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Influence of seasons on the composition of goat milk reared under conditions of mauzmabad tehsil, Jaipur district

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Abstract

This study investigates the impact of seasonal variations on the composition of goat milk in Mauzmabad Tehsil, Jaipur District. The research aims to analyze fluctuations in key milk components such as fat, protein, lactose, total solids, and mineral content across different seasons. The findings provide insights into optimizing dairy goat management practices to enhance milk yield and quality throughout the year has been. The research was conducted at the SV College of Agriculture, Nayla, Jaipur district of Rajasthan during 2022-24. The overall average specific gravity, fat, protein, lactose, ash, total solids and solids not fat of goat breeds reared under conditions of Mauzmabad Tehsil in different seasons of all 1200 samples was 1.0301 ± 0.00011 , 3.59 ± 0.018 per cent, 3.79 ± 0.029 , 3.81 ± 0.027 , 0.88 ± 0.009 per cent, 13.09 ± 0.039 and 8.60 ± 0.014 per cent, respectively. The specific gravity, fat, calcium, phosphorus, potassium, magnesium and chloride percentage in the milk under seasonal conditions was significantly differ. Season has conspicuous effects on milk quality of goats.

Keywords: Goat milk composition, seasonal variation, Jaipur district, fat content

Introduction

Milk composition is a crucial factor determining the quality and commercial value of goat milk products. However, seasonal changes in environmental conditions, such as temperature, humidity, and feed availability, can influence milk composition. This research focuses on understanding these variations in the Mauzmabad Tehsil of Jaipur district, a region with distinct climatic seasons. The scapegoat was domesticated as early as 6- 7 BC, as substantiated by archaeological remains collected in western Asia (Singh *et al.*, 2014f). The major population of India is primarily dependent on an agrarian- grounded system for their diurnal life, including scapegoat keeping that constitutes an important pastoral business of small borderline growers and landless sloggers (Singh *et al.*, 2014g). The product and use of beast products in the use of mortal diet is entering tremendous attention (Singh *et al.*, 2012)^[14]. The productive advancements among dairy creatures can be made through proper operation, feeding, handling, etc., which may impact the expression of productive characters as per their heritability nature. Before relating the creatures for parentage and product purposes, webbing of creatures shall be performed on the base of physical traits (Singh *et al.*, 2013)^[15]. The scapegoat population of our country increased from 47.14 million in the time 1951 to 124.5 million during 2005 (Singh and Sharma, 2013a)^[16] and (Singh *et al.*, 2013b)^[15]. Creatures reared in ferocious product systems consume a considerable quantum of protein and other nitrogen- containing substances in their diets (Singh *et al.*, 2017a). Small ruminants have a large impact on the frugality and food force of people in tropical and tropical countries. This benefit is frequently not shown in public statistics because of informal trading and slaughtering (Singh and Sharma, 2017b). There are adverse ecological and physiological constraints in the Indian system of scapegoat husbandry (Singh *et al.*, 2014a). The global scapegoat population presently stands at 921 million, of which over 90 are set up in developing countries. Asia is home to about 60 of the total world scapegoat population and has the largest scapegoat strain share of 26.

Non-cattle milk accounts for roughly 15 of the total milk consumption by humans worldwide (Singh *et al.*, 2014c). The Jakhrana strain is set up in the north- west arid and semi-arid regions substantially in eastern Rajasthan. The strain derives its name from the Jakhrana village in Alwar quarter where it's set up in its purest form. They're large creatures. The fleece is generally black with white spots on the cognizance and the nib is short and lustrous. The face line is straight, with a narrow and slightly bulging forepart. The strain looks analogous to the Beetal, the major difference being that the Jakhrana is high. The observance length is medium and the udder is large, with conical teats. Does are reared for milk. A maturity of the bucks is vended for meat, with a small number retained for parentage (Verma *et al.*, 2004, Singh *et al.*, 2014h).

Originating in Asia, scapegoats have spread over all the main lands and inhabit nearly all climatic zones from the Arctic Circle to the ambit (Singh, G., 2024). In moment's competitive business terrain every association is dependent on environmental forces for meeting the organizational objects and hype through announcements offers an occasion for the marketable as well as non-commercial associations to manage up with the fast changes and spread applicable information (Sharma and Mehta, 2020). Operation and association are an integral part of every business and it includes the conditioning of setting pretensions, relating course of action, framing plans and perpetration through collaboration of professed and unskilled labour to achieve service association (Sharma, K. 2019). Along with the provident development, knowledge workers as a carrier of intellectual capital, come necessary crucial people for enterprises to make and maintain a competitive advantage (Sharma and Mehta, 2020a, Sharma, *et al.* 2020b). Scapegoats, which were known as "wet nursers of babies" in the United Kingdom and "poor man's cow" in India, were the first creatures to be domesticated. Goat milk contains less lactose than cow's milk, so it's less likely to spark lactose dogmatism (Singh and Sharma, 2015). The scapegoat was domesticated as early as 6- 7 BC, as substantiated by archaeological remains collected in western Asia. It has since played a significant socioeconomic part in the evolvement of mortal civilization around the world (Singh and Sharma, 2015a). Pearl millet was honored as a main source of energy for beast and is fed at critical times, similar as during lactation, illness, and for weight gain. Farmers felt that lawn is more useful to fill the creatures' tummies and would thus come ahead crop stover as a feed. Farmers preferred Deda over Kona because it has further biomass (Singh and Sharma, 2015b). This explains why scapegoat growers infrequently consider the possibilities of adding product through either crossbreeding or artificial copulation. A veritably important aspect in this regard is the mindfulness of threat by resource-poor growers and their emphasis on minimizing it (Singh and Sharma, 2016). Scapegoats play a vital socio- profitable part in Asian husbandry, particularly for resource-poor people living in harsh surroundings. Scapegoats, being a multipurpose beast, produce meat, milk, skin, fiber, and ordure. The country is endowed with a large and biologically different population of scapegoats (Singh and Sharma, 2016a and Singh, G. 2019).

India is endowed with a significant share of the world's beast population, growing steadily and continuously. Buffalo are generally creatures of poor countries with a

veritably high viscosity of beast and mortal population and with poor feed coffers. In tropical and tropical regions, dairy cattle generally depend simply on native or introduced ranges as their only source of nutrients, and in particular, during critical ages of the time, similar as the downtime or dry season, the creatures cannot fulfill their nutrient conditions because probe is either scarce or of low quality (Singh, G., 2019a). Milk- concealing apkins and colorful tubes throughout the udder can be damaged by bacterial poisons, and occasionally endless damage to the udder occurs. Severe acute cases can be fatal, but indeed in cows that recover, there may be consequences for the rest of the lactation and posterior lactations (Singh and Singh, 2020). Beast has come an integral part of all interventions aimed at reducing pastoral poverty and enhancing food and nutrition security. The dairy beast possessors who raise cattle and buffaloes are yet ignorant of scientific operation practices (Singh and Somvanshi, 2020a). Mortal Resource Management facilitates enforcing of colorful HR functions like reclamation, induction, training, performance appraisal, etc. and engulfs planning & development of workers or preservation of knowledge capital (Sharma and Agrawal, 2020c). Environmental sustainability refers to conserving the terrain for unborn generations and support mortal life. It's an action that involves decision making that protects the natural world and realise the full impact of business associations on the terrain (Sharma and Agrawal, 2021). The changing circumstances and the zeal to learn have canceled the hassles and walls of tutoring from remote destinations and owing to the growing significance of lifelong literacy, online literacy has come a popular tool for learning in adverse conditions (Sharma and Choudhary, 2020d). The nutritive value of milk is nearly related to its composition, which is affected by factors similar as strain, diet, stage of lactation, and season. Goat milk has further calcium (Ca), phosphorus (P), potassium (K), magnesium (Mg), and chloride (Cl), and lower sodium (Na) and sulfur (S) compared to cow milk (Singh *et al.*, 2024b). Minerals are needed by dairy creatures for their metabolic functions, growth, milk product, reduplication, and health. Creatures cannot synthesize minerals inside their bodies, and generally, feeds and fodders fed to the dairy creatures do n't give all the minerals in the needed volume (Singh *et al.*, 2024c). The scapegoat is allowed to have been the foremost tamed ruminant and, of all the species of tamed creatures except the canine, has the widest ecological range (Singh *et al.*, 2024d). The productive advancements among dairy creatures can be made through proper operation, feeding, handling, etc., which may impact the expression of productive characters as per their heritability nature (Singh *et al.*, 2024e). The product and use of beast products in the use of mortal diet is entering tremendous attention (Singh *et al.*, 2025). Digital education is a precedence task of government of India and is pivotal to conduct education to the disinterested scholars of pastoral academy (Sharma and Choudhary, 2020e). Organization have grown interest in strategies which address environmental aspects and pursue new openings for sustainability creating a competitive geography to comeback the effect of environmental destruction and take into consideration association practices for initiating terrain protection (Sharma and Agrawal, 2019a). Education system in literal times was sound enough to conduct knowledge through practical training and erecting a strong relationship between Guru and Shishya

(Sharma, *et al.* 2020f). Health care Services are the primary need and is veritably pivotal for an frugality like India where a large population to serve the adding demand for high quality health care services (Sharma and Jain, 2021a). The competitive business terrain around the globe has made announcement an important tool for every association to produce a buzz in the society (Sharma and Gupta, 2017). Announcements to spread information regarding social issues are known as social announcements. In recent times, numerous marketable associations have initiated flashing their brands accompanying with a social communication which was before done only by government and non-government associations with an ideal of social weal (Sharma and Gupta, 2020g). Man, beast, and nature are in a symbiotic relationship for their survival and food. The balance maintained among the three for several glories has been disturbed by the overexploitation of natural coffers to meet the demands of the adding population of men and creatures (Singh *et al.*, 2024a). The nutritive value of milk is nearly related to its composition, which is affected by factors similar as strain, diet, stage of lactation, and season. Goat milk has further calcium (Ca), phosphorus (P), potassium (K), magnesium (Mg), and chloride (Cl), and lower sodium (Na) and sulfur (S) compared to cow milk (Singh *et al.* 2024b) and (Singh *et al.* 2025b). Minerals are needed by dairy creatures for their metabolic functions, growth, milk product, reduplication, and health. Creatures cannot synthesize minerals inside their bodies, and generally, feeds and fodders fed to the dairy creatures do n't give all the minerals in the needed volume (Singh *et al.*

2024c). The scapegoat is allowed to have been the foremost tamed ruminant and, of all the species of tamed creatures except the canine, has the widest ecological range (Singh *et al.* 2024d). The productive advancements among dairy creatures can be made through proper operation, feeding, handling, etc., which may impact the expression of productive characters as per their heritability nature (Singh *et al.* 2024e). The product and use of beast products in the use of mortal diet is entering tremendous attention (Singh *et al.* 2025c).

Materials and Methods

The research was conducted at the College of Agriculture, Nayla, Jaipur district of Rajasthan during 2022-24. The study was conducted in Mauzmabad Tehsil, Jaipur District, characterized by semi-arid climatic conditions with hot summers, monsoon rains, and cold winters. Data were collected from local goat farms maintaining indigenous and crossbred goat breeds under semi-intensive management systems. Monthly milk samples were collected from lactating goats over a one-year period to cover seasonal variations randomly. A total of 1200 milk samples were collected Mauzmabad tehsil. All samples were analyzed by an electronic milk analyzer. Data were analyzed using the ANOVA procedure of RBD (at 5% and 1% significance levels) for the statistical analysis of all milk samples. The results were statistically analyzed to determine the significance of seasonal variations.

Results and Discussion

Table 1: Effect of seasons on the composition of goat milk

Components	Seasons	Overall average	Test of significance	Table value (t) 5% 1%
Specific gravity	(i) Summer	1.0382±0.00032	1.441 ^{NS}	1.960 2.576
	(ii) Rainy	1.0301±0.00011	2.063 ⁺	
	(iii) Winter	1.0307±0.00037	1.984 ⁺	
	Overall mean	1.0330±0.00026		
Fat	(i) Summer	3.59±0.017	1.986 ⁺	
	(ii) Rainy	3.59±0.014	2.791 ⁺⁺	
	(iii) Winter	3.61±0.016	2.034 ⁺	
	Overall mean	3.59±0.016		
Protein	(i) Summer	3.79±0.029	2.116 ⁺	
	(ii) Rainy	3.34±0.028	2.341 ⁺	
	(iii) Winter	3.40±0.026	2.416 ⁺	
	Overall mean	3.515±0.025		
Lactose	(i) Summer	3.81±0.027	2.734 ⁺⁺	
	(ii) Rainy	3.92±0.021	4.316 ⁺⁺	
	(iii) Winter	4.12±0.016	5.103 ⁺⁺	
	Overall mean	3.96±0.023		
Ash	(i) Summer	0.85±0.009	1.994 ⁺	
	(ii) Rainy	0.78±0.008	2.314 ⁺	
	(iii) Winter	0.81±0.009	2.097 ⁺	
	Overall mean	0.81±0.009		
Total Solids	(i) Summer	13.09±0.039	3.083 ⁺⁺	
	(ii) Rainy	12.98±0.067	2.038 ⁺	
	(iii) Winter	13.09±0.039	5.634 ⁺⁺	
	Overall mean	13.09±0.089		
Solids-Not-Fat	(i) Summer	8.60±0.014	9.312 ⁺⁺	
	(ii) Rainy	7.77±0.024	8.169 ⁺⁺	
	(iii) Winter	8.27±0.028	10.631 ⁺⁺	
	Overall mean	8.22±0.021		

Note: NS=Non-Significant +=Significant at $p < 0.05$ ++ = Significant at $p < 0.01$

It is clear from the above table that the results on specific gravity of milk of different seasons are presented in Table 1. It indicated that the specific gravity of milk in different

seasons i.e. summer, rainy and winter was 1.0382±0.00032, 1.0301±0.00011 and 1.0307±0.00037, respectively. The overall average specific gravity of Mauzmabad Tehsil in

different seasons of all samples was 1.0330 ± 0.00026 . These data suggested that the specific gravity was higher in summer seasons and lower in rainy seasons. Our results on specific gravity in different seasons in the milk are in fair agreement with the findings of (Singh *et al.*, 2014b). The results on the fat percentage in the milk reared under conditions of Mauzmadabad Tehsil in summer, rainy and winter seasons was found to be 3.59 ± 0.017 , 3.59 ± 0.014 and 3.61 ± 0.016 . The overall average fat percentage of all samples was 3.59 ± 0.016 per cent. The higher fat per cent was recorded in rainy season in the samples. Our data on seasonal variation in the goat milk compared favorably with (Singh *et al.*, 2014e).

Protein percentage in the milk reared under conditions of Mauzmadabad Tehsil in summer, rainy and winter seasons was 3.79 ± 0.029 , 3.34 ± 0.028 and 3.40 ± 0.026 . The overall average protein per cent of aforesaid samples and seasons reared under conditions of Mauzmadabad Tehsil was 3.515 ± 0.025 . The results obtain in this investigation on the level of protein content are equal with the findings of (Singh and Sharma, 2014). It is evident from the table that the lactose content of milk reared under conditions of Mauzmadabad Tehsil in summer, rainy and winter seasons was found to be 3.81 ± 0.027 , 3.92 ± 0.021 and 4.12 ± 0.016 . The overall average lactose per cent in all samples was found to be 3.96 ± 0.023 . Our results on lactose content of goat milk in different seasons are corroborated by the observations of (Singh *et al.*, 2018) reported lower level of lactose in winter season in the milk of aforesaid goats where (Singh and Sharma, 2014) reported higher level of lactose content in different seasons in Jaipur and other goat breed's milk. Perusal of table indicated that the ash content of goat breed milk reared under conditions of Mauzmadabad Tehsil in different seasons i.e. summer, rainy and winter was found to be 0.85 ± 0.009 , 0.78 ± 0.008 and 0.81 ± 0.009 . The overall average ash content of goat breeds in all seasons was 0.81 ± 0.009 per cent. Our results on ash content in different seasons are greater than observations of (Singh *et al.*, 2025a).

The results laid down in table indicated that the total solids percentage in the milk of Jakhrana goats reared under conditions of Mauzmadabad Tehsil in summer, rainy and winter seasons was found to be 13.09 ± 0.039 , 12.98 ± 0.067 and 13.09 ± 0.039 . The overall average total solids percentage of all 1200 samples of milk was found to be 13.09 ± 0.089 . The value reported by (Singh and Sharma, 2014) for seasonal effect on total solids content in the goat breed's milk support results of present study. Solids-not-fat percentage in the milk of goat breed reared under conditions of Mauzmadabad Tehsil in summer, rainy and winter seasons was found to be 8.60 ± 0.014 , 7.77 ± 0.024 and 8.27 ± 0.028 . The overall average solids-not-fat content of all animals' milk in all seasons was 8.22 ± 0.021 per cent. The results of present investigation on the level of solids-not-fat per cent in different seasons are similar with the findings of (Singh and Sharma, 2014) whereas, (Singh *et al.*, 2017c) reported lower values on it. In the summer season it was high temperatures and heat stress resulted in reduced fat and protein content. Water intake increased, leading to a dilution effect on milk components. In the monsoon season, improved pasture availability contributed to an increase in milk fat and protein content. Higher humidity and moderate temperatures positively influenced milk quality. In the winter season, it was cold temperatures led to higher fat and

protein content, attributed to increased dry matter intake and lower metabolic stress in goats.

Conclusion

The specific gravity, fat, calcium, phosphorus, potassium, magnesium and chloride percentage in the milk of goat under seasonal conditions was significantly differ. Season has conspicuous effects on milk quality of goats. Seasonal variations significantly influence the composition of goat milk in Mauzmadabad Tehsil. Understanding these changes can help farmers adopt suitable management practices to maintain consistent milk quality. Future studies should explore nutritional interventions and breeding strategies to mitigate seasonal fluctuations.

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