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# Changes of metabolic conditions around calving affect oxidative stress and acute phase protein in pluriparous dairy cows

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## Aim

**The study aims at evaluating the relationships between the change of metabolism during the *postpartum* and the inflammatory conditions and oxidative stress in dairy cows.**

## Materials & methods

Animals: 30 pluriparous Friesian cows were selected in two commercial farms on the basis of expected date of calving.

Experimental protocol: Blood was sampled every fortnight starting from 14 days before calving and until 70 days *postpartum* (7 samples), and Fat thickness (FT) of pelvic region was measured with an ultrasound scanner equipped with a 5 MHz transducer.

*Blood analysis*:

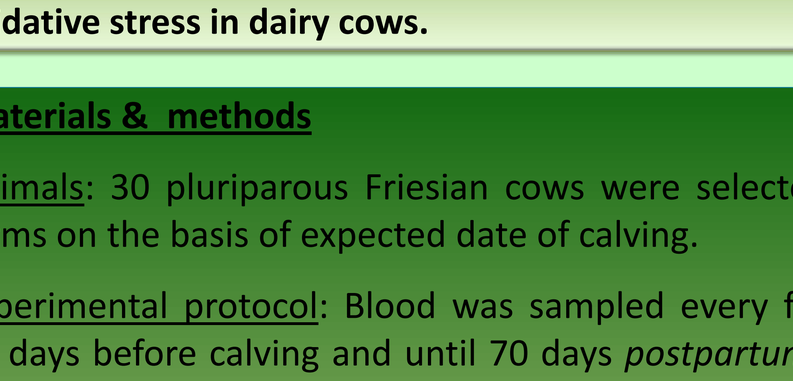
- **Acute phase response**: ceruloplasmin, haptoglobin, albumin, zinc;

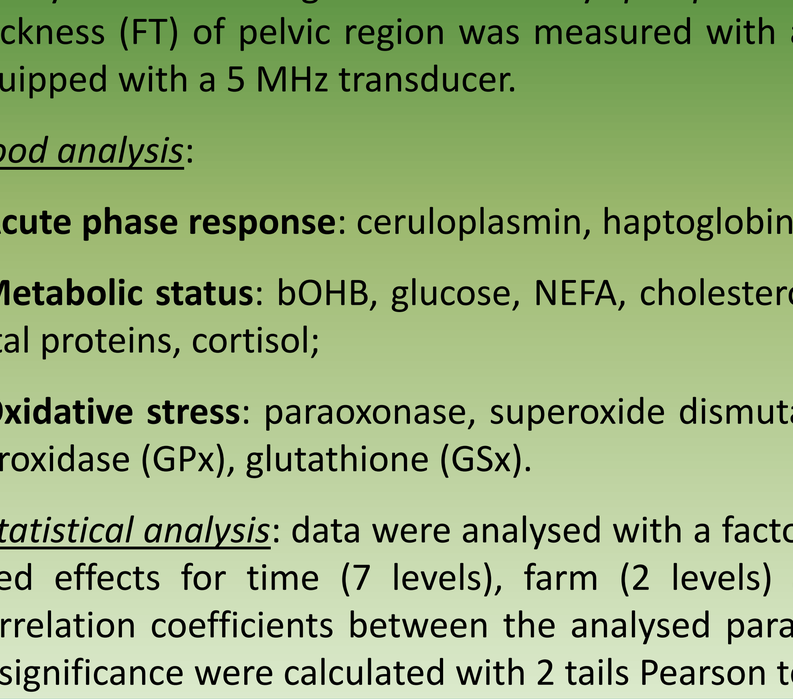
- **Metabolic status**: bOHB, glucose, NEFA, cholesterol, urea, haemoglobin, total proteins, cortisol;

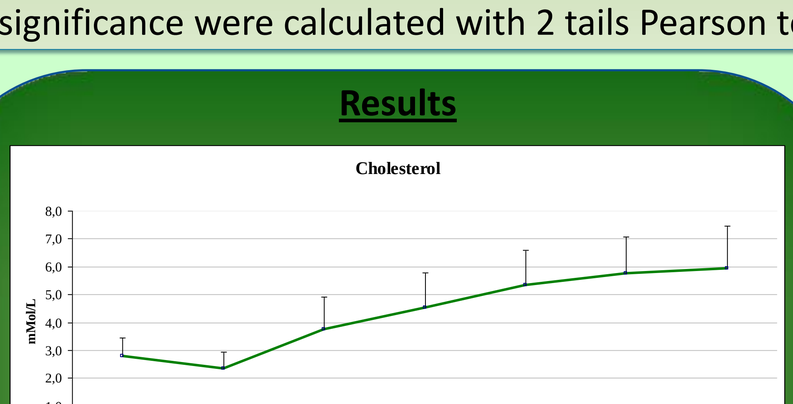
- **Oxidative stress**: paraoxonase, superoxide dismutase (SOD), glutathione peroxidase (GPx), glutathione (GSx).

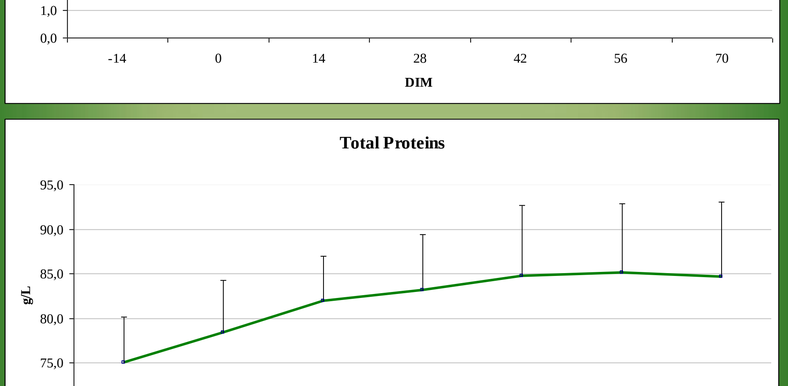
- *Statistical analysis*: data were analysed with a factorial model (GLM) with fixed effects for time (7 levels), farm (2 levels) and their interaction. Correlation coefficients between the analysed parameters and the levels of significance were calculated with 2 tails Pearson test.

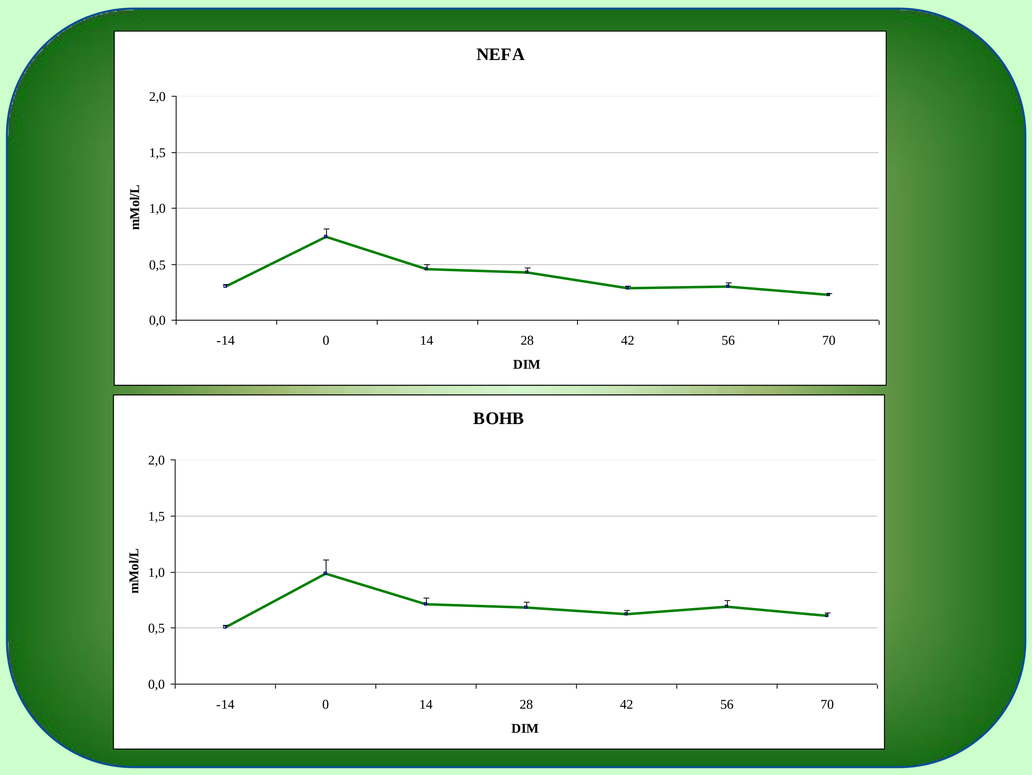
## Results




## Discussion & Conclusions

Data confirm that the early stage of lactation in dairy cows is characterized by:

- a negative energy balance (NEB) with the increase of fat mobilization, and consequent higher values of NEFA and bOHB;

- a proinflammatory condition, with higher haptoglobin and lower cholesterol, albumin and paraoxonase;

- an oxidative stress, but these changes are not clearly reflected from the parameters analysed.

Besides the expected correlations between FT and energy parameters (NEFA and bOHB), interesting are those between inflammatory indices and NEB, suggesting a relationship (i.e. inflammation impairs NEB).

These results are relevant and suggest that inflammation (reducing dry matter intake), besides milk yield and diet, can affect the energy efficiency in early lactating cows.

Statistical analysis allowed to select the best predictors of metabolic and inflammatory conditions around parturition, i.e. total proteins, haptoglobin, cholesterol, bOHB, NEFA and paraoxonase.

## Correlations

| | Cholesterol | Total proteins | Albumins | Haptoglobin | NEFA | BOHB | Paraoxonase | GSx |
|---|---|---|---|---|---|---|---|---|
| FT | 0,283** | 0,088 | 0,395** | -0,096 | 0,074 | 0,043 | 0,139 | 0,393** |
| Cholesterol | | 0,278** | 0,491** | -0,446** | -0,396** | -0,136 | 0,573** | 0,182 |
| Total proteins | | | 0,168 | -0,089 | -0,200* | -0,064 | 0,043 | 0,241* |
| Albumins | | | | -0,355** | 0,111 | 0,118 | 0,639** | 0,288** |
| Haptoglobin | | | | | 0,393** | 0,304** | -0,527** | 0,036 |
| NEFA | | | | | | 0,609** | -0,333** | 0,220* |
| BOHB | | | | | | | -0,123 | 0,205* |
| Paraoxonase | | | | | | | | 0,015 |

Correlation coefficients calculated for the early lactation period (DIM 0-42)

**Correlation is significant at the 0.01 level; *Correlation is significant at the 0.05 level