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THEME 9 | RUMINANT NUTRITION AND PRODUCTION

Seasonal effect and milking schedule on the behavior of urea nitrogen, milk urea nitrogen and urinary urea nitrogen

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Nitrogen urea is an indicator of diet balance. This is metabolized from protein intake to ammonia and then to seric urea (SU) in the liver, passes on to plasma and by diffusion to the mammary gland and eliminated as milk urea nitrogen (MUN), another portion is eliminated with the urine (UU). The objective of this study was to determine the behavior of SU, MUN, UU and protein measurements in two milking schedules (morning and afternoon) and in three seasons of the year: spring-summer (SS), autumn (AU) and winter (W). The study was performed in the district of Etna, Oaxaca, Mexico. Blood, urine and milk samples were collected from 185 Holstein cows with body condition ≤ 2.5 . Samples were processed immediately after collection determining MUN (mmol/L), SU (mmol/L), UU (mmol/L), total protein TP (g/L), albumin A (g/L) and globulin G (g/L) by enzymatic method with spectrophotometer under the chemical specifications for each reagent. The data were subjected to analysis of variance under a 2x3 factorial arrangement; fixed variables were season of the year and milking schedules. The mean square test was used to detect differences ($P < 0.05$). An effect ($P < 0.05$) of the interaction seasons* schedules of milking was observed in all variables analyzed. With the exception of G, all variables were found within reference values for the species and productive stage. The values of G in seasons and in both milking schedules are the following, SS: 18.85 ± 1.1^{bc} and 18.2 ± 1.1^c ; AU: 18.2 ± 1.1^c and 21.26 ± 1.3^{ab} ; W: 21.38 ± 0.9^{ab} and 23.08 ± 0.9^a , increasing the immune activity in winter afternoon ($P < 0.05$). As for the morning and afternoon determinations of SU were SS: 4.64 ± 0.28^{bc} and 5.7 ± 0.28^a , AU: 5.38 ± 0.33^{ab} and 5.57 ± 0.33^a ; W: 4.4 ± 0.23^c and 4.71 ± 0.23^{bc} associated with UU in SS: 0.28 ± 0.04^a and 0.28 ± 0.04^b , AU: 0.06 ± 0.06^b and 0.12 ± 0.06^b , W: 0.34 ± 0.04^a and 0.36 ± 0.04^a , AU presents higher levels of SU and the lowest levels of UU, however TP has an effect in the following morning and evening values in SS: 53.14 ± 1.4^b and 54.81 ± 1.14^{ab} ; AU: 54.19 ± 1.36^b and 51.86 ± 1.36^b ; W: 56.19 ± 1.36^a and $\pm 0.94^a$; where the highest values were observed in winter, the SU concentrations in the afternoon may be associated with the diffusion of urea nitrogen from mammary gland into plasma to continue synthesizing as protein. Unlike the MUN values that shown in the morning values and afternoon SS: 1.93 ± 0.11^{bc} and 2.22 ± 0.11^a ; AU: 1.85 ± 0.8^{bcd} and 1.64 ± 0.13^{cd} ; W: 2.02 ± 0.08^{ab} and 1.63 ± 0.09^d , although the cows had poor body condition the MUN is in optimal balance. The effect continues in A with the following values in morning and afternoon SS: 34.9 ± 0.6^{ab} and 35.9 ± 0.6^a ; AU: 34 ± 0.7^{bc} and 32.2 ± 0.7^c ; W: 33.9 ± 0.5^{bc} and 32.7 ± 0.5^c , the general behavior in SS can be attributed to the quality of the forages favoring the balance between protein and energy in the diet. In conclusion seasonal effect is evident in winter were the levels of MUN, SU and UU are lower in both times of the day, due to the availability and quality of forages used affecting energy and protein balance more evident in afternoon samples, the best season is SS with the highest levels of variables there for the use of MUN is not sensitive to evaluate the protein balance in cows with low body conditions and metabolic challenges, but it is evaluating the balance of the protein ration at different times of the year.

Keywords: Milk Urea, globulins, albumin, protein