

Nota Breve

Determination of the milk fat content of fat mixtures

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RESUMEN

Determinación del contenido de grasa de leche en mezclas de grasas.

Los métodos para la determinación del contenido de grasa de leche en mezclas de grasas se basan habitualmente en el análisis de ácido butírico. Este ácido graso es específico de la grasa de la leche. Para el cálculo del contenido de grasa de leche a partir del contenido de ácido butírico de la mezcla se utiliza un factor de conversión. Cuando se aplica este procedimiento, no se tiene en cuenta la variación natural del contenido en ácido butírico de la grasa de leche. Datos publicados recientemente indican que si este factor no se tiene en cuenta se cometen importantes errores, haciendo difícil la interpretación de los resultados analíticos. Se propone, por tanto, un procedimiento de control que considere este aspecto.

PALABRAS-CLAVE: Ácido butírico – Análisis – Grasa de leche – Mezcla de grasas.

SUMMARY

Determination of the milk fat content of fat mixtures.

Methods for the determination of the milk fat content of fat mixtures are usually based on a butyric acid determination. This fatty acid is specific for milk fat. A conversion factor is used to calculate the milk fat content from the butyric acid content of the mixture. When applying this procedure, the natural variation of the butyric acid content of milk fat is not taken into consideration. Recently published data show that a considerable error may thus be introduced, making the interpretation of analytical results difficult. It is therefore proposed to envisage a control procedure which takes this aspect into consideration.

KEY-WORDS: Analysis – Butyric acid – Fat mixtures – Milk fat.

1. INTRODUCTION

Methods for the determination of the milk fat content of fat mixtures are of considerable practical importance, as can be seen from three relevant Regulations published by the European Commission and the Council, respectively (1, 2, 3). These methods are based on the determination of butyric acid that is exclusively present in milk fat (4). A procedure based on the calculation of several fatty

acid methyl esters (5) apparently did not find widespread application.

While it is generally accepted that measurement uncertainty has to be taken into consideration when evaluating analytical results, the variation of the butyric acid content of milk fat is usually not taken into consideration. A conversion factor is normally used to calculate the milk fat content of fat mixtures from the results of butyric acid determination (4, 6, 7). This procedure can lead to considerable errors. An approach based on the actual butyric acid content of the milk fat used for the production of fat mixtures therefore appears to be preferable.

2. ERRORS INTRODUCED BY APPLYING A CONVERSION FACTOR BASED A MEAN VALUE

Data published by Molentin and Precht (4) show that the arithmetic mean of the butyric acid content of 136 milk fat samples obtained from 8 EU Member States and Switzerland is 3.42% (g/100 g milk fat), the standard deviation 0.144%.

It can be expected that 95% of the results vary between 3.13% and 3.71%. A butyric acid content of 1.50% found by analysis would lead to the conclusion that the fat mixture contains 43.9% milk fat. However, depending on the actual butyric acid content of the milk fat, 1.50% butyric acid could correspond to milk fat contents between 40.4 and 47.9%.

Though the authors present indirect evidence that their data reflect the real variation of the butyric acid content of milk fat in the EU, it would be difficult to draw legal conclusions from results showing non-compliance with a declaration, even if the above variation is taken into consideration. It could be argued that some EU Member States are poorly or not at all represented by the results of the study. The same argument could be used for products imported from third countries into the EU.

Furthermore, the analytical error has to be taken into consideration, when evaluating results of butyric acid analysis. Consequently, there are two important sources of variation.

Under these circumstances, compliance testing can be rather difficult and there is a risk that fat mixtures containing less milk fat than declared have to be accepted. These facts lead to the conclusion that a procedure based on a conversion factor calculated from the arithmetic mean of the butyric acid content, even of a large set of representative milk fat samples, may not be the adequate solution of the analytical problem considered here.

3. AN ALTERNATIVE APPROACH

Ideally, when performing the analysis, information on the butyric acid content of the milk fat used for the production of mixed fats should be available. This information could be part of the milk fat specification and passed by the processor to the control authority. Occasional inspections which include the collection of milk fat and product samples would help to improve the reliability of the control procedure.

There are two essential aspects:

- The information on the butyric acid content of the milk fat used must be correct, i.e. based on adequate sampling and analysis carried out by a competent laboratory.
- Obviously, there is a risk that the user of the milk fat claims to process a milk fat with a low butyric acid content, while in reality a milk fat with a high butyric acid content is used. It is essential that the control authority is fully aware of this risk and develops a strategy for the detection of this type of manipulation. Should it not be possible to establish a control procedure along these lines, at least unannounced control visits including sampling and analysis should be envisaged. Without such measures it is hardly possible to protect the honest food processor against unfair competition.

4. CONCLUSION

When determining the milk fat content of mixed fats using a method based on butyric acid determination, information on the butyric acid content of the milk fat actually used must be available to the control authority. Otherwise it may be difficult to interpret the analytical results obtained. As a consequence, fat mixtures containing less milk fat than declared would have to be accepted.

Attention has to be drawn to the fact that there are/may be further sources of variation which could be relevant:

- variation of the butyric acid content within a lot of milk fat.
- variation of the milk fat content within a lot of mixed fat due to possible blending problems.

These sources of variation can be neglected, if their contribution to the overall variation is small compared to the repeatability variance.

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