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QUALITY AND SAFETY OF BUTTERMILK

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Abstract: Buttermilk (BM) is one of the main by-products of the dairy industry. Most BM is dried and added as an ingredient in food products, or is used in animal feed. The present study evaluated the physico-chemical composition and hygienic quality of BM from a dairy processing plant. The occurrence and concentration of heavy metals was also investigated to determine the possible health risks to humans. Total dry matter (TDS) had a mean value of 8.8%. Lecithin content (16.3 mg%) of this by-product provides it with emulsifying properties. Together with a high lactose content (4.45%), recommends buttermilk as a source for sweet products. The mean bacterial contamination (TNG) value was 2.39×10^7 cfu/ml, and the mean acidity of buttermilk samples was 52.5° T. The high total microbial load associated with high acidity values qualifies BM as an easily perishable product. The levels of heavy metals (lead, copper and zinc) did not exceed the permissible limits laid down by legislation.

• Introduction

Buttermilk (BM) is the main by-product of butter manufacturing, with a chemical composition similar to skim milk. Various refreshing drinks are made from sweet BM, by combining with sugar, flavorings and inoculated with lactic acid bacteria. BM made from pasteurized and fermented sour cream is a food of high dietary value, widely consumed in the Nordic countries. The addition of skimmed milk to buttermilk results in a type of cheese similar to cottage cheese. The present study focused on evaluation of the nutritional and hygienic quality of BM. The occurrence and concentration of heavy metals was also investigated to assess the possible health risks to humans.

• Material and method

A total of 26 BM samples from the extra butter technology were collected and analyzed.

Microbiological analysis

The hygienic quality of the BM samples was evaluated by determining the total number of aerobic germs (TNG), using standardized method (ISO 4833-1:2013)

Chemical composition

The content of the main components of BM: total dry matter - TDM(%), protein (P%), fat (F%), and lactose (L%) was performed using a Lactoscope analyzer (Delta Instruments).

Determining the amount of lecithin

The acid digestion method of phospholipid, followed by colorimetric determination of the inorganic phosphate formed was used to determine the lecithin content.

The titratable acidity of milk was evaluated according to the Thórner method.

Heavy metal content was measured by atomic absorption spectrometry.

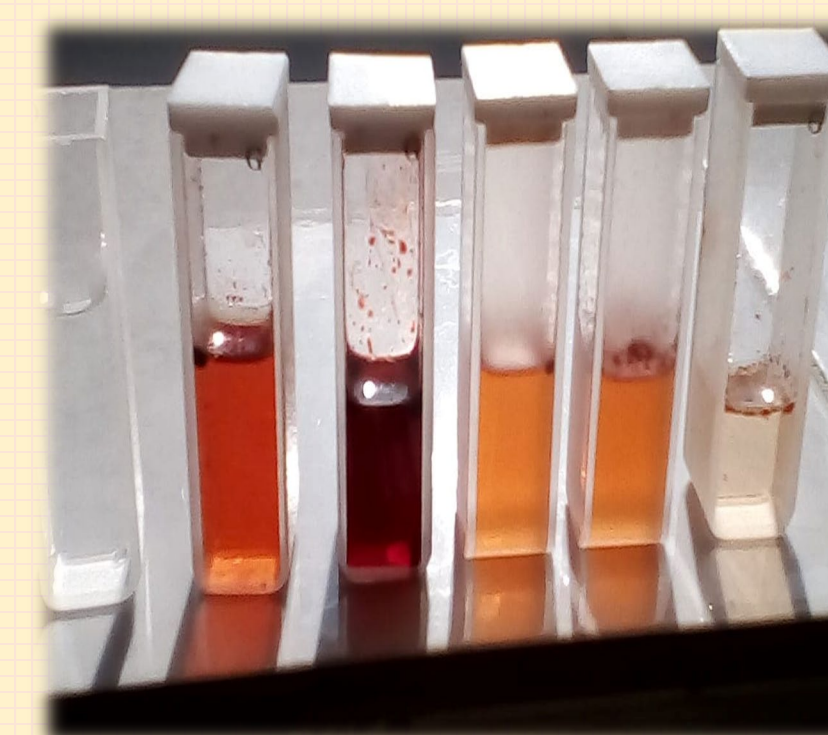
• Results and discussions

Chemical composition, acidity and microbial contamination of BM samples

Parameter	Min. value	Mean value	Max. value
TDS %	[4,7]	8,84	[11,2]
Protein (P%)	[0,7]	1,58	[9]
Fat (F%)	[0,2]	1,29	[2,6]
Lactose (L%)	[2,8]	4,45	[5,9]
Acidity (° T)	[22]	52,46	[96]
TNG (cfu/mL)	1×10^7	$2,39 \times 10^7$	$3,7 \times 10^7$



Variation in lecithin content in BM samples



Lead = 0,06 mg/kg
STAS 0,5 mg/kg

Cooper = 0,06 mg/kg
STAS 0,2 mg/kg

Zinc = 6.4 mg/kg
STAS 30 mg/kg

• Conclusions

- BM resulting from the production of assortment of "Extra" butter, in discontinuous flow, can be considered as a by-product with a physico-chemical composition similar to skimmed milk, but with an inconstant nutritional value.
- Relatively high level of microbial contamination, combined with increased levels of acidity of BM, qualifies this product as highly easily perishable.
- The significant amount of lecithin provides BM with important emulsifying properties. The association of lecithin with a high lactose content recommends BM as a raw material in the manufacturing of certain sweet products.