Coarseness of grain or level of rumen by-pass starch had marginal effects on rumen environment and rumen wall conditions in concentrate-fed veal calves

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The production of concentrate-fed bull calves

- Dairy-type bull calves
- Ad libitum concentrate feeding
- Slaughtered at 10 – 12 month of age

Problem

- Subacute rumen acidosis (ph < 5.6)
- Damage on the ruminal epithelia
- Liver abscesses

Objective

Is it possible to decrease the incidence of subacute rumen acidosis, damages on the ruminal epithelia and at the same time maintain a high daily gain by:

1. Changing the particle size in pelleted concentrate?

2. Changing the amount of by-pass starch in pelleted concentrate?

Composition and nutritional values of the experimental treatments

	CONTROL	ROUGH	SLOW
Concentrate starch sources, %			
Wheat, grounded	31		17
Wheat, coarsely rolled		31	
Barley, grounded	30		15
Barley, coarsely rolled		30	
Corn, grounded			13
Sorghum, grounded			13
Nutritional values, g / kg			
Starch	338	338	346
Theoretical by-pass starch	33	33	100

Expectations of ROUGH and SLOW

- Decreased accessibility to the starch granules (ROUGH)
- Decreased rumen fermentation of starch (SLOW)
- Higher rumen pH and less hours of subacute rumen acidosis
- Improved rumen wall conditions
- Total starch digestion either unchanged (ROUGH) or reduced (SLOW)

Randomized complete design

- **9 rumen fistulated bull calves**

Age at start	8.5 mo.
BW at start	371kg
ADG	1.4 kg/d
Concentrate intake	7.9 kg DM/d
Barley straw intake	0.8 kg DM/d
Feed efficiency	5.7 kg DMI/ kg ADG

- **3 Treatments**

CON	Control
ROUGH	Increased particle size
SLOW	Increased amount of by-pass starch

- **3 Periods (with three weeks interval)**

- **9 times (9 rumen samples / 24 h)**

Protocol

Housing – Tie stalls

Ad libitum feeding (measured intake)

BW measured (every 3 weeks)

Samples and analysis

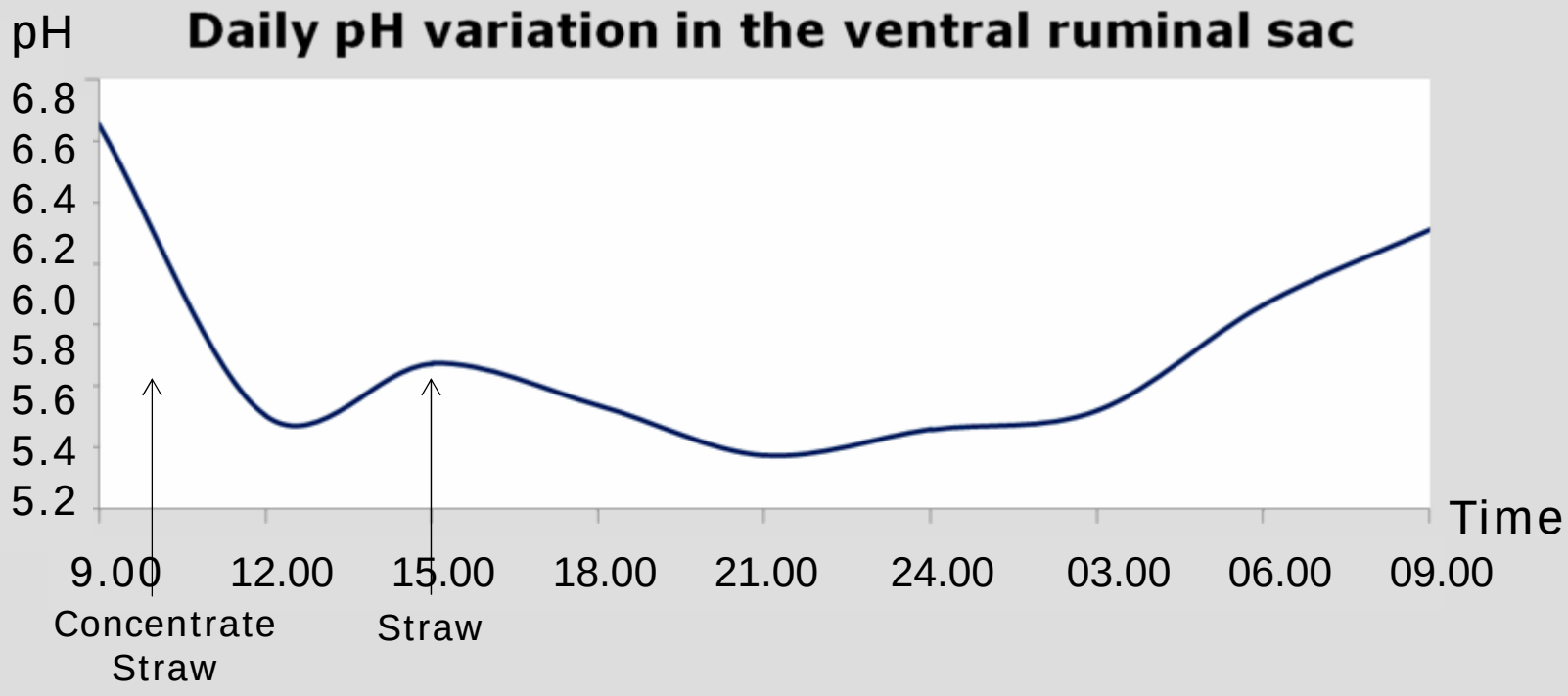
- Rumen samples (pH and SCFA)
- Feces (pH, SCFA, DM, Starch)

Macroscopic rumen examination

- Papillae length and shape
- Evaluation of the rumen wall conditions (clotting, redness and necrosis)

Ruminal environment and daily variation

Item	Means	S.E.	P-value Treat	P-value Time
Ventral rumen samples				
SCFA	124	4	ns	***
pH	5.9	0.1	ns	***
Minimum	5.2	0.1	ns	-



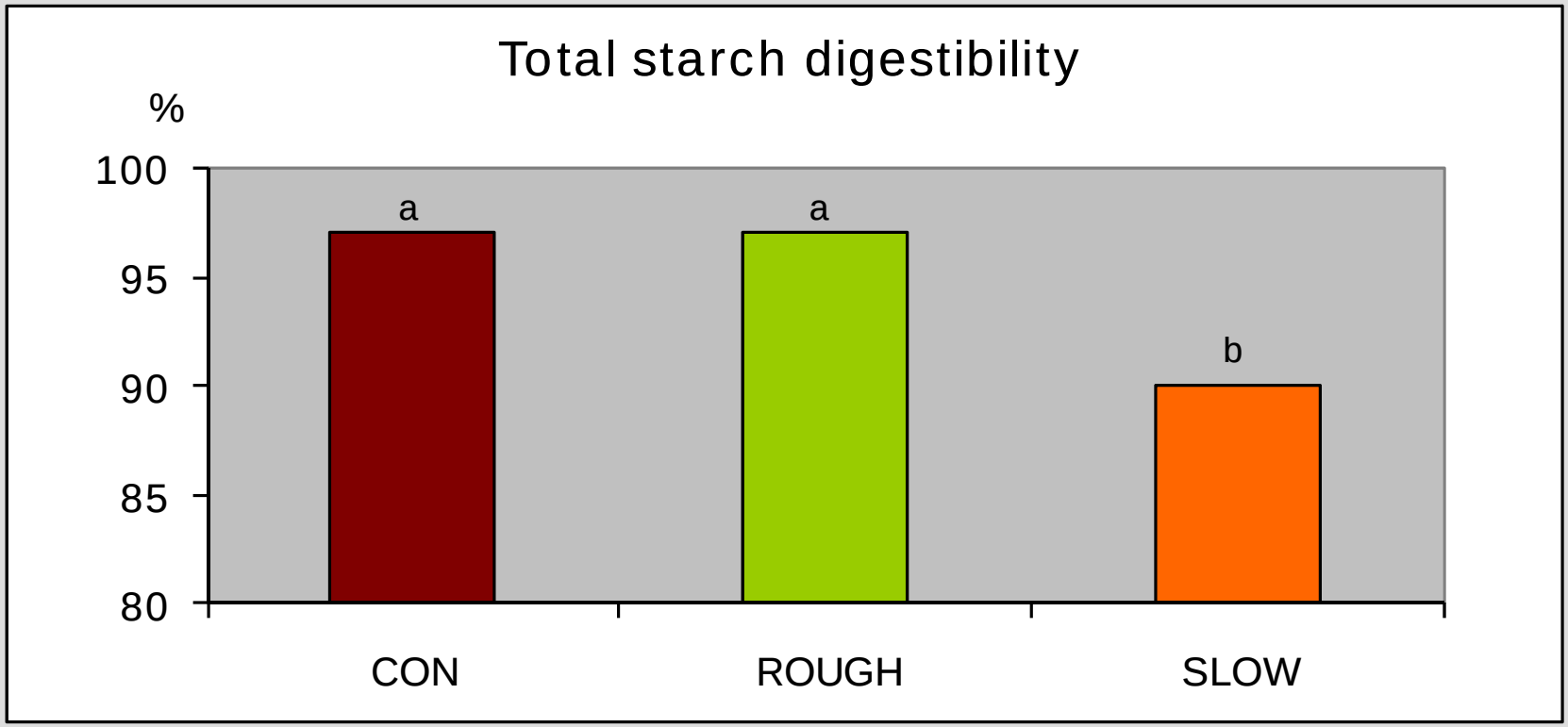
The incidence of subacute rumen acidosis

	Treatment				P-value
Item	**CON**	**ROUGH**	**SLOW**	**S.E.**	**Treat**
Ventral rumen samples					
Duration pH<5.6, h/d	9.0	4	9.7	2	ns

Subacute rumen acidosis

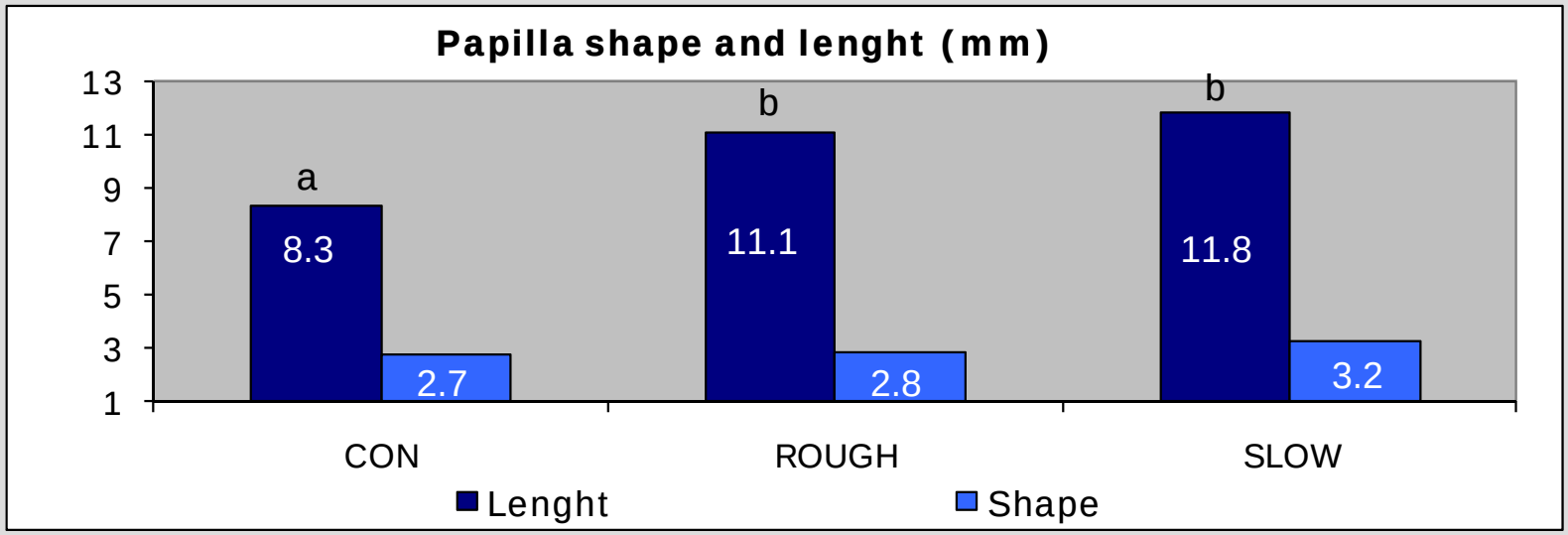
Feces and total starch digestibility

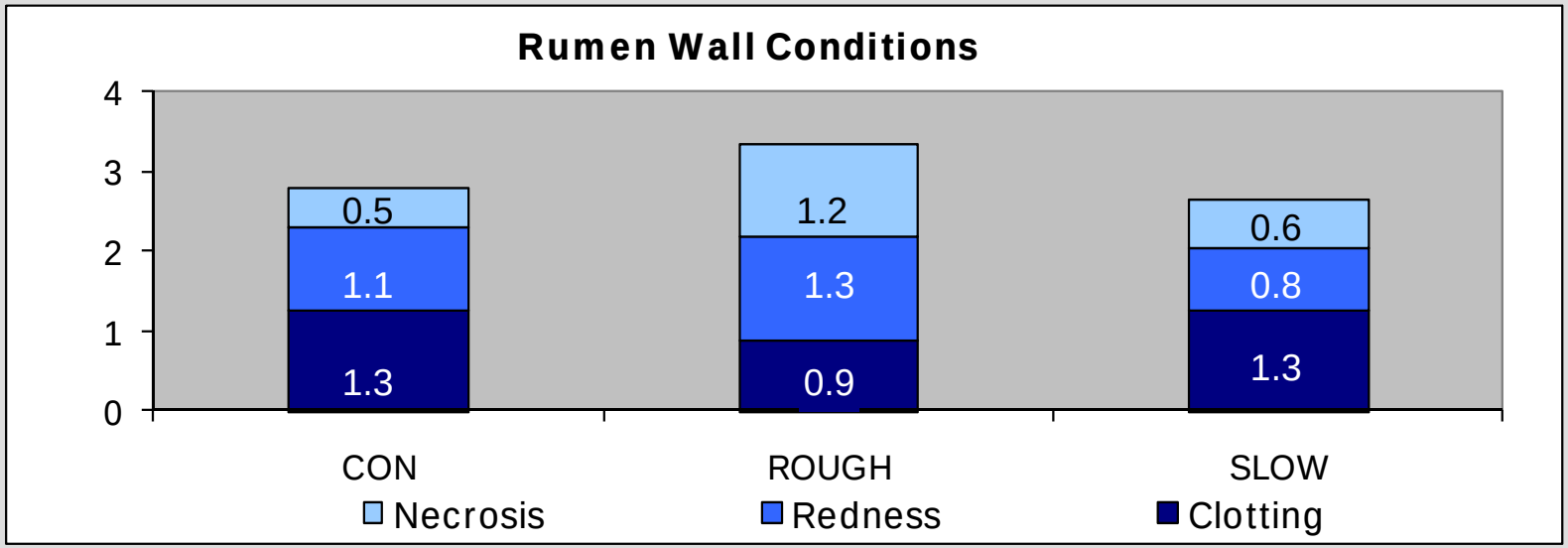
Item	Treatment CON	ROUGH	SLOW	S.E.	P-value Treat
Feces					
Total SCFA mM	**142a**	**129a**	**162b**	**7**	***



Treatments with different letters are significantly different (P < 0.05)

Ruminal epithelium





Treatments with different letters are significantly different (P < 0.05)

Conclusion

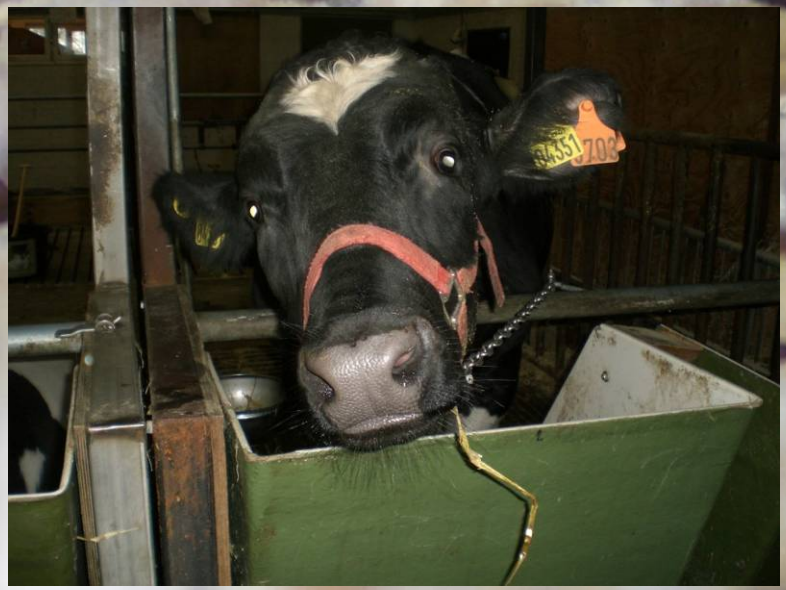
Effects of ROUGH and SLOW versus CONTROL

- No effects on ADG or feed efficiency
- No effect on rumen pH values or the incidence of subacute rumen acidosis
- No effect on rumen papillae shape
- Increased rumen papillae length
- No effects on the rumen wall conditions

- **ROUGH** did not affect total starch digestibility
- **SLOW** decreased total starch digestibility

More slowly fermentable starch or more coarsely grounded grain had only marginal effects on rumen environment and rumen wall conditions in pelleted concentrate-fed veal calves.

Thank you for your attention



Questions?