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PHYSIO – CHEMICAL QUALITIES OF THE TODA BUFFALO MILK

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ABSTRACT
Toda buffaloes are still being reared by the most ancient tribes of the Nilgiris, Tamil Nadu with their major occupation constituting buffalo rearing and dairy. They are a closed knit unit. As like their tribe the Toda buffalo is also unique and there is paucity of information regarding the physio – chemical qualities of their milk. The present investigation was carried out to analyse the qualities of physio-chemical values of Toda buffalo's milk. A total of 30 milk samples were collected from Toda buffaloes, from in and around the Nilgiris district of Tamil Nadu. There are numerous variations were observed in the qualities of raw Toda buffaloes milk. Specific gravity mean values were 1.0350 $\pm$ 0.001 and freezing point mean values were 0.570 $\pm$ 0.003°C. The chemical qualities like total solids, solids not fat, fat, protein and lactose mean values were 22.41 $\pm$ 0.18, 12.13 $\pm$ 0.30, 9.327 $\pm$ 0.27, 4.61 $\pm$ 0.16 and 5.63 $\pm$ 0.16. The present manuscript concludes that comparatively Toda buffaloes milk have higher nutritive values with other breeds of non-descript and cross bred buffaloes, further research is warranted at individual level to come to discrete conclusions

KEY WORDS: Toda buffalo – Milk – Physio- chemical properties – Nilgiris.

INTRODUCTION
Toda breed of buffaloes is named after an ancient tribe, Toda, of South India. Toda buffaloes and its religious care maintenance of Toda people were accounted by various researchers [14,16]. Earlier apart from Toda people, Badagas and Kotas communities also maintained the Toda buffaloes in small number. These buffaloes are unique breed, quite distinct from other breeds and are confined to Nilgiri hills of Tamil Nadu. The animals have long body, deep and broad chest, and short and strong legs and are identified by their semi circular horns. They are gregarious in nature. Toda buffaloes are good milkers, yielding from 4.4 to 8.8 litres of very rich milk. The average daily milk yield in Toda buffaloes was reported to be 2.53 ± 0.06 kg [8]. There is very less research pertaining to the Physio-chemical qualities of the milk of Toda buffaloes. Understanding the physical and chemical characteristics of indigenous breeds like Toda buffaloes milk is predominantly important to elucidate the characteristic nutritive value of milk. This manuscript mainly aimed to record the physiological and chemical qualities of Toda buffalo's milk and the findings are discussed.

MATERIALS & METHODS
A total of 30 milk samples of Toda buffaloes were obtained two munds or hamlets, namely Tharanadu and Kariya located in the Nilgiri district of Tamil Nadu. Milk samples were collected from days first milk in morning time in a clean and sterile sample container and were taken the chilling centre laboratory at the ooty Aavin Milk depot, Nilgiris for specific analysis. To estimate specific gravity, total solids, solid not fat, fat, protein, lactose and freezing point, the samples were analysed with LACTOSCAN machine. The data were analyzed using computer package SPSS release 7.5, copyright, 1996, SPSS Inc.).

RESULTS
The Physio-chemical qualities of the milk of Toda buffaloes were estimated and the results are tabulated (Table 1 & Table 2).

TABLE 1: Physical characteristics' of Toda buffaloes milk

S. No	Physical parameters	Value with standard error	Values ranges
1.	Specific gravity / Density (%)	1.0350 $\pm$ 0.001	1.0301 to 1.0502
2.	Freezing point (°C)	0.570 $\pm$ 0.003	0.528 to 0.599

TABLE 2: Chemical characteristics' of Toda buffaloes milk

S. No	Chemical parameters	Value with standard error (%)	Values ranges (%)
1.	Fat	10.72 $\pm$ 0.20	9.24 to 14.82
2.	Solid not fat	11.69 $\pm$ 0.23	9.02 to 13.92
3.	Total solids	22.41 $\pm$ 0.18	20.24 to 23.94
4.	Lactose	5.63 $\pm$ 0.16	3.98 to 7.65
5.	Protein	4.61 $\pm$ 0.16	3.21 to 6.21

DISCUSSION

Specific gravity or density of milk is used in conjunction with the fat test to estimate the content of total solids. In this present investigation, the variation in the physical characteristics of Toda buffaloes milk were analysed and specific gravity varied from 1.0301 to 1.0502 and the mean value is 1.0350 ±0.001. These results were agreement with the limit values of other Buffalo species. [4, 10,11,12]. The freezing point of milk depends on the concentration of water-soluble constituents of milk. The objective of the measurement of freezing point of milk is virtually restricted of water determination of water content of the product to detect illegal addition of water. The variation of freezing point in Toda buffaloes was around 0.570°C ±0.003 and ranged between 0.528 to 0.599°C. These findings concurred with [6] (0.518 °C to 0.590 °C). The Freezing Point of Italian buffaloe milk was affected by season (0.528 °C and 0.531 °C in warm and cold weather, respectively) and farm size (0.532 °C and 0.519 °C in small and large farms, respectively [15]. The freezing point of buffalo milk in Germany ranged from 0.5509 °C to 0.5146 °C [3]. These variations of freezing point of buffalo's milk may be due to the lag in time before analyzing, vacuum treatment, cold storage, and the addition of water increases the freezing point.

Commercially, fat is the most important constituent of milk. It is also the most variable fraction in milk. The percentage of fat in the milk may vary with in individuals and influenced by several factors. In this present study, the fat percentage varied from 10.72 ± 0.20 (9.24 to 14.82). This was found to be slightly elevated to the findings of [9] and [13] with the value of 6.99-8.41 per cent. The reason for the increase in fat content may be due to the grazing patterns, increase utilization of common straw, which increases the acetic acid component, thus increasing fat content. It can be logically reasoned that the genetic makeup of the animal naturally attributes to the fat content.

Solid not fat, values of present study (11.69 ± 0.23) was slightly increased with to the reports of [13] with the value of 9.89 ± 0.15 percent. In the present investigation, total solids values were 22.41 ± 0.18 which ranged from 20.24 to 23.94. This variation was in coincidence with the findings of [1, 2, 13, 17]. Lactose also known as milk sugar is present exclusively in mammalian milk, lactose is a least variable and most unstable constituent of milk being quickly fermented by microorganisms. Lactose is also responsible for texture, colour and flavour of milk. In the present study the lactose value was 5.63 ± 0.16 and ranged from 3.98 to 7.65. Lactose content found in buffalo milk was slightly increased with the findings of [8, 9]. Recorded protein values in this study were 4.61 ± 0.16 with the range from 3.21 to 6.21. The results were elevated with the findings of [2, 5, 7].

CONCLUSION

The of physio-chemical values of Toda buffaloes milk were estimated and the revealed findings of specific gravity, total solids, solid not fat, fat, protein, lactose higher than that of other cross bred buffalo breeds. This elevation could be associated with various factors like topography, natural grazing pattern and type, individual variation, environmental factors, meteorology and the genetic makeup of the animal. So, the present study

concludes that comparatively Toda buffaloes milk have higher nutritive values with other breeds of non descript and cross bred buffaloes, further research is warranted at individual level to come to discrete conclusions.

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