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Effect of Season on Jamunapari Goat Meat Composition under Field and Farm Rearing Condition

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ABSTRACT

Goat meat in human nutrition as a primary and supplementary nutrient source is presented in terms of the dist ribution of goats, production characteristics, composition and nutrient value of goat meat, muscle fat and processed goat meat. The study was conducted at the central institute for research on goats, Makhdoom, Mathura, under the nutrition feed resources and products technology division, for the study of farm rearing conditions. A total of 36 meat samples were collected from field and farm rearing condition 12 summer (field 6 and farm 6), Rainy 12 (field 6 and farm 6) and Winter 12 (field 6 and farm 6) meat samples from each breed. The moisture content in Jamunapari goat breed meat under field and farm rearing condition in aforesaid seasons was found to be 75.28±0.14 and 75.11±0.19, 75.38±0.16 and 75.25±0.17 and 76.43±0.22 and 76.34±0.21 per cent, respectively. The statistical analysis of these data revealed that effect of seasons on moisture content in meat was significantly different in Jamunapari goat breed meat under field and farm rearing samples at 1 % level of significance. Protein content in the meat of Jamunapari goat breed meat under field and farm rearing samples in above all seasons was 19.87±0.18 and 19.891±0.11, 19.74±0.16 and 19.95±0.18 and 19.30±0.12 and 19.42±0.14 per cent, respectively. It is observed from the above observations that similar protein content was found in field and farm rearing samples in all seasons. Effect of season on fat content in meat was significantly different under field as well as farm rearing conditions at 1 % level of significance. The ash content of Jamunapari goat breeds meat under field and farm rearing samples in aforesaid seasons was found to be 1.80±0.04 and 1.92±0.03, 1.93±0.03 and 1.96±0.03 and 1.62±0.04 and 1.63±0.02 per cent respectively. The analysis of variance table revealed that effect of season on meat content was significant at 1 % level of significance.

Key words: *Goat meat, Protein, Fat, Breed, Nutrition.*

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INTRODUCTION

Jamnapari (or Jamunapari) is a breed of goat originating from Indian subcontinent. Since 1953 they have been imported to Indonesia (popular as Etawa goat, and its mixture with a local goat called "PE", *peranakan Etawa* or Etawa mix) where they have been a great success. It is bred for both milk and meat. The name is derived from the rivers Yamuna, Jamuna (West Bengal) and Jamuna (Bangaladesh) of India and Bangladesh. There is a great variation in coat colour, but the typical coat is white with small tan patches on head and neck. The typical character of the breed is a highly convex nose line with a tuft of hair, yielding a parrotmouth appearance. The ears are very long, flat and drooping; ear length: 26.79 ± 0.21 cm. Both sexes are horned; horn length: 8.69 ± 0.27 cm. Tail is thin and short. A thick growth of hair on the buttocks, known as feathers, obscures the udder when observed from behind. The udder is well developed, round, with large conical teats[12]. This breed is one of the ancestors of the American Nubian[21].

Meat is the primary reason to raise goats, which is why meat goats constitute the majority of the world's goat production systems. Goat meat comprises 63 percent of all red meat that is consumed worldwide. Currently, goats are the main source of animal protein in many North African and Middle Eastern nations. Goats are also important in Southeast Asia, the Caribbean, and other tropical regions. Goat meat has been established as a lean meat with favorable nutritional qualities, and it's an ideal choice for the health-conscious consumer. Goats as mixed feeding opportunists are able to adapt to seasonal and geographical changes and utilize low-quality rangelands to produce high-quality animal protein, which is extremely important[18].

Goats have become important livestock in arid and semi-arid regions of the world because of their characteristics of versatility in harvesting forage and their ability to survive adverse foraging conditions. As opportunistic foragers, goats are able to maintain a relatively high-quality diet, even under diverse conditions, and at times they prefer shrubs over other types of range plants[20]. More recently, Tianfu goats in China have emerged as a new breed with excellent performance for meat production and reproduction efficiency, and they are easily adapted to the local environment[26].

The chemical composition of goat meat is as follows: moisture 74.2–76.0%; protein 20.6–22.3%; fat 0.6–2.6%; ash 1.1%[11]. Goat meat cuts have protein levels comparable to similarly prepared beef, lamb, and veal but have lower fat content[16]. In addition, the percentage of saturated fat in goat meat is lower than in chicken, beef, pork, or lamb[5,25].

A little information available to determine if season of birth impacts growth and survival traits of meat-goat kids. In fact, Shrestha and Fahmy[23] stated that scientific knowledge of meat-goat production is negligible compared to other livestock and poultry species. Research with cattle and sheep has shown differences in weaning weight for different calving and lambing seasons[7,23,17,19]. Previous studies with sheep and goats indicate that there are seasonal differences in survival rate of young stock[4,14,15,22].

Fig. 1: Jamunapari Goat and meat pieces

Cuts from the hind limb are associated with high value due to the low carcass fat and high lean content[8,24]. Cuts from the dorsal trunk have a low fat content, but they are perceived to contain a percentage of bone. Goat meat protein also has a high biological value of approximately 60.4 and digestibility coefficient of 97% based on trials with rats fed a 10% protein level from goat meat[9].

MATERIALS AND METHODS

The study was conducted at the central institute for research on goats, Makhdoom, Mathura, under the nutrition feed resources and products technology division, for the study of farm rearing conditions. Field samples were collected from different villages. The Jamunapari breed meat samples were available in different villages of Mathura, India (27^{o} 10´N, 78^{-o} 002´E and 169 m above MSL). Geologically the Institute land falls under Jamuna alluvial is semi arid. Temperature ranges between 6^{o} C in winter to as high 45^{o} C in summer. Annual average rainfall is a period of 50 -60 days. Monsoon arrives in mid July and remains active till mid September[1]. The methodology used was an adaption from Bourbouze[6] and Alvarez Funes and Paz Motola[2], with the following phases: (i) sample selection and construction of the data – gathering instrument, and (ii) information treatment and statistical processing, including the review and selection of variables for the analysis of types, application of multivariate statistical techniques and analysis of variance and contingency tables.

Experimental goats and management: - The breed of goat used for the study was the Jamunapari. It was a total of 12 samples under field and farm rearing conditions. Farm goats managed at C.I.R.G. farm and field samples were collected from different villages.

Sample collection and analysis: - A total of 36 meat samples were collected from field and farm rearing condition 12 summer (field 6 and farm 6), Rainy 12 (field 6 and farm 6) and Winter 12 (field 6 and farm 6) meat samples from each breed. The leg and the shoulder of each half carcass were separated, deboned and ground to prepare two composite samples from each organ. Meat samples were ground in a grinder and kept at -20°C until analysis. Moisture and protein content was determined according to the method of Association of Official Analytical Chemists[3]. Total Fat Content (TF) was extracted in Soxhlet Extraction Unit as described by AOAC[3]. Ash percentage was determined by gravimetric method as described by AOAC[3] using muffle furnace.

Information treatment and statistical analysis: - The field and farm data were introduce into an excel matrix after checking for missing and abnormal data. Composition between the different quantities variable was performed using ANOVA table and RBD (atd" 5&1%) for analysis of meat samples.

RESULTS AND DISCUSSION

Perusal of data presented in Table 1 revealed that the moisture content in Jamunapari goat breed meat under field and farm rearing condition in aforesaid seasons was found to be 75.28±0.14 and 75.11±0.19, 75.38±0.16 and 75.25±0.17 and 76.43±0.22 and 76.34±0.21 per cent, respectively. Data presented in the table suggested that the moisture content was higher in field rearing samples as compare to farm samples. The statistical analysis of these data revealed that effect of seasons on moisture content in meat was significantly different in Jamunapari goat breed meat under field and farm rearing samples at 1 % level of significance. It is also observed that moisture per cent was found highest in winter season than summer and rainy season goat meat under field as well as farm rearing samples.

It is evident from Table 1 that protein content in the meat of Jamunapari goat breed meat under field and farm rearing samples in above all seasons was 19.87±0.18 and 19.891±0.11, 19.74±0.16 and 19.95±0.18 and 19.30±0.12 and 19.42±0.14 per cent, respectively. It is observed from the above observations that similar protein content was found in field and farm rearing samples in all seasons. It is also observed from the above table that lowest protein content was found in winter season whereas highest in rainy seasons under field and farm rearing conditions.

Table 1:Effect of seasons on the percentage of meat components

Sl. No.	Component	Field	Farm	Overall average	Test of significance	Table value (t) 5% 1%
1.	Moisture (i) Summer	75.275±0.14(6)	75.111±0.19(6)	75.193±0.16 (12)	1.342^{NS}	2.179 3.055
	(ii) Rainy	75.383±0.16(6)	75.250±0.17(6)	75.316±0.14 (12)	1.034^{NS}	
	(iii) Winter	76.425±0.22 (6)	76.342±0.21(6)	76.383±0.21 (12)	0.866^{NS}	
2.	Protein (i) Summer	19.867±0.18 (6)	19.891±0.11(6)	19.879±0.15 (12)	0.884^{NS}	2.179 3.055
	(ii) Rainy	19.743±0.16 (6)	19.945±0.18(6)	19.844±0.17 (12)	1.438^{NS}	
	(iii) Winter	19.303±0.12 (6)	19.415±0.14(6)	19.359±0.14 (12)	0.913^{NS}	
3.	Fat (i) Summer	3.063±0.03 (6)	3.038±0.03 (6)	3.050±0.03 (12)	0.963^{NS}	2.179 3.055
	(ii) Rainy	2.947±0.01 (6)	2.845±0.02 (6)	2.896±0.02 (12)	1.341^{NS}	
	(iii) Winter	2.648±0.02 (6)	2.617±0.01 (6)	2.633±0.02 (12)	1.011^{NS}	
4.	Ash (i) Summer	1.795±0.04 (6)	1.920±0.03 (6)	1.858±0.04 (12)	2.034^{NS}	2.179 3.055
	(ii) Rainy	1.927±0.03 (6)	1.957±0.03(6)	1.942±0.03 (12)	0.811^{NS}	
	(iii) Winter	1.623±0.04 (6)	1.627±0.02 (6)	1.625±0.03 (12)	0.433^{NS}	

Note: Figure in parenthesis indicated number of samples.

NS = Non Significant

The data laid down in Table 1 indicated that the fat content in meat of Jamunapari goat meat, the fat content under field and farm rearing conditions in aforesaid seasons was found to be 3.06±0.03 and 3.04±0.03, 2.95±0.01 and 2.85±0.02 and 2.65±0.02 and 2.617±0.01 per cent, respectively. It is clear from the above table that there was no any variance in fat percentage was observed under field and farm rearing samples in all seasons. Effect of season on fat content in meat was significantly different under field as well as farm rearing conditions at 1 % level of significance. It is also observed from the above analysis that higher fat content was found in summer season meat and lowers in winter season under field as well as farm rearing conditions.

Perusal of data presented in Table 1 indicated that the ash content of Jamunapari goat breeds meat under field and farm rearing samples in aforesaid seasons was found to be 1.80±0.04 and 1.92±0.03, 1.93±0.03 and 1.96±0.03 and 1.62±0.04 and 1.63±0.02 per cent respectively. It is observed from the above table that ash content in goat meat was higher in farm rearing conditions than field rearing conditions in all seasons but it was insignificant. The analysis of variance table revealed that effect of season on meat content was significant at 1 % level of significance.

The information on the composition of goat meat of Indian breeds during different seasons is inadequate. The literature on effect of season on goat meat composition is rarely available. Our results obtained from the present investigation on moisture and protein content in the meat of Jamunapari goat breeds are fair agreement with the Annual report of C.I.R.G[10] who have reported that the grazing material available for goats was constituted of seasonal grasses of high moisture contents (>82% moisture contents) In addition to grazing, goat farmers were supplementing harvested grasses and grain (in few cases). On dry matter basis, grasses were containing 10.15% crude protein.

CONCLUSION

The chemical quality of goat meat, in general, was slightly better in goats reared under field conditions than in farm conditions.

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