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Carcass Traits in Hair and Crossbred Lambs in Mexico

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Abstract: The carcass of 42 lambs born to Blackbelly (BB), Charollais (CH), Katahdin (KT), Pelibuey (PB) and Suffolk (SF) bucks and BB and PB ewes was characterized. All animals received a 13.2% PC and 2.4 Mcal of ME/ kg DM diet. Slaughter weight was 35 to 40 kg for BB and PB, 40 to 45 kg for KT and 45 to 50 kg for SF and CH. Data were fitted to a model with buck's breed as a fixed effect and means comparison was performed by orthogonal contrasts:C1) BB + PB vs. CH + SF; C2) BB + PB vs. KT, C3) PB vs. BB C4) CH vs. SF. There were no difference (P> 0.05) in carcass yield and primal cuts loin and back leg. Total carcass lean tissue composition was higher for BB (P <0.05) than the other breeds; but PB and CH had higher values in adipose tissue (P <0.05), in C3 and C4 respectively. Breed had no effect on carcass yield, even for major primal cuts, while wool breeds had higher back fat thickness than hair breeds. Comparing carcass tissue composition within haired breeds, BB had a greater proportion of lean tissue that PB, but PB adipose tissue was higher than BB as CH was higher than SF.

Key words: Lambs · Sheep breeds · Productive performance · Lean tissue · Fat tissue

INTRODUCTION

Farmers´ interest in sheep production in Mexico has augmented since 1996. Although sheep production increased by 83% in the period 1996 to 2010, is far from meeting the domestic supply, as the country has to import about 44 % of the meat consumed yearly [1, 2].

The main factors behind the increase in production are the comparative lower price paid for cattle and pigs meat and the high demand that lamb has in the center of the country where it is consumed in the form of barbecue. Thus, the growing demand for breeding stock and meat sheep, offers real option for business. In particular, a sheep production program fits well into reconversion and livestock diversification programs of northern Mexico.

Pelibuey and Blackbelly hair sheep breeds are medium size and have a moderate productive potential because of their hardiness, which has restricted their upbringing in many places. However, the production of these breeds has increased successfully in tropical and temperate climates despite exhibiting a lower growth rate than traditional wool breeds such as Suffolk and Charollais [3, 4] or than haired breeds specialized in meat production, such as Dorper and Katahdin [5].

A previous study in Mexico showed that Pelibuey has a lower carcass yield than other breeds [6], but F1 crosses of Pelibuey with Rambouillet and Dorset improved carcass weight and feed conversion efficiency [7]. In accordance with previous results, it could be hypothesized that Pelibuey and Blackbelly breeds carcass yield can be improved through crossbred with breeds specialized in meat production such as Dorset, Suffolk, Charollais and Katahdin. These breeds are raised in Mexico and have a good productive performance and an accelerated growth [8-10].

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Because sheep population is constantly increasing, farmers seek more diversified markets, ie, new products to offer and animal traits required for such products. For example, lamb market in Mexico demands animals weighting at least 40 kg; this implies preference for terminal crossbreds with meat, wool or hair breeds.

The aim of the study was to characterize carcass traits of a diverse sampling of sheep breeds in the cut market. Such information will be useful for specialized producers who are currently selling lamb cuts into central Mexico markets.

MATERIALS AND METHODS

Location: The study was conducted during the Summer and Fall of 2005 at the Metabolic Unit, School of Animal Husbandry and Ecology, Autonomous University of Chihuahua, Mexico. A total of 42 male lambs from pure breed Blackbelly (BB) and Pelibuey (PB) and crossbred Charollais (CH/BB or PB), Katahdin (KT/BB) and Suffolk (SF/ BB or PB) were used.

Study Design and Animal Management: At weaning, intact animals received a finishing diet containing 2.4 Mcal ME / kg DM and 13.2% crude protein and were housed in individual pens. The detailed management of animals during fattening is described by Villalobos *et al.* (2006) [11]. Lambs were slaughtered on the premises of the Meat Factory Shop in the same school. Slaughter weight was 35 to 40 kg for Blackbelly, Pelibuey, 40 to 45 kg for Katahdin and 45 to 50 kg for Suffolk and Charollais. End weights were related to slaughter weights used in the region. After slaughter carcasses were refrigerated at 1 to 3°C. Twenty-four hour later carcasses were divided longitudinally. Five primal cuts were done on the left side and each cut was dissected into its components, muscle, bone, fat and others, which included connective tissue, lymph nodes, tendons, nerves and blood vessels [12, 13, 14]. The right halves were disposed of through normal commercial outlets.

In order to compare carcass measurements among genetic groups, the percentage of following variables were recorded and: live weight, empty body weight, cold carcass weight and weight of each primal cutting to account for the contribution of all organs and tissue constituents of the carcass.

Statistical Analysis: Data on weight, measurements and percentages of carcass and tissues yield were analyzed using a simple statistical model including the fixed effect of paternal genetic group, by the Statistical Analysis System Software [15]. For means comparison, orthogonal contrasts were performed, C1) Blackbelly+Pelibuey *vs* Charollais +Suffolk, C2) Blackbelly+Pelibuey *vs* Katahdin, C3) Blackbelly+Pelibuey and C4) Charollais *vs* Suffolk.

RESULTS AND DISCUSION

Animal at slaughter and carcass traits are presented in Table 1. Suffolk had the longest carcass and Blackbelly the shortest. Suffolk also had the greatest depth whereas Charollais and Pelibuey had the smallest. Among animals product of crosses with breeds specialized in meat production, Suffolk was slightly higher than Charollais and Katahdin, which is related to breed size since Suffolk is classified as a large size breed, while Charollais and Katahdin are considered medium size breeds. In addition, the lighter weight Blackbelly had the lowest body size.

Longíssimos dorsi eye area (LDEA) was bigger in Suffolk and Charollais than in Blackbelly and Pelibuey, which is related to the fact that Suffolk and Charollais are improved breeds with higher slaughter weight. All studied groups lacked further development of LDEA, which can be overcome by improving the two-haired breeds.

According to U.S. federal classification, LDEA range from 6.5 to 27.1 cm^2 [16], averaging 16.8 cm^2 with a normal variation between 9.7 and 23.2 cm^2. LDEA average in this study was 8.74 cm^2, pointing to a poor development of the pure Mexican hair breed and the implicit difficulty of exporting such cuts to the U.S.

Crossbred wool breeds specialized in meat producing Charollais and Suffolk had thicker back fat thickness (BFT) compared to Blackbelly and Pelibuey ($P < 0.05$). Blackbelly had the slowest growth rate (Table 2). All groups were short in fattening time, which would increase the EGD and allow them to comply with the Mexican classification norm, which begins at a 3 mm thickness [17]. EGD overall average was 1.9 mm. EGD minimum thickness necessary to maintain the carcass in its best fresh appearance and avoid excessive muscle shrinkage and discoloration is 2.54 mm [16].

Average carcass yield was 57.6% varying from 56.8 to 58.0% in the half-carcasses, lacking statistical significance (Table 2). By genetic group, left half carcass yield was 50.2% in average and non-significant difference was found among groups; however, for the front quarter, the comparison Blackbelly +Pelibuey *vs* Katahdin had a significant difference in favor of Blackbelly +Pelibuey ($p < 0.05$); but for the back quarter, Katahdin was superior to Blackbelly + Pelibuey ($p < 0.05$), which shows the better performance of this genotype for meat production.

Table 1: Minimum Square Means (± SE) for Sheep Carcass Traits at Slaughter by Genetic Group

	Genetic group[1]				
Traits[2]	BB	CH/PB	KT	PB	SF
Lambs, no.	10	10	5	7	10
Weight at slaughter, (kg)	35.9 ± 0.5	46.1 ± 0.5	40.8± 0.7	39.2 ± 0.6	46.8± 0.5
Age at slaughter, (days)	183.1± 5.5	184.2± 5.5	183.6±7.8	168.5±6.6	192.3±5.5
Empty body,(kg)[3]	32.9 ± 0.6	42.3 ± 0.6	37.0 ± 0.8	35.4 ± 0.7	42.4 ± 0.6
Hot carcass weight,(kg)	19.1 ± 0.3	24.5 ± 0.3	21.2 ± 0.4	20.3 ± 0.4	24.1 ± 0.3
Cold carcass weight,(kg)	19.0±0.3	24.4±0.3	21.0±0.4	20.1±0.4	24.0±0.3
Left side carcass (kg)	9.6 ± 0.2	12.2 ± 0.2	10.4 ± 0.3	10.3 ± 0.3	12.1 ± 0.2
Carcass length, (cm)	60 ± 0.8	61 ± 0.8	63 ± 1.1	63 ± 0.9	64 ± 0.8
Carcass length, (cm)	29 ± 0.4	28 ± 0.4	29 ± 0.6	28 ± 0.5	30 ± 0.4
Loin area,(cm^2)	7.6 ± 0.3	10.1 ± 0.3	8.3 ± 0.4	7.6 ± 0.3	10.1 ± 0.3

[1]Abbreviations of genetic groups and number of animals per group: BB, purebred Blackbelly, n = 10; CH, ½ Charollais: ½ BB o ½ PB, n =10; KT, ½ Katahdin: ½ BB, n =5; PB, purebred Pelibuey, n =7; SF, ½ Suffolk: ½ BB o ½ PB, n =10.

[2]For these variables, comparisons were not performed, as the animals were at slaughtered at different weights.

[3]Empty Body = Live body weight – gastroenteric content weight.

Table 2: Minimum Square Means (± SE) for Sheep Left-carcass and Primal Cuts Traits at 24 Hours Post-slaughter by Genetic Group

	Genetic group[1]					Differences estimated by contrasts[2]			
Variables	BB	CH	KT	PB	SF	C1	C2	C3	C4
Backfat tickness, (mm)	1.4±0.24	2.2±0.24	1.8±0.33	1.9± 0.28	2.1± 0.24	-1.0±1.5*	-0.2±0.4	-0.5±0.4	0.1±0.3
Carcass yield[4]	58.0±0.7	58.0±0.7	57.4±0.9	57.3±0.8	56.8±0.7	0.5±2	0.2±1	0.6±1	1.2±1
Left-side[3]	50.4±0.5	49.8±0.5	49.5±0.7	50.9±0.6	50.0±0.5	1.2±1.0	1.1±0.8	0.5±0.7	0.5±0.7
Front quarter[4]	54.7±0.8	53.1±0.8	51.9±1.1	54.2±0.9	53.1±0.8	2.8±1.6	2.6±1.2*	0.5±1.2	0.1±1.1
Hind quarter[4]	45.3±0.8	46.9±0.8	48.1±1.1	45.8±0.9	46.9±0.8	-2.8±1.6	-2.6±1.2*	-0.5±1.2	0.1±1.1
Front leg[4]	17.0±0.7	18.8±0.7	16.3±0.9	16.8±0.8	17.7±0.7	-2.7±1.4*	0.6±1.1	0.2±1.0	1.2±0.9
Bag Leg	24.3±0.5	23.7±0.5	25.0±0.7	23.2±0.6	25.0±0.5	1.1±1.0	1.2±0.8	1.1±0.8	1.3±0.7
Rib	25.7±0.9	28.7±0.9	27.4±1.3	28.8±1.1	26.6±0.9	-0.8±1.9	-0.2±1.5	-3.1±1.4*	2.1±1.3
Loin	20.7±0.6	22.2±0.6	23.0±0.8	22.1±0.7	21.5± 0.6	0.8±1.3	1.5±1.0	1.4±0.9	0.7±0.8
Neck	12.3±0.7	9.3±0.7	8.6±1.1	9.0±0.9	9.4±0.7	2.6±1.6	2.1±1.2	3.2±1.2*	0.2±1.1

NS, non significant

*, P< 0.05

[1] C1) BB+PB *vs* CH+SF; C2) BB+PB *vs* KT; C3) BB *vs* PB; C4) CH *vs* SF

[2] Abbreviations of genetic groups and number of animals per group: BB, purebred Blackbelly, n = 10; CH, ½ Charollais: ½ BB o ½ PB, n =10; KT, ½ Katahdin: ½ BB, n =5; PB, purebred Pelibuey, n = 7; SF, ½ Suffolk: ½ BB o ½ PB, n =10.

[3] As a percentage of the cold carcass weight.

[4] As a percentage of the average total left-half carcass.

As a percentage of total average weight average in the left-side carcass channel, there was difference ($P < 0.05$) in three out of five primal cuts. In front leg, at C1, figures were in favor of the wool group, while in ribs that occurred for the C3 among hair breeds. Pelibuey had greater percentage ($P < 0.05$) than Blackbelly, but the same contrast, in neck Blackbelly exceeded ($P < 0.05$) Pelibuey.

In the remaining primal cuts, which are the most economically important, the contrasts done did not find any difference. Regarding the tissue composition of primal cuts, front leg only showed significant differences in lean and fat tissues and in the C3 comparison (Table 3). Blackbelly had the leanest carcass ($P < 0.05$). This finding agrees with today's consumer goal, ie. to have much muscle and less fat in the meat. In this case, the Blackbelly breed showed an overall performance in which a slow growth rate results from a dominant muscle synthesis and a reduced fat deposition. In comparison, the Pelibuey breed showed a better performance, since by the same time it was at a physiologically advanced development stage of muscle and fat tissue.

Regarding the tissue composition of the back leg, one of the most commercially valuable cuts, only fat tissue showed significant difference ($P < 0.05$) in the C1 and C2 comparisons, from animals crossed with breeds specialized in meat production, such as Charollais + Suffolk and Katahdin, respectively (Table 3). There was no difference in muscle tissue because all groups had similar physiological development, but in fat tissue development significant difference were observed.

Table 3: Minimum Square Means (± SE) for Percentage Tissue Composition of Front Leg and Back Leg by Genetic Group

	Genetic group[1]					Differences estimated by contrasts[2]			
Variable	BB	CH	KT	PB	SF	C1	C2	C3	C4
Front leg[3]									
Lean	64.6 ± 1.2	60.5 ± 1.2	60.9 ± 1.7	59.5 ± 1.4	62.4 ± 1.2	1.3±2.5	1.2±1.9*	5.1±1.9	1.8±1.7
Fat	9.9 ± 1.1	12.2 ± 1.1	11.4 ± 1.6	13.3 ± 1.4	12.2 ± 1.1	- 1.2±2.4	0.2±1.8*	- 3.5±1.8	0.0±1.6
Bone	20.7 ± 0.9	21.4 ± 0.9	21.4 ± 1.2	21.4 ± 1.0	20.4 ± 0.9	0.2±1.8	0.4±1.4	0.7±1.4	1.0±1.2
Others	3.5 ± 0.6	4.4 ± 0.6	5.0 ± 0.9	4.4 ± 0.8	3.9 ± 0.6	0.4±1.4	1.1±1.0	0.9±1.0	0.5±0.9
Back leg[3]									
Lean	70.1 ± 1.5	66.2 ± 1.5	65.7 ± 2.2	67.7 ± 1.9	68.5 ± 1.5	3.0±3.3	3.1±2.5	2.4±2.4	- 2.3±2.2
Fat	6.5 ± 0.8	9.7 ± 0.8	9.9 ± 1.1	8.3 ± 1.0	8.8 ± 0.8	- 3.7±1.7*	- 2.6±1.3*	- 1.8 ±1.3	0.9±1.1
Bone	18.8±0.63	17.6±0.63	19.2±0.89	19.3±0.75	18.8±0.63	1.7±1.3	0.1±1.0	0.5±1.0	1.2±0.9
Others	3.5 ± 0.4	3.1 ± 0.4	4.0 ± 0.6	3.9 ± 0.5	3.1 ± 0.4	1.1±0.9	0.3±0.7	0.4±0.7	0.0±0.6

NS, non significant

*, P< 0.05

[1]Abbreviations of genetic groups and number of animals per group: BB, purebred Blackbelly, n = 10; CH, ½ Charollais: ½ BB o ½ PB, n =10; KT, ½ Katahdin: ½ BB, n =5; PB, purebred Pelibuey, n =7; SF, ½ Suffolk: ½ BB o ½ PB, n =10.

[2]C1) BB+PB *vs* CH+SF; C2) BB+PB *vs* KT; C3) BB *vs* PB; C4) CH *vs* SF.

[3]As a percentage of total front leg or back leg.

At the time of ending this study, the Blackbelly for its slow rate growth had still not started fat tissue infiltration; hence a low percentage on this cut was recorded. In contrast, the slightly faster development observed in mature weight (65%) of the Pelibuey breed compared to the other breeds, is a sign of a slower rate in the growth of lean tissue, but a steady fat growth rate. Finally, Charollais, Katahdin and Suffolk animals already showed infiltration of fat, but still paralleling the muscle development that would gradually increase. Average percentage of fat in the back leg was 8.6%, which was the lowest of all the cuts indicating a percentage of development lower than other cuts because their body does not ripens matures evenly.

There were no differences in Rib tissue composition for the four tissues compared (Table 4). In the C3 comparison, Blackbelly was superior to Pelibuey for lean tissue ($p < 0.05$), as occurred in the previous cut, but in the C1 comparison, wool breeds performed 6% better than hair breeds for fat tissue ($p < 0.05$). Moreover, also in the C3 comparison, Pelibuey had a significantly higher ($p<0.05$) fat content compared to Blackbelly. In the C1 comparison, haired breeds had significantly more bone percentage than wool breeds ($p<0.05$). Finally, for other tissue, in the C4 comparison a significant difference was detected in favor of Suffolk ($p < 0.05$).

For the Rib tissue proportion, wool breeds exhibited a better balance between muscle tissue, fat and bone than hair breeds. The percentage of bone tissue in Blackbelly exceeds the fat tissue proportion; this breed has a muscular rib, but a good bone percentage, pointing to a slow development and a smaller size, as indicated by the low percentage of fat and higher lean tissue percentage when compared to other breeds. Average fat tissue content of Rib (21.8%) indicates that this cut exhibits the highest physiological development. This is because body fat content, at the point where the mass or lean protein is higher (mature weight or length) always represents between 34 and 37% of the empty body in all cases examined [18]. The carcass weight is calculated by the sum of all primal cuts composition. In this case, the Rib is the cut closer to this percentage, so its development to a mature size is larger.

The loin, one of the most economically important cuts in the market, showed significant differences in lean and fat tissue in the C1, C3 and C3 comparisons, respectively. For lean tissue, in the C1 comparison, the values are higher for Charollais+Suffolk; in the C3 comparison, Blackbelly performed better ($p < 0.05$). In turn, for fat tissue, in the C3 comparison, Pelibuey outperformed Blackbelly ($p<0.05$). The lowest percentage of lean tissue and the higher fat tissue content of the Pelibuey breed denote a good productive potential and earlier maturation rate than the other breeds (Table 4).

Pelibuey group ADG was 0.23kg/d in 112 days of fattening and efficiency on weight gain (EWG) was 4.64, the second best of the participating groups, surpassed only by the Suffolk [19]. Pelibuey mature weight was 60 kg. At the time of slaughter, these animals were at 65% of their mature weight, hence they reached the fattening phase earlier than other groups [20].

Table 4: Minimum Square Means (± SE) for Percentage Tissue Composition of Rib and Loin by Genetic Group

	Genetic Groups[1]					Differences estimated by contrasts[2]			
Traits	BB	CH	KT	PB	SF	C1	C2	C3	C4
Rib[3]									
Lean	53.3±1.1	50.4±1.1	50.2±1.5	47.7±1.3	49.8±1.1	0.6±2.3	0.2±1.7	5.6±1.7*	0.6±1.5
Fat	16.9±1.4	24.3±1.4	24.0±1.9	22.7±1.6	21.3±1.4	-6.0±2.9*	-4.2±2.2	-5.8±2.1*	3.0±1.9
Bone	23.0±0.9	20.0±0.9	20.0±1.3	22.0±1.1	20.7±0.9	4.2±1.9*	2.5±1.4	1.1±1.4	-0.6±1.3
Others	4.9±0.7	3.7±0.7	4.3±1.0	5.5±0.8	6.2±0.7	0.5±1.4	0.9±1.1	-0.7±1.1	-2.5±1.0*
Loin[4]									
Lean	59.4±1.4	57.9±1.4	56.0±2.0	50.2±1.7	58.8±1.4	-7.1±3.0*	-1.2±2.3	9.1±2.2*	-0.9±2.0
Fat	15.7±1.3	19.4±1.3	19.9±1.9	24.0±1.6	16.2±1.3	4.1 ± 2.9	-0.0 ± 2.1	-8.2±2.1*	3.2±1.9
Bone	16.3±1.2	14.6±1.2	15.3±1.7	16.8±1.5	16.7±1.2	1.8 ± 2.6	1.2±2.0	0.5 ± 1.9	2.1±1.7
Others	7.7 ± 0.9	6.4±0.9	7.4±1.2	6.9±1.0	6.7±0.9	1.5 ± 1.8	0.1±1.4	-0.8±1.4	-0.3±1.2

NS, non significant

*, P< 0.05

[1] Abbreviations of genetic groups and number of animals per group: BB, purebred Blackbelly, n = 10; CH, ½ Charollais: ½ BB o ½ PB, n =10; KT, ½ Katahdin: ½ BB, n =5; PB, purebred Pelibuey, n =7; SF, ½ Suffolk: ½ BB o ½ PB, n =10.

[2] C1) BB+PB *vs* CH+SF; C2) BB+PB *vs* KT; C3) BB *vs* PB; C4) CH *vs* SF.

[3] As a percentage of total Rib.

[4] As a percentage of total loin.

Table 5: Minimum Square Means (± SE) for Percentage Tissue Composition of Neck and Left-side Carcass by Genetic Group

	Genetic group[1]					Differences estimated by contrasts[2]			
Traits	BB	CH	KT	PB	SF	C1	C2	C3	C4
Neck[3]									
Lean	54.7±1.8	54.6±1.8	55.0±2.5	53.0±2.1	56.6±1.8	3.4 ± 3.7	1.1 ± 2.9	1.7 ± 2.8	2.0 ± 2.5
Fat	13.7±1.8	18.0±1.8	20.9±2.6	16.3±2.2	14.6±1.8	-2.6 ± 3.8	-5.8 ± 2.9*	-2.7 ± 2.8	3.4 ± 2.6
Bone	22.1±1.7	16.4±1.7	15.7±2.4	19.2±2.0	17.5±1.7	7.4 ± 3.6*	5.0 ± 2.7	2.9 ± 2.6	-1.1 ± 2.4
Others	7.4±1.2	9.1±1.2	7.3±1.6	9.0±1.4	9.5±1.2	-2.1 ± 2.4	1.0 ± 1.9	-1.6 ± 1.8	-0.4 ± 1.6
Lrft-side Carcass[4]									
Lean	61.6±0.9	58.9±0.9	58.2±1.2	56.0±1.0	60.1±0.9	-1.4 ± 1.8	0.6 ± 1.4	5.7 ± 1.4*	-1.2 ± 1.2
Fat	12.8±0.9	17.6±0.9	17.6±1.2	18.1±1.0	15.2±0.9	-1.9 ± 1.8	-2.1 ± 1.4	-5.3 ± 1.3*	2.5 ± 1.2*
Bone	20.3±0.5	18.5±0.5	18.8±0.7	20.3±0.6	19.3±0.5	2.8 ± 1.1*	1.5 ± 0.8	0.0 ± 0.8	-0.8 ± 0.7
Others	5.3±0.4	4.9±0.4	5.4±0.5	5.6±0.4	5.5±0.4	0.5 ± 0.8	0.0 ± 0.6	-0.3 ± 0.6	-0.6 ± 0.5

NS, non significant

*, P< 0.05

[1]Abbreviations of genetic groups and number of animals per group: BB, purebred Blackbelly, n = 10; CH, ½ Charollais: ½ BB o ½ PB, n =10; KT, ½ Katahdin: ½ BB, n =5; PB, purebred Pelibuey, n =7; SF, ½ Suffolk: ½ BB o ½ PB, n =10.

[2]C1) BB+PB *vs* CH+SF; C2) BB+PB *vs* KT; C3) BB *vs* PB; C4) CH *vs* SF.

[3]As a percentage of total neck.

[4]As a percentage of total carcass

In the C1 comparison for lean tissue, the Charollais + Suffolk group performed better than the Blackbelly + Pelibuey group (p <0.05) versus, highlighting its specialization for meat production. The remaining tissue percentages were similar between these groups. In heavy breeds such as Charollais, Katahdin or Suffolk, when mature weight is high or is increasing in the parents of fat lambs, at conventional slaughter weights, the efficiency of lean tissue production increases, with a reduced fat and bone content, which is a desirable condition [20].

Finally, in the primal cut neck in adipose tissue and bone there were differences only in the C2 and C1 contrasts, respectively (Table 5). In C2, Katahdin had a significantly better performance than the Blackbelly + Pelibuey group (p <0.05). The Katahdin breed also had the highest fat percentage indicating that the cut was in a fatness stage at the time of slaughter. Considering its 16.7% overall average fat percentage, this was the third cut with greater maturity. In the C1 contrast, haired breeds had greater bone tissue content than wool breeds (p <0.05). The totals of tissue composition of the carcass for lean tissue, fat, bone and others were 59, 16.3, 19.4 and 5.3%, respectively (Table 5). Given the 16.3% fat percentage, it can be estimated that, in average, there was a 46% development of the total mature growth, which corresponds to a 35.5% body fat average. Contrasts comparisons found difference in the first three tissues: for lean tissue in the C3 contrast, the Blackbelly group performed better than the Pelibuey group (p <0.05). For fat tissue in the C3 contrast, the Pelibuey group had a significant difference compared to the Blackbelly group (p <0.05); and in the C4 contrast, the Charollais group outperformed the Suffolk group (p <0.05) in Suffolk. Finally, for bone tissue content, in the C1 contrast, haired breeds had more bone than wool breeds (p <0.05). The traits shown in the results could be considered as specific traits for each group, given their particular genetic pool.

CONCLUSIONS

Lamb genetic groups considered in this study showed similar performance in their carcass traits, with an average backfat thickness of 1.9 mm. As a percentage of carcass weight, there was no breed effect for the two main primal cuts, while in backfat thickness wool breeds performed better than hair breeds. Tissue composition of haired breeds (ie. Blackbelly) had a higher proportion of lean tissue that Pelibuey. For wool breeds, fat content was higher than in Charollais and Suffolk. The use of specialized paternal sheep breeds for meat production crossed with maternal hair breeds improves carcass traits of size, shape and tissue balance.

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