THE EFFECT OF SLAUGHTERING WEIGHT ON THE QUALITY OF LAMB'S CARCASSES FROM BARDHOKA AND CROSSING RACE

Veterinary Medicine

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Abstract

This study was made in lambs which were consisting of 24 females, 23 males and 19 castrated males: Bardhoka (n = 21), Ruda x Bardhoka (n = 23) and Shkodrane x Bardhoka (n = 22). We have studied the effects of slaughtering on the quality of carcasses and lambs meat with low weight (n = 45): 22.3 ± 2.8 kg, aged 60 ± days and lambs with higher weight (n = 21): 43.1 ± 6.3kg, 169 ± 8.9 days. The weight after slaughtering, affect the probability (P ≤0.05), in all evaluated characteristics of the carcasses. The lambs with higher weight have good conformation compared with lambs with low weight. This is respectively in carcasses (0.320 for 0.190 kg/cm, 1.09 for 1.07 kg/cm). We have the best level of fattening respectively in lambs with higher weight to those with the smallest weight (15.7 to 7.3 mm) and the best tissue's composition in lambs with high weight respectively to those with the smallest weight (2.9 to 1.9 meat/bone, 2.5 to 2.2 meat/adipose tissue). At the same time carcasses of lambs with low weight have higher level of trade compared with lambs that have higher weight. In terms of measurable of meat characteristics, only the pH is affected by the slaughtering weight. In analysis of organoleptic characteristics, only sex and race affect the cross race of meat unfailing. Meat from lambs to females or castrated was mild compared with the meat-free castrated lambs especially in cases where they were to cross lambs race. Slaughtering weight affects all organoleptic features. The meat of carcasses with higher weight is categorized as strong and with a good flavor.

1. Introduction

Lamb meat production in our country is recently increased, based mainly in two forms: small lambs (22 -24 live weight) and grown lambs (over 34 kg). According to the national evaluation, the largest categories of lambs slaughtered are males with genotypic backgrounds for double productions way, meat and wool. According to different authors there are studies and discussions about the effects of many factors on the quality of meat production and in particular meat lamb, (Bianchi 2005).

The objective of the study is to evaluate the weight of the sacrifice (small lambs 22.3 ±2.8 kg for 60 ± 2.4 days and grown lambs 43.1 ± 6.3 kg of live weight for 169 ± 8-9 days), on the quality of meat and especially lambs (female, male and castrated males) of Bardhoka races, Ruda x Bardhoka and Bardhoka x Shkodrane.

2. Material and Methods

The study is realized in collaboration of the Faculty of Veterinary Medicine, Tirana and "RO-AL" farm in Lushnja district. In this study we used 66 slaughter lambs, from which based on sex we had 24 females, 23 males and 19 castrated male), and based on genetic type we had 21 Bardhoka (B), 23 crosrace Bardhoka x Ruda (RxB) and 22 Shkodrane x Bardhoka (ShxB).

In the following two treatments based on weight and age of lambs slaughtering we have small lambs (n: 45, 22.3 ± 2.8 kg live weight for 60 ± 2.4 days), and the grown lambs (n: 21,43.1 ± 6.3

kg live weight for 169 ± 8-9 days). The lambs obtained in this study are born late August. All lambs are initially fed from the mother and later with combine food rations.

3. The methodology

3.1. Controls on the carcasses

The animals are slaughtered in different ways when they reach the desired weight and meet to the satisfaction level required from the customer. In compliance with the standards, before sacrificing, the animals are kept for 15 hours without feeding them but having water. Small lambs carcasses (11.2 ±1.82 kg) and large lambs (23.2 ±5.3), were placed in the cooling chamber (24 hours 4°C) where we determined conformation of morphological parameters: the length and thickness of the legs, described by Fisher and de'Boer (1994) and Ruiz de Huidobro, *et al.*, (2000). According to this information it is calculated the Carcass Compactness Index (CCI) and even the final weight of the carcass that is selected based on its length, the Index of Compactness of the Posterior Limb (ICPL) and the limb width divided along its length. The level of fatness is determined by performing the evaluation of tissue depth on the 12 rib around 11 cm from the *linea alba*. In continues, there is performed the carcass-sections in the first, second and third category (Vergara and Gallego, 2000). The above mentioned carcass-sections are classified in the following categories:

First category: limbs, ribs, dorsal region of neck

Second category: shoulder

Third category: the neck and lateral abdominal fascies

Firstly, the carcasses placed in cooling chamber, initially with fresh temperature and then in freezen**,** (Colomer and Rocher 1988). In a second phase the carcasses are kept out in room temperature for 24 hours, by unfreezing gradually. This is the phase which facilitates the shoulder dissection: overall weight, adipose tissue subcutaneous, intramuscular adipose tissue, prescapulare adipose tissue, muscle, bone (head and joints) and waste (fascie and ligaments). According to this information we can calculate the ratio muscle/adipose tissue and muscle/bone.

3.2. Meat control

In the samples of muscle *Longissimus dorsi* matured for 24 hours, we measured the pH, the capacity of the water activity (a_w) (Pla 2000), pigment (Albert, 2000) and hardness (Beltran and Roncales 2000). In order to perform the analyses of organoleptico characteristics we used fillet from the muscle *Longissimus dorsi* taken from these carcasses based on the methodology described by Guerrero (2000). Assessment of the samples was realized by 49 persons (11 females and 38 males) of the age 21-22 years old. The panel was consisted of students from the Faculty of Medicine Veterinary where each of them for 1 hour has evaluated on individual 2-3 samples. The evaluation was done by using the numbers from 1 to 10 for three elements: the degree of hardness, the quality of smell and desirability.

4. Statistic Analyse

The effect of slaughtering weight, to all meat quality variables (pH, aw, pigmetit and hardness) are studied by using the analysis of variance by considering a fixed model and the latest data by usingf GLM of the statistical package SAS (version 8), by taking in consider the amount of cells type III. This was even used for analysis of the variables of the organoleptic evaluation (hardness, flavor and eligibility) part of the questionnaire. In order to compile and format the questionnaire we used a fixed model which included: race (3 levels), sex (3 levels), weight at sacrifice (2 levels) and interaction of factors such as that customer, the manner of the treatment and the order of sample in the random way.

5. Results and Discussion

Table 1. Presents the effects of slaughtering weight on conformation, level of fatness and carcass composition tissues.

Carcasses Characteristic	**Small lamb**	**Grown Lamb**
Conformation and the fatness	(n=45)	(n=21)
The length of carcasses (cm)	59.8 ± 0.50 b	71.0 ± 0.74 a
The width of carcasses	17.1 ± 0.25 b	23.4 ± 0.37 a
Depth of thorax (cm)	20.9 ± 0.18 b	27.0 ± 0.27 a
The length of the legs	17.6 ± 0.16 b	21.0 ± 0.23 a
Perimeter of the leg (cm)	54.4 ± 0.39 b	62.5 ± 0.59 a
Compactness of the leg	1.07 ± 0.01 b	1.09 ± 0.01 a
Compactness of the carcasses (kg/cm)	0.19 ± 0.05 b	0.32 ± 0.01 a
Tissue composition of the shoulder	**Small lamb**	**Grown Lamb**
Meat (%)	49.4 ± 0.84 b	56.6 ± 1.21 a
Bone (%)	27.2 ± 0.49 b	19.9 ± 0.49 b
Total adipose tissue (%)	23.4 ± 0.74 a	23.6 ± 1.06 a
Adipose tissue subcutaneous / Total adipose tissue (%)	48.2 ± 2.12 a	41.0 ± 3.06 b
Intramuscular adipose tissue / Total adipose tissue (%)	33.6 ± 0.05 b	39.1 ± 3.50 a
Prescapulare adipose tissue / Total adipose tissue (%)	18.2 ± 0.88 a	19.9 ± 1.27 a
Meat/ adipose tissue	2.1 ± 0.11 b	2.4 ± 0.15 a
Meat/Bone	1.8 ± 0.06 b	2.8 ± 0.09 a

(a,b): Different values presented with $P \leq 0.05$.

The slaughtering weight has affected ($P \leq 0.05$) in all the characteristics of the evaluated carcasses. The grown lambs has presented a better conformation (0.320 from 0.190 kg/cm, 1.09 from 1.07, 55.7 from 51.9 compactness of the carcasses, respectively for limb of the small and grown lambs), high level of Adipose tissue (15.7 from 7.3 mm in the respectively young and grown lamb carcasses) and a better muscle composition (2.8 from 1.8 meat/bone, 2.4 from 2.1 meat/ Adipose tissue in the respectively young and grown lamb).

Table 2 presents the effects of the weight in the slaughter moment on the carcasses composition. The carcasses of the small lambs, in some anatomic part, have presented better composition

compared with the grown lambs, in particular those parts which represents an economic interest. The higher relative contribution of the posterior legs from grown and small lambs is comparable with the quick development, especially in this part. On the other hand the result is turned over when we take into consideration one part with a slow development as the case of the development of the rips. In the same time, the shoulders of the young lambs are comparative with recorded conformation of the carcasses which correspond with the data of the other authors (Ruiz de Huidobro. *et al.,* 2000). These authors describe that in the long carcasses which have no good conformation there are different part with absence of the adipose tissue. (i.e.: shoulder), while in the compact carcasses there are big portions of adipose tissue, (i.e.: rips).

Table 2. The effects of slaughtering on the composition of the parts of carcasses in male and females of races Bardhoka, and Bardhoka mixed, Ruda x Bardhoka, Bardhoka x Shkodrane.

Classification of the carcasses and the relative effect of the different parts	Small Lamb (n=45)	Grown Lamb (n=21)
Category I (%)	58.5 ± 0.46 a	52.5 ± 0.71 b
Posterior leg	57.9 ± 0.46 a	55 ± 0.70 b
Dorsal neck part	10.9 ± 0.34 a	10.0 ± 052 a
Rips	31.2 ± 0.44 b	34.6 ± 068 a
Category II (%)	18.8 ± 0.16 a	17.9 ± 0.25 b
Shoulder	100 a	100 a
Category III (%)	19.8 ± 0.25 b	25.4 ± 0.38 a
Abdominal lateral fascias	66.5 ± 0.73 b	75.3 ± 1.12 a
Neck (%)	33.5 ± 0.73 a	24.7 ± 1.12 b

(a,b): Different values presented with P≤0.05.

In the third table is presented the effect of slaughter weight on the quality of the meat. From the quality characteristics only the pH resulted different in the lamb with different weight, when the lambs were small they had higher value of pH. In this result we think that it may have affected a lot the stress of weaning in the moment of the slaughter by affecting in the other factors such as fasten decreasing level of pH by affecting in the final pH ne (Bianchi 2005).

Table 3. The effects of slaughtering on the characteristic of the meat of lambs male and female of races Bardhoka, and Bardhoka mixed, Ruda x Bardhoka, Bardhoka x Shkodrane.

Quality of the meat	Small lamb	Grown Lamb
pH	5.9 ± 0.01 a	5.6 ± 0.01 b
a_w (%)	16.4 ± 0.71 a	14.4 ± 1.09 a
HG (%)	19.0 ± 0.69 a	15.8 ± 1.07 b
Color (mg mioglobine/g muscle)	3.02 ± 0.46 a	3.73 ± 0.68 a
Hardness (kg)	4.7 ± 0.25 a	4.1 ± 0.38 a

(a,b): Different values presented with P≤0.05 HG: losses during treatment; a_w : the capacity of the water activity.

The slaughter weight practically does not effect on the meat characteristics, while integral features or production usually effect a lot on the meat quality, by resulting less important on the characteristics of meat quality, especially in lambs (Sañudo C. 1998).

In the fourth table is presented the effect of sex, race and slaughter weight on the hardness, quality of the smell and eligibility of the lamb meat. From the analyzed interaction resulted only one that showed significant interest was the genetic one (P=0.02). (Mixed race) x slaughter weight, while pure breeds of meat presented with acceptable hardness for both categories (small lambs and grown lambs). Sex and race affect only in the variable of hardness by resulting hard meat the meat of the females or castrated lambs compared with males meat especially in the mixed races. Also the meat of the mixed races, in the organoleptic aspect, has resulted harder compared with the lambs of Bardhoka race not mixed. Slaughter weight affect on all the organoleptic characteristics of the meat. It results from the costumers that this correlation is more evident in the grown lambs. The high level of fatness is linked with a better liquidity and low desirability of the session of the carcasses, maybe this explains the desirability of big lamb meat for all the global consume. The sensitivity of the sensorial analyzes explains the trend shown in the hardness, (smaller force of cutting lambs meat seen at lambs grown, table 3), sensorial characteristic resulted important by having strong meat depending of increasing of the slaughter weight, (table 4).

Table 4. Consumer evaluation of the value of lamb meat, males and females, small and grown lambs, race Bardhoke and mixed.

	Hardness (1-10)[1]	**Quality of smell (1-10)[1]**	**Eligibility (1-10)[1]**
SEX	**0**	**ns**	**ns**
Female lambs (n=24)	6.9 ± 0.24	6.8 ± 0.22	6.8 ± 0.23
Male lambs (n=23)	6.3 ± 0.26	7.0 ± 0.23	6.9 ± 0.24
Castrated male lambs (n=19)	6.9 ± 0.23	7.1 ± 0.21	7.1 ± 0.22
Genetic type	*	**ns**	**ns**
B (n=21)	6.2 ± 0.25 b	6.8 ± 0.23	6.7 ± 0.24
R x B (n=23)	6.7 ± 0.23 ab	7.0 ± 0.22	6.9 ± 0.23
Sh x B (n=22)	7.2 ± 0.28 a	7.2 ± 0.25	7.2 ± 0.27
Slaughter weight	**	***	***
Small lambs (n=45)	6.3 ± 0.28 b	6.6 ± 0.20 b	6.5 ± 0.21 b
Grown lambs (n=21)	7.1 ± 0.25 a	7.3 ± 0.23 a	7.4 ± 0.24 a

ns: P>0.05; (+):P ≤0.05; (*): P ≤0.01; (**): P≤0.005; (***): P≤0.0001;
(a, b): Different value presented with P≤0.01. (1): Rate of score.

Studies realized in this article has showed that which race of produced lamb represent more interest on the characteristic of the meat (in particularly conformation and distribution in various ways on the carcasses in relation to adipose tissue in general), by taking into consideration that the consumer like mire the meat of the grown lamb and especially from mixed races.

6. References

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