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LIETUVOS RESPUBLIKOS ŽEMĖS ŪKIO MINISTERIJA
Session 01 : Physiological limits related to intensive livestock farming systems

Subacute ruminal acidosis: animal welfare & feeding behaviour

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CONTEXT

- Normal ruminal pH fluctuates between 6 & 7 units
- High-energy diets : large production of Volatile Fatty Acids (↓ pH)
- Animal ingesting by accident very large quantities of high-energy foods → Acute acidosis

  pH <5 = severe apathy with metabolic acidosis that can cause death
- Chronic intake of large quantities of high-energy diets in intensive production → SubAcute Ruminal Acidosis (SARA)

  pH fluctuates around low physiological values, without specific symptoms

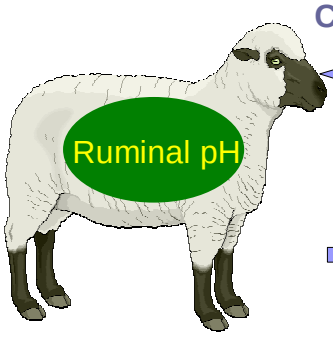
  Working definition : Time spent with pH < 5.6 (Krause, 2005) (>8 hr=SARA)

  - Prevalence of 20% (Oetzel, 2004)
  - Lower performances and economic losses : - 0.76€ /cow /day (Stone,1999)
  - Low feed efficiency and fluctuating intake (=1st sign)

QUESTIONS

Are there risky behaviours?

Consequences



welfare

Feeding behaviour
- **Dry Matter Intake**
- **Concentrate:Forage**
- **Intake distribution**

Adaptation

Is the animal able to re-adjust its behaviour?

EXPERIMENTAL DESIGN

2 x 6 sheep
cross-over design

ad libitum
Hay and wheat
(4 weeks)

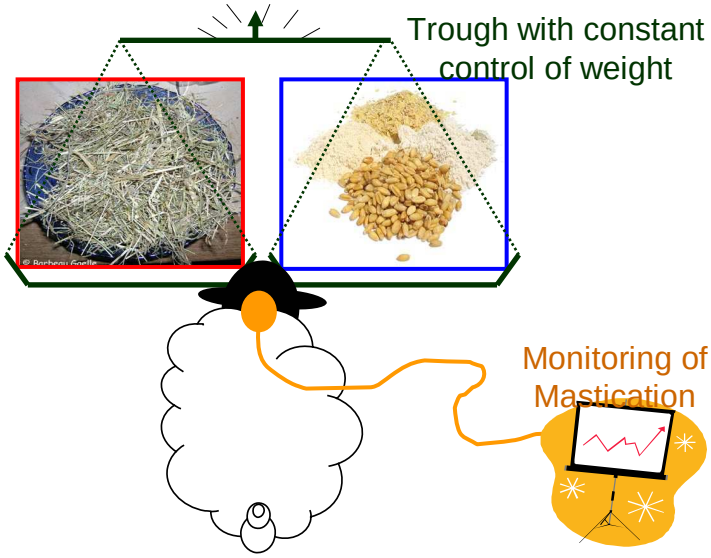
X

fixed diet (930g.d^{-1})
40% hay + 60% wheat
(4 weeks)

Statistical analysis presented here concern only sheep in *ad libitum* diet

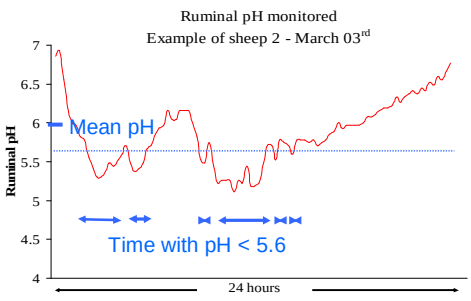
two equal meals at 8 AM and 4 PM

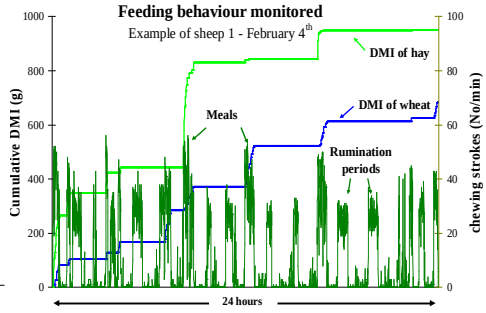
MEASUREMENTS



Introduction – Materials and methods – Results and discussion – Conclusion

MEASUREMENTS

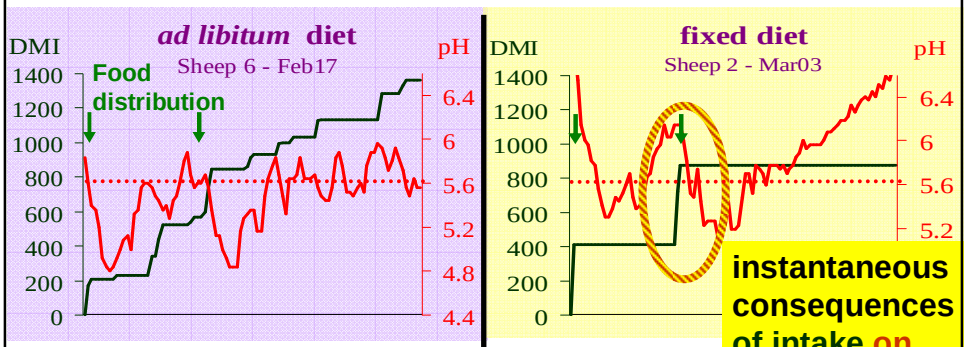




Kinetics of ruminal pH
- → Mean pH
- → Time with pH<5.6

Kinetics of intake & mastication
- → Intake rate
- → Intake distribution
- → Time spent ruminating

FEEDING BEHAVIOUR PATTERNS



instantaneous consequences of intake on ruminal pH

Total DMI	1350 g	850 g
% wheat	49 %	59 %
Intake distr.	1190	1770
Time pH<5.6	7hr40	3hr

«Intake distribution» estimates with standard deviation of DMI per 15 min

Introduction – Materials and methods – Results and discussion – Conclusion

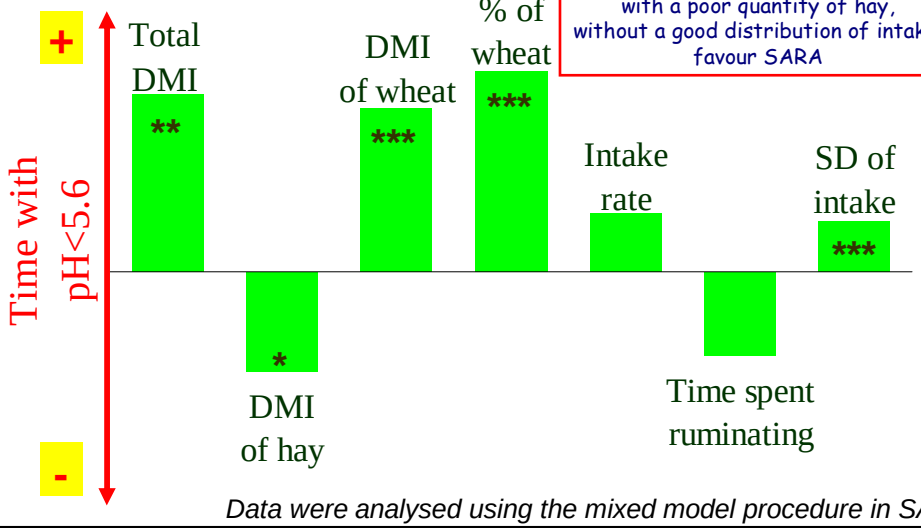
MODEL

Time with pH<5.6$_{d0}$ = f (feeding behaviour parameter$_{d0}$)

Are there risky behaviours?

in *ad libitum* diet

A large quantity of food (particulary of concentrate) with a poor quantity of hay, without a good distribution of intake, favour SARA

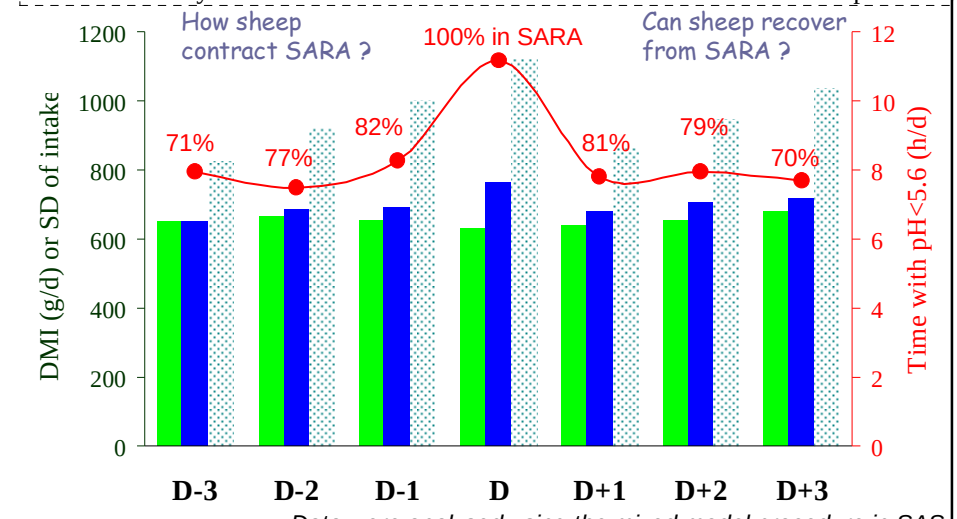


Data were analysed using the mixed model procedure in SAS

DMI, SD of intake and ruminal pH around a day with SARA

Is the animal able to re-adjust his behaviour ?

in *ad libitum* diet



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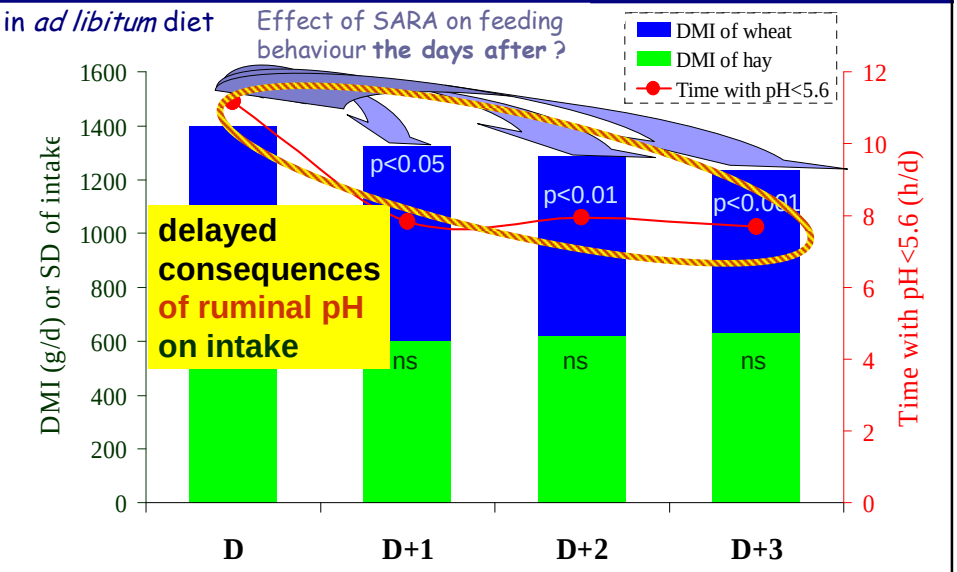
Introduction – Materials and methods – Results and discussion – Conclusion

What are effects of ruminal pH on variations of feeding behaviour the next day(s) ?

Will the animal re-adjust his behaviour after SARA ?

in *ad libitum* diet



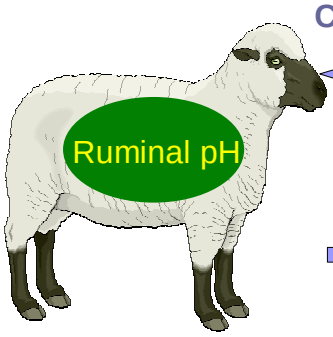
Data were analysed using the mixed model procedure in SAS

Instantaneous

Are there risky behaviours?

Yes !
- ↑ DMI of wheat
- ↘ DMI of hay
- ↘ Distribution of intake
- → favour SARA

Consequences



welfare

Feeding behaviour

Dry Matter Intake

Concentrate:Forage

Intake distribution

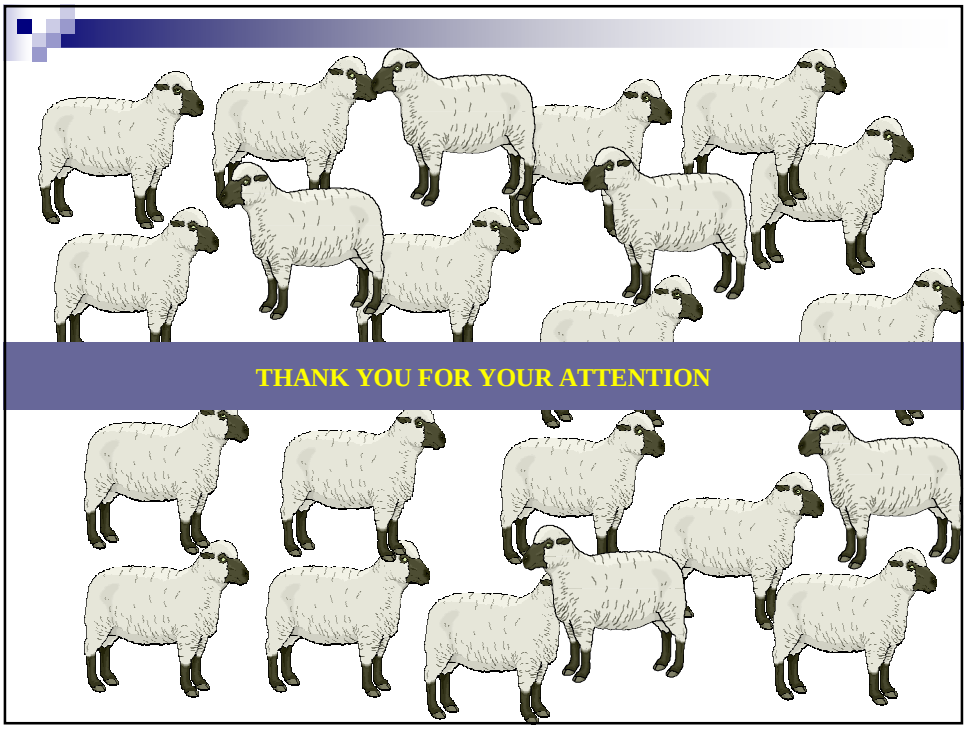
Adaptation

Is the animal able to re-adjust his behaviour?

after SARA
- ↘ DMI of wheat
- ↘ Concentrate:Forage
- → Distribution of intake

at least on 3 days

Delayed



THANK YOU FOR YOUR ATTENTION