

IN VITRO EQUINE CAECAL FERMENTATION CHARACTERISTICS OF OIL PALM FRONDS

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Abstract

Horses are non-ruminant herbivores that require forage in their diet. They depend on the microbial digestion in the caecum for nutritional needs. Therefore it is imperative that equine feeds have the necessary characteristics that promote healthy caecal digestion and fulfill the equine nutrition needs at a reasonable cost. Currently, the available equine feeds are costly. Oil palm fronds (OPF), being readily available locally and cheaper, is a good candidate to be considered for inclusion in equine feed formulation. Extensive studies on OPF as ruminant roughage has been carried out but there is scarce information on OPF utilization in the equine feed. The aims of this study were to investigate the dry matter (DM) digestibility of OPF in caecal content derived from horses based on the volatile fatty acids (VFA) production, protein digestion, total gas production and caecal pH changes in an *in vitro* model. Caecal content from a euthanised horse was used to digest the dried feed samples over 24 hours in a closed system syringes. Eight feed samples comprising oil palm fronds (OPF), alfalfa (*Medicago*) hay, timothy (*Phleumpratense*) hay, oaten chaffs, grains mixture and premix pellets: concentrate J (Equi-Jewel[®]), concentrate L (Pegasus[™]), concentrate P (Pegasus[™]) and concentrate S (Mitavite[®]) were used. The products of digestion measured were gas production and DM disappearance to determine the fermentability of feed, total VFA concentration as it is a portion of energy source, pH changes which affect the gastrointestinal flora habitat and ammonia nitrogen concentration to indicate protein digestion. Oil palm fronds had comparable ($p > 0.05$) DM digestibility ($30 \pm 2.93\%$) to commercial feeds evaluated in this experiment. However, it had significantly ($p < 0.05$) lower total VFA concentration (9.3 ± 0.67 mM), and greatest (51 ± 8.74 ppm) ammonia nitrogen concentration ($p < 0.05$) vis-à-vis other diets in this trial. The OPF yielded higher acetic acid to propionic acid proportion consistent in horses fed mainly with forage diets. In addition to that, OPF showed significantly ($p < 0.05$) better buffering ability (pH: 7.4 ± 0.03) to caecal content and least gas production ($p < 0.05$). The *in vitro* model managed to mimic the cellulolytic digestion of an equine caecum, which is crucial to understand digestion dynamics of various feeds in the equine caecum. In summary, the OPF feed showed to be a low cost feed with suitable characteristics to be included in equine diet.

Keywords: caecal fermentation, horse, oil palm fronds, *in vitro* digestibility, volatile fatty acids