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Relationship between innate immune system components and somatic cell count of Latvian Brown cows

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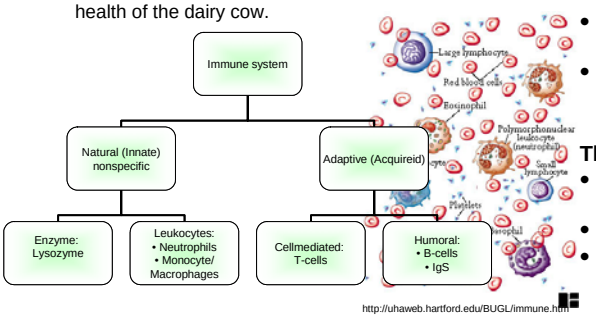
Introduction

- Mastitis is the most common disease in dairy cows mainly due to reduced milk production and changes in milk quality (Smith and Hogan, 2001).
- The immune response to an incoming infection into the udder is of utmost importance for the health of the dairy cow.



Materials and methods

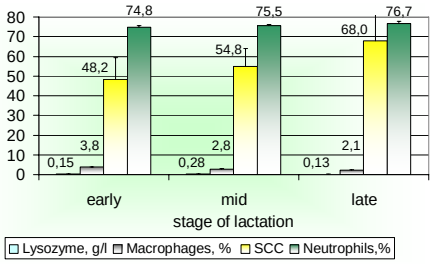
- 1st lactation 30 Latvian brown cows from four genetic groups.
- The milk samples were analyzed 3 times during lactation for somatic cell count (SCC), lysozyme, neutrophils, macrophages, T- and B cells.
- In blood - lysozyme, neutrophils, macrophages, T- and B cells.
- Heritability of somatic cell count and immune system components were estimated by GLM.

The objective of this study was:

- to analyze heritability of immune system component;
- its relationship with somatic cell count in milk;
- to get answer could be used the immune system component for the selection of cattle.

Results

Figure 1. Milk leukocyte counts for healthy cows with low SCC in milk (SCC < 150,000 cells/ml) in different stage of lactation



- Somatic Cell Count in research group range 5 – 1036t.cells/ml, in average 129,5t.cells/ml.
- 71,6% of samples were with SCC < 150 t.cells/ml.
- The percentage of Neutrophils was higher in late stage of lactation.
- In early lactation, the percentage of Macrophages was higher, percentage of Macrophages in late lactation only about half of the values in early lactation.

Table 1. Correlation between SCC and innate immune system components in milk

Traits	SCC	Lysozyme	Neutrophils	Macrophages
SCC	*0,17*	-0,15	**0,50***	**0,61***
Lysozyme	0,06	*0,11*	-0,09	**0,52***
Neutrophils	-0,16	-0,07	*0,11*	**-0,70***
Macrophages	-0,17	0,02	**-0,54***	*0,15*

Above diagonal correlation, if SCC in milk limit <150000 cells/ml
Under diagonal correlation, if SCC in milk <=150000 cells/ml
Diagonal elements - heritability

- Heritability of somatic cell count and immune system components were low ranging from 0.1 to 0.18.
- No significant relationship was found when somatic cell count in milk was till 150t.ml^{-1}.
- Moderate phenotypic correlations exited between somatic cell count and neutrophils, somatic cell count and macrophages (r_p=0.50, 0.61), when somatic cell count in milk was above 150t.ml^{-1}.

Table 2. Correlation between SCC and innate immune system components in blood

Traits	SCC	Lysozyme	Neutrophils	Monocyte
SCC	*0,17*	**0,48***	**-0,97***	**0,53***
Lysozyme	0,19	*0,01*	-0,33	0,13
Neutrophils	-0,27	-0,24	*0,12*	-0,36
Monocyte	-0,22	-0,03	-0,39	*0,16*

Above diagonal correlation, if SCC in milk limit <150000 cells/ml
Under diagonal correlation, if SCC in milk <=150000 cells/ml
Diagonal elements - heritability

- Heritability of innate immune system components were low.
- Positive moderate phenotypic correlations between somatic cell count and neutrophils, somatic cell count and monocyte (r_p=0.48, 0.53), when somatic cell count in milk was above 150t.ml^{-1}.
- Significant negative correlation between SCC and neutrophils r_p=-0.97

Conclusions:

- The innate immune system components in milk was significantly affected by the lactation phase of a cow (p<0.001).
- Innate immune system components in milk and blood not statistically different between sires progeny groups, with low heritability of innate immune system components.
- Significant relationships between SCC and cells of the immune system were found when somatic cell count in milk was above 150t.ml^{-1}.