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Carcass characteristics and meat quality evaluation of Assam local goats reared under intensive management

Jeherul Hoque, Raj Jyoti Deka, Purabi Kaushik and Dulal Chandra Mili

Abstract
A study was conducted in the Department of Livestock Production & Management of College of Veterinary Science, AAU, Khanapara, Guwahati-22, Assam with an objective to evaluate the carcass characteristics and meat quality of local goats of Assam managed under intensive management system. Twenty (20) Assam local goats were divided in two groups *viz*. Group T_0 (Control) and Group T_1 (Treatment) comprising of 10 goats per group which were reared up to 5 months of age. Carcass characteristics were studied and meat quality evaluation were done at slaughter. The average carcass weights and dressing percentages were significantly higher in the goats reared under intensive management system (8.33±0.34 kg and 49.95%, $p<0.01$). There were highly significant ($p<0.01$) differences in different prime cuts including leg, loin, rack, shoulder, breast, flank, and neck in the goats under treatment. Highly significant ($p<0.01$) differences were also observed in tenderness, juiciness and overall acceptability between the two groups.

Keywords: Local goats, intensive management, carcass trait

Introduction
Goat husbandry playing a significant role in the socio-economic life of the rural communities in India. The country houses the highest population of goat in the World and Chevon is one of the most preferred meat. There is an increasing trend in the demand of goat meat. A major portion of the total goat population has been managed by rural communities as unorganised farming sector in the country with low or no manage mental investment. This sector has a very high potential to project as an income generating activity to enhance the economic stability of the resource poor rural mass in the near future. In the recent times, there is growth for adoption of commercialization in goat rearing. As per the Livestock Census Report, 2019 (20th Livestock Census) [1], India is having 148.88 million goats which is about 27.44% of the total livestock population of the country. There is a growth of 10.1% of the goat population during 20th Livestock Census when compared to the 19th Livestock Census. The State of Assam consist of 4.32 million goats (20th Livestock Census, 2019)[1] and predominantly contributing to the total meat production of the state. As per the Integrated Sample Survey, 2019-20 [2] report, goat is producing 15.95 million kg of meat in Assam contributing about 30.12% of total meat production of the state. Goat husbandry in Assam is a neglected sector in terms of scientific intervention and there is a ample scope to up-lift this sector towards adoption of scientific approaches for management, feeding, breeding and health care. The local goats of Assam are generally reared under extensive management with almost zero input. The present investigation was aimed to study the carcass trait and meat quality of Assam local goat in intensive management system.

Materials and Methods
The study was carried out under the Department of Livestock Production & Management of College of Veterinary Science, AAU, Khanapara, Guwahati-22, Assam. One month old 20 (Twenty) kids with about 3 Kg weight were randomly selected from the field condition to perform the experiment. The animals were then categorized into two groups *viz*. Control (T_0) and Treatment (T_1) with 10 goats in each group. The goats of both groups were managed under similar housing management. The goat house was constructed with bamboo rails with raised platform about 1 meter high above the ground facilitating falling of excreta and urine on the ground. The width of the shed was 3 meters with a manger of 35 cm wide running through the center. Kids were provided with a floor space of 0.4 sq.m per kid till 3 months of age and tied on either side of the house. Afterwards animal were provided 1 sq.m per goat.

Feeding management

T_0= Normal grazing + browsing in extensive management
T_1= Supply of *ad-lib* fodder + concentrate feed in intensive system

The kids were weaned at 60 days of age in T_0 and T_1 groups. However, the goats under T_1 group were managed under a strict feeding schedule as follows:

31-60 days: Allowed suckling twice daily + *ad-lib* Concentrate + *ad-lib* fodder
Ration-1: CP-18% and TDN- 70% till 3 months of age.
Ration-2: CP-16% and TDN-75% till 5 months of age.

The experiment was carried out up to 5 months of age. Ten animals from both the groups (Treatment and Control) were randomly selected and slaughtered for carcass evaluation after completion of the experiment. Slaughtering of the animals were done following humane method. The animals were kept on fasting for 12 hours, providing only clean drinking water before slaughter. Data on live weight before slaughter and hot carcass weight were recorded individually to calculate the dressing percentage. The internal organs *viz*. kidney, liver, heart, and spleen were carefully excised and weighted. The carcasses were cut in to wholesale cuts (Shoulder, rack, loin, legs, breast and flank) and the weights of individual cuts were recorded. Sensory evaluation was also done on the cooked sample of meat. The slaughter and carcass traits and sensory evaluation parameters were analyzed using the SAS statistical package following completely randomized design.

Results and Discussion

Carcass characteristics

The average carcass weights were 4.80±0.11 and 8.33±0.34 kg in the control (T_0) and treatment (T_1) groups respectively. The dressing percentages were recorded as 44.00 and 49.95 in both the group. The weight of non- carcass components was also higher in the treatment group than the control group. There was a highly significant (p<0.01) differences between both the groups in the carcass weight and dressing percentage. The difference between carcass weight and in dressing percentage might be due to the differences in live body weight. Simillar findings were also made by Baruah (1986) [4] and Lawrie (1998) [7] who stated that carcass composition is weight dependent and largely not influenced by age. Present findings in dressing percentage also corroborated well with the findings of Elangovan *et al*. (2010) [5] in Kannaiadu goats and Paramsivam *et al*. (2002) [8] in Barbari goats.

Average weight of non-carcass components *viz*. head, heart, drainable blood, skin, fore-shank, liver, spleen, lung and trachea and testicle were 0.73±0.05 and 0.82±0.01, 0.40±0.01 and 0.59±0.01, 0.33±0.11 and 0.48±0.03, 0.86±0.03 and 1.33±0.03, 0.10±0.00 and 0.21±0.01, 0.25±0.01 and 0.28±0.01, 0.16±0.004 and 0.19±0.03, 0.23±0.01 and 0.36±0.01 and 0.140±0.01 and 0.143±0.01 kg in T_0 and T_1 group respectively. A highly significant difference (p<0.01) was also observed in some non-carcass components.

Among prime cuts, the average weight of the leg, loin, rack, shoulder, breast, flank, and neck were 1.60±0.04 and 2.59±0.15, 0.39±0.01 and 0.58±0.03, 0.35±0.01 and 0.91±0.03, 0.87±0.02 and 1.23±0.03, 0.86±0.01 and 1.90±0.07, 0.14±0.02 and 0.20±0.01 and 0.40±0.01 and 0.71±0.01 in T_0 and T_1 group respectively (Fig. 1). Highly significant (p<0.01) differences were observed in different prime cuts including leg, loin, rack, shoulder, breast, flank, and neck. This may be due to differences in pre-slaughter body weight between both the groups. These findings corroborate with the findings of Lawrie (1998) [7] that carcass composition is weight dependent and largely not influenced by age.

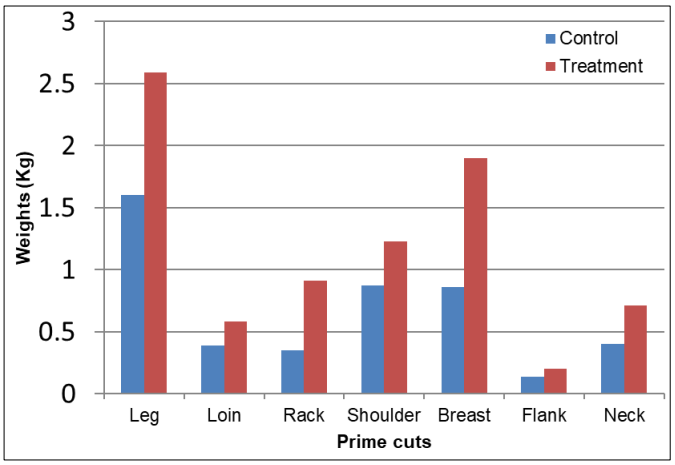

Fig 1: Weight of different prime cuts in control and treatment group

Sensory evaluation test

The Mean±SE value of sensory properties of the control and treatment group in Assam local goat is presented in Table 1. Highly significant (p<0.01) differences were recorded for tenderness, juiciness, and overall acceptability in the sensory assessment. Average tenderness in was rated 7.33±0.21 in the control (T_0) and 8.50±0.22 in the treatment group (T_1), average juiciness was 7.17±0.17 in the control and 8.50±0.22 in the treatment group, overall acceptability was found 7.33±0.21 in the control group and 8.50±0.22 in the treatment group. Significant differences (p<0.05) were observed in flavor and texture among the control and treatment groups. For quality assessment of meat Sensory Evaluation Test was done. Highly significant (p<0.01) differences were observed for tenderness, juiciness, and overall acceptability were observed. Significant (p<0.05) differences were also observed in flavour and texture among the control and experimental group. These findings corroborate the findings by Fasae *et al*. (2013) [6], who reported that, with higher protein and fat in the carcass resulted in more flavour, tender and juicy meat. The findings of the present study were also in close agreement with the findings of Schonfeldt *et al*. (1993) [9], who reported that there is a significant increment of tenderness and flavour in cooked cuts of mutton with increasing fatness of the carcass.

Table 1: Sensory properties of meat in control and treatment group

Parameters	Control	Treatment	t-value	P-value
Appearance	8.33±0.21	8.50±0.22	0.54	0.599
Flavor	7.6±0.20	8.6±0.20	2.88	0.020
Texture	7.33±0.33	8.17±0.17	2.24	0.049
Juiciness	7.17±0.17	8.83±0.17	7.07	<0.001
Tenderness	7.33±0.21	8.50±0.22	3.80	0.004
Colour	8.00±0.26	8.17±0.31	0.42	0.687
Overall acceptability	7.33±0.21	8.50±0.22	3.80	0.004

p-value < .05 is significant; p-value < .01 is highly significant; p-value > .05 is not significant

Conclusion

The Assam local goats are the most abundantly available,

adoptive and indigenous breed of goat found in the northeastern region of India. These goats are normally reared in extensive management system with minimum inputs. Although it has a high market demand, these animals are very poor in terms of growth rate and dressing percentage. From the present study, it could be concluded that the slaughter weight, dressing percentage and weight of the prime cuts were significantly higher in Assam local goats reared in intensive management system with concentrate feeding assuring higher return.

Conflict of Interest

There is no conflict between the authors regarding the preparation of the manuscript. The research was conducted as a part of fulfillment of M.V.Sc. Degree Programme. All authors contributed equally to the research woks and are also the members of the research advisory committee. All authors read and approved the final manuscript.

Ethical Approval

The research was conducted following the guidelines of Institutional Animal Ethics Committee of Assam Agricultural University, Khanapara, Guwahati-781022, Assam, India vide the application approval number 770/ac/CPCSEA/FVSc/AAU/IAEC/16-17/409 dated 30.07.2016.

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