

## Differences in fermentation kinetics by age of donor animals

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Fermentation kinetics are investigated using *in-vitro* gas curves. During research concerning early fermentation kinetics, differences by age of the donor of rumen fluid were seen during incubation of the same feeds. Total accumulated gas production was detected by pressure sensors during incubation, after which residues were filtered to determine dry matter degradation. Despite similar endpoint gas production (ml gas produced at STP per gram DM) and dry matter degradation after 24 or 48 hours, significant differences were seen in the fermentation kinetics of ruminant concentrate feeds. The same 10 concentrate samples were tested in duplicates, triplicates or quadruplicates in each of 2 trials with rumen fluid from 6 calves 5-6 weeks old, 4 calves 10-12 weeks old and 2 heifers between 1 and 1.5 years old. The samples were heat treated rapeseed meal, soybean meal, faba beans (toasted and untoasted), rapeseed cake, 2 different calf starter types, organic alfalfa pellets, grass pellets and soybean cake. One and half year old heifers almost always had a fermentation curve which could best be described by the equation:

$$(1): Y_t = b / (1 + (H^c / t^c))$$

while the fermentation kinetics of the 6 week old calves was always best described by a simple exponential:

$$(2): Y_t = b (1 - e^{-ct})$$

where  $Y_t$  is the total gas produced at time  $t$  (ml/g DM incubated),  $b$  is the asymptotic gas production (ml/g DM), and  $c$  is the constant determining the steepness of the curve.  $H$  (equation 1) is the time at which half the asymptotic amount of gas was produced. The fermentation kinetics of 10-12 week old calves was intermediate. The 10-12 week old calves had the greatest gas production per gram DM (asymptote) for all concentrates. Toasted and untoasted faba beans were not significantly different in DM degradation or gas production within each of the three age groups after 24 hours. However, while the untoasted faba beans were significantly more rapidly fermented in the 10-12 week old calves, the toasted faba beans were slightly more rapidly fermented in the youngest and oldest age groups, thereby changing the ranking of the feeds from 5-10 hours after start of fermentation. We conclude that early fermentation kinetics is affected by the age of the donor animal, and this may affect the ranking of feeds. Research regarding composition of the gas produced and fermentation products can indicate age dependent differences in microbial populations.