Milk metabolites are non-invasive biomarkers for nutritional and metabolic disorders of dairy herds?

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What? The interpretation of milk metabolites from milk recording can be indicative of nutritional and metabolic disorders?

Why? Milk Recording is done monthly in dairy farmers, is this a management tool?

How? Individual milk samples collected monthly from January to March 2017

Where? 27 herds in South of Portugal

Who? University of Évora and EABL

Background

Prevalence of elevated milk β-hydroxybutyrate concentrations in Holstein cows measured by Fourier-transform infrared analysis in Dairy Herd Improvement milk samples and association with milk yield and components

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Lactose and milk urea nitrogen: fluctuations during lactation in Holstein cows

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THE IMPORTANCE OF MONITORING CHANGES IN MILK FAT TO MILK PROTEIN RATIO IN HOLSTEIN COWS DURING LACTATION

VÝZNAM SLEDOVÁNÍ ZMĚN POMĚRU TUK/BÍLKOVINA V MLÉCE HOLŠTÝNSKÝCH DOJNIC

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The effect of non-nutritional factors on milk urea nitrogen levels in dairy cows in Prince Edward Island, Canada

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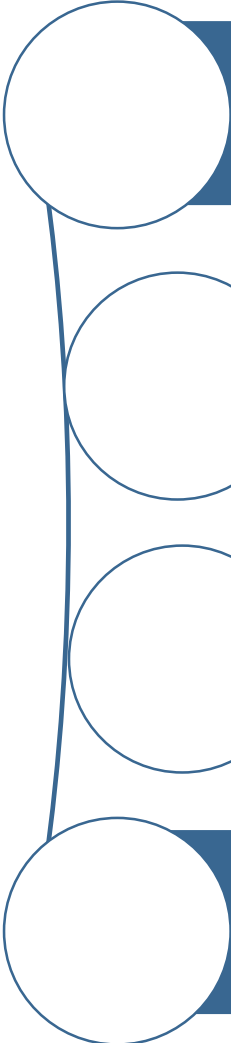550 University Avenue, Charlottetown, PEI, Canada C1A 4P3

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Background

Nutrient Imbalances - relationship between carbohydrates fermentability and protein degradability in the rumen can be diagnosed by **Milk Urea Nitrogen**, **Protein** and **Relation of Fat/Protein**.

Metabolic Imbalances - Negative Energy Balance, Hyperketonemia and Ketosis can be diagnosed by **β-hydroxybutyrate**, **Fat** and **Relation of Fat/Protein.**

Metabolic Imbalances - Acidosis can be diagnose by **Fat** and **Relation of Fat/Protein**.

Milk metabolites can be indicators of **Health** and **Welfare** of the cow
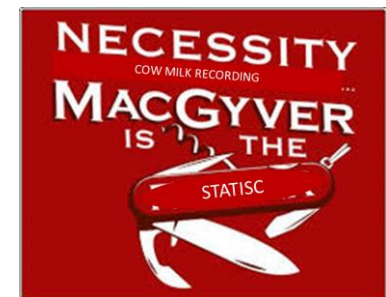
Background

Thresholds

Levels	Fat (%)	Protein (%)	Relation F/P	MUN (mg/kg)	BHB (mmol/L)
Low	< 3,20 [1]	< 3,00 [3,4,5]	< 1,00 [6]	< 100	< 0,10 [8]
Normal	3,20 – 4,50	3,00 – 3,20	1,00 – 1,40	100 – 300	0,10 – 0,20
High	> 4,50 [2]	> 3,20 [3,4,5]	> 1,40 [1,7]	> 300	> 0,20 [9,10,11,12]

Material & Methods

- 27 farms
- 1 milk sample / month / cow
- January 2015 – March 2017
- 110461 individual milk smaples - 9523 lactation

- Descriptive Statistics
- Boxplots
- GLMM
- Spearmann´s Correl.

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Results

First 30 days of lactation:

7.7% of milk recording had BHB concentration over 0.2mmol/L.

These cows had high possibility of being with clinical ketosis.

44.8% of milk recording had the relation of F/P over 1.4.

49.3% of milk recording had milk fat over 4.5%.

Theses cows were probability mobilizing body fat.

11.9% of milk recording had the relation of F/P above 1.4.

21.6% of milk recording had milk protein above 3%.

These cows were ingesting a small proportion of protein in the diet comparing with the quantity of carbohydrates.

Conclusions

These non-invasive biomarkers can reflect **nutritional and metabolic disorders.**

The interrelation between them must be taken into account.

The thresholds of this milk metabolites to indicate health disorders are not consensual among the authors.

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