Measuring rumen pH on farms with wireless telemetry boluses: the impact of farm routine

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Overview

- Introduction
- Why measure rumen pH
- The rumen pH bolus system
- Seven rumen pH profiles revealed
- Conclusions
The problem: why measure rumen pH

- Cow biome is a complex interaction of 20k organisms
- Forage quality is highly variable
- Nutritional theory is hard to apply on farms
- Milk output is conserved in the short term
SARA: the problem

Rumen pH is determined by FERMENTABILITY X INTAKE

As genetics has created cows with large appetites and intakes we have a problem of low pHs causing illness and reduced milk quality.

SARA defined as “extended” periods of “low” pH
What is “extended” and “low”.
If you cannot measure it you cannot control it.
Rumen pH Bolus

- Inserted by mouth
- Retained in Reticulo-rumen
- Raw data (pH & T) downloaded to handset
- Handset Uploads to internet
- Bolus lasts over 100 days before sensor fails
- Used >3 per group
Rumen pH data flow

1. Advice and feedback based on data review
2. Data published to online dashboard
3. Raw data collected by farmer, vet or nutritionist
4. Data uploads to eCow server automatically
This study

- Thirty Farms
- Range of farm types
- >120 cows with boluses
- Started May 2013
- Continues …
Case 1: Correcting low pH

350 cow housed herd on TMR
12,000 litre average yields
Was this SARA?
  No Cud-balls
  Some Loose dung with observed grains
Case 1: Strong daily cycle

pH low and wide range, not much night time eating
Case 1: after a feed change

After reducing digestible energy, pH is higher with narrower range, cows eat more at night, no change in milk yield, farm saved £6000 within 3 weeks
Case Study 2: Grazing

- Grass is the perfect food for cows?
- Cheapest form of forage in UK
  - hidden costs
    - Nitrate pollution
    - Fixed costs of fencing, tracks etc
    - Methane emissions
    - Weather dependent
- High digestibility
Case 2: Effect of grazing

The low period is when cows grazed a new high sugar grass pasture.
Case 3: Total Mixed Ration (TMR)

- Each mouthful is a balanced mixed ration
- In open bunkers needs push ups
- Rumen pH used to measure consistency of daily management
Case 3: TMR and push up timing
Case 4: Robotic Milking

A plot of the pH over 11 days; Farm D 1990 11062013

- **Threshold**
- **pH**

**Time**

- 20/05/2013
- 21/05/2013
- 22/05/2013
- 23/05/2013
- 24/05/2013
- 25/05/2013
- 26/05/2013
- 27/05/2013
- 28/05/2013
- 29/05/2013
- 30/05/2013
Case 5: Cake and Grass

- Traditional predominant system in the South West UK
- Cows at grass from April to October
- Cows fed in parlour with concentrate
Case 5: Cake and Grass

A plot of the pH over 9 days; Farm G 891 14062013

Strong twice daily fluctuations in pH
Case 6: Rumen Buffer

- Rumen Buffer is routinely used to “raise” pH
- Experimental Farms are good for controlled studies
  - But
  - Farm practice is very different
  - Results are used to sell a product
  - No diagnosis possible before wireless rumen bolus
Case 6: Rumen Buffer

A plot of the pH over 9 days; Farm M 0532 04102013(1)

<table>
<thead>
<tr>
<th>Additive</th>
<th>Price £</th>
<th>p/cow/day</th>
<th>Cost (£) 250 cows</th>
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<tbody>
<tr>
<td>Bicarb</td>
<td>350</td>
<td>9</td>
<td>22.5</td>
</tr>
<tr>
<td>Acidbuf</td>
<td>550</td>
<td>5.5</td>
<td>13.75</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>16.5</td>
<td>36.25</td>
</tr>
</tbody>
</table>

£1103/month
£13,231/year
Conclusions

- Rumen pH was monitored in the reticulum routinely
- Each farm system has a different pattern of pH
- Incidence of SARA were rare (self selected group)
- Grass can cause low pHs
- Rumen pH analysis should focus on
  - Mean values
  - Range of values (less is better?)
  - Slope of drop
  - Number of drops per day
  - Length of non-feeding periods
Operational Groups funded via Pillar 2

- A group of farmers link to academics/consultants to identify an area that can be improved and Defra will pay for the activities
Thanks to :-

- Toby.mottram@rau.ac.uk
- Mole Valley Farmers
- Jeremy Hamilton, Three Counties Feeds
- Colleagues at RAU

- For boluses talk to your vet or call harriet@ecow.co.uk 01392 422441