



ϵ - FRUCTOSIL-LYSINE IN MILK

RAPID METHOD FOR THE DETERMINATION OF ϵ -FRUCTOSIL-LYSINE IN MILK

INTRODUCTION

Thermal treatment in milk is necessary to guarantee the microbiologic safety of the food but may alter its nutritional qualities. Therefore it is of primary importance to determine if the thermal treatment is adequate.

Raw milk of a good microbiological quality can have a lighter pasteurization treatment too much light that it maintains mostly unaltered the chemical-physical and nutritional characteristics. On the contrary for the production of UHT and powder milk temperature too much high generates the degeneration of the proteins and determine a milk of lower quality.

For the production of some kind of cheese the law requires the use of only "fresh milk" that means milk that do not have encountered high thermal treatments.

To evaluate the effect of thermal treatments applied to milk or to determine if powder milk or UHT milk has been added, some indicators as furosine and lactulose are used.

Through furosine determination it is detected the intensity of the initial phase of Maillard reaction (responsible of the browning of heated milk). This reaction is then related to the thermal process done to milk.

ϵ -fructosil-lysine is the first product of Maillard reaction and it is converted into furosine through the acid hydrolysis of milk. Furosine it is then analyzed using the HPLC method. This method is very long, complex and expensive.

ϵ -fructosil-lysine, the first stable product of Maillard reaction is a precursor of furosine and can give the same indications that can be obtained by the analysis of furosine.

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MATERIALS AND METHODS

The principal of the method is based on a redox reaction in which a tetrazolium salt reacts with ϵ -fructosil-lysine forming a violet compound. This colour intensity, measured at 545 nm is proportional to the concentration of ϵ -fructosil-lysine in milk.

FOODLAB innovative method permits to quantify the ϵ -fructosil-lysine in milk in a very simple and quick way. The sample is used without any pre-treatment needed. A microquantity is used and the reagent is pre-filled in single use cuvette.

Materials:

- FOODLAB instrument
- Pre-filled single use cuvette
- Bottle with starter reagent
- Micropipette to be used for taking 50-200 μ L

Using the specific pipette, add 150 μ L of sample and, after 5 minutes of incubation in the specific cells, add 100 μ L starter reagent. After 1 minute, the instrument displays the result expressed as delta x 1000 of ϵ -fructosil-lysine.

Reagents	Sample Volume	Wavelength	Analysis type	Unit of measure	Calibration available
2 compounds	150 uL	545 nm	Kinetic	delta x 1000 ϵ -fructosil-lysine	YES

Linearity	Accuracy	Repeatability	Corr. Coefficient	Sensitivity	Test time	Test/hour
>1000 delta x 1000 ϵ -fructosil-lysine	+ - 10%	CV < 10%	0,95	10 delta x 1000 ϵ -fructosil-lysine	6 minutes	30



RESULTS AND DISCUSSIONS

Parmalat® and CDR have conducted a study on ϵ -fructosil-lysine to evaluate the possibility of using it as an indicator for thermal treatment (*).

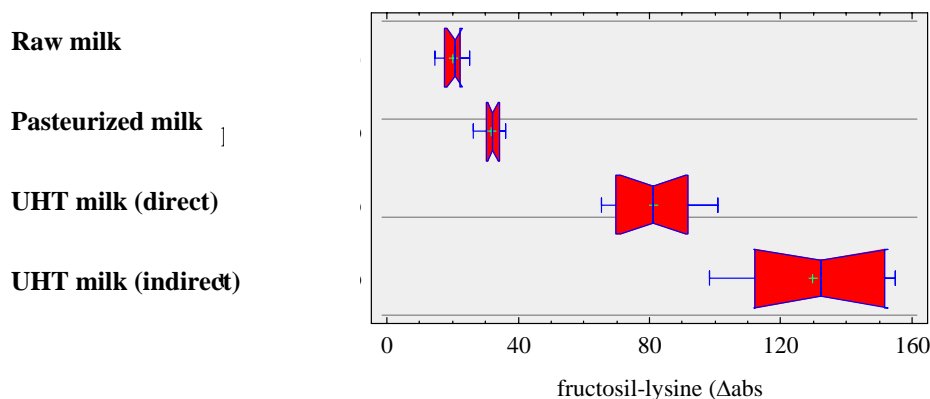
Many determinations in parallel between furosine and ϵ -fructosil-lysine on samples of different types of milk have been done.

The results show a good correlation between the two methods ($R^2 = 0,95$). These results make possible to align the values obtained with ϵ -fructosil-lysine and furosine methods.

Linearity of ϵ -fructosil-lysine test is also good ($R^2 = 0,99$).

Sensitivity is also good: through this test it can be determined an addition of 10% of powder milk in raw milk.

It has been done a study on various kind of milk in order to identify, through ϵ -fructosil-lysine value, different classes of milk depending on the thermal treated that have received. ϵ -fructosil-lysine test, as furosine, the discrimination among raw milk, pasteurized, direct or indirect UHT milk



* Vatteroni, Manghi, Gandolfi, Cagnasso (Parmalat®), Bonicolini, Bicchiega (CDR) "Valutazione di un metodo rapido per il trattamento termico del latte: test della ϵ -fruttosil lisina"



CONCLUSIONS

FOODLAB method for ϵ -fructosil-lysine analysis is a good alternative to classic methods as furosine.

The test is capable of discriminate various kinds of thermal treatment received and therefore it can be used to optimize the milk and diary products production process or to identify frauds (for example the addition of powder milk to fresh milk).

The test is very simple and quick and can be done even directly at milk reception or during the process of treatment and transformation of milk.

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