GLUCONEOGENIC ENZYMES ACTIVITIES IN SHEEP SUPPLEMENTED WITH NON PROTEIN NITROGEN

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Introduction: Ureagenesis is efficiently coordinated with the gluconeogenic pathway, being performed mainly if not exclusively by the liver. Liver FBPase is stimulated by ammonia and recognized as one of the major regulatory enzymes of gluconeogenesis. Meanwhile, ammonia interferes in gluconeogenesis in ruminants reducing \textit{in vitro} conversion of propionate to glucose.

Objective: The effect of non protein nitrogen (NPN) supplementation on activities of gluconeogenic and ureagenesis complementary enzymes of sheep fed with lucerne hay every 8h (460KJ/kg$^{0.75}$/d) was investigated.

Material & methods: Three groups of six sheep each, control, moderate (MN) and high (HN) NPN were used. Urea was incorporated to the ration of the groups MN (0.55g N/kg$^{0.75}$/d ) and HN (1.28N/kg$^{0.75}$/d). Three animals of each group were slaughtered on days 9 and 17 of the experiment. The liver activities of the gluconeogenic (PEPCK EC:4.2.2.32, FBPase EC: 3.1.3.11, aldolase EC: 3.1.2.13) and ureagenic complementary (GLDH EC: 1.4.1.2, AST EC: 2.6.1.1 and ALT EC: 2.6.1.2) enzymes were determined and expressed as means ± SD of the total activity in mM/min.

Results: Liver PEPCK activity was higher in the HN group (6965 ± 845) than in the MN (5174 ± 629) and control (4916 ± 800) groups (P< 0.05, this diference suggest a metabolic adaptation in gluconeogenesis capacity in animals fed with high NPN. The liver activities of FBPase (2119 ± 1090, 2458 ± 548, 2830 ± 1146) and aldolase (2950 ± 507, 3219 ± 714, 3469 ± 345) were similar (P>0.05), in the groups control, MN and HN respectively but a trend to increase the activities of FBPase and aldolase was appreciated in the animals treated with NPN. The liver PEPCK and aldolase activities were relationated (r= 0.63; P< 0.05), but this not observed with others gluconeogenic enzymes. The complementary enzymes of ureagenesis had similar activities between groups control, MN and HN (GLDH: 90798 ± 19676, 59390 ± 15923, 76048 ± 36473; AST: 18065 ± 7435, 19533 ± 4747, 26172 ± 12592 and ALT: 1600 ± 647, 1515 ± 390, 1811± 489), respectively. However was appreciate a trend to increase the activity of the AST and ALT in the animals treated with NPN.

In conclusion: Non protein nitrogen supplementation in sheep produces an increment on PEPCK activity.

Keywords: NPN, gluconeogenesis, sheep, enzymes