A preliminary study on Milk Urea Nitrogen values of the Ambewela farm

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Introduction

Feeding management is a key factor in profit maximizing of a dairy farm. Milk Urea Nitrogen (MUN) is a tool that measures the efficiency of protein and carbohydrate feeding to milking cows (Jonker *et al*., 1999). Implementing routine use of MUN on dairy farms could reduce nutrient loading to natural environments and improve farm profitability (Jonker *et al*., 2002). According to Kohn (2007) dairy herds should have MUN concentrations between 8 to 12 mg dL^{-1}. However, the MUN values could be affected by many factors such as environment, breed, feed, season, etc. (Godden *et al*., 2001). Hence the use of 8 to 12 mg dL^{-1} MUN values to evaluate the dairy herds in the Sri Lanka would be inappropriate, since there were no studies carried out in to determine the baselines of MUN values in Sri Lanka. Therefore, this study has been carried out as a preliminary study, to study about the prevailing MUN values of one of the commercial dairy farm in Sri Lanka.

Methodology

The study was conducted at Ambewela farm and Veterinary Research Institute, Sri Lanka. Four groups of the milking herd in the Ambewela farm (treatments) which have been made based on the production levels of the cows were used to collect milk samples. Samples from each group were taken once in fortnight during three months' experimental period. During each sample collection, 15 cows were selected randomly from each group and 50 mL of milk from each cow was obtained after complete milking. Milk from five cows belonging to each group was pooled. Hence, each treatment consisted with three replicates. Milk fat was analyzed using the Gerber method. Solids-non-fat (SNF), protein, salts and lactose contents were measured using a portable ultrasonic milk analyzer (Lactoscan MCC, Milkotronic Ltd., Bulgaria). Lacto meter was used to measure the milk specific gravity. The urea content in milk was estimated according to the method described by Malik and Sirohi (1998) and the optical density of the sample was measured at 450 nm using the spectrophotometer (Cary 50 Conc - 10069600, Agilent Technologies, Australia). In the statistical analysis, according to the normality of the sample data test by Anderson-Darling test, the relationships were evaluated using multiple regression analysis or Spearman Rank Correlation Coefficient. STATA S/E ® 11.2 and Minitab ® 17 software were used in statistical analysis of the data. The MUN levels were interpreted based on the current recommended levels of Kohn (2007).

Results and Discussion

The results revealed that the milk fat%, SNF%, protein%, lactose%, and specific gravity does not have a significant relationship with MUN ($P>0.05$). Similarly Godden *et al.* (2001) have stated that there is no association between MUN and either milk fat or true protein percentages. Broderick and Clayton (1997) also confirm that there is no significant relationship between milk SNF% and MUN values. Therefore, it can be stated that MUN values are not related with fat%, SNF%, and protein% in dairy cow milk.

The variation of MUN values of each group in the selected weeks of experimental period are shown in Figure 01.

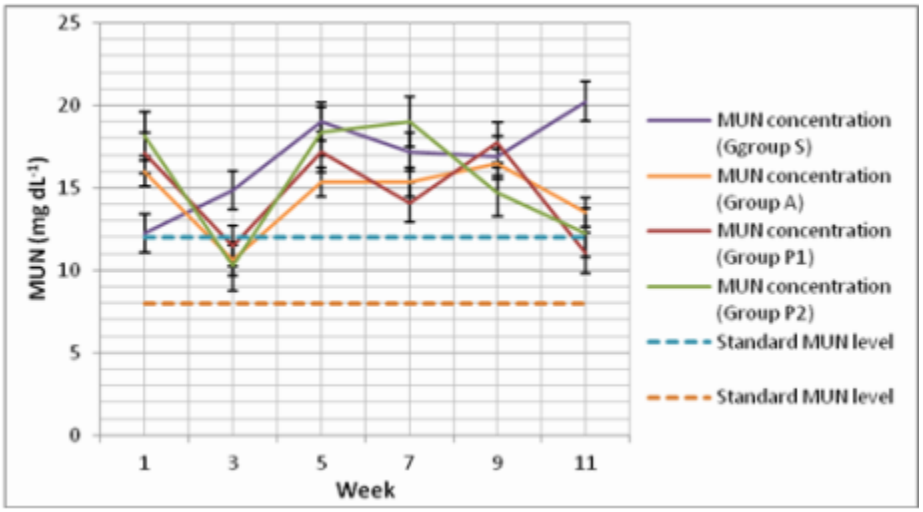

Figure 01: Average MUN concentrations of different groups during the experimental period

All the groups showed higher MUN values during the experimental period except in 3rd and 11thweeks. On the 3rd week, all groups and on the 11th week, group P1 and P2 showed MUN values close to the upper limit of Kohn (2007). However, on 11th week also group S and A showed higher MUN values than the reference range. Moreover, the analysis of mean MUN values of each group during the experimental period also revealed mean MUN values of each group is higher than the recommended levels of Kohn (2007) (Table 01).

The highest mean MUN value is recorded in Group S consisting highest producing cows. High levels of MUN are generally interpreted as an indication of inefficient utilization of protein, which is economically unfavorable. However, high MUN values could be found in high producing cows due to high protein provided with their rations. (Godden *et al.*, 2001).

Feed formulation records of the farm did not indicated any higher deviations from the standard NRC recommendations for dairy cattle feeding. Therefore, the higher mean MUN values cannot be strictly interpreted along with inefficient utilization of protein. Hence, establishment of MUN reference range for Sri Lankan dairy herds for evaluation of efficient dietary nutrient utilization is an essential.

Table 01: Mean MUN values of different groups during the experimental period

Group	Mean MUN □ SEM (mg dL^{-1})	Standard deviation	Max (mg dL^{-1})	Min (mg dL^{-1})
S	16.75 □ 1.17	2.87	20.24	12.25
A	14.53 □ 0.89	2.17	16.43	10.59
P1	14.77 □ 1.23	3.01	17.72	11.04
P2	15.46 □ 1.49	3.64	19.02	10.24

SEM- Standard Error of Mean

Conclusion

The mean MUN values of each milking cow group were higher than the recommended range indicating the inefficient utilization of protein in the ration given to these groups. However, the feed formulation records did not indicated higher deviations from the recommended nutritional requirements of these animals. Therefore, further research is needed to make the baseline levels of MUN to farms of Sri Lanka.

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