

Morphometry and Carcass Characteristics of Goat Fed with Indigofera (Indigofera suffruticosa Mill.) And Super Napier (Pennisetum purpureum Schumach x Pennisetum Glaucoma L.)

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Abstracts: The study aimed to ascertain the effects of various Indigofera and Super Napier combinations on goats' morphometry, carcass, and growth characteristics. The experiment was carried out using a completely randomized design (CRD), with six treatments replicated four times. Several treatments were compared using multiple means using the Tukey HSD test. The final weights of the 100% Super Napier-fed goats, 16.93 kg, 16.68 kg, and 16.57 kg, respectively, show that these goats greatly surpassed their size (3.16 kg, 2.90 kg, and 2.67 kg) after a 60-day experiment. 100% Indigofera also affected the chest circumference (57.20 cm), loin eye area (11.66 cm²), hot carcass weight (6.72 kg), pluck weight (0.68kg), and percentage weight of total trimmable fats (2.02 kg). Goats should be fed a diet of 80% Super Napier and 20% Indigofera. Since the study was only carried out for 60 days, it may be done over a longer time. Higher weights in the GIT contents and a larger chest circumference (cm) were also noted.

Keywords: Morphometry, Carcass characteristics, Indigofera, Super Napier.

1. INTRODUCTION

Goats are little ruminants that consume plant leaves, grass, and fodder. Goat rearing has a low initial investment, making it perfect for small-scale farms. Every cultural event must include goats. Animals can increase the diversity and economic health of an agricultural system. Goats require a diet higher in nutrients due to their shorter digestive tracts than other ruminants.

Because of their small mouths and flexible lips, grazing goats may select the parts of plants that are incredibly nutritious and avoid the less nutritious parts. Each goat may consume up to 5% of its body weight in dry stuff daily (perhaps more if the forage is highly digestible). Goats are raised with high-quality feed and an optimal combination of numerous vital nutrients to ensure their best growth and development. Some agricultural wastes or byproducts are being viewed as alternative feeds for small ruminants to address the issue of inadequate feed. The quantitative characteristics of the carcass play a critical role in influencing yield, regional composition (commercial cuts), tissue composition, and carcass muscularity in the meat production system.

1.1. The objective of the study

The morphometric and quantitative characteristics of the carcass, carcass quality, dressing percentage, meat yield, and total fat contents of goats fed with various combinations of Indigofera and Super Napier grass will be assessed to determine if there is a significant difference between treatment methods.

2. METHODOLOGY

2.1. Morphometric Evaluation and Measurement

Animal body condition scores (BCS) were calculated before the slaughter of the goats using spine palpation following the 13th pair of thoracic ribs. The classification was done on a scale of zero to five (Plate 1), where zero represents the cachectic animal and five represents obese animals. Examples of the spinous process in goat BCS can be shown on Plate 2. (Langston University, 2007, Meat Goat Production Handbook).

Using techniques described by Yanez et al. (2004), the following external morphometric measurements were measured objectively in vivo:

- Body length (BL), the distance between the cervical-thoracic articulation and the base of the tail in the first intercoccygeal articulation, wither height (WH), and the distance between the withers and the distal forelimb.
- Region height (RH), the distance between the sacral tuberosity and the distal hind limb
- Hindleg length (The equation stated by Ynez et al. (2004), $COMPAC = WS/BL$, was used to calculate the objective index of in vivo conformation known as the body compactness (COMPAC; kg/cm)

Parameters Monitored

Morphometric Measurements

2.2. External Measurements

a. Body length (cm) – the distance between cervical-thoracic articulation and tail of the first inter-coccygeal articulation.

b. Heart girth (cm) – the distance between lateral sides of scapular-humeral articulation.

c. Wither height (cm) – the distance between withers and distal forelimb region.

d. Rump height (cm) – the distance between sacral tuberosity and distal hind limb.

e. Hindleg length (cm) – the distance between the largest femur trochanter and the edge of tarsal-metatarsal articulation.

f. Foreleg length (cm) – the distance between the largest humerus trochanter and the edge of carpal-metacarpal articulation.

g. Thoracic perimeter (cm) – perimeter taking the sternum and withers as base passing the tape after the palette.

h. COMPAC (kg/cm) = Weight at slaughter/body length.

i. Body condition score (0-5 scales)

2.3. Measurements for the Slaughtering Process and the Carcass

The following are the slaughtering procedures:

1. Two goats per treatment were slain after an 8-hour fast, their empty live weight was recorded, and they were killed humanely by having their carotid arteries and jugular veins severed.

2. All of the goats' blood that had been severed was allowed to trickle.

3. The fore and hind legs were cut off at the carpal and tarsal joints, respectively, while the heads were cut off at the atlantooccipital joint. The non-carcass weight was calculated by weighing the heads and legs.

4. The goats killed had been scalded or passed through boiling water to remove their hair fleece.

5. The visceral organs were promptly removed from the carcass by evisceration. The esophagus was bound to keep the contents of the intestines from contaminating the carcass.

6. The carcass was weighed as soon as it was eviscerated and was given the name "hot carcass weight."

7. The heart, liver, spleen, kidney, and lungs were all combined and given the pluck designation.

8. To calculate the empty body weight (EBW), the gastrointestinal tract was weighed both full and empty to

determine the true yield: $TY (\%) = HCW/EBW \times 100$ (Cezar & Souza, 2007).

9. The difference between a digestive tract that is full and one that is empty was used to calculate the weight of the digestive content or gastrointestinal tract contents.

10. The total weight of the trimmable fats, which included visceral fat, subcutaneous fat, intermuscular fat, and fat from pluck, was measured.

11. The internal and external lengths of the carcass, the rump's breadth and perimeter, and the chest's width, depth, and perimeter were all measured.

12. The leg, loin, rib, neck, breast, and foreshank were the six components divided into each carcass's left and right halves. Cuts are produced using the typical chevon cutting strategies (Plates 3, 4, and 5). After being refrigerated for 24 hours at 5 C, they were weighed to determine their cold weight and reported with their cooler shrink (Cezar & Souza, 2007).

13. The LEA (loin eye area) was calculated. A cross-section was taken between the 12th and 13th thoracic vertebrae on the left half-carcass. After the longissimus dorsi muscle was exposed, length and height measurements were obtained and multiplied for the loin eye area (cm²) (Cezar & Souza, 2007).

14. Carcass were weighed to determine the cold carcass weight after being refrigerated for 24 hours at about 5°C in a refrigerator (CCW). Utilizing the formula provided by Mattos et al., the index of loss by cooling (ILC) and cold carcass yield and/or commercial yield (2006).

2.4. Carcass Measurements

a. Carcass inner length (cm) – the distance between the public bone's front edge and the first rib's front edge at its midpoint.

b. Carcass external length (cm) – the distance between cervical-thoracic articulation and 1st inter-coccygeal articulation.

c. Rump width (cm) – the distance between the largest trochanters of the femur.

d. Rump perimeter (cm) – the perimeter of the rump region, based on the trochanters of the femur.

e. Chest depth (cm) – the distance between the sternum and withers.

f. Chest perimeter (cm) – the perimeter of the anterior region, based on the trochanters of the femur.

g. Carcass compactness index (kg/cm) – hot carcass weight/carcass inner length

h. Loin eye area (cm) – length x width of the area.

2.5. Carcass Characteristics

a. Weight at slaughter (kg)

b. GIT contents (kg)

c. Empty body weight (kg)

d. Hot carcass weight (kg)

e. Cold carcass weight (kg)

- f. True Yield (%) = HCW/EBW
- g. Index Loss of Cooling (%) = $HCW - CCW/HCW \times 100$
- h. Cold carcass or commercial yield (%) = $HCW/WS \times 100$
- i. Dressing percentage or hot carcass yield (%) = $HCW/WS \times 100$
- j. Non-carcass weight (kg)
- k. Percentage non-carcass weight (%)
- l. Total GIT weight (kg) and its percentage (%)
- m. Pluck weight (kg) and its percentage (%)
- n. Weight of total trimmable fats (kg) and its percentage (%)
- o. Percentage of different cut parts in relation to cooler shrink.
 - 1. Percentage of leg cut (%)
 - 2. Percentage loin cut (%)
 - 3. Percentage rib cut (%)
 - 4. Percentage neck cut (%)
 - 5. Percentage of breast cut (%)
 - 6. Percentage foreshank cut (%)

The analysis of variance approach for a Complete Randomized Design was used to analyze the acquired data. Using a one-way analysis of variance, the mean significant differences between the various treatments were determined. The significant findings for multiple mean comparisons were calculated using the Tukey HSD test.

3. RESULTS AND DISCUSSION

After a feeding trial of 60 days, there were no significant changes in the goats' exterior measurements, which include their body length, heart girth, wither's height, hindleg length, foreleg length, and thoracic perimeter, as well as their COMPAC and body condition scores. The loin eye area of the goats given 90% Super Napier + 10% Indigofera was significantly higher, measuring 7.31 cm² and 7.11 cm², respectively. After 60 days of feeding, goats fed a diet consisting of 90% Super Napier and 10% Indigofera had a high weight and percentage of total trimmable fats. No discernible difference could be seen in the dressing %, hot carcass yield, non-carcass weight, or pluck weight of the goats fed with these treatments.

Animals frequently undergo morphometric investigations, which aid in deciphering their fossil record. It is possible to measure an essential evolutionary characteristic using morphometrics. Determine anything about their ontogeny, function, or evolutionary links by observing variations in shape. One of the morphometrics' main goals is to statistically examine theories regarding the factors that impact shape (Yanez et al., 2004).

After 60 days, goats' slaughter and empty body weight had little bearing on them. Since it excludes changes in the gastrointestinal tract's contents from the computation, the actual yield is the most accurate (Hashimoto et al., 2007). In this study, feeding different dosages of Super Napier and Indigofera combinations to goats had no

appreciable impact on the percentage of goats that were dressed. Predicting the carcass yield or quality with accuracy is difficult due to the vital interplay among the numerous parameters that impact dressing percentage (Shelton et al., 1984). After 60 days, there was no discernible variation in the weight of the goats' entire gastrointestinal tract (Osorio et al., 2002).

However, the contents of the gastrointestinal tract revealed a significant result ($P < 0.05$), indicating that the weight of the GIT had been affected by three treatments. This demonstrated that nutrients from meals were only focused on growing carcass components rather than non-carcass sections. Significant variations were also seen in the heart, liver, kidney, and lungs of the goats that were used in the experiment.

4. CONCLUSIONS AND RECOMMENDATIONS

Goats should be fed a diet of 80% Super Napier and 20% Indigofera. Since the study was only carried out for 60 days, it may be done over a longer time. Higher weights in the GIT contents and a larger chest circumference (cm) were also noted.

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