

The effect of a concentrate based diet (CD) or a total mixed fibre ration (TMFR) on *in vitro* stomach and hindgut health

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Background: Maximum growth rates in young stock are often achieved by feeding high-levels of cereal based concentrates. This can negatively impact digestive health and alter the composition of hindgut microbiota.

Objective: Determine the effect of TMFR versus CD on simulated stomach and hindgut pH and hindgut d-Lactate concentrations.

Method: Stomach digestion was simulated *in vitro* in a shaking incubator, pH loggers (Neulog Edu-logger 900-209) recorded pH at 30 second intervals over 6 hours. Feed (10g) and saliva (NaCl 2.9g/L, KHCO₃ 1.5g/L and NaHCO₃ 2.8g/L) were added to pH 6.0 HCL incubated at 37°C. After 2 hours pH was reduced to pH 5.4 at 4 hours pH was adjusted to 2.6, pepsin (0.4g) added and incubated for a final 2 hours.

Faeces from foals fed TMFR (n=4) or concentrates (n=4) were used as microbial inocula for *in vitro* gas production. Post inoculation bottles were harvested at 4, 12, 24, 62 hours for pH and d-lactate. D-lactate was measured via colourmetric assay (Sigma-Aldrich). Data were analysed by ANOVA and Fisher least significant difference (LSD) test post *hoc*.

Results: Stomach pH was lower for the CD than TMFR in each simulated region ($P<0.001$). Hindgut pH at 12 hrs was higher in CD than TMFR whereas the opposite occurred at 24 hours. D-lactate was higher (x2) in CD fermentations ($P=0.023$), at both 12 and 24 hours.

Conclusion: *In vitro* TMFR kept stomach and hindgut pH and hindgut d-lactate closer to optimum compared to CD reducing potential risks to digestive health in young stock.