Effect of feeding bakery by-products on feed intake, milk production and ruminal pH in dairy cows

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Background

- High amounts of energy-rich concentrates in intensive ruminant production systems
  - high risk of subacute ruminal acidosis (SARA)
  - increase in grain demands
  - concerns about future food security
  - pressure on livestock systems

- Energy-rich by-products
  - covering high energy requirements
  - reducing food competition between cattle and humans

Background

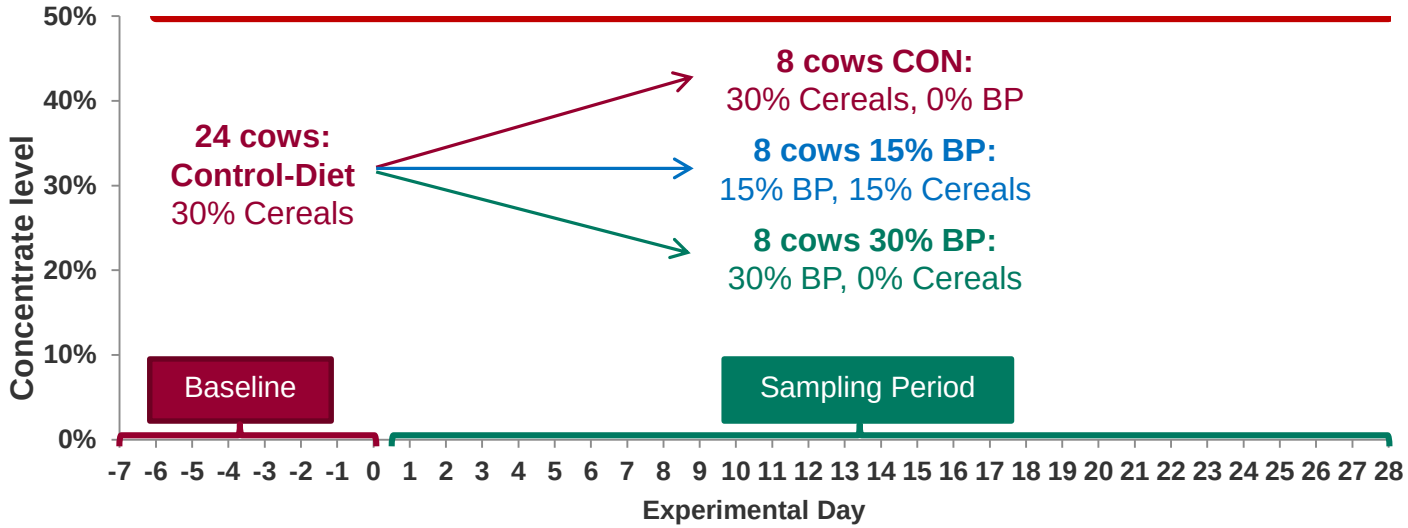
- Bakery products (BP)
  - frequently delivered to stores to ensure freshness
  - high volume of leftover products
  - high energy content, substitute for cereal grains
  - lack of research regarding its potential to substitute grains

Objective:

Evaluation of the effect of the graded substitution of cereal grains by bakery products on production performance and ruminal pH in high-yielding dairy cows

Material & Methods

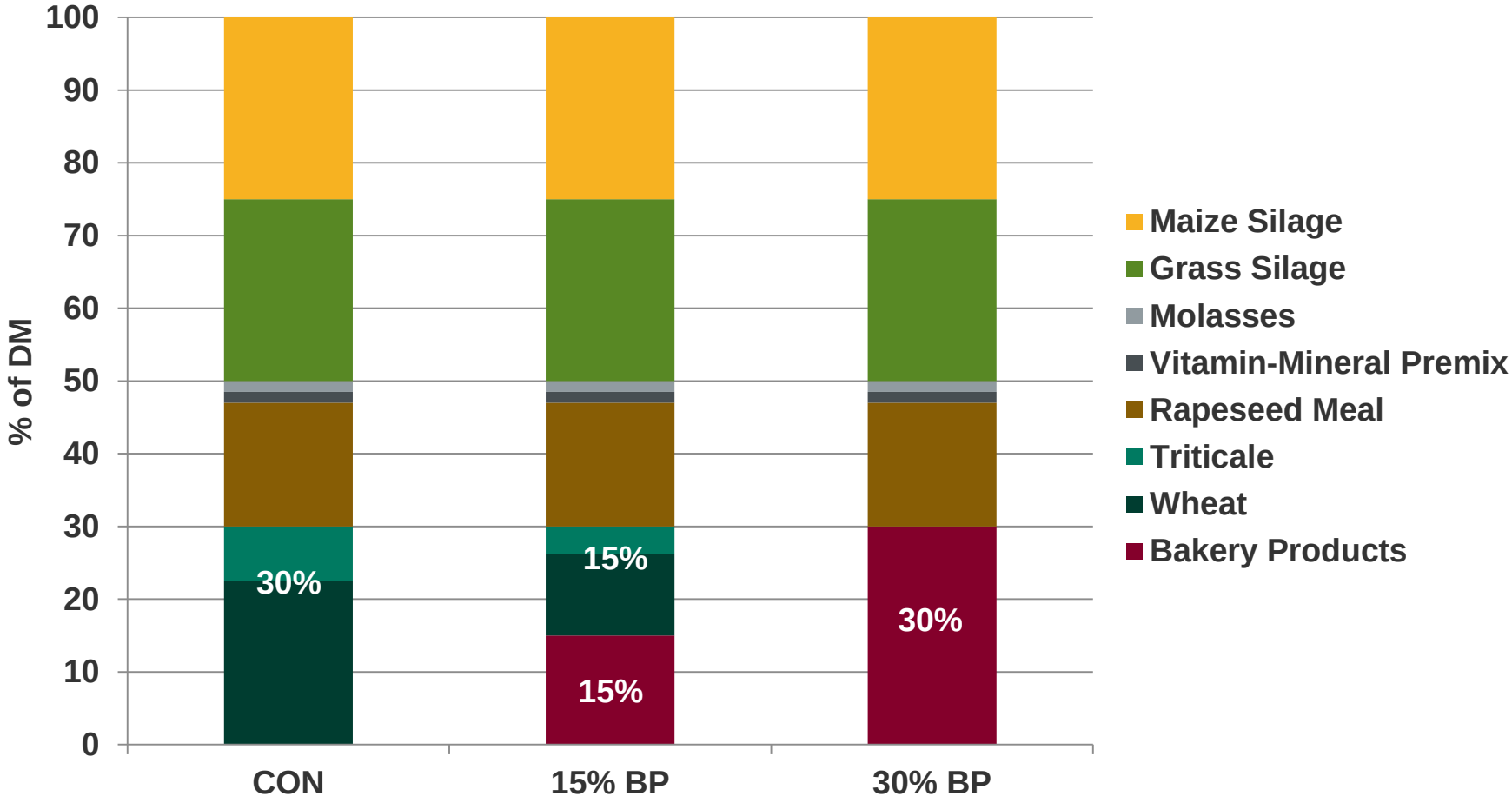
Trial Arrangement



- 24 Simmental cows
- 149 ± 22.3 days in milk
- mean lactation number: 2.63 ± 1.38
- average body weight: 756 ± 89.6 kg

Material & Methods

Experimental Diets



Material & Methods

Chemical Composition

% of DM, unless stated	CON	15% BP	30% BP
Dry matter (% of FM)	46.1	46.2	47.4
Ash	7.50	7.27	7.47
Crude protein	15.9	16.5	16.7
Ether extracts	2.40	3.10	4.00
Neutral detergent fiber	34.5	31.9	31.0
Acid detergent fiber	23.0	22.7	21.4
Starch	23.6	22.3	21.4
Sugars	4.50	5.60	5.97
NE_L, MJ/kg DM	6.50	6.96	7.24

Material & Methods

Feeding, Milking, pH Measurements

- Total mixed rations (TMRs)
- offered twice a day, available ad libitum
- electronically regulated feeding troughs (Insentec B.V., Marknesse, the Netherlands)

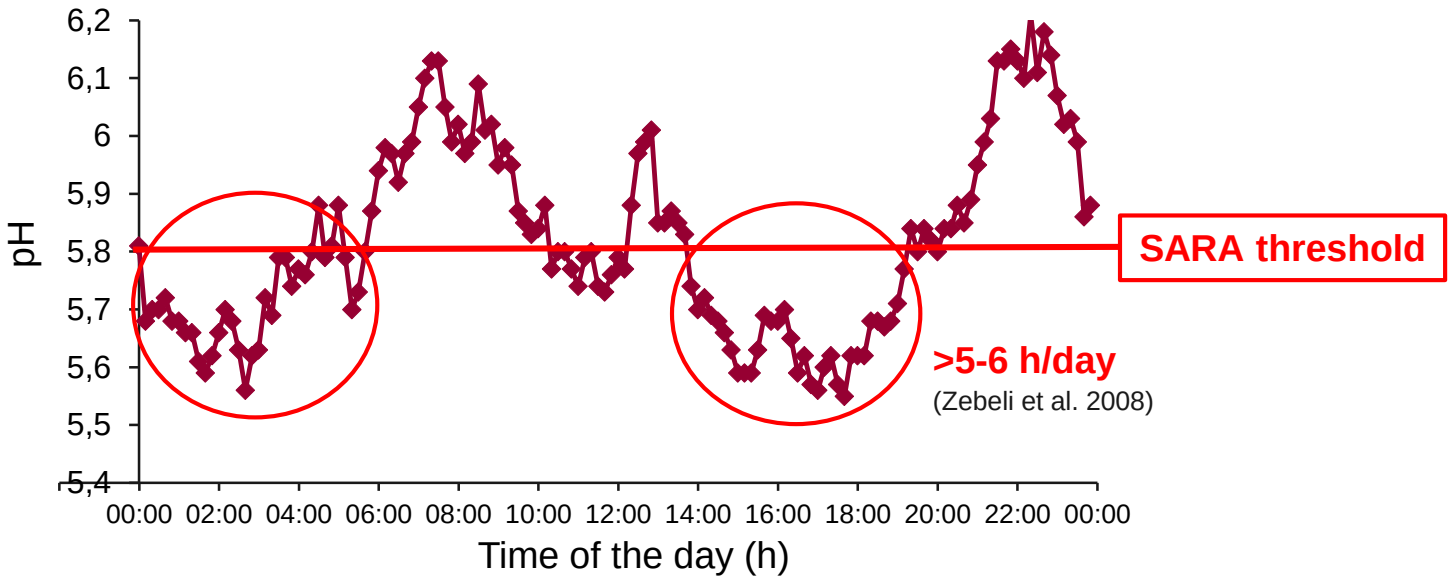
- milked twice daily, tandem milking parlor
- electronic machine recorder (DeLaval Corp., Tumba, Sweden)

- ruminal pH: measured in 20 cows continuously
- wireless bolus sensors (smaXtec, Graz, Austria)

Material & Methods

Calculations & Statistical Analysis

- **Ruminal pH:**
  time below 5.8

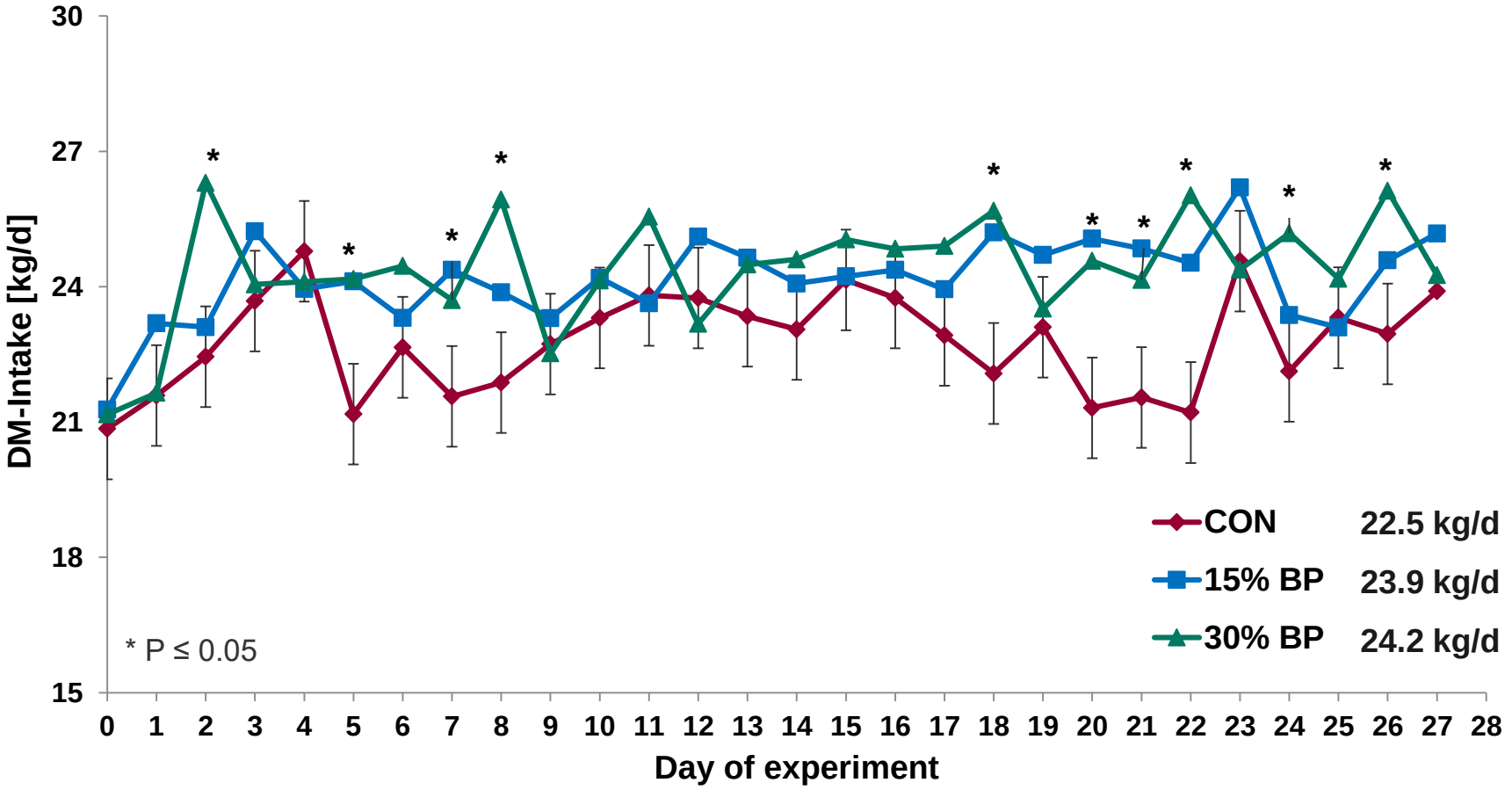


- **Statistical analysis:**
  - ANOVA, MIXED procedure of SAS (version 9.4)
  - fixed effects: diet, day, diet x day
  - random effects: lactation number, days in milk, individual cow
  - repeated measurements
  - measurements during baseline: covariates

.

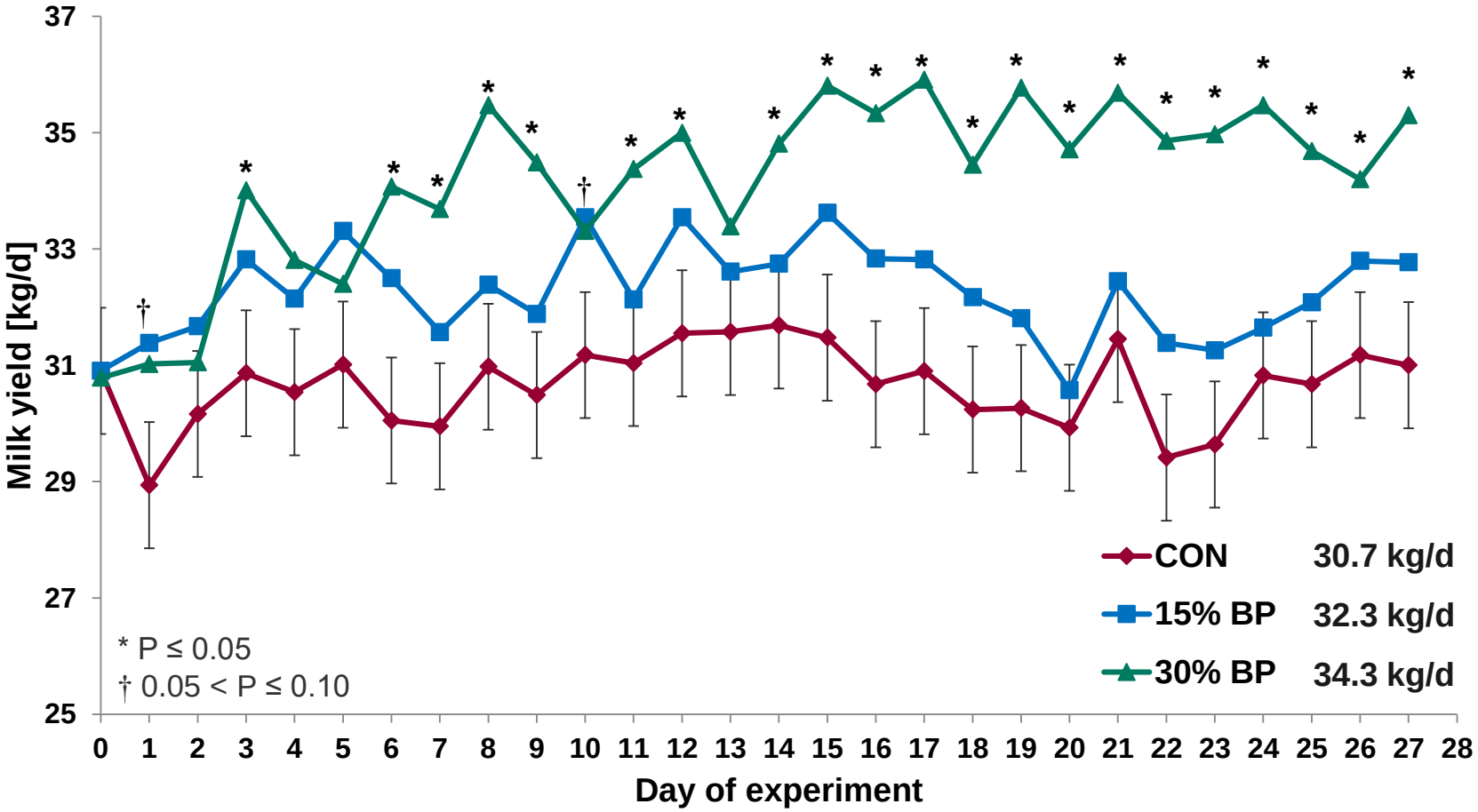
Results

Feed Intake



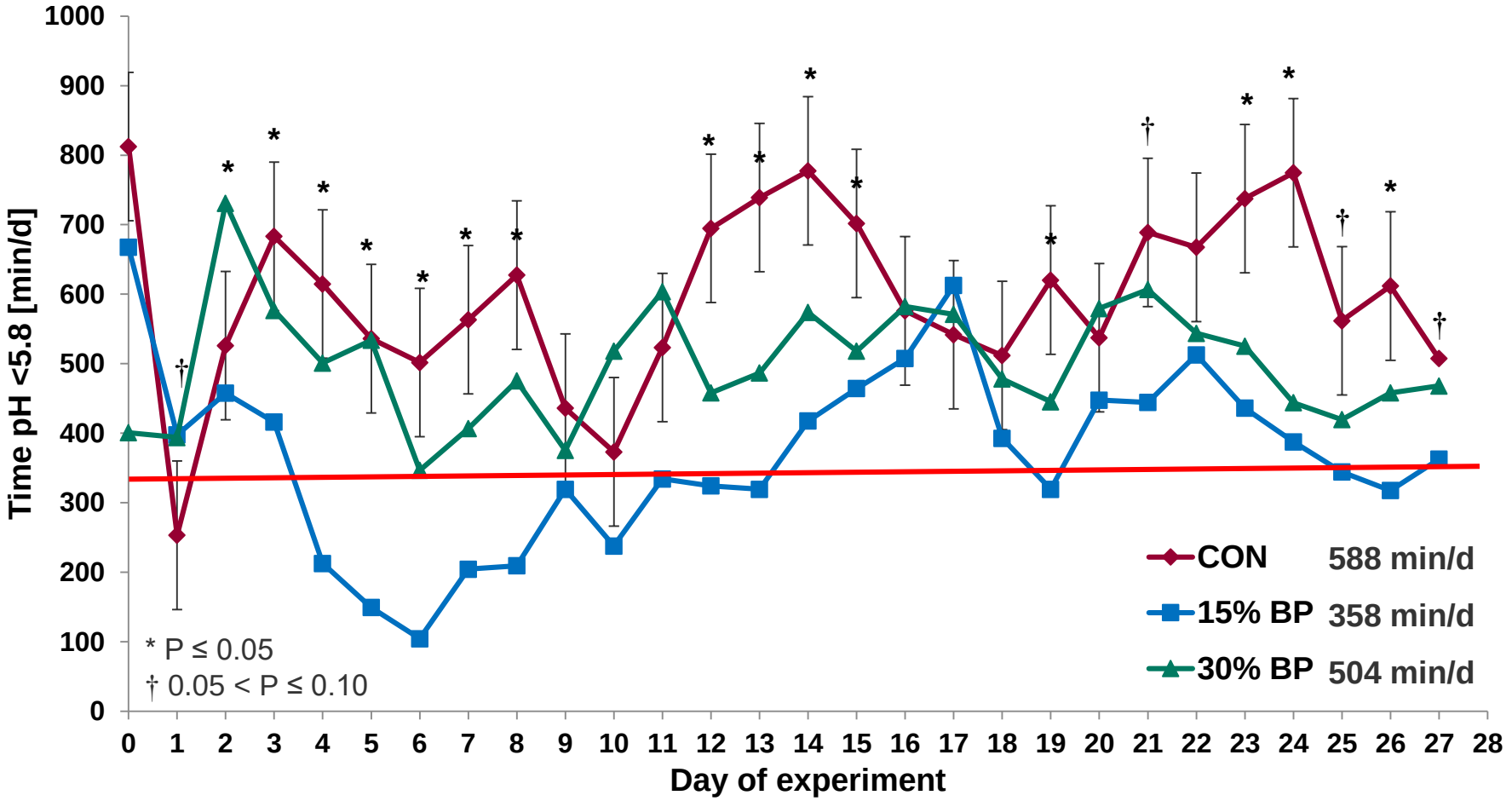
Results

Milk yield



Results

Ruminal pH below SARA-threshold



Conclusions

Inclusion of BP

- improved production performance
- improved ruminal health

- substitution of cereal grains with BP seems to be a promising attempt to reduce food competition between high-yielding cattle and humans

Acknowledgement

- Königshofer Futtermittel
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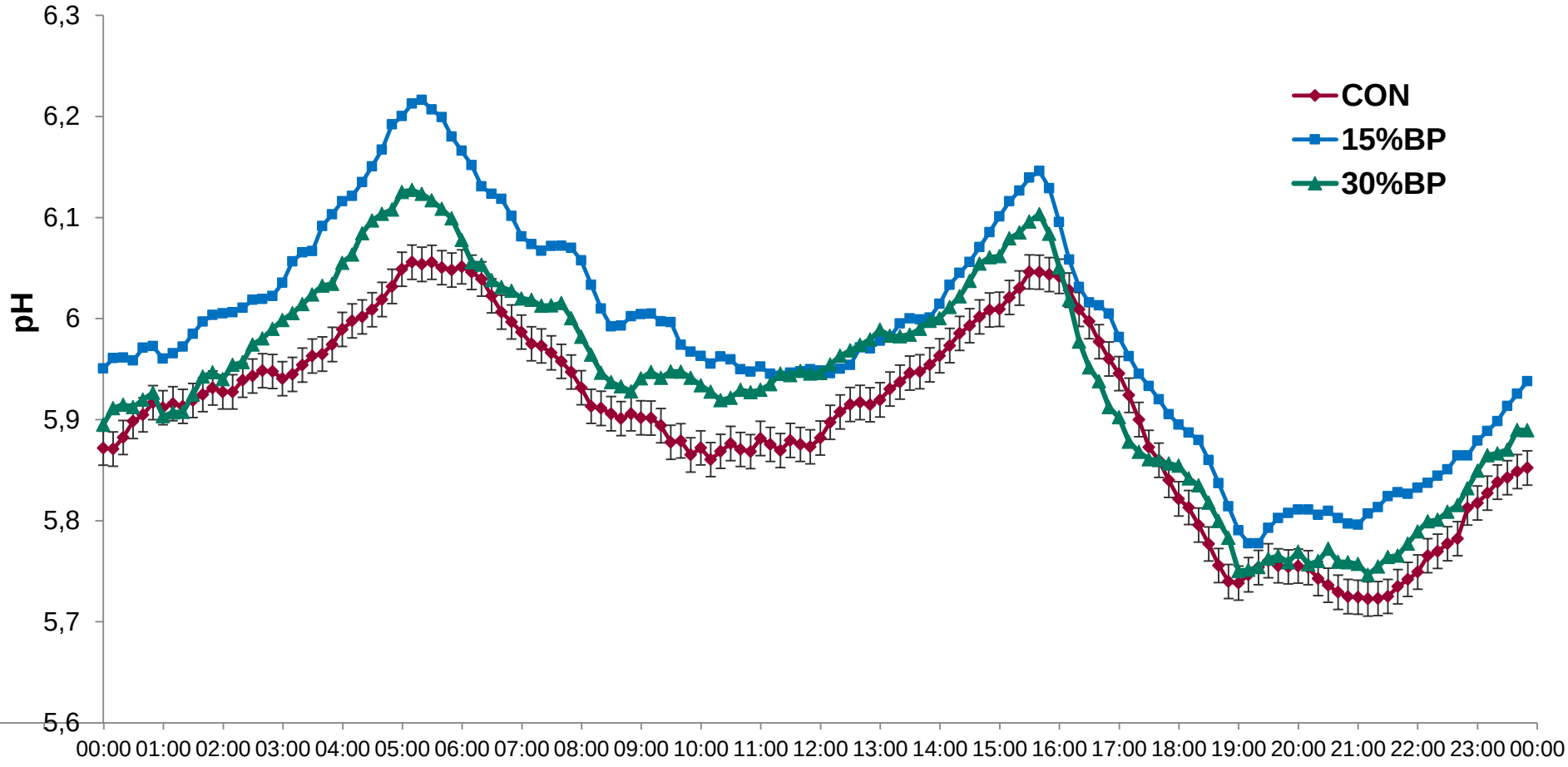
- VetFarm Kremesberg
- Institute of Animal Nutrition and Functional Plant Compounds

Thanks to the cows!

Chemical Composition

Cereals vs. Backery products

% of DM	Wheat	Triticale	BP
DM (% of FM)	88.4	88.5	90.8
Ash	1.65	2.00	3.35
Crude protein	16.0	12.3	13.9
NDF	11.4	12.0	7.1
ADF	3.7	3.6	2.3
Ether extracts	1.9	1.6	10.9
Starch	66.3	66.4	50.4
Sugar	2.8	4.3	10.6
NE_L, MJ/kg DM	8.57	8.44	9.14
Ca	0.08	0.08	0.14
P	0.36	0.41	0.28
Mg	0.15	0.17	0.11
Na	0.011	0.010	0.642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CON
15%BP
30%BP
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