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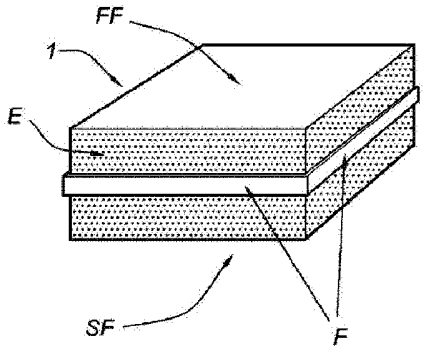
(54) **Method for ripening a cheese in the presence of a frame.**

(57) The present invention provides a method for foil-ripening a cheese comprising:
a. providing a cheese having an edge, a first face and a second face;
b. packaging said cheese in a closed cheese-ripening foil having a water vapour transmission rate of at least 5 g/(m^2.24 hours) at 12 °C and 85% relative humidity; and
c. ripening this foil-packaged cheese in the presence of a frame which surrounds at least part of the edge of said cheese, wherein during ripening moisture is allowed to evaporate from said cheese.
Advantageously, shape loss of the foil-packaged cheese during ripening is prevented or diminished.



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Method for ripening a cheese in the presence of a frame

Field of the invention

The present invention relates to a method for foil-ripening a cheese and to a (foil-packaged) cheese obtainable by such method.

Background of the invention

Methods for foil-ripening a cheese are known in the art. According to a conventional process for providing a "foil-ripened" or "rindless" cheese, a freshly brined cheese block is packaged into a closed water-impermeable multilayer foil and is then ripened, usually by storage at 7-18 °C during at least 4 weeks. An advantage of the known foil ripening process relates to favourable logistics aspects of the ripening stage. During ripening, the packaged cheese blocks are commonly stacked in layers. Herein, each layer comprises several foil-packaged cheeses which are in close (lateral) contact with each other. The entire stack is tightly surrounded by a crate or the like. After a desired ripening time has been obtained, the foil-packaged cheeses are removed from the stack. The foil can then removed from the ripened cheeses and the resulting cheese blocks can be conveniently sliced or cut before consumption and/or transportation. Another advantage of the traditional method for preparing foil-ripened cheese is that the cheese does not lose moisture during ripening. This is because the (multilayer) foil in which it is packaged during ripening is essentially impermeable to water vapour.

In order to provide ripened cheese which corresponds more to "natural ripened" cheese, WO2009047332 discloses a process for preparing foil-ripened cheese comprising ripening a cheese after brining in a cheese-aging packaging comprising a thermoplastic, monolithic film. The closed cheese-aging packaging has a water vapour transmission rate of at least 10 $g/m^2/24$ hours (measured according to ASTM E96B cup test at 10 °C and 85% relative humidity on a film) and an oxygen permeability of at most 100 $cm^3/m^2.24$ hours.atm (measured according to ASTM standard D3985 at 10 °C and 85% relative humidity on a film using Mocon equipment).

GB2291407 describes a cheese container comprising a base, a lid and a tubular wall portion which together form a compartment within which cheese is to be

accommodated. At least one of the lid and base is displaceable within the tubular wall portion to vary the size of the compartment. The cheese container is characterised by strap means that are engageable around the base and lid to maintain the base and lid at a maximum predetermined spacing from each other for alleviating distortion from its intended shape of cheese accommodated within the compartment.

FR2600310 describes a stackable package, constituted by a rigid box comprising a bottom and open on its face opposite this bottom. The box comprising in its corners blocks protruding with respect to one of the faces of the box. In alignment with the blocks and on the other face of the box, cells are formed capable of receiving the blocks protruding from another box. The depth of these cells is less than the protruding height of the blocks. The stackable package is applied, in particular, to the packing of cheese.

Summary of the invention

A disadvantage of traditional foil-ripening may be that the development of a typical cheese flavour and consistency may lag, especially as compared with the characteristics of a "natural ripened" (coated) cheese such as described in for example EP1537785.

In the process according to WO2009047332, the cheeses are preferably not stacked during ripening as in the traditional foil-ripening process. In a stacked arrangement, moisture will not evaporate from each foil-packaged cheese (at least to a comparable degree amongst different cheeses). Instead it is preferred that in the process of WO2009047332, during ripening at least part (preferably at least 25%, more preferably at least 40%, most preferably at least 60%) of the surface of the foil-packaged cheese is exposed to an atmosphere having a relative humidity of less than 100%. It is especially preferred that ripening is realized under conditions wherein each cheese is individually placed on (wooden) shelves and wherein there is essentially no contact between the cheeses. Under these conditions of so-called "individual ripening", adequate moisture evaporation from each cheese can be achieved.

However, it has been observed that under conditions of "individual ripening" of foil-packaged cheeses, the cheeses tend to lose their original shape in time. In particular, they tend to flatten in a direction parallel to the force of gravity, and to expand in a

direction perpendicular to the force of gravity. This shape loss, which increases with increasing ripening time, is highly undesirable since many industrial apparati, forms of packaging etc. used in cutting, slicing and/or packaging the foil-ripened cheese, rely on standardised dimensions thereof which need to be met within tight limits. Furthermore, said shape loss of the cheese may generally lead to unwanted cheese loss occurring during cutting or slicing of the cheese.

In order to obviate the disadvantage of the process according to WO2009047322 and/or to at least diminish shape-loss of foil-packaged cheese during (individual) ripening, the present invention provides a method for foil-ripening a cheese comprising:

a. providing a cheese having an edge, a first face and a second face;
b. packaging said cheese in a closed cheese-ripening foil having a water vapour transmission rate of preferably at least 5 g/(m^2.24 hours) at 12 °C and 85% relative humidity, and having a oxygen transmission rate of preferably at most 100 cm^3/m^2.24 hours.atm; and
c. ripening this foil-packaged cheese wherein during ripening moisture is allowed to evaporate from said cheese, wherein the ripening is optionally in the presence of a frame which surrounds at least part of the edge of said cheese, wherein when the ripening is in the presence of the frame, preferably the frame is in contact with the edge in the range of 1-80% of the surface of the edge, especially in the range of 10-80% of the surface of the edge.

Especially, the present invention provides a method for foil-ripening a cheese comprising:

a. providing a cheese having an edge, a first face and a second face;
b. packaging said cheese in a closed cheese-ripening foil having a water vapour transmission rate of at least 5 g/(m^2.24 hours) at 12 °C and 85% relative humidity; and
c. ripening this foil-packaged cheese in the presence of a frame which surrounds at least part of the edge of said cheese, wherein the frame is in contact with the edge in the range of 1-80%, especially 10-80% of the surface of the edge, and wherein during ripening moisture is allowed to evaporate from said cheese.

The water vapour transmission rate of the cheese-ripening foil is preferably measured according to ASTM E96B cup test at 12 °C and against 85% relative humidity (the relative humidity within the cup is 100%).

In an embodiment, the cheese has a flat-cylindrical shape which may correspond to that of a (Gouda) cheese wheel. More preferably, the cheese is an essentially block shaped cheese. It is further preferred that the block-shaped cheese has a length (L), a width (b) and a height (h), the height preferably being smaller than the length and the width. Then, the dimensions of each of the first face and the second face are essentially provided by the length and the width of said cheese, and the edge is essentially described by the remaining surface area residing in between the first and the second face. In a further preferred example of an essentially block-shaped cheese, length L = 20-40 cm, width b = 20-70 cm and height h = 5-15 cm. The essentially block-shaped cheese is preferably a so-called Euroblock-cheese, having approximate dimensions length L = 30 cm, width b = 50 cm, height h = 10 cm. In an embodiment, the cheese may be substantially spherical, with small substantially flat first and second faces, such as an Edam type of cheese.

The invention also provides a foil-packaged cheese (of which the edge is) at least partially surrounded by a frame, wherein the foil has a water vapour transmission rate of at least 5 g/(m^2.24 hours) at 12 °C and 85% relative humidity. It is preferred that said foil-packaged cheese is obtainable according to the method of the invention. The invention also provides the cheese *per se*, obtainable after the method of foil-ripening.

Detailed description of the invention

Description of the figure

Figure 1a illustrates an example of an essentially block shaped foil-packaged cheese in perspective view (top left) The cheese (indicated with reference 1) resides with its second face (SF) on an imaginary horizontal surface. Its first face (FF) faces upwards. The visible part of the edge (E) is shown in a dotted pattern. The height of the cheese 1 is indicated with reference h.

Figure 1b shows the same block-shaped foil-packaged cheese in top view. Joint line pieces e1+e2+e3+e4 form the top view projection of the edge E of the (foil-packaged) cheese 1. Line pieces e2 and e4 have outer dimensions L (length); line pieces e1 and e3 have outer dimensions b (width).

Figure 1c illustrates an example of the essentially block-shaped foil-packaged cheese, now surrounded by a frame in perspective view. The frame (F) surrounds the edge E of the foil-packaged cheese, partly covering it. Hence, the frame surrounds at least part of the (foil-packaged) cheese. As will be clear to a person skilled in the art, the frame F may also entirely surround the (foil-packaged) edge E.

Figure 1d provides a top view of the essentially block-shaped foil-packaged cheese surrounded by the frame (F). Joint line pieces f1+f2+f3+f4 form the top view projection of the frame surrounding the cheese 1. As shown by the dotted lines, the inner dimensions of the frame (F) match the outer dimensions of the edge (E).

In the schematic drawings of figure 1c and 1d, the frame F surrounds (or is extending over) the total length of the edge E (i.e. edges e1, e2, e3 and e4, thus 2 x L + 2 x b), but the height of the frame is smaller than the height h of the edge E. The total length of the edge E is herein also indicated as circumferential length.

Figure 1e schematically depicts an example of cheese 1 having a flat-cylindrical shape which may correspond to that of a Gouda cheese wheel, with frame F surrounding at least part of the edge E. As will be clear to a person skilled in the art, the frame F may also entirely surround the (foil-packaged) edge E.

Figure 1f schematically depicts an example of cheese 1 having a substantially spherical shape, with small substantially planar parts at the top and bottom (i.e. first face FF and second face SF) which may correspond to that of an Edam type cheese. As will be clear to a person skilled in the art, the frame F may also entirely surround the (foil-packaged) edge E.

Figure 1g schematically depicts an embodiment wherein the frame F comprises openings, which may further allow water vapour to escape from the cheese into the surrounding atmosphere. The openings are indicated with reference Fo, and may have any shape. For instance, the frame F may have circular openings Fo, as here depicted, but the frame F may also be a grating type of frame, etc. As will be clear to a person skilled in the art, the frame F may also entirely surround the (foil-packaged) edge E. Figure 1h schematically depicts such frame F with openings or perforation Fo in more detail, again, by way of example with circular openings Fo.

The frame F is in contact with the edge E. To estimate the percentage the frame F is in contact with the edge E, the edge area in contact with the frame is related to the total edge area. When openings Fo are present, the edge area in front of the frame openings Fo is not counted as area of the edge E that is in contact with the frame F.

Figure 1i schematically depicts a cross-section of an embodiment of cheese 1 with frame F around the edge E. The first surface FF and second surface SF change into the edge E at positions 11 and 12, respectively. The edge E is in contact with the frame F at areas 13. Here, the frame F comprises an opening Fo. The edge "behind" this opening, indicated with reference 14, does thus not count as edge area in contact with the frame F.

Figure 1j schematically depicts an embodiment wherein the frame F entirely surrounds the (foil-packaged) edge E. Here, by way of example, a gouda type of cheese is depicted, and by way of example the frame FD has perforations or holes Fo. As can be seen from this schematic drawing, the frame surrounds substantially the entire edge E (100% of E), but the contact surface of the frame F with the (foil-packaged) edge E is less than 100% in this embodiment, such as about 50-60%. This may facilitate moisture evaporation of the cheese, also via the edge E. Hence, in a specific embodiment, the edge is surrounded for 100% (or less) with the frame, but the frame is in contact with 80% or less of the edge (due to the presence of perforation or holes). The perforations or holes, herein, such as in the porous frames, are through-holes or through-perforations. The schematic drawings are not necessarily on scale. The perforation Fo may for instance have diameters in the range of 0.5 nm-50 mm.

Embodiments of the invention will be described, by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, as indicated above. The drawings may not be drawn to scale. The invention is not limited to the embodiments schematically depicted in the drawings. For instance, the cheese 1 may also have a cylindrical shape.

Definitions

The verb “to comprise” as is used in this description and in the claims, and its conjugations, is used in its non-limiting sense to mean that items following the word are included, but items not specifically mentioned are not excluded. In addition, reference to an element by the indefinite article "a" or "an" does not exclude the possibility that more than one of the element is present, unless the context clearly requires that there is one and only one of the elements. The indefinite article "a" or "an" thus usually means "at least one".

The cheese-ripening foil. Preferably, the cheese-ripening foil is provided as a monolithic film. The monolithic film may be provided as a single layer foil or as a multilayer foil. As used herein, a monolithic film is a film not containing holes, perforations, pores or micro-pores that provide a direct pathway for water molecules to flow through. The monolithic film is in an embodiment preferably defined as in WO2009047332. However, the cheese-ripening film may also be provided as a perforated or (micro-) porous film or as a multilayer foil wherein optionally one or more of the layers are present as a perforated or (micro)porous film. Herein, the terms “perforated film” and “microporous film” are considered clear to the skilled person; these terms are preferably defined as in WO2009047332.

The water vapour transmission rate of the cheese-ripening foil is preferably at least 10 g/(m^2.24 hours), more preferably at least 15 g/(m^2.24 hours) at 12 °C and 85% relative humidity. Accordingly, even better flavour and/or texture properties can be obtained. Alternatively or more preferably additionally, the water vapour transmission rate of the cheese-ripening foil is preferably at most 300 g/(m^2.24 hours), more preferably at most 200 g/(m^2.24 hours), even more preferably at most 150 g/(m^2.24 hours) at 12 °C and 85% relative humidity. If the water vapour permeability is too high, efficiency of the

cheese making process may be reduced as result of excessive moisture loss during ripening, whilst no noticeable further quality gain of the ripened cheese will be achieved.

In order to be able to function as a packaging, the cheese-ripening foil preferably possesses sufficient mechanical properties such as for example puncture resistance and tear strength. In view of this, the thickness of the cheese-ripening foil is preferably at least 15 μm, more preferably at least 25 μm. The thickness of the cheese-ripening foil is preferably less than 200 μm, more preferably less than 100 μm, most preferably less than 75 μm. If the ripening foil is too thick, sealing may take too much time.

In an embodiment, the cheese-ripening foil has an oxygen transmission rate of at most 100 cm^3/m^2.24 hours.atm, more preferably of at most 50 cm^3/m^2.24 hours.atm, most preferably of at most 20 cm^3/m^2.24 hours.atm. Herein, oxygen transmission rate is preferably measured according to ASTM standard D3985 at 12 °C and 85% relative humidity. Low oxygen permeability is advantageous for preventing mould growth on the surface of the cheese during ripening. Low oxygen permeability values of at most 100 cm^3/m^2.24 hours.atm are preferably obtained when the cheese-ripening foil is provided as a monolithic film. However, low oxygen permeability of the cheese-ripening foil is not an absolute requirement since mould inhibition can also be successfully achieved in many other ways known to the skilled person, for example by treating the cheeses with a (food-grade) fungicide prior to packaging them into the cheese-ripening foil. Therefore, the cheese ripening foil may alternatively have an oxygen transmission rate of 100 cm^3/m^2.24 hours.atm or higher, further in an embodiment preferably between 100 and 10,000 cm^3/m^2.24 hours.atm.

The cheese-ripening foil is preferably embodied as a mono- or multilayer foil comprising a polycondensation polymer. Preferred examples of monolayer cheese-ripening foils are for example provided in Table 1 of WO2009047332 as packaging materials 2 (Akulon®), 3 and 4 (Akulon®/Arnitel® blends) and 5(Arnitel®). However a number of alternative foil materials may be used.

The cheese

The cheese, which is preferably obtainable according to the method of the invention, is preferably a semi-hard or hard cheese. The cheese is preferably selected from the group consisting of Gouda, Edam, Tilsit, Gruyere, Cheddar, Emmental and Maasdam, especially from the group consisting of Gouda, Edam, Tilsit, Gruyere and Cheddar, even more especially the cheese is a Gouda. In an especially favourable embodiment, the cheese has a relatively low fat content, i.e. a fat content of 30 wt.% or less relative to the dry weight of the cheese. Such a cheese is even more prone to undergoing shape loss during ripening, so that the presence of the frame during ripening is even more beneficial.

In a particular embodiment, the cheese comprises propionibacteria, such as Maasdam or Emmental. This cheese is at least partially ripened at a temperature of between 16-25 °C causing the propionibacteria to produce carbon dioxide at enhanced rates, so as to introduce eyes in the cheese. At these relatively high temperatures, the cheese has an enhanced risk to lose its shape during ripening, so that the presence of the frame during ripening is even more beneficial.

In yet a further embodiment, the cheese does not comprise propionibacteria, which may for instance be the case for Gouda or Edam.

In another embodiment, the cheese, preferably Gouda-type cheese, further comprises a strain of *Lactobacillus helveticus*. Also this cheese is preferably ripened at relatively high temperatures of between 14-25 °C.

After removing the foil and the frame, the cheese preferably comprises a drying rind which is visibly present near one or both of its faces and/or the edge. That is, the cheese preferably comprises an outer rind and an interior cheese mass, wherein the colour of the outer rind associated with the first or the second face is preferably darker than the colour of the interior cheese mass.

The frame

The frame is preferably made of one or more materials selected from the group consisting of metal, plastic, paper, cardboard and wood. Especially favourably, at least 50 wt.% of the frame is provided as plastic, paper, cardboard or wood. Optionally, the material from which the frame is made contains perforations or holes. Said perforations or holes preferably have a diameter of *ca.* 0.01-50 mm, more preferably of *ca.* 0.1 – 5 mm. In an embodiment, the frame is made of wood.

However, the frame may in an embodiment also be porous, such as mirco porous or meso porous. Especially, such mirco porous or meso porous frame has a water vapour transmission rate of at least 5 g/(m^2.24 hours) at 12 °C and 85% relative humidity, even more preferably at least 10 g/(m^2.24 hours), such as at least 50 g/(m^2.24 hours), especially at least 100 g/(m^2.24 hours), such as at least 300 g/(m^2.24 hours), even more especially at least 1000 g/(m^2.24 hours), with the frame being in contact with the edge in the range of 1-80%, especially 10-80% of the surface of the edge. The dimensions, especially diameter of such micro or meso pore perforations may for instance be selected from the range of 0.5-50 nm.

Hence, the perforations or holes of the frame may in general have a diameter of 0.5 nm-50 mm, such as 1 nm -5 mm. Hence, the frame may in embodiment comprise perforation, having diameters in the range of 0.5 nm – 50 mm.

The perforations may also comprise slits or other type of openings. The length(s) and width(s) of such perforations may also be *ca.* 0.01-50 mm, more preferably of *ca.* 0.1 – 5 mm. Especially, the area of such perforation(s) is selected from the range of 0.1 mm^2 – 10 cm^2, such as 0.5 mm^2 – 2 cm^2.

The frame may essentially consist of rigid material. However, the frame may in an embodiment also be flexible. For instance, in an embodiment, the frame is a belt.

It is particularly preferred that the frame comprises or more preferably consists of heat sterilisable material. The heat sterilisable material is preferably defined as a material which does not melt at a temperature of 120 °C or less. The heat sterilisable material is preferably a heat sterilisable plastic or a metal such as iron or a steel, especially stainless steel. Heat sterilisable plastics are known to the skilled person. and may be selected as, for example, nylon, polyethylene, polypropylene, poly(vinyl chloride), an epoxy-based plastic or a mixture thereof.

In an embodiment, the frame is connected to or forms part of the (preferably wooden) panel or board on which the cheese resides during ripening.

The frame is preferably externally applied to the foil-packaged cheese as a separate element. However the frame may also form an integral part of the cheese-ripening foil, for example in the form of a reinforcing plastic strip.

If the foil-packaged cheese is provided as an essentially block-shaped cheese, it is preferred that the frame is embodied as a square or rectangular-shaped support material surrounding the edge of the cheese, for example as shown in Figure 1(a-d).

The frame F may surround at least part of the edge (E, see figures 1a-1d) of the cheese. This indicates that the frame may in an embodiment entirely surround the edge, i.e. the circumferential length of the frame (in the embodiment of figure 1d this circumferential length is the length of f1+f2+f3+f4) may substantially be equal to the circumferential length of the edge (where the frame is applied) (in figure 1b this circumferential length of the edge is the length e1+e2+e3+e4). This may in an embodiment also indicate that the frame surrounds a substantial part of the circumferential length of the edge. For instance, the frame may have an opening (for instance a U-shaped frame). The frame, or elements thereof, may also be part of a larger structure. The cheese (i.e. the foil-packaged cheese) is preferably surrounded by the frame over at least about 80 % of the total circumferential length of the edge (i.e. at least about 80% of the sum of 2 x L + 2 x b), especially at least about 90%. In a specific embodiment, the frame surrounds the edge over the total circumferential length of the edge (figures 1c and 1d schematically depict such embodiment wherein the cheese is surrounded by the frame over 100 % of the total circumferential length of the edge). The term circumferential length relates to the circumference of a cheese, which may especially have a cylindrical shape or which may in a specific embodiment be essentially block shaped, or which may have another shape.

In an embodiment, the frame may substantially surround the entire height of the edge height (in the embodiment of figure 1a height h), but may in an embodiment also surround only part of the height of the edge, such as for instance schematically depicted

in figure 1c, where the height of the frame F is smaller than the height of the edge E. Preferably, the frame is in contact with the edge in the order of 1-100%, especially 5-100% of the surface of the edge, such as in the range of 10-80%, like 15-70%, such as 20-60%, especially 20-50%. In the embodiment wherein the frame is in contact with 100% of the edge, i.e. substantially the whole edge between the first and second surface is in contact with the frame. Especially when the frame is of porous material, a low contact percentage with the edge may be possible, like below 20%, or even below 10% (of the surface of the edge). When there is a high contact percentage with the edge, such as equal to or larger than 20% (of the surface of the edge), such as above 40%, the ripening foil and the frame where spatially overlapping, preferably together have a water vapour transmission rate of at least 5 g/(m^2.24 hours) at 12 °C and 85% relative humidity.

Hence, in an embodiment the frame may entirely surround the edge (so to say 100% of the edge), but only have contact with 80% or less with the edge, due to the presence of perforations or holes in the frame. Hence, for instance the frame may surround the edge for 100% or less, such as 30-100%, such as 50-100% (of the surface of the edge) (especially for the perforated frame), and have contact with the edge of 1-100%, especially 1-80%, such as 10-80% (of the surface of the edge).

The phrase "wherein the frame is in contact with the edge" and similar phrases indicates that the frame is in contact with the edge of the foil-packaged cheese.

The term "diameter" may also refer to non-circular shaped cross-sections of holes or perforations. In such instance, the term "diameter" may refer to the effective diameter (i.e. using the area of the cross-section and define this area as an area of a circle and determine the diameter thereof).

In an embodiment, the frame is in contact with part of the first face and/or part of the second surface in the order of not more than about 70% of the total surface area of the first and/or second surfaces, respectively, such as in the range of 0-60%, especially in the range of about 0-10%. Hence, the frame may be in contact with part of the first face and/or part of the second surface.

In a preferred embodiment, the frame comprises elements which are connectable by (releasable) fastening means, such as a belt or a clip. To provide the frame, such elements may be assembled by connecting with the fastening means. Accordingly, the foil-packaged cheese may be surrounded by the frame more easily. With one or more releasable fastening means, the frame can be conveniently removed after the cheese has obtained a desired ripening time. For instance, referring to figure 1d, the elements f1, f2, f3 and f4 may be separate elements that are joined together with (releasable) fastening means.

In an embodiment, the frame may be further in contact with the first face and/or the second face of the foil-packaged cheese. Accordingly, the cheese may be even better protected against mechanical damage. It is preferred, however, that the frame does not completely block moisture evaporation from the cheese. This may conveniently achieved for example by ensuring that the surface of the frame being in contact with the edge is in the order of 1-80%, such as 10-80%, like 20-50%, of the surface of the edge. The frame may be provided with perforations or holes as indicated above. In such embodiment, the edge may be surrounded by the frame over its total circumferential length (and optionally also its total height) whereas the area of the edge being in contact with the frame is (substantially) lower than 100% of the total area of the edge.

The term "surround" and derivatives do include embodiments wherein the foil-packaged cheese has a substantially cylindrical shape, wherein the frame surrounds at least part of the cylindrical edge and embodiments wherein the foil-packaged cheese has a block-shaped shape, wherein the frame surrounds at least part of the rectangular edge of the foil-packaged cheese.

Ripening conditions

The foil-packaged cheese is preferably ripened under conditions of controlled relative humidity and temperature. The relative humidity preferably ranges between 20-95%. It is especially preferred that the relative humidity ranges between 75 and 90%. Preferably, the air near the foil-packaged cheese is displaced at a rate of 0.01 – 5 m/s, more preferably at a rate of 0.05 – 3 m/s. The temperature preferably ranges between 6-25 ^{o}C. In an especially preferred embodiment, the temperature ranges between 11 and

20 °C during ripening. The conditions together with the water vapour transmission rate of the cheese-ripening foil are especially preferably chosen such that during ripening in (c.) the total amount of moisture which is allowed to evaporate from the foil-packaged cheese is 0.5 – 20 wt.%, more preferably 1-15 wt.% relative to the weight of the foil-packaged cheese provided in (b.). The ripening time may be in the range of about 28 days or longer, and in general equal to or less than about 2 years, preferably equal to or less than about 1 year, such as bout 3 months.

Preferably, during ripening, the foil-packaged cheese is allowed to rest on any one of its first or second face. Alternatively or more preferably additionally, during ripening, the foil-packaged cheese is turned upside-down at least once. Accordingly, an even moisture evaporation can be obtained from the first face and the second face. As an additional advantage, for brined cheeses, turning the foil-packaged cheese upside-down at least once will promote an even distribution of the brine within each foil-packaged cheese during ripening. Hence, in a preferred embodiment, the cheeses are individually ripened and are not in contact with other cheeses. It is especially preferred that ripening is realized under conditions wherein each cheese is individually placed on (wooden) shelves and wherein there is essentially no contact between the cheeses. Under these conditions of so-called "individual ripening", adequate moisture evaporation from each cheese can be achieved.

Further embodiments of the method

After the foil-packaged cheese has been ripened for a desired time, the frame is preferably removed. Alternatively or more preferably additionally, after the foil-packaged cheese has been ripened for a desired time, the cheese-ripening foil is removed.

In case both the frame and the cheese-ripening foil are removed, the "naked" cheese thus obtained is preferably further packaged in an essentially gas- and water-impermeable foil and/or is provided with a layer of a cheese coating or cheese wax. If it is further packaged in an essentially gas- and water-impermeable foil, it may be stored, preferably with cooling to below 7 °C, without further ripening and/or evaporative weight loss to occur. Accordingly, cheese may be stored until necessary and keep its

desired "ripening age", which is an important logistical advantage. Similar advantage may be obtained if the naked cheese is provided with a layer of cheese wax, preferably by dipping. If the naked cheese is provided with one or more layers of a water-borne cheese coating composition, which preferably comprises an emulsion (co)polymer, the cheese obtains the appearance of a traditionally natural ripened cheese, which may be advantageous for some applications.

In case both only the frame is removed, the ripened foil-packaged cheese thus obtained may also preferably be further packaged in an essentially gas- and water-impermeable foil or may be provided with a layer of a cheese coating or cheese wax. Comparable advantages may be obtained, especially for further packaging in the essentially gas- and water-impermeable foil or providing the layer of cheese wax.

After removing the foil and the frame, the cheese preferably comprises an outer rind and an interior cheese mass, wherein the colour of the outer rind associated with the first or the second face is darker than the colour of the interior cheese mass. This phenomenon, commonly associated with natural ripened cheeses, is known to the skilled person as a "drying rind".

The cheese provided in (a.) of the method according to the invention and/or the ripened foil-packaged cheese obtainable thereby preferably comprise at least one strain of *Lactococcus lactis* spp. *lactis* and at least one strain of *Lactococcus lactis* spp. *cremoris*. Even more preferably, the cheese further comprises a strain of *Lactococcus lactis* spp. *lactis* biovar. *diacetylactis* and/or a strain of *Leuconostoc*. Accordingly, a semi-hard cheese having a typical Gouda flavour may be favourably obtained.

EXAMPLES

A block-shaped cheese produced using a so-called LD-starter (*i.e.* comprising one or more strains of each of *Lactococcus lactis* spp. *lactis*, *Lactococcus lactis* spp. *cremoris*, *Lactococcus lactis* spp. *lactis* biovar. *diacetylactis* and *Leuconostoc*) was divided in 4 parts each measuring 15cm(w) x 11cm(h) x 25cm(l). The cheese was packaged in a closed cheese-ripening foil made of a commercially available polyester urethane

copolymer. Before packaging the cheese in said foil, its surface was treated with an aqueous suspension comprising 500 ppm of natamycin.

The foil had a thickness of 50 μm. The oxygen transmission rate (OTR) of the foil was determined as 750 $ml.m^{-2}.bar^{-1}.24h^{-1}$ at 12 °C and 85% relative humidity. The water vapour transmission rate (WVTR) was determined as 18 $g.m^{-2}.24h^{-1}$ at 12 °C and against an atmosphere of 85% relative humidity.

OTR was measured according to ASTM standard D3985 using Mocon equipment. WVTR was measured according to the ASTM E96B cup test at 12 °C and against 85% relative humidity (the relative humidity within the cup is 100%).

The cheeses were placed on a wooden shelf, leaving sufficient space (between 10 and 50 cm) between them. The foil-packaged cheeses were allowed to ripen under controlled conditions of 12 °C and 83% relative humidity. After 60 days, the weight loss from the cheeses – due to evaporation of moisture - was on average 4 wt.%. By comparison, similarly sized cheese blocks which were "naturally ripened" during the same period of 60 days and under the same conditions lost approx. 12 wt.% of their original weight; the natural ripening process comprised 15 half-sided treatments with a water-borne cheese-coating composition (Ceska WL) each half-sided treatment followed by turning of the cheese upside-down.

The foil-packaged cheeses were observed to undergo shape-loss in time, especially the cheeses became flattened.

Said shape-loss can be prevented or at least diminished by ripening the foil-packaged cheeses in the presence of a frame. The frame can preferably be made of wood or plastic which may have a thickness of between 1 and 10 mm. The frame has interior dimensions of approx. 15(L)x25(b) cm (rectangular-shaped) and tightly surrounds the edge of the cheese (*cf.* Figure 1 for a further illustration).

Conclusies

1. Werkwijze voor het in folie rijpen van een kaas, omvattend:

a. verschaffen van een kaas die een rand, een eerste vlak en een tweede vlak heeft;

b. verpakken van deze kaas in een gesloten kaasrijpingsfolie die een waterdamp-doorlaatbaarheid van ten minste 5 g/(m^2.24 uur) bij 12 °C en 85% relatieve vochtigheid heeft; en

c. rijpen van deze in folie verpakte kaas in aanwezigheid van een frame dat ten minste een deel van de rand van de kaas omgeeft, waarbij het frame in contact is met de rand in het gebied van 1-80% van het oppervlak van de rand, en waarbij gedurende het rijpen vocht uit de kaas kan verdampen.

2. Werkwijze volgens conclusie 1, waarbij het frame poreus is, en bij voorkeur perforaties omvat die diameters in het gebied van 0,5 nm – 50 mm, zoals 1 nm – 5 mm, hebben.

3. Werkwijze volgens één van de voorgaande conclusies, waarbij het frame in contact is met de rand in het gebied van 10-80% van het oppervlak van de rand.

4. Werkwijze volgens één van de voorgaande conclusies, waarbij de waterdamp-doorlaatbaarheid van de kaasrijpingsfolie ten minste 10 g/(m^2.24 uur), met meer voorkeur ten minste 15 g/(m^2.24 uur) bij 12°C en 85% relatieve vochtigheid is.

5. Werkwijze volgens één van de voorgaande conclusies, waarbij de waterdamp-doorlaatbaarheid van de kaasrijpingsfolie ten hoogste 300 g/(m^2.24 uur), met meer voorkeur ten hoogste 200 g/(m^2.24 uur), met meer voorkeur ten hoogste 150 g/(m^2.24 uur) bij 12°C en 85% relatieve vochtigheid is.

6. Werkwijze volgens één van de voorgaande conclusies, waarbij gedurende het rijpen in (c.) de totale hoeveelheid vocht die mag verdampen uit de in folie verpakte kaas 0,5 – 20 gew.%, met meer voorkeur 1-15 gew.% is ten opzichte van het gewicht van de in folie verpakte kaas die is verschaft in (b.).

7. Werkwijze volgens één van de voorgaande conclusies, waarbij nadat de in folie verpakte kaas gedurende een gewenste tijd heeft gerijpt, het frame wordt verwijderd en de kaasrijpingsfolie wordt verwijderd.

8. Werkwijze volgens conclusie 7, waarbij de aldus verkregen kaas verder wordt verpakt in een in hoofdzaak gas- en water-ondoorlatende folie of wordt voorzien van een laag van een kaasbekleding of kaaswas.

9. Werkwijze volgens één van de voorgaande conclusies, waarbij het frame verder in contact is met een deel van het eerste vlak en/of een deel van het tweede vlak van de kaas.

10. Werkwijze volgens één van de voorgaande conclusies, waarbij het frame is gemaakt van één of meer materialen die zijn geselecteerd uit de groep bestaande uit metaal, plastic, papier, karton en hout.

11. Werkwijze volgens één van de voorgaande conclusies, waarbij het frame elementen omvat die verbonden kunnen worden door bevestigingsmiddelen, in het bijzonder door losmaakbare bevestigingsmiddelen.

12. Werkwijze volgens één van de voorgaande conclusies, waarbij gedurende het rijpen de in de folie verpakte kaas mag rusten op willekeurige een van zijn eerste of tweede vlak, en waarbij gedurende het rijpen de in folie verpakte kaas ten minste eenmaal wordt omgekeerd.

13. Werkwijze volgens één van de voorgaande conclusies, waarbij de gerijpte in folie gerijpte kaas die in (c.) is verkregen een droge korst omvat die zichtbaar aanwezig is nabij één of beide van zijn vlakken en/of de rand.

14. Werkwijze volgens één van de voorgaande conclusies, waarbij de kaas verder een stam van *Lactobacillus helveticus* of propionibacteriën omvat.

15. In folie verpakte kaas ten minste gedeeltelijk omgeven door een frame, die kan worden verkregen volgens de werkwijze volgens één van de conclusies 1 – 14.

******

5

Fig 1a

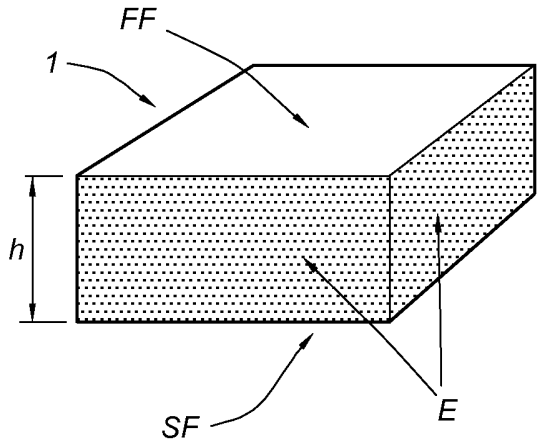


Fig 1b

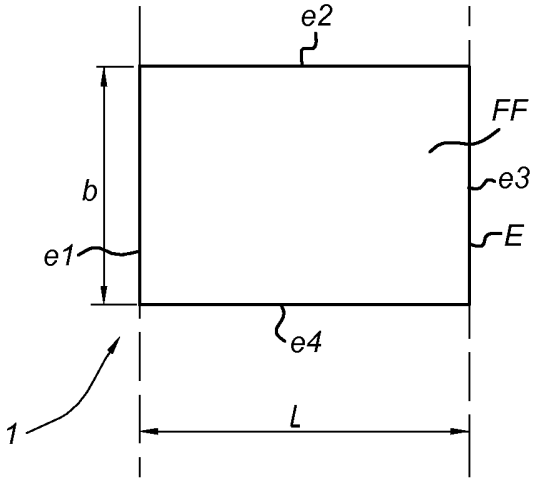


Fig 1c

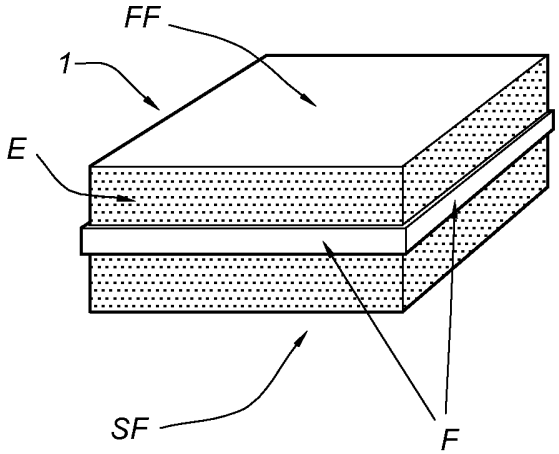


Fig 1d

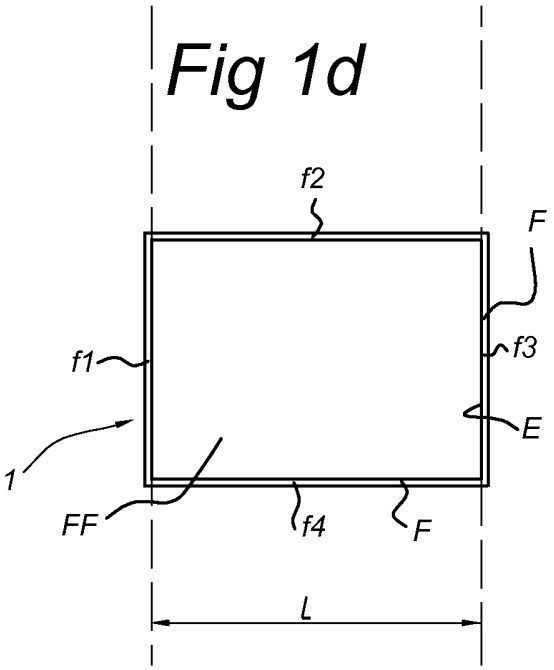


Fig 1e

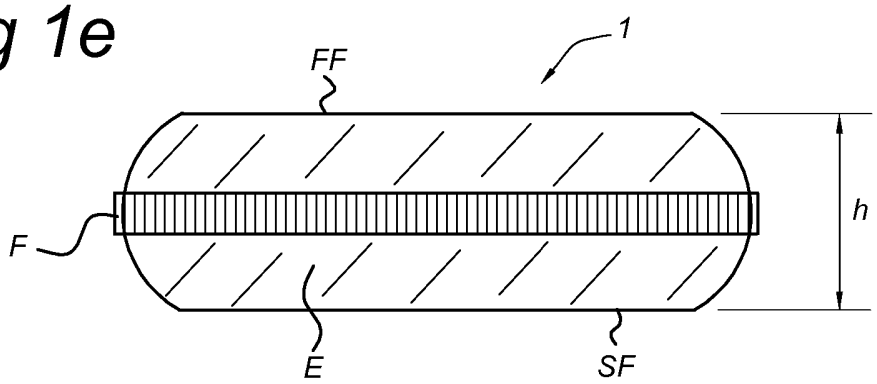


Fig 1f

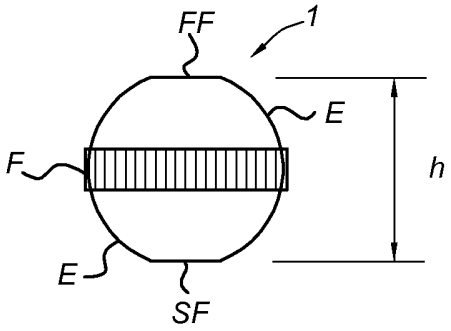


Fig 1g

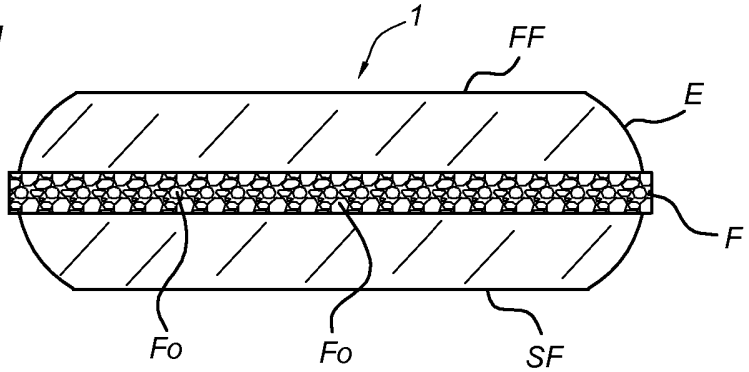


Fig 1h

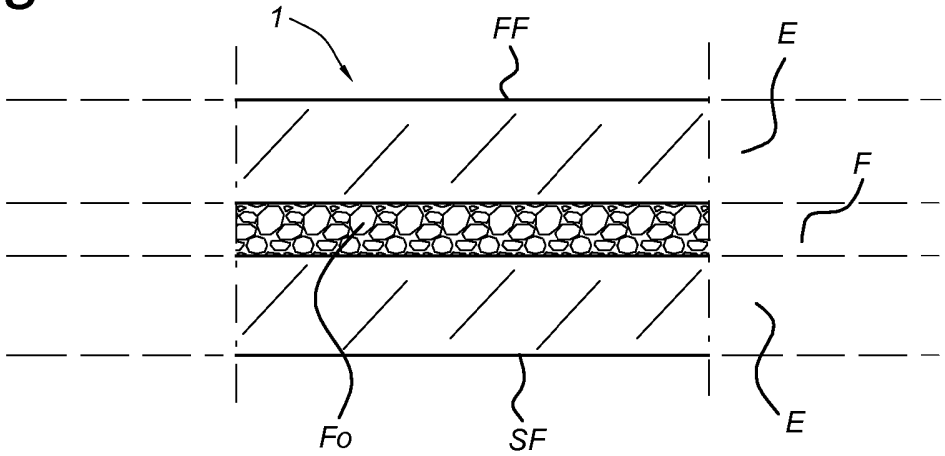


Fig 1i

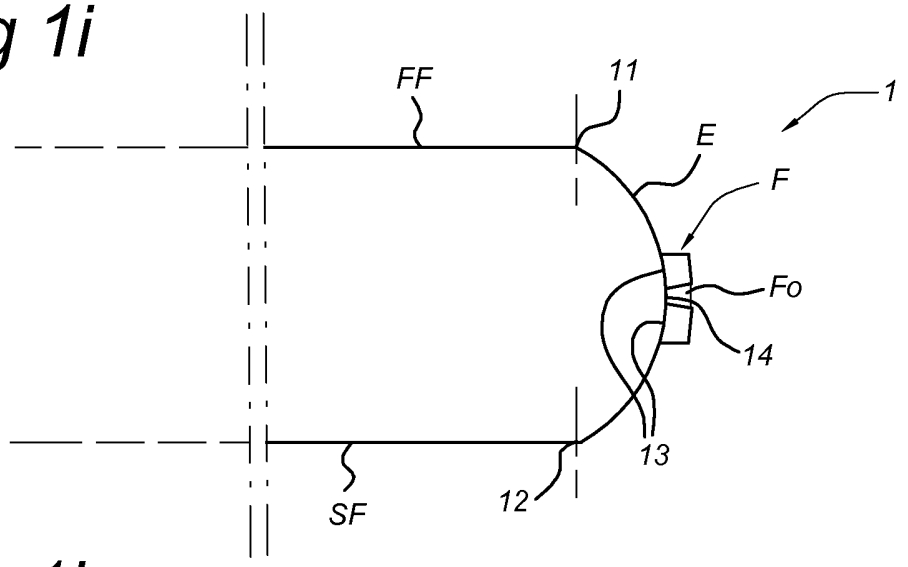
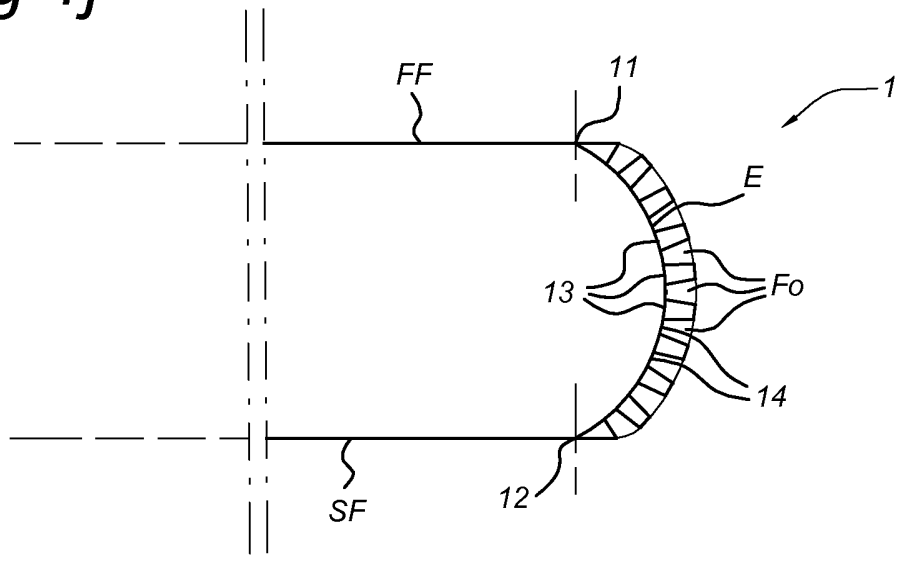


Fig 1j



Agentschap NL
Ministerie van Economische Zaken,
Landbouw en Innovatie

RAPPORT BETREFFENDE HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK

Octrooiaanvrage 2005792

Classificatie van het onderwerp[1]: A23C19/16, A01J25/16, B65D85/76,	Onderzochte gebieden van de techniek[1]: A23C, A01J, B65D
Computerbestanden: EPODOC, WPI	Omvang van het onderzoek: Volledig
Indien gewijzigde conclusies; indieningsdatum van deze conclusies:	Niet onderzochte conclusies[2]:

Van belang zijnde literatuur

Categorie[3]	Vermelding van literatuur met aanduiding, voor zover nodig, van speciaal van belang zijnde tekstgedeelten of figuren.	Van belang voor conclusie(s) nr.:
D, Y	WO 2009/047332 A2 (DSM IP ASSETS BV) 16 april 2009 * het gehele document * – – –	1-14
X Y	EP 0362024 A1 (UNION COOP AGRICOLE) 4 april 1990 * het gehele document * – – –	15 1-14
D, X Y	FR 2600310 A1 (ROGER FREDERIC) 24 december 1987 * figuren * – – –	15 1, 3-14
X Y	NL 7906005 A (B. T. GEESSINK) 10 februari 1981 * figuren; pagina 1, regel 11; pagina 3, regels 9-13 * – – –	15 1, 3-14
X	NL 1006488C C2 (BAARS LEERDAM PRODUCTIE B V) 5 januari 1999 * figuren; conclusie 1 * – – –	15
X	GB 937441 A (COW & GATE LTD) 18 september 1963 * figuren; conclusies * – – –	15

[1] Gedefinieerd volgens International Patent Classification (IPC).
[2] Voor motivering zie toelichting in de schriftelijke opinie.
[3] Verklaring van de categorie-aanduiding: zie apart blad.

A	NL 8900668 A (NL ZUIVELBOND FNZ) 16 oktober 1990 * het gehele document * - - -	1-14
D, A	GB 2291407 A (LIN PAC MOULDINGS) 14 januari 1996 * het gehele document * - - -	1-15
A	NL 7700794 A (FRIESCHE COOEPERATIEVE ZUIVEL) 28 juli 1978 * het gehele document * - - -	1-15
A	FR 2579864 A2 (SERAMAC SARL) 10 oktober 1986 * het gehele document * - - - - -	1-15

Datum waarop het onderzoek werd voltooid: 12 juli 2011	De bevoegde ambtenaar: Mw. dr. ing. L. Bechger **NL Octrooicentrum**

Categorie van de vermelde literatuur:

X: op zichzelf van bijzonder belang zijnde stand van de techniek
Y: in samenhang met andere geciteerde literatuur van bijzonder belang zijnde stand van de techniek
A: niet tot de categorie X of Y behorende van belang zijnde stand van de techniek
O: verwijzend naar niet op schrift gestelde stand van de techniek
P: literatuur gepubliceerd tussen voorrangs- en indieningsdatum
T: niet tijdig gepubliceerde literatuur over theorie of principe ten grondslag liggend aan de uitvinding
E: octrooiliteratuur gepubliceerd op of na de indieningsdatum van de onderhavige aanvrage en waarvan de indieningsdatum of de voorrangsdatum ligt voor de indieningsdatum van de onderhavige aanvrage.
D: in de aanvrage genoemd
L: om andere redenen vermelde literatuur
&: lid van dezelfde octrooifamilie; corresponderende literatuur

AANHANGSEL BEHORENDE BIJ HET RAPPORT BETREFFENDE HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK, UITGEVOERD IN OCTROOIAANVRAGE NR. 2005792

Het aanhangsel bevat een opgave van elders gepubliceerde octrooiaanvragen of octrooien (zogenaamde leden van dezelfde octrooifamilie), die overeenkomen met octrooigeschriften genoemd in het rapport. De opgave is samengesteld aan de hand van gegevens uit het computerbestand van het Europees Octrooibureau per **10 augustus 2011**

De juistheid en volledigheid van deze opgave wordt noch door het Europees Octrooibureau, noch door NL Octrooicentrum gegarandeerd; de gegevens worden verstrekt voor informatiedoeleinden.

In het rapport genoemd octrooi-geschrift		datum van publicatie	overeenkomend(e) geschrift(en)		datum van publicatie
WO2009047332	A	2009-04-16			
			AU2008309571	A	2009-04-16
			EP2200447	A	2010-06-30
			CN101820769	A	2010-09-01
			EA201000602	A	2010-10-29
			US2010297311	A	2010-11-25
EP0362024	AB	1990-04-04			
			FR2636806	AB	1990-03-30
FR2600310	A	1987-12-24			
NL7906005	A	1981-02-10			
			BE884561	A	1980-11-17
NL1006488C	C	1999-01-05			
			EP0888710	AB	1999-01-07
			DE69807791T	T	2003-05-28
GB937441	A	1963-09-18			
NL8900668	A	1990-10-16			
			IE63444	B	1995-04-19
			EP0387959	AB	1990-09-19
			DK0387959T	T	1993-11-15
			ES2043242T	T	1993-12-16
			DE69001927T	T	1994-01-20

In het rapport genoemd octrooi-geschrift		datum van publicatie	overeenkomend(e) geschrift(en)	datum van publicatie
GB2291407	A	1996-01-24		
NL7700794	A	1978-07-28		
FR2579864	AB	1986-10-10		

SCHRIFTELIJKE OPINIE

Octrooiaanvrage 2005792

Indieningsdatum: 1 december 2010	Voorrangsdatum: 17 december 2009
Classificatie van het onderwerp[1]: A23C19/16, A01J25/16, B65D85/76,	Aanvrager: CSK Food Enrichment B.V.

Deze schriftelijke opinie bevat een toelichting op de volgende onderdelen:

☑ Onderdeel I	Basis van de schriftelijke opinie
☑ Onderdeel II	Voorrang
☐ Onderdeel III	Vaststelling nieuwheid, inventiviteit en industriële toepasbaarheid niet mogelijk
☐ Onderdeel IV	De aanvraag heeft betrekking op meer dan één uitvinding
☑ Onderdeel V	Gemotiveerde verklaring ten aanzien van nieuwheid, inventiviteit en industriële toepasbaarheid
☐ Onderdeel VI	Andere geciteerde documenten
☐ Onderdeel VII	Overige gebreken
☑ Onderdeel VIII	Overige opmerkingen

De bevoegde ambtenaar:

Mw. dr. ing. L. Bechger

NL Octrooicentrum

[1] Gedefinieerd volgens International Patent Classification (IPC).

Schriftelijke Opinie

Octrooiaanvrage **2005792**

Onderdeel I Basis van de schriftelijke opinie

Deze schriftelijke opinie is opgesteld op basis van de meest recente conclusies ingediend voor aanvang van het onderzoek.

Onderdeel II Voorrang

Deze schriftelijke opinie is opgesteld onder de aanname dat eventueel ingeroepen voorrang geldig is, tenzij hieronder anders is aangegeven. Controleren van de voorrang maakt geen deel uit van het reguliere onderzoek naar de stand van de techniek.

Onderdeel V Gemotiveerde verklaring ten aanzien van nieuwheid, inventiviteit en industriële toepasbaarheid

1. Verklaring

Nieuwheid	Ja:	Conclusies	1-14
	Nee:	Conclusies	15
Inventiviteit	Ja:	Conclusies	
	Nee:	Conclusies	1-14
Industriële toepasbaarheid	Ja:	Conclusies	1-15
	Nee:	Conclusies	

2. Literatuur en toelichting

D1 = WO 2009/047332
D2 = EP 0362024
D3 = FR 2600310
D4 = NL 7906005
D5 = NL 1006488C
D6 = GB 937441

D1 openbaart een werkwijze voor het in folie rijpen van een kaas, omvattend:

a. verschaffen van een kaas die (impliciet) een rand, een eerste vlak en een tweede vlak heeft (vgl. pag.10, regels 22-24);
b. verpakken van deze kaas in een gesloten kaasrijpingsfolie die een waterdamp-doorlaatbaarheid van ten minste 5 g/(m^2.24 uur) bij 12 °C en 85% relatieve vochtigheid heeft (pag.5, regels 8-9);
c. waarbij gedurende het rijpen vocht uit de kaas kan verdampen.

De onderhavige aanvrage verschilt nu daarin van D1 dat het rijpen van deze in folie verpakte kaas in aanwezigheid van een frame plaatsvindt, welk frame tenminste een deel van de rand van de kaas omgeeft en waarbij het frame in contact is met de rand in het gebied van 1-80% van het oppervlak van de rand.

Conclusie 1 en de daarvan afhankelijke conclusies 2 t/m 14 zijn derhalve nieuw.

Conclusie 1 en de daarvan afhankelijke conclusies 2 t/m 14 zijn echter niet inventief.
Het probleem dat getracht wordt op te lossen in de onderhavige aanvrage is vormverlies in het (specifieke) rijpingsproces van D1 tegen te gaan, waarbij (bij voorkeur) in acht wordt genomen dat vochtverdamping tijdens de rijping zo min mogelijk geblokkeerd wordt, zoals ook beschreven op pagina 3, regels 8-10 en pagina 13, regels 11-13 in de beschrijving van de aanvrage. Een vakman gesteld voor dit probleem zal documenten raadplegen die (algemene) rijpingsprocessen van kazen openbaren en die het probleem van vormverlies tegengaan. Een van die documenten is D2, waarin kazen tijdens de rijping in een frame worden geplaatst (zie figuur 5), waarbij het frame tenminste een deel van de rand van de kaas omgeeft en voor 10-80% in contact is met de rand. Er wordt vermeld dat de oorspronkelijke vorm van de kaas blijft behouden (zie kolom 1, regels 15-16 "La forme initiale des fromages est ainsi conservée") en dat goede ventilatie rondom de kazen tijdens het rijpen mogelijk blijft (zie kolom 3, regels 6-7 "permettant leur aération pendant l'affinage"). De materie van conclusies 1 en 3 is derhalve niet inventief ten opzichte van de combinatie van D1 met D2.
Het frame uit D2 is poreus (zie kolom 2, regels 36-37, "qui est largement ajouré" en kolom 3, regels 5-4, "toute autre forme d'organe ajouré souple"), is gemaakt van plastic (zie kolom 2, regels 35-36 "matière plastique") en omvat elementen die verbonden kunnen worden door bevestigingsmiddelen (nrs. 5 en 6 in de figuren). Ook conclusies 2, 10 en 11 zijn niet inventief in het licht van de combinatie D1 met D2.
Eenzelfde inventiviteitsbezwaar voor conclusies 1, 3, 10 en 11 gaat op voor de combinatie van D1 met D3 of D1 met D4. In respectievelijk D3 en D4 wordt het probleem van vormverlies van de kaas tijdens het rijpingsproces opgelost d.m.v. een frame (zie pagina 1, regels 22-23, 28-31, pagina 2, regels 1-8 in D3 en de figuren en pagina 3, regels 9-13 in D4) en blijft goede ventilatie rondom de kaas mogelijk.

De materie van conclusie 4 (zie D1, pagina 3, regel 21-22), conclusie 5 (D1, pagina 5, regel 13), conclusie 6 (D1, figuur 1) en conclusie 14 (D1, pagina 17, regel 15) is op zichzelf bekend uit D1 en is derhalve niet inventief.

De maatregelen van conclusies 7, 8, 9, 12 en 13 betreffen niet meer dan triviale maatregelen die binnen het bereik van de vakman liggen en kunnen dan ook niet inventief bevonden worden.

De onafhankelijke conclusie 15 betreft een in folie verpakte kaas die ten minste gedeeltelijk omgeven wordt door een frame en die kan worden verkregen volgens werkwijze volgens een van de conclusies 1-14. Derhalve zijn alle documenten die een in folie verpakte kaas openbaren die ten minste gedeeltelijk omgeven worden door een frame, nieuwheidsbezwarend voor conclusie 15. Conclusie 15 is niet nieuw in het licht van D2, D3, D4, D5 of D6.

Schriftelijke Opinie

Octrooiaanvrage **2005792**

Onderdeel VIII Overige opmerkingen

De volgende opmerkingen met betrekking tot de duidelijkheid van de conclusies, beschrijving, en figuren, of met betrekking tot de vraag of de conclusies nawerkbaar zijn, worden gemaakt:

De woorden "bij voorkeur" in conclusie 1, "met meer voorkeur" in conclusies 4, 5, en 6 en "in het bijzonder" in conclusie 11 zijn niet beperkend en de zinsnede achter deze woorden kan daarom worden weggedacht