Milk Urea Disappears During Milk Processing into Cheese

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Abstract
The purpose of this experiment was to evaluate first to what extent a well-known dose of urea added deliberately to milk can be found in the same concentration in cheese or milk whey and second how it determines the development of milk processing. Urea was added to milk in increasing amounts from 0,5 mg to 28 mg / 100 ml milk. Obtained data revealed the fact that added urea in milk can be found after coagulation as well in cheese and also in milk whey. During maturation period, urea concentration from cheese is stepwise reduced and is proportional with initial concentration. Cheese with lower content than 3 mg urea, loses this substance in the first 14 days of maturation and keeping. From our experiment we can see that presence of milk urea reduces to half the time of coagulation compared to the milk without urea.

Key words: Coagulation, cheese, milk urea

1. Introduction

Fresh milk normally contains a certain urea concentration. It derives from luminal degradation of proteins by ruminal microflora. Urea milk concentration can increase accidentally too, during wrong manipulation of nitrite substances used in agriculture, or polluted water used in dairy device washing used in milk harvest, processing and keeping [1, 2, 3, 5, 6, 7].
The milk and milk products consumer is interested not only in the toxicity degree of urea but also what happens with it beginning with milk harvest, during harvesting and keeping until using. These are the motives which determined us to measure what quantity of urea added deliberately into milk can be found in the cheese obtained from it and kept into salty water for 40 days.

2. Materials and methods

In order to achieve the objectives mentioned above we realized the following experiment. In 200 ml of integral milk sorted in a number of 20 recipes we added different quantities of urea, realizing increasing concentrations from 0,5 mg until 25 mg %. The recipe which didn't contain urea was used as the control probe. All the probes were then processed for milk coagulation with similar clot quantities noticing also the coagulation time from each recipe. The clot was then processed and transformed into cheese following the classic technology. Obtained cheese and whey were than analyzed for their content in urea at 24 hours from clotting and 14 days, 40 days of keeping [8].

3. Results and discussion

1.) *Regarding urea content in cheese and whey*
Obtained data regarding milk urea after clotting are shown in figure 1.
In figure 1 we expose the obtained results regarding urea content in fresh cheese and whey and also the one kept in salty water for 40 days. The diagram shows that milk urea passes after clotting into clot but also into whey

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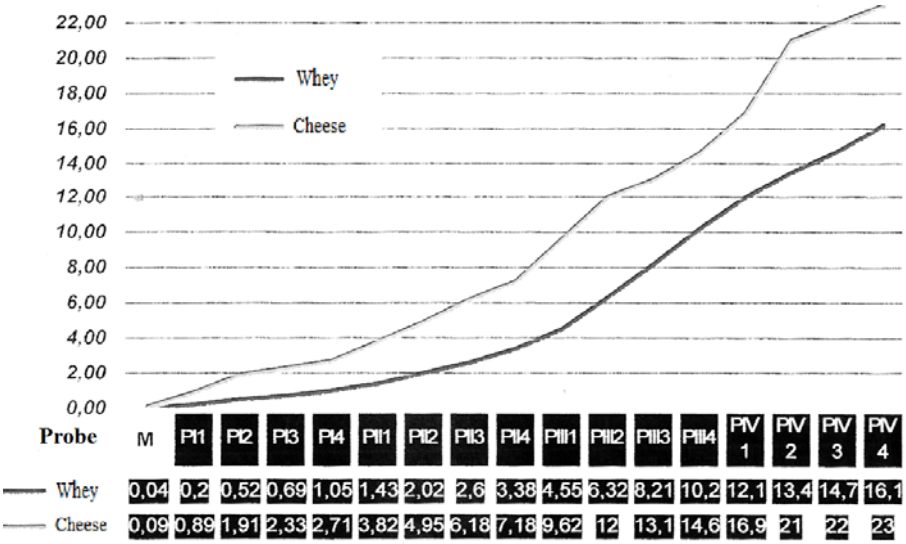

Figure 1 Cheese and whey urea quantity evolution after 24 hours of pressing

Its concentration in the two components depends on the concentration level in milk probes.

In table 1 we expose the urea quantity found in cheese after 24 hours from its fabrication, after 14 and 40 days of keeping in salty water.

Table 1 Urea quantity variations in cheese samples after 24 hours, 14 days, 40 days

Sample	Total amount of urea in milk probes (native and added urea)	Amount of urea found in cheese after 24 hours (mg%)	Amount of urea found in cheese after 14 days of maturation (mg%)	Amount of urea found in cheese after 40 days of maturation (mg%)
M1	0.8	0.7	0.00	0.00
PI1	1.1	0.89	0.00	0.00
PI2	1.6	1.5	0.00	0.00
PI3	2.1	2.0	0.00	0.00
PI4	2.6	2.5	0.00	0.00
M2	0.4	0.3	0.00	0.00
PII1	3.8	3.7	0.61	0.00
PII2	4.8	4.6	0.99	0.00
PII3	5.8	5.7	1.42	0.00
PII4	6.8	6.7	2.01	0.00
M3	0.4	0.3	0	0.00
PIII1	8.8	8.6	2.78	0.00
PIII2	10.8	10.7	3.60	0.00
PIII3	12.8	12.6	4.18	1.31
PIII4	14.8	14.4	4.81	2.33
M4	0.3	0.2	0	0
PIV1	16.6	16.6	5.71	3.04
PIV2	20.6	20	7.36	4.21
PIV3	24.6	23	7.92	4.84
PIV4	28.7	27	9.21	6.45

From table above we can see that after 24 hours from its fabrication cheese contains a decreased amount of urea compared to the one found in the milk from where it derived. From here we can observe that during 14 days of keeping the cheese in salty water, in all sorts of cheese, urea concentration from its composition is reduced extremely. Urea quantity which dissapears from cheese composition during its keeping seems to be constant. Because of that in cheese probes which were obtained from milk with a smaller content

than 3,8 mg urea at 100 ml milk, after 14 days of there are no urea traces. In cheese obtained from milk which contained a higher amount of urea than 2,6 ml at 100 ml milk, after 14 days of keeping in salty water we can find 30 % of urea which was found in the milk from which it was produced. After 40 days of keeping the cheese in salty water we can find urea only in the type of , neutralyzing it.

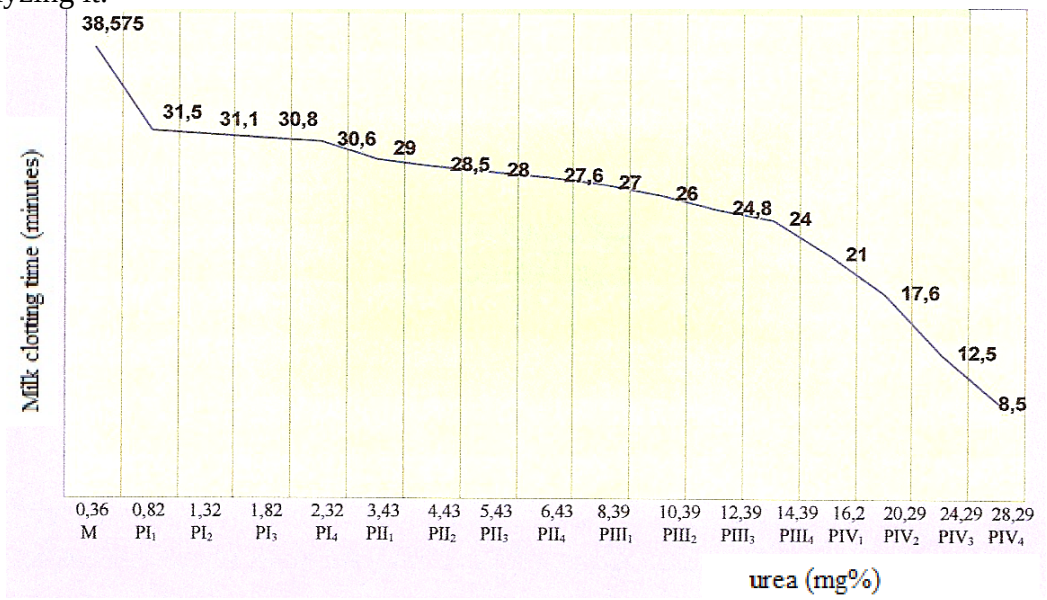

Figure 2 Milk clotting time variation depending upon urea existing in the probes

2). *Regarding the milk clotting time under the influence of different urea concentrations*

Data obtained by measurements regarding the effect which urea concentration in milk has upon clotting time are shown in figure 2. From figure 2 we can observe that milk clotting time decreases constantly as urea concentration increases.

Conclusions

From our experiments we can conclude:

1. Urea from milk can be found after clotting both in cheese and whey.
2. Cow cheese "telemea" presents a great neutralizing capacity through urea hydrolysis which reaches its composition.
3. Urea concentration from milk is smaller than 3,5 mg%, and disappears from cheese before 14 days after its processing. In the next 40 days of keeping the cheese in salty water urea disappears also from the sorts fabricated from milk with a higher concentration than 12,8 mg % milk keeping the cheese in salty water cheese which was produced from milk which contained a higher amount than 12,8 mg urea at 100 ml milk. This only contains 20% of the initial urea. All these demonstrate that milk and cheese posess a great capacity of lysis of the urea molecule
4. Milk clotting time is reduced in milk with higher concentration of urea.

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