

AN *IN VITRO* SYSTEM TO DETERMINE THE DIGESTIBILITY OF FEEDS FOR HORSES

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Data on the digestibility of Australian feeds for horses are not extensive and it has been recognised that more are required, especially for pasture species (McMeniman 1996). To obtain these data from *in vivo* digestion trials would be both time consuming and expensive. A reliable *in vitro* digestibility system would allow for the generation of significant amounts of data at relatively low cost. Aufrere (1982) described an enzymatic *in vitro* digestion system and Miraglia and Tisserand (1985) showed that the technique could be used to predict the digestibility of horse diets. This investigation was conducted to further develop the enzymatic *in vitro* digestion system and to verify it for Australian conditions.

The technique involves incubating 0.50 g samples of feeds in 50 ml of a solution containing 2% pepsin (1:10000) in 1 N HCl for 24 hours with frequent agitation. After centrifugation (4000 g for 10 minutes) the residues of the samples are resuspended in 50 ml of a cellulase solution (0.05 M sodium acetate, 5 units of cellulase activity, pH 4.6 - 4.8) and incubated for a further 24 hours with frequent agitation. After centrifugation the undigested portions of the samples are dried, weighed and *in vitro* digestibility calculated.

Seven diets containing varying proportions of oaten chaff, lucerne chaff, proprietary horse pellets and cottonseed meal were fed to adult horses and the *in vivo* digestibility of the diets was determined by the conventional total faecal collection technique. A further three diets containing different proportions of chaffed lucerne and grass hay were fed to three horses and the *in vivo* digestibility determined with the n-alkane marker technique (O'Keefe and McMeniman 1998). The *in vitro* digestibilities of the components of these diets were then determined with the method described above and the *in vitro* digestibilities of the mixed diets were calculated from these results.

The relationship between the *in vivo* (Y) and calculated *in vitro* (X) digestibility values was:

$$Y = 11.13 + 0.83 X \quad \text{r.s.d.} \pm 4.16$$

These results show that the enzymatic *in vitro* system gives reasonably reliable estimates of *in vivo* digestibility. Further refinement of the technique should result in increased accuracy of prediction. Use of the enzymatic *in vitro* digestibility technique should allow for the rapid determination of the digestible energy content of feeds for horses.

AUFRERE, J. (1982). *Ann. Zootech.* **31**, 111-30.

McMENIMAN, N.P. (1996). *Aust. Vet. J.* **74**, 64-70.

MIRAGLIA, N. and TISSERAND, J.L. (1985). *Ann. Zootech.* **34**, 229-36.

O'KEEFE, N. and McMENIMAN, N.P. (1998). *Anim. Prod. Aust.* **22**, 337.