A comparison of rumen fluid sampling techniques for ammonia and volatile fatty acid determination

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Introduction

Routine sapling of rumen contents is required to obtain a clear picture of rumen fermentation profiles

Ruminally cannulated animals allow for the frequent sampling of rumen liquid and solid fractions although cost and oxygen ingress to the rumen can be an issue

Oesophageal sampling (OS) allows for a less invasive, but more limited sampling of rumen contents to take place

With the OS technique the rumen sampling is much less selective

The aim of this study was to compare the volatile fatty acid (VFA) and ammonia (NH_3) concentrations of rumen fluid samples collected via a rumen cannula (C) or via the use of the OS technique

Materials and Methods

Eleven ruminally cannulated, lactating Holstein Friesian cows were used

Sampled on 4 separate dates over a 2 week period across a range of diets

Rumen fluid was sampled using a FLORA rumen scoop oesophageal sampler (OS) or via the rumen cannula (C)

Samples were then analysed for VFA and NH_3 concentrations

Statistical analysis was performed using PROC MIXED in SAS

Results

OS showed a reduction in the total VFA concentration ($P<0.001$) compared to the C method (Figure 1)

Individual VFA proportions, acetate: propionate ratio and rumen NH_3 concentration was unaffected by sampling method ($P>0.05$)

Correlation analysis showed a moderate to strong association (ranging from R=0.58-0.89) between OS and C methods for all variables measured except for total VFA's (Table 1)

Table 1 Individual VFA proportions & NH_3 concentrations

	C	ST	s.e.m	P-value
Acetic	0.61	0.62	0.005	0.18
Propionate	0.21	0.21	0.003	0.85
Iso-butyrate	0.01	0.01	0.0002	0.31
Butyrate	0.13	0.13	0.003	0.21
Iso-valerate	0.018	0.017	0.0007	0.74
Valerate	0.02	0.02	0.0007	0.11
Acetic : propionate	2.9	3.1	0.06	0.12
Ammonia	64.2	55.4	4.4	0.15

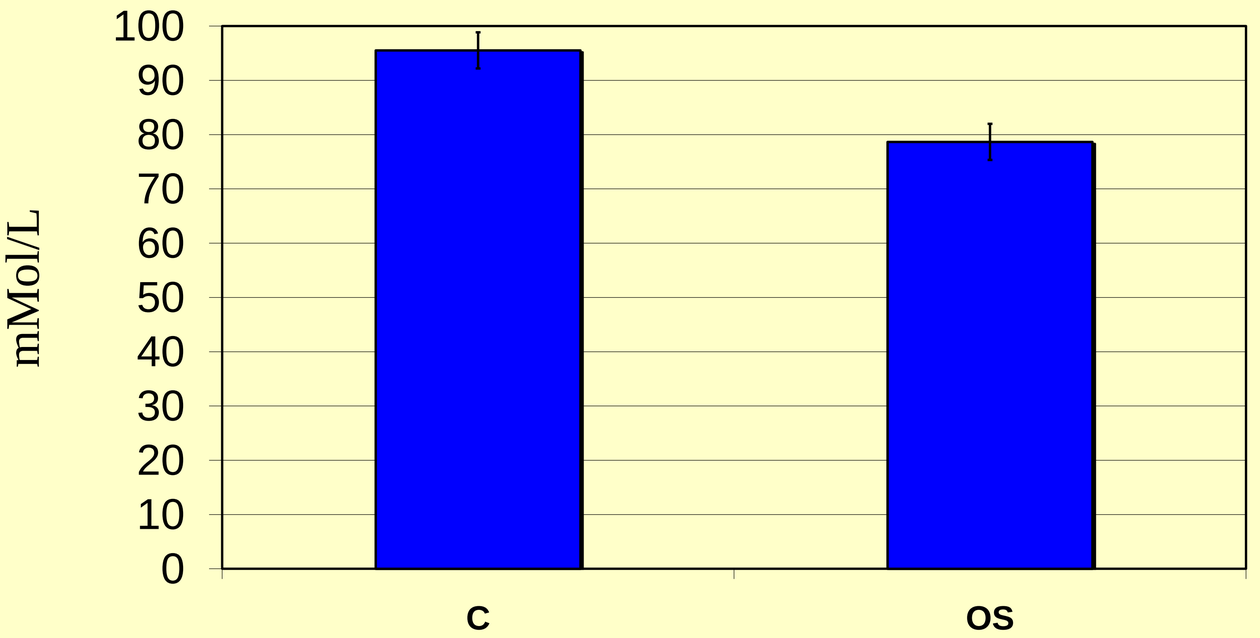

Figure 1 Effect of sampling method on total VFAs concentration

Summary & Conclusions

Results suggest that the OS technique gives an accurate representation of VFA proportions and NH_3 concentration when compared to cannula sampling

It can underestimate total VFA concentration but with the use of an accurate regression formula we can estimate total VFAs

The use of the OS technique means samples can be taken from a large number of animals however solid rumen samples or frequent rumen samples (hourly) cannot be collected using the OS technique

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