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Slaughter and Carcass Characteristics of Honamlı and Honamlı x Hair (F_1) Goat Male Kids Reared under Extensive Conditions

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Summary: The aim of study was to comparatively investigate slaughter and carcass characteristics of Honamlı and Honamlı x Hair crosbreeds reared under extensive conditions. Seven Honamlı and Honamlı x Hair crossbreed kids at 30-35kg pre-slaughter weight were firstly separated from their herds for determination of slaughter and carcass traits. Dressing percentages based on slaughter weight and empty body weight were detected as 45.51% and 53.21% for Honamlı kids. Almost the same values, 44.31% and 52.20%, were also determined for Honamlı x Hair crossbreed kids. M. longissimus dorsi (MLD) areas were defined as 14.10 cm^2 and 12.88 cm^2 for Ho and Ho x H, respectively and also a significant difference was found between genotypes ($P<0.05$). The differences among genotypes for the percentages of the parts which had an economical importance, were not found significant in the current study ($P>0.05$). As a result, the genetic potential of Honamlı goat related to high dressing percentages and MLD area might be reflected by rearing in more suitable management conditions.

Key words: Carcass, Honamlı, kid, slaughter

Ekstansif Şartlarda Yetiştirilen Honamlı ve Honamlı x Kıl Keçisi Melezi (F_1) Oğlakların Kesim ve Karkas Özellikleri

Özet: Bu araştırmanın amacı ekstansif koşullarda yetiştirilen Honamlı ve Honamlı x Kıl Keçisi melezi oğlakların kesim ve karkas özelliklerinin karşılaştırılmalı olarak incelenmesidir. Kesim ve karkas özelliklerinin belirlenmesi için 30-35 kg arasında canlı ağırlığa en önce ulaşan Honamlı ve Honamlı x Kıl keçisi melezi 7'şer adet oğlak bulundukları sürülerden alınmıştır. Honamlı oğlaklarının kesim öncesi canlı ağırlık ve boş vücut ağırlıklarına göre karkas randımanı değerleri sırasıyla %45.51 ve %53.21 olarak belirlenmiştir. Aynı değerler Honamlı x Kıl keçisi melezi oğlaklar için ise sırasıyla %44.31 ve %52.20 olarak bulunmuştur. M. longissimus dorsi kesit alanları Honamlı oğlakları ve melez oğlaklar için sırasıyla 14.10 cm^2 ve 12.88 cm^2 olarak tespit edilmiş ve iki genotip arasında istatistiksel olarak önemli bir fark bulunmuştur ($P<0.05$). Çalışmada ekonomik değeri yüksek olan karkas parçalarının ağırlık ve oranları açısından genotipler arasındaki fark istatistiksel olarak önemli bulunmamıştır ($P>0.05$). Sonuç olarak uygun bakım ve besleme koşullarının sağlanmasıyla Honamlı oğlaklarının yüksek karkas randımanı ve MLD alanı açısından sahip oldukları genetik üstünlükleri daha belirgin şekilde ortaya çıkabilir.

Anahtar kelimeler: Honamlı, karkas, kesim, oğlak

Introduction

Goats the first domesticated farm animals are able to provide better products through their low metabolic requirements, high digetion

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activity and the ability of reduce metabolism despite living in adverse environmental conditions (14,30). So especially adopted goat breeds in a certain area are so important for the local people (3). Turkey was the one of important country on goat breeding in Europe, but especially there were a rapid decline the number of goats in the last 20 years. Much of the decline has resulted from some reasons such as social and economical problems in rural areas, migrations to urban areas, lack of cooperation between breeders, young people's reluctance to goat breeding, lack of sufficient demand for goat products, difficulties in finding shepherds (19,23).

The goat population in Turkey, about 10.4 million (4), is composed mostly of the Hair goat (Anatolian Black) spreading among all the regions but concentreated in especially in Mediterranean, South-East Anatolia and South-West Anatolia regions. Hair goats have generally a middle-sized body, but remarkable differences in body size are also seen. Their breeding purpose is mainly meat and milk. They are well adapted to all climate and rangeland conditions of Turkey. However they are able to utilize land covered with heath and scrubs (21). On the other hand, Angora goat, Malta, Kilis, Abaza, Damascus and Georgian goats are the other native breeds of Turkey (1). In addition to this, Honamlı goat was defined as a new breed and under protection with the notification of Repuclic of Turkey Ministry of Food Agriculture and Livestock (41). The pure breed Honamlı goats that are being breed in the Antalya region have white or brown foreheads and legs and the body is black. Sometimes grey spotting occurs (18).

Sale of kids is primary income for goat breeders especially, in traditional breeding systems (42). Specific consumption patterns and preferences for goat meat are dictated by cultural and traditional backgrounds and the socio-economic status of the community (11). Goat meat is thought to be a good alternative for those consumers who look for a healthy protein of high biological value (43) and especially young goats could be suitable for low-fat, low-calorie diets because of having low intramuscular and subcutaneous fat content (38).

The goat meat consumption has began to increase especially the last 20 year in the world-wide (32). However the importance of goat as a meat-production animal is increasing as its meat becoming accepted in many new markets (33).

The aim of the present study was to compare slaughter and carcass characteristics of Honamlı (Ho) and Honamlı x Hair crosbreeds (Ho x H).

Material and Methods

The study was carried out in Burdur (latitude 36º53′ and 37º50′ N, longitude 29º24′ and 30º53′ E) and Antalya (latitude 36º07′ and 37º29′ N, longitude 29º20′ and 32º35′ E). In the region, summers are hot and dry, winters are mild and rainy, expressed as climate type. In additional to this, Cold semi-land climate is also observed in the internal part. The macques areas are dominants 500-600 m from the coast as the charasteristis of vegetation (5,6). The experimental goats were of purebred Honamlı male kids and the crossbreds at F_1 level of Honamlı x Hair male kids. In herds, kids were kept with their mothers during suckling period at morning and night until 90th day of age. Then does and kids were begun to grazing together in the rangelands. Seven kids reached the 30-35 kg pre-slaughter liveweight firstly were separated from their herds for Ho and Ho x H for determination of slaughter and carcass traits at average 188th day of age and 209th day of age, respectively. Kids were purchased from the breeders and transfered to a commercial slaughterhouse applied the standart slaughter

procedure in Burdur province. On the day of slaughter, pre-slaughter liveweights were recorded after deprived of food (for 12 h) but free access to water. Non-carcass components (head, skin, feet, lungs and trachea, liver, heart, spleen) were recorded and then hot carcass weight of each kid was determined. The gastro-intestinal tract was weight when it is full and empty. Thus empty body weight (EBW) was also calculated. Dressing percentage was detected based on full liveweight and EBW. The carcasses were then chilled at 4°C for 24 h. At the end of this period, the cold carcass weights were detected.

Some carcass measurements such as carcass length, leg length, buttock width were defined as described by Fisher and De Boer (20) on the hanging carcass. Testes, kidney, kidney and pelvic fat and tail were excluded and weighed. After splitting the chilled carcasses along the vertebral column, the left side was divided into five primal cuts (neck, flank, ribs, shoulder and long leg) described by Colomer-Rocher et al. (12) and weighed. Fat thickness over the leg, loin, rack, and shoulder) 12th rib was detected using digital plot. The surface area of the MLD was obtained with a new procedure which was applied in this study in the first time. In this procedure, the surface area of MLD traced onto acetate papers and then tranfered to computers by scanning. The Autocad software program (8) was used to calculate MLD area.

Study has been approved by Suleyman Demirel University Local Ethical Committee on Animal expirements (23.02.2012, meeting number: 06, resolution number: 07).

Statistical Analysis

Minitab (34) statistical programme was used in order to examine slaughter and carcass traits. Student-T test was employed the defined differences between Honamlı and Honamlı x Hair goats.

Results

Slaughter and carcass characteristics of the Honamlı (Ho) and Honamlı x Hair (Ho x H) male kids were presented in Table 1. The differences among genotypes which were at similar pre-slaughter weight were significant ($P<0.001$). Dressing percentages based on slaughter weight and empty body weight were detected as 45.51% and 53.21% for Ho kids. The same values were also determined 44.31% and 52.20% for Ho x H kids.

Honamlı kids had higher values than crossbreds and significant differences were found between genotypes. The higher values for chilling losses of kids were found at Honamlı kids (2.70%) than Ho x H kids (1.87%) which were seen in Table 2. Lower back fat thickness and compactness values for Ho kids (0.59 mm and 218.93 g/cm) than Ho x H kids (0.75 mm and 238.12 g/cm) might be related to higher chilling losses for Ho kids. M. Longissimus dorsi area providing information about the amount of meat in the carcass values were defined as 14.10 cm^2 and 12.88 cm^2 for Ho and Ho x H, respectively and also the significant difference found between genotypes ($P< 0.05$). Some carcass measurements such as carcass length, leg length and buttock width were determined 75.93 cm, 26.71 cm and 17.21 cm for Ho kids and 73.40 cm, 28.21 cm and 17.12 cm for Ho x H kids.

The percentages of the valuable parts and non-carcass companents were presented in Table 3. There were significant differences between genotypes for the percentages of feet, spleen and internal fat ($P<0.05$-0.01). The non-significant differences among genotypes for the percentages of shoulder, long leg and ribs, the parts which had an economical importance, found in the current study ($P>0.05$).

Table 1. Certain slaughter and carcass characteristics of Honamlı (Ho) and Honamlı x Hair (Ho x H) kids ($\bar{x}\pm s_{\bar{x}}$)

Traits	Ho (n=7)	CV%	Ho x H (n=7)	CV%	P
Age at slaughter (day)	187.57±0.92	2.65	208.14±0.97	3.25	0.001**
Slaughter weight (kg)	33.28±0.55	4.39	34.25±0.56	4.11	0.224^{ns}
Empty body weight (kg)	28.45 ±0.47	4.68	29.06 ±0.48	5.23	0.046*
Hot carcass weight (kg)	15.14 ± 0.29	5.44	15.18 ±0.41	4.48	0.057^{ns}
Dressing percentage-1^{DP1}, %	45.51±0.47	2.93	44.31±0.98	3.59	0.081^{ns}
Dressing percentage-1^{DP2}, %	53.21±0.69	3.47	52.20±0.65	4.34	0.993^{ns}
Head weight (g)	2043.08±54.01	6.96	2171.01±70.32	7.20	0.173^{ns}
4 Feet weight (g)	1191.40 ±19.10	8.32	1055.72 ±24.11	7.37	0.001**
Skin weight (g)	3360.07±125.23	9.85	3589.12±100.85	10.11	0.182^{ns}
Lungs and trachea weight (g)	451.42 ±21.90	11.23	525.74 ±16.29	9.87	0.017*
Heart weight (g)	168.67±12.80	12.56	174.32±5.71	10.73	0.683^{ns}
Liver weight (g)	625.77 ±21.10	5.13	725.73 ±27.90	6.41	0.010*
Spleen weight (g)	45.71 ±3.79	16.12	68.60 ±5.91	15.43	0.008**
Full stomach weight (g)	4830.21 ±118.56	4.89	5581.71±255.23	5.29	0.003**
Empty stomach weight (g)	1297.54 ±66.42	7.12	1485.71 ±33.12	8.27	0.034*
Full intestine weight (g)	2914.90±81.10	3.93	2577.84±132.11	5.40	0.162^{ns}
Empty intestine weight (g)	1383.32±60.12	4.51	1603.65±131.26	5.29	0.166^{ns}
Internal fat weight (g)	45.71 ±5.79	16.45	88.62 ±7.65	15.95	0.001**
Testes weight (g)	251.40±13.32	13.67	248.54±12.24	14.12	0.985^{ns}

*: $P < 0.05$, **: $P < 0.01$, ***: $P < 0.001$. ^{ns}: nonsignificant ($P > 0.05$). CV: Coefficient of variance

^{DP1}: Dressing percentage based on slaughter weight. ^{DP2}: Dressing percentage based on empty body weight.

Table 2. Certain cold carcass characteristics of Honamlı (Ho) and Honamlı x Hair (Ho x H) kids ($\bar{x}\pm s_{\bar{x}}$)

Traits	Ho (n=7)	CV%	Ho x H (n=7)	CV%	P
Cold carcass weight (kg)	14.78±0.30	5.76	14.91±0.40	4.86	0.062^{ns}
Chilling loss (%)	2.70±0.18	12.45	1.87±0.05	10.98	0.003**
Dressing percentage-1^{DP1}, %	44.42±0.47	3.02	44.03±0.68	4.23	0.056^{ns}
Dressing percentage-1^{DP2}, %	51.95±0.70	3.06	51.27±0.62	5.10	0.656^{ns}
Left half of carcass weight (kg)	7.02±0.17	6.19	7.53±0.23	5.81	0.105^{ns}
Shoulder weight (g)	1506±39.21	6.45	1594±60.02	6.83	0.246^{ns}
Flank weight (g)	720.78±37.43	5.45	857.00±57.22	7.11	0.071^{ns}
Neck weight (g)	811.05±45.90	7.75	806.19±43.12	8.32	0.946^{ns}
Ribs weight (g)	1675.11±52.10	6.58	1806.56±62.41	7.39	0.135^{ns}
Sirloin weight (g)	1144.39±28.20	5.48	1215.03±46.64	6.27	0.222^{ns}
Loin weight (g)	525.07±36.79	4.69	590.71±21.52	5.70	0.147^{ns}
Long leg weight (g)	2268.18±47.20	5.31	2346.22±64.19	7.46	0.342^{ns}
Tail weight (g)	27.14±1.16	4.22	30.00±2.22	6.31	0.276^{ns}
Kidney weight (g)	50.36±3.14	8.78	53.93±2.08	5.23	0.354^{ns}
Kidney and pelvic fat weight (g)	24.29±1.46	17.75	35.00±2.81	15.69	0.010*
Back fat thickness (mm)	0.59±0.07	10.57	0.75±0.04	11.01	0.067^{ns}
M. Longissimus dorsi area (cm^2)	14.10±0.29	9.32	12.88±0.22	8.73	0.018*
Carcass length (cm)	75.93±0.90	7.94	73.40±0.83	8.37	0.064^{ns}
Leg length (cm)	26.71±0.36	8.51	28.21±0.74	6.20	0.105^{ns}
Buttock width (cm)	17.21±0.26	6.67	17.12±0.29	4.93	0.831^{ns}
Carcass compactness (g/cm)	218.93±3.70	7.45	238.12±6.71	6.47	0.034*

*: $P < 0.05$, **: $P < 0.01$, ***: $P < 0.001$. ^{ns}: nonsignificant ($P > 0.05$). CV: Coefficient of variance

^{DP1}: Dressing percentage based on slaughter weight. ^{DP2}: Dressing percentage based on empty body weight.

Table 2. Certain cold carcass characteristics of Honamlı (Ho) and Honamlı x Hair (Ho x H) kids ($\bar{x}\pm s_{\bar{x}}$)

Traits	Ho (n=7)	CV%	Ho x H (n=7)	CV%	P
Percentages (%) relative to cold carcass weight					
Shoulder	21.44±0.21	7.25	21.16±0.40	8.30	0.540^{ns}
Flank	10.25±0.42	9.21	11.36±0.56	7.41	0.142^{ns}
Neck	11.51±0.47	8.43	10.71±0.45	8.86	0.245^{ns}
Ribs	23.84±0.37	7.75	24.10±1.12	6.43	0.821^{ns}
Sirloin	16.31±0.34	6.89	16.23±0.78	7.34	0.921^{ns}
Loin	7.44±0.39	7.20	7.87±0.30	7.46	0.402^{ns}
Long Leg	32.33±0.51	5.45	31.18±0.34	8.23	0.090^{ns}
Tail	0.38±0.01	6.12	0.39±0.02	7.67	0.751^{ns}
Kidney	0.71±0.04	7.88	0.70±0.02	6.97	0.994^{ns}
Kidney and Pelvic Fat	0.34 ±0.02	10.21	0.46 ±0.03	9.59	0.023*
Percentages (%) relative to empty body weight					
Head	7.67±0.12	7.58	7.48±0.29	7.36	0.569^{ns}
4 Feet	4.35 ±0.16	6.85	3.68 ±0.05	8.45	0.004**
Skin	10.62±0.43	9.63	10.38±0.23	10.21	0.639^{ns}
Lungs and Trachea	1.22±0.07	8.58	1.81±0.08	9.12	0.427^{ns}
Heart	0.64±0.03	10.52	0.58±0.01	11.73	0.178^{ns}
Liver	2.36±0.04	6.20	2.51±0.09	7.10	0.202^{ns}
Spleen	0.17 ±0.01	10.94	0.24 ±0.02	11.29	0.046*
Internal Fat	0.17 ±0.02	9.78	0.32 ±0.03	8.43	0.001**

*: $P < 0.05$, **: $P < 0.01$. ^{ns}: nonsignificant ($P > 0.05$). CV: Coefficient of variance

Discussion

In the present study, dressing percentages defined as 45.51% for Ho and 44.31% for Ho x H (based on slaughter weight) were lower than Koyuncu et al. (31) and Kebede et al. (27). On the other hand, Pena et al. (37), Yilmaz et al. (44), Özcan et al. (36) and Kor et al. (28) reported lower values than the present study. However, Dhanda et al. (16), Daskiran et al. (13) and Ekiz et al. (17) reported similar results with the current research. Cameron et al. (10), Kadim et al. (26) and Yilmaz et al. (45) did not found significant effects between different genotypes for dressing percentages in agreement of the current study. In contrast to this, a significant effect of genotype on dressing percentage reported by some authors (15,24,29,36). Diffrences on dressing percentages between genotypes were also associated with differences of gastro-intestinal tract content in breeds by some researches (15, 26). Therefore, dressing percentages were detected according to slaughter weight and empty body weight for preventing the effect of gastro-intestinal tract content in the present study. Management and feeding were one of the factors affecting dressing percentages. this study was conducted on extensive conditions, the fattening performances of the kids were not determined. Aktaş et al (2), detected the fattening performance of Honamlı and Hair male kids at similar slaughter weights and also calculated higher dressing percentages than the present study. Therefore, it was thought that dressing percentages would be higher with better management systems.

The back fat thickness values (0.59 mm and 0.75 mm) determined in the current study was higher than Özcan et al. (36), Yilmaz et al. (45) and Koşum et al. (29) reports. In contry to this, Koyuncu et al. (31) and Dhanda et al. (15) found higher back fat thickness than the present study. Lower carcass compactness and back fat thickness values for Ho kids than Ho x H kids might be related to higher chilling losses. In the present study, there was significant difference between genotypes for MLD area (14.10 cm^2 and 12.88 cm^2). Similarly, Kadim et al. (26), Koşum et al. (29) and Oman et al. (35) reported significant genotype effects on MLD area. Besides, Dhanda et al. (16), reported MLD area as 12.1 cm^2 for kids which have 30-35 kg pre-slaughter liveweight like the present study. Gökdal et al. (22), reported lower MLD area values (10.5 cm^2 and 11.5 cm^2) for Alpin x Hair and Saanen x Hair having the near pre-slaughter liveweight than the present study. Other that, The differences among Ho and Ho x H kids in terms of carcass parts weights and percentages were not significant ($P>0.05$) in the present study. Similarly, Cameron et al. (10), Dhanda et al. (16), Özcan et al. (36) and Yilmaz et al. (45) reported non-significant genotype effects on the percentages of carcass parts. However, higher percentages of these parts reported by some authors (9,13,29,37). Differences for the percentages of carcass parts might be related with the factors such as breed, slaughter weight and slaughter age (22,31,37,39).

The carcass length value as an indicator of the carcass size for Ho is agreement with the results reported by Gök et al for Honamlı kids. The same values for Honamlı x Hair crossbred kids is higher than the some reports in different studies concerning Hair goat kids (40,45). In this study, non-significant differences for the percentages of non-carcass components except feet and spleen were in agreement with the studies conducted by some authors (25,29,39). On the other hand, the differences of skin percentages than the other studies might be associated the hair production of Ho and Ho x H crossbred kids.

In the present study, the significant differences found for internal fat weight and percentages between genotypes ($P<0.01$) and also these values were lower some reports (7,9,13,28). It is

though that this situation is might be related to extensive condition with inadequate care and management.

The present study showed that Honamlı kids had higher dressing percentages and MLD area than Honamlı x Hair crossbred kids. In additon to this, the back fat thickness and carcass compactness were lower in Honamlı kids. Any significant differences were not found between genotypes for the valuable carcass parts.

The present study is the first on comperative investigation of slaughter and carcass characteristics of Honamlı kids with other genotype. As seen in the present study; the breeders had began to use Honamlı for meat production at crossbreding. However, there is a need further researches related to the backcrossing of Honamlı and Hair goat rather than F_1. Planning and regulating right crossbreding systems might be used in Teke Region for becoming a meat goat production center. The genetic potential of Honamlı goat related to high dressing percentages and also MLD area might be detected by reared more suitable management conditions. The studies about fattening performances of Honamlı goat should be applied. In this way, goat meat production and also consumption might be in Teke Region of Turkey.

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