

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN AND RELATING TO TREATMENT OF DAIRY PRODUCTS

(71) We, TETRA PAK INTERNATIONAL A.B. a Swedish corporate body of Fack S-221 01, Lund 1, Sweden, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the treatment of milk or a milk product in the course of packaging it.

Dairy products, and more especially milk, skimmed milk, cream and other milk products, contain disaccharide known as lactose or milk sugar, to an amount of approximately 4.5% which proportion may, however, vary within certain limits. Lactose is made up of the monosaccharides galactose and glucose, and the human body, in order to make use of lactose, splits it into monosaccharides galactose and glucose. This splitting is normally achieved by an enzyme occurring naturally in the human body, known as lactase. However, there exist groups of people whose bodies do not supply this enzyme, and furthermore the capacity of forming the enzyme is sometimes lost with advancing years. In such cases a sensitivity towards lactose may develop which expresses itself in attacks of diarrhoea. This state of affairs prevails, for example, among some African tribes, whose members can tolerate only small amounts of lactose, whilst larger quantities produce, among other things, severe diarrhoea. For such individuals there is clearly a need to reduce the lactose content in milk, and the present invention provides a method for the treatment of milk and milk products in the course of packaging whereby the lactose content is reduced.

With this end in view the invention consists in a method of treating milk or a milk product in the course of packaging

thereof, wherein the milk or milk product is pasteurized or sterilized by heat and then cooled, whereafter there is added an enzyme adapted to break down the lactose content of the milk or milk product into mono-saccharides, and the mixture being loaded into, and sealed in, packaging containers, the desired reaction between the added enzymes and the lactose content of the packaged material taking place mainly or wholly inside the sealed containers.

One preferred manner of carrying into effect the method in accordance with the invention will now be described in greater detail.

Normally raw milk, which has a lactose content of approximately 4.5%, is treated by being first subjected to a centrifuging process in order to separate milk fractions of different fat content, that is to say the cream, the consumers' milk, and so-called light milk or skimmed milk. The separated milk fractions are then subjected to heat treatment, for pasteurization, during which milk is heated to a temperature somewhat over 70°C, to render harmless certain pathogenic bacteria. After this heat treatment the milk is normally ready for packaging, but when it is required that the packaged milk shall have a long shelf life, the heat treatment is extended to a sterilization treatment during which the milk is heated for a short time to approximately 120°C, which renders harmless all the micro-organisms present in the milk. The pasteurized milk can be packed in normal manner, whilst the sterilized milk, after sterilizing, must be handled under aseptic conditions and also packed in containers which are sterile and impervious to micro-organisms seeking to penetrate into the sealed containers.

Both in the packaging of pasteurized consumers' milk and of sterilized, long life, milk, just before the milk is introduced

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into the containers, or at the same time, there is added an enzyme, having such properties that it breaks down the lactose, present in the milk, into its monosaccharides, galactose and glucose, which are acceptable to, and readily used by the human body.

An enzyme which has the capacity of thus splitting lactose is known as lactase and a quantity of lactase appropriate for the splitting of the lactose is present in each sealed container, the reaction taking place in the closed space of the package.

The chemical splitting operation continues for at least a day at a temperature not less than 8°C, and during this time the container should not be opened. In normal cases, and especially when sterilized, or long life, milk is packaged, considerably longer periods of time should be allowed to elapse between the packaging and the consumption, so that usually no problem arises in ensuring the required splitting before the milk is consumed. All enzymes are easily destroyed under the effect of heat, and it is important therefore that the enzyme should not be added to the milk before the heat treatment, since it would otherwise be wholly or partially destroyed by the heating.

When packaging sterilized milk it is of course also important that the enzyme added should also be sterile and not be a carrier of bacteria, which might re-infect the already sterilized milk.

It has been found that individuals who are unable without inconvenience to drink milk because their bodies lack the capacity to split the lactose in a natural manner, can utilize the lactose-reduced milk treated in accordance with the invention. This has proved to be of particular importance for a large number of Africans who need the additional nutriment that milk provides, but have been unable previously to make use of the milk. It may also be pointed out that the method in accordance with the invention is relatively cheap to carry out and does not

require any large-scale reconstruction of packaging machines or other milk-treating equipment, since it has been found that the enzyme can be added to the milk by a relatively simple dosing device which can be connected to the machine or the filling device used in the course of packaging the milk.

WHAT WE CLAIM IS:—

1. A method of treating milk or a milk product in the course of packaging thereof, wherein the milk or milk product is pasteurized or sterilized by heat and then cooled, whereafter there is added an enzyme adapted to break down the lactose content of the milk or milk-product into mono-saccharides, and the mixture being loaded into, and sealed in, packaging containers, the desired reaction between the added enzyme and the lactose content of the packaged material taking place mainly or wholly inside the sealed containers.

2. A method as claimed in Claim 1 wherein the added enzyme is lactase.

3. A method as claimed in Claim 1 or 2 wherein the milk or milk product is sterilized, the enzyme added thereto is in a sterile condition, and the mixture is packaged and sealed under aseptic conditions.

4. A method as claimed in Claim 1, 2 or 3 wherein the supply of the enzyme to the cooled milk or milk product is controlled by a dosing device.

5. A method as claimed in any preceding claim wherein the packaged containers are kept in sealed condition for a day or longer, before being opened for access to the contents for use.

6. A method of treating milk or a milk product in the course of packaging substantially as described herein.

7. A package of milk or a milk product, treated substantially as described herein.

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2. A method as claimed in Claim 1 wherein the added enzyme is lactase.

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4. A method as claimed in Claim 1, 2 or 3 wherein the supply of the enzyme to the cooled milk or milk product is controlled by a dosing device.

5. A method as claimed in any preceding claim wherein the packaged containers are kept in sealed condition for a day or longer, before being opened for access to the contents for use.

6. A method of treating milk or a milk product in the course of packaging substantially as described herein.

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ERRATUM

SPECIFICATION NO 1477087

Page 2, line 73, *for* lactose *read* lactase

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ERRATUM

SPECIFICATION NO 1477087

Slip No 2

Page 1, line 71 *for* 700°C *read* 70°C

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