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:

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

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.


