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The relationship between the number of somatic cells and the casein content of cow's milk

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Abstract: Proteins constitute a significant portion of milk's nutritional value, with the average amount of protein in liquid milk being 3.5%. In the process of fabrication of cheese, milk caseins are essential because these create the form of the gel network that entraps the other constituents. Somatic cell count has been regarded by many dairy producers' a crucial factor in programs that compensate farmers for producing milk of the highest quality. The presence of bovine mastitis is typically indicated by a higher number of somatic cells, which also alters the milk's physical, microbiological, and chemical composition. This study follows the relationship between the number of somatic cells and the content of casein in cow milk.

Introduction

- Proteins are important component parts in the nutritional value of milk, with liquid milk typically containing between 3.2% - 3.5% protein. Based on relative solubility, dairy proteins are divided into caseins.
- In countries where large quantities of milk are processed to make cheese, it is crucial to assess the range of the casein proportion in milk protein and the factors causing it to vary.
- The objective of this study was to follow the influence of somatic cell count on the casein content from cow's milk.

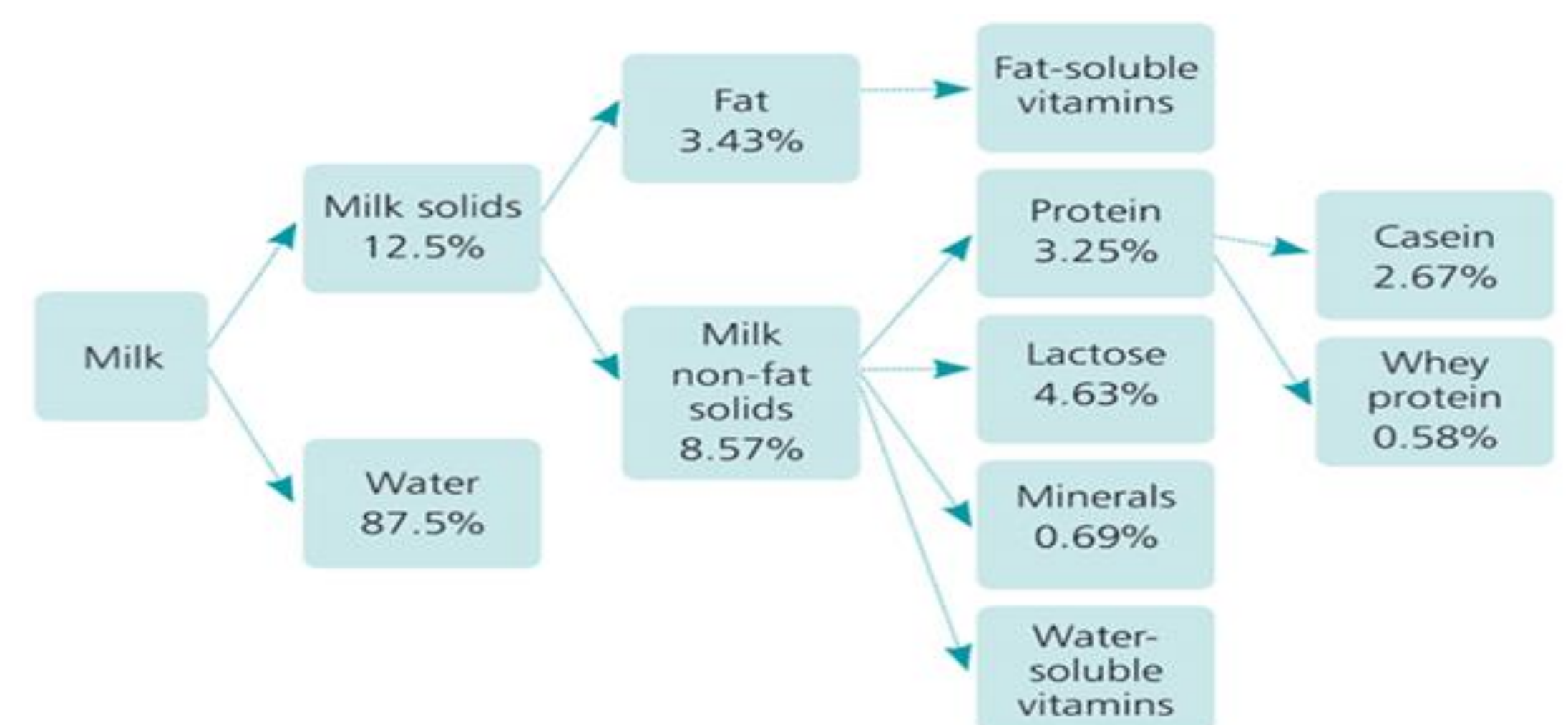
Material and Methods

- **Materials:** cow milk, sterile containers, Decon solution, Triton solution, staining solution.
- **Identifying mastitis-affected cows**
 - The AfiMilk application, the world's most cutting-edge dairy farm management software, was used to track the dynamic behavior of cows. Every time the milk quantity and conductivity change, the software sends notifications based on the designed algorithm.
 - The automated analyzer - **FTIR CombiScope 600/300** (LactoScope FTIR 600/300 and SomaScope LFC 600/300) was used to determine physico-chemical parameters (fat, dry matter, protein, lactose, density) and somatic cell count (NCS).



Results and discussions

- The aim of this work was to investigate the impact of somatic cell count (SCC) on the casein content of cow's milk.
- Mastitic milk has a higher proteolytic activity than normal milk, in part due to the increased proteinase plasmin, which hydrolyzes caseins.
- Casein in milk from healthy cows is around 2.7 - 3% and the casein content of milk with mastitis is low.



- Lower values of casein might be observed in high SCC milk because of plasmin- and somatic-cell-protease-mediated activity against caseins, especially α S1- and β -casein.

Table 1. Variation of casein distribution in function number of somatic cells in milk

Average casein content and SCC from milk cow	Healthy	Subclinical mastitis	Clinical mastitis
SCC (10^3 cells/ml)	<200	300 – 500	> 500
Casein, %	2.7	2.50	2.20

Conclusions

- Results highlight the significance of casein as a possible biomarker for mastitis in farms of bovine.
- Further studies are needed to clarify the relationships between casein content and SCC in cow's milk.