

Evaluation of Carcass Yield Characteristic of Sheep and Goat at ELFORA Export Abattoir, Bishoftu town, Ethiopia

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Abstract: Ninety sheep and ninety goats underwent this study to investigate the effect of breed and age on live weight, carcass weight and dressing percentage of small ruminants commonly slaughtered for exporting meat. The average live weight and hot carcass weight of yearling sheep breeds ranged between 18.37-19.77, 8.12-8.79 kg respectively and for adult 20.2-20.67, 9.9-9.36 Kg respectively. For the yearling goat breeds the live weight and carcass weight ranged between 18.67-19, 8.25-8.39 Kg respectively but for the adult goat breeds it ranged between 19a.61-20.28 and 8.74-9.17Kg respectively. The dressing percentage ranged between 43.94-44.49 % for yearling sheep, whereas for adult sheep of ranged between 44.46-45.26 % respectively. The dressing percentage for yearling goats ranged between 43.46-44.49 %, whereas it adult ranged between 44.54-45.21 % respectively. No significant difference was observed among the parameters considered within and between breeds group and age groups.

Key words: Age Breed • Dressing Percentage • Goat • Hot Carcass Weight • Live Weight • Sheep

INTRODUCTION

Small ruminants are important domestic animals in the tropical animal production system [1]. Within African society, small ruminants comprise a greater proportion of the total wealth of the poor families, because of low input requirements such as small initial capital, fewer resource and maintenance cost. They are also able to produce milk and meat in readily usable quantities using marginal lands and poor pasture and crop-residual [2, 3]. They are also contributing in providing export commodities, such as live animal, meat and skins to earn foreign exchange to the country [4].

Africa has a population of 205 million sheep and 174 million goats representing approximately 17% and 31% of the world populations, respectively [5]. Their distribution within Africa varies widely. Sheep and goats produce only about 16% of the world's meat, despite their higher contribution to the total world livestock population [6].

Ethiopia owns huge numbers of small ruminants, estimated to be 20.73 million sheep and 16.36 million goats [7]. They are important components of the livestock population and contribute significantly to the economy and food supply of the poorest sector of the society.

They are also important sources of export earnings, especially through the export of live animals, meat and skins [8].

Sheep and goats cover more than 30% of all domestic meat consumption and generate cash income from export of meat, edible organs, live animals and skins [9].

Sheep and goats production in Ethiopia is primarily for meat. While some communities use sheep and goats for milk production [10]. At present, annual per capital consumption of milk and meat in Ethiopia is estimated to be 16 kg and 10 kg respectively. This ranks Ethiopia, as having the lowest consumption of meat and milk, even among neighboring countries, although, it has Africa's largest national herd size [11].

In general, the socio-economic importance of sheep and goats is widely recognized; they are valuable source of meat, milk, skins and immediate source of cash income. Meat production from these animals is important because they are suitable for family consumption owing to their comparative small size [12]. Even though, Ethiopia has the largest population of sheep and goats, the productivity level of sheep and goats is very low. The carcass yield per animals slaughtered is estimated to be 10 kg sheep and 8 kg goat [11]. The carcass yield is lower when compared

with the average carcass weight of sheep in the neighboring countries with values of 13, 13, 12 and 13 kg in Sudan, Somalia, Djibouti and Kenya, respectively [11]. This might be due to the effect to breed or age of animals at slaughters.

Much of the sheep and goats research for meat production is largely focused on carcass yield and quality as defined in developed countries and tends not to be concerned with the non-carcass components. With regard to nutritive value, research has shown that the non-carcass items are comparable or even superior to the carcass components [13]. Thus, it can be said that much of the research on meat or meat production has ignored an important components of traditional meat consumption [14]. The same source reported that the yield of carcass and non carcass components was affected by breed, sex and age. In Ethiopia, most sheep and goats are slaughtered at one year of their age with average weight of 16-20 kg and the carcass weight of various breeds of sheep and goats [15].

The primary unit of small ruminants' meat is the carcass [16]. Information on carcass yield is useful in comparing and determining the actual and potential performance of meat animals. During the evaluating and comparing carcass traits of sheep and goats, many factors that can affect growth and carcass traits such as genetic, sex, nutrition, season and other related factor should be considered [17].

The majority of Ethiopia's sheep and goats are indigenous breeds and the distribution and density of sheep and goat population varies according to farming system, ecological and administrative, carcass weight and dressing percentage of the indigenous breeds and had not been studied extensively.

Therefore, the objective of this study was to evaluate the effect of breed and age on live weight, carcass weight and dressing percentage of sheep and goats commonly slaughtered at ELFORA export abattoir.

MATERIALS AND METHODS

Study Area: The study was conducted at ELFORA export abattoir, Bishoftu town, from November to April. The abattoir is a privately owned export oriented abattoir, exporting mutton, goat meat and edible organs like liver, kidneys and heart of sheep and goats to Middle East countries. The abattoir is found in the town, Bishoftu town, which is located at 9°N and 40°E with an altitude of 1880m above sea level in the central highlands of Ethiopia at 47 km South East of Addis Ababa. It has annual rain fall

of 1151.6mm of which 84% falling down during the long rain season that extends from June to September and the remaining during the short rain season that extends from March to May. The mean annual minimum and maximum temperatures are 18.5°C and 30.7°C respectively and the mean relative humidity is 61.3% [18]. The abattoir slaughters as many animals as possible per day with few number of meat inspectors assigned by the Ministry of Agriculture and Rural Development (MOARD).

Study Animals: The animals were only males with varies breeds, ages originated from different parts of the country such as Arsi, Afar, East Shoa, Wello, Borena and Hararge. But the breeds of the animals were mainly Afar, Borena and East Shoa and were classified as yearling and adult. Age was determined by dentition, animals with milk teeth were grouped as yearling, whereas animals with at least one pair of permanent teeth were classed as adult. The study animals are identified by a number. They were transported to the abattoirs using vehicles such as ISUZU, Lorry and/or trekking. A total of 90 sheep and 90 goats were used for this study. Feed and water were withheld for 12-18 hours prior to slaughter. Live weight was taken immediately before slaughter. Each animal was recorded according to their breed and age.

Study Methodology

Measurements: Body weight (live weight) was taken prior to slaughter and after the animals were fasted for 12-18 hours. Carcass weight or hot carcass weight was taken after the animals were bled, skinned, dressed and eviscerated.

Slaughter Procedures: After, all sheep and goats were fasted for 12-18 hours; animals were weighed and slaughtered for determination of carcass characteristics. The procedure was done by severing the jugular vein and the carotid artery with knife. The blood was drained in to the ground. The sums of all edible and non-edible offal's were obtained by subtracting hot carcass weight from live weight or animals prior to slaughter. The weight of hot carcass was measured after all offal's were properly removed from the carcass. The dressing percentage was based on hot carcass weight and live weight after animals fasted.

Data Analysis: Data was subjected to general linear modes (GLM) procedure of the CSA, [19] using a fixed model with genotype and age, interaction as the independent variables and carcass characteristics as

dependent variables. The effect is tested against the error mean squares [20]. Analysis of variance was conducted to determine the effect of breed and age on carcass yield and dressing percentage of sheep and goats.

RESULTS

Average live weight, hot carcass weight and dressing percentage were determined for Afar, Borena and East Shoa sheep breeds of both age groups (yearling and adult) (Table 1). There was no significant difference in average live weight, carcass weight and dressing percentage between breeds of sheep within similar age group. However, adult sheep had higher live weight, hot carcass weight and dressing percentage than yearlings. The non significant difference in hot carcass weight and dressing percentage of breeds of sheep within same age group might be attributed to the purchasing policy of the abattoir, where the abattoir purchases almost entirely animals that are not weighing more than 20-22 kg live weight.

This level of live weight produces a carcass with higher proportion of lean meat for which a premium price is being paid by the consumers, whereas live weight higher than 22 kg was found to produce fatter carcass, which was less accepted by the consumers.

The dressing percentage ranged between 43.94-44.49% for yearling sheep breeds and 44.46-45.26% for adult sheep breeds which was almost similar between breeds of sheep and age groups. The similarity in dressing percentage between sheep breeds and age groups reflected that the non-carcass components were proportionally similar among and between breed and age groups.

The average live weight, hot carcass weight and dressing percentage were determined for Afar, Borena and East Shoa goats breeds of both age groups (yearling and adult) (Table 2). There was no significant difference in average live weight, carcass weight and dressing percentage between breeds of goat within similar age group. However, adult goat had higher live weight, hot carcass weight and dressing percentage than yearlings. The non significant difference in hot carcass weight and dressing percentage of breeds of goat within same age group might be attributed to the purchasing policy of the abattoir, where the abattoir purchases almost entirely animals that are not weighing more than 20-22 kg live weight. This level of live weight produces a carcass with higher proportion of lean meat for which a premium price is being paid by the consumers, whereas live weight higher than 22 kg was found to produce fatter carcass, which was less accepted by the consumers.

The dressing percentage ranged between 43.46-44.68% for yearling goat breeds and 44.54-45.21% for adult goat breeds which was almost similar between breeds of goat and age groups. The similarity in dressing percentage between goat breeds and age groups reflected that the non-carcass components were proportionally similar among and between breed and age groups.

DISCUSSION

Carcass represents the remaining parts after the animal has been slaughtered and bled out, without skin, feet, head internal organs, digestive tracts, udder and sexual organs [21]. Information on carcass yield is useful in comparing and determining the actual and potential performance of meat animals. During evaluating and

Table 1: Variation in live weight, carcass weight and dressing percentage of different sheep breeds and ages. (Mean \pm SD)

Variation	Yearling			Adult		
	Afar	Borena	East Shoa	Afar	Borena	East Shoa
Live weight (kg)	18.37 \pm 2.26	18.93 \pm 2.37	19.77 \pm 2.06	20.2 \pm 2.04	20.28 \pm 2.41	20.67 \pm 2.32
HCW (kg)	8.12 \pm 1.121	8.31 \pm 1.041	8.79 \pm 0.936	9 \pm 1.119	9.15 \pm 1.168	9.36 \pm 1.105
Dressing percentage (%)	44.03 \pm 1.271	43.94 \pm 1.38	44.49 \pm 1.568	44.46 \pm 1.515	45.11 \pm 1.556	45.26 \pm 1.603

HCW=Hot Carcass Weight

Table 2: Variation in live weight, carcass weight and dressing percentage of different goat breeds and ages. (Mean \pm SD)

Variation	Yearling			Adult		
	Afar	Borena	East Shoa	Afar	Borena	East Shoa
Live weight (kg)	19.37 \pm 1.69	18.67 \pm 2.55	18.97 \pm 2.02	19.61 \pm 1.49	20.28 \pm 2.44	19.8 \pm 2.04
HCW (kg)	8.25 \pm 0.739	8.34 \pm 1.153	8.39 \pm 1.018	8.74 \pm 0.785	9.17 \pm 1.069	8.91 \pm 0.916
Dressing percentage (%)	43.46 \pm 1.408	44.68 \pm 1.508	44.17 \pm 1.408	44.54 \pm 1.347	45.21 \pm 1.122	45.2 \pm 1.207

comparing carcass traits of sheep and goats, many factor that can affect growth and carcass traits like genetic, sex and age and also other factor should be considered [17]. Dressing percentage is an important trait in carcass merit considerations [22]. Dressing percentage is the ration of dressed carcass weight to the live weight of the animal. Carcass dressing percentage is affected by breed, age, sex, nutrition and environment condition [23-25].

The results of hot carcass weight in the current study were 8.12, 8.31 and 8.79 kg for yearling Afar, Borena and East Shoa breeds of sheep, respectively and 9, 9.15 and 9.36 kg for adult Afar, Borena and East Shoa breeds of sheep, respectively. The observed results of this study were comparable with the results reported by Tesfay [26] for Afar rams which varied from 5.6-9.4 kg per head. In addition to this, the result of this study is nearly comparable with results of FAO [11] for tropical sheep with average carcass weight value of 10 kg. Also, carcass yield of 8.25, 8.34 and 8.39 kg were also recorded for yearling Afar, Borena and East Shoa breeds of goats respectively and for the adult 8.74, 9.17 and 8.91 kg for Afar, Borena and East Shoa breeds of goats, respectively. The result of this study was nearly comparable with result of Banerjee *et al.* [27]. In most of the tropics, carcass of goats ranges from 7-8 kg. Similar results to this study were reported by FAO [11], Where average dressed carcass output per goat was estimated to be 8 kg.

Regarding the dressing percentage, the current findings clearly showed 44.03%, 43.94% and 44.49% for yearling sheep breeds of Afar, Borena and East Shoa, respectively, but for adults 44.46%, 45.11% and 45.26% for Afar, Borena and East Shoa, respectively. The results observed in the current study were in line with the result of Jagdish [24], who reported the dressing percentage between 40-50%. In the present study, the dressing percentage of different goat breeds was 43.46%, 44.68% and 44.17% for yearling Afar, Borena and East Shoa, respectively and for adult Afar, Borena and East Shoa 44.54%, 45.21% and 45.10%, respectively. Comparable results to the present study were reported by Simret [28] and Getahun [29] on dressing percentage of Somali goats, indicated values of 41.71-49.44% and 41.34%, respectively. In addition, the dressing percentage of Mid-Rift Valley goats as reported by Getahun [29] was 41.79%; while the dressing percentage of Harrarge Highland goats ranged from 37.79-47.30% [30]. In relation to this Ensminger [31] also indicated that the dressing percentage of goats ranged from 37.55%. But different factors such as breed, age sex and nutrition influence the dressing percentage of goats [32].

CONCLUSION

Small ruminant are important domestic animals, it comprise a greater proportion of the total wealth of the poor families and their distribution varies widely. They are important source of export earnings, by export of live animals, meat and skins. Carcass yield is affected by breed, age, sex, nutrition and season. Ethiopia has the largest population of small ruminants but their productivity level is very low, the carcass yield per animal is estimated to be 8-10 kg for sheep and goat. The carcass yield is lower when compared with the neighboring countries. This might be due to the effect of breed and age of animals at slaughter. The average range of hot carcass weight and dressing percentage in the current study was between 8.12-8.79 kg and 43.94-44.49%, respectively for yearling sheep breeds and for the adult 9-9.36 kg and 44.46-45.26%, respectively; for yearling goats breeds 8.25-8.39 kg and 43.46-44.68%, respectively and also for adult 8.74-9.17 kg and 44.54-45.21%, respectively. Adult sheep breeds and adult goat breeds had higher hot carcass weight and dressing percentage than yearling breeds. The non significant difference in hot carcass weight and dressing percentage of breeds of sheep and goat within same age group might be due to the purchasing policy of the abattoir, where the abattoir purchases almost entirely animals that are not weighing more than 20-22 kg of live weight. Based on the above conclusion the following point is forwarded to improve the genetic and nutrition to get higher carcass weight.

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