Title: MIXTURES OF FATTY ACID GLYCERIDES FROM C_1 TO C_22 TO IMPROVE ZOOTECNICAL PERFORMANCES AND/OR THE HEALTH OF THE INTESTINE OF ANIMALS

Abstract: The present invention relates to the production and/or use of mixtures of monoglycerides, diglycerides and triglycerides of fatty acids from C_1 to C_22 to administer to livestock and pets, in order to improve performances and the health of the intestine. The glycerides are produced by the reaction of glycerol with mixtures of fatty acids from C_1 to C_22 or by the reaction of glycerol with mixtures of fatty acids from C_3 to C_22 and/or vegetable oils and/or animals fats. In one embodiment, a minimum of 5% and a maximum of 100% of butyric acid is provided.
“MIXTURES OF FATTY ACID GLYCERIDES FROM C₁ TO C₂₂ TO IMPROVE ZOOTECNICAL PERFORMANCES AND/OR THE HEALTH OF THE INTESTINE OF ANIMALS”

DESCRIPTION

The present invention relates to the production and/or use of mixtures of monoglycerides, diglycerides and triglycerides of fatty acids from C₁ to C₂₂ to administer to livestock and pets, in order to improve performances and the health of the intestine.

In particular, the invention relates to the production and/or use of mixtures of monoglycerides, diglycerides and triglycerides of fatty acids from C₁ to C₁₂, charged with improving the health of the intestinal tract of animals, and of mixtures of monoglycerides, diglycerides and triglycerides of fatty acids from C₁ to C₂₂, charged with controlling the quantity and quality of depot fat, satisfying specific nutritional requirements of the various animal species in various ages and improving the health of the intestine.

These glycerides are produced by the reaction of glycerol with fatty acids from C₁ to C₂₂ previously mixed together, or by the reaction of glycerol with mixtures of fatty acids from C₁ to C₂₂ and/or with vegetable oils and/or with animal fats.

Other characteristics of the invention are defined in the claims following the present description.

The present invention contributes towards solving two important problems in livestock feeding, namely:

- health of the intestinal tract,
- control of the quantity and quality of depot fats.

This is obtained through the production and/or use, in animal feeding, of:

- mixtures of monoglycerides, diglycerides and triglycerides of short and medium chain fatty acids from C₁ to C₁₂ to improve the health of the intestinal tract;
- mixtures of monoglycerides, diglycerides and triglycerides of fatty acids from C₁ to C₂₂ to control the quantity and quality of depot fats and improve the health of the intestinal tract.
With regard to the health of the intestinal tract, recent directives on the subject of food safety provide for a gradual but unequivocal withdrawal of the use of antibiotics, and therefore the development of new products capable of combating pathogenic agents with "natural" mechanisms has become urgent and a priority.

It is useful to specify that for some time now it has been known that butyric acid (C₄:0) is efficacious as nutrient of the intestinal mucosa, as stimulator of intestinal trophism in terms of renewal of basal cells and increase in the density and length of villi, as antibacterial/bacteriostatic agent against pathogenic microorganisms, including clostridium acetobutyllicum, Escherichia coli, streptococcus cremoris, salmonella sp, brachyspira hydysenteriae etc., and as modulator of the intestinal flora as it promotes the development of "useful" microorganisms such as lactobacilli.

In nature, butyric acid is found in the milk of cows, sows and other species. Moreover, butyric acid is commonly produced in the intestine subsequent to digestive-metabolic degradation of fibers and carbohydrates.

The beneficial effects of butyric acid (from its bacteriostatic effect to its ameliorative effect on zootechnical yield as stimulator of the growth of intestinal villi) are widely documented in the scientific literature with reference to various livestock species (poultry, pigs, rabbits, ruminants) and the zootechnical industry has for some time been involved in implementing methods that allow sources of butyric acid to be added to the diets of animals at costs that permit their use at efficacious doses in rearing of livestock.

In practice, there are in fact numerous limits to the use of products based on butyric acid. One of these is represented by the extremely unpleasant and persistent odor which also remains in some products in which it is contained (i.e. in the salts of butyric acid such as calcium or sodium butyrate).

Another limitation is represented by the high costs of products which although containing butyric acid are odorless, but generally also very expensive, such as microencapsulated products.
The unpleasant and persistent odor of butyric acid are caused by the extremely high volatility of this fatty acid. In the new glycerides forming the object of the present invention the volatility of the butyric acid is drastically limited by increasing the molecular weight due to combination of said butyric acid with glycerol. The new glycerides containing butyric acid have a slight odor, not unpleasant and not persistent. Moreover, the production process employed to produce the new glycerides does not require forms of encapsulation and does not require aromatization, thereby making it possible to obtain a final product at limited costs.

With regard to elimination of the odor of butyric acid and limiting production costs, the glycerides to which the present invention refer solve the problem completely.

With regard to bacteriostatic efficacy, the glycerides, to which the present invention refers, represent an interesting solution to another problem which arises when the butyric acid requires to be carried, in its undissociated form, to intestinal tracts where it is required to perform its bacteriostatic function and stimulate the trophism of basal cells.

With the new glycerides the butyric acid it is, in fact, administered in the form of glyceride, or as fatty acid bound to glyceride.

The glycerol-organic acid bond is not influenced by the pH of the stomach (gastric by-pass) and the glycerides reach the intestine integral, where the gradual process to release the fatty acids through the action of lipases takes place. The fatty acids, in this case butyric acid, is released by enzymatic attack, in its undissociated form, as the glyceride advances in the intestine, exerting its efficacy through time and in the various intestinal tracts (slow release effect). The decomposition process of the glycerides can in this case be compared to the process to which the glycerides forming the lipid fraction of the milk of cows, sows and other species are subjected.

Other volatile fatty acids from C₁ to C₁₂ and contained, in nature, in foods (such as grapes, honey, wine, milk, butter, cheese, etc) also perform useful and selective antibacterial/bacteriostatic actions against strains of intestinal pathogens (such as E.coli, Oocysts, Clostridium
perfrigens, Salmonella enteritidis etc.), and can therefore contribute
towards the health of the intestinal tract. Nonetheless, due to their volatile
nature, these organic acids have problems of handling and administration
common to those of butyric acid: they release strong and unpleasant
odors, tend to evaporate if added as is (loose) to the feed, require carrier
forms that guarantee their integrity during passage through the stomach
(gastric by-pass), and release, in undissociated form, in the various tracts
of the intestine. As in the case of butyric acid, by increasing the molecular
weight, bonding with glycerol eliminates the problems of odor and
volatility, and moreover, as it is not influenced by the pH of the stomach,
it guarantees gastric by-pass and allows slow release of the
undissociated fatty acid in the various intestinal tracts.

The mixtures of glycerides forming the subject of the present
invention offer important advantages not only for their efficacy in carrying,
in the various intestinal tracts, specific fatty acids important for
antibacterial action, health and trophism of the intestine, but also for their
specifically nutritional value. In particular, the mixtures of fatty acid
glycerides from C₁ to C₂₂ forming the object of the present invention have
three aspects worthy of notice:

A) the glycerides in question are composed of monoglycerides,
diglycerides and triglycerides in proportions which exert an
emulsifying action suitable to promote absorption of the fatty acids
contained in glycerides and also of those other fatty acids contained
in the lipid fraction of the diet;

B) as the fatty acids in the monoglycerides and in the diglycerides in
question are prevalently (over 80%) in position 1 and 3 in the
molecule, this peculiarity means that these monoglycerides and
diglycerides (once absorbed) have difficulty in being reesterified into
triglycerides and are therefore used by the animal prevalently for
energy purposes; consequently, it is possible to program the new
glycerides as a function of the greater or lesser quantity of depot
fats required, predetermining the percentage of monoglycerides and
diglycerides of the mixtures by dosing the glycerol in the production
process;
C) in the glycerides containing butyric acid noteworthy synergy is always obtained between bacteriostatic efficacy and nutritional efficacy.

According to the invention, the percentages of monoglycerides, diglycerides and triglycerides of the fatty acids can vary in the following proportions:

- in mixtures with fatty acids from C_{1} to C_{12}
  - monoglycerides 0% - 86%
  - diglycerides 0% - 86%
  - triglycerides 0% - 100%

- in mixtures with fatty acids from C_{4} to C_{22}
  - monoglycerides 7% - 86%
  - diglycerides 7% - 86%
  - triglycerides 7% - 86%

By way of example, a mixture of glycerides of butyric acid can be composed of:

- monoglycerides of butyric acid = 20% - 25%
- diglycerides of butyric acid = 47% - 53%
- triglycerides of butyric acid = 25% - 30%

A mixture of this type has proved particularly efficacious in poultry in stimulating the growth of intestinal villi (with consequent improvement in the absorption of nutrients and in obtaining a high antibacterial/bacteriostatic effect).

See Reports:

- Short Title: BUTYRIC ACID ON PERFORMANCE AND CARCASS YIELD Scientific Section: METABOLISM AND NUTRITION - Effect of Butyric Acid on the Performance and Carcass Yield of Broiler Chickens - S. Leeson Department of Animal & Poultry Science, University of Guelph, ON, Canada N1G 2W1; H. Namkung, M. Antongiovanni Department of Animal Science University of Florence (Italy), and F.H. Lee, Vetech Laboratories Inc. 131 Malcolm Road, Guelph, ON, Canada N1K 1AB.
- Response of Broiler Chickens to Glycerides of Butyric Acid (GBA) Department of Animal Science University of Florence (Italy) Mauro

It has been ascertained that use of butyric acid in feed for poultry administered to the animals in the aforesaid chemical forms boosts the efficacy of vaccination against coccidiosis.

In particular, in animals subjected to experimental infection with Oocysts and Clostridium Perfringes it has been shown that the growth of animals, to which butyric acid was administered in association with the vaccine against coccidiosis, was superior to those vaccinated (and infected) without the addition of butyric acid.

See reports:
- "Effect of butyric acid on the performance and carcass quality of broiler chickens" experiment 2 - Prof. Leeson of the University of Guelph - Canada - 2004.

The use in animal feed of glycerides as above containing from a minimum of 5% to a maximum of 100% of butyric acid, makes it possible to modulate the final quantity of butyric acid in the diet as a function of the total percentage of lipids added and of the specific nutritional requirements, or to boost the immune response against intestinal pathogenic agents (salmonella, E.coli, etc.) of the various species of farm animals.

The glycerides in question – in particular from C₁ to C₁₂ – can also be utilized carried in the drinking water destined for the animals.

This makes it possible to obtain variation of the daily doses to be administered as a function of the specific and contingent requirements and also facilitates direct use by farm workers. Administration of the glycerides in question in the drinking water is made possible by the high monoglyceride and diglyceride content; in fact, monoglycerides and diglycerides are highly "polar" compounds able to make the glycerides in which they are contained easily water-dispersible.

Some examples of the use of products based on fatty acid glycerides are given hereunder.
The use of glycerides containing both butyric acid and short and medium chain fatty acids from C$_1$ to C$_{12}$ in animal feed makes it possible to obtain, in addition to the antibacterial/bacteriostatic effect, an important nutritional value especially for young animals: in fact, fatty acids from C$_1$ to C$_{12}$ represent a source of energy which can be assimilated even if there is a scarcity of biliary salts (typical in young animals). The percentage of butyric acid in these mixtures of glycerides can vary from 5% to 100%.

The use of mixtures of butyric acid and C$_{18}$ unsaturated fatty acids in the form of glycerides in animal feed has shown to have high digestibility, a high energy value and numerous and different actions. This can be found particularly in the case of butyric acid and oleic acid (C$_{18}:1$) and/or linoleic acid (C$_{18}:2$).

In fact, the glycerides structured as indicated above allow butyric acid (which performs antibacterial/bacteriostatic functions, functions of modulation of the intestinal flora and stimulation of the growth of intestinal villi) to be administered simultaneously to oleic acid (important for its high digestibility and beneficial effects on the metabolism of lipids) and/or to linoleic acid, an essential fatty acid not synthesized by the organism but indispensable for its functions, in particular in young animals.

The percentage of butyric acid in these mixtures normally varies from 2% to 15%, the percentage of oleic acid from 40% to 70% and the percentage of linoleic acid from 10% to 60%.

The use in animal feed of mixtures of butyric acid and saturated fatty acids C$_{15}$-C$_{18}$ in the form of glycerides offers numerous advantages: the glycerides thus structured allow butyric acid (which performs antibacterial/bacteriostatic functions, functions of modulation of the intestinal flora and stimulation of the growth of intestinal villi) to be administered simultaneously to palmitic acid and to stearic acid. In this way, in finishing, in addition to covering specific physiological requirements, the subcutaneous fat of the animal destined for slaughter is given consistency and oxidation stability.

The percentage of butyric acid in these mixtures normally varies from 2% to 20%, the percentage of palmitic acid from 10% to 50% and
the percentage of stearic acid from 2% to 70%.

The above description can vary within the scope of the claims hereunder.
CLAIMS

1. Production and/or use, in animal feed, of mixtures of monoglycerides, diglycerides and triglycerides of fatty acids from C₁ to C₂₂ to improve the health of the intestinal tract and to control the quantity and quality of depot fats.

2. Production and/or use as claimed in claim 1, in animal feed, of mixtures of monoglycerides, diglycerides and triglycerides of fatty acids from C₁ to C₁₂, aimed at improving the health of the intestinal tract of animals.

3. Production and/or use as claimed in claim 1, in animal feed, of mixtures of monoglycerides, diglycerides and triglycerides of fatty acids from C₁ to C₂₂, aimed at controlling the quantity and quality of depot fat, satisfying specific nutritional requirements of the various animal species in various ages and improving the health of the intestine.

4. Production and/or use of glycerides as claimed in claim 3, to improve the health of the intestinal tract, characterized in that the fatty acids are included in the range C₁-C₂-C₃-C₄-C₅-C₆-C₇-C₈-C₉-C₁₀-C₁₁-C₁₂ with percentages of monoglycerides, diglycerides and triglycerides in the mixtures included in the following proportions:

monoglycerides 0% - 86%
diglycerides 0% - 86%
triglycerides 0% - 100%

5. Production and/or use of glycerides as claimed in at least claim 1, characterized by the reaction of glycerol with fatty acids from C₁ to C₂₂ previously mixed together, or with mixtures of fatty acids from C₁ to C₂₂ and/or vegetable oils and/or animal fats.

6. Production and/or use of glycerides as claimed in at least claim 1, to control the quantity and quality of depot fat, characterized in that the fatty acids are included in the range from C₁ to C₂₂, with percentages of monoglycerides, diglycerides and triglycerides included in the following proportions:

monoglycerides 7% - 86%
diglycerides 7% - 86%
triglycerides 7% - 86%
and the fatty acids in the monoglycerides and diglycerides are prevalently (approximately over 80%) in position 1 and 3 in the molecule, so that said monoglycerides and diglycerides tend to be used by the animal for energy purposes, as they have difficulty, once absorbed, in being reesterified into triglycerides.

7. Use of glycerides in poultry feed, as claimed in at least one of the previous claims, characterized in that the fatty acid present is only butyric acid.

8. Use of glycerides as claimed in at least claim 3, characterized in that the percentages of monoglycerides, diglycerides and triglycerides are included in the following ranges:
   - Monoglycerides of butyric acid: 20% - 25%
   - Diglycerides of butyric acid: 47% - 53%
   - Triglycerides of butyric acid: 25% - 30%.

9. Use of glycerides as claimed in one or more of the previous claims, wherein a minimum of 5% and a maximum of 100% of butyric acid is provided.

10. Use of glycerides as claimed in one or more of the previous claims, wherein said glycerides are administered in the drinking water destined for animals, due to the high content of monoglycerides and diglycerides which are highly "polar" compounds and are therefore able to make the glycerides in which they are contained easily water-dispersible.

11. Use of glycerides as claimed in at least one of the previous claims, wherein – to obtain a synergic antibacterial/bacteriostatic, nutritional effect – both butyric acid and medium chain fatty acids from C₆ to C₁₂ are contained, the percentage of butyric acid in these mixtures of glycerides normally varying from 5% to 65%.

12. Use of mixtures of monoglycerides, diglycerides and triglycerides for animal feed, composed both of butyric acid and of C₁₈ unsaturated fatty acids.

13. Use of mixtures of monoglycerides, diglycerides and triglycerides as claimed in at least claims 9 and/or 12, characterized in that the unsaturated fatty acids are composed mainly of oleic acid (C₁₈:1)
and/or linoleic acid (C₁₈:2)

14. Use of mixtures of monoglycerides, diglycerides and triglycerides as claimed in claim 13, characterized in that the percentage of butyric acid contained therein varies from 2% to 15%, the percentage of oleic acid from 40% to 70% and the percentage of linoleic acid from 10% to 60%.

15. Use of mixtures of monoglycerides, diglycerides and triglycerides for animal feed, composed both of butyric acid and of C₁₆-C₁₈ saturated fatty acids.

16. Use of mixtures of monoglycerides, diglycerides and triglycerides as claimed in claim 15, characterized in that the percentage of butyric acid contained therein varies from 2% to 20%, the percentage of palmitic acid from 10% to 50% and the percentage of stearic acid from 2% to 70%.

17. Use of mixtures of monoglycerides, diglycerides and triglycerides as claimed in at least one of the previous claims, characterized in that they act in synergy with vaccines, in particular with vaccines against coccidiosis, with consequent synergic effect.

18. Use of mixtures of mono-di-triglycerides of fatty acids from C₁ to C₂₂ as ameliorators of zootechnical performances, inhibitors of pathogenic agents and to eliminate the odor of butyric acid, as described.

19. Method for producing glycerides, for the purposes indicated, characterized in that it includes the reaction of glycerol with mixtures of fatty acids from C₁ to C₂₂.

20. Method for producing glycerides, for the purposes indicated, characterized in that it includes the reaction of glycerol with mixtures of fatty acids from C₁ to C₂₂ and with vegetable oils.

21. Method for producing glycerides, for the purposes indicated, characterized in that it includes the reaction of glycerol with mixtures of fatty acids from C₁ to C₂₂ and with animal fats.

22. Method for producing glycerides, for the purposes indicated, characterized in that it includes the reaction of glycerol with vegetable oils.

23. Method for producing glycerides, for the purposes indicated,
characterized in that it includes the reaction of glycerol with animal fats.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. A23K1/16       A61K31/215       C11C3/02

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)
A23K A61K C11C

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

Electronic database consulted during the international search (name of database and, where practical, search terms used)
EPO-Internal, WPI Data, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>EP 0 519 458 A (KAO CORPORATION) 23 December 1992 (1992-12-23) page 2, line 9 - page 3, line 34; claims; examples</td>
<td>1-18</td>
</tr>
<tr>
<td>X</td>
<td>US 5 565 232 A (WHEELER ET AL) 15 October 1996 (1996-10-15) column 11, line 57 - column 12, line 3; example 26</td>
<td>1-5,8,9, 11,15-19</td>
</tr>
<tr>
<td>X</td>
<td>EP 1 342 419 A (CANTINI, FERNANDO) 10 September 2003 (2003-09-10) paragraphs [0007], [0008], [0013], [0017]; claims 3-9</td>
<td>1-18</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:
  *A* document defining the general state of the art which is not considered to be of particular relevance
  *E* earlier document but published on or after the international filing date
  *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  *DF* document referring to an oral disclosure, use, exhibition or other means
  *P* document published prior to the international filing date but later than the priority date claimed

"F" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"A" document member of the same patent family

Date of the actual completion of the international search
8 June 2006

Date of mailing of the international search report
05/07/2006

Name and mailing address of the ISA/
European Patent Office, P.B. 5918 Patentlaan 2 NL-2280 H Wassenaar
Tel: (+31-70) 940-2040, Tx: 31 951 epo nl, Fax: (+31-70) 940-3016

Authorized officer
Rinaldi, F
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 2004/062847 A1 (KOIKE SHIN ET AL) 1 April 2004 (2004-04-01) paragraphs [0011] - [0019], [0035], [0045]; claims 3-9, 14; examples 1, 2</td>
<td>1-19</td>
</tr>
<tr>
<td>A</td>
<td>EP 1 224 870 A (XERIS) 24 July 2002 (2002-07-24) paragraphs [0001] - [0008], [0019] - [0028], [0042], [0043], [0051] - [0053]</td>
<td>7-9, 12, 14-16, 18</td>
</tr>
<tr>
<td>A</td>
<td>WO 95/13062 A (SLOAN-KETTERING INSTITUTE FOR CANCER RESEARCH) 18 May 1995 (1995-05-18) claims 1-4; example 1</td>
<td>7-9, 12, 14-16, 18</td>
</tr>
<tr>
<td>X</td>
<td>DE 197 18 245 C1 (HENKEL KGAA, 40589 DUESSELDORF, DE; COGNIS DEUTSCHLAND GMBH &amp; CO. KG) 30 July 1998 (1998-07-30) column 1, line 55 - column 2, line 26 column 4, line 52 - line 65; claims 7, 8; example 3 column 1, line 26 - line 33</td>
<td>1-6, 19</td>
</tr>
<tr>
<td>X</td>
<td>US 3 952 107 A (SHIBATA ET AL) 20 April 1976 (1976-04-20) column 1, line 7 - column 2, line 41; claims 1-4; examples 1, 2</td>
<td>1-19</td>
</tr>
<tr>
<td>X</td>
<td>EP 0 445 692 A (EUROPEAN ECONOMIC COMMUNITY E.E.C) 11 September 1991 (1991-09-11) examples 1, 4; table 3</td>
<td>20, 21</td>
</tr>
<tr>
<td>X</td>
<td>WO 01/77271 A (CONLINCO, INC; SAIRO, ASGEIR; SKARIE, CARL) 18 October 2001 (2001-10-18) example 6</td>
<td>20, 21</td>
</tr>
</tbody>
</table>
International Search Report

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [x] Claims Nos.: 1-18
Because they relate to subject matter not required to be searched by this Authority, namely:

Although claims 1-18 are directed to a method of treatment of the animal body, the search has been carried out and based on the alleged effects of the composition.

2. [ ] Claims Nos.:
Because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. [ ] Claims Nos.:
Because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. [ ] As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. [x] As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

   1-21

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

[ ] The additional search fees were accompanied by the applicant’s protest.

[ x] No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-18
   use of monoglycerides, diglycerides and triglycerides in animal feed

2. claim: 19
   Reaction of glycerols with fatty acids C1-C22.

3. claim: 20
   Reaction of glycerols with fatty acids C1-C22 and vegetable oils

4. claim: 21
   Reaction of glycerols with fatty acids C1-C22 and animal fats

5. claim: 22
   Reaction of glycerols with vegetable oils

6. claim: 23
   Reaction of glycerols with animal fats
<table>
<thead>
<tr>
<th>Patent document</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CA 2071349 A1</td>
<td>18-12-1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DE 69216159 D1</td>
<td>06-02-1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DE 69216155 T2</td>
<td>07-05-1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ES 2098393 T3</td>
<td>01-05-1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5462967 A</td>
<td>31-10-1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CA 2418348 A1</td>
<td>14-02-2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN 1468960 A</td>
<td>14-01-2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 1307108 A2</td>
<td>07-05-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WO 0211551 A2</td>
<td>14-02-2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 2002053892 A</td>
<td>19-02-2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AU 1177595 A</td>
<td>29-05-1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CA 2175249 A1</td>
<td>18-05-1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 0727989 A1</td>
<td>28-08-1996</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 9509139 T</td>
<td>16-09-1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5645852 A</td>
<td>08-07-1997</td>
</tr>
<tr>
<td>DE 19718245 C1</td>
<td>30-07-1998</td>
<td>AT 246881 T</td>
<td>15-08-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AT 246879 T</td>
<td>15-08-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AT 243032 T</td>
<td>15-07-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AT 243033 T</td>
<td>15-07-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AT 211126 T</td>
<td>15-01-2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AU 735493 B2</td>
<td>12-07-2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AU 7431398 A</td>
<td>24-11-1998</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BR 9809421 A</td>
<td>13-06-2000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CA 2287476 A1</td>
<td>05-11-1998</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DK 1135998 T3</td>
<td>08-12-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DK 1135996 T3</td>
<td>08-12-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DK 1138325 T3</td>
<td>13-10-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DK 1138326 T3</td>
<td>13-10-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DK 980349 T3</td>
<td>15-04-2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WO 9849129 A1</td>
<td>05-11-1998</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ES 2204784 T3</td>
<td>01-05-2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ES 2201004 T3</td>
<td>16-03-2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ES 2201005 T3</td>
<td>16-03-2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ES 2201006 T3</td>
<td>16-03-2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 2002510288 T</td>
<td>02-04-2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NZ 500698 A</td>
<td>29-06-2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PT 980349 T</td>
<td>28-06-2002</td>
</tr>
<tr>
<td>US 3952107 A</td>
<td>20-04-1976</td>
<td>AU 6749774 A</td>
<td>09-10-1975</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 862094 C</td>
<td>30-05-1977</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 49123863 A</td>
<td>27-11-1974</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 51035620 B</td>
<td>04-10-1976</td>
</tr>
<tr>
<td>Patent document cited in search report</td>
<td>Publication date</td>
<td>Patent family member(s)</td>
<td>Publication date</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------</td>
<td>-------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PT 96944 A</td>
<td>31-10-1991</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CA 2404799 A1</td>
<td>18-10-2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 1268722 A2</td>
<td>02-01-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 2004506746 T</td>
<td>04-03-2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO 20024799 A</td>
<td>29-11-2002</td>
</tr>
</tbody>
</table>