period in local long-haired kids, the subcutaneous and internal fat depositions in the carcass were very poorly

expressed. In the kids of KLG, the internal fats (included mesenterium and mesenteric lymph nodes) weigh 0.701 kg, and in the kids of BSLG - 0.658 kg. Related to the weight of the chilled carcass, they made up a relatively low percentage – 3.478% and 3.267% respectively. These results can be explained with the early slaughtering age and the lack a period of intensive fattening of the kids.

In intensively fattened local kids, for example, the percentage of internal fat increases (Zunev and Uzunov, 1994). Some authors cited that in kids from specialized dairy goat breeds, with increasing age, delamination of internal fat is more pronounced (Dhanda et al. 2003; Ekiz et al., 2010; Yalcintan et al., 2010).

The local longhaired kids weaned at 90 days of age have a relatively higher dressing

percentage (48.97% at Kalofer and 50.50 at Screw-horned) compared to intensively fattened local Strandzha kids up to 23.40 kg and 110 days old at which the dressing percentage was 46.58% (Stankov et al., 1999).

The our data for the dressing percentage of 90-days old kids of KLG and BSLG were higher than those cited by Zunev and Uzunov (1994) for local kids, intensively fattened up to 160 days. Markovic et al. (2011) cited lower values for this sign in the 90 days old kids from local goat breed in Montenegro - Balkan goat.

A much higher percentage of dressing percentage is cited by Dhanda et al. (1999) in cross-bred kids with specialized meat goat breed - Boer (50-55%).

Table 3. Ratio between some offal and live weight before slaughter of Kalofer longhaired and Bulgarian screw-horned longhaired kids at weaning in 90 days of age (n = 6 kids/breed)

Signs/breeds	Kalofer longhaired kids				Bulgarian screw-horned kids			
	SX	SD	max	min	SX	SD	max	min
Skin: live weight before slaughter, %	8.806	0.774	9.774	7.500	6.399	0.366	7.573	5.288
Legs: live weight before slaughter, %	3.132	0.552	3.500	2.051	3.255	0.116	3.365	3.030
Head: live weight before slaughter, %	4.373	0.501	5.000	3.590	4.271	0.355	4.670	3.788
Internal fats: live weight before slaughter, %	3.478	0.220	3.810	3.231	3.267	0.536	3.788	2.473
Intestines: live weight before slaughter, %	4.651	1.074	6.190	3.077	3.680	0.322	4.040	3.261
Stomach: live weight before slaughter, %	2.727	0.371	3.250	2.308	2.725	0.333	3.297	2.273

In the analysis of some linear dimensions of the carcass of the Kalofer longhaired and the Bulgarian screw-horned longhaired kids (Table 4), there is a tendency for pronounced carcass compactness. Shorter, more compact, carcasses give the impression of better muscularity, and more prominent muscle profiles (Figure 3). This is very important for their commercial appearance. The length of the carcass was 49.50 cm in the Kalofer kids. The carcasses of the Screw-horned kids were not much longer - 56.6 cm.

The length and the circumference of the ham are criteria for the muscles development of the carcass. It was noteworthy that the length and the circumference of the ham in the Kalofer kids were with almost same values - 32.16 cm and 32.83 cm respectively (Table 4). This fact

gave the impression of excellent muscularity and good filling of the ham. Similar values were observed in the Screw-horned kids - 30.16 cm and 30.18 cm, respectively - length and circumference of the ham.

Based on the fact that local longhaired goats are breeds with combined productivity (meat, milk and skins), the linear carcass dimensions obtained were logical. Specialized milk breeds have a longer carcasses, and longer and narrower hams, compared to these in local breeds from the combined productivity (Sanudo et al., 2012). Ekiz et al. (2010) also highlight differences on productive type and body size.

In intensively fattened local Strandzha kids at 110 days of age Stankov et al. (1999), indicated higher values of carcass length, and at the same time, lower values for the circumference of

ham. The area of m. Longissimus in Kalofer longhaired kids was 10.396 cm². A similar results for this sign we found in Bulgarian screw-horned longhaired kids - 10.00 cm². In intensively fattened to older age (110 days), and to higher live weight (23.40 kg) local Strandzha kids, Stankov et al. (1999) established similar values - 10.32 cm².

The both signs - area of m. Longissimus and circumference of the ham are representative for the meat content of the carcasse.

The obtained values of these indicators determine the relatively good qualities of the carcass of the kids from KLG and BSLG, slaughtered at weaning at 90 days of age. The local kids from the Balkan goat breed in Montenegro, at the same age, had longer carcasses than Kalofer kids. The length of the carcass was 53.13 cm, with a slaughter live weight 13.50 kg (Memisi et al. 2009).

Table 4. Linear measurements of carcass of Kalofer longhaired and Bulgarian screw-horned longhaired kids at weaning in 90 days of age (n = 6 kids/breed)

Signs/breeds	Kalofer longhaired kids				Bulgarian screw-horned kids			
	SX	SD	max	min	SX	SD	max	min
Big length of cold carcass, cm	49.500	1.760	52.0	47.0	56.666	2.732	61.0	53.0
Length of ham, cm	32.166	1.940	34.0	29.0	30.166	0.983	31.0	29.0
Circumference of ham, cm	32.833	1.169	34.0	31.0	30.185	1.169	32.0	29.0
Area of m. Longissimus (at 11 ribs), cm ²	10.396	1.599	12.25	7.76	10.006	0.326	10.3	9.6

In order to provide a more complete assessment of the meat productivity of the 90 days old suckling kids from KLG and BSLG, the "meat: bone" ratio in different parts of the carcass was determined.

The results presented in Table 5, shows that the meat: bone ratio in the left half of the carcass of the Kalofer kids was 2.997: 1. In the Screw-horned kids meat: bone ratio was 2.871: 1. This defined a relatively high meatiness class for the

carcasses of suckling kids from KLG and BSLG.

This ratio was maintained at approximately constant limits in the various parts of the carcass - neck, shoulder, ribs, loin and ham.

The lack of detachable subcutaneous fat were a criterion for the high dietary properties of meat from weaned at 90 days of age, local longhaired kids.

Table 5. Ratio meat: bones in left half of the carcass of Kalofer longhaired and Bulgarian screw-horned longhaired kids at weaning at 90 days of age (n = 6 kids/breed)

Signs/breeds	Kalofer longhaired kids				Bulgarian screw-horned kids			
	SX	SD	max	min	SX	SD	max	min
Meat: bones (left half)	2.997	0.167	3.174	2.835	2.871	0.257	3.271	2.581
Meat: bones (neck)	2.961	0.262	3.222	2.500	2.610	0.368	3.090	2.125
Meat: bones (shoulder)	3.368	0.275	3.640	2.959	3.559	0.518	4.240	2.888
Meat: bones (ribs)	2.263	0.275	2.781	2.022	2.097	0.215	2.484	1.840
Meat: bones (first quarter)	2.728	0.195	3.029	2.503	2.644	0.260	3.045	2.267
Meat: bones (loin)	2.954	0.497	3.538	2.291	2.447	0.366	2.875	2.000
Meat: bones (ham)	2.977	0.214	3.379	2.760	2.733	0.349	3.225	2.250
Meat: bones (second quarter)	3.447	0.242	3.861	3.193	3.253	0.350	3.634	2.720

Despite the lower slaughter age (90 days), the meat: bone ratio in the carcass of the investigated animals allows the slaughter to be made at the designated weaning age in order to obtain light carcasses. Slaughtering at this early age does not adversely affect of the economic

strategy of the farmers and the nutritional and dietary values of the carcasses of kids. This free niche, namely the production of light carcasses (up to 13 kg), could be a good alternative for sustainable development of the Bulgarian local goat breeds.



Figure 1. KLG - Kalofer longhaired goat breed (doe). © Sedefchev.



Figure 2. BSLG - Bulgarian Screw-horned longhaired goat breed (doe). © Sedefchev.



Figure 3. Carcasses of a suckling kids, slaughtered at weaning 90 days of age (KLG – left, BSLG – right). © Vuchkov.

CONCLUSIONS

On the basis of the results obtained of slaughter traits of suckling kids of the Kalofer longhaired goat (KLG) and Bulgarian screw-horned longhaired goat (BSLG) breeds, several conclusions are drawn.

The average weight of cold carcass was 9.88 kg for males suckling Kalofer longhaired kids and 9.79 kg for males Bulgarian screw-horned longhaired kids, at 90 days of age. Dressing percentage of chilled carcass, without offal was 48.87%, and 50.5% for kids from KLG and BSLG, respectively.

The linear measurements of the carcass of males suckling Kalofer longhaired kids at 90 days of age was respectively - big length of carcass - 49.50 cm, length of the ham - 32.16, circumference of ham - 32.83 cm. The area of m. Longissimus at 11 ribs was 10.39 cm².

Determination the linear measurements of the carcass of males suckling Bulgarian screw-horned longhaired kids at 90 days of age was respectively - big carcass length - 56.66 cm, length of the ham - 30.16 and circumference of ham - 30.18 cm. The area of m. Longissimus at 11 ribs was 10.0 cm².

The ratio meat:bones in the carcass of suckling Kalofer longhaired kids at 90 days of age was significantly higher - 2.99:1. The value of this sign in the Bulgarian screw-horned longhaired kids was 2.87:1.

These results allowed that the slaughter of the kids from Bulgarian local breeds, can be done in the specified age of weaning (90 days of age), with the aim to producing light carcasses (type Capretto), and without a negative impact on economic strategy of the farmers. This free niche, namely the production of light carcasses (up to 13 kg), could be a good alternative for sustainable development of the Bulgarian local goat breeds.

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