LIVEWEIGHT GAINS AND NUTRITIONAL BIOCHEMISTRY OF CATTLE GRAZING TAGASASTE DURING AUTUMN

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Tagasaste *(Chamaecytisus palmensis)* is a perennial legume of shrubby habit grown extensively on the deep sands of the West Midland district immediately north of Perth. Cattle grazing tagasaste during winter and spring increase liveweight at one kilogram per day or better. However, during summer and autumn, cattle will only maintain liveweight, even though the chemical analysis of the leaf and young stem material from tagasaste during this period of the year is consistent with sufficient crude protein and energy for growth. Here we report some of the ruminal and metabolic factors that are associated with this poor growth during summer and autumn and also the effects of barley supplementation on liveweight gain.

A grazing trial was conducted from February to May 1994 at a private farm, Dunmar (near Badgingarra, 250 km north of Perth) using Shorthorn weaner steers weighing an average of 238 ± 2.8 kg in January 1994. The steers were allocated to one of two treatments according to ranked liveweight; a control group of 31 steers grazing tagasaste (13.7% crude protein and 66% in vitro dry matter digestibility or 9.4 MJ ME/kg DM) at two steers per hectare, and a high grain group of 39 steers receiving barley (10.5% crude protein and 11.5 MJ ME/kg DM) supplements at 1.5% liveweight and grazed at four steers per hectare. Virginiamycin was included at 4 ppm with the barley to protect against acidosis. The cattle were weighed every 21 days. After 105 days of grazing, rumen and blood samples were collected from 10 animals in the control group and 11 in the barley group. The rumen samples were analysed for volatile fatty acids, plasma samples were analysed for glucose, urea, creatinine, albumin, total protein, aspartate transaminase, γ-glutamyl transferase, creatine kinase, Ca, P, Mg, Cu, Zn and blood samples for glutathione peroxidase.

Cattle grazing tagasaste alone lost weight during the trial (-0.07 ± 0.02 kg per day) and those cattle receiving barley supplementation grew at only 0.46 ± 0.03 kg per day. Given the possibility of salivary contamination in rumen tube collections and feed intake factors, we have chosen to present the VFA data as a ratio of the molar sum of the short-chain fatty acids: acetic, propionic and butyric acids relative to the branched-chain: isobutyric and isovaleric acids, and medium-chain fatty acids: pentanoic, hexanoic and heptanoic acids. This ratio was significantly ($P<0.01$) higher (79.1 ± 9.4) in cattle grazing tagasaste compared with 29.6 ± 5.2 in cattle also receiving barley supplements. Plasma urea nitrogen and creatinine were both significantly higher ($P<0.05$) in the tagasaste group (4.5 ± 0.3 mM and 213.3 ± 7.1 RM respectively) compared with the barley supplemented group (3.4 ± 0.2 mM and 173.1 ± 7.0 RM respectively). Plasma glucose, protein, albumin, Ca, P, Mg Cu and Zn, and the plasma enzymes were all within normal reference ranges for the Veterinary Clinical Pathology Laboratory at Murdoch University. Blood glutathione peroxidase activity decreased significantly ($P<0.05$) from 37.4 ± 2.3 EU/g Hb in the tagasaste group to 24±1.0 EU/g Hb in the supplemented group.

Cattle grazing tagasaste did not increase their live weight during the autumn. Barley supplemention provided moderate liveweight gains and certainly less than the growth rates seen in spring with tagasaste. In the tagasaste group, there was the relative lack of ruminal branch-chain and medium-chain fatty acids which are carbon precursors for amino acid synthesis by ruminal bacteria. Moreover, the higher plasma urea-N and creatinine values may be indicative of endogenous protein mobilisation. Thus an inadequate supply of microbial protein, which would normally comprise the majority of the protein digested and absorbed in cattle, may be the reason for the lack of growth in cattle grazing tagasaste during the summer/autumn period.

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