RESEARCHES ON THE COMPARATIVE CHARACTERIZATION OF STRUCTURAL COMPOSITION OF LAMBS AND KIDS CARCASSES

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Abstract

The purpose of this study is to compare the properties of meat from the carcass composition of lambs and kids reared in similar conditions of maintenance. This work is a study of correlations between gender, age, live weight at slaughter, breed, managed nutrition and development carcass sensory and physical- chemical properties of lambs and kids. Bibliographic materials were studied on the relationship between carcass composition and significant influence (0,05) on the quality, default on consumer requirements.

Key words: lamb, quality, chemical composition and meat

INTRODUCTION

The diversity of products, particularly biological value and achieving their economicity ever made the species of sheep and goats been highly appreciated, and also enjoying the attention of breeders. [18] There is a variation on the requirments of different markets to the weight and quality of lamb and kid carcasses delivered to the market.

Quality assessment of sheep and goat carcasses can be done taking into account the following main criteria: development, conformation, fattening status, tissue composition, color and consistency of muscle. [19]

MATERIAL AND METHODS OF WORK

Biological material, which is the subject of research, used by Santos et al. consisted of 55 suckling kids (27 males and 28 females) and 57 suckling lambs (28 males and 29 females) of Portuguese native breeds produced according to “Cabrito de Barrosa-PGI” [21], and “Borrego Terrincho-PDO” [23] specifications, respectively. This experiment was conducted in accordance with the guiding principles and guidelines set for animal care and use. [7] According to protected geographical indication (PGI) specifications, carcasses of "Cabrito de Barroso –PGI" must weigh from 4 to 6 kg, be obtained from kids up to 3 mo of age, be raised on pasture with their mothers in the Barroso region (north of Portugal), and belong to the native Serrana and Bravia goat breeds or their crossbreeds. [27]

Location of growing area is northeast of Portugal, at 400-700 m altitude above sea level. The average annual temperature is 11.9°C, with an average minimum temperature of 0.9°C (January) and a maximum average temperature of 21°C (July). The relative humidity varies between 60 and 84%. [15]

Briefly, sheep and goats meet their nutritional requirements mainly through grazing of natural pastures interpresed with areas of shrubby vegetation. Pastures are used all year by groups of about 100 ewes or goats at a low stoking rate. The lambing season occurs mainly during September to December. In this production system, kids and lambs are penned at the farm during the first two weeks. After this period, kids and lambs are naturally suckled and left with their mothers at pasture areas. [23]

Development and carcass conformation is assessed objectively by the dimensions of length and width. Fattening status of the carcass is another important criterion by which to appreciate quality. It considers the quantity, distribution and characteristics of body fat. [19]

Carcass measurements, cutting and dissection

Carcass dressing was performed after the methods of Fisher and Boer (1994).

Carcasses were refrigerated for 24 h at 4^0C. hot and cold carcass weight (HCW and CCW, respectively), were recorded. The carcasses were splint along the vertebral column, and the kidney knob and pelvic fat (KKPF) weighed.

Fisher and Boer (1994) pointed out various measurements of body: leg length (from the sypmhysis pubis to the tarsal-metatarsal joint), internal carcass length (from anterior edge of the symphysis pubis to the anterior edge of the first rib), as well as chest circumference, anterior buttock circumference and posterior buttock circumference. Carcass compactness, used as conformation indicator, was determined as the ratio between CCW and internal carcass length measure (CCW/L, $kg \cdot m^{-1}$). [8]

Calheiros and Neves (1968, Figure 1) outlined that the left side in fabricate in commercial cuts. Greater cuts were leg, chump and loin. After weighing, each cuts was separated into dissectible muscle, bone, fat (subcutaneous and intermuscular fat depots were registered separately), and the remainder (major blood vessels, ligaments, tendons and thick connective tissue sheets associated with some muscles) in a dissection room under controlled environment with temperature maintained below 15^0C. [3]

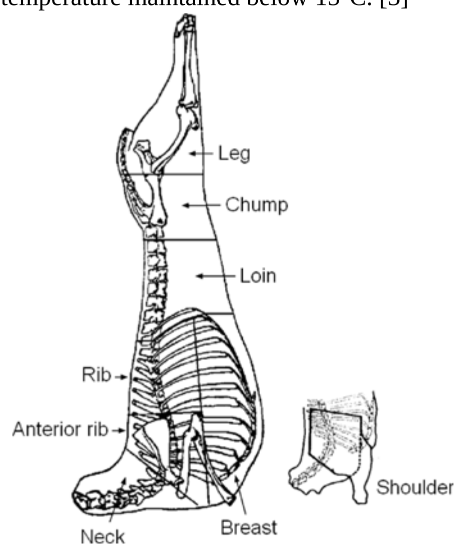

Figure 1. Representation of the carcass cuts (Calheiros and Neves, 1968).

Muscle sampling: The Longissimus samples were taken at 24 h postmortem between the 6^{th} thoracic vertebra and 5^{th} lumbar vertebrae from the right half of each carcass, whereas the left half was fabricated into commercial cuts. One part of the LM (between the 12^{th} thoracic vertebra and 5^{th} lumbar vertebrae) was packaged in vacuum bags (Combivac, Felzmann, Linz, Austria) using a packaging machine (Minipack- Torre SpA, MVS- 35, Dalmine, Italy) and aged at 4^0C for 72 h for cooking losses and Warner-Bratzler shear force determinations. The remaining portion, approximately 100 g, was frozen and stored at -20^0C until chemical analysis (< MO). [23]

Meat Quality Measurements

Santos et al., 2008 evaluated the pH at 1 and 24 h (pH_{24}) postmortem in the LM between 1^{st} and 2^{nd} lumbar vertebrae, using a pH meter equipped with a pene trating electrode (Hanna Instruments, HI- 9025, Woonsocket, RI). Meat color was assessed by L∗,a∗ and b∗ system (CIE, 1986) using a Minolta CR- 10 colorimeter (Osaka, Japan). The color was measured on the muscle surface at the same site as the pH, at 60 min after cutting. Cooking loss was evaluated in refrigerated meat samples of similar geometry, individually placed inside polyethylene bags in a water bath at 75^0C. samples were heated to an internal temperature of 70^0C, monitored with thermocouples introduced in the core, and cooled for 15 min under running tap water. They were taken from the bags, dried with filter paper and weighed. Cooking loss was expressed as the percentage of loss related to the initial weight. After measurement of cooking loss, samples were stored in a refrigerator and used for objective tenderness determinations (after equilibration temperature). The Warner- Bratzler shear force was evaluated in subsamples (at least 3), prepared manually, of 1 cm^2 cross section and 3 to 4 cm in length, with the fibers perpendicular to the direction of the blade attached to a Stevens QTS 25 (Essex, UK) device. [23]Intramuscular fat was determined with 20,0 g (in duplicate) of minced meat via the Soxhlet extraction method using petroleum ether as the solvent and was determined gravimetrically after evaporating the solvent. [1]

Statistical analysis

The results were analyzed using GLM procedure (SAS Inst. Cary, NC) to determine the influence of species, sex and their interaction on carcass and meat quality characteristics. Least squares means were calculated and tested by Santos et al., by differences using Bonferroni test. [21]

RESULTS AND DISCUSSION

After Warmington and Kirton, 1990 and Dhanda et al., 2008, the state of fattening and performance varies widely with genotype, sex, feeding, weigkt or age at slaughter. [5]Suckling kids and lambs were slaughtered within BW limits (8 to 11 kg of live BW), corresponding to approximately 19% of maturity (table 1). Live body weight at slaughter was recorded after 14 h of fasting with free access to water. Kids and lambs were slaughtered using standard commercial procedures. [23]

Table 1.
Means (±SE) of slaughter BW (SLW), maturity, HCW, and cold carcass weight (CCW) of male and female kids and lambs

Species	Sex	n	SLW, kg	Maturity, %	HCW,[1] kg	CCW, kg
Kids	Female	27	9.1 ± 0.36	20.1 ± 0.81	5.9 ± 0.23	4.6 ± 0.21
	Male	28	10.4 ± 0.37	17.7 ± 0.63	6.4 ± 0.24	5.0 ± 0.21
Lambs	Female	28	8.6 ± 0.53	19.1 ± 0.61	5.4 ± 0.31	4.2 ± 0.26
	Male	29	9.9 ± 0.23	17.1 ± 0.40	5.9 ± 0.27	4.8 ± 0.23

1. [1]Includes head, liver, lungs, heart, and kidneys

The degree of maturity was defined by Fitzhugh and Taylor, 1971 as: (slaughter weight/adult body weight) x 100. The adult live BW for each species and breed was estimated as the average BW of adult male (58,2± 0,46 kg, n= 314) and female (45,1± 0,37 kg, n= 2206) goats belonging to the same flock and herds, respectivly. [9]

Carcass traits and composition

Following determination of cold carcass weight, Santos et al., 2008 states that suckling lambs had a higher proportion of meat than suckling kids (table 2). [23] Similar results were found and by researchers such as Mahgoub and Lodge (1998), Riley (1989), and Tsabalala (2003) on comparative studies of these two species at the highest live body weight by different systems production. [13, 20, 28] However, Sen, 2004 reported that the difference in yield of carcass content expressed in terms of live body weight is not significant between sheep and goats reared under semiarid conditions. [21, 22]

There were no significant differences in percentages between male and female carcass content (Table 2). In this study, carcass fat is expressed as a proportion of KKPF (kidney knob and pelvic fat) and cold carcass weight was not affected by species ($p>0,05$), but females had a higher proportion KKPF ($p<0,01$) than males (Table 2). Mahgoub and Lodge, 1998 Hadjipanayiotou and Koumas, 1994, El Khidir, 1998 have shown differences in between sheep and goats in partitioning of body fat. They showed that goats tend to deposit most of their fat intarnally in mesenteries, kidneys and alimentary tract, whereas more fat in sheep is deposited in the carcass. Kids present superior linear and circumference measurments (table 2). Males had greater anterior ($p<0,05$) and posterior buttock ($p<0,01$) circumferences and long leg measurments ($p<0,05$). These differences can be attributed to the small diferences in slaughter live body weight between species and sexes like it's was presented in table 1.

Table 2.
Least squares means (±SE) of carcass characteristics of male and female kids and lambs

Item[1]	Species (Sp)		Sex		Significance		
	Kids (n=55)	Lambs (n=57)	Female (n=57)	Male (n=55)	Sp	Sex	Sp x Sex
Traits							
Dressing percentage (CCW · basis), %	47.8±0.39[b]	49.3±0.39[a]	48.3±0.39	48.8±0.39	**	NS	NS
KKPF·CCW^{-1}, %	2.3±0.12	2.3±0.12	2.6±0.13[a]	2.1±0.12[b]	NS	**	NS
Carcass measurements (cm)							
Chest circumferences	48.4±0.55[a]	44.5±0.54[b]	45.7±0.55	47.2±0.54	***	NS	NS
Anterior buttock circumferences	35.6±0.54[a]	33.1±0.53[b]	33.5±0.54[b]	35.3±0.53[a]	**	*	NS
Posterior buttock circumferences	46.6±0.55[a]	37.6±0.51[b]	37.6±0.54[b]	46.6±0.53[a]	***	***	NS
Carcass internal length	44.2±0.51[a]	40.9±0.50[b]	42.1±0.51	43.0±0.50	***	NS	NS
Long leglength	30.0±0.29[a]	27.9±0.28[b]	28.5±0.29[b]	29.5±0.28[a]	***	*	NS
Carcass compactness index (CCW · L^{-1})	10.8±0.33	10.5±0.32	10.2±0.33	11.1±0.32	NS	NS	NS

1. [a,b] Within a row, species or sex least squares means without a common superscript letter differ (P<0,05)
2. [1]CCW = cold carcass weight; KKPF= kidney knob and pelvic fat.
3. *P<0,05; **P<0,01;***P<0,001.

Morand- Fehr, 1981; Naude and Hofmeyr, 1981 reported that goat carcasses generally have poorer conformation than sheep carcasses, especially early in life. [17]

Santos et al., 2008 reported that there were no significant differences between species and sexes in carcass compactness index at this maturity stage. Lambs had greater proportions of the highly valued leg cut and lower proportions of shoulder, anterior rib and neck cuts than kids (table 3). [23] Similarly, Naud and Hofmeyr (1981) reported that the proportion of the high priced leg cut in the Boer goat was significantly lower than that in sheep of comparable carcass weight. [17] After Santos et al., 2008,sex difference for wholsale cuts tended to be small and mostly nonsignificant (table 3). [23]

Tabel 3.
Least squares means (±SE) of cut percentages of male and female kids and lambs

Item, %	**Species (Sp)**		**Sex**		**Significance**		
	Kids (n=55)	**Lambs (n=57)**	**Female (n=57)**	**Male (n=55)**	**Sp**	**Sex**	**Sp x sex**
Leg	25.1±0.16[b]	27.7±0.15[a]	26.4±0.16	26.4±0.15	***	NS	NS
Shoulder	22.6±0.15[a]	21.6±0.15[b]	22.0±0.15	22.2±0.15	***	NS	NS
Chump	8.3±0.09	8.2±0.09	8.4±0.09[a]	8.2±0.09[b]	NS	*	NS
Loin	10.5±0.11	10.3±0.10	10.5±0.11	10.4±0.10	NS	NS	NS
Rib	6.6±0.07	6.7±0.07	6.7±0.07[a]	6.5±0.07[b]	NS	*	NS
Anterior rib	5.7±0.07[a]	5.3±0.06[b]	5.5±0.07	5.4±0.06	***	NS	NS
Breast	11.6±0.17	11.3±0.17	11.3±0.17	11.5±0.17	NS	NS	NS
Neck	9.7±0.11[a]	8.8±0.11[b]	9.1±0.11	9.3±0.11	***	NS	NS
Higher priced[1]	43.9±0.14[b]	46.3±0.14[a]	45.3±0.14[a]	44.9±0.14[b]	***	*	NS

1. [a, b]Within a row, species or sex least squares means without a common superscript letter differ (P< 0,05).
2. [1]Includes leg, loin and chump cuts.
3. *P<0,05;**P<0,001.

Tissue carcass percentages obtained by dissection of left half carcass cuts are presented in Tables 4 and 5. Dissection results indicated that kid and lamb carcasses had more than 60% of dissectible lean, about 21,0 to 21,8 of bone content and 12,9 to 16,9% of dissectible fat. These dissection results are in agreement with those obtained by Dhanda at al., 1999 with Capretto carcasses and by Sanudo et al., 2000 with suckling lambs (shoulder dissection). [5, 24] However, Santos et al., 2008, recorded that kid carcasses had greater muscle content (P<0,001) and lower dissected fat (P<0,001) and bone (P<0,05) than lambs (Table 4 and 5). In all cuts, muscle proportions were greater for kids than for lambs. [23] Naud and Hofmeyr, 1981, Gail and Ali, 1985 confirmed that sheep are less flexible than the goats. [10, 17] Regardless of species, chop cut has the highest proportion of muscle the breast has the highest proportion of intermuscular fat (Table 5). The small diference observed between the sexes in the dissection of fat that can be explained by age or slaughter weight decreased, because it would be expected more differences in age and slaughter weight more advanced.

Table 4.
Least squares means (±SE) of muscle and bone tissue percentages and rations of male and female kids and lambs

Item	Species (Sp)		Sex		Significance		
	Kids (n=55)	Lambs (n=57)	Female (n=57)	Male (n=55)	Sp	Sex	Sp x sex
Muscle, %							
Leg	68.7±0.25[a]	65.1±0.24[b]	67.2±0.25[a]	66.5±0.24[b]	***	*	NS
Shoulder	65.2±0.30[a]	62.0±0.29[b]	63.7±0.30	63.5±0.29	***	NS	NS
Chump	66.8±0.44[a]	61.3±0.43[b]	64.4±0.44	63.7±0.43	***	NS	NS
Loin	72.1±0.54[a]	65.8±0.53[b]	69.2±0.54	68.8±0.53	***	NS	NS
Rib	59.2± 0.68	58.9±0.67	59.2±0.68	58.9±0.67	NS	NS	NS
Anterior rib	62.6±0.53	61.6±0.52	62.2±0.53	61.9±0.52	NS	NS	NS
Breast	53.5±0.60[a]	49.6±0.59[b]	52.3 0.60	50.8±0.59	***	NS	NS
Neck	63.0±0.54[a]	57.9±0.53[b]	60.5±0.54	60.3±0.53	***	NS	NS
Carcass	64.8±0.34[a]	61.2±0.33[b]	63.3±0.34	62.7±0.33	***	NS	NS
Bone, %							
Leg	23.2±0.26[b]	24.2±0.25[a]	23.5±0.26	24.0±0.25	**	NS	NS
Shoulder	22.4±0.25[b]	24.2±0.25[a]	23.1±0.25	23.6±0.25	***	NS	NS
Chump	17.4±0.30	17.5±0.29	17.4±0.30	17.6±0.29	NS	NS	NS
Loin	14.8±0.35	14.8±0.34	14.8±0.35	14.9±0.34	NS	NS	NS
Rib	22.7±0.44[a]	21.1±0.43[b]	21.8±0.44	21.9±0.43	**	NS	NS
Anterior rib	22.4±0.38	22.1±0.37	21.9±0.38	22.6±0.37	NS	NS	NS
Breast	20.2±0.40	20.1± 0.39	20.1±0.40	20.1±0.39	NS	NS	NS
Neck	20.3±0.47[b]	23.3±0.46[a]	21.6±0.47	22.0±0.46	***	NS	NS
Carcass	21.0±0.24[b]	21.8±0.23[a]	21.2±0.24	21.60.23	*	NS	NS
Muscle: bone							
Leg	3.0±0.04[a]	2.7±0.03[b]	2.9±0.04	2.8±0.03	***	NS	NS
Shoulder	2.9±0.03[a]	2.6±0.03[b]	2.8±0.03	2.7±0.03	***	NS	NS
Chump	3.9±0.07[a]	3.6±0.07[b]	3.8±0.07	3.7±0.07	**	NS	NS
Loin	5.0±0.13[a]	4.6±0.12b	4.8±0.13	4.8±0.12	*	NS	NS
Rib	2.6±0.06[b]	2.9±0.05[a]	2.8±0.06	2.7±0.05	***	NS	NS
Anterior rib	2.8±0.06	2.8±0.06	2.9±0.06	2.8±0.06	NS	NS	NS
Breast	2.7±0.33	2.9±0.33	2.6±0.33	2.9±0.33	NS	NS	NS
Neck	3.2±0.07[a]	2.6±0.07[b]	2.9±0.07	2.8±0.07	***	NS	NS
Carcass	3.1±0.03[a]	2.8±0.03[b]	3.0±0.03	2.9±0.03	***	NS	NS

1. [a,b]Within a row, species or sex least squares means without a common superscript letter differ (P<0,05).
2. *P<0,05;**P<0,01;***P<0,001.

Table 5.
Least squares means (±SE) of dissected fat percentages of male and female kids and lambs

Item	**Species (Sp)**		**Sex**		**Significance**		
	Kids (n=55)	**Lambs (n=57)**	**Female (n=57)**	**Male (n=55)**	**Sp**	**Sex**	**Sp x sex**
Subcutaneous fat, %							
Leg	2.8±0.19[b]	5.0±0.19[a]	3.8±0.19	4.1±0.19	***	NS	NS
Shoulder	4.5±0.24[b]	5.2±0.24[a]	4.8±0.24	4.9±0.24	*	NS	NS
Chump	7.0±0.42[b]	11.0±0.41[a]	8.6±0.42	9.3±0.41	***	NS	NS
Loin	5.1±0.37[b]	8.7±0.36[a]	6.6±0.37	7.2±0.36	***	NS	NS
Rib	3.5±0.28[b]	5.8±0.28[a]	4.5±0.28	4.8±0.28	***	NS	NS
Breast	7.7±0.20[a]	0.1±0.20[b]	3.7±0.20	4.0±0.20	***	NS	NS
Neck	1.0±0.19[b]	4.0±0.19[a]	2.2±0.19[b]	2.8±0.19[a]	***	*	NS
Carcass	4.1±0.22[b]	6.0 ± 0.22[a]	4.9 ± 0.22	5.2 ± 0.22	***	NS	NS
Intermuscular fat, %							
Leg	4.7±0.17[b]	5.7±0.16[a]	5.2±0.17	5.2±0.16	***	NS	NS
Shoulder	7.2±0.23[b]	8.6±0.23[a]	8.0±0.23	7.7±0.23	***	NS	NS
Chump	8.0±0.25[b]	10.2±0.25[a]	9.1±0.25	9.1±0.25	***	NS	NS
Loin	7.3±0.34[b]	10.7±0.34[a]	9.1±0.34	8.9±0.34	***	NS	NS
Rib	12.0±0.57[b]	14.3±0.56[a]	13.0±0.57	13.3±0.56	**	NS	NS
Anterior rib	12.1±0.53[b]	16.3±0.52[a]	14.5±0.53	14.0±0.52	***	NS	NS
Breast	17.4±0.55[b]	21.9±0.54[a]	19.5±0.55	19.8±0.54	***	NS	NS
Neck	10.8±0.54[b]	14.8±0.53[a]	13.2±0.54	12.4±0.53	***	NS	NS
Carcass	8.8±0.29[b]	10.9±0.28[a]	9.9±0.29	9.8±0.28	***	NS	NS

1. [a,b]Within a row, species or sex least squares means without a common superscript letter differ (P<0,05).
2. *P<0,05;**P<0,01;***P<0,001.

Table 6.
Least squares means (±SE) of meat quality attributes of male and female kids and lambs

Item[1]	**Species (Sp)**		**Sex**		**Significance**		
	Kids (n=55)	**Lambs (n=57)**	**Female (n=57)**	**Male (n=55)**	**Sp**	**Sex**	**Sp x sex**
pH_1	6.5±0.03	6.6±0.03	6.6±0.03	6.6±0.03	NS	NS	NS
pH_{24}	5.8±0.02[a]	5.6±0.02[b]	5.6±0.02[b]	5.7±0.02[a]	***	*	NS
L*(ligtness)	47.3±0.49[a]	46.0±0.48[b]	46.5±0.49	46.8±0.48	*	NS	NS
a*(redness)	17.0±0.28	16.5±0.28	17.0±0.28	16.5±0.28	NS	NS	NS
b*(yellowness)	5.2±0.15[b]	11.1±0.15[a]	8.3±0.15	8.0±0.15	***	NS	NS
Shear force value, $kg \cdot cm^{-1}$	7.7±0.31[b]	9.0±0.29[a]	8.3±0.30	8.4±0.30	**	NS	NS
Cooking loss, %	11.1±0.40[b]	14.3±0.38[a]	13.0±0.39	12.4±0.39	***	NS	NS
Dry matter, %	23.6±0.10[b]	24.3±0.10[a]	24.1±0.10	23.8±0.10	***	NS	NS
Fat, %	1.0±0.07[b]	2.1±0.07[a]	1.7±0.07	1.4±0.07	***	NS	NS

1. [a,b]Within a row, species or sex least squares means without a common superscript letter differ (P<0,05).
2. Ph_1 = Ph 1 h postmortem; Ph_{24} = pH 24 h postmortem.
3. *P<0,05;**P<0,01;***P<0,001.

Species had no effect on muscle pH measured at 60 minutes after slaughter, but at 24 hours after slaughter, kids had pH values significantly higher (Table 6). Ph_{24} site was similar to that of other breeds of sheep by feeding such as Manchego (Diaz et al., 2005) or suckling kids of the Canary goats group (Marichal et al., 2003). [6, 14] No significant differences were observed between sexes meat traits, except for pH determination at 24 hours (Table 6). Muscles color is extremly important in suckling lamb and kid production, whose carcasses should be pale or pink.brightness values (from 46,0 to 47,3) determined by Santos at al., are indicative of extremly pale meat. [23] Kids meat is much brighter and less yellow than that of lamb meat. These results are in agreement with those Sheridan et al. (2003), who analyzed the Longissimus muscle for color measurments of Boer goat kids and mutton merino lambs finished under feedlot conditions. [26] Santos affirmed that the redness of muscle was not affected by species. [23] After Babiker et al. 1990, Sheridan et al., 2003 goat meat color tends to be darker than that of lamb meat. Kid meat presented less cooking losses (P<0,001) than lamb meat (Table 6). This result is in agreement with the findings of Babiker et al. (1990), who reported that chevon had significantly less cooking losses than lamb. [2, 26] However, Sen et al., 2004 and Lee et al., 2007 justified the difference in cooking losses to sheep and goats are insignificant. [12, 25]

In general, shear force values of kid and lamb meat were high compared with the values developed in other studies of kids Marichal et al., 2003, or lambs in studies of Velasco et al., 2000 meat was evaluated under similar conditions. [14, 29] The Waner-Bratzler shear force values of lamb meat beyond 5,5 kg are often be considered as objectionably tough both by a trained sensory panel and the consumers (Webb et al., 2005); however, these values are based on a core size and shape different for that used in the present study. [30] Because of the smaller size and lack of subcutaneous fat coverage, low weight carcasses of kids and lambs dissipate heat at a rapid rate during the immediate postmortem period. This rapid cooling rate of carcasses of kids and lambs dissipate heat at a rapid rate during the immediate postmortem period. This rapid cooling rate of carcasses may cause cold shortening, a phenomen that results in lower tenderness of meat (Kannan et all., 2006). Shear force values was, however, significantly greater (P<0,01) in lamb meat. [11] This results opposes those who found shear force value was significantly greaterin goat meat (Sen et al., 2004; Lee et al., 2007), but these studies were conducted with greater slaughter age or weight, in goats and sheep were reared under different production systems. [12, 25]

The kid meat had significantly more moisture and less intramuscular fat content than lamb (Table 6). These results are in close agreement with the findings of Babiker et al. (1990) and Sen et al. (2004). [2, 23, 25] The chemical composition of the Longissimus muscle was similar to that found by Marichal et al. (2003) in Longissimus muscle of Canary goats group kids. [14] According to Wood (1990), 2 to 3% of intramuscular fat is needed to ensure the organoleptic qualities of meatm therefore, lambs potentially presented a better intramuscular fat distribution. [31]

At this maturity stage, there were significant differences on both carcass and meat quality attributes of suckling kids and lambs, possibly due to inherent species distinction, but sensory analysis of kid and lambs meat should be considered in further investigation. Relative to meat quality attributes, with special focus on tenderness, it seems that low- weight carcasses of kid and lamb shouldbe handled carefully to retain the meat tenderness. Carcasses chilled slowly or electrical stimulations before chilling were pointed out as very effective to improve meat tenderness (McMillin and Brock, 2005; Devine et al., 2006) and must be considered in future research with low weight kid and lamb carcasses. [4, 16]

CONCLUSIONS

The most important conclusins of bibliographic studies we have drawn are:

1. Proportion of breast meat from lambs carcasses is greater than of suckling kids.
2. In terms of carcass tissue distribution were not significant differences between the sexes except kidney knob and pelvic fat content, which is higher in lambs than the kids.
3. In terms of carcass conformation kids are less developed than lambs.
4. The meat color of kids is darker than the lambs.
5. Cooker losses are greater in lambs than in kids.

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