

## Vitamin A status of heifers fed a diet deficient in $\beta$ carotene

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### Introduction

Ruminants derive their retinol (vitamin A) requirements from  $\beta$ -carotene and generally have sufficient liver reserves to maintain healthy function through dry periods, but clinical vitamin A deficiency has been reported in cattle during prolonged drought (Hill *et al.* 2009). The level of endogenous reserves at which animals become symptomatic are unclear and manifestation of the disease seems highly variable (Jones *et al.* 1943). We characterised blood and liver retinol levels in growing heifers from a common background, systematically deprived of dietary  $\beta$ -carotene.

### Material and Methods

Yearling Brahm heifers (n=30) were fed a  $\beta$ -carotene deficient diet consisting of wheaten straw *ad lib* and a wheat-based pellet, throughout the trial. Blood was collected monthly, liver tissue biopsied every 90d and weight recorded weekly. Retinol concentrations were determined by HPLC.

### Results and Discussion

LW increased from 179kg (SEM 2.66 kg) at 0d to 306kg (SEM 4.15kg) at 176d. Initial serum and liver retinol concentrations decreased by 29% and 91% respectively, over the corresponding period (Fig. 1). No animals displayed signs of vitamin A deficiency during the depletion period.

Decline in liver retinol over ~180d agreed with Kohlmeier and Burroughs (1970) for cattle fed dry-forage, but observed poor correlation between blood and liver retinol, except when critically low, suggesting serum retinol levels are not reliable indicators of Vitamin A reserves in young cattle.

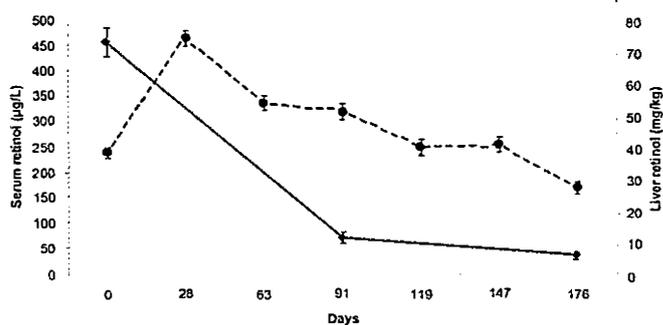


Fig. 1. Serum (---●---) and liver (—◆—) retinol in heifers systematically deprived of  $\beta$ -carotene.

### References

- Hill B, Holroyd R, Sullivan M (2009) Clinical and pathological findings associated with congenital hypovitaminosis A in extensively grazed beef cattle. *Aust Vet J* **87**, 94-8.
- Jones JH, Schmidt H, Dickson RE, Fraps GS, Jones JM, Riggs JK, Kemmerer AR, Howe PE, Black WH, Ellis NR, Marion PT (1943) Vitamin A studies in fattening feeder calves and yearlings. *Bull Texas Agric Exp Sta* **630**, 1-52.
- Kohlmeier RH, Burroughs W (1970) Estimation of Critical Plasma and Liver Vitamin a Levels in Feedlot Cattle with Observations upon Influences of Body Stores and Daily Dietary Requirements. *J Anim Sci* **30**, 1012-1018.

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