

Urinary copper excretion in Simmental and Angus cattle fed diets with varying levels of copper, molybdenum and sulphur

K K Pathirana¹, S R Gooneratne² and Thakshala Seresinhe^{1*}

¹*Department of Animal Science, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya, Sri Lanka and*

²*Animal and Food Sciences Division, P.O. Box 84, Lincoln University, Canterbury, New Zealand*

Copper (Cu), which is an essential trace mineral, has been of much interest due to its well recognized deficiency and toxicity syndromes. These syndromes, particularly as a function of its interrelationship with Mo and S as reported over four decades ago has been of continued interest. This paper presents the urinary flow and its concentrations and excretions of Cu in Simmental and Angus breeds of cattle fed varying dietary levels of Cu, Mo and S. Eight, 10-mo-old heifers; four each of Simmental and Angus weighing 209 ± 18 (SD) and 192 ± 34 kg, respectively were fed a diet with levels (mg/ kg diet) of Cu at low (LCu 5) or high (HCu 40), molybdenum at high (HMo 10) and sulfur at high (HS 0.5% of diet) levels in six diets designated as LCu, HCu, LCu-HS, HCu-HS, HCu-HMo and HCu-HMo-HS. All animals were sequentially fed on each diet for two months. Urine volume measured and sampled at the end of one and two months. The lowest and the highest ($P < 0.05$) flow of urine (L/ 6 h) were with LCu (2.133) and LCu-HS (3.173) diets, respectively. Highest ($P < 0.05$) urinary Cu concentration (mg/ L) and excretion (mg/ 6 h) were with the HCu-HMo-HS diet ((0.116 and 0.292, respectively) while the lowest ($P < 0.05$) were with HCu-HMo (0.064 and 0.161, respectively). Thus, urinary Cu-excretion increased ($P < 0.05$) in HCu diets with a combination of HMo and HS (HCu-HMo-HS diet). Non-significant ($P < 0.05$), but a greater tendency for the flow of urine (L/ 6 h) with a higher concentration (mg/ L) and excretion (mg/ 6 h) of Cu in Simmental (2.746, 0.087 and 0.213, respectively) compared with Angus (2.617, 0.084 and 0.201, respectively) agree with previous reports on the greater susceptibility of the former breed to Cu deficiency. Indications are that, in addition to the levels of S and Mo in the diet, breed differences in the metabolism and excretion of Cu need to be considered in looking at the susceptibility to deficiencies and toxicities in nutritional recommendations of dietary Cu levels.

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