

*Original Research***Carcass Yield of Sahelian Goats in Guera Province at Central-Eastern, Chad****Mopate Logtene Youssouf¹, Madjina Tellah^{2*}, Djalal Ardjoun Khalil² and Mahamat Seid Souleyman²**¹Livestock Research Institute for Development (LRID), Animal Production Program, Farcha BP. 433, N'Djamena, CHAD²Higher National Institute of Sciences and Techniques of Abeche (HNISTA); Department of Breeding Sciences and Techniques, BP 130 Abeche, CHAD*Corresponding author: madjinateallah@gmail.com

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Abstract

The purpose of the study is to estimate the carcass yield of Sahelian goats in Guera Province at Central-Eastern, Chad. The data were collected by weight gain: goats before slaughter and weight of hot and cold carcasses, three times a week from November 2016 to July 2017. The study involved 835 goats, of which 551 goats were slaughtered in Mangalme municipal slaughterhouse and 284 heads slaughtered in Mongo. These animals came mainly for 85% from transhumant breeding against 15% from sedentary breeding. Males (225 heads or 27%) were 26.3 ± 22.6 years old and females (610 goats, 73%) aged 40.6 ± 33.9 months. The majority of goats slaughtered (about 85%) in Mangalme and Mongo come from transhumant herds. More than 50% of slaughtered females were heavier and older than males. The carcass yield of the females was lower than that of the male carcasses. The slaughter of females resulted in losses of goat reproduction in the study area. However, the origin of slaughtered goats had no influence on carcass yield of goats. So, the slaughter of males is to be encouraged and that of females to be minimized. Goat farming should focus on raising kids to supply slaughterhouses. This will contribute to enhance the value of local food resources that can promote the sustained development of goat meat production, improve the quality of meat produced and master the goat breeding in the Sahelian zone of Chad.

Key words: Carcass yield, Central-East, Chad, Goat**How to cite:** Mopate, L.Y., Tellah, M., Djalal, A.K., & Souleyman, M. S. (2019). Carcass Yield of Sahelian Goats in Guera Province at Central-Eastern, Chad. International Journal of Livestock Research, 9(9), 30-36. doi: 10.5455/ijlr.20190619074240**Introduction**

Small ruminants and especially goats are the most bred animal species in tropical and Sahelian zones. They play a very important role in food security and strongly contribute to the family economy and regional culture. Among the small ruminants, goats are exploited by the rural farmers to meet the daily treasures and

consumption requirements of meat proteins and also to restore the herds (Gnanda *et al.*, 2016; Alexandre *et al.*, 2012).

In Chad, the number of goats from the last livestock census in 2015 was 30.8 million head (MERA, 2015). Goat breeding is the traditional extensive or semi-extensive type with a low level of inputs and embraces three major ecological zones (Saharan, Sahelian and Sudanian). Goats adapt to different agro-ecological breeding conditions. Most of them are maintained according to the regions and breeding methods, either by men or by women (Abdilatif *et al.*, 2018). Food resources (fodder and water) dictate the adoption of the conduct modes. They also explain the output variables of these systems, particularly the weight performances (live weight and carcass yields) of animals that evolve in these areas. Studies on carcass yields of small ruminants related to rearing methods are rare in Chad. However, the goat herd structure of these areas is known (Mopate *et al.*, 2014). This structure can help as a guide to project the output of herd animals by breeders. The prediction of live weight predicts goats is nowadays a valid strategy for improving livestock market management for rural producers in Africa (Chinchilla-Vargas *et al.*, 2018).

For constraints on the productivity of small ruminants, the overall mortality rate varies between 29% and 35% (Dumas 1980, Lancelot *et al.* 1994). It is higher (41%) among young people between 0-1 year of age (Lancelot *et al.*, 1993). To these constraints are added the reproductive losses resulting from the slaughter of pregnant females. This practice is due either to an increase in protein demand (Alade *et al.*, 2011) or to producer ignorance (Garba *et al.*, 1992). These significant losses are rarely evaluated by studies.

The purpose of the study was to estimate the carcass yields of goats slaughtered at slaughterhouses in Mongo and Mangalmé towns and to indirectly assess the importance of transhumance in the meat supply of these towns in the North-Guera, in Central-Eastern Chad.

Materials and Methods

The study was conducted in two cities including Mongo and Mangalme located in Guera Province. The locations by GPS (Global Positioning System) coordinates are: 12 ° 09 '30' 'of latitude North and 18 ° 40' 30 " of longitude East for the city of Mongo and 12 ° 21 '04' 'and 19 ° 36 '01' 'for that of Mangalme.

Sampling and Data Collection Methods

The study targeted goats acquired by butchers on the market and slaughtered in slaughterhouses in these two localities. The information collected before goat slaughter concerned: sex, the animal origins (sedentary or transhumance), the age (in months estimated according to the dentition), their body condition, the live weight (after a 24-hour fast). After slaughter, bleeding, evisceration and butchering, the collected data was focused on the hot carcass weighing (immediately after bleeding, skinning), evisceration and removal of the head, legs, teats, genitals). The hot carcass weight was retained in order to quickly release the butchers for the market. The weighing's were carried out using 50 kg load cells brand COFFIA, with a minimum of

1 kg and 500 g. The data was collected three times a week and during eight months from November 2016 to July 2017.

Data Analysis

The collected information was entered with the "Access" database software and transferred to the "Winstat i.c" (CIRAD / IITCF) processing software. The analysis of variance was made and the significance of the differences in means was sought at the 5% threshold. The cold weight was deducted from hot weighing by applying a theoretical refraction of 2% for cattle, sheep and goats. The crude yield was evaluated by the formula (carcass weight / live weight) \times 100. The empty live weight (EVV) was calculated as the difference between the live weight to fast before slaughter and the contents of the digestive tract; true carcass yield was calculated as the ratio of cold carcass weight (PCF) to empty live weight (PVV).

Results and Discussion

Number, Sex, Species and Origin of Slaughtered Goats

Overall, 835 goats were slaughtered, including 66% (551 goats) in Mangalme and 34% (284 goats) in Mongo. The males constituted 26.95% against 73.05% of goats (610 goats). Most of these animals are from transhumant farms (85%) and 15% from sedentary farms (Table 1).

Table 1: Goat numbers slaughtered at Mangalme and Mongo municipal slaughterhouses in central Chad by sex and animal origin (sedentary or transhumant)

Sex	Sedentary Breeding	Transhumant Breeding	Total (n)
Male	51	174	225
Female	77	533	610
Total (N)	128	707	835

Of all goats slaughtered in the Guera during the study period, 84.67% of these animals come from transhumant livestock against 15.33% from sedentary livestock. Transhumant livestock rearing is the main source of meat supply in urban centers in the Guera region. Goats were the most slaughtered (73.05%) than cattle (26.95%).

Depending on the origin of the goats slaughtered, it is safe to say that the supply of this area goat meat would be mainly provided by animals from transhumant farms. Indeed, the area is a transit point for transhumant herders from different provinces of Chad such as Batha, Biltine or Ouaddaï, en route to those of Salamat and Moyen-Chari. Many of these breeders sometimes spend the rainy season on the way home. It is therefore not excluded that they can sell goats for their livelihood.

Live Weight of Goats at Slaughter

Transhumant goats had a mean live weight of 22.4 ± 7.3 kg, significantly higher ($P < 0.001$) than sedentary animals with 20.0 ± 6.8 kg. The same was true for the average age of transhumant animals (28.5 ± 23.2 months) higher ($P < 0.001$) than for sedentary animals (21.3 ± 19.3 months). Mean live weight at goat slaughter in both towns (Malgamé and Mongo) was 24.32 ± 6.57 kg, corresponding to a mean age at slaughter of 35.49 ± 29.86 months or about 3 years. Goats were slower at slaughter (26.3 ± 22.6 kg) than goats (40.6 ± 33.9 kg). The heaviness of the goats is justified by the fact that they were older and most often pregnant at the time of slaughter (26.0 ± 6.5 months) while the goats (21.3 ± 6.7) were slaughtered in their growth phase ($P < 0.05$). The high average age of goats from transhumant animals suggests a reform of some breeders. These parameters varied according to the origin of the animals (Table 2).

Table 2: Goat weights (kg) and ages (months) at slaughter in the Mangalme and Mongo municipal slaughterhouses in Central-East, Chad

Origin of Breeding	Male		Female	
	Live Weight	Age	Live Weight	Age
Sedentary	20.8 ± 6.8^a	23.5 ± 21.1^a	29.2 ± 6.5^a	57.4 ± 37.9^a
Transhumant	21.4 ± 6.7^a	27.1 ± 23.1^a	25.6 ± 6.3^b	38.4 ± 32.7^b

a, b- Means with different superscript vary significantly ($P < 0.05$).

Females were heavier at slaughter than males. Similarly, their average age at slaughter was higher than that of males ($p < 0.05$). The average weight of transhumant goats tends to be higher than sedentary goats, but without a significant difference ($p > 0.05$). On the other hand, goats from sedentary breeding were heavier at a later age than those from transhumant breeding. In general, culled goats are older than 45 months for sedentary and about 40 months for transhumant breeding ($p < 0.05$). The high age of females at slaughter is explained by the fact that breeder sells his female if it has age of reform or if it has a problem of reproduction. The average live weight of goats was close to 30 kg for sheep and 25 kg for goats reported in official statistics (DSPA, 2011).

Hot Carcass Weight

The carcass weight of Sahelian goats in Chad is likely to be influenced by the sex and origin of the slaughtered animals (Table 3). Mean carcass weight was higher in sedentary than in transhumant goats ($p < 0.05$). Although the carcasses of the females were lighter than those of the males but, the origin of the animals had no effect on it ($p > 0.05$). The heaviness of female carcasses explained by the fact that males are slaughtered younger than females. This difference in weight between the sex of slaughtered goats was consistent with observations reported in Nigeria (Idahor, 2013). This weight was not very different from that reported in official statistics (DSPA, 2011).

Table 3: Average carcass weight (kg) of goats slaughtered in the Mangalmé and Mongo municipal slaughterhouses in Central-East, Chad

Origin of Breeding	Male	Female
Sedentary	12.1 ± 4.8 ^a	16.5 ± 5.5 ^a
Transhumant	12.6 ± 5.3 ^a	13.3 ± 5.3 ^b
Mean	12.5 ± 5.2	13.7 ± 5.4

a, b- Means with different superscript vary significantly ($P < 0.05$)

However, it was less than 17.69 kg reported in the Sahelian goat in Nigeria (Jibir *et al.*, 2012), 19.3 ± 7.74 kg (6.1 - 38.2 kg) reported in the tropics (Alexandre *et al.*, 2012).

Cold Carcass Yield

The variation in cold carcass yield was studied according to the sex and origin of the animals slaughtered (Table 4) (sedentary or transhumant).

Table 4: Average carcass yield (%) of cold goats slaughtered in central-eastern, Chad

Origin of Breeding	Male	Female
Sedentary	57.6 ± 12.9 ^a	55.2 ± 12.5 ^a
Transhumant	57.7 ± 13.7 ^a	50.2 ± 11.4 ^b
Mean	57.7 ± 13.5	50.8 ± 11.6

a, b- Means with different superscript vary significantly ($P < 0.05$)

Carcass yield in females was higher than that of males ($p < 0.05$). It is beneficial for butchers to slaughter lighter goats than heavier goats to maximize their profit margin. Overall, this value was not significantly different from 53.96% reported in Nigeria in Sahelian goats (Jibir *et al.*, 2012). This is contrary to the observation of Limea *et al.* (2006) who reported that carcass yield tends to increase with slaughter weight in Creole goats. It was also higher for sedentary goats than for transhumant animals ($p < 0.05$). This difference in yield in terms of the origin of goats can be explained by the care and attention given to sedentary goats compared with transhumant animals, which often lose weight in the hunt in search of pasture. This average yield was higher than that reported in the tropical area of 46.1 ± 5.7% by Alexandre *et al.* (2012).

Conclusion

Measurements of goat weights before and after slaughter in municipal slaughterhouses in Guera Province determined weight of live weight and age at slaughter, carcass weight and carcass yield. Slaughter weight and slaughter age were higher in females, but carcass yield was better for males. Thus, slaughter of males is the best indicated because for their better carcass yield and to avoid the loss in reproduction by slaughter of pregnant goats. Producers in this Sahelian area should therefore focus more their breeding activities on

the production of butchering kids to supply slaughterhouses and make meat available to the population. In the future, this will contribute to enhance the value of local food resources that can promote the sustained development of goat meat production, improve the meat produced quality and control goat reproduction in the Sahelian zone of Chad.

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Conflict of interest

The authors declare there is no conflict of interest.

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