(54) Title: YOGURT-BASED COATING FOR FROZEN FOOD PRODUCTS

(57) Abstract: A yogurt-based coating composition is provided for coating frozen foods with an exterior layer. The said composition comprises from about 45% to about 54% by weight of an oil having a melting point of from about 25°C to about 35°C, about 29% to about 38% by weight of yogurt, about 8% to about 12% by weight of sugar, about 0.5% to about 1% by weight of lecithin, and containing at least 10^3 colony-forming units (CFU) lactic acid bacteria per gram of the yogurt-based coating composition.
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Yogurt-based Coating for Frozen Food Products

Background

[1] Ice cream and other frozen foods are a treat enjoyed in many places around the world. Consumers often view such frozen foods as an indulgence, and so often look for a unique or particularly enjoyable eating experience from ice cream and other similar frozen treats in order to make the eating experience memorable. There is a need, then, to provide new frozen foods that satisfy customer demand for unique and enjoyable eating experiences.

Field

[2] The present disclosure relates to compound coating technology and more particularly, to a yogurt-based coating composition suitable for coating frozen foods with a yogurt-based coating.

Summary

[3] Provided herein is a method of making a yogurt-based coating composition. The method includes combining an oil and lecithin solution with yogurt and a sugar solution to produce a sweetened yogurt mixture at a temperature of from about 40° C to about 45° C; and emulsifying the sweetened yogurt mixture to produce the yogurt-based coating composition comprising an emulsion that is stable for at least 30 minutes at 25° C and contains from about 45% to about 54% by weight of an oil having a melting point of from about 25° C to about 35° C, about 29% to about 38%> by weight yogurt, about 8%> to about 12% by weight sugar, about 0.5% to about 1% by weight lecithin, and containing at least 103 colony forming units (CFU) lactic acid bacteria per gram of the yogurt-based coating composition. In some embodiments, the sweetened yogurt mixture is emulsified in a shear emulsifier at about 8,000 rpm to about 10,000 rpm for 90 seconds to 150 seconds. In some embodiments, the sweetened mixture is emulsified in a high pressure emulsifier at about 500 bar to about 800 bar
pressure for 90 seconds to 150 seconds.

[4] In some embodiments, the yogurt-based coating composition comprises 53% to 54% coconut oil, 29% to 30% yogurt, 9% to 11% sugar, and 0.75% to 0.9% lecithin.

[5] In some embodiments, the yogurt has a protein content of from about 3% to about 5% and a fat content of from about 6% to about 9%.

[6] In some embodiments, the yogurt has a viscosity of about 20,000 cp to about 21,500 cp prior to combining with the oil and lecithin mixture.

[7] In some embodiments, the lecithin is dissolved in the oil at a temperature of about 68° C to about 75° C.

[8] In some embodiments, a method of making a yogurt-based coating composition includes combining an oil and lecithin solution with yogurt to produce a yogurt and oil mixture at a temperature of from about 40° C to about 45° C; emulsifying the yogurt and oil mixture to produce a first emulsion; combining the first emulsion with a sugar solution to produce a sweetened yogurt mixture; and emulsifying the sweetened yogurt mixture to produce the yogurt-based coating composition comprising a second emulsion that is stable for at least 30 minutes at 25° C and contains from about 45% to about 54% by weight of an oil having a melting point of from about 25° C to about 35° C, about 29% to about 38%, by weight yogurt, about 8% to about 12% by weight sugar, about 0.5% to about 1%, by weight lecithin, and containing at least 103 CFU lactic acid bacteria per gram of the yogurt-based coating composition. In some embodiments, each of the first and the second emulsion is produced in a shear emulsifier at about 8,000 rpm to about 10,000 rpm for a total of 90 seconds to 150 seconds. In some embodiments, each of the first and the second emulsion is produced in a high pressure emulsifier at about 500 bar to about 800 bar pressure for a total of 90 seconds to 150 seconds.

[9] In some embodiments, the yogurt-based coating composition comprises 53% to 54% coconut oil, 29% to 30% yogurt, 9% to 11% sugar, and 0.75% to 0.9% lecithin.
[10] In some embodiments, the yogurt has a protein content of from about 3% to about 5% and a fat content of from about 6% to about 9%.

[11] In some embodiments, the yogurt has a viscosity of about 20,000 cp to about 21,500 cp prior to combining with the oil and lecithin mixture.

[12] In some embodiments, the lecithin is dissolved in the oil at a temperature of about 68°C to about 75°C.

[13] A method of making a coated frozen food is also provided herein. The method includes applying a yogurt-based coating composition comprising an emulsion that is stable for at least 30 minutes at 25°C and contains from about 45% to about 54% by weight of an oil having a melting point of from about 25°C to about 35°C, about 29% to about 38% by weight yogurt, about 8% to about 12% by weight sugar, about 0.5% to about 1% by weight lecithin, and containing at least 103 colony forming units (CFU) lactic acid bacteria per gram of the yogurt-based coating composition. In some embodiments, the sweetened yogurt mixture is emulsified in a shear emulsifier at about 8,000 rpm to about 10,000 rpm for 90 seconds to 150 seconds. In some embodiments, the sweetened mixture is emulsified in a high pressure emulsifier at about 500 bar to about 800 bar pressure for 90 seconds to 150 seconds at a temperature of from about 28°C to about 30°C to a surface of a frozen food to coat the surface of the frozen food with a yogurt-based coating having a thickness of from about 2 mm to about 3 mm; and chilling the coated frozen food at a temperature of from about 0°C to about 4°C, wherein the coating on the coated frozen food contains at least 103 CFU lactic acid bacteria per gram coating.

[14] Provided herein is a yogurt-based coating composition including about 29% to about 38%, yogurt, about 45% to about 54% coconut oil, about 8% to about 12% sugar, about 0.5% to about 1% lecithin, and at least 103 CFU lactic acid bacteria. In some embodiments, the yogurt-based coating composition comprises an emulsion that is stable at 25°C for at least 30 minutes.

[15] Provided herein is a frozen food including ice cream having a surface coated with about 2 mm to about 3 mm of the yogurt-based coating composition having
about 29% to about 38% yogurt, about 45% to about 54% coconut oil, about 8% to about 12% sugar, about 0.5% to about 1% lecithin, wherein the coating on the frozen food contains at least 103 CFU lactic acid bacteria per gram coating.

**Detailed Description**

[16] As consumers demand more unique eating experiences, especially from foods that are frequently considered indulgences, there is a challenge to produce foods that satisfy customer tastes and trends. It is particularly challenging to produce frozen foods, such as ice cream, that can provide an enjoyable eating experience for the entirety of the frozen shelf life of the product. In addition, new foods should consider both standard ingredients, as well as formulations with mostly-natural, all-natural, or non-GMO ingredients in order to provide consumers with choices that fit their ingredient expectations while still providing a delightful eating experience. Described herein is a yogurt-based coating composition that is suitable for coating frozen foods with a yogurt-based coating and can be formulated as all-natural and/or non-GMO while providing a delightful eating experience throughout a frozen shelf life of at least 1 month (e.g., at least 4 months).

[17] A yogurt-based coating provided herein includes yogurt, oil, an emulsifier, and sugar. A yogurt-based coating described herein provides several handling and storage benefits while still maintaining a desirable texture and flavor. For example, a yogurt-based coating described herein is surprisingly stable over a frozen shelf life of at least 1 month (e.g., at least 4 months), and can be stored without separation of oil, protein, or water from the coating. In addition, a yogurt-based described herein resists cracking during manufacture, handling, and storage, while still providing a first-bite crispness to a frozen food, producing an audible snap when bitten. In addition, a yogurt-based coating can provide a smooth mouthfeel resulting from rapid melting in the mouth following a first-bite crispness.

[18] A yogurt-based coating described herein can include a surprisingly high
amount of yogurt while retaining stability and texture over the frozen shelf life of a coated frozen food. The relatively high amount of yogurt can provide a distinct yogurt flavor that can be increased with increasing amounts of yogurt or modified with the addition of flavoring agents, such as fruit juices or flavors.

[19] A yogurt-based coating provided herein can also have an added benefit of containing live and active lactic acid bacteria. For example, a yogurt-based coating can contain at least about $10^3$ colony forming units (CFU), or at least $10^4$ CFU of lactic acid bacteria (e.g., *Lactobacillus delbrueckii* subsp. *bulgaricus*, *Streptococcus thermophilus*, and the like, or a combination thereof) per gram coating. Live and active lactic acid bacteria cultures are believed to contribute to health benefits associated with yogurt.

[20] Yogurt

[21] Yogurt is included in a yogurt-based coating in an amount of between about 29% to about 38%, by weight of the yogurt-based coating. An amount below 29% can reduce the yogurt flavor of the yogurt-based coating too much, while an amount greater than 38% can result in instability of the coating due to an increased water content of the coating. In some embodiments, the amount of yogurt included in a yogurt-based coating can be adjusted to arrive at a desired amount of live and active lactic acid bacteria in the yogurt-based coating.

[22] A yogurt suitable for use in a yogurt-based coating provided herein has a protein content of about 3% to about 5% (e.g., from about 3.5% to about 3.7%), a fat content of about 6% to about 9% (e.g., about 8%), and a pH of about 3.5 to about 4 (e.g., from about 3.6 to about 3.8). A suitable yogurt can have a viscosity of about 20,000 - 21,500 cp.

[23] In some embodiments, a yogurt is formulated and fermented for a strong yogurt flavor. Generally, a relatively long fermentation time and a culture specifically selected for long fermentation can produce a strong yogurt flavor as well as the desired viscosity, pH, and nutritional profile.

[24] In some embodiments, the ingredients used for fermentation can be adjusted to
result in a desired nutritional profile, pH, or viscosity. For example, suitable ingredients, such as whole milk, skim milk, and cream can be combined and fermented to produce a yogurt having an appropriate fat and protein content. In addition, the amount of fat and protein can be adjusted to adjust the viscosity of a yogurt suitable for use in a yogurt-based coating described herein.

[25] Generally, a yogurt suitable for use in a yogurt-based coating is stored at 0°C to 4°C prior to use in a yogurt-based coating.

[26] **Oil**

[27] Oil is included in a yogurt-based coating in an amount of between about 45% to 54% by weight of the yogurt-based coating. An amount of oil greater than 54% can result in a coating that results in an oily or waxy mouthfeel or form white spots on the surface during storage due to oil migration. An amount of oil less than 45% can result in a coating that does not provide a desired crispness upon biting.

[28] Suitable oils include one or a combination of oils or oil fractions that are solid at room temperature and have a melting point of from about 25°C to about 35°C. An oil or combination of oils having a melting point of about 25°C to about 35°C provide an appropriate level of first-bite crispness to a frozen food coated with a yogurt-based coating, as well as a melting profile that prevents waxiness when in the mouth. Melting points below 25°C exhibit decreasing hardness when used in a yogurt-based coating and increase cracking risk of the coating in subsequent steps, such as decoration or storage. Melting points above 35°C exhibit increasing waxiness in the mouth. In addition, a suitable oil is liquid at a temperature low enough (e.g., about 68°C to about 75°C) to reduce the risk of damaging any added emulsifier and remain liquid at a temperature low enough (e.g., about 40°C to about 45°C) to prevent denaturation of yogurt proteins. In some embodiments, a suitable oil is liquid at a temperature (e.g., about 40°C to about 45°C) that reduces the risk of damaging live and active lactic acid bacteria. A particularly suitable oil is coconut oil.
Sugar

Sugar is included in a yogurt-based coating in an amount of between about 8% to about 12% (e.g., from about 9% to about 11%, or about 10%) by weight of the yogurt-based coating. Generally, sucrose is the preferred sugar for use in a yogurt-based coating, though other sugars, such as fructose and maltose can also be used alone or in combination. The amount of sugar can be adjusted to provide a desired sweetness and appearance of a frozen food product coated with a yogurt-based coating.

Emulsifier

An emulsifier is included in a yogurt-based coating in an amount of from about 0.5% to about 1% (e.g., from about 0.75% to about 0.9%, or about 0.85%) by weight of the yogurt-based coating.

Emulsifiers suitable for use in a yogurt-based coating include lecithin (e.g., soy lecithin) and sodium/calcium stearoyl lactylate (SSL/CSL). Lecithin is a preferred emulsifier for use in an all-natural or mostly-natural yogurt-based coatings. Other natural emulsifiers, such as egg yolk, may have reduced emulsifying ability if heated to temperatures suitable for a method of making a yogurt-based coating provided herein.

Other Ingredients

Other ingredients can be included in a yogurt-based coating provided herein. For example, natural or artificial colors or flavors can be added to provide a variety of flavor and appearance options.

Method

A method for making a yogurt-based coating provided herein is shown in Figures 1 and 2. Generally, a method for making a yogurt-based coating composition 100, 200 includes dissolving an emulsifier in a heated oil 110, 210
to produce an oil and emulsifier solution, blending a yogurt and a sugar solution
with the heated oil mixture to produce a sweetened yogurt mixture 120, and
emulsifying the sweetened yogurt mixture 130, 250 to produce a yogurt-based
coating composition. The yogurt-based coating composition can then be
applied to a frozen food 140, 260, such as ice cream and chilled 150, 270 to
form a yogurt-based coating.

[38] To make an oil and emulsifier solution, oil is heated to a temperature range of
68° C to 75° C and emulsifier is added and stirred until completely dissolved.
This temperature range maintains the oil in a liquid state and facilitates
emulsifier dissolution. A temperature higher than 75° C can result in reduced
emulsifier activity. In addition, a temperature higher than 75° C can result in
off-flavors from degraded emulsifier and yogurt proteins and reduce the
viability of the lactic acid bacteria culture in subsequent steps. A temperature
lower than 68° C can reduce the ability of an emulsifier to dissolve in the oil.

[39] In some embodiments, a yogurt-based coating composition can be made by
blending an oil and emulsifier solution with a yogurt and a sugar solution in a
continuous emulsion process 100.

[40] In other embodiments, a yogurt-based coating composition can be made by
blending an oil and emulsifier solution with a yogurt to make a yogurt and oil
mixture 220 and emulsifying the yogurt and oil mixture to make a first emulsion
230, then adding a sugar solution to the first emulsion to make a sweetened
yogurt mixture 240 and emulsifying the sweetened yogurt mixture to make a
second emulsion 250, in a two-step emulsion process 200, as shown in Figure 2.

[41] Yogurt is added to the oil and emulsifier solution to form a yogurt and oil
mixture (in a two-step emulsion process) or sweetened yogurt mixture (in a
continuous emulsion process) at a temperature of from about 40° C to about 45°
C. A temperature outside the range of from about 40° C to about 45° C may
not efficiently form an emulsion. A temperature higher than 45° C can result in
a reduction of the viability of the lactic acid bacteria culture or denaturation of
yogurt proteins.
In some embodiments, the temperature of the yogurt is from about 0°C to about 4°C prior to combining with the oil and emulsifier solution, which when combined with the oil and emulsifier solution, results in the desired temperature of from about 40°C to about 45°C. In some embodiments, the oil and emulsifier solution can be cooled and/or the yogurt warmed so that the yogurt and oil mixture is at a temperature of from about 40°C to about 45°C. In addition, the temperature of a sugar solution added in a continuous emulsion process can be adjusted as desired to result in a sweetened yogurt mixture at a temperature of from about 40°C to about 45°C.

The concentration and amount of sugar solution added can be adjusted to result in a sugar content of from about 8% to about 12% of the sweetened yogurt mixture.

Emulsion can be performed using a shear emulsifier at 8,000 rpm to 10,000 rpm or a high pressure emulsifier at about 500 bar to about 800 bar. Emulsification is performed for a time sufficient to form a yogurt-based coating composition comprising an emulsion that is stable for at least 30 minutes at 25°C. An emulsion is considered stable if the appearance remains homogeneous after 30 minutes at 25°C.

In a continuous emulsion process, emulsion of a sweetened yogurt mixture is done for 90 seconds to 150 seconds (e.g., about 100 seconds to about 140 seconds, or about 120 seconds).

The combined emulsification time in a two-step emulsification process is sufficient to produce a second emulsion that is homogeneous in appearance and stable for at least 30 minutes at 25°C. In a two-step emulsification process the combined emulsification time for producing the first emulsion and second emulsion is from about 90 seconds to about 150 seconds (e.g., about 100 seconds to about 140 seconds, or about 120 seconds). For example, in a two-step emulsification process, each of the yogurt and oil mixture and the sweetened yogurt mixture can be emulsified for 45 seconds to 75 seconds (e.g., 50 seconds to 70 seconds, or 60 seconds).
[47] If emulsification is done in a shear emulsifier at a speed outside of 8,000 rpm to 10,000 rpm or a time outside of 90 seconds to 150 seconds, the emulsion may not form for a yogurt-based coating composition or the emulsion may not remain stable for at least 30 minutes at 25°C. Similarly, if emulsification is done using a high pressure emulsifier at a pressure outside of 500 bar to 800 bar or a time outside of 90 seconds to 150 seconds, the emulsion may not form for a yogurt-based coating composition or the emulsion may not remain stable for at least 30 minutes at 25°C.

[48] A yogurt-based coating composition can have a viscosity of about 500 cp to about 800 cp (e.g., from about 600 cp to about 700 cp). A viscosity less than 500 cp may not produce a sufficiently thick coating on a frozen food base during enrobing, while a viscosity greater than 800 may produce a coating that is too thick.

[49] A yogurt-based coating composition provided herein can include at least 10³, or at least 10⁴ CFU of lactic acid bacteria per gram of yogurt-based coating composition.

[50] In some embodiments, an oil and emulsifier solution, yogurt, and sugar solution can be combined and stored or combined and shipped prior to emulsification in order to form a yogurt-based coating composition.

[51] A yogurt-based coating composition can be applied at a temperature of from about 28°C to about 30°C to a frozen food base (e.g., ice cream) that is at a temperature of less than -15°C (e.g., from about -20°C to about -40°C, or about -25°C) to produce a frozen food product coated with a yogurt-based coating. At these temperatures, the yogurt-based coating can coat the frozen food base at a thickness of 2-3 mm. At a yogurt-based coating temperature below 28°C, the yogurt-based coating may be too viscous for sufficient flowability and result in a too thick of a coating or may not successfully coat the food base at all. A coating that is thicker than 3 mm on a frozen food can result in a texture that is too hard to provide an enjoyable eating experience and can contribute to a higher cracking risk during storage or transportation. At a
yogurt-based coating composition temperature above 30° C, the yogurt-based coating composition may be too runny and form a too thin of a coating. A coating that is thinner than 2 mm on a frozen food can also result in a higher cracking risk, as well as result in the frozen food base being at risk of melting and losing its shape. A thickness of 2-3mm provides the coating with a good balance of strength and flexibility, not too fragile or too rigid to prevent cracking.

[52] Once a frozen food base is coated with a yogurt-based coating composition, the coated food can be chilled at a temperature of less than 4° C (e.g., 0° C to 4°C). Chilling the coated food can further solidify the coating and facilitate packaging and any decoration steps. A frozen food that has a yogurt-based coating provided herein can include at least $10^3$ (e.g., at least $10^4$) CFU lactic acid bacteria per gram of the coating.

[53] The implementations described above and other implementations are within the scope of the following claims. One skilled in the art will appreciate that the present disclosure can be practiced with embodiments other than those disclosed. The disclosed embodiments are presented for purposes of illustration and not limitation.
What is claimed is:

1. A method of making a yogurt-based coating composition, comprising:
   a. combining an oil and lecithin solution with yogurt and a sugar solution to produce a sweetened yogurt mixture at a temperature of from about 40° C to about 45° C; and
   b. emulsifying the sweetened yogurt mixture to produce the yogurt-based coating composition comprising an emulsion that is stable for at least 30 minutes at 25° C and contains from about 45% to about 54% by weight of an oil having a melting point of from about 25° C to about 35° C, about 29% to about 38% by weight yogurt, about 8% to about 12% by weight sugar, about 0.5% to about 1% by weight lecithin, and containing at least 10^3 colony forming units (CFU) lactic acid bacteria per gram of the yogurt-based coating composition.

2. The method of claim 1, wherein the sweetened yogurt mixture is emulsified in a shear emulsifier at about 8,000 rpm to about 10,000 rpm for 90 seconds to 150 seconds.

3. The method of claim 1, wherein the sweetened mixture is emulsified in a high pressure emulsifier at about 500 bar to about 800 bar pressure for 90 seconds to 150 seconds.

4. A method of making a yogurt-based coating composition, comprising:
   a. combining an oil and lecithin solution with yogurt to produce a yogurt and oil mixture at a temperature of from about 40° C to about 45° C;
   b. emulsifying the yogurt and oil mixture to produce a first emulsion;
   c. combining the first emulsion with a sugar solution to produce a sweetened yogurt mixture;
   d. emulsifying the sweetened yogurt mixture to produce the yogurt-based coating composition comprising a second emulsion that is stable for at least 30 minutes at 25° C and contains from about 45% to about 54% by weight of an oil having a melting point of from about 25° C to about 35° C, about 29% to about 38% by weight yogurt, about 8%...
to about 12% by weight sugar, about 0.5% to about 1% by weight lecithin, and containing at least $10^3$ CFU lactic acid bacteria per gram of the yogurt-based coating composition.

5. The method of claim 4, wherein each of the first and the second emulsion is produced in a shear emulsifier at about 8,000 rpm to about 10,000 rpm for a total of 90 seconds to 150 seconds.

6. The method of claim 4, wherein each of the first and the second emulsion is produced in a high pressure emulsifier at about 500 bar to about 800 bar pressure for a total of 90 seconds to 150 seconds.

7. The method of claim 1 or 4, wherein the yogurt-based coating composition comprises 53% to 54% coconut oil, 29% to 30% yogurt, 9% to 11% sugar, and 0.75% to 0.9% lecithin.

8. The method of claim 1 or 4, wherein the yogurt has a protein content of from about 3% to about 5% and a fat content of from about 6% to about 9%.

9. The method of claim 1 or 4, wherein the yogurt has a viscosity of about 20,000 cp to about 21,500 cp prior to combining with the oil and lecithin mixture.

10. The method of claim 1 or 4, wherein the lecithin is dissolved in the oil at a temperature of about 68° C to about 75° C.

11. A method of making a coated frozen food, comprising:
   a. applying the yogurt-based coating composition of claim 1 or claim 4 at a temperature of from about 28° C to about 30° C to a surface of a frozen food to coat the surface of the frozen food with a yogurt-based coating having a thickness of from about 2 mm to about 3 mm; and
b. chilling the coated frozen food at a temperature of from about 0° C to about 4° C, wherein the coating on the coated frozen food contains at least $10^3$ CFU lactic acid bacteria per gram coating.

12. A yogurt-based coating composition, comprising:
   a. about 29% to about 38% yogurt;
   b. about 45% to about 54% coconut oil;
   c. about 8% to about 12% sugar;
   d. about 0.5% to about 1% lecithin; and
   e. at least $10^3$ CFU lactic acid bacteria.

13. The yogurt-based coating composition of claim 12, wherein the yogurt-based coating composition comprises an emulsion that is stable at 25° C for at least 30 minutes.

14. A frozen food, comprising ice cream having a surface coated with about 2 mm to about 3 mm of the yogurt-based coating composition of claim 13, wherein the coating on the frozen food contains at least $10^3$ CFU lactic acid bacteria per gram coating.
100  
Oil

110  
Heat to 68°C – 75°C;  
Stir until completely dissolved

120  
Blend

Yogurt

130  
Emulsify

140  
Enrobe at 28°C – 30°C

150  
Chill at 0°C – 4°C

Yogurt-coated Frozen Food

Frozen food base at temperature below -15°C

Sugar solution

Emulsifier
Figure 2

1. Oil
   - Heat to 68°C – 75°C; Stir until completely dissolved
2. Blend
3. Emulsify
4. Sugar solution
   - Blend
   - Emulsify
5. Frozen food base
   - Enrobe at 28°C – 30°C
6. Chill at 0°C – 4°C
7. Yogurt-coated Frozen Food
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
A23G 9/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
A23G; A23C; A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPLEPDOC,CNPAT,CNKI yogurt, oil, sugar, lecithin, CFU, coating, emulsify,shear, pressure, temperature, composition, frozen food

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Category</th>
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<td>CN 102138614 A (INNER MONGOLIA YILI IND GROUP CO LTD) 03 August 2011 (2011-08-03) claims 1-8, description, paragraph 2</td>
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Further documents are listed in the continuation of Box C.

Date of the actual completion of the international search
10 March 2016

Date of mailing of the international search report
23 March 2016

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