

## **RESEARCHES CONCERNING THE PROTEOLITICAL MODIFICATIONS DURING THE FERMENTATION AND THE STORAGE OF CULTURED BUTTER MILK**

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### **Abstract**

*In this study were followed biochemical modifications of cultured butter milk during processing. The researches were focused on two main working directions: appreciation of raw milk quality, and cultured butter milk amino-acids determination by gas chromatographic method.*

**Keywords:** *fermented dairy, quality, cultured butter milk, amino-acids*

### **Introduction**

Fermented dairy products are based on physical and chemical modifications of milk caused by the development of starter culture and his metabolic activity.

The nutritive value of these products is dependent on the availability and digestibility of nutritive constituent, also by the modification of these constituents induced by the lactic acid bacteria development and by them metabolic activity (Apostu, 2006).

This nutritive value is improved by biochemical modifications which appear during fermentation and storage.

### **Experimental**

One type of cultured butter milk was taken in study. The samples were studied in three points of the technological process of fabrication which was considered essentials:

1. Milk prepared from souring with starter culture noted: BM1-butter milk

2. Culture butter milk at the middle period of fermentation noted BM 2.
3. Culture butter milk at the end of processing, noted: BM3.

Analyze methods had followed two directions:

**The appreciation of milk quality**, meaning: the appreciation of milk integrity and freshness degree. Appreciation of milk integrity (determination of fat content, proteins and lactose) was realized with Lactoscan and milk freshness was determined by measuring titrable acidity with Thorner method (Gus, 2005).

**Determination of amino-acids** through gas chromatography method coupled with the mass spectrophotometer (GC-MS) was realized using a capillary column fused silica Rtx-5MS, the mass spectrophotometer cuadrupolar Trace DSQ with sensibility of pg order (Culea, 1986). The method consists in: extraction, esterification and trifluoacetylation.

## Results and Discussions

The results from the appreciation of milk quality are expressed in table 1, and the variation of amino-acids content in cultured butter milk during processing is presented in table 2.

**Table 1.** The variation of protein, fat and lactose in cultured butter milk during processing

Sample	Fat	Lactose	Protein
	g%		
BM1	2.21	5.08	3.3
BM2	2.12	4.24	3.1
BM3	2.3	3.82	3.2

During processing of cultured butter milk, small modifications were registered at fat content value: 21 (BM1) → 2.12 (BM2) → 2.30 (BM3) which appears during incubation because of product evaporation and concentration (Table 1).

**Table 2.** The variation amino-acids (AA) content in cultured butter milk during processing

AA	BM1	BM2	BM3
g/100 g			
<b>Ala</b>	<b>8.63</b>	<b>4.77</b>	<b>3.16</b>
Gly	1.82	1.67	1.55
Thr	2.51	2.21	1.64
Ser	2.50	4.10	2.21
Val	4.58	2.96	2.58
<b>Leu</b>	<b>17.44</b>	<b>11.38</b>	<b>8.72</b>
Ile	1.92	1.35	1.09
<b>Cys</b>	<b>8.39</b>	<b>3.02</b>	<b>0.91</b>
<b>Pro</b>	<b>26.57</b>	<b>16.28</b>	<b>11.14</b>
Met	1.58	1.84	0.96
Asp	3.27	2.27	1.91
Phe	5.30	3.47	2.13
Tyr	1.36	0.36	0.22
<b>Ac. Glu</b>	<b>18.72</b>	<b>12.97</b>	<b>10.25</b>
<b>Lys</b>	<b>9.56</b>	<b>7.01</b>	<b>4.15</b>
Arg	4.72	2.25	1.52
His	5.08	2.58	2.13
Cis	5.95	2.80	2.65

A decrease of lactose content was observed: 5.08(BM1) →4.24 (BM2) →3.82 (BM3), explained by the transformation of lactose in lactic acid pursuant to the microorganisms activity from the starter culture. (Table 1)

Total protein content registered a decrease, because of proteolysis: 3.3(BM1) →3.1 (BM2) →3.2 (BM3). (Table 1)

From 18 amino acids studied, only 5 amino-acids present significant values, meaning Leu, Pro, Ac. Glutamic, Lys to the final product.

Also, from all the amino-acids taken in study, 6 of them registered a significant decrease from raw milk to final product, meaning: Ala from 8.63 to 3.16, Leu from 8.39 to 0.91, Pro from 26.57 to 11.14, Ac. Glu from 18.72 to 10.25, Lys from 9.56 to 4.15.

These amino-acids are used preferential by microorganisms; also the rest of amino-acids registered decrease, but they do not make part from lactic acid bacteria nutritional necessary.

### **Conclusions**

Nine amino acids are generally regarded as essential for humans. They are: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine. During fermentation, proteins are hydrolyzed in soluble oligopeptides especially those which contains Phe, Tyr, Tre and Ser that are more absorbent from human digest tract, offering for the final product a high nutritive efficiency. The cumulative effect of essential amino-acids from milk proteins and microbial cells proteins contribute to the biological value of the product.

### **References**

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