

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
5 October 2006 (05.10.2006)

PCT

(10) International Publication Number  
**WO 2006/103210 A1**

- (51) International Patent Classification:  
A23C 9/00 (2006.01) A23C 1/12 (2006.01)
- (21) International Application Number:  
PCT/EP2006/061064
- (22) International Filing Date: 27 March 2006 (27.03.2006)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
05006707.3 29 March 2005 (29.03.2005) EP
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AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

**Published:**

- with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SHELF-STABLE CONDENSED MILK WITH REDUCED SUGAR CONTENT

(57) Abstract: This invention relates to a reduced-calorie sweetened condensed milk containing polyols and/or polydextrose and having a shelf life stability equal to standard sweetened condensed milk. The invention also relates to a method for manufacturing such a product .



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**Shelf-stable condensed milk with reduced sugar content**

This invention relates to a reduced-calorie sweetened condensed milk having a shelf life stability equal to standard sweetened condensed milk. The invention also relates to a method  
5 for manufacturing such a product.

**Background of the invention**

Sweetened condensed milk is basically concentrated milk to which sugar has been added. In its  
10 manufacturing, heat treated milk along with sugar is taken to the evaporator, where it gets concentrated. The product is then cooled and seeding lactose is added such that lactose forms very small crystals in the supersaturated solution.

The standard product has long been used in the bakery and confectionery trades, and it  
15 normally contains 8% fat, 45 % sugar, 20% SNF and 27% moisture. The high amount of sugar is aimed to give a solution having an osmotic pressure sufficiently high enough to prevent the growth of microorganisms which would cause product spoilage, i.e. approximately 61.0 to 64.0 % sugar solids in the water phase.

20 In view of providing healthier products and improving the image of condensed milks for weight-conscious people, it would be of interest to have a sweetened condensed milk with reduced-sugar content. However, this would inevitably lead to an impaired shelf-life stability and texture. It is thus an object of the present invention to provide such a product, with maintained shelf-life stability and texture as in standard sweetened condensed milks and a  
25 method for manufacturing it.

**Summary of the invention**

It has been surprisingly found that a calorie-reduction of at least 25% compared to standard  
30 SCM, may be obtained with a controlled water activity, enabling a shelf-life stability of at least 12 months, by using polyols or polydextrose as part of the sweetener.

Accordingly, it is a first object of the present invention to provide a shelf stable calorie-reduced sweetened condensed milk composition containing polyols and/or polydextrose as part of the sweetener.

5

In a preferred process according to the invention, a milk base is prepared by mixing skimmed milk, sugar and polyol or polydextrose as part of the sweetener; heating the mixture for 1 to 1200 s at a temperature of about 80 to 150°C; evaporating, cooling, crystalising and filing the product in hygienic conditions.

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The sweetened condensed milk of the present invention may have a reduced calorie-content of about 25% whilst maintaining a shelf-life stability of at least 12 months. It has also a smooth texture and all the beneficial effects of reduced-calorie product on health.

## 15 Detailed description of the invention

The sweetened condensed milk generally has a water content of 15 to 30% by weight, preferably 25 to 28%. The fat content of the sweetened condensed milk is generally 0 to 20% fat by weight, preferably 5 to 10%. The sweetened condensed milk preferably has a water  
20 activity (defined as the ratio of the water vapour pressure over a food to that over pure water) of lower than 0.86, most preferably between 0.80 and 0.85. The standard filling technique valid for condensed milk can be used.

In the shelf stable calorie-reduced sweetened condensed milk according to the present  
25 invention, polyols and/or polydextrose are used to replace part of the sugar and still maintaining the required water activity. In a preferred embodiment, the amount of sugar may be from 0 to about 45% by weight.

In one embodiment, the sugar is replaced in totality by polyols or polydextrose.

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The polyols according to the present invention may be any suitable polyol including for example sorbitol, maltitol, glycerin, mannitol, polyglycitol, xylitol, lactitol monohydrate,

anhydrous isomalt, erythritol or their derivatives, or mixtures thereof. The polydextrose according to the present invention is preferably used for the preparation of colored products because it showed significant browning reaction in SCM after a short time storage. For uncolored and white SCMs, polyols are then preferably used as well as for the manufacture of

5 sugar-free sweetened condensed milks.

Polyols or polydextrose are present in the final product, in an amount depending on the required final calorie-reduction and water activity (see Table 1). In fact, polyols and polydextrose amount depends on their relative sweetness vs. sucrose, their respective

10 molecular weight and respective calorie content. Based on the Table bellow, the skilled person is able to determine the preferable amounts of polyols or polydextrose, depending on the targeted calorie reduction.

| product              | % relative sweetness<br>vs. sucrose | molecular<br>weight | calorie content (Kcal/g) |     |
|----------------------|-------------------------------------|---------------------|--------------------------|-----|
|                      |                                     |                     | USA                      | EU  |
| sorbitol             | 60                                  | 182                 | 2.6                      | 2.4 |
| mannitol             | 50                                  | 182                 | 1.6                      | 2.4 |
| polyglycitol powders | <30                                 | 170,000-<br>360,000 | 3                        | N/A |
| maltitol             | 90                                  | 344                 | 2.1                      | 2.4 |
| xylitol              | 100                                 | 152.17              | 2.4                      | 2.4 |
| lactitol monohydrate | 30-40                               | 362.33              | 2                        | 2.4 |
| anhydrous isomalt    | 40                                  | 344.32              | 2                        | 2.4 |
| erythritol           | 60-70                               | 122                 | 0.2                      | N/A |
| glycerin             | 55-75                               | 99                  | 4.3                      | 4.3 |
| polydextrose         | 0                                   | <22,000             | 1                        | 1   |
| sucrose              | 100                                 | 342                 | 4                        | 4   |
| fructose             | 117                                 | 180                 | 4                        | 4   |
| maltose              | 30                                  | 342                 | 4                        | 4   |

Table 1: Polyols comparison chart

Apart from the sweetener, the SCM may contain fat. Fat may be present in a reduced amount but the SCM according to the present invention may be fat-free. The SCM may also comprise solids non-fat e.g milk proteins, milk sugar and minerals; and moisture. These ingredients may be in amount as in standard condensed milk. Other optional ingredients such as flavours such  
5 as fruit flavours, chocolate, vanilla or omelette, colorants, minerals, vitamins, probiotics may be added to the SCM.

In order to put the process of the present invention into practice, a standardized milk base is prepared, that is to say the respective quantities by weight of fats and non-fat solids are  
10 adjusted to desired values by adding to the milk base, according to need, for example skimmed milk, cream or anhydrous milk fats. Preferably, a mixture of pasteurized skimmed milk and pasteurized cream or anhydrous milk fats is standardized to have a desired fat content.

The heat treatment may take place by direct or indirect heating in any normal apparatus  
15 enabling the liquid to be kept at 80-150°C, for about 1 to 1200 s. After the heat treatment, the liquid is concentrated by evaporation with expansion in a single effect or preferably a multiple effect evaporator, to a dry matter content of preferably 65 to 75%. The dry matter content will also depend on the desired  $a_w$  and the nature of the polyol, in particular its molecular weight (see Table 1).

20

The concentrate is then preferably cooled to a temperature of <25°C. If flavourings are used, any flavouring concentrate may for example be used on a lipidic, aqueous, alcoholic, or liqueur type support or a mixture of these diluents. Various type of flavourings may be added such as chocolate, cocoa, coffee, banana, strawberry, cherry, orange, cinnamon, vanilla, chestnut,  
25 almond, baileys cream or whisky cream, for example. The quantity of flavourings used may represent according to its nature, preferably 0.05 to 5% by weight of the dry matter of the final product. According to a variant of the flavouring addition, applicable to heat sensitive flavours, for example those diluted with alcohol, this is carried out in an hygienic manner in the sweetened milk base.

30

The concentrate is then further crystallized as conventional by addition of seeding lactose. then filled into a container, and the container is closed and sealed. The container can for example

be a small pot, a can or a plastic cup, for example. The filling process is preferably a clean filling operation in an environment with clean filtered air, as used for filling SCM. Preferably, all the operations following evaporation are carried out in an hygienic maner.

- 5 The calorie-reduced SCM prepared by such a process has a shelf life of at least 12 months. It may be used as is, or in confectionery or cooking applications such as puddim, as toppings, creamer or sweetener.

### Examples

10

The following examples illustrate the invention. In these, percentages and parts are by weight, unless indicated to the contrary.

#### Example 1 : Preparation of a reduced calorie SCM

15

120g of sugar, 900 g of skimmed milk and 96 g of maltitol are mixed so as to obtain a milk base, which is heated at 95°C for 300 seconds and was then concentrated by evaporation to 69% dry matter. The concentrate was then cooled to a temperature around 20/ 30°C. It is crystalized by addition of 0.01 to 0.2 g of seeding lactose and then packaged in small pots in  
20 hygienic conditions.

The product as a calorie reduction of about 25% compared to standard SCM.

#### Example 2 : Calorie reduction in comparison with existing SCM

- 25 Four reduced calorie SCM are prepared as in example 1, having the composition as presented in Table 2.

| in % by weight | standard | SMC1 | SMC2 | SMC3 | SMC4 |
|----------------|----------|------|------|------|------|
| Sugar          | 45       | 30   | 27   | 30   | 27.2 |
| Skim milk SNF  | 20       | 25.5 | 25.5 | 20.5 | 25.5 |
| Polydextrose   |          | 5    | 0    | 0    | 0    |
| Sorbitol       |          | 9    | 16   | 0    | 12.8 |

|                     |           |             |             |             |             |
|---------------------|-----------|-------------|-------------|-------------|-------------|
| Maltitol            |           | 0           | 0           | 18          | 3.2         |
| Milk fat            | 8         | 0           | 0           | 0           | 0           |
| <b>Total solids</b> | <b>73</b> | <b>69.5</b> | <b>68.5</b> | <b>69.5</b> | <b>68.7</b> |
| Kcal /100g          | 328.4     | 242.7       | 243.9       | 244.7       | 244.11      |

table 2.

The four prepared compositions were compared to the standard SCM formula of table 2. The results are presented in Table 3 bellow.

|                       | Standard<br>SCM | SMC1          | SMC2          | SMC3          | SMC4          |
|-----------------------|-----------------|---------------|---------------|---------------|---------------|
| Kcal /100g            | <b>328.4</b>    | 242.7         | 243.9         | 244.7         | 244.11        |
| Reduction to standard | <b>0</b>        | <b>26.1 %</b> | <b>25.7 %</b> | <b>25.5 %</b> | <b>25.7 %</b> |

5 Table 3.

**Claims**

1. A shelf stable calorie-reduced condensed milk product containing polyols and/or polydextrose as part of the sweetener to replace sugar.

5

2. A product according to claim 1, in which the polyol is sorbitol, maltitol, glycerin, mannitol, polyglycitol, xylitol, lactitol monohydrate, anhydrous isomalt, erythritol or their derivatives, or mixtures thereof.

10

3. A product according to claim 1 or 2, in which the sugar is in an amount of 0 to 45% by weight.

4. A product according to one of claims 1 to 3, in which the fat is comprised between 0 and 20% by weight.

15

5. A product according to one of claims 1 to 4, having a reduced calorie content of about 25% compared to standard sweetened condensed milk.

6. A product according to one of claims 1 to 5, having a water activity value lower than 0.86.

20

7. A process for the manufacture of a calorie reduced condensed milk characterized in that a milk base is prepared by mixing skimmed milk, sugar and polyol or polydextrose as part of the sweetener; heating the mixture for 1 to 1200 seconds at a temperature of about 80 to 150°C; evaporating, cooling, crystalising and filing the product in hygienic conditions.

25

8. A method of providing a healthier product based on sweetened condensed milk comprising providing to the consumer a calorie-reduced condensed milk according to one of claims 1 to 6.

30

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2006/061064

A. CLASSIFICATION OF SUBJECT MATTER  
INV. A23C9/00 A23C1/12

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)  
A23C

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 practical, search terms used)

EPO-Internal, PAJ, WPI Data, FSTA, BIOSIS, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

30 May 2006

Date of mailing of the international search report

09/06/2006

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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2006/061064

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Information on patent family members

International application No

PCT/EP2006/061064

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