PLASMA AND LIVER VITAMIN $B_{12}$ CONCENTRATIONS IN CATTLE

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Plasma vitamin $B_{12}$ has been used in sheep to assess current cobalt intake, although it cannot be used to predict liver $B_{12}$ reserves (Sutherland 1980; Millar and Albyt 1984). In cattle, few data are available regarding plasma $B_{12}$ concentrations as indicators of $B_{12}$ status.

The aim of this study was to examine the relationship between plasma and liver $B_{12}$ concentrations in cattle.

Hereford cross heifers of about 4 months of age were housed in individual pens and fed a diet of pelleted hay and barley (50:50, cobalt 0.04 mg/kg DM). Animals were allocated to one of 3 treatment groups (5 per group) based on liveweight and liver $B_{12}$ concentration.

The treatments were:
- Control (no added cobalt)
- Supplemented (0.5 mg cobalt daily) pair-fed to control
- Supplemented, with ad libitum diet

Samples of blood and liver were taken at intervals over an 8-month period. Vitamin $B_{12}$ in blood and liver was determined using a radioisotope dilution method (Judson et al. 1988).

There was no difference in feed intakes or liveweights (mean increase 420 g/day) between groups during the experimental period.

![Fig. 1. Liver $B_{12}$ (nmol/kg) and plasma $B_{12}$ (pmol/L) concentrations in cattle fed diets without cobalt supplement (control) or supplemented and either pair-fed to control or fed ad libitum.](image)

Analysis of variance showed a time x treatment interaction ($P < 0.05$) for plasma $B_{12}$ and a time effect ($P < 0.001$) for liver $B_{12}$. Tukey’s test indicated that mean plasma $B_{12}$ of pair-fed animals was significantly greater ($P < 0.05$) than controls at week 32. Regression analysis demonstrated a parallel response in the pair-fed ($P < 0.001$) and ad libitum ($P < 0.001$) animals for liver and plasma $B_{12}$ but different intercepts and slopes ($P < 0.001$) for the control animals. Plasma $B_{12}$ in cattle was not very responsive to cobalt supplementation but increased at the same rate as liver $B_{12}$ (Fig. 1). Clarke et al. (1986) found similar trends in cattle at pasture with adequate liver $B_{12}$. In controls there was no relationship between the 2 variables. These results cast doubt on plasma $B_{12}$ as a reliable guide to cobalt intake in cattle. It also appears that 0.04 mg/kg cobalt in the diet was not sufficiently low to induce a clinical $B_{12}$ deficiency.


