



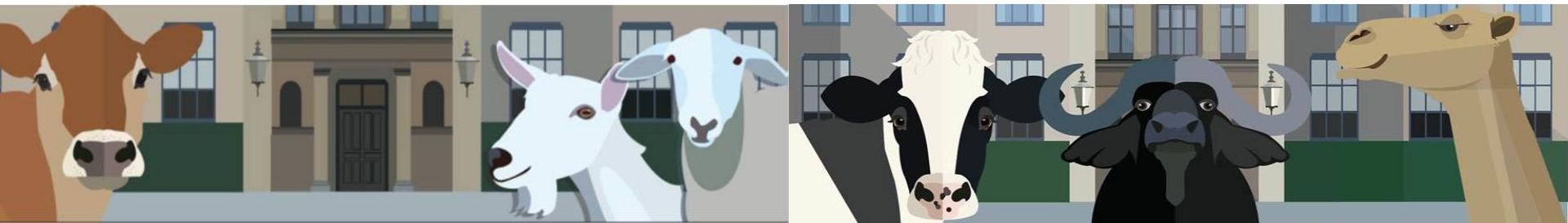
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# Can supplementation with mineral buffer mixtures improve the welfare of heat-stressed transition cows?

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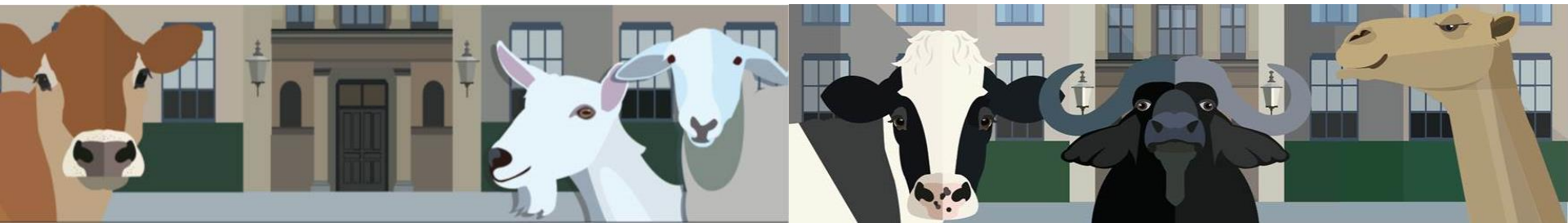




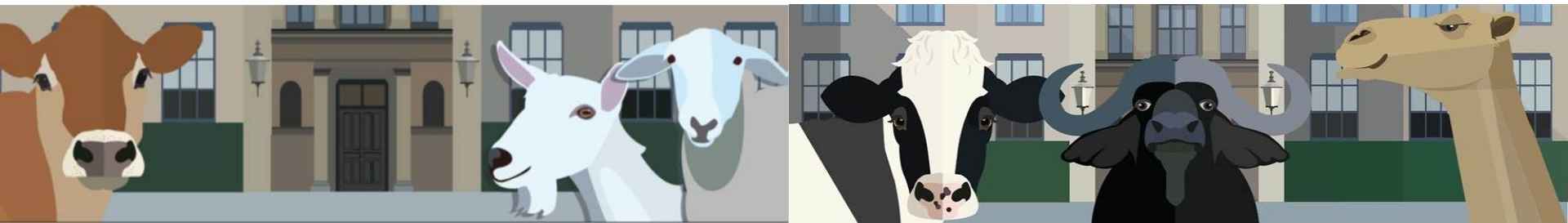
# Introduction



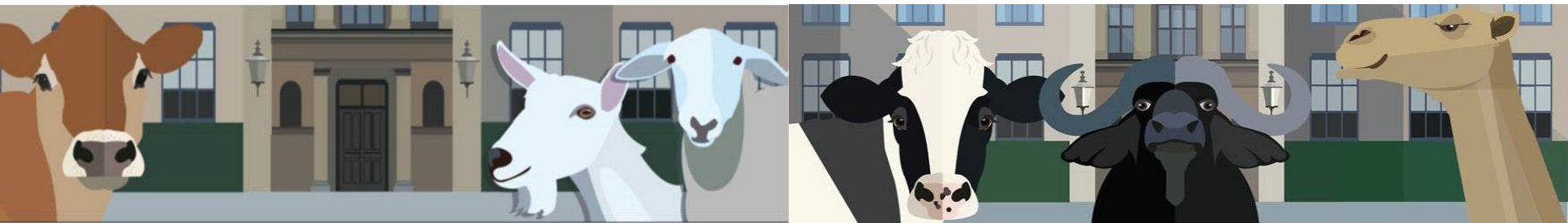
- Holstein high producing dairy cows has tremendous changes in diet during the first stage of lactation.
- Transition period is the period of transition diet, when fermentation of high energy concentrate can change micro-population in the rumen, affected the health status and welfare of the dairy cows.
- High concentration of carbohydrates has high acidogenic potential during fermentation causing decrease pH in the microenvironment and developing ruminitis and parakeratosis, especially in heat stressed dairy cows.



- Dairy cows in first stage of lactation, were divided in two groups:
  - experimental (n=15)
  - control (n=15)
- exposed in high environment temperatures ( $36.6 \pm 2.5^{\circ}\text{C}$ ).
- supplementatation in the daily feeding with mineral buffered mixtures, betonite with magnesium oxide (60%)



- Biochemistry profiles:
  - glucose,
  - total proteins,
  - albumins,
  - globulins,
  - urea,
  - HDL-cholesterol,
  - LDL-cholesterol,
  - total bilirubine,
  - calcium,
  - phosphorus,
  - ALT
  - AST
- Milk quantity:
  - Record data by DeLaval
- Milk quality:
  - Milcoscan
- Rumen pH:
  - pH meter WTW 330i





# Material and Methods

*Composition of mineral mixtures, %*



Indicator	K	E
<i>Mixture component</i>		
<i>Magnesium oxide</i>	60	40
<i>Bentonite</i>	-	20
<i>Zeolite</i>	20	20
<i>Sodium bicarbonate</i>	20	20
<i>Total</i>	100	100





# Results



Quantity and composition of milk

Indicator	K	E
Daily milk quantity (l)	27,19 ± 2,95	27,31 ± 3,12
Milk fat (%)	3,29 ± 0,21	3,54 ± 0,19**
Protein (%)	2,89 ± 0,19	3,01 ± 0,18
Dry matter (%)	11,52 ± 0,47	11,94 ± 0,61*

Statistically significant difference (p<0.05) \*\* (p<0.01)\*





# Results

Important biochemical parameters of blood serum

Indicator	K	E
<i>Glucose</i> , mmol/l	3,18 ± 0,34	3,21 ± 0,46
Protein, g/l	63,07 ± 4,68	63,77 ± 4,08
Albumin, g/l	26,44 ± 1,74	23,66 ± 2,39
Globulin, g/l	36,63 ± 5,73	40,11 ± 4,33
Albumin/Globulin	0,74 ± 0,14	0,60 ± 11
Urea mmol/l	3,50 ± 0,35	3,68 ± 1,54
<i>Triglycerides</i> mmol/l	0,35 ± 0,03	0,29 ± 0,02
<i>HDL-cholesterol</i> , mmol/l	1,83 ± 0,22	1,67 ± 0,44
<i>LDL-cholesterol</i> , mmol/l	0,37 ± 0,03	0,43 ± 0,04
ALT, U/L	64 ± 49	31 ± 21
AST, U/L	141 ± 116	139 ± 50
AST/ALT	4,60 ± 5,76	7,48 ± 6,97
Bilirubine nmol/l	5,04 ± 0,80	5,23 ± 0,64
<i>Carotene</i> , nmol/l	9,48 ± 2,33	8,66 ± 2,00
<i>Calcium</i> , mmol/l	2,64 ± 0,09	2,59 ± 0,14
<i>Phosphorus</i> , mmol/l	1,50 ± 0,12	1,54 ± 0,13
Ca/P	1,58 ± 0,14	1,58 ± 0,15

NS - no statistically significant difference





## Discussion and Conclusion



- Bentonite is natural aluminosilicate mineral with high potential surface and buffer activity. The basic structure of the molecule is stable, with amphoteric features, with sufficient capability for maintaining neutral pH.
- Results for quantity of milk production didn't revealed any statistically significant changes, although results for milk fat content ( $p < 0.05$ ) and dry matter ( $p < 0.01$ ) express statistically significant difference.
- Diet supplementation with mineral buffering mixtures can prevent developing rumen acidosis and improving animal welfare in heat stressed dairy cows.

