(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 September 2015 (11.09.2015)

WIPO | PCT

(10) International Publication Number
WO 2015/131995 A1

(51) International Patent Classification:
A23L 1/30 (2006.01) *A61P 3/06* (2006.01)
A61K 31/575 (2006.01)

(21) International Application Number:
PCT/EP2015/000476

(22) International Filing Date:
3 March 2015 (03.03.2015)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
14000748.5 3 March 2014 (03.03.2014) EP
14001830.0 26 May 2014 (26.05.2014) EP
PCT/EP2014/002551
19 September 2014 (19.09.2014) EP

(71) Applicant: **RAISIO NUTRITION LTD** [FI/FI]; Raisionkaari 55, FIN-21200 Raisio (FI).

(72) Inventors: **WESTER, Ingmar**; Raisio Nutrition Ltd, Raisionkaari 55, FIN-21200 Raisio (FI). **KUUSISTO, Päivi**; Raisio Nutrition Ltd, Raisionkaari 55, FIN-21200 Raisio (FI). **NIEMELÄ, Jouni**; Raisio Nutrition Ltd, Raisionkaari 55, FIN-21200 Raisio (FI). **FÖRBOM, Tuula**; Raisio Nutrition Ltd, Raisionkaari 55, FIN-21200 Raisio (FI). **DRAGET, Kurt, I.**; Raisio Nutrition Ltd, Raisionkaari 55, FIN-21200 Raisio (FI). **SIWEK, Andrzej**; Raisio Nutrition Ltd, Raisionkaari 55, FIN-21200 Raisio (FI). **LUNDHAUG, Kamilla**; Raisio Nutrition Ltd, Raisionkaari 55, FIN-21200 Raisio (FI). **OLSEN, Jan, Erik**; Raisio Nutrition Ltd, Raisionkaari 55, FIN-21200 Raisio (FI).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

WO 2015/131995 A1

(54) Title: SERUM CHOLESTEROL LOWERING EDIBLE PRODUCT

(57) Abstract: The present invention relates to a serum LDL cholesterol lowering edible product containing plant sterol ester and/or plant stanol ester, and especially to a dietary supplement product.

SERUM CHOLESTEROL LOWERING EDIBLE PRODUCT

FIELD OF THE INVENTION

The present invention relates to an edible product having serum LDL cholesterol lowering effect, and especially to an edible product based on plant sterol ester and/or plant stanol ester. Typically the edible product is a dietary supplement product.

BACKGROUND OF THE INVENTION

Cardiovascular disease is counted among the most common diseases in Western countries and its occurrence is further increasing. The most important individual risk factor is elevated serum LDL cholesterol level, and therefore, lowering of the blood concentrations of LDL cholesterol is the most effective single measure regarding both prevention and effective treatment of cardiovascular disease.

The most important drugs for reduction of cholesterol levels are the statins, which primarily function by inhibiting the synthesis of cholesterol in the liver. The most common side effects of the statins are gastrointestinal. Other less common side effects include headache, dizziness, rash, and sleep disturbances. In addition, statins may cause both liver damage and muscle disorders, and they have been reported to increase the risk of type II diabetes.

As an alternative to drugs, or in addition to them, also life style changes can reduce the risk of cardiovascular diseases. In particular increasing physical exercise and/or adopting a low-fat or low-cholesterol diet is beneficial. Another nutritional way to reduce the serum LDL cholesterol levels is to use cholesterol lowering ingredients in functional foods that can be consumed as part of a conventional diet. This alternative has been greatly welcomed by consumers.

Foods, such as margarine-type spreads, drinkable and spoonable yoghurts, with added plant sterols and/or plant stanols for effective serum LDL cholesterol lowering are popular in the market place, especially in the European markets. Both in USA and in the EU markets food and dietary supplement products with added plant sterols and/or plant stanols can be marketed with approved coronary heart disease risk reduction health claims due to the serum LDL cholesterol lowering effect, provided that the products fulfil set conditions for use of such health claims. The success of commercial plant sterol and/or plant stanol products is dependent on the possibility to market the products with strong health claims.

In EU the product needs to deliver 1.5-2.4 g equivalents of plant sterols and/or plant stanols in order to bear such a coronary heart disease risk reduction health claim. In USA the latest

CONFIRMATION COPY

provision of FDA states that the product needs to deliver at least 0.5 g equivalents of plant sterols and/or plant stanols per Reference Amount Customarily Consumed (RACC) for a total daily intake of 2 g plant sterols and/or plant stanols in order to bear the disease risk reduction health claim. The daily needed 2 g of plant sterols and/or plant stanols can be delivered in 1-4 servings of the food or the dietary supplement.

The current popular plant sterol ester and/or plant stanol ester based foods are products that need continuous refrigeration. However, many consumers would prefer to have their daily dose of plant sterols and/or plant stanols available in a product that can be carried along wherever they go, e.g. as a dietary supplement.

Dietary supplements based on esterified plant sterols and/or plant stanols are currently marketed mainly as so-called soft gelatin capsules. However one problem with this type of product is that the size of the soft gelatin capsule is big, causing problems with the swallowing of it. Such soft gelatin capsules typically deliver about 1 g plant sterol ester and/or plant stanol ester contained in each soft gelatin capsules. Usually the recommended amount of plant sterols and/or plant stanols is 2 g/day, which means that the daily minimum required amount of plant sterol ester and/or plant stanol ester is about 3.4 g. This means that the consumer has to swallow several big soft gelatin capsules per day to obtain the daily recommended amount of plant sterol and/or plant stanol in esterified form. Many consumers have difficulties in swallowing such big capsules. Furthermore the swallowing of such capsules involves simultaneous drinking of water or some other liquid and the capsules are therefore not so convenient to use.

Dietary supplements based on free plant sterols and/or plant stanols are usually compressed tablets. These are usually smaller than the soft gelatin capsules, but liquid is usually required in order to swallow the tablets. However, people with dysphagia may have difficulties in swallowing even smaller sized tablets.

Thus there is a need for a new type of portable plant sterol ester and/or plant stanol ester edible products, such as dietary supplement products. Such products should preferably be easy to consume and be portable with the possibility of being stored at room temperatures and still have long enough shelf life in order to be commercially viable. They should also preferably have good taste. Furthermore such a product should preferably deliver the daily minimum amount of plant sterols and/or plant stanols needed to fulfil the provisions of the cholesterol lowering health claims in various jurisdictions.

It would be advantageous to have a portable edible product, such as a dietary supplement product with a high plant sterol ester and/or plant stanol ester content that can be stored at room temperatures. Furthermore, such an edible product should be easy to consume with limited or no

problems in swallowing and it should be possible to consume it without simultaneous consumption of any liquid. Furthermore, such an edible product preferably has low energy content. Good organoleptic properties are desirable. The formulation of the product should preferably also be such that the serum LDL cholesterol lowering effect of the plant sterol and/or plant stanol is good. The current invention satisfies these needs and provides a new type of edible product (such as a dietary supplement product) containing plant sterol ester and/or plant stanol ester.

BRIEF DESCRIPTION OF THE INVENTION

The present invention is directed to a gelled emulsion comprising

- plant sterol ester and/or plant stanol ester in an amount of at least 20 % by weight,
- gelling agent in an amount of at most 15 % by weight, and
- water in an amount of 3.0-35 % by weight.

The present invention is further directed to an edible product, comprising the gelled emulsion as defined above.

The present invention is further directed to a blister comprising the gelled emulsion or the edible product.

The present invention is further directed to methods for preparing the above defined gelled emulsion and the edible product.

DETAILED DESCRIPTION OF THE INVENTION

It is thus an object of the present invention to provide a gelled emulsion which comprises plant sterol ester and/or plant stanol ester, gelling agent and water. It is also an object of the present invention to provide an edible product (such as a dietary supplement product) which comprises the gelled emulsion containing plant sterol ester and/or plant stanol ester, gelling agent and water. The gelled emulsion and the edible product are preferably aimed for lowering serum LDL cholesterol level.

It has surprisingly been found that a portable and easy to consume edible product (such as a dietary supplement product) that has good organoleptic properties and that can be stored at room temperatures and still retains its good quality and that has a high content of plant sterol ester and/or plant stanol ester can be prepared as a gelled emulsion. Preferably the product has low energy content. By using specific amounts of the plant sterol ester and/or plant stanol ester, gelling agent and water, gelled emulsions having high plant sterol ester and/or plant stanol ester content and good organoleptic properties can be obtained. By having the specific amounts of plant sterol ester and/or plant stanol ester, gelling agent and water, gelled emulsions with good texture and mouthfeel can

be prepared. The mouthfeel and the surface of the gelled emulsion are not oily. Despite the high concentration of plant sterol ester and/or plant stanol ester, the gelled emulsion retains the plant sterol ester and/or plant stanol ester in the gel matrix. This is surprising, as corresponding products could not be produced by using free plant sterols and/or plant stanols instead of plant sterol ester and/or plant stanol ester. It was also surprisingly noticed that it is preferred to have a weight ratio of plant sterol ester and/or plant stanol ester to gelling agent that is at least 6.0. Preferably the gelled emulsion is a solid gelled emulsion. It is suitably used as such (i.e. uncoated) as an edible product. Most preferably the edible product (e.g. a dietary supplement product) is (i.e. consists of) a dose unit of the gelled emulsion that has been enclosed in a package. The edible product comprising the gelled emulsion (e.g. a dietary supplement product) can preferably be packed in blisters, most preferably in an aluminium blister for excellent water retaining and barrier properties. The uncoated edible product (i.e. the gelled emulsion) is preferably packed as individual dose units in blisters. Alternatively, the gelled emulsion may be coated with a chewable coating or a coating that melts in the mouth. After coating the edible product may be packed as individual dose units or several dose units in the same package.

One advantage of the edible product, such as a dietary supplement product, of the present invention is the use of esterified plant sterols and/or plant stanols (i.e. plant sterol ester and/or plant stanol ester) in high concentrations in the edible product and that the product still has good organoleptic properties. The invention cannot be applied to the use of free plant sterols and/or plant stanol instead of the esterified plant sterols and/or plant stanols. The edible product is portable. This means it can easily be carried along. The edible product can be stored at room temperatures. This means that it still retains its good quality (i.e. organoleptic and microbiological quality) when stored for prolonged time at room temperatures. Thus, the edible product does not require refrigeration. The edible product is preferably a dietary supplement product. The edible product comprises a gelled emulsion, which is preferably solid at room temperatures, but has a soft and chewable texture with good taste. The edible product is not spreadable. The edible product is chewable. Thus the consumer does not need to swallow capsules or tablets, but can easily chew the edible product. Further, the edible product can be consumed without necessary ingesting liquid at the same time. The edible product is therefore easy to consume. The edible product preferably has a low energy content.

Plant sterol ester and/or plant stanol ester are solid, semi-solid or liquid at room temperatures and typically result in an unpleasant fatty coating of the mouth, especially of the back roof of the mouth, when ingested as such. Surprisingly the mouthfeel of the gelled emulsion according to this invention is not oily, nor fatty, and further it does not cause any unpleasant fatty coating in the back roof of the mouth upon ingestion, despite its high plant sterol ester and/or plant stanol ester content. The mouthfeel is not gummy or sticky either and the gelled emulsion does not get caught onto the teeth.

The gelled emulsion is chewable. The gelled emulsion is preferably solid at room temperatures (e.g. 22 °C), not pourable, and even when removed from its package (e.g. when packed in aluminium blisters) and stored at room temperatures the gelled emulsion still retains its physical state and form.

Despite the high content of plant sterol ester and/or plant stanol ester the preparation of the gelled emulsion does not require high concentrations of the gelling agent or gelling agent mixture. The physical properties of the emulsion, such as stability and viscosity of the emulsion at temperatures where the emulsification and the further processing take place, are such that it enables the production and packaging.

The production process of the edible product, e.g. a dietary supplement product can, but does not preferably include coating of the gelled emulsion. Preferably the production process does not include any drying step. The edible product can be stored at room temperature, especially when packed in aluminium blisters. Therefore the edible product has a long shelf life at room temperature. The shelf life is from at least 6 months up to several years.

Thus, the present invention is directed to an edible product, preferably a dietary supplement product, preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing

- plant sterol ester and/or plant stanol ester in an amount of at least 20 % by weight,
- gelling agent in an amount of at most 15 % by weight, and
- water in an amount of 3.0-35 % by weight.

The present invention is also directed to the above defined gelled emulsion.

The present invention is further directed to a blister comprising the gelled emulsion or the edible product.

The present invention is further directed to the gelled emulsion and to the edible product, preferably a dietary supplement product, for use as a medicament. By medicament is here meant a substance that is physiologically active in preventing or alleviating a disease or a risk factor of a disease. The gelled emulsion and the edible product are suitable e.g. for treating or alleviating asthma, Alzheimer's disease and/or for reducing the risk of cardiovascular disease.

The present invention is further directed to the gelled emulsion and to the edible product, preferably a dietary supplement product, for lowering serum LDL cholesterol level.

By "dietary supplement product" is in this disclosure meant edible products that are not presented or marketed as conventional food products but to supplement the diet with plant sterol ester and/or

plant stanol ester with preferably the aim of reducing serum LDL cholesterol concentrations. In this disclosure, the term "dietary supplement" also covers edible products that fulfil the aforementioned definition, but can be presented or marketed in some countries for similar purposes such as "a medical food" or "a medical device". The dietary supplement products do not substitute for meals, snacks or for a daily diet. The edible product, e.g. a dietary supplement product, of the present invention is preferably a low-energy, gelled water-in-oil emulsion that is solid at room temperatures and more preferably it is uncoated.

By "emulsion" is in this disclosure meant a mixture of an aqueous phase and a lipid phase containing plant sterol ester and/or plant stanol ester, wherein both phases are in liquid form at the temperature of the emulsifying process, and wherein one phase is evenly dispersed as small droplets throughout the other phase. The emulsion is preferably an oil-in-water (O/W) emulsion, or if desired, it can also be more than biphasic (e.g. a double emulsion). By "oil-in-water (O/W) emulsion" is meant emulsions in which lipids are present as the dispersed phase and water as the continuous phase.

By "gelled emulsion" is in this disclosure meant an emulsion which contains plant sterol ester and/or plant stanol ester and a gelled aqueous phase containing gelling agent. In the gelled aqueous phase, the gelling agent has formed a rigid three dimensional network that traps or immobilises the water within the interstices. The gelled emulsion is thus a gel. Preferably the gelled emulsion is an oil-in-water –type emulsion. The plant sterol ester and/or plant stanol ester is emulsified with the aqueous phase containing gelling agent, preferably at a temperature of at least 40 °C. Gelation of the gelling agent in the aqueous phase then stabilizes the emulsion, i.e. a "gelled emulsion" is formed. Gelation involves association of the gelling agent molecules with each other to form a three dimensional network, i.e. a gel. The process of gelling is complex and affected by the nature and concentrations of different components in the emulsion, as well as on the processing conditions. Gelation happens e.g. upon cooling or with the aid of ions, e.g. Ca ions. Preferably the gelation happens upon cooling. Gel forming capability is dependent not only on the nature of the gelling agent, but also depends on other factors such as the concentration of the gelling agent, water concentration and plant sterol ester and/or plant stanol ester concentration. The plant sterol ester and/or plant stanol ester phase is thus dispersed throughout the gel matrix, i.e. within the network of gelling agent molecules and immobilised water. The plant sterol ester and/or plant stanol ester is in liquid, semi-solid and/or solid state, preferably in semi-solid and/or solid state, in the gelled emulsion at room temperatures. The aqueous phase is in gelled form at room temperature (e.g. 22 °C). The plant sterol ester and/or plant stanol ester phase may or may not chemically interact with the gel matrix. The gelled emulsion of the present invention is chewable. The gelled emulsion is not spreadable. The gelled emulsion is not a powder. The gelled emulsion

of the present invention is preferably solid at room temperatures (e.g. 22 °C). Most preferably the gelled emulsion is a solid gelled emulsion (at 22 °C).

By "solid gelled emulsion" is in this disclosure meant a gelled emulsion of the present invention which has a solid appearance and retains its structure at room temperature (e.g. 22 °C). The solid gelled emulsion is not pourable at room temperatures. With the term solid gelled emulsion is meant that the gelled emulsion retains its form (i.e. shape, which means it retains its three-dimensional form) at room temperature. This means that when it is released from its blister or other mould the form is retained i.e. even when it is stored as such without any coating or mould the form is retained. The solid gelled emulsion therefore has a solid appearance at 20 °C, preferably at 22 °C, more preferably at 25 °C, and most preferably at 30 °C. Practically, solid gelled emulsion means that the product is solid enough for one to pick it with one's fingers from the package. When the temperature is raised above 30 °C, the solid gelled emulsion is preferably softened. More preferably the solid gelled emulsion is softened at temperatures around or higher than 35 °C. Preferably the gelling of the aqueous phase of the solid gelled emulsion is thermally reversible, i.e. the gel structure is broken when temperature is raised to or above the gel melting temperature.

The gelled emulsion and the edible product (such as a dietary supplement product) according to the current invention contains plant sterol ester and/or plant stanol ester. As used in this disclosure, the term "plant sterol ester and/or plant stanol ester" refers to plant sterols and/or plant stanols in esterified form. The term "plant sterols" means 4-desmethyl sterols and 4-monomethyl sterols and the term "plant stanols" means 4-desmethyl stanols and 4-monomethyl stanols. Typical 4-desmethyl sterols are sitosterol, campesterol, stigmasterol, brassicasterol, 22-dehydro-brassicasterol and δ5-avenasterol. Typical stanols are sitostanol, campestanol and their C24-epimers. The term "plant sterols and/or plant stanols" means all possible mixtures of named sterols and/or stanols as well as any individual sterol and/or stanol.

In this invention plant sterols and/or plant stanols are esterified with a carboxylic acid or with a blend of carboxylic acids and are called "plant sterol ester and/or plant stanol ester". Examples of suitable carboxylic acids are fatty acids, which are preferred carboxylic acids according to this invention. The fatty acids are aliphatic, have 4-24 carbon atoms, and are saturated, monounsaturated or polyunsaturated. Preferably the plant sterols and/or plant stanols are thus esterified with fatty acids (so called plant sterol fatty acid ester and/or plant stanol fatty acid ester), more preferably with vegetable oil based fatty acids. Preferred are fatty acids of liquid vegetable oils, such as rapeseed oil, soybean oil, sunflower oil and corn oil.

Most preferred are plant stanol fatty acid esters. Therefore, "the plant sterol ester and/or plant stanol ester" comprises preferably plant stanol ester in an amount of at least 10 %, more

preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight. Preferably plant sterol ester and/or plant stanol ester comprises plant sterol fatty acid esters and/or plant stanol fatty acid esters that are semi-solid or solid at room temperatures. Preferably plant sterol ester and/or plant stanol ester is in a semi-solid or solid form in the gelled emulsion, of the invention.

Plant stanol fatty acid ester and the cholesterol lowering effects thereof, as well as a suitable method for its preparation, are disclosed in e.g. US 6 174 560. Obviously also plant sterol esters can efficiently be produced by the production method disclosed in US 6 174 560. Alternatively fatty acid esters of plant sterols and/or plant stanols can be produced by any suitable food grade method disclosed in the art. Commercially available plant sterol ester and/or plant stanol ester ingredients e.g. from Raisio Nutrition Ltd or BASF can be used. Commercial ingredients contain small amounts of plant sterols and/or plant stanols in free form (typically less than 3 % of the ingredient). In this invention the term "plant sterol ester and/or plant stanol ester" refers only to plant sterols and/or plant stanols in esterified form, and thus the content of "plant sterol ester and/or plant stanol ester" is calculated only by taking into account the plant sterols and/or plant stanols in esterified form contained in the dietary supplement product.

The cholesterol lowering effects of plant sterols and/or plant stanols have been found to be additive both to the cholesterol lowering effect of statins and to the cholesterol lowering effect of healthy diets, such as low-saturated-fat and low-cholesterol diets. Thus the edible product, such as a dietary supplement product of the present invention can be used both as such and in combination with cholesterol lowering drugs and/or cholesterol lowering diets.

According to the invention the amount of plant sterol ester and/or plant stanol ester is at least 20 %, preferably at least 25 %, more preferably at least 30 %, still more preferably at least 35 %, even more preferably at least 40 %, further more preferably at least 42 %, still further more preferably at least 45 %, even further more preferably at least 48 %, still even further more preferably at least 50 % and most preferably at least 52 % by weight of the gelled emulsion. The amount of plant sterol ester and/or plant stanol ester is preferably at most 80 %, more preferably at most 75 %, still more preferably at most 73 %, even more preferably at most 70 % and most preferably at most 68 % by weight of the gelled emulsion. Preferably the plant sterol ester and/or plant stanol ester content of the gelled emulsion may be, and preferably is, 20-80 %, more preferably 30-80 %, still more preferably 35-75 %, even more preferably 40-75 %, further more preferably 45-73 %, still further more preferably 48-70 %, even further more preferably 50-70 % and most preferably 52-68 % by weight.

By "gelling agent" is meant any edible polymer compound that is capable of forming a gelled emulsion either on its own or together with other compounds (e.g. Ca-ions). Examples of such gelling agents include gel forming proteins, such as gelatin, and gel forming polysaccharides, which may be derived from plants, animals, algae, microbes or may be synthetic. It should be noted that not all proteins and polysaccharides that are used as thickening agents in foods are capable of forming gels. Preferably the gelling agent is a protein, a polysaccharide or mixtures thereof. If the gelling agent is a protein, it is preferably gelatin. Suitable gelling agents are for example gelatin, carrageenan, pectin, alginate, gellan gum, agar, gum Arabic, starch, starch derivatives, inulin, xanthan gum, locust bean gum and glucomannan and/or mixtures thereof. The gelled emulsion of the invention can contain one gelling agent or a mixture of two or more gelling agents. Mixtures of different polysaccharides or mixtures of one or more polysaccharide and gelatin may be used. Suitable gelling agents are therefore gelatin, carrageenan, pectin, alginate, gellan gum, agar, starch, starch derivatives, and such polymer compounds which form gels when used together with other polymer compounds, and mixtures thereof. Such polymer compounds that form gels when used together with other polymer compounds are selected from gum Arabic, inulin, xanthan gum, locust bean gum and glucomannan. Suitable combinations are e.g. a mixture of xanthan gum and locust bean gum, or a mixture of xanthan gum and glucomannan. Other suitable combinations are mixtures of inulin and another gelling agent such as gelatin, gellan gum, carrageenan or pectin. More preferably the gelling agent is selected from gelatin, carrageenan, pectin, alginate, gellan gum, agar or mixtures thereof. Still more preferably the gelling agent contains gelatin. Even more preferably the gelling agent contains gelatin and one or more other gelling agent selected from the group consisting of carrageenan, pectin, alginate, gellan gum and agar. Further more preferably the gelling agent contains gelatin in an amount of at least 50 %, more preferably at least 60 %, still more preferably at least 70 %, even more preferably at least 80 % and most preferably at least 90 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin.

Gelatin is a protein produced by a partial hydrolysis of collagen, the principal constituent of animal skin, bone and connective tissue. Gelatin is produced by treating the collagen raw material with dilute acid (type A gelatin) or alkali (type B gelatin). Gelatin is most often derived from porcine or bovine origins, but also poultry or fish can be used as a gelatin source. Gelatin is capable of forming thermally reversible gels, which melt in the mouth. A "Bloom value" is often used to characterize the gel strength of a gelatin. Commercial mammalian gelatins usually have a Bloom value between 50 and 300. Fish gelatins may be produced from cold water or warm water fish species. Fish gelatins tend to have lower gelling and melting temperatures as compared to bovine gelatins, but usually relatively higher viscosities than corresponding mammalian gelatins, and are often considered as having sub-optimal functional properties compared to mammalian gelatins.

The gels formed with fish gelatin usually tend to be less stable than the gels formed with mammalian gelatin.

In the gelled emulsion of the present invention, the gelling agent preferably comprises gelatin. Gelatin from mammal and/or fish origin may be used. Preferably the gelatin is a low or medium viscosity gelatin. Also gelatin hydrolysates or modified gelatins, such as chemically or enzymatically modified gelatins may be used. Enzyme modified gelatins may be for example gelatins crosslinked by using enzymes, such as transglutaminase, polyphenol oxidase, lipoxygenase, tyrosinase, lysyl oxidase or peroxidase. Also mixtures of different gelatins may be used. A preferred gelatin has a Bloom value of at most 300, preferably at most 280, more preferably at most 260, still more preferably at most 230 and most preferably at most 200. A preferred gelatin has a Bloom value of at least 80, preferably at least 120. Preferably the gelatin has a Bloom value of 80-300, more preferably 120-280, still more preferably 120-260, even more preferably 120-230, and most preferably 120-200. A preferred gelatin has a low or medium viscosity, preferably for example at most 6 mPas, more preferably at most 5 mPas, still more preferably at most 4.5 mPas, even more preferably at most 4.2 mPas, further more preferably at most 3.5 mPas and most preferably at most 3 mPas (when the dynamic viscosity of a 6.67 % gelatin water solution is measured at 60 °C by the Official Procedure of the Gelatin Manufacturers Institute of America, Inc., 2013).

The total amount of the gelling agent is at most 15 %, preferably at most 14 %, more preferably at most 13 %, still more preferably at most 12 %, even more preferably at most 11 % and most preferably at most 10 % by weight of the gelled emulsion. The total amount of the gelling agent is preferably at least 0.1 %, more preferably at least 0.2 %, still more preferably at least 0.3 %, even more preferably at least 0.4 % and most preferably at least 0.5 % by weight of the gelled emulsion. Preferably the total amount of the gelling agent is 0.1-15 %, more preferably 0.2-14 %, still more preferably 0.3-12 %, even more preferably 0.4-11 % and most preferably 0.5-10 % by weight of the gelled emulsion.

In the embodiments, where the gelling agent is gelatin, the amount of gelatin is typically at least 1.0 %, preferably at least 2.0 %, more preferably at least 2.5 %, still more preferably at least 3.0 %, even more preferably at least 3.5 % and most preferably at least 4.0 % by weight of the gelled emulsion. In the embodiments, where the gelling agent is gelatin, the amount of gelatin is typically at most 15 %, preferably at most 14 %, more preferably at most 13 %, still more preferably at most 12 %, even more preferably at most 11 % and most preferably at most 10 % by weight of gelled emulsion. In the embodiments, where the gelling agent is gelatin, the amount of gelatin is typically 1.0-15 %, preferably 2.0-14 %, more preferably 2.5-13 %, still more preferably 3.0-12 %, even more preferably 3.5-11 %, and most preferably 4.0-10 % by weight of the gelled emulsion. In the

embodiments, where the gelling agent comprises polysaccharide(s) or a mixture of gelatin and polysaccharide(s), the total amount of the gelling agent is typically lower than in the embodiments where the gelling agent is gelatin.

It has surprisingly been found that gelled emulsions having a high weight ratio of the active ingredient, i.e. plant sterol ester and/or plant stanol ester, to the gelling agent can be prepared and the organoleptic properties of the gelled emulsions are good. The gelled emulsions of the present invention need to have good texture and mouthfeel. The mouthfeel and texture are not sticky, gummy or hard, but soft and chewable. The mouthfeel is not oily or greasy either, and the gelled emulsion retains the plant sterol ester and/or plant stanol ester in the gelled matrix, despite the high concentration of plant sterol ester and/or plant stanol ester. Therefore, the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of gelling agent is preferably at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0. In the embodiments, where the gelling agent is gelatin, the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent is preferably at most 45, more preferably at most 40, still more preferably at most 35, even more preferably at most 30 and most preferably at most 25 and/or preferably at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0.

In a preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 35 % by weight and the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0.

In another preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 40 % by weight and the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0.

In still another preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 45 % by weight and the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0.

In still another preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 52 % by weight and the weight ratio of plant sterol ester and/or plant

stanol ester to the gelling agent, which preferably is gelatin, is at least 6.5, more preferably at least 7.0, still more preferably at least 7.5, and most preferably at least 8.0.

The total amount of the gelling agent is preferably at most 150 %, more preferably at most 120 %, still more preferably at most 100 %, even more preferably at most 90 %, further more preferably at most 80 %, and most preferably at most 70 % by weight of the amount of water in the gelled emulsion. In the embodiments, where the gelling agent is gelatin, the amount of gelatin is preferably at most 55 %, more preferably at most 50 %, still more preferably at most 45 % and most preferably at most 40 % by weight of the amount of water in the gelled emulsion. Preferablyin embodiments, where the gelling agent is gelatin, the amount of gelatin is 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. It is surprising that in a gelled emulsion with a high concentration of plant sterol ester and/or plant stanol ester the amount of gelatin (% by weight) of the amount of water is this low. Gummy and sticky texture and mouthfeel can be avoided, but still the plant sterol ester and/or plant stanol ester is retained in the gelled matrix, and the texture and mouthfeel of the gelled emulsion is not oily either.

Gelling of the emulsion of the present invention is greatly affected by the nature and concentration of different compounds in the emulsion. One of the important determinants is the water content of the emulsion. If the water content is too high or too low, gelling of the emulsion is disturbed and the organoleptic properties of the gelled emulsion weakened. The water content of the gelled emulsion according to the invention is thus at least 3 %, preferably at least 8 % by weight and at most 35 %, preferably at most 28% by weight. Therefore, the water content of the gelled emulsion is 3.0-35 %, preferably 4.0-34 %, more preferably 5.0-33 %, still more preferably 6.0-32 %, even more preferably 7.0-31 %, further more preferably 8.0-30 %, still further more preferably 9.0-29 %, even further more preferably 10-28 % and most preferably 11-27 % by weight. Despite the relatively high water content of the gelled emulsion in some embodiments of this invention, the water activity of the gelled emulsion is low. The water activity, a_w, of the gelled emulsion is preferably at most 0.90, more preferably at most 0.87, still more preferably at most 0.85, even more preferably at most 0.80 and most preferably at most 0.75.

Preferably the gelled emulsion of the invention comprises 0-20 %, more preferably 0-15 %, and still more preferably 0-10.0 % by weight triglyceride fat. By "triglyceride fat" is meant edible fats and oils, such as vegetable oils and fish oils. Triglyceride fat can also be a mixture of different edible fats and/or oils. Even more preferably the amount of triglyceride fat is 0-9.0 %, further more preferably 0-8.0 %, still further more preferably 0-6.0 %, even further more preferably 0-4.0 %, still even further more preferably 0-2.0 % and most preferably 0-0.1 % by weight of the gelled emulsion. If there is triglyceride fat present in the gelled emulsion, preferably the weight ratio of

the plant sterol ester and/or plant stanol ester to the triglyceride fat is at least 1.0, more preferably at least 1.3, still more preferably at least 1.5, even more preferably at least 1.7, further more preferably at least 2.0, still further more preferably at least 3.0, even further more preferably at least 4.0, still even further more preferably at least 5.0, even still further more preferably at least 6.0 and most preferably at least 13.

Preferably the gelled emulsion of the invention comprises one or more polyols (here also called polyol(s)). By "polyol" is meant compounds that are chemically alcohols with multiple hydroxyl groups, and can be used in foods and/or dietary supplements. Examples of the polyols include sugar alcohols, propylene glycol and glycerol. Typical sugar alcohols are for example sorbitol, xylitol, erythritol, mannitol, maltitol, isomalt and lactitol. Preferably the gelled emulsion comprises glycerol, sorbitol, xylitol, erythritol or a mixture of at least two of these, more preferably glycerol, sorbitol, xylitol or a mixture of at least two of these, and most preferably glycerol and/or xylitol. The polyol is preferably glycerol, sorbitol, xylitol, erythritol or a mixture of at least two of these, more preferably glycerol, sorbitol, xylitol or a mixture of at least two of these, most preferably glycerol and/or xylitol. A preferred mixture of polyols is a mixture of glycerol and xylitol, where the amount of glycerol is preferably at least 5 % of the total amount of glycerol and xylitol. Preferably in this mixture the weight ratio of glycerol to xylitol is 0.05-10 (i.e. the amount of glycerol is from 5 % to 1000 % of the amount of xylitol in the gelled emulsion). More preferably the weight ratio of glycerol to xylitol is 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Another preferred mixture of polyols is a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0 (i.e. the amount of xylitol is from 100 % to 300 % of the amount of sorbitol in the gelled emulsion). More preferably the weight ratio of xylitol to sorbitol is 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2.

It has surprisingly been noticed that polyols further improve the organoleptic properties, especially texture, of the gelled emulsion of the present invention. Furthermore, polyols also bring improvement into the processing of the emulsion before gelling. The gelled emulsion of the invention contains one or more polyols in an amount of 0-60 % by weight. The total amount of polyols may be at least 1.0 %, preferably at least 2.0 %, more preferably at least 3.0 %, still more preferably at least 4.0 % and most preferably at least 5.0 % by weight of the gelled emulsion and at most 60 %, preferably at most 50 %, more preferably at most 40 %, still more preferably at most 35 %, even more preferably at most 30 % and most preferably at most 25 % by weight of the gelled emulsion. Preferably the total amount of polyols is 1.0-60 %, more preferably 1.0-50 %, still more preferably 2.0-50 %, even more preferably 3.0-40 %, further more preferably 4.0-35 %, still further more preferably 4.0-30 %, even further more preferably 5.0-30 %, still even

further more preferably 5.0-25 % and most preferably 5.0-20 % by weight of the gelled emulsion.

If glycerol is used, preferably the amount of glycerol is at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 % and most preferably at least 85 % by weight of the total amount of polyols in the gelled emulsion. Preferably the amount of glycerol is at least 1 %, more preferably at least 3 %, still more preferably at least 5 %, even more preferably at least 6 %, further more preferably at least 7 %, still further more preferably at least 8 % and most preferably at least 9 % by weight of the gelled emulsion. Preferably the amount of glycerol is 1-30 %, more preferably 3-30 %, still more preferably 5-30 %, even more preferably 6-28 %, further more preferably 7-25 %, still further more preferably 8-22 % and most preferably 9-20 % by weight of the gelled emulsion.

Glycerol is preferably used as a mixture of glycerol and at least one other polyol, for example xylitol, sorbitol or erythritol. A preferred mixture is a mixture of glycerol and xylitol, where the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture, the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5.

Another preferred mixture is a mixture of glycerol, xylitol and sorbitol, where the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2.

If xylitol is used, preferably the amount of xylitol is at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. Preferably the amount of xylitol is at least 1 %, more preferably at least 2 %, still more preferably at least 3 %, even more preferably at least 4 %, and most preferably at least 5 % by weight of the gelled emulsion. Preferably the amount of

xylitol is 1-30 %, more preferably 2-28 %, still more preferably 3-25 %, even more preferably 4-23 %, most preferably 5-20 % by weight of the gelled emulsion.

Xylitol is preferably used as a mixture of xylitol and at least one other polyol, for example glycerol, sorbitol or erythritol. A preferred mixture is a mixture of xylitol and sorbitol, in which the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Another preferred mixture is a mixture of xylitol, erythritol and sorbitol, where the amount of xylitol is preferably at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, and most preferably at least 40 % by weight of the total amount of xylitol, sorbitol and erythritol.

Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. It has surprisingly been found that gelled emulsions having a high weight ratio of the active ingredient, i.e. plant sterol ester and/or plant stanol ester, to the total amount of polyols can be prepared and still the organoleptic properties of the gelled emulsions are good.

In a preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 35 % by weight and the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. In this embodiment, preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 % and most preferably at least 85 % by weight of the total amount of polyols in the gelled emulsion. In this embodiment, it is further preferred that the polyols contain, and more preferably is a mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain, and preferably is a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture, the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain, and preferably is a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0,

still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2.

In another preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 35 % by weight and the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. In this embodiment, preferably the polyols contain xylitol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. In this embodiment, it is further preferred that the polyols comprise, and more preferably is a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, preferably 1.2-2.8, more preferably 1.5-2.5, and most preferably 1.7-2.2.

In still another preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 40 % by weight and the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. In this embodiment, preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 % and most preferably at least 85 % by weight of the total amount of polyols in the gelled emulsion. In this embodiment, it is further preferred that the polyols contain, and more preferably is a mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain, and preferably is a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain, and preferably is a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0,

still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2.

In still another preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 40 % by weight and the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. In this embodiment, preferably the polyols contain xylitol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. In this embodiment, it is further preferred that the polyols comprise, and more preferably is a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, preferably 1.2-2.8, more preferably 1.5-2.5, and most preferably 1.7-2.2.

In still another preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 45 % by weight and the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. In this embodiment, preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 % and most preferably at least 85 % by weight of the total amount of polyols in the gelled emulsion. In this embodiment, it is further preferred that the polyols contain, and more preferably is a mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain, and preferably is a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture, the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain, and preferably is a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0,

still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2.

In still another preferred embodiment, the amount of plant sterol ester and/or plant stanol ester in the gelled emulsion is at least 45 % by weight and the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. In this embodiment, preferably the polyols contain xylitol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. In this embodiment, it is further preferred that the polyols comprise, and more preferably is a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, preferably 1.2-2.8, more preferably 1.5-2.5, and most preferably 1.7-2.2.

The gelled emulsion of the invention may also contain other ingredients, for example sweeteners, flavors, pH modifiers, colors, emulsifiers, stabilizers, antioxidants and preservatives. The gelled emulsion may also contain other ingredients with beneficial health effects, for example vitamins (e.g. C, D, E and K vitamins), minerals, antioxidants and/or polyphenols.

The taste of the plant sterol ester and/or plant stanol ester is bland, and does not require any masking. However, if desired, the gelled emulsion of the invention may be flavored or sweetened. For example fruit or berry flavors may be utilized, for example citrus flavors. Natural or artificial sweeteners may be used. Sugar based natural sweeteners include for example sucrose, sugar syrups, fructose, glucose, maltose and dextrins. Artificial sweeteners include, but are not limited to, e.g. aspartame, stevia, sucralose, acesulfame-K, saccharin and cyclamates. Cariogenic sugars selected from the group consisting of sucrose, glucose fructose, maltose and lactose may also be included in the gelled emulsion. Preferably the total amount of cariogenic sugars is low, preferably at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. By "cariogenic sugars" is here meant sugars producing or promoting the development of dental caries selected from the group consisting of sucrose, glucose fructose, maltose and lactose. Limiting the amount of cariogenic sugars is not only a health issue, but surprisingly it also brought on a further improvement into processing of the emulsion.

Food grade acids and/or buffering agents may be used as pH modifiers. Suitable acids include for example citric acid, malic acid, lactic acid, fumaric acid, tartaric acid, acetic acid and phosphoric acid. Suitable buffering agents include for example the salts of the before mentioned acids. Preferred acids include citric acid and malic acid, and preferred buffering agents include their salts. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight of the gelled emulsion. In another preferred embodiment the gelled emulsion does not contain a buffering agent, but the desired pH is achieved otherwise, e.g. by using only an acid. If no acidic taste or pH is desired, the gelled emulsion may be prepared without the use of an acid.

The gelled emulsion of the present invention can preferably be prepared according to the following method, which is a further object of the present invention. The method comprises at least the following steps:

a) preparing an aqueous phase by mixing water and gelling agent, and optionally other water soluble ingredients, preferably at a temperature of at least 40 °C,

b) melting plant sterol ester and/or plant stanol ester, preferably at a temperature of at least 40 °C, more preferably at 40-80 °C, and optionally mixing it with other lipid soluble ingredients,

c) emulsifying the melted plant sterol ester and/or plant stanol ester, or the mixture of plant sterol ester and/or plant stanol ester and other lipid soluble ingredients, with the aqueous phase, preferably at a temperature of at least 40 °C, more preferably at 40-80 °C, still more preferably at 45-70 °C and most preferably at 45-60 °C

d) feeding the obtained emulsion, preferably at a temperature of at least 40 °C, into moulds, preferably into dose unit moulds, and

e) allowing the emulsion to cool to or below the gelation temperature of the aqueous phase, and thus preferably to solidify, to obtain the gelled emulsion.

The edible product, such as a dietary supplement product of the present invention can preferably be prepared according to the following method. The method comprises at least the following steps:

a) preparing an aqueous phase by mixing water and gelling agent, and optionally other water soluble ingredients, preferably at a temperature of at least 40 °C,

b) melting plant sterol ester and/or plant stanol ester, preferably at a temperature of at least 40 °C, more preferably at 40-80 °C, and optionally mixing it with other lipid soluble ingredients,

c) emulsifying the melted plant sterol ester and/or plant stanol ester, or the mixture of plant sterol ester and/or plant stanol ester and other lipid soluble ingredients, with the aqueous

phase, preferably at a temperature of at least 40 °C, more preferably at 40-80 °C, still more preferably at 45-70 °C and most preferably at 45-60 °C

d) feeding the obtained emulsion, preferably at a temperature of at least 40 °C, into dose unit moulds,

e) allowing the emulsion to cool to or below the gelation temperature of the aqueous phase to obtain a dose unit of the gelled emulsion,

f) optionally coating the dose unit, and

g) packing the obtained dose unit.

Preferably the method includes no coating step f. It is also preferred that the dose unit is packed in a blister.

Despite the high plant sterol ester and/or plant stanol ester content, the viscosity of the emulsion before the gelling is within the range allowing further processing, e.g. dosing into moulds, preferably into the dose unit moulds. The type of production line, e.g. dosing nozzles and packaging line sets requirements on the viscosity range. The recipe can be modified to fulfil the viscosity requirements set by the individual production lines. Also the shear rate that is used at the emulsification step affects the viscosity of the emulsion formed. E.g. the viscosity of the emulsion can be reduced by reducing the share rate.

The viscosity of the emulsion before the gelling can be preferably at most 40 000 mPas, more preferably at most 30 000 mPas and most preferably at most 20 000 mPas (measured with Brookfield viscometer, 1.5 rpm, at 55°C, 5 minutes). Preferably the viscosity is at least 5000 mPas.

It has surprisingly been found that the gelled emulsion having a high plant sterol ester and/or plant stanol ester content can be prepared according to the present invention without having unacceptably high viscosity of the emulsion before the gelling, and still retaining a good emulsion stability. Still the gelling property of the emulsion is good and the final gelled product has the desired organoleptic properties with no fatty mouthfeel.

The dose units of the gelled emulsion may be produced by feeding the emulsion into stationary or moving moulds. The feeding takes place preferably via nozzles or needles using appropriate pressure. The moulds are preferably dose unit moulds, such as hollow blisters or cavities produced from at least one film, e.g. plastic-coated aluminum foil. These blisters or cavities are sealed after filling e.g. with a releasable cover film or foil. However, the gelled emulsion may also be removed from the moulds followed by separate end-use packaging. If gelling was not performed in dose unit moulds but in bigger moulds, the gelled emulsion may be removed from the used moulds and cut into dose units before the end-use packaging. The removed gelled dose units may also be coated by any suitable coating procedure and coating material e.g. chewable soft gel coatings or sugar alcohols such

as sorbitol or maltitol. The edible product, e.g. a dietary supplement product of the invention is preferably packaged in a blister or a blister pack, preferably in an aluminium blister for excellent water retaining and barrier properties. Canadian patent number 1289074 describes ways to produce usable uncoated administration forms packed e.g. in blisters. The aqueous phase has preferably a gelling temperature from 10 °C to 35 °C, more preferably from 12 °C to 33 °C and most preferably from 15 °C to 30 °C. The pH of the aqueous phase is preferably from 2 to 9, more preferably from 2.5 to 8 and most preferably from 3 to 7.

All operations during the processing are preferably done at inert atmosphere. Optionally the emulsion is degassed before dosing into dose units. Despite the high plant sterol ester and/or plant stanol ester content, the emulsion stability during the processing before gelling is good. If desired, the gelled emulsion may be more than biphasic, i.e. a double emulsion. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion.

The dose units of the gelled emulsion may optionally be dried before packaging, but in preferred embodiments drying is not used. If the water content of the dose units of the gelled emulsion is undesired high, the dose units are dried after step e) to obtain the desired level. The dose units may be coated, but preferably they are uncoated. Preferably the dose units are individually packaged. However if the dose units are coated also several dose units may be packed in one package. The size of the dose unit of the gelled emulsion is preferably at least 0.3 g, more preferably at least 0.7 g and most preferably at least 1.0 g. The size of the dose unit of the gelled emulsion is preferably at most 12.5 g, more preferably at most 7 g, and most preferably ar most 6 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g.

Because the gelled emulsion of the invention has a high plant sterol ester and/or plant stanol ester content, the daily dose of plant sterol ester and/or plant stanol ester can be incorporated in a small amount of the gelled emulsion. The preferred daily dose of plant sterol ester and/or plant stanol ester is at least 0.8 g, more preferably at least 1.3 g, still more preferably at least 1.7 g, even more preferably at least 2.5 g and most preferably the daily dose of plant sterol ester and/or plant stanol ester is at least 3.4 g. The preferred daily dose of plant sterol ester and/or plant stanol ester is at most 15 g, more preferably at most 13 g, still more preferably at most 12 g, even more preferably at most 11 g and most preferably at most 10 g.

The daily dose of plant sterol ester and/or plant stanol ester is preferably provided by 1.0-25 g of the gelled emulsion. Thus the daily dose of the gelled emulsion is preferably 1.0-25 g. More preferably the daily dose of the gelled emulsion is 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The daily dose of the gelled emulsion can be provided in one

or more servings. Preferably the daily dose of the gelled emulsion is provided by one to four servings, more preferably in one or two servings, and most preferably in one serving. By a "serving" is meant the recommended amount of dose units of the gelled emulsion to be consumed at the same intake occasion. The size of the dose unit is dependent on the size of the mould wherein the emulsion is gelled.

The energy content of the gelled emulsion is preferably at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content of the gelled emulsion is preferably at least 4 kJ, more preferably at least 8 kJ, still more preferably at least 12 kJ, even more preferably at least 16 kJ and most preferably at least 20 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ.

EMBODIMENT 1a: A preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 25-80 % by weight, gelling agent in an amount of at most 13 % by weight, and water in an amount of 5.0-33 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. The plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight. The gelling agent preferably contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 2.5-13 %, more preferably 3.0-12 %, still more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0. The water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion preferably contains 0-20 %, more preferably 0-15 %, still more preferably 0-10.0 %, even more preferably 0-9.0 %, further more preferably 0-8.0 %, still further more preferably 0-6.0 %,

even further more preferably 0-4.0 %, still even further more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 1.3, more preferably at least 1.7, still more preferably at least 2.0, even more preferably at least 3.0, further more preferably at least 4.0, still further more preferably at least 5.0, even further more preferably at least 6.0 and most preferably at least 13. The gelled emulsion preferably contains one or more polyols in an amount of 1.0-50 %, more preferably 2.0-50 %, still more preferably 3.0-40 %, even more preferably 4.0-35 %, further more preferably 5.0-30 %, still further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 %, and most preferably at least 85 % by weight of the total amount of polyols. In this embodiment, it is further preferred that the polyols contain a mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture, the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight of the gelled emulsion. The daily dose of the gelled emulsion is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of

the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 1b: Another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 25-80 % by weight, gelling agent in an amount of at most 13 % by weight, and water in an amount of 5.0-33 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. The plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight. The gelling agent preferably contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 2.5-13 %, more preferably 3.0-12 %, still more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0. The water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion preferably contains 0-20 %, more preferably 0-15 %, still more preferably 0-10.0 %, even more preferably 0-9.0 %, further more preferably 0-8.0 %, still further more preferably 0-6.0 %, even further more preferably 0-4.0 %, still even further more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 1.3, more preferably at least 1.7, still more preferably at least 2.0, even more preferably at least 3.0, further more preferably at least 4.0, still further more preferably at least 5.0, even further more preferably at least 6.0 and most preferably at least 13. The gelled emulsion preferably

contains one or more polyols in an amount of 1.0-50 %, more preferably 2.0-50 %, still more preferably 3.0-40 %, even more preferably 4.0-35 %, further more preferably 5.0-30 %, still further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain xylitol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. Preferably the polyols contain a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight of the gelled emulsion. The daily dose of the gelled emulsion is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 2a: A preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 35-75 % by weight, gelling agent in an amount of at most 12 % by weight, and water in an amount of 5.0-33 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. The plant sterol ester and/or plant stanol

ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight. The gelling agent preferably contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 3.0-12 %, more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0. The water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion preferably contains 0-20 %, more preferably 0-15 %, still more preferably 0-10.0 %, even more preferably 0-9.0 %, further more preferably 0-8.0 %, still further more preferably 0-6.0 %, even further more preferably 0-4.0 %, still even further more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 1.7, more preferably at least 2.0, still more preferably at least 3.0, even more preferably at least 4.0, further more preferably at least 5.0, still further more preferably at least 6.0 and most preferably at least 13. The gelled emulsion preferably contains one or more polyols in an amount of 1.0-50 %, more preferably 2.0-50 %, still more preferably 3.0-40 %, even more preferably 4.0-35 %, further more preferably 5.0-30 %, still further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 %, and most preferably at least 85 % by weight of the total amount of polyols. In this embodiment, it is further preferred that the polyols contain a mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably

0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight of the gelled emulsion. The daily dose of the gelled emulsion is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 2b: Another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 35-75 % by weight, gelling agent in an amount of at most 12 % by weight, and water in an amount of 5.0-33 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. The plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight. The gelling agent preferably contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 3.0-12 %, more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and

most preferably 25-40 % by weight of the amount of water in the gelled emulsion. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0. The water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion preferably contains 0-20 %, more preferably 0-15 %, still more preferably 0-10.0 %, even more preferably 0-9.0 %, further more preferably 0-8.0 %, still further more preferably 0-6.0 %, even further more preferably 0-4.0 %, still even further more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 1.7, more preferably at least 2.0, still more preferably at least 3.0, even more preferably at least 4.0, further more preferably at least 5.0, still further more preferably at least 6.0 and most preferably at least 13. The gelled emulsion preferably contains one or more polyols in an amount of 1.0-50 %, more preferably 2.0-50 %, still more preferably 3.0-40 %, even more preferably 4.0-35 %, further more preferably 5.0-30 %, still further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain xylitol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. Preferably the polyols contain a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight of the gelled emulsion. The daily dose of the gelled emulsion is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the

gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 3a: Another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 40-75 % by weight, gelling agent in an amount of at most 12 % by weight, and water in an amount of 6.0-32 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this embodiment, the gelling agent preferably contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 3.0-12 %, more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-10.0 %, preferably 0-9.0 %, more preferably 0-8.0 %, still more preferably 0-6.0 %, even more preferably 0-4.0 %, further more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 4.0, more preferably at least 5.0, still more preferably at least 6.0 and most preferably at least 13. The gelled emulsion preferably contains one or more polyols in an amount of 1.0-40 %, more preferably 2.0-40 %, still more preferably 3.0-40 %, even more preferably 4.0-35 %, further more preferably 5.0-30 %, still further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 %, and most preferably at least 85 % by weight of the total amount of polyols. In this embodiment, it is further preferred that the polyols contain a

mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture, the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 3b: Another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 40-75 % by weight, gelling agent in an amount of at most 12 %

by weight, and water in an amount of 6.0-32 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this embodiment, the gelling agent preferably contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 3.0-12 %, more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-10.0 %, preferably 0-9.0 %, more preferably 0-8.0 %, still more preferably 0-6.0 %, even more preferably 0-4.0 %, further more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 4.0, more preferably at least 5.0, still more preferably at least 6.0 and most preferably at least 13. The gelled emulsion preferably contains one or more polyols in an amount of 1.0-40 %, more preferably 2.0-40 %, still more preferably 3.0-40 %, even more preferably 4.0-35 %, further more preferably 5.0-30 %, still further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain xylitol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. Preferably the polyols contain a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled

emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 3c: Another preferred embodiment of the present invention is a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 40-75 % by weight, gelatin in an amount of 3.0-12 % by weight, and water in an amount of 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. The amount of gelatin is 22-45 % and preferably 25-40 % by weight of the amount of water in the gelled emulsion. The weight ratio of plant sterol ester and/or plant stanol ester to gelatin is at least 6.0, preferably at least 6.5, more preferably at least 7.0, still more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-2.0 % and preferably 0-0.1 % by weight triglyceride fat. The gelled emulsion contains one or more polyols in an amount of 5.0-25 % and preferably 5.0-20 % by weight. It is preferred that the polyols contain a mixture of glycerol and xylitol. When the polyols contain a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 10 %, more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. The weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is preferably at least 1.7, more preferably at least 2.0, still more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present

in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 6.0 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 4a: Still another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of at least 42 %, preferably at least 45 %, more preferably at least 48 %, still more preferably at least 50 % and most preferably at least 52 % by weight of the gelled emulsion, gelling agent in an amount of at most 13 % by weight, and water in an amount of 6.0-32 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. The amount of plant sterol ester and/or plant stanol ester is in this embodiment preferably at most 80 %, more preferably at most 75 %, still more preferably at most 73 %, even more preferably at most 70 % and most preferably at most 68 % by weight of the gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this embodiment, the gelling agent preferably contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 2.5-13 %, more preferably 3.0-12 %, still more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-10.0 %, preferably 0-9.0 %, more preferably 0-8.0 %, still more preferably 0-6.0 %, even more preferably 0-4.0 %, further more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 5.0, more preferably at least 6.0 and

most preferably at least 13. Further in this embodiment, the gelled emulsion preferably contains one or more polyols in an amount of 1.0-40 %, more preferably 3.0-40 %, still more preferably 4.0-35 % even more preferably 5.0-30 %, further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 %, and most preferably at least 85 % by weight of the total amount of polyols. In this embodiment, it is further preferred that the polyols contain a mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture, the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8 % and most preferably less than 6 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ,

more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 4b: Still another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of at least 42 %, preferably at least 45 %, more preferably at least 48 %, still more preferably at least 50 % and most preferably at least 52 % by weight of the gelled emulsion, gelling agent in an amount of at most 13 % by weight, and water in an amount of 6.0-32 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. The amount of plant sterol ester and/or plant stanol ester is in this embodiment preferably at most 80 %, more preferably at most 75 %, still more preferably at most 73 %, even more preferably at most 70 % and most preferably at most 68 % by weight of the gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this embodiment, the gelling agent preferably contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 2.5-13 %, more preferably 3.0-12 %, still more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, more preferably at least 6.5, still more preferably at least 7.0, even more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-10.0 %, preferably 0-9.0 %, more preferably 0-8.0 %, still more preferably 0-6.0 %, even more preferably 0-4.0 %, further more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 5.0, more preferably at least 6.0 and most preferably at least 13. Further in this embodiment, the gelled emulsion preferably contains one or more polyols in an amount of 1.0-40 %, more preferably 3.0-40 %, still more preferably 4.0-35 % and even more preferably 5.0-30 %, further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain xylitol in an amount of at least 5

%, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. Preferably the polyols contain a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8 % and most preferably less than 6 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 5a: Still another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 45-73 % by weight, gelling agent in an amount of at most 12 % by weight, and water in an amount of 7.0-31 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this

embodiment, the gelling agent contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 3.0-12 %, more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. The gelatin concentration is preferably at least 3.0 %, more preferably at least 3.5 % and most preferably at least 4.0 % by weight of the gelled emulsion. The weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, preferably at least 6.5, more preferably at least 7.0, still more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-9.0 %, preferably 0-8.0 %, more preferably 0-6.0 %, still more preferably 0-4.0 %, even more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 5.0, more preferably at least 6.0 and most preferably at least 13. Further in this embodiment, the gelled emulsion preferably contains one or more polyols in an amount of 1.0-40 %, more preferably 3.0-40 %, still more preferably 4.0-35 % and even more preferably 5.0-30 %, further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 %, and most preferably at least 85 % by weight of the total amount of polyols. In this embodiment, it is further preferred that the polyols contain a mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture, the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the

total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 5b: Still another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 45-73 % by weight, gelling agent in an amount of at most 12 % by weight, and water in an amount of 7.0-31 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this embodiment, the gelling agent contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 3.0-12 %, more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. The gelatin concentration is preferably at least 3.0 %, more preferably at least 3.5 % and most preferably at

least 4.0 % by weight of the gelled emulsion. The weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, preferably at least 6.5, more preferably at least 7.0, still more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-9.0 %, preferably 0-8.0 %, more preferably 0-6.0 %, still more preferably 0-4.0 %, even more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 5.0, more preferably at least 6.0 and most preferably at least 13. Further in this embodiment, the gelled emulsion preferably contains one or more polyols in an amount of 1.0-40 %, more preferably 3.0-40 %, still more preferably 4.0-35 % and even more preferably 5.0-30 %, further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain xylitol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. Preferably the polyols contain a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even

more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 6a: Still another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of at least 48 %, preferably at least 50 %, and more preferably at least 52 % by weight of the gelled emulsion, gelling agent in an amount of at most 13 % by weight, and water in an amount of 7.0-31 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. The amount of plant sterol ester and/or plant stanol ester is in this embodiment preferably at most 80 %, more preferably at most 75 %, still more preferably at most 73 %, even more preferably at most 70 % and most preferably at most 68 % by weight of the gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this embodiment, the gelling agent contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 2.5-13 %, more preferably 3.0-12 %, still more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. The gelatin concentration is preferably at least 3.0 %, more preferably at least 3.5 % and most preferably at least 4.0 % by weight of the gelled emulsion. The weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, preferably at least 6.5, more preferably at least 7.0, still more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-8.0 %, preferably 0-6.0 %, more preferably 0-4.0 %, still more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 6.0, most preferably at least 13. Further in this embodiment, the gelled emulsion preferably contains one or more polyols in an amount of 1.0-35 %, more preferably 3.0-35 %, still more preferably 4.0-35 % and even more preferably 5.0-30 %, further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still

more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 %, and most preferably at least 85 % by weight of the total amount of polyols. In this embodiment, it is further preferred that the polyols contain a mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture, the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8 % and most preferably less than 6 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 6b: Still another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of at least 48 %, preferably at least 50 %, and more preferably at least 52 % by weight of the gelled emulsion, gelling agent in an amount of at most 13 % by weight, and water in an amount of 7.0-31 % by weight. Preferably the gelled emulsion contains water in an amount of 8.0-30 %, more preferably 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. The amount of plant sterol ester and/or plant stanol ester is in this embodiment preferably at most 80 %, more preferably at most 75 %, still more preferably at most 73 %, even more preferably at most 70 % and most preferably at most 68 % by weight of the gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this embodiment, the gelling agent contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 2.5-13 %, more preferably 3.0-12 %, still more preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. The gelatin concentration is preferably at least 3.0 %, more preferably at least 3.5 % and most preferably at least 4.0 % by weight of the gelled emulsion. The weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.0, preferably at least 6.5, more preferably at least 7.0, still more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-8.0 %, preferably 0-6.0 %, more preferably 0-4.0 %, still more preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 6.0 and most preferably at least 13. Further in this embodiment, the gelled emulsion preferably contains one or more polyols in an amount of 1.0-35 %, more preferably 3.0-35 %, still more preferably 4.0-35 % and even more preferably 5.0-30 %, further more preferably 5.0-25 % and most preferably 5.0-20 % by weight. Preferably the polyols contain xylitol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of

the total amount of polyols in the gelled emulsion. Preferably the polyols contain a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8 % and most preferably less than 6 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 7a: Still another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 52 – 68 % by weight, gelling agent in an amount of at most 11 % by weight, and water in an amount of 8.0-30 % by weight. Preferably the gelled emulsion contains water in an amount of 9.0-29 %, more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this embodiment, the gelling agent contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when

the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. The weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is at least 6.5, preferably at least 7.0, more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-4.0 %, preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 13.0. Further in this embodiment, the gelled emulsion contains one or more polyols in an amount 1.0-30 %, preferably 4.0-30 %, more preferably 5.0-30 %, still more preferably 5.0-25 % and most preferably 5.0-20 % by weight of the dietary supplement product. Preferably the polyols contain glycerol in an amount of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 %, and most preferably at least 85 % by weight of the total amount of polyols. In this embodiment, it is further preferred that the polyols contain a mixture of glycerol and xylitol, or a mixture of glycerol, xylitol and sorbitol. When the polyols contain a mixture of glycerol and xylitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol and xylitol. Preferably in this mixture, the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. When the polyols contain a mixture of glycerol, xylitol and sorbitol, the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol. Preferably in this mixture, the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5. Further in this mixture, the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8 % and most preferably less than 6

% by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

EMBODIMENT 7b: Still another preferred embodiment of the present invention is an edible product, preferably a dietary supplement product, more preferably a serum LDL cholesterol lowering dietary supplement product, which comprises a gelled emulsion containing plant sterol ester and/or plant stanol ester in an amount of 52 – 68 % by weight, gelling agent in an amount of at most 11 % by weight, and water in an amount of 8.0-30 % by weight. Preferably the gelled emulsion contains water in an amount of 9.0-29 %, still more preferably 10-28 % and most preferably 11-27 % by weight. Preferably the gelled emulsion is an oil-in-water (O/W) emulsion. Preferably the gelled emulsion is a solid gelled emulsion. In this embodiment, plant sterol ester and/or plant stanol ester preferably contains plant stanol ester in an amount of at least 10 %, more preferably at least 50 %, still more preferably at least 70 % and most preferably at least 90 % by weight of the plant sterol ester and/or plant stanol ester. Further in this embodiment, the gelling agent contains gelatin, preferably in an amount of at least 50 % of the total amount of gelling agent. Most preferably the gelling agent is gelatin. When the gelling agent is gelatin, the amount of gelatin is preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion. Further, when the gelling agent is gelatin, the amount of gelatin is preferably 15-55 %, more preferably 20-50 %, still more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion. The weight ratio of plant sterol ester and/or plant stanol ester to the gelling agent, which preferably is gelatin, is p at least 6.5, preferably at least 7.0, more preferably at least 7.5, and most preferably at least 8.0. Further in this embodiment, the water activity, a_w, of the gelled emulsion is at most 0.80 and preferably at most 0.75. Further, the gelled emulsion contains 0-4.0 %, preferably 0-2.0 % and most preferably 0-0.1 % by weight triglyceride fat. If triglyceride fat is present in the gelled emulsion, the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is preferably at least 13.0. Further in this embodiment, the gelled emulsion contains one or more polyols in an amount 1.0-30 %, preferably 4-30 %, more preferably 5.0-30 %, still more preferably 5.0-25 % and most preferably 5.0-20 % by weight of the dietary supplement product. Preferably the polyols contain xylitol in an amount

of at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 40 %, still further more preferably at least 50 %, even further more preferably at least 60 %, still even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols in the gelled emulsion. Preferably the polyols contain a mixture of xylitol and sorbitol, where the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2. Preferably the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, more preferably at least 1.4, still more preferably at least 1.7, even more preferably at least 2.0, further more preferably at least 2.5, and most preferably at least 3.0. Preferably the total amount of cariogenic sugars is at most 20 %, more preferably at most 15 %, still more preferably at most 10 %, even more preferably at most 5.0 % and further more preferably 0-0.1 % by weight of the gelled emulsion. Most preferably there are no cariogenic sugars present in the gelled emulsion. Preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8 % and most preferably less than 6 % by weight of the gelled emulsion. The daily dose of the gelled emulsion of this embodiment is preferably 1.0-25 g, more preferably 1.3-20 g, still more preferably 1.5-17 g, even more preferably 1.8-15 g, and most preferably 2.0-13 g. The size of the dose unit of the gelled emulsion is preferably 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g. Preferably the energy content of the gelled emulsion is at most 840 kJ, more preferably at most 670 kJ, still more preferably at most 500 kJ, even more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion. The energy content per gram of the gelled emulsion is preferably at most 40 kJ, more preferably at most 35 kJ, still more preferably at most 30 kJ, even more preferably at most 25 kJ and most preferably at most 20 kJ. Preferably the gelled emulsion of this embodiment is uncoated.

The content of the plant sterol ester and/or plant stanol ester of the dietary supplement product can e.g. be analyzed by a method described by Lubinus et al. (Eur. J. Nutr. 2013, 52(3):997-1013) or by Esche et al. (J. Agric. Food Chem. 2012, 30;60(21):5330-9). The water activity (aw) can be analyzed by using an instrument which measures the relative humidity of a sample, such as Novasina ms1 aw-meter.

In this description the amounts given in percentages mean percentage by weight (wt-%) of the gelled emulsion unless otherwise stated.

Comprising means "containing at least" in this context.

The invention will be described in greater detail by means of the following non-limiting examples.

EXAMPLE 1

Gelled emulsions containing plant sterols and/or plant stanols were prepared. The targeted daily dose of the gelled emulsion was chosen to be 6.5 g. The targeted amount of plant sterols and/or plant stanols to be incorporated in the daily dose of the gelled emulsion was 2 g as sterol/stanol equivalents, which corresponds to 3.4 g as plant sterol ester and/or plant stanol ester or to 2 g as free plant sterols or stanols.

Three gelled emulsions were prepared (recipes 1a-1c). One of them was a reference product without plant sterols or plant stanols (1a), one was prepared with free plant sterols (1b) and one with plant stanol ester (1c). Some rapeseed oil was added to the recipe 1b in order to get the same content of rapeseed oil fatty acids as in the recipe 1c (corresponding the fatty acids of the plant stanol ester).

	1a Comparative	1b Comparative	1c Invention
Plant stanol ester ingredient*	-	-	53
Rapeseed oil	53	22	-
Phytosterol powder (free sterols)		31	
Water phase:			
Water	17.5	17.5	17.5
Glycerol	17	17	17
Gelatin	6.5	6.5	6.5
Trisodium citrate	4	4	4
Citric acid	1.6	1.6	1.6
Orange flavor	0.4	0.4	0.4

*containing 98 % by weight plant stanol ester, i.e. plant stanol ester concentration in the recipe is 52 % by weight; esterified with fatty acids from rapeseed oil; Raisio Nutrition Ltd

Preparation method:

The water phase was prepared first. Fish gelatin having a Bloom value 193 and low or medium viscosity (below 4.2 mPas) was used. Gelatin was added to the water and let to swell for 30 minutes. The gelatin solution was then heated to 70 °C with stirring and stirred at that temperature for 15 minutes. Other water soluble components were added (first glycerol, then citric acid and trisodium citrate), and allowed to dissolve under stirring for 30-60 minutes. Then the stirring was stopped and the blend was degassed and the mixture was allowed to cool for about 30 minutes (to about 55 °C).

1A: Rapeseed oil was warmed to 55 °C, mixed with the flavor and emulsified with the water phase, by slowly adding it to the water phase and emulsifying by using an UltraTurrax (10000

rpm). The viscosity of the emulsion was measured at 55 °C (Brookfield viscometer, 1.5 rpm). The resulting emulsion was poured into moulds and let to gel for 60 minutes at room temperature (22 °C).

1B: The finely grounded phytosterol powder was mixed with rapeseed oil preheated at 100 °C. The resulting mixture was very thick and the sterol did not completely dissolve in the oil. The flavor was added into this mixture. The mixture was slowly added and mixed with the water phase, by using an UltraTurrax (10000 rpm), but it could not be evenly dispersed in the water phase. The resulting inhomogeneous mixture was placed into moulds, and let to stay there for 5 hours at room temperature (22 °C). The mixture did not gel.

1C: Plant stanol ester was heated until totally melted, the flavor was added and then the mixture was slowly added to the water phase and emulsified with the water phase at 55 °C, by using an UltraTurrax (10000 rpm). The viscosity of the emulsion was measured at 55 °C (Brookfield viscometer, 1.5 rpm).The resulting emulsion was poured into moulds and let to gel for 60 minutes at room temperature (22 °C).

The resulting products were evaluated by a trained sensory panel. Results are presented in the table below.

	1a	1b	1c
Properties of the emulsion	Emulsion is well flowing, pourable. Viscosity at 55 °C 5500 mPas.	The sterol-rapeseed oil mixture was too thick, and could not be evenly dispersed in the water phase. The product did not gel.	Emulsion is stable and pourable, there is no phase separation. Viscosity at 55 °C 11000 mPas.
Appearance, Texture, Mouthfeel	Oily surface, oily mouthfeel, the gel does not seem to retain the oil, too soft product	The product could not be prepared	Soft, but still good texture, chewable, not gummy, not sticky, no oily surface, no oily mouthfeel, pleasant
Taste	Mild orange taste. Oily taste, especially oily aftertaste.	The product could not be prepared	Mild orange taste, no oily or fatty taste, no aftertaste

The gelled emulsion prepared with plant stanol ester (1c) was found to be stable and to have acceptable viscosity before gelling. The final product, i.e. the gelled emulsion, had soft, chewable texture, which was not gummy. There was no oily or fatty mouthfeel. The recipe provided 3.4 g

plant stanol ester in 6.5 g of the gelled emulsion (dose unit size 6.5 g), which is a very convenient daily dose. The weight ratio of the plant stanol ester to the gelling agent (gelatin) in this recipe was 8.0. The recipe contained 17 % glycerol. The weight ratio of the plant stanol ester to the total amount of polyols was 3.1. Despite the high content of plant stanol ester, the emulsion gelled well and had a good texture. The dose unit of the gelled emulsion was not coated, but it was used as an edible product, such as a dietary supplement product, as such.

It was not possible to prepare a gelled emulsion providing an equivalent amount of the cholesterol lowering plant sterol ingredient (2 g free plant sterols) in 6.5 g of the product (recipe 1b).

EXAMPLE 2

Gelled emulsion containing 68 % by weight plant stanol ester

	%
Plant stanol ester ingredient*	69.3
Water	12.8
Glycerol	10.1
Gelatin	4.0
Trisodium citrate	1.5
Malic acid 99%	1.0
Flavor	0.7
Color	0.5
Sweetener (stevia)	0.1
	100

*containing 98 % by weight plant stanol ester, i.e. plant stanol ester concentration in the recipe 68 % by weight. Plant stanols were esterified with rapeseed oil fatty acids

The gelled emulsion was prepared in a similar way as described in the example 1c, except a lower shear rate was used in the emulsification step (Ultra Turrax 8000 rpm). The gelatin used had a bloom value of 255 and low or medium viscosity (at most 4.2 mPas). The color and the flavor were added into the plant stanol ester before emulsifying it with the water phase. The emulsion was thick, stable and gelled well. The gelled emulsion that was obtained had soft and chewable texture (a bit harder than the texture of the gelled emulsion in example 1c), which was not gummy. The mouthfeel was not fatty or oily. The recipe provided 3.4 g plant stanol ester in 5.0 g of the gelled emulsion. The weight ratio of the plant stanol ester to the gelling agent (gelatin) in this recipe was 17. The recipe contained 10.1 % by weight glycerol. The weight ratio of the plant stanol ester to the total amount of polyols was 6.7.

EXAMPLE 3

Gelled emulsion containing 50 % by weight of plant stanol ester and plant sterol ester

	%
Plant stanol ester ingredient*	40.8
Plant sterol ester ingredient**	10.3
Water	18.2
Gelatin	6.2
Glycerol	10.0
Sorbitol	1.4
Xylitol	6.7
Malic acid 99%	1.8
Trisodium Citrate	3.6
Flavor	1.0
Color	0.03
	100.0

*containing 98 % by weight plant stanol ester (the same as in 1c) ** containing 97.5 % by weight plant sterol ester, both esterified with rapeseed oil fatty acids. The plant stanol ester and plant sterol ester concentration in the recipe was 50 % by weight.

The gelled emulsion was prepared in a similar way as described in the example 1c. Plant stanol ester and plant sterol ester were melted and mixed before emulsification with the water phase. The gelatin used had a bloom value of 160. The emulsion was stable and gelled well upon cooling. The texture of the gelled emulsion obtained was homogeneous and chewable, although a bit harder than the texture of the gelled emulsion in example 1c. The texture was not gummy and the mouthfeel was good (not fatty or oily). The recipe provided 3.4 g plant stanol ester and plant sterol ester in 6.8 g of the gelled emulsion. The weight ratio of the plant stanol ester and plant sterol ester to the gelling agent (gelatin) in this recipe was 8.1. The recipe contained 10.0 % by weight glycerol and 6.7 % by weight xylitol, and the amount of glycerol was 55.2 % and the amount of xylitol 37.0 % by weight of the total amount of polyols. The weight ratio of the plant stanol ester and plant sterol ester to the total amount of polyols was 2.8.

EXAMPLE 4

Gelled emulsion containing 42 % by weight of plant stanol ester

	%
Plant stanol ester ingredient*	43.0
Water	18.6
Xylitol	3.6
Glycerol	21.0
Gelatin	6.5
Trisodium citrate	3.6
Malic acid 99 %	1.8
Flavor	1.0

Color	0.7
Sweetener	0.2
	100

*containing 98 % by weight plant stanol ester (the same as in 1c), i.e. plant stanol ester concentration in the recipe 42 % by weight

The gelled emulsion was prepared in a similar way as described in the example 1c. The gelatin used had a bloom value of 260, and low or medium viscosity (at most 4.2 mPas). The emulsion was stable, well flowing and fairly thin, but gelled well upon cooling. The gelled emulsion obtained had soft (softer than the gelled emulsion in the example 1c), chewable and homogeneous texture. The texture was not gummy. The mouthfeel was good, not fatty or oily. The recipe provided 3.4 g plant stanol ester in 8.1 g of the gelled emulsion. The weight ratio of the plant stanol ester to the gelling agent (gelatin) in this recipe was 6.5. The recipe contained 21.0 % by weight glycerol, and the amount of glycerol was 85.4 % by weight of the total amount of polyols. The recipe contained 3.6 % xylitol and the amount of xylitol was 14.6 % of the total polyols. The weight ratio of plant stanol ester to the total amount of polyols was 1.7.

EXAMPLE 5

Gelled emulsion, containing 59 % of plant stanol ester

	%
Plant stanol ester ingredient*	60.0
Water	16.8
Xylitol	7.2
Glycerol	7.2
Gelatin	5.0
Trisodium citrate	1.8
Citric acid	0.5
Flavor	0.9
Color	0.5
Sweetener	0.1
	100

*containing 98 % by weight plant stanol ester (the same as in 1c), i.e. plant stanol ester concentration in the recipe 59 % by weight

The gelled emulsion was prepared in a similar way as described in the example 1c, except a lower shear rate was used in the emulsification step (Ultra Turrax 8000 rpm). The gelatin used had a bloom value of 255, and low or medium viscosity (at most 4.2 mPas). The emulsion was stable, fairly thick, but still pourable and gelled in moulds well upon cooling. The gelled emulsion obtained had soft, but firm texture, which was chewable. Also the mouthfeel was good, not fatty or oily. There was no gumminess either. The recipe provided 3.4 g plant stanol ester in 5.8 g of the

gelled emulsion. The weight ratio of the plant stanol ester to the gelling agent (gelatin) in this recipe was 12. The recipe contained 7.2 % by weight glycerol, and the amount of glycerol was 50 % by weight of the total amount of polyols. The recipe contained also 7.2 % by weight xylitol, and the amount of xylitol was 50 % by weight of the total amount of polyols. The weight ratio of plant stanol ester to the total amount of polyols was 4.1.

EXAMPLE 6

Packed gelled emulsion containing 51 % by weight of plant stanol ester

	%
Plant stanol ester ingredient*	52.0
Water	16.2
Xylitol	19.8
Glycerol	3.7
Gelatin	4.5
Trisodium citrate	2.0
Malic acid 99 %	0.7
Flavor	1.0
Color	0.1
	100

*containing 98 % by weight plant stanol ester (the same as in example 1c), i.e. plant stanol ester concentration in the recipe 51 % by weight

The gelled emulsion was prepared in a similar way as described in the example 1c, except a lower shear rate was used in the emulsification step (Ultra Turrax 6500 rpm). The gelatin used was bovine gelatin, having bloom value of 195. Of the polyols, xylitol was added first to the gelatin solution and stirred for 15 minutes. Glycerol was then added and the solution was stirred for additional 5 minutes, after which malic acid, trisodium citrate and the sweetener were added and the stirring continued for additional 20 minutes. Color and flavor were added into the plant stanol ester before its emulsification with the water phase. The emulsion was stable. 6.7 g of the emulsion was dosed into each dose unit mould (blister trays) and sealed with an aluminum foil. The dose units of the emulsion were allowed to cool in the blister pack and the emulsion gelled well upon cooling. The gelled emulsion had chewable, soft texture. The mouthfeel was pleasant, not fatty, oily or gummy-like. The recipe provided 3.4 g plant stanol ester in 6.7 g of the gelled emulsion. The weight ratio of the plant stanol ester to the gelling agent (gelatin) in this recipe was 11.3. The recipe contained 3.7 % by weight glycerol, which was 15.7 % by weight of the total amount of polyols (glycerol and xylitol). The recipe contained 19.8 % by weight xylitol, which was 84.3 % by weight of the total amount of polyols (glycerol and xylitol). The weight ratio of xylitol to glycerol was 5.4. The weight ratio of plant stanol ester to the total amount of polyols was 2.2.

EXAMPLE 7

Gelled emulsion containing 47 % by weight of plant sterol ester

	%
Plant sterol ester ingredient*	48.2
Water	16.8
Xylitol	14.5
Sorbitol	7.2
Glycerol	4.0
Gelatin	5.4
Trisodium citrate	2.0
Malic acid 99 %	0.7
Flavor	1.0
Color	0.1
	100

*containing 97.5 % by weight plant sterol ester (the same as in example 3), i.e. plant sterol ester concentration in the recipe 47 % by weight

The gelled emulsion was prepared in a similar way as described in the example 1c. The gelatin used was bovine gelatin, having a bloom value of 195, and low or medium viscosity. Of the polyols, sorbitol was added first to the gelatin solution and stirred for 5 minutes. Xylitol was added then and stirred for additional 10 minutes, after which glycerol was added and the stirring continued for additional 5 minutes. Malic acid and trisodium citrate were added then and the stirring continued for additional 20 minutes. Color and flavor were added into the plant sterol ester before its emulsification with the water phase. The emulsion gelled in moulds well upon cooling. The gelled emulsion had a bit harder surface than the gelled emulsions prepared with plant stanol ester. However, the inner texture was soft and the overall acceptability of the texture was still good, despite the bit harder surface. The mouthfeel was pleasant, not fatty or oily. The recipe provided 3.4 g plant sterol ester in 7.2 g of the gelled emulsion. The weight ratio of the plant sterol ester to the gelling agent (gelatin) in this recipe was 8.7. The recipe contained 4.0 % by weight glycerol, which was 15.6 % by weight of the total amount of polyols. The recipe contained also xylitol (14.5 % by weight of the gelled emulsion and 56.4 % by weight of the total amount of polyols), and sorbitol (7.2 % by weight of the gelled emulsion and 28.0 % by weight of the total amount of polyols). The weight ratio of xylitol to sorbitol was 2.0. The weight ratio of plant sterol ester to the total amount of polyols was 1.8.

EXAMPLE 8

Gelled emulsion containing 54 % by weight of plant stanol ester

	%
Plant stanol ester ingredient*	55.0
Water (purified)	19.2
Xylitol	8.8
Sorbitol	4.0
Gelatin	6.0
Trisodium citrate	3.6
Malic acid 99 %	1.8
Flavor (lemon)	1.0
Color	0.6
	100

*containing 98 % by weight plant stanol ester (the same as in 1c), i.e. plant stanol ester concentration in the recipe 54 % by weight

The gelled emulsion was prepared in a similar way as described in the example 1c, except a lower shear rate was used in the emulsification step (Ultra Turrax 6500 rpm). The gelatin used was bovine gelatin having bloom value of 150, and low or medium viscosity. The emulsion was stable and gelled in moulds well upon cooling. The gelled emulsion obtained had chewable and soft texture, and good lemon taste. The mouthfeel was not fatty or oily. There was no gumminess either. The recipe provided 3.4 g plant stanol ester in 6.3 g of the gelled emulsion. The weight ratio of the plant stanol ester to the gelling agent (gelatin) in this recipe was 9. The recipe contained 8.8 % by weight xylitol, and the amount of xylitol was 69 % by weight of the total amount of polyols. The weight ratio of xylitol to sorbitol was 2.2. The weight ratio of plant stanol ester to the total amount of polyols was 4.2.

EXAMPLE 9

Gelled emulsion containing 40 % by weight of plant stanol ester

	%
Plant stanol ester ingredient*	41.0
Water	18.3
Xylitol	18.2
Sorbitol	9.4
Gelatin	6.2
Trisodium citrate	3.6
Malic acid 99 %	1.8
Flavor	0.8
Color	0.7
	100

*containing 98 % by weight plant stanol ester (the same as in example 1c), i.e. plant stanol ester concentration in the recipe 40 % by weight

The gelled emulsion was prepared in a similar way as described in the example 1c, except a bit higher shear rate was used in the emulsification step (Ultra Turrax 11500 rpm). The gelatin used was bovine gelatin, having bloom value of 150, and low or medium viscosity. The emulsion was stable and gelled well upon cooling. The gelled emulsion obtained had soft, but firm texture, which was chewable. The mouthfeel was good, not fatty, oily or gummy-like. The recipe provided 3.4 g plant stanol ester in 8.5 g of the gelled emulsion. The weight ratio of the plant stanol ester to the gelling agent (gelatin) in this recipe was 6.5. The recipe contained 18.2 % by weight xylitol, and the amount of xylitol was 66 % by weight of the total amount of polyols. The weight ratio of xylitol to sorbitol was 1.9. The weight ratio of plant stanol ester to the total amount of polyols was 1.4.

EXAMPLE 10

Gelled emulsion containing 44 % by weight of plant sterol ester

	%
Plant sterol ester ingredient*	45.0
Water	18.3
Xylitol	15.0
Sorbitol	8.6
Gelatin	6.2
Trisodium citrate	3.6
Malic acid	1.8
Flavor	1.0
Color	0.5
	100

*containing 97.5 % by weight plant sterol ester (the same as in example 3), i.e. plant sterol ester concentration in the recipe 44 % by weight

The gelled emulsion was prepared in a similar way as described in the example 1c, except a bit higher shear rate was used in the emulsification step (Ultra Turrax 11000 rpm). The gelatin used was bovine gelatin having a bloom value of 160, and low or medium viscosity. The emulsion was stable and gelled in moulds well upon cooling. The gelled emulsion obtained had a harder surface texture than the gelled emulsions prepared with plant stanol ester, but the inner texture was still good, chewable and soft. The mouthfeel was not fatty or oily. The recipe provided 3.4 g plant sterol ester in 7.7 g of the gelled emulsion. The weight ratio of the plant sterol ester to the gelling agent in this recipe was 7.1. The recipe contained 15.0 % by weight xylitol, and the amount of xylitol was 63.6 % by weight of the total amount of polyols. The weight ratio of xylitol to sorbitol was 1.7. The weight ratio of plant sterol ester to the total amount of polyols was 1.9.

EXAMPLE 11

Gelled emulsion containing 54 % by weight of plant stanol ester

	%
Plant stanol ester ingredient*	55.0
Water	18.0
Erythritol	6.6
Xylitol	6.6
Sorbitol	1.4
Gelatin	5.8
Trisodium citrate	3.6
Malic acid 99 %	1.8
Flavor	0.5
Color	0.7
	100

*containing 98 % by weight plant stanol ester (the same as in example 1c), i.e. plant stanol ester concentration in the recipe 54 % by weight

The gelled emulsion was prepared in a similar way as described in the example 1c. The gelatin used was bovine gelatin, having bloom value of 240-260, and low or medium viscosity (at most 4.2 mPas). The emulsion was stable and gelled well upon cooling. The gelled emulsion obtained had soft and chewable texture. The mouthfeel was good, not fatty or oily and it was not gummy-like. The recipe provided 3.4 g plant stanol ester in 6.3 g of the gelled emulsion. The weight ratio of the plant stanol ester to the gelling agent (gelatin) in this recipe was 9.3. The recipe contained 6.6 % by weight xylitol, which was 45 % by weight of the total amount of xylitol, sorbitol and erythritol. The weight ratio of plant stanol ester to the total amount of polyols was 3.7.

FURTHER EMBODIMENTS OF THE INVENTION

1. A gelled emulsion comprising
   - plant sterol ester and/or plant stanol ester in an amount of at least 20 % by weight,
   - gelling agent in an amount of at most 15 % by weight, and
   - water in an amount of 3.0-35 % by weight.

2. The gelled emulsion according to embodiment 1, characterised in that the amount of plant sterol ester and/or plant stanol ester is at most 80 %, preferably at most 75 %, more preferably at most 73 %, still more preferably at most 70 % and most preferably at most 68 % by weight.

3. The gelled emulsion according to embodiment 1 or 2, characterised in that the amount of plant sterol ester and/or plant stanol ester is at least 25 %, preferably at least 30 %, more preferably at least 35 %, still more preferably at least 40 %, even more preferably at least 42 %, further more preferably at least 45 %, still further more preferably at least 48 %, even further more preferably at least 50 % and most preferably at least 52 % by weight.

4. The gelled emulsion according to any one of embodiments 1 to 3, characterised in that the plant sterol ester and/or plant stanol ester comprises plant stanol ester in an amount of at least 10 %, preferably at least 50 %, more preferably at least 70 % and most preferably at least 90 % by weight.

5. The gelled emulsion according to any one of embodiments 1 to 4, characterised in that the gelled emulsion further comprises triglyceride fat in an amount of 0-20 %, preferably 0-15 %, more preferably 0-10 %, still more preferably 0-9.0 %, even more preferably 0-8.0 %, further more preferably 0-6.0 %, still further more preferably 0-4.0 %, still even further more preferably 0-2.0 % and most preferably 0-0.1 % by weight.

6. The gelled emulsion according to any one of embodiments 1 to 5, characterised in that the total amount of the gelling agent is at most 14 %, preferably at most 13 %, more preferably at most 12 %, still more preferably at most 11 % and most preferably at most 10 % by weight.

7. The gelled emulsion according to any one of embodiments 1 to 6, characterised in that the total amount of the gelling agent is at least 0.1 %, preferably at least 0.2 %, more preferably at least 0.3 %, still more preferably at least 0.4 % and most preferably at least 0.5 % by weight.

8. The gelled emulsion according to any one of embodiments 1 to 7, characterised in that the gelling agent is selected from the group consisting of one or more proteins, one or more polysaccharides and any mixture thereof, preferably from the group consisting of gelatin, carrageenan, pectin, alginate, gellan gum, agar, starch, starch derivatives, gum Arabic, inulin, xanthan gum, locust bean gum, glucomannan and/or mixtures thereof, more preferably from the group consisting of gelatin, carrageenan, pectin, alginate, gellan gum, agar, starch, starch derivatives, and polymer compounds which form gels when used together with other polymer compounds such as xanthan gum and locust bean gum; xanthan gum and glucomannan; inulin and any one of gelatin, gellan gum, carrageenan or pectin, and mixtures thereof, still more preferably from the group consisting of gelatin, carrageenan, pectin, alginate, gellan gum, agar or mixtures thereof.

9. The gelled emulsion according to any one of embodiments 1 to 8, characterised in that the gelling agent comprises gelatin, preferably in an amount of at least 50 % more preferably at least 60 %, still more preferably at least 70 %, even more preferably at least 80 % and most preferably at least 90 % by weight, and optionally at least one gelling agent selected from the group consisting of carrageenan, pectin, alginate, gellan gum and agar, and most preferably the gelling agent is gelatin.

10. The gelled emulsion according to embodiment 9, characterised in that the amount of gelatin is 1.0-15 %, preferably 2.0-14 %, more preferably 2.5-13 %, still more preferably 3.0-12 %, even more preferably 3.5-11 % and most preferably 4.0-10 % by weight.

11. The gelled emulsion according to embodiment 9 or 10, characterised in that the amount of gelatin is 15-55 %, preferably 20-50 %, more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion.

12. The gelled emulsion according to any one of embodiments 1 to 11, characterised in that the gelled emulsion further comprises one or more polyols.

13. The gelled emulsion according to embodiment 12, characterised in that the total amount of polyols is 1.0-60 %, preferably 1.0-50 %, more preferably 2.0-50 %, still more preferably 3.0-40 %, even more preferably 4.0-35 %, further more preferably 4.0-30 %, still further more preferably 5.0-30 %, even further more preferably 5.0-25 % and most preferably 5.0-20 % by weight.

14. The gelled emulsion according to embodiment 12 or 13, characterised in that the polyols comprise glycerol, and preferably the amount of glycerol is at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 % and most preferably at least 85 % by weight of the total amount of polyols.

15. The gelled emulsion according to embodiment 12 or 13, characterised in that the polyols comprise xylitol, and preferably the amount of xylitol is at least 5 %, more preferably at least 10 %, still more preferably at least 20 %, even more preferably at least 40 %, further more preferably at least 50 %, still further more preferably at least 60 %, even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols.

16. The gelled emulsion according to embodiment 12 or 13, characterised in that the polyols comprise glycerol and xylitol, and preferably the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5, and/or the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 % and most preferably at least 14 % by weight of the total amount of glycerol and xylitol.

17. The gelled emulsion according to embodiment 12 or 13, characterised in that the polyols comprise xylitol and sorbitol, and preferably the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5 and most preferably 1.7-2.2.

18. The gelled emulsion according to embodiment 12 or 13, characterised in that the polyols comprise glycerol, xylitol and sorbitol, and preferably the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5, and/or the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2 and/or the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol.

19. The gelled emulsion according to any one of embodiments 1 to 18, characterised in that it further comprises one or more cariogenic sugars selected from the group consisting of sucrose, glucose, fructose, maltose and lactose.

20. The gelled emulsion according to embodiment 19, characterised in that the total amount of cariogenic sugars is at most 20 %, preferably at most 15 %, more preferably at most 10 %, still more preferably at most 5 %, even more preferably 0-0.1 % by weight.

21. The gelled emulsion according to any one of embodiments 1 to 18, characterised in that there are no cariogenic sugars present in the gelled emulsion.

22. The gelled emulsion according to any one of embodiments 1 to 21, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the gelling agent is at least 6.0, preferably at least 6.5, more preferably at least 7.0, still more preferably at least 7.5 and most preferably at least 8.0.

23. The gelled emulsion according to any one of embodiments 6 to 22, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is at least 1.3, preferably at least 1.5, more preferably at least 2.0, still more preferably at least 3.0, even more preferably at least 4.0, further more preferably at least 5.0, still further more preferably at least 6.0 and most preferably at least 13.

24. The gelled emulsion according to any one of embodiments 12 to 23, characterised in that the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, preferably at least 1.4, more preferably at least 1.7, still more preferably at least 2.0, even more preferably at least 2.5 and most preferably at least 3.0.

25. The gelled emulsion according to any one embodiments 1 to 24, characterised in that the size of the dose unit of the gelled emulsion is at least 0.3 g, preferaby 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g.

26. The gelled emulsion according to any one of embodiments 1 to 25, characterised in that the daily dose of the gelled emulsion is 1.0-25 g, preferably 1.3-20 g, more preferably 1.5-17 g, still more preferably 1.8-15 g and most preferably 2.0-13 g.

27. The gelled emulsion according to any one of embodiments 1 to 26, characterised in that its water activity aw is at most 0.90, preferably at most 0.87, more preferably at most 0.85, still more preferably at most 0.80 and most preferably at most 0.75.

28. The gelled emulsion according to any one of embodiments 1 to 27, characterised in that its water content is 4.0-34 %, preferably 5.0-33 %, more preferably 6.0-32 %, still more preferably 7.0-31 %, even more preferably 8.0-30 %, further more preferably 9.0-29 %, still further more preferably10-28 % and most preferably 11-27 % by weight.

29. The gelled emulsion according to any one of embodiments 1 to 28, characterised in that it further comprises pH modifiers, such as acids and buffering agents, preferably the total amount of

the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight.

30. The gelled emulsion according to any one of embodiments 1 to 29, characterised in that its energy content is at most 840 kJ, preferably at most 670 kJ, more preferably at most 500 kJ, still more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion.

31. The gelled emulsion according to any one of embodiments 1 to 30, characterised in that its energy content per gram of the gelled emulsion is at most 40 kJ, preferably at most 35 kJ, more preferably at most 30 kJ, still more preferably at most 25 kJ and most preferably at most 20 kJ.

32. The gelled emulsion according to any one of embodiments 1 to 31, characterised in that it is a solid gelled emulsion and/or it is solid at 20 °C, preferably at 22 °C, more preferably at 25 °C and most preferably at 30 °C and/or it is chewable and/or it can be stored at room temperature.

33. The gelled emulsion according to any one of embodiments 1 to 32, characterised in that it is a dietary supplement product.

34. The gelled emulsion according to any one of embodiments 1 to 33, characterised in that it comprises

- plant sterol ester and/or plant stanol ester in an amount of 25-80 % by weight,
- gelling agent in an amount of at most 13 % by weight,
- water in an amount of 5.0-33 % by weight, and the water activity of the gelled emulsion being at most 0.80
- optionally triglyceride fat in an amount of 0-20 % by weight, and
- optionally polyol(s) in an amount of 1.0-50 % by weight.

35. The gelled emulsion according to embodiment 34, characterised in that it comprises one or more polyols in a total amount of 1.0 to 50 % preferably 2.0-50 %, more preferably 3.0-40 %, still more preferably 4.0-35 %, even more preferably 4.0-30 %, further more preferably 5.0-30 %, still further more preferably 5.0-25 % and most preferably 5.0-20 % by weight.

36. The gelled emulsion according to embodiment 34 or 35, characterised in that it comprises

- plant sterol ester and/or plant stanol ester in an amount of 35-75 % by weight,
- gelling agent in an amount of at most 12 % by weight.

37. The gelled emulsion according to embodiment 36, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is at least 2.0, preferably at least 3.0, more preferably at least 4.0, still more preferably at least 5.0, even more preferably at least 6.0 and most preferably at least 13.

38. The gelled emulsion according to embodiment 34, characterised in that it comprises

- plant sterol ester and/or plant stanol ester in an amount of 40-75 % by weight,
- gelling agent in an amount of at most 12 % by weight,

- water in an amount of 6.0-32 % by weight,
- optionally triglyceride fat in an amount of 0-10 % by weight, and
- optionally polyol(s) in an amount of 1.0 -40 % by weight.

39. The gelled emulsion according to embodiment 38, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is at least 5.0, preferably at least 6.0 and most preferably at least 13.

40. The gelled emulsion according to embodiment 38 or 39, characterised in that it comprises one or more polyols in a total amount of 1.0-40 %, preferably 2.0-40 %, more preferably 3.0-40 %, still more preferably 4.0-35 %, even more preferably 5.0-30, further more preferably 5.0-25 % and most preferably 5.0-20 % by weight.

41. The gelled emulsion according to any one of embodiments 38 to 40, characterised in that it comprises

- plant sterol ester and/or plant stanol ester in an amount of 45-73 % by weight,
- gelling agent in an amount of at most 12 % by weight,
- water in an amount of 7.0-31 % by weight,
- optionally triglyceride fat in an amount of 0-9.0 % by weight, and
- optionally polyol(s) in an amount of 1.0-40 % by weight.

42. The gelled emulsion according to embodiment 41, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is at least 6.0 and most preferably at least 13.

43. The gelled emulsion according to any one of embodiments 34 to 42, characterised in that it contains no cariogenic sugar.

44. The gelled emulsion according to any one of embodiments 34 to 43, charactersed in that the weight ratio of the plant sterol ester and/or plant stanol ester to the gelling agent is at least 6.0, preferably at least 6.5, more preferably at least 7.0, still more preferably at least 7.5 and most preferably at least 8.0.

45. The gelled emulsion according to any one of embodiments 34 to 44, characterised in that the gelling agent comprises gelatin and preferably is gelatin.

46. The gelled emulsion according to embodiment 45, charactersed in that the amount of gelatin is 15-55 %, preferably 20-50 %, more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion.

47. The gelled emulsion according to embodiment 45 or 46, charactersed in that the amount of gelatin is 3.0-12 %, preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion.

48. The gelled emulsion according to any one of embodiments 34-47, charactersed in that the polyols comprise glycerol, and preferably the amount of glycerol is at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more

preferably at least 50 %, still further more preferably at least 70 % and most preferably at least 85 % by weight of the total amount of polyols.

49. The gelled emulsion according to any one of embodiments 34-48, charactersed in that the amount of water is 8.0-30 %, preferably 9.0-29 %, more preferably 10-28 % and most preferably 11-27 % by weight.

49B. The gelled emulsion according to any one of embodiments 1 to 49, characterised in that it comprises plant sterol ester and/or plant stanol ester in an amount of 40-75 % by weight, gelatin in an amount of 3.0-12 % by weight, water in an amount of 11-27 % by weight, one or more polyols in a total amount of 5.0-25 % by weight, and optionally triglycerides in an amount of 0 to 2.0 % by weight, wherein the water activity a_w of the gelled emulsion is at most 0.80 and the weight ratio of plant sterol ester and/or plant stanol ester to gelatin is at least 6.0, and preferably the amount of gelatin is 22-45 % by weight of the amount of water in the gelled emulsion.

50. Use of the gelled emulsion according to any one of embodiments 1 to 49B for preparing an edible product.

51. An edible product comprising the gelled emulsion according to any one of embodiments 1 to 49B.

52. The edible product according to embodiment 51, characterised in that it is a dietary supplement.

53. The edible product according to embodiment 51 or 52, characterised in that it further comprises a coating.

54. The edible product according to embodiment 51 or 52, characterised in that it is uncoated.

55. The edible product according to any one of embodiments 51 to 54, characterised in that it is packed in a blister.

56. The edible product according to any one of embodiments 51 to 55, characterised in that it is portable and/or it is chewable and/or it can be stored at room temperatures and/or it has a long shelf life at room temperatures.

57. A blister comprising the gelled emulsion according to any one of embodiments 1 to 49B or the edible product according to any one of embodiments 51 to 56.

58. The gelled emulsion according to any one of embodiments 1 to 49B or the edible product according to any one of embodiments 51 to 56 for use as a medicament.

59. The gelled emulsion according to any one of embodiments 1 to 49B or the edible product according to any one of embodiments 51 to 56 for lowering serum LDL cholesterol level.

60. A method for preparing the gelled emulsion according to any one of embodiments 1 to 49B comprising

a) preparing an aqueous phase by mixing water and gelling agent, and optionally other water soluble ingredients, preferably at a temperature of at least 40 °C,

b) melting plant sterol ester and/or plant stanol ester, preferably at a temperature of at least 40 °C, and optionally mixing it with other lipid soluble ingredients,

c) emulsifying the melted plant sterol ester and/or plant stanol ester, or the mixture of plant sterol ester and/or plant stanol ester and other lipid soluble ingredients, with the aqueous phase, preferably at a temperature of at least 40 °C,

d) feeding the obtained emulsion, preferably at a temperature of at least 40 °C into moulds, preferably into dose unit moulds, and

e) allowing the emulsion to cool to or below the gelation temperature of the aqueous phase to obtain the gelled emulsion.

61. A method for preparing the edible product according to any one of embodiments 51 to 56 comprising

a) preparing an aqueous phase by mixing water and gelling agent, and optionally other water soluble ingredients, preferably at a temperature of at least 40 °C,

b) melting plant sterol ester and/or plant stanol ester, preferably at a temperature of at least 40 °C, and optionally mixing it with other lipid soluble ingredients,

c) emulsifying the melted plant sterol ester and/or plant stanol ester, or the mixture of plant sterol ester and/or plant stanol ester and other lipid soluble ingredients, with the aqueous phase, preferably at a temperature of at least 40 °C,

d) feeding the obtained emulsion, preferably at a temperature of at least 40 °C into dose unit moulds,

e) allowing the emulsion to cool to or below the gelation temperature of the aqueous phase to obtain a dose unit of the gelled emulsion,

f) optionally coating the dose unit,

g) packing the obtained dose unit.

62. The method according to embodiment 60 or 61, characterised in that step b is performed at a temperature of 40-80 °C.

63. The method according to any one of embodiments 60 to 62, characterised in that step c is performed at a temperature of 40-80 °C, preferably at 45-70 °C and most preferably at 45-60 °C.

64. The method according to any one of embodiments 61 to 63, characterised in that the method includes no coating step f.

65. The method according to any one of embodiments 61 to 64, characterised in that the dose unit is packed in a blister.

CLAIMS

1. A gelled emulsion comprising
   - plant sterol ester and/or plant stanol ester in an amount of at least 20 % by weight,
   - gelling agent in an amount of at most 15 % by weight, and
   - water in an amount of 3.0-35 % by weight.

2. The gelled emulsion according to claim 1, characterised in that the amount of plant sterol ester and/or plant stanol ester is at most 80 %, preferably at most 75 %, more preferably at most 73 %, still more preferably at most 70 % and most preferably at most 68 % by weight.

3. The gelled emulsion according to claim 1 or 2, characterised in that the amount of plant sterol ester and/or plant stanol ester is at least 25 %, preferably at least 30 %, more preferably at least 35 %, still more preferably at least 40 %, even more preferably at least 42 %, further more preferably at least 45 %, still further more preferably at least 48 %, even further more preferably at least 50 % and most preferably at least 52 % by weight.

4. The gelled emulsion according to any one of claim 1 to 3, characterised in that the plant sterol ester and/or plant stanol ester comprises plant stanol ester in an amount of at least 10 %, preferably at least 50 %, more preferably at least 70 % and most preferably at least 90 % by weight.

5. The gelled emulsion according to any one of claims 1 to 4, characterised in that the gelled emulsion further comprises triglyceride fat in an amount of 0-20 %, preferably 0-15 %, more preferably 0-10 %, still more preferably 0-9.0 %, even more preferably 0-8.0 %, further more preferably 0-6.0 %, still further more preferably 0-4.0 %, still even further more preferably 0-2.0 % and most preferably 0-0.1 % by weight.

6. The gelled emulsion according to any one of claims 1 to 5, characterised in that the total amount of the gelling agent is at most 14 %, preferably at most 13 %, more preferably at most 12 %, still more preferably at most 11 % and most preferably at most 10 % by weight.

7. The gelled emulsion according to any one of claims 1 to 6, characterised in that the total amount of the gelling agent is at least 0.1 %, preferably at least 0.2 %, more preferably at least 0.3 %, still more preferably at least 0.4 % and most preferably at least 0.5 % by weight.

8. The gelled emulsion according to any one of claims 1 to 7, characterised in that the gelling agent is selected from the group consisting of one or more proteins, one or more polysaccharides and any mixture thereof, preferably from the group consisting of gelatin, carrageenan, pectin, alginate, gellan gum, agar, starch, starch derivatives, gum Arabic, inulin, xanthan gum, locust bean gum, glucomannan and/or mixtures thereof, more preferably from the group consisting of gelatin, carrageenan, pectin, alginate, gellan gum, agar, starch, starch derivatives, and polymer compounds which form gels when used together with other polymer compounds such as xanthan gum and locust bean gum; xanthan gum and glucomannan; inulin and any one of gelatin, gellan gum,

carrageenan or pectin, and mixtures thereof, still more preferably from the group consisting of gelatin, carrageenan, pectin, alginate, gellan gum, agar or mixtures thereof.

9. The gelled emulsion according to any one of claims 1 to 8, characterised in that the gelling agent comprises gelatin, preferably in an amount of at least 50 % more preferably at least 60 %, still more preferably at least 70 %, even more preferably at least 80 % and most preferably at least 90 % by weight, and optionally at least one gelling agent selected from the group consisting of carrageenan, pectin, alginate, gellan gum and agar, and most preferably the gelling agent is gelatin.

10. The gelled emulsion according to claim 9, characterised in that the amount of gelatin is 1.0-15 %, preferably 2.0-14 %, more preferably 2.5-13 %, still more preferably 3.0-12 %, even more preferably 3.5-11 % and most preferably 4.0-10 % by weight.

11. The gelled emulsion according to claim 9 or 10, characterised in that the amount of gelatin is 15-55 %, preferably 20-50 %, more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion.

12. The gelled emulsion according to any one of claims 1 to 11, characterised in that the gelled emulsion further comprises one or more polyols.

13. The gelled emulsion according to claim 12, characterised in that the total amount of polyols is 1.0-60 %, preferably 1.0-50 %, more preferably 2.0-50 %, still more preferably 3.0-40 %, even more preferably 4.0-35 %, further more preferably 4.0-30 %, still further more preferably 5.0-30 %, even further more preferably 5.0-25 % and most preferably 5.0-20 % by weight.

14. The gelled emulsion according to claim 12 or 13, characterised in that the polyols comprise glycerol, and preferably the amount of glycerol is at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 % and most preferably at least 85 % by weight of the total amount of polyols.

15. The gelled emulsion according to claim 12 or 13, characterised in that the polyols comprise xylitol, and preferably the amount of xylitol is at least 5 %, more preferably at least 10 %, still more preferably at least 20 %, even more preferably at least 40 %, further more preferably at least 50 %, still further more preferably at least 60 %, even further more preferably at least 65 % and most preferably at least 80 % by weight of the total amount of polyols.

16. The gelled emulsion according to claim 12 or 13, characterised in that the polyols comprise glycerol and xylitol, and preferably the weight ratio of glycerol to xylitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5, and/or the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 % and most preferably at least 14 % by weight of the total amount of glycerol and xylitol.

17. The gelled emulsion according to claim 12 or 13, characterised in that the polyols comprise xylitol and sorbitol, and preferably the weight ratio of xylitol to sorbitol is 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5 and most preferably 1.7-2.2.

18. The gelled emulsion according to claim 12 or 13, characterised in that the polyols comprise glycerol, xylitol and sorbitol, and preferably the weight ratio of glycerol to the total amount of xylitol and sorbitol is 0.05-10, more preferably 0.08-2.0, still more preferably 0.11-1.0, even more preferably 0.14-0.8, and most preferably 0.16-0.5, and/or the weight ratio of xylitol to sorbitol is preferably 1.0-3.0, more preferably 1.2-2.8, still more preferably 1.5-2.5, and most preferably 1.7-2.2 and/or the amount of glycerol is preferably at least 5 %, more preferably at least 7 %, still more preferably at least 10 %, even more preferably at least 12 %, and most preferably at least 14 % by weight of the total amount of glycerol, xylitol and sorbitol.

19. The gelled emulsion according to any one of claims 1 to 18, characterised in that it further comprises one or more cariogenic sugars selected from the group consisting of sucrose, glucose, fructose, maltose and lactose.

20. The gelled emulsion according to claim 19, characterised in that the total amount of cariogenic sugars is at most 20 %, preferably at most 15 %, more preferably at most 10 %, still more preferably at most 5 %, even more preferably 0-0.1 % by weight.

21. The gelled emulsion according to any one of claims 1 to 18, characterised in that there are no cariogenic sugars present in the gelled emulsion.

22. The gelled emulsion according to any one of claims 1 to 21, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the gelling agent is at least 6.0, preferably at least 6.5, more preferably at least 7.0, still more preferably at least 7.5 and most preferably at least 8.0.

23. The gelled emulsion according to any one of claims 6 to 22, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is at least 1.3, preferably at least 1.5, more preferably at least 2.0, still more preferably at least 3.0, even more preferably at least 4.0, further more preferably at least 5.0, still further more preferably at least 6.0 and most preferably at least 13.

24. The gelled emulsion according to any one of claims 12 to 23, characterised in that the weight ratio of plant sterol ester and/or plant stanol ester to the total amount of polyols is at least 1.0, preferably at least 1.4, more preferably at least 1.7, still more preferably at least 2.0, even more preferably at least 2.5 and most preferably at least 3.0.

25. The gelled emulsion according to any one claims 1 to 24, characterised in that the size of the dose unit of the gelled emulsion is at least 0.3 g, preferaby 0.3-12.5 g, more preferably 0.4-10 g, still more preferably 0.5-9.0 g, even more preferably 0.6-8.0 g, further more preferably 0.7-7.0 g and most preferably 1.0-6.0 g.

26. The gelled emulsion according to any one of claims 1 to 25, characterised in that the daily dose of the gelled emulsion is 1.0-25 g, preferably 1.3-20 g, more preferably 1.5-17 g, still more preferably 1.8-15 g and most preferably 2.0-13 g.

27. The gelled emulsion according to any one of claims 1 to 26, characterised in that its water activity aw is at most 0.90, preferably at most 0.87, more preferably at most 0.85, still more preferably at most 0.80 and most preferably at most 0.75.

28. The gelled emulsion according to any one of claims 1 to 27, characterised in that its water content is 4.0-34 %, preferably 5.0-33 %, more preferably 6.0-32 %, still more preferably 7.0-31 %, even more preferably 8.0-30 %, further more preferably 9.0-29 %, still further more preferably10-28 % and most preferably 11-27 % by weight.

29. The gelled emulsion according to any one of claims 1 to 28, characterised in that it further comprises pH modifiers, such as acids and buffering agents, preferably the total amount of the acids and/or buffering agents is less than 15 %, more preferably less than 13 %, still more preferably less than 10 %, even more preferably less than 8.0 % and most preferably less than 6.0 % by weight.

30. The gelled emulsion according to any one of claims 1 to 29, characterised in that its energy content is at most 840 kJ, preferably at most 670 kJ, more preferably at most 500 kJ, still more preferably at most 330 kJ and most preferably at most 200 kJ per daily dose of the gelled emulsion.

31. The gelled emulsion according to any one of claims 1 to 30, characterised in that its energy content per gram of the gelled emulsion is at most 40 kJ, preferably at most 35 kJ, more preferably at most 30 kJ, still more preferably at most 25 kJ and most preferably at most 20 kJ.

32. The gelled emulsion according to any one of claims 1 to 31, characterised in that it is a solid gelled emulsion and/or it is solid at 20 °C, preferably at 22 °C, more preferably at 25 °C and most preferably at 30 °C and/or it is chewable and/or it can be stored at room temperature.

33. The gelled emulsion according to any one of claims 1 to 32, characterised in that it is a dietary supplement product.

34. The gelled emulsion according to any one of claims 1 to 33, characterised in that it comprises

- plant sterol ester and/or plant stanol ester in an amount of 25-80 % by weight,
- gelling agent in an amount of at most 13 % by weight,
- water in an amount of 5.0-33 % by weight, and the water activity of the gelled emulsion being at most 0.80
- optionally triglyceride fat in an amount of 0-20 % by weight, and
- optionally polyol(s) in an amount of 1.0-50 % by weight.

35. The gelled emulsion according to claim 34, characterised in that it comprises one or more polyols in a total amount of 1.0 to 50 % preferably 2.0-50 %, more preferably 3.0-40 %, still more

preferably 4.0-35 %, even more preferably 4.0-30 %, further more preferably 5.0-30 %, still further more preferably 5.0-25 % and most preferably 5.0-20 % by weight.

36. The gelled emulsion according to claim 34 or 35, characterised in that it comprises

- plant sterol ester and/or plant stanol ester in an amount of 35-75 % by weight,
- gelling agent in an amount of at most 12 % by weight.

37. The gelled emulsion according to claims 36, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is at least 2.0, preferably at least 3.0, more preferably at least 4.0, still more preferably at least 5.0, even more preferably at least 6.0 and most preferably at least 13.

38. The gelled emulsion according to claim 34, characterised in that it comprises

- plant sterol ester and/or plant stanol ester in an amount of 40-75 % by weight,
- gelling agent in an amount of at most 12 % by weight,
- water in an amount of 6.0-32 % by weight,
- optionally triglyceride fat in an amount of 0-10 % by weight, and
- optionally polyol(s) in an amount of 1.0 -40 % by weight.

39. The gelled emulsion according to claim 38, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is at least 5.0, preferably at least 6.0 and most preferably at least 13.

40. The gelled emulsion according to claim 38 or 39, characterised in that it comprises one or more polyols in a total amount of 1.0-40 %, preferably 2.0-40 %, more preferably 3.0-40 %, still more preferably 4.0-35 %, even more preferably 5.0-30, further more preferably 5.0-25 % and most preferably 5.0-20 % by weight.

41. The gelled emulsion according to any one of claims 38 to 40, characterised in that it comprises

- plant sterol ester and/or plant stanol ester in an amount of 45-73 % by weight,
- gelling agent in an amount of at most 12 % by weight,
- water in an amount of 7.0-31 % by weight,
- optionally triglyceride fat in an amount of 0-9.0 % by weight, and
- optionally polyol(s) in an amount of 1.0-40 % by weight.

42. The gelled emulsion according to claim 41, characterised in that the weight ratio of the plant sterol ester and/or plant stanol ester to the triglyceride fat is at least 6.0 and most preferably at least 13.

43. The gelled emulsion according to any one of claims 34 to 42, characterised in that it contains no cariogenic sugar.

44. The gelled emulsion according to any one of claims 34 to 43, charactersed in that the weight ratio of the plant sterol ester and/or plant stanol ester to the gelling agent is at least 6.0, preferably

at least 6.5, more preferably at least 7.0, still more preferably at least 7.5 and most preferably at least 8.0.

45. The gelled emulsion according to any one of claims 34 to 44, characterised in that the gelling agent comprises gelatin and preferably is gelatin.

46. The gelled emulsion according to claim 45, charactersed in that the amount of gelatin is 15-55 %, preferably 20-50 %, more preferably 22-45 % and most preferably 25-40 % by weight of the amount of water in the gelled emulsion.

47. The gelled emulsion according to claim 45 or 46, charactersed in that the amount of gelatin is 3.0-12 %, preferably 3.5-11 % and most preferably 4.0-10 % by weight of the gelled emulsion.

48. The gelled emulsion according to any one of claims 34-47, charactersed in that the polyols comprise glycerol, and preferably the amount of glycerol is at least 5 %, more preferably at least 10 %, still more preferably at least 15 %, even more preferably at least 20 %, further more preferably at least 50 %, still further more preferably at least 70 % and most preferably at least 85 % by weight of the total amount of polyols.

49. The gelled emulsion according to any one of claims 34-48, charactersed in that the amount of water is 8.0-30 %, preferably 9.0-29 %, more preferably 10-28 % and most preferably 11-27 % by weight.

50. Use of the gelled emulsion according to any one of claims 1 to 49 for preparing an edible product.

51. An edible product comprising the gelled emulsion according to any one of claims 1 to 49.

52. The edible product according to claim 51, characterised in that it is a dietary supplement.

53. The edible product according to claim 51 or 52, characterised in that it further comprises a coating.

54. The edible product according to claim 51 or 52, characterised in that it is uncoated.

55. The edible product according to any one of claims 51 to 54, characterised in that it is packed in a blister.

56. The edible product according to any one of claims 51 to 55, characterised in that it is portable and/or it is chewable and/or it can be stored at room temperatures and/or it has a long shelf life at room temperatures.

57. A blister comprising the gelled emulsion according to any one of claims 1 to 49 or the edible product according to any one of claims 51 to 56.

58. The gelled emulsion according to any one of claims 1 to 49 or the edible product according to any one of claims 51 to 56 for use as a medicament.

59. The gelled emulsion according to any one of claims 1 to 49 or the edible product according to any one of claims 51 to 56 for lowering serum LDL cholesterol level.

60. A method for preparing the gelled emulsion according to any one of claims 1 to 49 comprising

f) preparing an aqueous phase by mixing water and gelling agent, and optionally other water soluble ingredients, preferably at a temperature of at least 40 °C,

g) melting plant sterol ester and/or plant stanol ester, preferably at a temperature of at least 40 °C, and optionally mixing it with other lipid soluble ingredients,

h) emulsifying the melted plant sterol ester and/or plant stanol ester, or the mixture of plant sterol ester and/or plant stanol ester and other lipid soluble ingredients, with the aqueous phase, preferably at a temperature of at least 40 °C,

i) feeding the obtained emulsion, preferably at a temperature of at least 40 °C into moulds, preferably into dose unit moulds, and

j) allowing the emulsion to cool to or below the gelation temperature of the aqueous phase to obtain the gelled emulsion.

61. A method for preparing the edible product according to any one of claims 51 to 56 comprising

h) preparing an aqueous phase by mixing water and gelling agent, and optionally other water soluble ingredients, preferably at a temperature of at least 40 °C,

i) melting plant sterol ester and/or plant stanol ester, preferably at a temperature of at least 40 °C, and optionally mixing it with other lipid soluble ingredients,

j) emulsifying the melted plant sterol ester and/or plant stanol ester, or the mixture of plant sterol ester and/or plant stanol ester and other lipid soluble ingredients, with the aqueous phase, preferably at a temperature of at least 40 °C,

k) feeding the obtained emulsion, preferably at a temperature of at least 40 °C into dose unit moulds,

l) allowing the emulsion to cool to or below the gelation temperature of the aqueous phase to obtain a dose unit of the gelled emulsion,

m) optionally coating the dose unit,

n) packing the obtained dose unit.

62. The method according to claim 60 or 61, characterised in that step b is performed at a temperature of 40-80 °C.

63. The method according to any one of claims 60 to 62, characterised in that step c is performed at a temperature of 40-80 °C, preferably at 45-70 °C and most preferably at 45-60 °C.

64. The method according to any one of claims 61 to 63, characterised in that the method includes no coating step f.

65. The method according to any one of claims 61 to 64, characterised in that the dose unit is packed in a blister.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/000476

A. CLASSIFICATION OF SUBJECT MATTER
INV. A23L1/30 A61K31/575 A61P3/06
ADD.

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)
A23L A61K

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)
EPO-Internal, WPI Data, FSTA, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ARJEN BOT ET AL: "Structuring in -sitosterol-oryzanol-based emulsion gels during various stages of a temperature cycle", FOOD HYDROCOLLOIDS, ELSEVIER BV, NL, vol. 25, no. 4, 28 July 2010 (2010-07-28), pages 639-646, XP028362741, ISSN: 0268-005X, DOI: 10.1016/J.FOODHYD.2010.07.026 [retrieved on 2010-08-05] page 639, paragraph 1 - page 640, right-hand column, paragraph 1 -----	1-59
X	US 2003/044449 A1 (MIYANISHI KENJI [JP] ET AL) 6 March 2003 (2003-03-06) paragraphs [0026] - [0029], [0037]; examples 8, 13 ----- -/--	1-65

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* 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 application or patent 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)

"O" 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

"T" 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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 May 2015	29/05/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Tallgren, Antti

1

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 491 952 B1 (SJOBERG KJELL [SE]) 10 December 2002 (2002-12-10) paragraphs [0003] - [0006]; claims 1,2,21; examples 1-9	1-65
Y	WO 2011/095305 A1 (COGNIS IP MAN GMBH [DE]; SCHWAIER BETTINA [DE]; MUELLER MICHAEL [DE];) 11 August 2011 (2011-08-11) page 6; claims 1,2	1-15
Y	WO 2006/037847 A1 (RAISIO BENECOL OY [FI]; EKBLOM JARI [FI]; LAHTINEN RITVA [FI]; KOPONEN) 13 April 2006 (2006-04-13) page 10, paragraph 3; claims 1,6,10; example 2	1-65
Y	WO 2009/068651 A1 (DSM IP ASSETS BV [NL]; HERSLOEF BENGT [SE]; KORNFELDT ANNA [SE]; VIBER) 4 June 2009 (2009-06-04) claim 1	1-65
Y	DE 10 2005 039835 A1 (COGNIS IP MAN GMBH [DE]) 1 March 2007 (2007-03-01) the whole document	1-65
A	WO 02/065859 A1 (NOVARTIS NUTRITION AG [CH]; AURIOU NICOLAS [CH]; FERRERES VIVIANA [US]) 29 August 2002 (2002-08-29) page 11, paragraph 2; claims 1,18,25; examples 1,2	1-65
A	US 2008/220051 A1 (HORLACHER PETER [DE] ET AL) 11 September 2008 (2008-09-11) paragraphs [0003], [0012]; example 1	1-65
A	WO 00/41491 A2 (NUTRAHEALTH LTD [GB]; VULFSON EVGENY NAUM [GB]; LAW BARRY ARNOLD [GB]) 20 July 2000 (2000-07-20) example 43	1-65
A	CA 1 289 074 C (PINS HEINRICH [DE]; SCHMITZ CHRISTIANE [DE]) 17 September 1991 (1991-09-17) cited in the application claims 1-6,17	25,26, 56-58,65
A	WO 2012/046066 A1 (PROBIO ASA [NO]; COCKBAIN JULIAN [GB]; SIWEK ANDRZEJ [NO]) 12 April 2012 (2012-04-12) claims 1-17; examples 1-6	25,26, 56-58,65
A	WO 97/42830 A1 (UNILEVER NV [NL]; UNILEVER PLC [GB]; RITTER HEIKE [DE]; SANDE ROBERT L) 20 November 1997 (1997-11-20) claim 1; examples 6-10	1-65

-/--

1

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 102 415 465 A (BAOLINGBAO BLOLOGY CO LTD) 18 April 2012 (2012-04-18) abstract	1-65
A	US 2008/089978 A1 (GRIGG LOUISE J [US] ET AL) 17 April 2008 (2008-04-17) paragraph [0288]; example 15	1-65
A	US 2009/238866 A1 (HAUG INGVILD [NO] ET AL) 24 September 2009 (2009-09-24) paragraphs [0009] - [0013], [0024] - [0026], [0033] - [0035]; claims 1,4,6; examples 1-11	1-65

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2015/000476

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003044449 A1	06-03-2003	AT 480155 T	15-09-2010
		CN 1392776 A	22-01-2003
		EP 1302113 A1	16-04-2003
		KR 20080018281 A	27-02-2008
		KR 20080018282 A	27-02-2008
		US 2003044449 A1	06-03-2003
		WO 0205662 A1	24-01-2002
US 6491952 B1	10-12-2002	AT 244557 T	15-07-2003
		AU 4303599 A	23-11-1999
		DE 69909413 D1	14-08-2003
		DE 69909413 T2	09-06-2004
		DK 1009385 T3	03-11-2003
		EP 1009385 A2	21-06-2000
		US 6491952 B1	10-12-2002
		WO 9956729 A1	11-11-1999
WO 2011095305 A1	11-08-2011	AU 2011212736 A1	23-08-2012
		AU 2011212737 A1	23-08-2012
		CA 2787525 A1	11-08-2011
		CA 2787537 A1	11-08-2011
		CN 102740710 A	17-10-2012
		CN 102740711 A	17-10-2012
		EP 2531043 A1	12-12-2012
		EP 2531044 A1	12-12-2012
		ES 2429357 T3	14-11-2013
		ES 2494642 T3	15-09-2014
		JP 2013518565 A	23-05-2013
		JP 2013518566 A	23-05-2013
		KR 20130040776 A	24-04-2013
		US 2012308710 A1	06-12-2012
		US 2012308711 A1	06-12-2012
		WO 2011095305 A1	11-08-2011
		WO 2011095306 A1	11-08-2011
WO 2006037847 A1	13-04-2006	AT 490695 T	15-12-2010
		CN 101048080 A	03-10-2007
		EP 1827137 A1	05-09-2007
		ES 2356178 T3	05-04-2011
		JP 4927744 B2	09-05-2012
		JP 2008515415 A	15-05-2008
		KR 20070107659 A	07-11-2007
		PT 1827137 E	16-02-2011
		US 2008187645 A1	07-08-2008
		WO 2006037847 A1	13-04-2006
WO 2009068651 A1	04-06-2009	NONE	
DE 102005039835 A1	01-03-2007	AU 2006284166 A1	01-03-2007
		DE 102005039835 A1	01-03-2007
		EP 1916912 A1	07-05-2008
		ES 2384884 T3	13-07-2012
		JP 2009505996 A	12-02-2009
		US 2008220051 A1	11-09-2008
		WO 2007022891 A1	01-03-2007
WO 02065859 A1	29-08-2002	BR 0207374 A	15-06-2004
		CA 2438519 A1	29-08-2002

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2015/000476

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		EP 1363508 A1	26-11-2003
		HU 0400749 A2	30-08-2004
		JP 2004519232 A	02-07-2004
		MX PA03007419 A	18-11-2003
		PL 363289 A1	15-11-2004
		WO 02065859 A1	29-08-2002
		ZA 200306161 A	02-08-2004
US 2008220051 A1	11-09-2008	AU 2006284166 A1	01-03-2007
		DE 102005039835 A1	01-03-2007
		EP 1916912 A1	07-05-2008
		ES 2384884 T3	13-07-2012
		JP 2009505996 A	12-02-2009
		US 2008220051 A1	11-09-2008
		WO 2007022891 A1	01-03-2007
WO 0041491 A2	20-07-2000	AU 1995400 A	01-08-2000
		EP 1146798 A2	24-10-2001
		WO 0041491 A2	20-07-2000
CA 1289074 C	17-09-1991	AU 577213 B2	15-09-1988
		AU 6841687 A	15-07-1987
		CA 1289074 C	17-09-1991
		DE 3545090 C1	25-06-1987
		DK 396787 A	29-07-1987
		EP 0227050 A1	01-07-1987
		EP 0250578 A1	07-01-1988
		GR 3002266 T3	30-12-1992
		JP H0778018 B2	23-08-1995
		JP S63502430 A	14-09-1988
		WO 8703805 A1	02-07-1987
WO 2012046066 A1	12-04-2012	AU 2011311326 A1	02-05-2013
		CA 2813696 A1	12-04-2012
		CN 103313699 A	18-09-2013
		EP 2624814 A1	14-08-2013
		JP 2013543502 A	05-12-2013
		US 2014065192 A1	06-03-2014
		WO 2012046066 A1	12-04-2012
WO 9742830 A1	20-11-1997	AU 767968 B2	27-11-2003
		AU 3028297 A	05-12-1997
		CA 2253855 A1	20-11-1997
		CZ 9803642 A3	16-06-1999
		DE 69732239 D1	17-02-2005
		DE 69732239 T2	22-12-2005
		EP 0918465 A1	02-06-1999
		ES 2235233 T3	01-07-2005
		PL 329763 A1	12-04-1999
		SK 153798 A3	13-04-1999
		US 6846507 B1	25-01-2005
		WO 9742830 A1	20-11-1997
CN 102415465 A	18-04-2012	NONE	
US 2008089978 A1	17-04-2008	NONE	
US 2009238866 A1	24-09-2009	AU 2007209128 A1	02-08-2007

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2015/000476

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		AU 2007209133 A1	02-08-2007
		CA 2640069 A1	02-08-2007
		CA 2640529 A1	02-08-2007
		CN 101384252 A	11-03-2009
		CN 101389310 A	18-03-2009
		CN 104013567 A	03-09-2014
		EA 200801602 A1	27-02-2009
		EA 200801603 A1	30-12-2008
		EP 1978929 A1	15-10-2008
		EP 1978943 A1	15-10-2008
		JP 5295781 B2	18-09-2013
		JP 5339920 B2	13-11-2013
		JP 2009524633 A	02-07-2009
		JP 2009526760 A	23-07-2009
		JP 2013100317 A	23-05-2013
		US 2009220576 A1	03-09-2009
		US 2009238866 A1	24-09-2009
		WO 2007085835 A1	02-08-2007
		WO 2007085840 A1	02-08-2007

---

(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 106061290 A
(43)申请公布日 2016.10.26

(21)申请号 201580010389.0

(22)申请日 2015.03.03

(30)优先权数据
14000748.5 2014.03.03 EP
14001830.0 2014.05.26 EP
PCT/EP2014/002551 2014.09.19 EP

(85)PCT国际申请进入国家阶段日
2016.08.25

(86)PCT国际申请的申请数据
PCT/EP2015/000476 2015.03.03

(87)PCT国际申请的公布数据
WO2015/131995 EN 2015.09.11

(71)申请人 拉伊西奥营养有限公司
地址 芬兰拉伊西奥

(72)发明人 I•韦斯特 帕伊维•库西斯托
约尼•尼玛拉 图拉•弗博姆
库尔特•I•德拉盖特
安德烈•斯维克
卡米拉•伦德豪格
简•埃里克•奥尔森

(74)专利代理机构 北京安信方达知识产权代理有限公司 11262
代理人 李平 郑霞

(51)Int.Cl.
A23L 33/10(2016.01)
A61K 31/575(2006.01)
A61P 3/06(2006.01)

权利要求书6页 说明书44页

(54)发明名称

降低血清胆固醇的食用产品

(57)摘要

本发明涉及一种含有植物甾醇酯和/或植物甾烷醇酯的降低血清LDL胆固醇的食用产品，并且尤其涉及一种膳食补充剂产品。

CN 106061290 A

1.一种胶化乳剂,包含:

-按重量计为至少20%的量的植物甾醇酯和/或植物甾烷醇酯,

-按重量计为至多15%的量的胶凝剂,以及

-按重量计为3.0%-35%的量的水。

2.根据权利要求1所述的胶化乳剂,其特征在于按重量计,植物甾醇酯和/或植物甾烷醇酯的量优选为至多80%,优选至多75%,更优选至多73%,仍更优选至多70%并且最优选至多68%。

3.根据权利要求1或2所述的胶化乳剂,其特征在于按重量计,植物甾醇酯和/或植物甾烷醇酯的量为至少25%,优选至少30%,更优选至少35%,仍更优选至少40%,甚至更优选至少42%,进一步更优选至少45%,仍进一步更优选至少48%,甚至进一步更优选至少50%并且最优选至少52%。

4.根据权利要求1至3中任一项所述的胶化乳剂,其特征在于该植物甾醇酯和/或植物甾烷醇酯包括按重量计为至少10%、优选至少50%、更优选至少70%并且最优选至少90%的量的植物甾烷醇酯。

5.根据权利要求1至4中任一项所述的胶化乳剂,其特征在于按重量计,该胶化乳剂进一步包含0%-20%,优选0%-15%,更优选0%-10%,仍更优选0%-9.0%,甚至更优选0%-8.0%,进一步更优选0%-6.0%,仍进一步更优选0%-4.0%,仍甚至进一步更优选0%-2.0%并且最优选0%-0.1%的量的甘油三酯脂肪。

6.根据权利要求1至5中任一项所述的胶化乳剂,其特征在于按重量计,该胶凝剂的总量为至多14%,优选至多13%,更优选至多12%,仍更优选至多11%并且最优选至多10%。

7.根据权利要求1至6中任一项所述的胶化乳剂,其特征在于按重量计,该胶凝剂的总量为至少0.1%,优选至少0.2%,更优选至少0.3%,仍更优选至少0.4%并且最优选至少0.5%。

8.根据权利要求1至7中任一项所述的胶化乳剂,其特征在于该胶凝剂选自由一种或多种蛋白质、一种或多种多糖以及它们的任何混合物组成的组,优选地选自由明胶、角叉菜胶、果胶、藻酸盐、结冷胶、琼脂、淀粉、淀粉衍生物、阿拉伯树胶、菊粉、黄原胶、刺槐豆胶、葡甘露聚糖和/或它们的混合物组成的组,更优选地选自由明胶、角叉菜胶、果胶、藻酸盐、结冷胶、琼脂、淀粉、淀粉衍生物、以及当与其他聚合化合物一起使用时形成凝胶的聚合化合物,诸如黄原胶和刺槐豆胶;黄原胶和葡甘露聚糖;菊粉以及明胶、结冷胶、角叉菜胶或果胶和它们的混合物中的任一种组成的组,仍更优选地选自由明胶、角叉菜胶、果胶、藻酸盐、结冷胶、琼脂或它们的混合物组成的组。

9.根据权利要求1至8中任一项所述的胶化乳剂,其特征在于该胶凝剂优选地包含按重量计至少50%,更优选至少60%,仍更优选至少70%,甚至更优选至少80%并且最优选至少90%的量的明胶,以及任选地选自由角叉菜胶、果胶、藻酸盐、结冷胶以及琼脂组成的组的至少一种胶凝剂,并且最优选该胶凝剂为明胶。

10.根据权利要求9所述的胶化乳剂,其特征在于按重量计,明胶的量为1.0%-15%,优选2.0%-14%,更优选2.5%-13%,仍更优选3.0%-12%,甚至更优选3.5%-11%并且最优选4.0%-10%。

11.根据权利要求9或10所述的胶化乳剂,其特征在于按该胶化乳剂中水的量的重量

计，明胶的量为15%-55%，优选20%-50%，更优选22%-45%并且最优选25%-40%。

12.根据权利要求1至11中任一项所述的胶化乳剂，其特征在于该胶化乳剂进一步包含一种或多种多元醇。

13.根据权利要求12所述的胶化乳剂，其特征在于按重量计，多元醇的总量为1.0%-60%，优选1.0%-50%，更优选2.0%-50%，仍更优选3.0%-40%，甚至更优选4.0%-35%，进一步更优选4.0%-30%，仍进一步更优选5.0%-30%，甚至进一步更优选5.0%-25%并且最优选5.0%-20%。

14.根据权利要求12或13所述的胶化乳剂，其特征在于这些多元醇包含甘油，并且按多元醇总量的重量计，甘油的量优选为至少5%，更优选至少10%，仍更优选至少15%，甚至更优选至少20%，进一步更优选至少50%，仍进一步更优选至少70%并且最优选至少85%。

15.根据权利要求12或13所述的胶化乳剂，其特征在于这些多元醇包含木糖醇，并且按多元醇总量的重量计，木糖醇的量优选为至少5%，更优选至少10%，仍更优选至少20%，甚至更优选至少40%，进一步更优选至少50%，仍进一步更优选至少60%，甚至进一步更优选至少65%并且最优选至少80%。

16.根据权利要求12或13所述的胶化乳剂，其特征在于这些多元醇包含甘油和木糖醇，并且甘油与木糖醇的重量比优选为0.05-10，更优选0.08-2.0，仍更优选地0.11-1.0，甚至更优选地0.14-0.8，并且最优选0.16-0.5，并且/或者按甘油和木糖醇总量的重量计，甘油的量优选为至少5%，更优选地至少7%，仍更优选地至少10%，甚至更优选地至少12%并且最优选至少14%。

17.根据权利要求12或13所述的胶化乳剂，其特征在于这些多元醇包含木糖醇和山梨糖醇，并且优选地木糖醇与山梨糖醇的重量比为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。

18.根据权利要求12或13所述的胶化乳剂，其特征在于这些多元醇包含甘油、木糖醇和山梨糖醇，并且甘油与木糖醇和山梨糖醇总量的重量比优选为0.05-10，更优选0.08-2.0，仍更优选地0.11-1.0，甚至更优选地0.14-0.8，并且最优选0.16-0.5，并且/或者木糖醇与山梨糖醇的重量比优选为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2，并且/或者按甘油、木糖醇和山梨糖醇总量的重量计，甘油的量优选为至少5%，更优选地至少7%，仍更优选地至少10%，甚至更优选地至少12%并且最优选至少14%。

19.根据权利要求1至18中任一项所述的胶化乳剂，其特征在于进一步包含选自由蔗糖、葡萄糖、果糖、麦芽糖以及乳糖组成的组的一种或多种致龋糖。

20.根据权利要求19所述的胶化乳剂，其特征在于按重量计，致龋糖的总量为至多20%，优选至多15%，更优选至多10%，仍更优选至多5%，甚至更优选0%-0.1%。

21.根据权利要求1至18中任一项所述的胶化乳剂，其特征在于没有致龋糖存在于该胶化乳剂中。

22.根据权利要求1至21中任一项所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该胶凝剂的重量比为至少6.0，优选至少6.5，更优选至少7.0，仍更优选至少7.5并且最优选至少8.0。

23.根据权利要求6至22中任一项所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该甘油三酯脂肪的重量比至少1.3，优选至少1.5，更优选至少2.0，仍更优选

至少3.0，甚至更优选至少4.0，进一步更优选至少5.0，仍进一步更优选至少6.0并且最优选至少13。

24.根据权利要求12至23中任一项所述的胶化乳剂，其特征在于植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比为至少1.0，优选至少1.4，更优选至少1.7，仍更优选至少2.5，甚至更优选至少2.5并且最优选至少3.0。

25.根据权利要求1至24中任一项所述的胶化乳剂，其特征在于该胶化乳剂的剂量单位的大小为至少0.3g，优选0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。

26.根据权利要求1至25中任一项所述的胶化乳剂，其特征在于该胶化乳剂的日剂量为1.0-25g，优选1.3-20g，更优选1.5-17g，仍更优选1.8-15g并且最优选2.0-13g。

27.根据权利要求1至26中任一项所述的胶化乳剂，其特征在于它的水活度aw为至多0.90，优选至多0.87，更优选至多0.85，仍更优选至多0.80并且最优选至多0.75。

28.根据权利要求1至27中任一项所述的胶化乳剂，其特征在于它的含水量按重量计为4.0％-34％，优选5.0％-33％，更优选6.0％-32％，仍更优选7.0％-31％，甚至更优选8.0％-30％，进一步更优选9.0％-29％，仍进一步更优选10％-28％并且最优选11％-27％。

29.根据权利要求1至28中任一项所述的胶化乳剂，其特征在于进一步包含pH调节剂，诸如酸和缓冲剂，这些酸和/或缓冲剂的总量优选为按重量计少于15％，更优选少于13％，仍更优选地少于10％，甚至更优选少于8.0％并且最优选少于6.0％。

30.根据权利要求1至29中任一项所述的胶化乳剂，其特征在于它的能含量为每个该胶化乳剂的日剂量至多840kJ，优选至多670kJ，更优选至多500kJ，仍更优选至多330kJ并且最优选至多200kJ。

31.根据权利要求1至30中任一项所述的胶化乳剂，其特征在于每克该胶化乳剂的能含量为至多40kJ，优选至多35kJ，更优选至多30kJ，仍更优选至多25kJ并且最优选至多20kJ。

32.根据权利要求1至31中任一项所述的胶化乳剂，其特征在于它是一种固体胶化乳剂并且/或者在20℃，优选在22℃，更优选在25℃并且最优选在30℃下它是固体，并且/或者它是可咀嚼并且/或者它可以在室温下储存。

33.根据权利要求1至32中任一项所述的胶化乳剂，其特征在于它是一种膳食补充剂产品。

34.根据权利要求1至33中任一项所述的胶化乳剂，其特征在于它包含

-按重量计为25％-80％的量的植物甾醇酯和/或植物甾烷醇酯，

-按重量计为至多13％的量的胶凝剂，

-按重量计为5.0％-33％的量的水，并且该胶化乳剂的水活度为至多0.80

-任选地按重量计为0％-20％的量的甘油三酯脂肪，以及

-任选地按重量计为1.0％-50％的量的一种或多种多元醇。

35.根据权利要求34所述的胶化乳剂，其特征在于它包含按重量计总量为1.0％至50％，优选2.0％-50％，更优选3.0％-40％，仍更优选地4.0％-35％，甚至更优选4.0％-30％，进一步更优选5.0％-30％，仍进一步更优选5.0％-25％并且最优选5.0％-20％的一种或多种多元醇。

36.根据权利要求34或35所述的胶化乳剂，其特征在于它包含

-按重量计为35%-75%的量的植物甾醇酯和/或植物甾烷醇酯，

-按重量计为至多12%的量的胶凝剂。

37.根据权利要求36所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该甘油三酯脂肪的重量比为至少2.0，优选至少3.0，更优选至少4.0，仍更优选至少5.0，甚至更优选至少6.0并且最优选至少13。

38.根据权利要求34所述的胶化乳剂，其特征在于它包含

-按重量计为40%-75%的量的植物甾醇酯和/或植物甾烷醇酯，

-按重量计为至多12%的量的胶凝剂，

-按重量计为6.0%-32%的量的水，

-任选地按重量计为0%-10%的量的甘油三酯脂肪，以及

-任选地按重量计为1.0%-40%的量的一种或多种多元醇。

39.根据权利要求38所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该甘油三酯脂肪的重量比为至少5.0，优选至少6.0并且最优选至少13。

40.根据权利要求38或39所述的胶化乳剂，其特征在于它包含按重量计总量为1.0%-40%，优选2.0%-40%，更优选3.0%-40%，仍更优选地4.0%-35%，甚至更优选5.0%-30%，进一步更优选5.0%-25%并且最优选5.0%-20%的一种或多种多元醇。

41.根据权利要求38至40中任一项所述的胶化乳剂，其特征在于它包含

-按重量计为45%-73%的量的植物甾醇酯和/或植物甾烷醇酯，

-按重量计为至多12%的量的胶凝剂，

-按重量计为7.0%-31%的量的水，

-任选地按重量计为0%-9.0%的量的甘油三酯脂肪，以及

-任选地按重量计为1.0%-40%的量的一种或多种多元醇。

42.根据权利要求41所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该甘油三酯脂肪的重量比为至少6.0并且最优选至少13。

43.根据权利要求34至42中任一项所述的胶化乳剂，其特征在于它不含有致龋糖。

44.根据权利要求34至43中任一项所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该胶凝剂的重量比为至少6.0，优选至少6.5，更优选至少7.0，仍更优选至少7.5并且最优选至少8.0。

45.根据权利要求34至44中任一项所述的胶化乳剂，其特征在于该胶凝剂包含明胶并且优选为明胶。

46.根据权利要求45所述的胶化乳剂，其特征在于按该胶化乳剂中水的量的重量计，明胶的量为15%-55%，优选20%-50%，更优选22%-45%并且最优选25%-40%。

47.根据权利要求45或46所述的胶化乳剂，其特征在于按该胶化乳剂的重量计，明胶的量为3.0%-12%，优选3.5%-11%并且最优选4.0%-10%。

48.根据权利要求34-47中任一项所述的胶化乳剂，其特征在于这些多元醇包含甘油，并且按多元醇总量的重量计，甘油的量优选为至少5%，更优选至少10%，仍更优选至少15%，甚至更优选至少20%，进一步更优选至少50%，仍进一步更优选至少70%并且最优选至少85%。

49.根据权利要求34-48中任一项所述的胶化乳剂，其特征在于按重量计，水的量为

8.0%-30%，优选9.0%-29%，更优选10%-28%并且最优选11%-27%。

50.根据权利要求1至49中任一项所述的胶化乳剂用于制备一种食用产品的用途。

51.一种食用产品，包含根据权利要求1至49中任一项所述的胶化乳剂。

52.根据权利要求51所述的食用产品，其特征在于它是一种膳食补充剂。

53.根据权利要求51或52所述的食用产品，其特征在于它进一步包含一个涂层。

54.根据权利要求51或52所述的食用产品，其特征在于它是未包覆的。

55.根据权利要求51至54中任一项所述的食用产品，其特征在于它包装在一种泡罩中。

56.根据权利要求51至55中任一项所述的食用产品，其特征在于它是便携的并且/或者它是可咀嚼并且/或者它可以在室温下储存，并且/或者它在室温下具有一个长的储存期限。

57.一种泡罩，包含根据权利要求1至49中任一项所述的胶化乳剂或者根据权利要求51至56中任一项所述的食用产品。

58.根据权利要求1至49中任一项所述的胶化乳剂或者根据权利要求51至56中任一项所述的食用产品，用作一种药物。

59.根据权利要求1至49中任一项所述的胶化乳剂或者根据权利要求51至56中任一项所述的食用产品，用于降低血清LDL胆固醇含量。

60.一种用于制备根据权利要求1至49中任一项所述的胶化乳剂的方法，该方法包括

f)优选地在至少40℃的温度下，通过将水与胶凝剂以及任选的其他水溶性成分混合来制备一种水相，

g)优选地在至少40℃的温度下，将植物甾醇酯和/或植物甾烷醇酯熔融，并且任选地将它与其他脂溶性成分混合，

h)优选地在至少40℃的温度下，将熔融植物甾醇酯和/或植物甾烷醇酯，或植物甾醇酯和/或植物甾烷醇酯与其他脂溶性成分的混合物与水相乳化，

i)优选地在至少40℃的温度下，将获得的乳剂给料至模具中，优选地给料至剂量单位模具中，并且

j)允许该乳剂冷却至或低于该水相的胶凝温度以获得该胶化乳剂。

61.一种用于制备根据权利要求51至56中任一项所述的食用产品的方法，该方法包括

h)优选地在至少40℃的温度下，通过将水与胶凝剂以及任选的其他水溶性成分混合来制备一种水相，

i)优选地在至少40℃的温度下，将植物甾醇酯和/或植物甾烷醇酯熔融，并且任选地将它与其他脂溶性成分混合，

j)优选地在至少40℃的温度下，将熔融植物甾醇酯和/或植物甾烷醇酯，或植物甾醇酯和/或植物甾烷醇酯与其他脂溶性成分的混合物与水相乳化，

k)优选地在至少40℃的温度下，将获得的乳剂给料至剂量单位模具中，

l)允许该乳剂冷却至或低于该水相的胶凝温度以获得一个剂量单位的该胶化乳剂，

m)任选地对该剂量单位进行包覆，

n)对获得的剂量单位进行包装。

62.根据权利要求60或61所述的方法，其特征在于步骤b是在40℃-80℃的温度下进行。

63.根据权利要求60至62中任一项所述的方法，其特征在于步骤c是在40℃-80℃，优选

在45℃-70℃并且最优选在45℃-60℃的温度下进行。

64.根据权利要求61至63中任一项所述的方法，其特征在于该方法不包括包覆步骤f。

65.根据权利要求61至64中任一项所述的方法，其特征在于该剂量单位包装在一种泡罩中。

降低血清胆固醇的食用产品

发明领域

[0001] 本发明涉及一种具有降低血清LDL胆固醇效果的食用产品，并且特别地涉及一种基于植物甾醇酯和/或植物甾烷醇酯的食用产品。典型地，该食用产品是一种膳食补充剂产品。

[0002] 发明背景

[0003] 在西方国家，心血管疾病被看作是最常见的疾病并且它的发生是进一步增加的。最重要的个体风险因素是升高的血清LDL胆固醇含量，并且因此，关于心血管疾病的预防和有效治疗两个方面，降低LDL胆固醇的血液浓度是最有效的单项措施。

[0004] 用于降低胆固醇含量的最重要的药物是他汀类，这类药物主要通过抑制肝脏中的胆固醇合成而起作用。他汀类最常见的副作用是胃肠的副作用。其他不太常见的副作用包括头痛、眩晕、皮疹、以及睡眠障碍。此外，他汀类可导致肝损伤和肌肉异常两者，并且据报道它们会增加II型糖尿病的风险。

[0005] 作为药物的一个替代方案，或除了药物之外，生活方式的改变也可以减小心血管疾病的风险。具体地说，增加身体锻炼并且/或者采取一种低脂肪或低胆固醇饮食是有益的。用于降低血清LDL胆固醇含量的另一个营养方式是在功能性食品中使用降低胆固醇的成分，这类功能性食品可以作为常规饮食的一部分被消耗。此替代方案已受到消费者的极大欢迎。

[0006] 具有添加的植物甾醇和/或植物甾烷醇以用于有效降低血清LDL胆固醇的食品(诸如人造黄油型涂抹食品、可饮用以及可勺取酸奶)在市场上很受欢迎，特别是在欧洲市场。在美国和欧洲两个市场中，具有添加的植物甾醇和/或植物甾烷醇的食品和膳食补充剂产品由于降低血清LDL胆固醇的效果而可以与经批准的冠心病风险降低健康宣称一起销售，其条件是这些产品满足使用此类健康宣称的设定条件。商用植物甾醇和/或植物甾烷醇产品的成功依赖于销售具有有力健康宣称的产品的可能性。

[0007] 在欧洲，为了支持这种冠心病风险降低健康宣称，该产品需要递送1.5-2.4g当量的植物甾醇和/或植物甾烷醇。在美国，FDA的最新条款规定，为了支持疾病风险降低健康宣称，对于2g植物甾醇和/或植物甾烷醇的总日摄取量，该产品需要递送每常规消耗的参考量(RACC)至少0.5g当量的植物甾醇和/或植物甾烷醇。每日需要的2g植物甾醇和/或植物甾烷醇可以在1-4份食品或膳食补充剂中递送。

[0008] 当前流行的基于植物甾醇酯和/或植物甾烷醇酯的食品是需要连续冷藏的产品。然而，许多消费者更愿意使他们日剂量的植物甾醇和/或植物甾烷醇存在于无论他们去哪里都可以随身携带的产品中，例如，作为一种膳食补充剂。

[0009] 基于酯化的植物甾醇和/或植物甾烷醇的膳食补充剂目前主要作为所谓的软胶囊剂进行销售。然而这种类型产品的一个问题是软胶囊剂的尺寸大，从而导致吞咽的问题。此类软胶囊剂典型地递送包含在每个软胶囊剂中的约1g植物甾醇酯和/或植物甾烷醇酯。通常植物甾醇和/或植物甾烷醇的推荐量为2g/天，这意味着植物甾醇酯和/或植物甾烷醇酯的每日最低所需量为约3.4g。这意味着消费者必须每天吞咽若干大的软胶囊剂以获得每日

推荐量的为酯化形式的植物甾醇和/或植物甾烷醇。许多消费者对吞咽此类大胶囊具有困难。此外，吞咽此类胶囊涉及同时饮用水或别的液体，并且这些胶囊因此不是很方便使用。

[0010] 基于游离植物甾醇和/或植物甾烷醇的膳食补充剂通常是压制片。这些压制片通常小于软胶囊剂，但通常需要液体以便吞咽这些片剂。然而，具有吞咽困难的人可能对吞咽即使较小尺寸的片剂也有困难。

[0011] 因此，对于一种新型便携式植物甾醇酯和/或植物甾烷醇酯食用产品(诸如膳食补充剂产品)存在需要。此类产品应当优选地是易于消耗和便携的，具有在室温下储存的可能性，并且仍具有足够长的储存期限以便在商业上可行。它们还应当优选地具有良好的味道。此外这种产品应当优选地递送为了履行不同司法权中降低胆固醇健康宣称的条款而所需要的日最小量植物甾醇和/或植物甾烷醇。

[0012] 具有可以在室温下储存的含有高植物甾醇酯和/或植物甾烷醇酯含量的一种便携式食用产品(诸如一种膳食补充剂产品)将会是有利的。此外，这种食用产品应当具有有限的吞咽问题或没有吞咽问题而易于消耗，并且它应当可能在不同时消耗任何液体的情况下而被消耗。此外，这种食用产品优选地具有低的能含量。良好的感官特性是令人希望的。该产品的配制品也应当优选地使得植物甾醇和/或植物甾烷醇的降低血清LDL胆固醇的效果良好。本发明满足这些需求并且提供一种含有植物甾醇酯和/或植物甾烷醇酯的新型食用产品(诸如一种膳食补充剂产品)。

[0013] 发明简要说明

[0014] 本发明是针对一种胶化乳剂，该胶化乳剂包含：

[0015] -按重量计为至少20％的量的植物甾醇酯和/或植物甾烷醇酯，

[0016] -按重量计为至多15％的量的胶凝剂，以及

[0017] -按重量计为3.0％-35％的量的水。

[0018] 本发明进一步针对一种食用产品，该食用产品包含如上所定义的胶化乳剂。

[0019] 本发明进一步针对一种泡罩，该泡罩包括该胶化乳剂或该食用产品。

[0020] 本发明进一步针对用于制备以上定义的胶化乳剂和食用产品的方法。

[0021] 发明具体说明

[0022] 因此本发明的一个目的是提供一种包含植物甾醇酯和/或植物甾烷醇酯、胶凝剂以及水的胶化乳剂。本发明的另一个目的是提供一种包含含有植物甾醇酯和/或植物甾烷醇酯、胶凝剂以及水的胶化乳剂的食用产品(诸如一种膳食补充剂产品)。该胶化乳剂和该食用产品优选地目标在于降低血清LDL胆固醇含量。

[0023] 已出人意料地发现，一种具有良好感官特性并且可以在室温下储存且仍保持它的良好品质并且具有高含量植物甾醇酯和/或植物甾烷醇酯的便携式且易于消耗的食用产品(诸如一种膳食补充剂产品)可以被制备成一种胶化乳剂。优选地该产品具有低的能含量。通过使用特定量的植物甾醇酯和/或植物甾烷醇酯、胶凝剂以及水，可以获得具有高植物甾醇酯和/或植物甾烷醇酯含量并且具有良好感官特性的胶化乳剂。通过具有特定量的植物甾醇酯和/或植物甾烷醇酯、胶凝剂以及水，可以制备具有良好质地和口感的胶化乳剂。胶化乳剂的口感和表面不是油性的。尽管植物甾醇酯和/或植物甾烷醇酯的浓度高，胶化乳剂将植物甾醇酯和/或植物甾烷醇酯保持在凝胶基质中。这是出人意料的，因为不可能通过使用游离植物甾醇和/或植物甾烷醇代替植物甾醇酯和/或植物甾烷醇酯来产生相应的产品。

还出人意料地注意到，具有为至少6.0的植物甾醇酯和/或植物甾烷醇酯与胶凝剂的重量比是优选的。优选地该胶化乳剂是一种固体胶化乳剂。它适合于如此(即，未包覆的)用作一种食用产品。最优选地该食用产品(例如一种膳食补充剂产品)是已封装至一个包装中的一个剂量单位的胶化乳剂(即，由一个剂量单位的胶化乳剂组成)。为了优异的水阻挡和阻隔特性，这种包含胶化乳剂的食用产品(例如一种膳食补充剂产品)可以优选地包装在泡罩中，最优选地包装在铝泡罩中。未包覆的食用产品(即胶化乳剂)优选地包装成在泡罩中的单个剂量单位。可替代地，该胶化乳剂可包覆有一种可咀嚼涂层或一种在口中融化的涂层。在包覆后，该食用产品可包装为单个剂量单位或同一包装中的若干剂量单位。

[0024] 本发明食用产品(诸如一种膳食补充剂产品)的一个优点在于，酯化的植物甾醇和/或植物甾烷醇(即植物甾醇酯和/或植物甾烷醇酯)以高浓度用于食用产品并且该产品仍具有良好的感官特性。本发明不能应用于使用游离植物甾醇和/或植物甾烷醇代替酯化的植物甾醇和/或植物甾烷醇。该食用产品是便携的。这意味着它可以容易地随身携带。该食用产品可以在室温下储存。这意味着当它在室温下延长时间储存时仍保持它的良好品质(即感官和微生物学品质)。因此，该食用产品不需要冷藏。该食用产品优选地是一种膳食补充剂产品。该食用产品包含一种胶化乳剂，该胶化乳剂优选地在室温下是固体，但具有味道良好的柔软且可咀嚼质地。该食用产品不可涂抹。该食用产品是可咀嚼的。因此消费者不需要吞咽胶囊或片剂但可以容易地咀嚼该食用产品。另外，该食用产品可以不同时使用必要的摄入液体而消耗。因此该食用产品是易于消耗的。该食用产品优选地具有低的能含量。

[0025] 植物甾醇酯和/或植物甾烷醇酯在室温下是固体、半固体或液体，并且在这样摄入时典型地导致一种口腔中的令人不悦的脂肪层，特别是在口腔的后部和顶部。出人意料地是根据本发明的胶化乳剂的口感不是油性的也不是脂肪的，并且另外它在摄入时不在口腔的后部和顶部导致任何令人不悦的脂肪层，尽管它的植物甾醇酯和/或植物甾烷醇酯含量高。该口感不是胶粘的或粘稠的，并且该胶化乳剂不会卡在牙齿上。该胶化乳剂是可咀嚼的。该胶化乳剂优选地在室温(例如22℃)下是固体，不可倾流，并且即使当从它的包装(例如当包装在铝泡罩中时)中移除并且在室温下储存时，该胶化乳剂仍保持它的物理状态和形式。

[0026] 尽管植物甾醇酯和/或植物甾烷醇酯的含量高，但胶化乳剂的制备不需要高浓度的胶凝剂或胶凝剂混合物。该乳剂的物理性质(诸如乳剂在其中发生乳化作用和进一步加工的温度下的稳定性和粘度)是使生产和包装能够进行的。

[0027] 该食用产品(例如一种膳食补充剂产品)的生产过程可以，但不优选地包括该胶化乳剂的包覆。优选地该生产过程不包括任何干燥步骤。该食用产品可以在室温下储存，特别是当包装在铝泡罩中时。因此该食用产品具有在室温下的长储存期限。该储存期限为从至少6个月直到若干年。

[0028] 因此，本发明是针对包含一种胶化乳剂的一种食用产品，优选一种膳食补充剂产品，优选一种降低血清LDL胆固醇的膳食补充剂产品，该胶化乳剂包含：

[0029] -按重量计为至少20％的量的植物甾醇酯和/或植物甾烷醇酯，

[0030] -按重量计为至多15％的量的胶凝剂，以及

[0031] -按重量计为3.0％-35％的量的水。

[0032] 本发明还针对以上定义的胶化乳剂。

[0033] 本发明进一步针对一种泡罩，该泡罩包括该胶化乳剂或该食用产品。

[0034] 本发明进一步针对用作一种药物的胶化乳剂和食用产品，优选一种膳食补充剂产品。这里的药物意指一种物质，该物质在预防或减轻疾病或疾病风险因素的方面是生理学活性的。该胶化乳剂和该食用产品适合于例如用于治疗或减轻哮喘、阿尔茨海默病(Alzheimer's disease)并且/或者用于降低心血管疾病的风险。

[0035] 本发明进一步针对用于降低血清LDL胆固醇含量的胶化乳剂和食用产品，优选一种膳食补充剂产品。

[0036] 本披露中的“膳食补充剂产品”意指不作为常规食物产品展示或销售但用于以植物甾醇酯和/或植物甾烷醇酯来补充饮食，而优选地目标在于降低血清LDL胆固醇浓度的食用产品。在本披露中，术语“膳食补充剂”还涵盖满足上述定义但是出于诸如“医药食品”或“医疗装置”的类似目的可以在一些国家展示或销售的食用产品。膳食补充剂产品不替代餐点、小吃或日常饮食。本发明的食用产品(例如一种膳食补充剂产品)优选地是一种低能量、胶化油包水乳剂，该油包水乳剂在室温下为固体并且更优选是未包覆的。

[0037] 本披露中的“乳剂”意指一种水相与含有植物甾醇酯和/或植物甾烷醇酯的一种脂相的混合物，其中两个相在乳化过程的温度下均为液体形式，并且其中一个相作为小液滴均匀分散到另一个相中。该乳剂优选地是一种水包油(O/W)乳剂，或者如果需要，它还可以是多于双相的(例如一种双重乳剂)。“水包油(O/W)乳剂”意指其中脂类以分散相存在并且水以连续相存在的乳剂。

[0038] 本披露中的“胶化乳剂”意指一种含有植物甾醇酯和/或植物甾烷醇酯以及一个含有胶凝剂的胶化水相的乳剂。在胶化水相中，胶凝剂已形成一种将水捕集或固定在间隙中的刚性三维网络。因此该胶化乳剂是一种凝胶。优选地该胶化乳剂是一种水包油类型的乳剂。优选地在至少40℃的温度下，用含有胶凝剂的水相来乳化植物甾醇酯和/或植物甾烷醇酯。然后水相中的胶凝剂的胶凝作用使乳剂稳定，即形成一种“胶化乳剂”。胶凝作用涉及使胶凝剂分子彼此缔合以形成一种三维网络，即一种凝胶。胶凝作用的过程是复杂的并且受到乳剂中不同成分的性质和浓度以及加工条件的影响。胶凝作用例如在冷却时发生或借助于离子(例如Ca离子)发生。优选地胶凝作用在冷却时发生。凝胶形成能力不仅取决于胶凝剂的性质，还取决于其他因素，诸如胶凝剂浓度、水浓度以及植物甾醇酯和/或植物甾烷醇酯浓度。因此植物甾醇酯和/或植物甾烷醇酯相分散在凝胶基质中，即分散在胶凝剂分子和固定化水的网络中。在室温下，胶化乳剂中的植物甾醇酯和/或植物甾烷醇酯为液体、半固体和/或固体状态，优选地为半固体和/或固体状态。该水相在室温(例如22℃)下为胶化形式。植物甾醇酯和/或植物甾烷醇酯相可以或不可以与凝胶基质化学相互作用。本发明的胶化乳剂是可咀嚼的。该胶化乳剂不可涂抹。该胶化乳剂不是粉末。本发明的胶化乳剂优选地在室温(例如22℃)下为固体。最优选地，该胶化乳剂是一种固体胶化乳剂(在22℃下)。

[0039] 本披露中的“固体胶化乳剂”意指一种本发明的胶化乳剂，该胶化乳剂在室温(例如22℃)下具有固体外观并且保持它的结构。该固体胶化乳剂在室温下不可倾流。术语固体胶化乳剂意指该胶化乳剂在室温下保持它的形式(即形状，这意味着该胶化乳剂保持它的三维形式)。这意味着当它从它的泡罩或其他模具中释放出来时，该形式被保持，即，即使当它没有任何涂层或模具如此进行储存时，该形式仍被保持。因此固体胶化乳剂在20℃、优选在22℃、更优选在25℃，并且最优选在30℃下具有一种固体外观。实际上，固体胶化乳剂意

味着该产品对于一个人用他的手指将其从包装中取出来说是足够坚固的。当温度升高到30℃以上时，固体胶化乳剂优选地变柔软。更优选地，固体胶化乳剂在35℃左右或高于35℃的温度下变柔软。优选地固体胶化乳剂的水相的胶凝作用是热可逆的，即当温度升高至或高于凝胶溶解温度时凝胶结构被破坏。

[0040] 根据本发明的胶化乳剂和食用产品(诸如一种膳食补充剂产品)含有植物甾醇酯和/或植物甾烷醇酯。如在本披露中所使用，术语“植物甾醇酯和/或植物甾烷醇酯”是指为酯化形式的植物甾醇和/或植物甾烷醇。术语“植物甾醇”意指4-去甲基甾醇和4-单甲基甾醇，并且术语“植物甾烷醇”意指4-去甲基甾烷醇和4-单甲基甾烷醇。典型的4-去甲基甾醇是谷甾醇、菜油甾醇、豆甾醇、菜子甾醇、22-去氢-菜子甾醇以及δ5-燕麦甾醇。典型的甾烷醇是谷甾烷醇(sitostanol)、菜油甾烷醇(campestanol)以及它们的C24-差向异构体。术语“植物甾醇和/或植物甾烷醇”意指名为甾醇和/或甾烷醇的所有可能的混合物，以及任何个体甾醇和/或甾烷醇。

[0041] 在本发明中，植物甾醇和/或植物甾烷醇与一种羧酸酯化，或与羧酸的一种共混物酯化，并且称为“植物甾醇酯和/或植物甾烷醇酯”。适合的羧酸的实例为脂肪酸，脂肪酸为根据本发明优选的羧酸。这些脂肪酸是脂肪族的，具有4-24个碳原子，并且是饱和的、单不饱和的或多不饱和的。因此，优选地植物甾醇和/或植物甾烷醇与脂肪酸酯化(通常所说的植物甾醇脂肪酸酯和/或植物甾烷醇脂肪酸酯)，更优选地与基于植物油的脂肪酸酯化。优选的是液体植物油(诸如菜籽油、大豆油、葵花油以及玉米油)的脂肪酸。

[0042] 最优选的是植物甾烷醇脂肪酸酯。因此，“植物甾醇酯和/或植物甾烷醇酯”优选地包括按重量计为至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。优选地植物甾醇酯和/或植物甾烷醇酯包括在室温下为半固体或固体的植物甾醇脂肪酸酯和/或植物甾烷醇脂肪酸酯。优选地植物甾醇酯和/或植物甾烷醇酯在本发明的胶化乳剂中为一种半固体或固体形式。

[0043] 植物甾烷醇脂肪酸酯及其降低胆固醇的作用以及其适合的制备方法被披露在例如US 6 174 560中。明显地，植物甾醇酯类也可以有效地通过在US 6 174 560中所披露的生产方法来生产。可替代地，植物甾醇类和/或植物甾烷醇类的脂肪酸酯可以通过本领域中披露的任何适合的食品级方法来生产。可以使用例如来自拉伊西奥营养有限公司(Raisio Nutrition Ltd)或巴斯夫(BASF)的商业上可获得的植物甾醇酯和/或植物甾烷醇酯成分。商业成分含有为游离形式的少量植物甾醇和/或植物甾烷醇(典型地少于该成分的3％)。在本发明中，术语“植物甾醇酯和/或植物甾烷醇酯”仅指为酯化形式的植物甾醇和/或植物甾烷醇，并且因此仅通过将包含在膳食补充剂产品中的为酯化形式的植物甾醇和/或植物甾烷醇考虑在内来计算“植物甾醇酯和/或植物甾烷醇酯”的含量。

[0044] 已发现植物甾醇和/或植物甾烷醇降低胆固醇的作用对他汀类降低胆固醇的作用以及健康饮食(诸如低饱和脂肪和低胆固醇饮食)降低胆固醇的作用是附加性的。因此本发明的食用产品(诸如一种膳食补充剂产品)可以这样使用并且与降低胆固醇的药物和/或降低胆固醇的饮食组合使用。

[0045] 根据本发明，按胶化乳剂的重量计，植物甾醇酯和/或植物甾烷醇酯的量为至少20％，优选至少25％，更优选至少30％，仍更优选至少35％，甚至更优选至少40％，进一步更优选至少42％，仍进一步更优选至少45％，甚至进一步更优选至少48％，仍甚至进一步更优

选至少50％，并且最优选至少52％。按胶化乳剂的重量计，植物甾醇酯和/或植物甾烷醇酯的量优选为至多80％，更优选至多75％，仍更优选至多73％，甚至更优选至多70％并且最优选至多68％。优选地，按重量计，胶化乳剂的植物甾醇酯和/或植物甾烷醇酯含量可以为并且优选为20％-80％，更优选30％-80％，仍更优选35％-75％，甚至更优选40％-75％，进一步更优选45％-73％，仍进一步更优选48％-70％，甚至进一步更优选50％-70％并且最优选52％-68％。

[0046] “胶凝剂”意指能够独立地或与其他化合物(例如Ca离子)一起形成胶化乳剂的任何可食用聚合化合物。此类胶凝剂的实例包括可来源于植物、动物、藻类、微生物或可以是合成的凝胶形成蛋白质(诸如明胶)和凝胶形成多糖。应注意，用作食物中的增稠剂的蛋白质和多糖并不全部都能够形成凝胶。优选地该胶凝剂是蛋白质、多糖或它们的混合物。如果该胶凝剂是一种蛋白质，那么它优选地是明胶。适合的胶凝剂是例如明胶、角叉菜胶、果胶、藻酸盐、结冷胶、琼脂、阿拉伯树胶、淀粉、淀粉衍生物、菊粉、黄原胶、刺槐豆胶以及葡甘露聚糖和/或它们的混合物。本发明的胶化乳剂可以含有一种胶凝剂或者两种或更多种胶凝剂的混合物。可使用不同多糖的混合物或者一种或多种多糖与明胶的混合物。因此适合的胶凝剂是明胶、角叉菜胶、果胶、藻酸盐、结冷胶、琼脂、淀粉、淀粉衍生物、以及当与其他聚合化合物一起使用时形成凝胶的此类聚合化合物、以及它们的混合物。当与其他聚合化合物一起使用时形成凝胶的此类聚合化合物选自阿拉伯树胶、菊粉、黄原胶、刺槐豆胶以及葡甘露聚糖。适合的组合是例如黄原胶和刺槐豆胶的混合物，或黄原胶和葡甘露聚糖的混合物。其他适合的组合是菊粉和另一种胶凝剂(诸如明胶、结冷胶、角叉菜胶或果胶)的混合物。更优选地该胶凝剂选自明胶、角叉菜胶、果胶、藻酸盐、结冷胶、琼脂或它们的混合物。仍更优选地该胶凝剂含有明胶。甚至更优选地该胶凝剂含有明胶和选自由角叉菜胶、果胶、藻酸盐、结冷胶以及琼脂组成的组的一种或多种其他胶凝剂。进一步更优选地该胶凝剂含有占胶凝剂总量的至少50％，更优选至少60％，仍更优选至少70％，甚至更优选至少80％并且最优选至少90％的量的明胶。最优选地该胶凝剂是明胶。

[0047] 明胶是一种由胶原(动物皮肤的主要成分)、骨头以及结缔组织的部分水解而产生的蛋白质。通过用稀酸(A型明胶)或碱(B型明胶)处理胶原原材料来产生明胶。明胶最经常来源于猪来源或牛来源，但家禽或鱼也可以用作明胶来源。明胶能够形成在口腔中融化的热可逆凝胶。“布卢姆值(Bloom value)”经常用于表征明胶的胶凝强度。商业的哺乳动物明胶通常具有在50与300之间的布鲁姆值。鱼明胶可从冷水鱼或温水鱼物种产生。鱼明胶与牛明胶相比倾向于具有较低的胶凝温度和熔融温度，但通常具有比相应哺乳动物明胶相对更高的粘度，并且经常被认为与哺乳动物明胶相比具有次佳的功能特性。与用哺乳动物明胶形成的凝胶相比，用鱼明胶形成的凝胶通常倾向于较不稳定。

[0048] 在本发明的胶化乳剂中，胶凝剂优选地包含明胶。可使用来自动物和/或鱼来源的明胶。优选地该明胶是一种低粘度或中等粘度的明胶。还可使用明胶水解产物或改性明胶，诸如化学或酶改性明胶。酶改性明胶可以是例如通过使用酶(诸如转谷氨酰胺酶、多酚氧化酶、脂肪氧合酶、酪氨酸酶、赖氨酰氧化酶或过氧化酶)交联的明胶。还可使用不同明胶的混合物。一种优选的明胶具有至多300、优选至多280、更优选至多260、仍更优选至多230并且最优选至多200的布鲁姆值。一种优选的明胶具有至少80，优选至少120的布鲁姆值。优选地该明胶具有80-300，更优选120-280，仍更优选120-260，甚至更优选120-230，并且最优选

120-200的布鲁姆值。一种优选的明胶具有低粘度或中等粘度，优选地例如至多6mPa，更优选至多5mPa，仍更优选至多4.5mPa，甚至更优选至多4.2mPa，进一步更优选至多3.5mPa并且最优选至多3mPa(当通过2013年美国明胶制造者协会公司(Gelatin Manufacturers Institute of America,Inc.,2013)的官方程序在60℃下测量一种6.67％明胶水溶液的动力粘度时)。

[0049] 按胶化乳剂的重量计，胶凝剂的总量为至多15％，优选至多14％，更优选至多13％，仍更优选至多12％，甚至更优选至多11％并且最优选至多10％。按胶化乳剂的重量计，胶凝剂的总量优选为至少0.1％，更优选至少0.2％，仍更优选至少0.3％，甚至更优选至少0.4％并且最优选至少0.5％。按胶化乳剂的重量计，优选地胶凝剂的总量为0.1％-15％，更优选0.2％-14％，仍更优选0.3％-12％，甚至更优选0.4％-11％并且最优选0.5％-10％。

[0050] 在其中胶凝剂为明胶的实施例中，按胶化乳剂的重量计，明胶的量典型地为至少1.0％，优选至少2.0％，更优选至少2.5％，仍更优选至少3.0％，甚至更优选至少3.5％并且最优选至少4.0％。在其中胶凝剂为明胶的实施例中，按胶化乳剂的重量计，明胶的量典型地为至多15％，优选至多14％，更优选至多13％，仍更优选至多12％，甚至更优选至多11％并且最优选至多10％。在其中胶凝剂为明胶的实施例中，按胶化乳剂的重量计，明胶的量典型地为1.0％-15％，优选2.0％-14％，更优选2.5％-13％，仍更优选3.0％-12％，甚至更优选3.5％-11％并且最优选4.0％-10％。在其中胶凝剂包含一种或多种多糖或者明胶与一种或多种多糖的混合物的实施例中，胶凝剂的总量典型地低于其中胶凝剂是明胶的实施例中的总量。

[0051] 已出人意料地发现，可以制备具有高的活性成分(即植物甾醇酯和/或植物甾烷醇酯)与胶凝剂重量比的胶化乳剂，并且这些胶化乳剂的感官特性是良好的。本发明的胶化乳剂需要具有良好的质地和口感。该口感和质地不是粘稠的、胶粘的或硬质的，而是柔软且可咀嚼的。该口感不是油性或油滑的，并且该胶化乳剂将植物甾醇酯和/或植物甾烷醇酯保持在胶化基质中，尽管植物甾醇酯和/或植物甾烷醇酯的浓度高。因此，植物甾醇酯和/或植物甾烷醇酯与胶凝剂总量的重量比优选为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。在其中胶凝剂为明胶的实施例中，植物甾醇酯和/或植物甾烷醇酯与胶凝剂的重量比优选为至多45，更优选至多40，仍更优选至多35，甚至更优选至多30并且最优选至多25并且/或者优选为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。

[0052] 在一个优选实施例中，植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少35％，并且植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。

[0053] 在另一个优选实施例中，植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少40％，并且植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。

[0054] 在仍另一个优选实施例中，植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少45％，并且植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。

[0055] 在仍另一个优选实施例中，植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少52％，并且植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.5，更优选至少7.0，仍更优选至少7.5，并且最优选至少8.0。

[0056] 按胶化乳剂中水的量的重量计，胶凝剂的总量优选为至多150％，更优选至多120％，仍更优选至多100％，甚至更优选至多90％，进一步更优选至多80％，并且最优选至多70％。在其中胶凝剂为明胶的实施例中，按胶化乳剂中水的量的重量计，明胶的量优选为至多55％，更优选至多50％，仍更优选至多45％并且最优选至多40％。优选地在其中胶凝剂为明胶的实施例中，按胶化乳剂中水的量的重量计，明胶的量为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。出人意料的是，在一种具有高浓度植物甾醇酯和/或植物甾烷醇酯的胶化乳剂中，相对于水量的明胶量(按重量计％)是低的。可以避免胶粘的和粘稠的质地与口感，但植物甾醇酯和/或植物甾烷醇酯仍保持在胶化基质中，并且胶化乳剂的质地和口感也不是油性的。

[0057] 本发明乳剂的胶凝作用极大地受到乳剂中不同化合物的性质和浓度的影响。重要决定因素之一是乳剂中的含水量。如果含水量太高或太低，那么乳剂的胶凝作用受干扰并且胶化乳剂的感官特性减弱。因此按重量计，根据本发明的胶化乳剂的含水量为至少3％，优选至少8％并且至多35％，优选至多28％。因此按重量计，胶化乳剂的含水量为3.0％-35％，优选4.0％-34％，更优选5.0％-33％，仍更优选6.0％-32％，甚至更优选7.0％-31％，进一步更优选8.0％-30％，仍进一步更优选9.0％-29％，甚至进一步更优选10％-28％并且最优选11％-27％。尽管在本发明一些实施例中胶化乳剂的含水量相对高，但胶化乳剂的水活度是低的。胶化乳剂的水活度a_w优选为至多0.90、更优选至多0.87、仍更优选至多0.85、甚至更优选至多0.80并且最优选至多0.75。

[0058] 按重量计，优选地本发明的胶化乳剂包含0％-20％，更优选0％-15％，并且仍更优选0％-10.0％的甘油三酯脂肪。“甘油三酯脂肪”意指食用脂肪和油类，诸如植物油和鱼油。甘油三酯脂肪还可以是不同的可食用脂肪类和/或油类的混合物。甚至更优选地，按胶化乳剂的重量计，甘油三酯脂肪的量为0％-9.0％，进一步更优选0％-8.0％，仍进一步更优选0％-6.0％，甚至进一步更优选0％-4.0％，仍甚至进一步更优选0％-2.0％并且最优选0％-0.1％。如果在胶化乳剂中存在甘油三酯脂肪，那么优选地植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比为至少1.0，更优选至少1.3，仍更优选至少1.5，甚至更优选至少1.7，进一步更优选至少2.0，仍进一步更优选至少3.0，甚至进一步更优选至少4.0，仍甚至进一步更优选至少5.0，甚至仍进一步更优选至少6.0并且最优选至少13。

[0059] 优选地本发明的胶化乳剂包含一种或多种多元醇(这里也称为一种或多种多元醇(polyol(s)))。“多元醇”意指为具有多个羟基基团的化学醇的化合物，并且可以用于食品和/或膳食补充剂中。多元醇的实例包括糖醇、丙二醇以及甘油。典型的糖醇是例如山梨糖醇、木糖醇、赤藓糖醇、甘露醇、麦芽糖醇、异麦芽糖醇以及乳糖醇。胶化乳剂优选地包含甘油、山梨糖醇、木糖醇、赤藓糖醇或这些中至少两种的混合物，更优选地包含甘油、山梨糖醇、木糖醇或这些中至少两种的混合物，并且最优选甘油和/或木糖醇。该多元醇优选为甘油、山梨糖醇、木糖醇、赤藓糖醇或这些中至少两种的混合物，更优选地包含甘油、山梨糖醇、木糖醇或这些中至少两种的混合物，最优选甘油和/或木糖醇。多元醇的优选混合物是一种甘油和木糖醇的混合物，其中甘油的量优选为甘油和木糖醇总量的至少5％。优选地在

此混合物中，甘油与木糖醇的重量比为0.05-10(即甘油的量为胶化乳剂中木糖醇量的从5％至1000％)。更优选地甘油与木糖醇的重量比为0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。多元醇的另一种优选混合物是一种木糖醇和山梨糖醇的混合物，其中木糖醇与山梨糖醇的重量比为1.0-3.0(即木糖醇的量为胶化乳剂中山梨糖醇量的从100％至300％)。更优选地木糖醇与山梨糖醇的重量比为1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。

[0060] 已出人意料地发现，多元醇进一步改善本发明胶化乳剂的感官特性，特别是质地。此外，多元醇还对乳剂在胶凝作用之前的加工带来改善。本发明的胶化乳剂含有按重量计为0％-60％的量的一种或多种多元醇。按胶化乳剂的重量计，多元醇的总量可以为至少1.0％，优选至少2.0％，更优选至少3.0％，仍更优选至少4.0％并且最优选至少5.0％，并且按胶化乳剂的重量计，至多60％，优选至多50％，更优选至多40％，仍更优选至多35％，甚至更优选地至多30％并且最优选至多25％。按胶化乳剂的重量计，多元醇的总量优选为1.0％-60％，更优选1.0％-50％，仍更优选2.0％-50％，甚至更优选3.0％-40％，进一步更优选4.0％-35％，仍进一步更优选4.0％-30％，甚至进一步更优选5.0％-30％，仍甚至进一步更优选5.0％-25％并且最优选5.0％-20％。

[0061] 如果使用甘油，那么按胶化乳剂中多元醇总量的重量计，甘油的量优选为至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少50％，仍进一步更优选至少70％并且最优选至少85％。按胶化乳剂的重量计，甘油的量优选为至少1％，更优选至少3％，仍更优选至少5％，甚至更优选至少6％，进一步更优选至少7％，仍进一步更优选至少8％并且最优选至少9％。按胶化乳剂的重量计，甘油的量优选为1％-30％，更优选3％-30％，仍更优选5％-30％，甚至更优选6％-28％，进一步更优选7％-25％，仍进一步更优选8％-22％并且最优选9％-20％。

[0062] 甘油优选地用作一种甘油和至少一种其他多元醇(例如木糖醇、山梨糖醇或赤藓糖醇)的混合物。优选混合物是一种甘油和木糖醇的混合物，其中按甘油和木糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。

[0063] 另一种优选混合物是一种甘油、木糖醇和山梨糖醇的混合物，其中按甘油、木糖醇和山梨糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇和山梨糖醇总量的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。进一步地在此混合物中，木糖醇与山梨糖醇的重量比优选为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。

[0064] 如果使用木糖醇，那么按胶化乳剂中多元醇总量的重量计，木糖醇的量优选为至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少40％，仍进一步更优选至少50％，甚至进一步更优选至少60％，仍甚至进一步更优选至少65％并且最优选至少80％。按胶化乳剂的重量计，木糖醇的量优选为至少1％，更优选至少2％，仍更优选至少3％，甚至更优选至少4％并且最优选至少5％。按胶化乳剂的重量计，木糖醇的量优选为1％-30％，更优选2％-28％，仍更优选3％-25％，甚至更优选4％-23％并且

最优选5%-20%。

[0065] 木糖醇优选地用作一种木糖醇和至少一种其他多元醇(例如甘油、山梨糖醇或赤藓糖醇)的混合物。优选混合物是一种木糖醇和山梨糖醇的混合物,其中木糖醇与山梨糖醇的重量比为1.0-3.0,更优选1.2-2.8,仍更优选1.5-2.5,并且最优选1.7-2.2。另一种优选混合物是一种木糖醇、赤藻糖醇和山梨糖醇的混合物,其中按木糖醇、山梨糖醇和赤藻糖醇总量的重量计,木糖醇的量优选为至少5%,更优选至少10%,仍更优选至少15%,甚至更优选至少20%,并且最优选至少40%。

[0066] 植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0,更优选至少1.4,仍更优选地至少1.7,甚至更优选地至少2.0,进一步更优选至少2.5,并且最优选至少3.0。已出人意料地发现,可以制备具有高的活性成分(即植物甾醇酯和/或植物甾烷醇酯)与多元醇总量的重量比的胶化乳剂,并且这些胶化乳剂的感官特性仍是良好的。

[0067] 在一个优选实施例中,植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少35%,并且植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比为至少1.0,更优选至少1.4,仍更优选至少1.7,甚至更优选至少2.0,进一步更优选至少2.5,并且最优选至少3.0。在此实施例中,按胶化乳剂中多元醇总量的重量计,多元醇优选地含有至少5%,更优选至少10%,仍更优选至少15%,甚至更优选至少20%,进一步更优选至少50%,仍进一步更优选至少70%并且最优选至少85%的量的甘油。在此实施例中,进一步优选的是多元醇含有,并且更优选地是一种甘油和木糖醇的混合物,或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有并且优选是一种甘油和木糖醇的混合物时,按甘油和木糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选0.16-0.5。当多元醇含有并且优选是一种甘油、木糖醇和山梨糖醇的混合物时,按甘油、木糖醇和山梨糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇和山梨糖醇总量的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选0.16-0.5。进一步地在此混合物中,木糖醇与山梨糖醇的重量比优选为1.0-3.0,更优选1.2-2.8,仍更优选1.5-2.5,并且最优选1.7-2.2。

[0068] 在另一个优选实施例中,植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少35%,并且植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比为至少1.0,更优选至少1.4,仍更优选至少1.7,甚至更优选至少2.0,进一步更优选至少2.5,并且最优选至少3.0。在此实施例中,按胶化乳剂中多元醇总量的重量计,多元醇优选地含有至少5%,更优选至少10%,仍更优选至少15%,甚至更优选至少20%,进一步更优选至少40%,仍进一步更优选至少50%,甚至进一步更优选至少60%,仍甚至进一步更优选至少65%并且最优选至少80%的量的木糖醇。在此实施例中,进一步优选的是多元醇包含,并且更优选是一种木糖醇和山梨糖醇的混合物,其中木糖醇与山梨糖醇的重量比为1.0-3.0,优选1.2-2.8,更优选1.5-2.5,并且最优选1.7-2.2。

[0069] 在仍另一个优选实施例中,植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少40%,并且植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比为至少

1.0,更优选至少1.4,仍更优选至少1.7,甚至更优选至少2.0,进一步更优选至少2.5,并且最优选至少3.0。在此实施例中,按胶化乳剂中多元醇总量的重量计,多元醇优选地含有至少5%,更优选至少10%,仍更优选至少15%,甚至更优选至少20%,进一步更优选至少50%,仍进一步更优选至少70%并且最优选至少85%的量的甘油。在此实施例中,进一步优选的是多元醇含有,并且更优选地是一种甘油和木糖醇的混合物,或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有并且优选是一种甘油和木糖醇的混合物时,按甘油和木糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选0.16-0.5。当多元醇含有并且优选是一种甘油、木糖醇和山梨糖醇的混合物时,按甘油、木糖醇和山梨糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇和山梨糖醇总量的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选0.16-0.5。进一步地在此混合物中,木糖醇与山梨糖醇的重量比优选为1.0-3.0,更优选1.2-2.8,仍更优选1.5-2.5,并且最优选1.7-2.2。

[0070] 在仍另一个优选实施例中,植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少40%,并且植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比为至少1.0,更优选至少1.4,仍更优选至少1.7,甚至更优选至少2.0,进一步更优选至少2.5,并且最优选至少3.0。在此实施例中,按胶化乳剂中多元醇总量的重量计,多元醇优选地含有至少5%,更优选至少10%,仍更优选至少15%,甚至更优选至少20%,进一步更优选至少40%,仍进一步更优选至少50%,甚至进一步更优选至少60%,仍甚至进一步更优选至少65%并且最优选至少80%的量的木糖醇。在此实施例中,进一步优选的是多元醇包含,并且更优选是一种木糖醇和山梨糖醇的混合物,其中木糖醇与山梨糖醇的重量比为1.0-3.0,优选1.2-2.8,更优选1.5-2.5,并且最优选1.7-2.2。

[0071] 在仍另一个优选实施例中,植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少45%,并且植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比为至少1.0,更优选至少1.4,仍更优选至少1.7,甚至更优选至少2.0,进一步更优选至少2.5,并且最优选至少3.0。在此实施例中,按胶化乳剂中多元醇总量的重量计,多元醇优选地含有至少5%,更优选至少10%,仍更优选至少15%,甚至更优选至少20%,进一步更优选至少50%,仍进一步更优选至少70%并且最优选至少85%的量的甘油。在此实施例中,进一步优选的是多元醇含有,并且更优选地是一种甘油和木糖醇的混合物,或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有并且优选是一种甘油和木糖醇的混合物时,按甘油和木糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选0.16-0.5。当多元醇含有并且优选是一种甘油、木糖醇和山梨糖醇的混合物时,按甘油、木糖醇和山梨糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇和山梨糖醇总量的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选

0.16-0.5。进一步地在此混合物中，木糖醇与山梨糖醇的重量比优选为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。

[0072] 在仍另一个优选实施例中，植物甾醇酯和/或植物甾烷醇酯在胶化乳剂中的量按重量计为至少45％，并且植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比为至少1.0，更优选至少1.4，仍更优选至少1.7，甚至更优选至少2.0，进一步更优选至少2.5，并且最优选至少3.0。在此实施例中，按胶化乳剂中多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少40％，仍进一步更优选至少50％，甚至进一步更优选至少60％，仍甚至进一步更优选至少65％并且最优选至少80％的量的木糖醇。在此实施例中，进一步优选的是多元醇包含，并且更优选是一种木糖醇和山梨糖醇的混合物，其中木糖醇与山梨糖醇的重量比为1.0-3.0，优选1.2-2.8，更优选1.5-2.5，并且最优选1.7-2.2。

[0073] 本发明的胶化乳剂还可含有其他成分，例如甜味剂、调味剂、pH调节剂、着色剂、乳化剂、稳定剂、抗氧化剂以及防腐剂。该胶化乳剂还可含有具有有益健康作用的其他成分，例如维生素(例如维生素C、D、E以及K)、矿物质、抗氧化剂和/或多酚类。

[0074] 植物甾醇酯和/或植物甾烷醇酯的味道是清淡的并且不需要任何掩蔽。然而，如果需要，那么本发明的胶化乳剂可以进行调味或增甜。例如可利用水果或浆果调味剂，例如柑桔调味剂。可使用天然或人造甜味剂。基于糖的天然甜味剂包括例如蔗糖、糖浆、果糖、葡萄糖、麦芽糖以及糊精。人造甜味剂包括但不限于，例如阿斯巴甜、甜叶菊、三氯蔗糖、安赛蜜-K、糖精以及环己氨磺酸盐。选自由蔗糖、葡萄糖、果糖、麦芽糖以及乳糖组成的组的致龋糖也可以包含在胶化乳剂中。优选地按胶化乳剂的重量计，致龋糖的总量是低的，优选至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。“致龋糖”在这里意指产生龋齿或促进龋齿发展的糖类，选自由蔗糖、葡萄糖、果糖、麦芽糖以及乳糖组成的组。限制致龋糖的量不仅是一个健康问题，而出人意料的是，它还对乳剂的加工带来进一步的改善。

[0075] 可将食品级酸和/或缓冲剂用作pH调节剂。适合的酸包括例如柠檬酸、苹果酸、乳酸、富马酸、酒石酸、醋酸以及磷酸。适合的缓冲剂包括例如上述酸的盐。优选的酸包括柠檬酸和苹果酸，并且优选的缓冲剂包括它们的盐。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8.0％并且最优选少于6.0％。在另一个优选实施例中，胶化乳剂不含有缓冲剂，而是以其他方式实现所希望的pH，例如通过仅使用一种酸。如果不需要酸性的味道或pH，那么可不使用酸来制备胶化乳剂。

[0076] 优选地可以根据以下方法来制备本发明的胶化乳剂，该方法是本发明的一个另外的目的。该方法至少包括以下步骤：

[0077] a)优选地在至少40℃的温度下，通过将水与胶凝剂以及任选的其他水溶性成分混合来制备一种水相，

[0078] b)优选地在至少40℃，更优选地在40℃-80℃的温度下，将植物甾醇酯和/或植物甾烷醇酯熔融，并且任选地将它与其他脂溶性成分混合，

[0079] c)优选地在至少40℃，更优选地在40℃-80℃，仍更优选地在45℃-70℃，并且最优选在45℃-60℃的温度下，将熔融植物甾醇酯和/或植物甾烷醇酯，或植物甾醇酯和/或植物

甾烷醇酯与其他脂溶性成分的混合物与水相乳化

[0080] d)优选地在至少40℃的温度下,将获得的乳剂给料至模具中,优选地给料至剂量单位模具中,并且

[0081] e)允许该乳剂冷却至或低于水相的胶凝温度,并且因此优选地进行固化以获得胶化乳剂。

[0082] 优选地可以根据以下方法来制备本发明的食用产品(诸如一种膳食补充剂产品)。该方法至少包括以下步骤:

[0083] a)优选地在至少40℃的温度下,通过将水与胶凝剂以及任选的其他水溶性成分混合来制备一种水相,

[0084] b)优选地在至少40℃,更优选地在40℃-80℃的温度下,将植物甾醇酯和/或植物甾烷醇酯熔融,并且任选地将它与其他脂溶性成分混合,

[0085] c)优选地在至少40℃,更优选地在40℃-80℃,仍更优选地在45℃-70℃,并且最优选在45℃-60℃的温度下,将熔融植物甾醇酯和/或植物甾烷醇酯,或植物甾醇酯和/或植物甾烷醇酯与其他脂溶性成分的混合物与水相乳化

[0086] d)优选地在至少40℃的温度下,将获得的乳剂给料至剂量单位模具中,

[0087] e)允许该乳剂冷却至或低于水相的胶凝温度以获得一个剂量单位的胶化乳剂,

[0088] f)任选地对该剂量单位进行包覆,并且

[0089] g)对获得的剂量单位进行包装。

[0090] 优选地该方法不包括包覆步骤f。还优选的是将该剂量单位包装在一种泡罩中。

[0091] 尽管植物甾醇酯和/或植物甾烷醇酯的含量高,乳剂在胶凝作用之前的粘度处在允许进行进一步加工(例如投配至模具中,优选地投配至剂量单位模具中)的范围内。生产线(例如投配喷嘴)和包装线的类型设定对于粘度范围的要求。可以修改该配方以满足由单独生产线设定的粘度要求。在乳化步骤中使用的剪切速率也影响所形成的乳剂的粘度。例如可以通过减小剪切速率来降低乳剂的粘度。

[0092] 乳剂在胶凝作用之前的粘度可以优选为至多40 000mPa,更优选至多30 000mPa并且最优选至多20 000mPa(用布氏粘度计(Brookfield viscometer)以1.5rpm在55℃下测量5分钟)。优选地该粘度为至少5000mPa。

[0093] 已出人意料地发现,可以根据本发明制备具有高植物甾醇酯和/或植物甾烷醇酯含量的胶化乳剂,该乳剂在胶凝作用之前不具有不可接受的高粘度,并且仍保持良好的乳剂稳定性。乳剂的胶凝特性仍是良好的并且该最终胶化产品具有所希望的感官特性而没有油腻的口感。

[0094] 可通过将乳剂给料至固定或移动模具中来生产胶化乳剂的剂量单位。该给料优选地经由使用适当压力的喷嘴或针而发生。这些模具优选为剂量单位模具,诸如由至少一层膜(例如塑料涂层的铝箔)产生的空心泡罩或腔体。在填充后例如用一种可释放的覆盖膜或箔片将这些泡罩或腔体密封。然而,还可将胶化乳剂从模具中移出然后进行独立的最终用途包装。如果不是在剂量单位模具中而是在更大的模具中进行胶凝作用,那么可将胶化乳剂从使用的模具中移出并且在最终用途包装前切割成剂量单位。还可通过任何适合的包覆程序和涂层材料(例如,可咀嚼的软凝胶涂层或诸如山梨糖醇或麦芽糖醇的糖醇)来包覆移出的胶化剂量单位。为了优异的水阻挡和阻隔特性,优选地将本发明的食用产品(例如一种

膳食补充剂产品)包装在一个泡罩或一个泡罩包装中(优选地在铝泡罩中)。加拿大专利号1289074描述了用于生产包装在例如泡罩中的可用未包覆施用形式的方式。水相优选地具有从10℃至35℃,更优选从12℃至33℃并且最优选从15℃至30℃的胶凝温度。水相的pH优选地为从2至9,更优选从2.5至8并且最优选从3至7。

[0095] 在加工过程中的所有操作优选地在惰性氛围下完成。任选地在投配至剂量单位之前对该乳剂进行脱气。尽管植物甾醇酯和/或植物甾烷醇酯含量高,在胶凝作用之前的加工过程中的乳剂稳定性是良好的。如果需要,胶化乳剂可以是多于双相的(即,一种双重乳剂)。优选地该胶化乳剂是一种水包油(O/W)乳剂。

[0096] 可任选地在包装之前干燥胶化乳剂的剂量单位,但在优选实施例中,不使用干燥。如果胶化乳剂的剂量单位的含水量是不希望的高,那么在步骤e)之后干燥这些剂量单位以获得所需的水平。剂量单位可以被包覆,但优选地它们是未包覆的。优选地剂量单位被单独包装。然而如果剂量单位被包覆,那么若干剂量单位也可被包装在一个包装中。胶化乳剂的剂量单位的大小优选为至少0.3g,更优选至少0.7g并且最优选至少1.0g。胶化乳剂的剂量单位的大小优选为至多12.5g,更优选至多7g并且最优选至多6g。胶化乳剂的剂量单位的大小优选为0.3-12.5g,更优选0.4-10g,仍更优选0.5-9.0g,甚至更优选0.6-8.0g,进一步更优选0.7-7.0g并且最优选1.0-6.0g。

[0097] 因为本发明的胶化乳剂具有高含量植物甾醇酯和/或植物甾烷醇酯,所以植物甾醇酯和/或植物甾烷醇酯的日剂量可以结合至少量的胶化乳剂。植物甾醇酯和/或植物甾烷醇酯优选的日剂量为至少0.8g,更优选至少1.3g,仍更优选至少1.7g,甚至更优选至少2.5g并且植物甾醇酯和/或植物甾烷醇酯最优选的日剂量为至少3.4g。植物甾醇酯和/或植物甾烷醇酯优选的日剂量为至多15g,更优选至多13g,仍更优选至多12g,甚至更优选至多11g并且最优选至多10g。

[0098] 植物甾醇酯和/或植物甾烷醇酯的日剂量优选地由1.0-25g胶化乳剂来提供。因此胶化乳剂的日剂量优选为1.0-25g,胶化乳剂的日剂量更优选为1.3-20g,仍更优选1.5-17g,甚至更优选1.8-15g,并且最优选2.0-13g。可以一份或多份来提供胶化乳剂的日剂量。优选地通过一至四份、更优选以一份或两份,并且最优选以一份来提供胶化乳剂的日剂量。“份”意指有待在同一摄入场合被消耗的胶化乳剂的剂量单位的推荐量。剂量单位的大小取决于其中乳剂被胶化的模具的大小。

[0099] 胶化乳剂的能含量优选为每个胶化乳剂的日剂量至多840kJ,更优选至多670kJ,仍更优选至多500kJ,甚至更优选至多330kJ并且最优选至多200kJ。胶化乳剂的能含量优选为每个胶化乳剂的日剂量至少4kJ,更优选至少8kJ,仍更优选至少12kJ,甚至更优选至少16kJ并且最优选至少20kJ。每克胶化乳剂的能含量优选为至多40kJ,更优选至多35kJ,仍更优选至多30kJ,甚至更优选至多25kJ并且最优选至多20kJ。

[0100] 实施例1a:本发明的一个优选实施例是一种食用产品,优选一种膳食补充剂产品,更优选一种降低血清LDL胆固醇的膳食补充剂产品,该产品包含一种胶化乳剂,该胶化乳剂含有按重量计25%-80%的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多13%的量的胶凝剂、以及按重量计5.0%-33%的量的水。按重量计,胶化乳剂优选含有8.0%-30%,更优选9.0%-29%,仍更优选10%-28%并且最优选11%-27%的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。植物甾醇酯和/或植物

甾烷醇酯优选地含有按重量计为至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。胶凝剂优选地含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为2.5％-13％，更优选3.0％-12％，仍更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。优选地植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比优选为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂优选地含有0％-20％，更优选0％-15％，仍更优选0％-10.0％，甚至更优选0％-9.0％，进一步更优选0％-8.0％，仍进一步更优选0％-6.0％，甚至进一步更优选0％-4.0％，仍甚至进一步更优选0％-2.0％并且最优选0％-0.1％的甘油三酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少1.3，更优选至少1.7，仍更优选至少2.0，甚至更优选至少3.0，进一步更优选至少4.0，仍进一步更优选至少5.0，甚至进一步更优选至少6.0并且最优选至少13。按重量计，胶化乳剂优选地含有1.0％-50％，更优选2.0％-50％，仍更优选3.0％-40％，甚至更优选4.0％-35％，进一步更优选5.0％-30％，仍进一步更优选5.0％-25％并且最优选5.0％-20％的量的一种或多种多元醇。按多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少50％，仍进一步更优选至少70％并且最优选至少85％的量的甘油。在此实施例中，进一步优选的是多元醇含有一种甘油和木糖醇的混合物，或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有一种甘油和木糖醇的混合物时，按甘油和木糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。当多元醇含有一种甘油、木糖醇和山梨糖醇的混合物时，按甘油、木糖醇和山梨糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇和山梨糖醇总量的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。进一步地在此混合物中，木糖醇与山梨糖醇的重量比优选为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8.0％并且最优选少于6.0％。胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至

多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0101] 实施例1b：本发明的另一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品包含一种胶化乳剂，该胶化乳剂含有按重量计25％-80％的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多13％的量的胶凝剂、以及按重量计5.0％-33％的量的水。按重量计，胶化乳剂优选含有8.0％-30％，更优选9.0％-29％，仍更优选10％-28％并且最优选11％-27％的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。植物甾醇酯和/或植物甾烷醇酯优选地含有按重量计为至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。胶凝剂优选地含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为2.5％-13％，更优选3.0％-12％，仍更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。优选地植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比优选为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂优选地含有0％-20％，更优选0％-15％，仍更优选0％-10.0％，甚至更优选0％-9.0％，进一步更优选0％-8.0％，仍进一步更优选0％-6.0％，甚至进一步更优选0％-4.0％，仍甚至进一步更优选0％-2.0％并且最优选0％-0.1％的甘油三酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少1.3，更优选至少1.7，仍更优选至少2.0，甚至更优选至少3.0，进一步更优选至少4.0，仍进一步更优选至少5.0，甚至进一步更优选至少6.0并且最优选至少13。按重量计，胶化乳剂优选地含有1.0％-50％，更优选2.0％-50％，仍更优选3.0％-40％，甚至更优选4.0％-35％，进一步更优选5.0％-30％，仍进一步更优选5.0％-25％并且最优选5.0％-20％的量的一种或多种多元醇。按胶化乳剂中多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少40％，仍进一步更优选至少50％，甚至进一步更优选至少60％，仍甚至进一步更优选至少65％并且最优选至少80％的量的木糖醇。优选地多元醇含有一种木糖醇和山梨糖醇的混合物，其中木糖醇与山梨糖醇的重量比为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8.0％并且最优选少于6.0％。胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-

6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0102] 实施例2a：本发明的一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品包含一种胶化乳剂，该胶化乳剂含有按重量计35％-75％的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多12％的量的胶凝剂、以及按重量计5.0％-33％的量的水。按重量计，胶化乳剂优选含有8.0％-30％，更优选9.0％-29％，仍更优选10％-28％并且最优选11％-27％的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。植物甾醇酯和/或植物甾烷醇酯优选地含有按重量计为至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。胶凝剂优选地含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为3.0％-12％，更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。优选地植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比优选为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂优选地含有0％-20％，更优选0％-15％，仍更优选0％-10.0％，甚至更优选0％-9.0％，进一步更优选0％-8.0％，仍进一步更优选0％-6.0％，甚至进一步更优选0％-4.0％，仍甚至进一步更优选0％-2.0％并且最优选0％-0.1％的甘油三酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少1.7，更优选至少2.0，仍更优选至少3.0，甚至更优选至少4.0，进一步更优选至少5.0，仍进一步更优选至少6.0并且最优选至少13。按重量计，胶化乳剂优选地含有1.0％-50％，更优选2.0％-50％，仍更优选3.0％-40％，甚至更优选4.0％-35％，进一步更优选5.0％-30％，仍进一步更优选5.0％-25％并且最优选5.0％-20％的量的一种或多种多元醇。按多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少50％，仍进一步更优选至少70％并且最优选至少85％的量的甘油。在此实施例中，进一步优选的是多元醇含有一种甘油和木糖醇的混合物，或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有一种甘油和木糖醇的混合物时，按甘油和木糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。当多元醇含有一种甘油、木糖醇和山梨糖醇的混合物时，按甘油、木糖醇和山梨糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇和山梨糖醇总量的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。进一步地在此混合物中，木糖醇与山梨糖醇的重量比优选为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元

醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8.0％并且最优选少于6.0％。胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0103] 实施例2b：本发明的另一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品包含一种胶化乳剂，该胶化乳剂含有按重量计35％-75％的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多12％的量的胶凝剂、以及按重量计5.0％-33％的量的水。按重量计，胶化乳剂优选含有8.0％-30％，更优选9.0％-29％，仍更优选10％-28％并且最优选11％-27％的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。植物甾醇酯和/或植物甾烷醇酯优选地含有按重量计为至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。胶凝剂优选地含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为3.0％-12％，更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。优选地植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比优选为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂优选地含有0％-20％，更优选0％-15％，仍更优选0％-10.0％，甚至更优选0％-9.0％，进一步更优选0％-8.0％，仍进一步更优选0％-6.0％，甚至进一步更优选0％-4.0％，仍甚至进一步更优选0％-2.0％并且最优选0％-0.1％的甘油三酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少1.7，更优选至少2.0，仍更优选至少3.0，甚至更优选至少4.0，进一步更优选至少5.0，仍进一步更优选至少6.0并且最优选至少13。按重量计，胶化乳剂优选地含有1.0％-50％，更优选2.0％-50％，仍更优选3.0％-40％，甚至更优选4.0％-35％，进一步更优选5.0％-30％，仍进一步更优选5.0％-25％并且最优选5.0％-20％的量的一种或多种多元醇。按胶化乳剂中多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少40％，仍进一步更优选至少50％，甚至进一步更优选至少60％，仍甚至进一步更优选至少65％并且最优选至少80％的量的木糖醇。优选地多元醇含有一种木糖醇和山梨糖醇的混合物，其中木糖醇与山梨糖醇的重量比为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植

物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8.0％并且最优选少于6.0％。胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0104] 实施例3a：本发明的另一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品包含一种胶化乳剂，该胶化乳剂含有按重量计40％-75％的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多12％的量的胶凝剂、以及按重量计6.0％-32％的量的水。按重量计，胶化乳剂优选含有8.0％-30％，更优选9.0％-29％，仍更优选10％-28％并且最优选11％-27％的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中，按植物甾醇酯和/或植物甾烷醇酯的重量计，植物甾醇酯和/或植物甾烷醇酯优选地含有至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。进一步在此实施例中，胶凝剂优选地含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为3.0％-12％，更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。优选地植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比优选为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。进一步在此实施例中，胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂含有0％-10.0％，优选0％-9.0％，更优选0％-8.0％，仍更优选0％-6.0％，甚至更优选0％-4.0％，进一步更优选0％-2.0％并且最优选0％-0.1％的甘油三酸酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少4.0，更优选至少5.0，仍更优选至少6.0并且最优选至少13。按重量计，胶化乳剂优选地含有1.0％-40％，更优选2.0％-40％，仍更优选3.0％-40％，甚至更优选4.0％-35％，进一步更优选5.0％-30％，仍进一步更优选5.0％-25％并且最优选5.0％-20％的量的一种或多种多元醇。按多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少50％，仍进一步更优选至少70％并且最优选至少85％的量的甘油。在此实施例中，进一步优选的是多元醇含有一种甘油和木糖醇的混合物，或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有一种甘油和木糖醇的混合物时，按甘油和木糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。

优选地在此混合物中，甘油与木糖醇的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。当多元醇含有一种甘油、木糖醇和山梨糖醇的混合物时，按甘油、木糖醇和山梨糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇和山梨糖醇总量的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。进一步地在此混合物中，木糖醇与山梨糖醇的重量比优选为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5.0％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8.0％并且最优选少于6.0％。此实施例的胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0105] 实施例3b：本发明的另一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品包含一种胶化乳剂，该胶化乳剂含有按重量计40％-75％的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多12％的量的胶凝剂、以及按重量计6.0％-32％的量的水。按重量计，胶化乳剂优选含有8.0％-30％，更优选9.0％-29％，仍更优选10％-28％并且最优选11％-27％的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中，按植物甾醇酯和/或植物甾烷醇酯的重量计，植物甾醇酯和/或植物甾烷醇酯优选地含有至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。进一步在此实施例中，胶凝剂优选地含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为3.0％-12％，更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。优选地植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比优选为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。进一步在此实施例中，胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂含有0％-10.0％，优选0％-9.0％，更优选0％-8.0％，仍更优选0％-6.0％，甚至更优选0％-4.0％，进一步更优选0％-2.0％并且最优选0％-0.1％的甘油三酸酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少4.0，更优选至少5.0，仍更优选至少6.0并且最优选至少13。

按重量计，胶化乳剂优选地含有1.0%-40%，更优选2.0%-40%，仍更优选3.0%-40%，甚至更优选4.0%-35%，进一步更优选5.0%-30%，仍进一步更优选5.0%-25%并且最优选5.0%-20%的量的一种或多种多元醇。按胶化乳剂中多元醇总量的重量计，多元醇优选地含有至少5%，更优选至少10%，仍更优选至少15%，甚至更优选至少20%，进一步更优选至少40%，仍进一步更优选至少50%，甚至进一步更优选至少60%，仍甚至进一步更优选至少65%并且最优选至少80%的量的木糖醇。优选地多元醇含有一种木糖醇和山梨糖醇的混合物，其中木糖醇与山梨糖醇的重量比为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20%，更优选至多15%，仍更优选至多10%，甚至更优选至多5.0%并且进一步更优选0%-0.1%。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15%，更优选少于13%，仍更优选少于10%，甚至更优选少于8.0%并且最优选少于6.0%。此实施例的胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0106] 实施例3c：本发明的另一个优选实施例是一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品包含一种胶化乳剂，该胶化乳剂含有按重量计40%-75%的量的植物甾醇酯和/或植物甾烷醇酯、按重量计3.0%-12%的量的明胶、以及按重量计11%-27%的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中，按植物甾醇酯和/或植物甾烷醇酯的重量计，植物甾醇酯和/或植物甾烷醇酯优选地含有至少10%、更优选至少50%、仍更优选至少70%并且最优选至少90%的量的植物甾烷醇酯。按胶化乳剂中水的量的重量计，明胶的量为22%-45%并且选25%-40%。植物甾醇酯和/或植物甾烷醇酯与明胶的重量比为至少6.0，优选至少6.5，更优选至少7.0，仍更优选至少7.5，并且最优选至少8.0。进一步在此实施例中，胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂含有0%-2.0%并且最优选0%-0.1%的甘油三酯脂肪。按重量计，胶化乳剂含有5.0%-25%并且优选5.0%-20%的量的一种或多种多元醇。优选的是，多元醇含有一种甘油和木糖醇的混合物。当多元醇含有一种甘油和木糖醇的混合物时，按甘油和木糖醇总量的重量计，甘油的量优选为至少10%，更优选至少12%，并且最优选至少14%。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.7，更优选至少2.0，仍更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，优选地致龋糖的总量为0%-0.1%。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，优选地酸和/或缓冲剂的总量为少于6%。此实施例的胶化乳剂的日剂量优选为2.0-13g。胶化乳剂的剂量单位的大小优选为1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多200kJ。每克胶化乳剂的能含量优选为至多20kJ。

优选地此实施例中的胶化乳剂是未包覆的。

[0107] 实施例4a:本发明的仍另一个优选实施例是一种食用产品,优选一种膳食补充剂产品,更优选一种降低血清LDL胆固醇的膳食补充剂产品,该产品包含一种胶化乳剂,该胶化乳剂含有按胶化乳剂的重量计至少42%,优选至少45%,更优选至少48%、仍更优选至少50%并且最优选至少52%的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多13%的量的胶凝剂、以及按重量计6.0%-32%的量的水。按重量计,胶化乳剂优选含有8.0%-30%,更优选9.0%-29%,仍更优选10%-28%并且最优选11%-27%的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中,按胶化乳剂的重量计,植物甾醇酯和/或植物甾烷醇酯的量优选为至多80%,更优选至多75%,仍更优选至多73%,甚至更优选至多70%并且最优选至多68%。在此实施例中,按植物甾醇酯和/或植物甾烷醇酯的重量计,植物甾醇酯和/或植物甾烷醇酯优选地含有至少10%、更优选至少50%、仍更优选至少70%并且最优选至少90%的量的植物甾烷醇酯。进一步在此实施例中,胶凝剂优选地含有明胶,优选地以占胶凝剂总量的至少50%的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时,按胶化乳剂的重量计,明胶的量优选为2.5%-13%,更优选3.0%-12%,仍更优选3.5%-11%并且最优选4.0%-10%。另外,当胶凝剂为明胶时,按胶化乳剂中水的量的重量计,明胶的量优选为15%-55%,更优选20%-50%,仍更优选22%-45%并且最优选25%-40%。优选地植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比优选为至少6.0,更优选至少6.5,仍更优选至少7.0,甚至更优选至少7.5,并且最优选至少8.0。进一步在此实施例中,胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外,按重量计,胶化乳剂含有0%-10.0%,优选0%-9.0%,更优选0%-8.0%,仍更优选0%-6.0%,甚至更优选0%-4.0%,进一步更优选0%-2.0%并且最优选0%-0.1%的甘油三酸酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中,那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少5.0,更优选至少6.0并且最优选至少13。进一步在此实施例中,按重量计,胶化乳剂优选地含有1.0%-40%,更优选3.0%-40%,仍更优选4.0%-35%,甚至更优选5.0%-30%,进一步更优选5.0%-25%并且最优选5.0%-20%的量的一种或多种多元醇。按多元醇总量的重量计,多元醇优选地含有至少5%,更优选至少10%,仍更优选至少15%,甚至更优选至少20%,进一步更优选至少50%,仍进一步更优选至少70%并且最优选至少85%的量的甘油。在此实施例中,进一步优选的是多元醇含有一种甘油和木糖醇的混合物,或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有一种甘油和木糖醇的混合物时,按甘油和木糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选0.16-0.5。当多元醇含有一种甘油、木糖醇和山梨糖醇的混合物时,按甘油、木糖醇和山梨糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇和山梨糖醇总量的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选0.16-0.5。进一步地在此混合物中,木糖醇与山梨糖醇的重量比优选为1.0-3.0,更优选1.2-2.8,仍更优选1.5-2.5,并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0,更优选至少1.4,仍更优选地至少

1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5.0％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8％并且最优选少于6％。此实施例的胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0108] 实施例4b：本发明的仍另一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品包含一种胶化乳剂，该胶化乳剂含有按胶化乳剂的重量计至少42％，优选至少45％，更优选至少48％、仍更优选至少50％并且最优选至少52％的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多13％的量的胶凝剂、以及按重量计6.0％-32％的量的水。按重量计，胶化乳剂优选含有8.0％-30％，更优选9.0％-29％，仍更优选10％-28％并且最优选11％-27％的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中，按胶化乳剂的重量计，植物甾醇酯和/或植物甾烷醇酯的量优选为至多80％，更优选至多75％，仍更优选至多73％，甚至更优选至多70％并且最优选至多68％。在此实施例中，按植物甾醇酯和/或植物甾烷醇酯的重量计，植物甾醇酯和/或植物甾烷醇酯优选地含有至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。进一步在此实施例中，胶凝剂优选地含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为2.5％-13％，更优选3.0％-12％，仍更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。优选地植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比优选为至少6.0，更优选至少6.5，仍更优选至少7.0，甚至更优选至少7.5，并且最优选至少8.0。进一步在此实施例中，胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂含有0％-10.0％，优选0％-9.0％，更优选0％-8.0％，仍更优选0％-6.0％，甚至更优选0％-4.0％，进一步更优选0％-2.0％并且最优选0％-0.1％的甘油三酸酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少5.0，更优选至少6.0并且最优选至少13。进一步在此实施例中，按重量计，胶化乳剂优选地含有1.0％-40％，更优选3.0％-40％，仍更优选4.0％-35％，并且甚至更优选5.0％-30％，进一步更优选5.0％-25％并且最优选5.0％-20％的量的一种或多种多元醇。按胶化乳剂中多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少40％，仍进一步更优选至少50％，甚至进一步更优选至少60％，仍甚至进一步更优选至少

65％并且最优选至少80％的量的木糖醇。优选地多元醇含有一种木糖醇和山梨糖醇的混合物，其中木糖醇与山梨糖醇的重量比为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5.0％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8％并且最优选少于6％。此实施例的胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0109] 实施例5a：本发明的仍另一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品一种胶化乳剂，该胶化乳剂包含含有按重量计45％-73％的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多12％的量的胶凝剂、以及按重量计7.0％-31％的量的水。按重量计，胶化乳剂优选含有8.0％-30％，更优选9.0％-29％，仍更优选10％-28％并且最优选11％-27％的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中，按植物甾醇酯和/或植物甾烷醇酯的重量计，植物甾醇酯和/或植物甾烷醇酯优选地含有至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。进一步在此实施例中，胶凝剂含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为3.0％-12％，更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。按胶化乳剂的重量计，明胶浓度优选为至少3.0％，更优选至少3.5％并且最优选至少4.0％。植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.0，优选至少6.5，更优选至少7.0，仍更优选至少7.5，并且最优选至少8.0。进一步在此实施例中，胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂含有0％-9.0％，优选0％-8.0％，更优选0％-6.0％，仍更优选0％-4.0％，甚至更优选0％-2.0％，并且最优选0％-0.1％的甘油三酸酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少5.0，更优选至少6.0并且最优选至少13。进一步在此实施例中，按重量计，胶化乳剂优选地含有1.0％-40％，更优选3.0％-40％，仍更优选4.0％-35％，并且甚至更优选5.0％-30％，进一步更优选5.0％-25％并且最优选5.0％-20％的量的一种或多种多元醇。按多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少50％，仍进一步更优选至少70％并且最优选至少85％的量的甘油。在此实施

例中，进一步优选的是多元醇含有一种甘油和木糖醇的混合物，或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有一种甘油和木糖醇的混合物时，按甘油和木糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。当多元醇含有一种甘油、木糖醇和山梨糖醇的混合物时，按甘油、木糖醇和山梨糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇和山梨糖醇总量的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。进一步地在此混合物中，木糖醇与山梨糖醇的重量比优选为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5.0％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8.0％并且最优选少于6.0％。此实施例的胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0110] 实施例5b：本发明的仍另一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品一种胶化乳剂，该胶化乳剂包含含有按重量计45％-73％的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多12％的量的胶凝剂、以及按重量计7.0％-31％的量的水。按重量计，胶化乳剂优选含有8.0％-30％，更优选9.0％-29％，仍更优选10％-28％并且最优选11％-27％的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中，按植物甾醇酯和/或植物甾烷醇酯的重量计，植物甾醇酯和/或植物甾烷醇酯优选地含有至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。进一步在此实施例中，胶凝剂含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为3.0％-12％，更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。按胶化乳剂的重量计，明胶浓度优选为至少3.0％，更优选至少3.5％并且最优选至少4.0％。植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.0，优选至少6.5，更优选至少7.0，仍更优选至少7.5，并且最优选至少8.0。进一步在此实施例中，胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂含

有0%-9.0%，优选0%-8.0%，更优选0%-6.0%，仍更优选0%-4.0%，甚至更优选0%-2.0%，并且最优选0%-0.1%的甘油三酸酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少5.0，更优选至少6.0并且最优选至少13。进一步在此实施例中，按重量计，胶化乳剂优选地含有1.0%-40%，更优选3.0%-40%，仍更优选4.0%-35%，并且甚至更优选5.0%-30%，进一步更优选5.0%-25%并且最优选5.0%-20%的量的一种或多种多元醇。按胶化乳剂中多元醇总量的重量计，多元醇优选地含有至少5%，更优选至少10%，仍更优选至少15%，甚至更优选至少20%，进一步更优选至少40%，仍进一步更优选至少50%，甚至进一步更优选至少60%，仍甚至进一步更优选至少65%并且最优选至少80%的量的木糖醇。优选地多元醇含有一种木糖醇和山梨糖醇的混合物，其中木糖醇与山梨糖醇的重量比为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20%，更优选至多15%，仍更优选至多10%，甚至更优选至多5.0%并且进一步更优选0%-0.1%。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15%，更优选少于13%，仍更优选少于10%，甚至更优选少于8.0%并且最优选少于6.0%。此实施例的胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0111] 实施例6a：本发明的仍另一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品包含一种胶化乳剂，该胶化乳剂含有按胶化乳剂的重量计至少48%，优选至少50%，并且更优选至少52%的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多13%的量的胶凝剂、以及按重量计7.0%-31%的量的水。按重量计，胶化乳剂优选含有8.0%-30%，更优选9.0%-29%，仍更优选10%-28%并且最优选11%-27%的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中，按胶化乳剂的重量计，植物甾醇酯和/或植物甾烷醇酯的量优选为至多80%，更优选至多75%，仍更优选至多73%，甚至更优选至多70%并且最优选至多68%。在此实施例中，按植物甾醇酯和/或植物甾烷醇酯的重量计，植物甾醇酯和/或植物甾烷醇酯优选地含有至少10%、更优选至少50%、仍更优选至少70%并且最优选至少90%的量的植物甾烷醇酯。进一步在此实施例中，胶凝剂含有明胶，优选地以占胶凝剂总量的至少50%的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为2.5%-13%，更优选3.0%-12%，仍更优选3.5%-11%并且最优选4.0%-10%。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15%-55%，更优选20%-50%，仍更优选22%-45%并且最优选25%-40%。按胶化乳剂的重量计，明胶浓度优选为至少3.0%，更优选至少3.5%并且最优选至少4.0%。植物甾醇酯和/

或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.0,优选至少6.5,更优选至少7.0,仍更优选至少7.5,并且最优选至少8.0。进一步在此实施例中,胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外,按重量计,胶化乳剂含有0%-8.0%,优选0%-6.0%,更优选0%-4.0%,仍更优选0%-2.0%,并且最优选0%-0.1%的甘油三酸酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中,那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少6.0,并且最优选至少13。进一步在此实施例中,按重量计,胶化乳剂优选地含有1.0%-35%,更优选3.0%-35%,仍更优选4.0%-35%,并且甚至更优选5.0%-30%,进一步更优选5.0%-25%并且最优选5.0%-20%的量的一种或多种多元醇。按多元醇总量的重量计,多元醇优选地含有至少5%,更优选至少10%,仍更优选至少15%,甚至更优选至少20%,进一步更优选至少50%,仍进一步更优选至少70%并且最优选至少85%的量的甘油。在此实施例中,进一步优选的是多元醇含有一种甘油和木糖醇的混合物,或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有一种甘油和木糖醇的混合物时,按甘油和木糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选0.16-0.5。当多元醇含有一种甘油、木糖醇和山梨糖醇的混合物时,按甘油、木糖醇和山梨糖醇总量的重量计,甘油的量优选为至少5%,更优选至少7%,仍更优选至少10%,甚至更优选至少12%,并且最优选至少14%。优选地在此混合物中,甘油与木糖醇和山梨糖醇总量的重量比为0.05-10,更优选0.08-2.0,仍更优选0.11-1.0,甚至更优选0.14-0.8,并且最优选0.16-0.5。进一步地在此混合物中,木糖醇与山梨糖醇的重量比优选为1.0-3.0,更优选1.2-2.8,仍更优选1.5-2.5,并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0,更优选至少1.4,仍更优选地至少1.7,甚至更优选地至少2.0,进一步更优选至少2.5,并且最优选至少3.0。按胶化乳剂的重量计,致龋糖的总量优选为至多20%,更优选至多15%,仍更优选至多10%,甚至更优选至多5.0%并且进一步更优选0%-0.1%。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计,酸和/或缓冲剂的总量优选为少于15%,更优选少于13%,仍更优选少于10%,甚至更优选少于8%并且最优选少于6%。此实施例的胶化乳剂的日剂量优选为1.0-25g,更优选1.3-20g,仍更优选1.5-17g,甚至更优选1.8-15g,并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g,更优选0.4-10g,仍更优选0.5-9.0g,甚至更优选0.6-8.0g,进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ,更优选至多670kJ,仍更优选至多500kJ,甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ,更优选至多35kJ,仍更优选至多30kJ,甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0112] 实施例6b:本发明的仍另一个优选实施例是一种食用产品,优选一种膳食补充剂产品,更优选一种降低血清LDL胆固醇的膳食补充剂产品,该产品包含一种胶化乳剂,该胶化乳剂含有按胶化乳剂的重量计至少48%,优选至少50%,并且更优选至少52%的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多13%的量的胶凝剂、以及按重量计7.0%-31%的量的水。按重量计,胶化乳剂优选含有8.0%-30%,更优选9.0%-29%,仍更优选10%-28%并且最优选11%-27%的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地

该胶化乳剂是一种固体胶化乳剂。在此实施例中，按胶化乳剂的重量计，植物甾醇酯和/或植物甾烷醇酯的量优选为至多80％，更优选至多75％，仍更优选至多73％，甚至更优选至多70％并且最优选至多68％。在此实施例中，按植物甾醇酯和/或植物甾烷醇酯的重量计，植物甾醇酯和/或植物甾烷醇酯优选地含有至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。进一步在此实施例中，胶凝剂含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为2.5％-13％，更优选3.0％-12％，仍更优选3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。按胶化乳剂的重量计，明胶浓度优选为至少3.0％，更优选至少3.5％并且最优选至少4.0％。植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.0，优选至少6.5，更优选至少7.0，仍更优选至少7.5，并且最优选至少8.0。进一步在此实施例中，胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂含有0％-8.0％，优选0％-6.0％，更优选0％-4.0％，仍更优选0％-2.0％，并且最优选0％-0.1％的甘油三酸酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少6.0并且最优选至少13。进一步在此实施例中，按重量计，胶化乳剂优选地含有1.0％-35％，更优选3.0％-35％，仍更优选4.0％-35％，并且甚至更优选5.0％-30％，进一步更优选5.0％-25％并且最优选5.0％-20％的量的一种或多种多元醇。按胶化乳剂中多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少40％，仍进一步更优选至少50％，甚至进一步更优选至少60％，仍甚至进一步更优选至少65％并且最优选至少80％的量的木糖醇。优选地多元醇含有一种木糖醇和山梨糖醇的混合物，其中木糖醇与山梨糖醇的重量比为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5.0％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8％并且最优选少于6％。此实施例的胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0113] 实施例7a：本发明的仍另一个优选实施例是一种食用产品，优选一种膳食补充剂产品，更优选一种降低血清LDL胆固醇的膳食补充剂产品，该产品包含一种胶化乳剂，该胶化乳剂含有按重量计52％-68％的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多11％的量的胶凝剂、以及按重量计8.0％-30％的量的水。按重量计，胶化乳剂优选含有9.0％-

29％，更优选10％-28％并且最优选11％-27％的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中，按植物甾醇酯和/或植物甾烷醇酯的重量计，植物甾醇酯和/或植物甾烷醇酯优选地含有至少10％、更优选至少50％、仍更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。进一步在此实施例中，胶凝剂含有明胶，优选地以占胶凝剂总量的至少50％的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时，按胶化乳剂的重量计，明胶的量优选为3.5％-11％并且最优选4.0％-10％。另外，当胶凝剂为明胶时，按胶化乳剂中水的量的重量计，明胶的量优选为15％-55％，更优选20％-50％，仍更优选22％-45％并且最优选25％-40％。植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.5，优选至少7.0，更优选至少7.5，并且最优选至少8.0。进一步在此实施例中，胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外，按重量计，胶化乳剂含有0％-4.0％，优选0％-2.0％并且最优选0％-0.1％的甘油三酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中，那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少13.0。进一步在此实施例中，按膳食补充剂产品的重量计，胶化乳剂含有1.0％-30％，优选4.0％-30％，更优选5.0％-30％，仍更优选5.0％-25％并且最优选5.0％-20％的量的一种或多种多元醇。按多元醇总量的重量计，多元醇优选地含有至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少50％，仍进一步更优选至少70％并且最优选至少85％的量的甘油。在此实施例中，进一步优选的是多元醇含有一种甘油和木糖醇的混合物，或一种甘油、木糖醇和山梨糖醇的混合物。当多元醇含有一种甘油和木糖醇的混合物时，按甘油和木糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。当多元醇含有一种甘油、木糖醇和山梨糖醇的混合物时，按甘油、木糖醇和山梨糖醇总量的重量计，甘油的量优选为至少5％，更优选至少7％，仍更优选至少10％，甚至更优选至少12％，并且最优选至少14％。优选地在此混合物中，甘油与木糖醇和山梨糖醇总量的重量比为0.05-10，更优选0.08-2.0，仍更优选0.11-1.0，甚至更优选0.14-0.8，并且最优选0.16-0.5。进一步地在此混合物中，木糖醇与山梨糖醇的重量比优选为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0，更优选至少1.4，仍更优选地至少1.7，甚至更优选地至少2.0，进一步更优选至少2.5，并且最优选至少3.0。按胶化乳剂的重量计，致龋糖的总量优选为至多20％，更优选至多15％，仍更优选至多10％，甚至更优选至多5.0％并且进一步更优选0％-0.1％。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计，酸和/或缓冲剂的总量优选为少于15％，更优选少于13％，仍更优选少于10％，甚至更优选少于8％并且最优选少于6％。此实施例的胶化乳剂的日剂量优选为1.0-25g，更优选1.3-20g，仍更优选1.5-17g，甚至更优选1.8-15g，并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ，更优选至多670kJ，仍更优选至多500kJ，甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ，更优选至多35kJ，仍更优选至多30kJ，甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳

剂是未包覆的。

[0114] 实施例7b:本发明的仍另一个优选实施例是一种食用产品,优选一种膳食补充剂产品,更优选一种降低血清LDL胆固醇的膳食补充剂产品,该产品包含一种胶化乳剂,该胶化乳剂含有按重量计52%-68%的量的植物甾醇酯和/或植物甾烷醇酯、按重量计至多11%的量的胶凝剂、以及按重量计8.0%-30%的量的水。按重量计,胶化乳剂优选含有9.0%-29%,仍更优选10%-28%并且最优选11%-27%的量的水。优选地该胶化乳剂是一种水包油(O/W)乳剂。优选地该胶化乳剂是一种固体胶化乳剂。在此实施例中,按植物甾醇酯和/或植物甾烷醇酯的重量计,植物甾醇酯和/或植物甾烷醇酯优选地含有至少10%、更优选至少50%、仍更优选至少70%并且最优选至少90%的量的植物甾烷醇酯。进一步在此实施例中,胶凝剂含有明胶,优选地以占胶凝剂总量的至少50%的量。最优选地该胶凝剂是明胶。当胶凝剂为明胶时,按胶化乳剂的重量计,明胶的量优选为3.5%-11%并且最优选4.0%-10%。另外,当胶凝剂为明胶时,按胶化乳剂中水的量的重量计,明胶的量优选为15%-55%,更优选20%-50%,仍更优选22%-45%并且最优选25%-40%。植物甾醇酯和/或植物甾烷醇酯与胶凝剂(优选地为明胶)的重量比为至少6.5,优选至少7.0,更优选至少7.5,并且最优选至少8.0。进一步在此实施例中,胶化乳剂的水活度a_w为至多0.80并且优选至多0.75。另外,按重量计,胶化乳剂含有0%-4.0%,优选0%-2.0%并且最优选0%-0.1%的甘油三酯脂肪。如果甘油三酯脂肪存在于胶化乳剂中,那么植物甾醇酯和/或植物甾烷醇酯与甘油三酯脂肪的重量比优选为至少13.0。进一步在此实施例中,按膳食补充剂产品的重量计,胶化乳剂含有1.0%-30%,优选4%-30%,更优选5.0%-30%,仍更优选5.0%-25%并且最优选5.0%-20%的量的一种或多种多元醇。按胶化乳剂中多元醇总量的重量计,多元醇优选地含有至少5%,更优选至少10%,仍更优选至少15%,甚至更优选至少20%,进一步更优选至少40%,仍进一步更优选至少50%,甚至进一步更优选至少60%,仍甚至进一步更优选至少65%并且最优选至少80%的量的木糖醇。优选地多元醇含有一种木糖醇和山梨糖醇的混合物,其中木糖醇与山梨糖醇的重量比为1.0-3.0,更优选1.2-2.8,仍更优选1.5-2.5,并且最优选1.7-2.2。植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比优选为至少1.0,更优选至少1.4,仍更优选地至少1.7,甚至更优选地至少2.0,进一步更优选至少2.5,并且最优选至少3.0。按胶化乳剂的重量计,致龋糖的总量优选为至多20%,更优选至多15%,仍更优选至多10%,甚至更优选至多5.0%并且进一步更优选0%-0.1%。最优选地在胶化乳剂中不存在致龋糖。按胶化乳剂的重量计,酸和/或缓冲剂的总量优选为少于15%,更优选少于13%,仍更优选少于10%,甚至更优选少于8%并且最优选少于6%。此实施例的胶化乳剂的日剂量优选为1.0-25g,更优选1.3-20g,仍更优选1.5-17g,甚至更优选1.8-15g,并且最优选2.0-13g。胶化乳剂的剂量单位的大小优选为0.3-12.5g,更优选0.4-10g,仍更优选0.5-9.0g,甚至更优选0.6-8.0g,进一步更优选0.7-7.0g并且最优选1.0-6.0g。优选地胶化乳剂的能含量为每个胶化乳剂的日剂量至多840kJ,更优选至多670kJ,仍更优选至多500kJ,甚至更优选至多330kJ并且最优选至多200kJ。每克胶化乳剂的能含量优选为至多40kJ,更优选至多35kJ,仍更优选至多30kJ,甚至更优选至多25kJ并且最优选至多20kJ。优选地此实施例中的胶化乳剂是未包覆的。

[0115] 可以例如通过露比纳斯(Lubinus)等人(欧洲营养学杂志(Eur.J.Nutr.)2013,52(3):997-1013)或通过埃舍(Esche)等人(农业化学与食品化学杂志(J.Agric.Food Chem.)

2012,30;60(21):5330-9)描述的方法来分析膳食补充剂产品的植物甾醇酯和/或植物甾烷醇酯含量。可以通过使用一种测量样品的相对湿度的仪器(诸如Novasina ms1 aw-meter)来分析水活度(aw)。

[0116] 在此说明书中,除非另外说明,否则以百分比给出的数量意指按胶化乳剂的重量计的百分比(重量%)。

[0117] 包括在本文中意味着“至少含有”。

[0118] 本发明将借助下列非限制性实例进行详细描述。

[0119] 实例1

[0120] 制备含有植物甾醇和/或植物甾烷醇的胶化乳剂。选择胶化乳剂的目标日剂量为6.5g。植物甾醇和/或植物甾烷醇的有待结合到胶化乳剂日剂量中的目标量作为甾醇/甾烷醇当量为2g,该量作为植物甾醇酯和/或植物甾烷醇酯对应于3.4g或作为游离植物甾醇或甾烷醇对应于2g。

[0121] 制备三种胶化乳剂(配方1a-1c)。它们中的一种是没有植物甾醇或植物甾烷醇的参考产品(1a),一种是用游离植物甾醇制备的(1b),而一种是用植物甾烷醇酯制备的(1c)。将一些菜籽油添加到配方1b中以便获得如在配方1c中的相同含量的菜籽油脂肪酸(对应于植物甾烷醇酯的脂肪酸)。

[0122]

	1a比较	1b比较	1c发明
植物甾烷醇酯成分*	-	-	53
菜籽油	53	22	-
植物甾醇粉末(游离甾醇)		31	
水相:			
水	17.5	17.5	17.5
甘油	17	17	17
明胶	6.5	6.5	6.5
柠檬酸三钠	4	4	4
柠檬酸	1.6	1.6	1.6
橘子调味剂	0.4	0.4	0.4

[0123] *按重量计含有98%的植物甾烷醇酯,即配方中的植物甾烷醇酯浓度为按重量计52%;与来自菜籽油的脂肪酸酯化;拉伊西奥营养有限公司制备方法:

[0124] 首先制备水相。使用具有布鲁姆值193和低粘度或中等粘度(低于4.2mPa)的鱼明胶。将明胶添加到水中并且使其膨胀30分钟。然后将明胶溶液搅拌加热至70℃并且在此温度下搅拌15分钟。添加其他水溶性组分(首先甘油,然后柠檬酸和柠檬酸三钠),并且允许其在搅拌下溶解30-60分钟。然后停止搅拌并且将共混物进行脱气,且允许该混合物冷却约30分钟(冷却至约55℃)。

[0125] 1A:将菜籽油温热至55℃,与调味剂混合并且通过将它缓慢添加到水相中且通过使用Ultra Turrax(10000rpm)来与水相乳化。在55℃下测量乳剂的粘度(布氏粘度计,1.5rpm)。将所得乳剂倾倒入模具中并且使其在室温(22℃)下胶化60分钟。

[0126] 1B:将精细研磨的植物甾醇粉末与在100℃下预加热的菜籽油混合。所得混合物非

常浓稠并且甾醇不完全溶解在油中。将调味剂添加到此混合物中。通过使用Ultra Turrax(10000rpm)缓慢添加混合物并且与水相混合，但是它不能均匀分散在水相中。将所得不均匀的混合物置于模具中，并且使其在室温(22℃)下保持5小时。该混合物不胶化。

[0127] 1C：加热植物甾烷醇酯直到完全熔融，添加调味剂并且然后将该混合物缓慢添加到水相中且通过使用Ultra Turrax(10000rpm)在55℃下与水相乳化。在55℃下测量乳剂的粘度(布氏粘度计，1.5rpm)。将所得乳剂倾倒入模具中并且使其在室温(22℃)下胶化60分钟。

[0128] 通过训练有素的感官评审小组来评估所得产品。结果呈现在下表中。

[0129]

	1a	1b	1c
乳剂的特性	乳剂是良好流动的，是可倾流的。粘度在55°C 下为5500 mPa。	甾醇-菜籽油混合物太浓稠并且不能均匀分散在水相中。该产品不胶化。	乳剂是稳定的和可倾流的，不存在相分离。粘度在55°C 下为11000 mPa。
外观、质地、口感	油性表面、油性口感，该凝胶似乎不保持该油，太柔软的产品	该产品不能被制备	柔软，但仍质地良好，可咀嚼，不是胶粘的，不是粘稠的，无油性表面，无油性口感，令人愉悦的
味道	柔和橙子味道。油性味道，特别是油性后味。	该产品不能被制备	柔和橙子味道，无油性或油腻味道，无后味

[0130] 发现用植物甾烷醇酯(1c)制备的胶化乳剂是稳定的并且在胶凝作用之前具有可接受的粘度。最终产品(即胶化乳剂)具有柔软、可咀嚼质地，该质地不是胶粘的。没有油性或油腻口感。该配方在6.5g胶化乳剂(剂量单位大小6.5g)中提供3.4g植物甾烷醇酯，这是非常方便的日剂量。在此配方中的植物甾烷醇酯与胶凝剂(明胶)的重量比为8.0。该配方含有17％甘油。植物甾烷醇酯与多元醇总量的重量比为3.1。尽管植物甾烷醇酯含量高，但是该乳剂胶化良好并且具有良好质地。胶化乳剂的剂量单位是未包覆的，但它可以如此用作一种食用产品，诸如一种膳食补充剂产品。

[0131] 制备一种在6.5g产品(配方1b)中提供等效量降低胆固醇植物甾醇成分(2g游离植物甾醇)的胶化乳剂是不可能的。

[0132] 实例2

[0133] 按重量计含有68％的植物甾烷醇酯的胶化乳剂

[0134]

	%
植物甾烷醇酯成分*	69.3
水	12.8
甘油	10.1
明胶	4.0
柠檬酸三钠	1.5
苹果酸 99%	1.0
调味剂	0.7
着色剂	0.5
甜味剂（甜叶菊）	0.1
	100

[0135] *按重量计含有98％的植物甾烷醇酯，即配方中的植物甾烷醇酯浓度为按重量计68％。植物甾烷醇与菜籽油脂肪酸酯化

[0136] 以如在实例1c中所述的类似方式来制备胶化乳剂，除了在乳化步骤中使用较低的剪切速率(Ultra Turrax 8000rpm)。使用的明胶具有255的布鲁姆值以及低粘度或中等粘度(至多4.2mPa)。在与水相乳化之前，将着色剂和调味剂添加到植物甾烷醇酯中。该乳剂是浓稠、稳定并且胶化良好的。所获得的胶化乳剂具有柔软和可咀嚼质地(比实例1c中的胶化乳剂的质地硬一点)，该质地不是胶粘的。该口感不是油腻或油性的。该配方在5.0g胶化乳剂中提供3.4g植物甾烷醇酯。在此配方中的植物甾烷醇酯与胶凝剂(明胶)的重量比为17。按重量计该配方含有10.1％的甘油。植物甾烷醇酯与多元醇总量的重量比为6.7。

[0137] 实例3

[0138] 按重量计含有50％的植物甾烷醇酯和植物甾醇酯的胶化乳剂

[0139]

	%
植物甾烷醇酯成分*	40.8

[0140]

植物甾醇酯成分**	10.3
水	18.2
明胶	6.2
甘油	10.0
山梨糖醇	1.4
木糖醇	6.7
苹果酸 99%	1.8
柠檬酸三钠	3.6
调味剂	1.0
着色剂	0.03
	100.0

[0141] *按重量计含有98％的植物甾烷醇酯(与1c中的相同)**按重量计含有97.5％的植物甾醇酯，两者均以菜籽油脂肪酸酯化。配方中的植物甾烷醇酯和植物甾醇酯浓度按重量计为50％。

[0142] 以如在实例1c中所述的类似方式来制备胶化乳剂。在与水相乳化之前将植物甾烷醇酯和植物甾醇酯熔融并且混合。使用的明胶具有160的布鲁姆值。该乳剂是稳定的并且一

旦冷却是胶化良好的。所获得的胶化乳剂的质地是均匀的和可咀嚼的，尽管比实例1c中的胶化乳剂的质地硬一点。该质地不是胶粘的并且口感是良好的(不是油腻或油性的)。该配方在6.8g胶化乳剂中提供3.4g植物甾烷醇酯和植物甾醇酯。在此配方中的植物甾烷醇酯和植物甾醇酯与胶凝剂(明胶)的重量比为8.1。该配方按重量计含有10.0％的甘油和6.7％的木糖醇，并且按多元醇总量的重量计，甘油的量为55.2％且木糖醇的量为37.0％。植物甾烷醇酯和植物甾醇酯与多元醇总量的重量比为2.8。

[0143] 实例4

[0144] 按重量计含有42％的植物甾烷醇酯的胶化乳剂

[0145]

	%
植物甾烷醇酯成分*	43.0
水	18.6
木糖醇	3.6
甘油	21.0
明胶	6.5

[0146]

柠檬酸三钠	3.6
苹果酸 99%	1.8
调味剂	1.0
着色剂	0.7
甜味剂	0.2
	100

[0147] *按重量计含有98％的植物甾烷醇酯(与1c中的相同)，即配方中的植物甾烷醇酯浓度为按重量计42％

[0148] 以如在实例1c中所述的类似方式来制备胶化乳剂。使用的明胶具有260的布鲁姆值以及低粘度或中等粘度(至多4.2mPa)。该乳剂是稳定，良好流动并且相当稀薄的，但是一旦冷却胶化良好。所获得的胶化乳剂具有柔软(比实例1c中的胶化乳剂更柔软)，可咀嚼以及均匀的质地。该质地不是胶粘的。该口感是良好的，不是油腻或油性的。该配方在8.1g胶化乳剂中提供3.4g植物甾烷醇酯。在此配方中的植物甾烷醇酯与胶凝剂(明胶)的重量比为6.5。该配方按重量计含有21.0％的甘油，并且按多元醇总量的重量计，甘油的量为85.4％。该配方含有3.6％的木糖醇，并且木糖醇的量为总多元醇的14.6％。植物甾烷醇酯与多元醇总量的重量比为1.7。

[0149] 实例5

[0150] 含有59％的植物甾烷醇酯的胶化乳剂

[0151]

	%
植物甾烷醇酯成分*	60.0
水	16.8
木糖醇	7.2
甘油	7.2
明胶	5.0

柠檬酸三钠	1.8
柠檬酸	0.5
调味剂	0.9
着色剂	0.5
甜味剂	0.1
	100

[0152] *按重量计含有98％的植物甾烷醇酯(与1c中的相同),即配方中的植物甾烷醇酯浓度为按重量计59％

[0153] 以如在实例1c中所述的类似方式来制备胶化乳剂,除了在乳化步骤中使用较低的剪切速率(Ultra Turrax 8000rpm)。使用的明胶具有255的布鲁姆值以及低粘度或中等粘度(至多4.2mPa)。该乳剂是稳定的,相当浓稠的,但仍可倾流并且一旦冷却在模具中胶化良好。所获得的胶化乳剂具有柔软但结实的质地,该质地是可咀嚼的。该口感也是良好的,不是油腻或油性的。也不存在胶粘性。该配方在5.8g胶化乳剂中提供3.4g植物甾烷醇酯。在此配方中的植物甾烷醇酯与胶凝剂(明胶)的重量比为12。该配方按重量计含有7.2％的甘油,并且按多元醇总量的重量计,甘油的量为50％。该配方按重量计还含有7.2％的木糖醇,并且按多元醇总量的重量计,木糖醇的量为50％。植物甾烷醇酯与多元醇总量的重量比为4.1。

[0154] 实例6

[0155] 按重量计含有51％的植物甾烷醇酯的包装的胶化乳剂

[0156]

	％
植物甾烷醇酯成分*	52.0
水	16.2
木糖醇	19.8
甘油	3.7
明胶	4.5
柠檬酸三钠	2.0
苹果酸99％	0.7
调味剂	1.0
着色剂	0.1
	100

[0157] *按重量计含有98％的植物甾烷醇酯(与实例1c中的相同),即配方中的植物甾烷醇酯浓度为按重量计51％

[0158] 以如在实例1c中所述的类似方式来制备胶化乳剂,除了在乳化步骤中使用较低的剪切速率(Ultra Turrax 6500rpm)。使用的明胶是牛明胶,具有195的布鲁姆值。首先将多元醇中的木糖醇添加到明胶溶液并且搅拌15分钟。然后添加甘油并且将溶液搅拌另外5分钟,在此之后添加苹果酸、柠檬三酸钠和甜味剂并且继续搅拌另外20分钟。在与水相乳化之前,将着色剂和调味剂添加到植物甾烷醇酯中。该乳剂是稳定的。将6.7g乳剂投配至每个剂量单位模具(泡罩托盘)并且用铝箔进行密封。允许乳剂的剂量单位在泡罩包装中冷却并且

乳剂一旦冷却胶化良好。胶化乳剂具有可咀嚼，柔软的质地。该口感是令人愉悦的，不是油腻、油性或类似胶粘性的。该配方在6.7g胶化乳剂中提供3.4g植物甾烷醇酯。在此配方中的植物甾烷醇酯与胶凝剂(明胶)的重量比为11.3。该配方按重量计含有3.7％的甘油，按多元醇(甘油和木糖醇)总量的重量计为15.7％。该配方按重量计含有19.8％的木糖醇，按多元醇(甘油和木糖醇)总量的重量计为84.3％。木糖醇与甘油的重量比为5.4。植物甾烷醇酯与多元醇总量的重量比为2.2。

[0159] 实例7

[0160] 按重量计含有47％的植物甾醇酯的胶化乳剂

[0161]

	％
植物甾醇酯成分*	48.2
水	16.8
木糖醇	14.5
山梨糖醇	7.2
甘油	4.0
明胶	5.4
柠檬酸三钠	2.0
苹果酸99％	0.7
调味剂	1.0
着色剂	0.1
	100

[0162] *按重量计含有97.5％的植物甾醇酯(与实例3中的相同)，即配方中的植物甾醇酯浓度为按重量计47％

[0163] 以如在实例1c中所述的类似方式来制备胶化乳剂。使用的明胶是牛明胶，具有195的布鲁姆值以及低粘度或中等粘度。首先将多元醇中的山梨糖醇添加到明胶溶液并且搅拌5分钟。然后添加木糖醇并且搅拌另外10分钟，在此之后添加甘油并且继续搅拌另外5分钟。然后添加苹果酸和柠檬酸三钠并且继续搅拌另外20分钟。在与水相乳化之前，将着色剂和调味剂添加到植物甾醇酯中。该乳剂一旦冷却在模具中胶化良好。该胶化乳剂具有比用植物甾烷醇酯制备的胶化乳剂更硬一点的表面。然而，内部质地是柔软的并且该质地的整体可接受性仍是良好的，尽管表面硬一点。该口感是令人愉悦的，不是油腻或油性的。该配方在7.2g胶化乳剂中提供3.4g植物甾醇酯。在此配方中的植物甾醇酯与胶凝剂(明胶)的重量比为8.7。该配方按重量计含有4.0％的甘油，按多元醇总量的重量计为15.6％。该配方还含有木糖醇(按胶化乳剂的重量计为14.5％以及按多元醇总量的重量计为56.4％)，和山梨糖醇(按胶化乳剂的重量计为7.2％以及按多元醇总量的重量计为28.0％)。木糖醇与山梨糖醇的重量比为2.0。植物甾醇酯与多元醇总量的重量比为1.8。

[0164] 实例8

[0165] 按重量计含有54％的植物甾烷醇酯的胶化乳剂

[0166]

	％

植物甾烷醇酯成分*	55.0
水(纯化的)	19.2
木糖醇	8.8
山梨糖醇	4.0
明胶	6.0
柠檬酸三钠	3.6
苹果酸99%	1.8
调味剂(柠檬)	1.0
着色剂	0.6
	100

[0167] *按重量计含有98%的植物甾烷醇酯(与1c中的相同),即配方中的植物甾烷醇酯浓度为按重量计54%

[0168] 以如在实例1c中所述的类似方式来制备胶化乳剂,除了在乳化步骤中使用较低的剪切速率(Ultra Turrax 6500rpm)。使用的明胶是牛明胶,具有150的布鲁姆值以及低粘度或中等粘度。该乳剂是稳定的并且一旦冷却在模具中胶化良好。所获得的胶化乳剂具有可咀嚼和柔软的质地,以及良好的柠檬味道。该口感不是油腻或油性的。也不存在胶粘性。该配方在6.3g胶化乳剂中提供3.4g植物甾烷醇酯。在此配方中的植物甾烷醇酯与胶凝剂(明胶)的重量比为9。该配方按重量计含有8.8%的木糖醇,并且按多元醇总量的重量计,木糖醇的量为69%。木糖醇与山梨糖醇的重量比为2.2。植物甾烷醇酯与多元醇总量的重量比为4.2。

[0169] 实例9

[0170] 按重量计含有40%的植物甾烷醇酯的胶化乳剂

[0171]

	%
植物甾烷醇酯成分*	41.0
水	18.3
木糖醇	18.2
山梨糖醇	9.4
明胶	6.2
柠檬酸三钠	3.6
苹果酸99%	1.8
调味剂	0.8
着色剂	0.7
	100

[0172] *按重量计含有98%的植物甾烷醇酯(与实例1c中的相同),即配方中的植物甾烷醇酯浓度为按重量计40%

[0173] 以如在实例1c中所述的类似方式来制备胶化乳剂,除了在乳化步骤中使用较高的剪切速率(Ultra Turrax 11500rpm)。使用的明胶是牛明胶,具有150的布鲁姆值以及低粘度或中等粘度。该乳剂是稳定的并且一旦冷却是胶化良好的。所获得的胶化乳剂具有柔软

但结实的质地，该质地是可咀嚼的。该口感是良好的，不是油腻、油性或类似胶粘性的。该配方在8.5g胶化乳剂中提供3.4g植物甾烷醇酯。在此配方中的植物甾烷醇酯与胶凝剂(明胶)的重量比为6.5。该配方按重量计含有18.2％的木糖醇，并且按多元醇总量的重量计，木糖醇的量为66％。木糖醇与山梨糖醇的重量比为1.9。植物甾烷醇酯与多元醇总量的重量比为1.4。

[0174] 实例10

[0175] 按重量计含有44％的植物甾醇酯的胶化乳剂

[0176]

	％
植物甾醇酯成分*	45.0
水	18.3
木糖醇	15.0
山梨糖醇	8.6
明胶	6.2
柠檬酸三钠	3.6
苹果酸	1.8
调味剂	1.0
着色剂	0.5
	100

[0177] *按重量计含有97.5％的植物甾醇酯(与实例3中的相同)，即配方中的植物甾醇酯浓度为按重量计44％

[0178] 以如在实例1c中所述的类似方式来制备胶化乳剂，除了在乳化步骤中使用较高的剪切速率(Ultra Turrax 11000rpm)。使用的明胶是牛明胶，具有160的布鲁姆值以及低粘度或中等粘度。该乳剂是稳定的并且一旦冷却在模具中胶化良好。所获得的胶化乳剂具有比用植物甾烷醇酯制备的胶化乳剂更硬的表面，但内部质地仍良好，可咀嚼且柔软。该口感不是油腻或油性的。该配方在7.7g胶化乳剂中提供3.4g植物甾醇酯。在此配方中的植物甾醇酯与胶凝剂的重量比为7.1。该配方按重量计含有15.0％的木糖醇，并且按多元醇总量的重量计，木糖醇的量为63.6％。木糖醇与山梨糖醇的重量比为1.7。植物甾醇酯与多元醇总量的重量比为1.9。

[0179] 实例11

[0180] 按重量计含有54％的植物甾烷醇酯的胶化乳剂

[0181]

	％
植物甾烷醇酯成分*	55.0

[0182]

水	18.0
赤藓糖醇	6.6
木糖醇	6.6
山梨糖醇	1.4
明胶	5.8
柠檬酸三钠	3.6
苹果酸 99%	1.8
调味剂	0.5
着色剂	0.7
	100

[0183] *按重量计含有98％的植物甾烷醇酯(与实例1c中的相同),即配方中的植物甾烷醇酯浓度为按重量计54％

[0184] 以如在实例1c中所述的类似方式来制备胶化乳剂。使用的明胶是牛明胶,具有240-260的布鲁姆值以及低粘度或中等粘度(至多4.2mPa)。该乳剂是稳定的并且一旦冷却是胶化良好的。所获得的胶化乳剂具有柔软和可咀嚼的质地。该口感是良好的,不是油腻或油性并且不是类似胶粘性的。该配方在6.3g胶化乳剂中提供3.4g植物甾烷醇酯。在此配方中的植物甾烷醇酯与胶凝剂(明胶)的重量比为9.3。该配方按重量计含有6.6％的木糖醇,按木糖醇、山梨糖醇和赤藓糖醇总量的重量计为45％。植物甾烷醇酯与多元醇总量的重量比为3.7。

[0185] 本发明的另外的实施例

[0186] 1.一种胶化乳剂,包含:

[0187] -按重量计为至少20％的量的植物甾醇酯和/或植物甾烷醇酯,

[0188] -按重量计为至多15％的量的胶凝剂,以及

[0189] -按重量计为3.0％-35％的量的水。

[0190] 2.根据实施例1所述的胶化乳剂,其特征在于按重量计,植物甾醇酯和/或植物甾烷醇酯的量优选为至多80％,优选至多75％,更优选至多73％,仍更优选至多70％并且最优选至多68％。

[0191] 3.根据实施例1或2所述的胶化乳剂,其特征在于按重量计,植物甾醇酯和/或植物甾烷醇酯的量为至少25％,优选至少30％,更优选至少35％,仍更优选至少40％,甚至更优选至少42％,进一步更优选至少45％,仍进一步更优选至少48％,甚至进一步更优选至少50％并且最优选至少52％。

[0192] 4.根据实施例1至3中任一项所述的胶化乳剂,其特征在于植物甾醇酯和/或植物甾烷醇酯包括按重量计为至少10％、优选至少50％、更优选至少70％并且最优选至少90％的量的植物甾烷醇酯。

[0193] 5.根据实施例1至4中任一项所述的胶化乳剂,其特征在于按重量计,该胶化乳剂进一步包含0％-20％,优选0％-15％,更优选0％-10％,仍更优选0％-9.0％,甚至更优选0％-8.0％,进一步更优选0％-6.0％,仍进一步更优选0％-4.0％,仍甚至进一步更优选0％-2.0％并且最优选0％-0.1％的量的甘油三酯脂肪。

[0194] 6.根据实施例1至5中任一项所述的胶化乳剂,其特征在于按重量计,该胶凝剂的

总量为至多14％，优选至多13％，更优选至多12％，仍更优选至多11％并且最优选至多10％。

[0195] 7.根据实施例1至6中任一项所述的胶化乳剂，其特征在于按重量计，该胶凝剂的总量为至少0.1％，优选至少0.2％，更优选至少0.3％，仍更优选至少0.4％并且最优选至少0.5％。

[0196] 8.根据实施例1至7中任一项所述的胶化乳剂，其特征在于该胶凝剂选自由一种或多种蛋白质、一种或多种多糖以及它们的任何混合物组成的组，优选地选自由明胶、角叉菜胶、果胶、藻酸盐、结冷胶、琼脂、淀粉、淀粉衍生物、阿拉伯树胶、菊粉、黄原胶、刺槐豆胶、葡甘露聚糖和/或它们的混合物组成的组，更优选地选自由明胶、角叉菜胶、果胶、藻酸盐、结冷胶、琼脂、淀粉、淀粉衍生物、以及当与其他聚合化合物一起使用时形成凝胶的聚合化合物，诸如黄原胶和刺槐豆胶；黄原胶和葡甘露聚糖；菊粉以及明胶、结冷胶、角叉菜胶或果胶和它们的混合物中的任一种组成的组，仍更优选地选自由明胶、角叉菜胶、果胶、藻酸盐、结冷胶、琼脂或它们的混合物组成的组。

[0197] 9.根据实施例1至8中任一项所述的胶化乳剂，其特征在于该胶凝剂优选地包含按重量计至少50％，更优选至少60％，仍更优选至少70％，甚至更优选至少80％并且最优选至少90％的量的明胶，以及任选地选自由角叉菜胶、果胶、藻酸盐、结冷胶以及琼脂组成的组的至少一种胶凝剂，并且最优选该胶凝剂为明胶。

[0198] 10.根据实施例9所述的胶化乳剂，其特征在于按重量计，明胶的量为1.0％-15％，优选2.0％-14％，更优选2.5％-13％，仍更优选3.0％-12％，甚至更优选3.5％-11％并且最优选4.0％-10％。

[0199] 11.根据实施例9或10所述的胶化乳剂，其特征在于按该胶化乳剂中水的量的重量计，明胶的量为15％-55％，优选20％-50％，更优选22％-45％并且最优选25％-40％。

[0200] 12.根据实施例1至11中任一项所述的胶化乳剂，其特征在于该胶化乳剂进一步包含一种或多种多元醇。

[0201] 13.根据实施例12所述的胶化乳剂，其特征在于按重量计，多元醇的总量为1.0％-60％，优选1.0％-50％，更优选2.0％-50％，仍更优选3.0％-40％，甚至更优选4.0％-35％，进一步更优选4.0％-30％，仍进一步更优选5.0％-30％，甚至进一步更优选5.0％-25％并且最优选5.0％-20％。

[0202] 14.根据实施例12或13所述的胶化乳剂，其特征在于这些多元醇包含甘油，并且按多元醇总量的重量计，甘油的量优选为至少5％，更优选至少10％，仍更优选至少15％，甚至更优选至少20％，进一步更优选至少50％，仍进一步更优选至少70％并且最优选至少85％。

[0203] 15.根据实施例12或13所述的胶化乳剂，其特征在于这些多元醇包含木糖醇，并且按多元醇总量的重量计，木糖醇的量优选为至少5％，更优选至少10％，仍更优选至少20％，甚至更优选至少40％，进一步更优选至少50％，仍进一步更优选至少60％，甚至进一步更优选至少65％并且最优选至少80％。

[0204] 16.根据实施例12或13所述的胶化乳剂，其特征在于这些多元醇包含甘油和木糖醇，并且甘油与木糖醇的重量比优选为0.05-10，更优选0.08-2.0，仍更优选地0.11-1.0，甚至更优选地0.14-0.8，并且最优选0.16-0.5，并且/或者按甘油和木糖醇总量的重量计，甘油的量优选为至少5％，更优选地至少7％，仍更优选地至少10％，甚至更优选地至少12％并

且最优选至少14％。

[0205] 17.根据实施例12或13所述的胶化乳剂，其特征在于这些多元醇包含木糖醇和山梨糖醇，并且优选地木糖醇与山梨糖醇的重量比为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2。

[0206] 18.根据实施例12或13所述的胶化乳剂，其特征在于这些多元醇包含甘油、木糖醇和山梨糖醇，并且甘油与木糖醇和山梨糖醇总量的重量比优选为0.05-10，更优选0.08-2.0，仍更优选地0.11-1.0，甚至更优选地0.14-0.8，并且最优选0.16-0.5，并且/或者木糖醇与山梨糖醇的重量比优选为1.0-3.0，更优选1.2-2.8，仍更优选1.5-2.5，并且最优选1.7-2.2，并且/或者按甘油、木糖醇和山梨糖醇总量的重量计，甘油的量优选为至少5％，更优选地至少7％，仍更优选地至少10％，甚至更优选地至少12％并且最优选至少14％。

[0207] 19.根据实施例1至18中任一项所述的胶化乳剂，其特征在于进一步包含选自由蔗糖、葡萄糖、果糖、麦芽糖以及乳糖组成的组的一种或多种致龋糖。

[0208] 20.根据实施例19所述的胶化乳剂，其特征在于按重量计，致龋糖的总量为至多20％，优选至多15％，更优选至多10％，仍更优选至多5％，甚至更优选0％-0.1％。

[0209] 21.根据实施例1至18中任一项所述的胶化乳剂，其特征在于没有致龋糖存在于该胶化乳剂中。

[0210] 22.根据实施例1至21中任一项所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该胶凝剂的重量比为至少6.0，优选至少6.5，更优选至少7.0，仍更优选至少7.5并且最优选至少8.0。

[0211] 23.根据实施例6至22中任一项所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该甘油三酯脂肪的重量比至少1.3，优选至少1.5，更优选至少2.0，仍更优选至少3.0，甚至更优选至少4.0，进一步更优选至少5.0，仍进一步更优选至少6.0并且最优选至少13。

[0212] 24.根据实施例12至23中任一项所述的胶化乳剂，其特征在于植物甾醇酯和/或植物甾烷醇酯与多元醇总量的重量比为至少1.0，优选至少1.4，更优选至少1.7，仍更优选至少2.5，甚至更优选至少2.5并且最优选至少3.0。

[0213] 25.根据实施例1至24中任一项所述的胶化乳剂，其特征在于该胶化乳剂的剂量单位的大小为至少0.3g，优选0.3-12.5g，更优选0.4-10g，仍更优选0.5-9.0g，甚至更优选0.6-8.0g，进一步更优选0.7-7.0g并且最优选1.0-6.0g。

[0214] 26.根据实施例1至25中任一项所述的胶化乳剂，其特征在于该胶化乳剂的日剂量为1.0-25g，优选1.3-20g，更优选1.5-17g，仍更优选1.8-15g并且最优选2.0-13g。

[0215] 27.根据实施例1至26中任一项所述的胶化乳剂，其特征在于它的水活度aw为至多0.90，优选至多0.87，更优选至多0.85，仍更优选至多0.80并且最优选至多0.75。

[0216] 28.根据实施例1至27中任一项所述的胶化乳剂，其特征在于它的含水量按重量计为4.0％-34％，优选5.0％-33％，更优选6.0％-32％，仍更优选7.0％-31％，甚至更优选8.0％-30％，进一步更优选9.0％-29％，仍进一步更优选10％-28％并且最优选11％-27％。

[0217] 29.根据实施例1至28中任一项所述的胶化乳剂，其特征在于进一步包含pH调节剂，诸如酸和缓冲剂，这些酸和/或缓冲剂的总量优选为按重量计少于15％，更优选少于13％，仍更优选地少于10％，甚至更优选少于8.0％并且最优选少于6.0％。

[0218] 30.根据实施例1至29中任一项所述的胶化乳剂，其特征在于它的能含量为每个该胶化乳剂的日剂量至多840kJ，优选至多670kJ，更优选至多500kJ，仍更优选至多330kJ并且最优选至多200kJ。

[0219] 31.根据实施例1至30中任一项所述的胶化乳剂，其特征在于每克该胶化乳剂的能含量为至多40kJ，优选至多35kJ，更优选至多30kJ，仍更优选至多25kJ并且最优选至多20kJ。

[0220] 32.根据实施例1至31中任一项所述的胶化乳剂，其特征在于它是一种固体胶化乳剂并且/或者在20℃，优选在22℃，更优选在25℃并且最优选在30℃下它是固体，并且/或者它是可咀嚼并且/或者它可以在室温下储存。

[0221] 33.根据实施例1至32中任一项所述的胶化乳剂，其特征在于它是一种膳食补充剂产品。

[0222] 34.根据实施例1至33中任一项所述的胶化乳剂，其特征在于它包含

[0223] -按重量计为25％-80％的量的植物甾醇酯和/或植物甾烷醇酯，

[0224] -按重量计为至多13％的量的胶凝剂，

[0225] -按重量计为5.0％-33％的量的水，并且该胶化乳剂的水活度为至多0.80

[0226] -任选地按重量计为0％-20％的量的甘油三酯脂肪，以及

[0227] -任选地按重量计为1.0％-50％的量的一种或多种多元醇。

[0228] 35.根据实施例34所述的胶化乳剂，其特征在于它包含按重量计总量为1.0％至50％，优选2.0％-50％，更优选3.0％-40％，仍更优选地4.0％-35％，甚至更优选4.0％-30％，进一步更优选5.0％-30％，仍进一步更优选5.0％-25％并且最优选5.0％-20％的一种或多种多元醇。

[0229] 36.根据实施例34或35所述的胶化乳剂，其特征在于它包含

[0230] -按重量计为35％-75％的量的植物甾醇酯和/或植物甾烷醇酯，

[0231] -按重量计为至多12％的量的胶凝剂。

[0232] 37.根据实施例36所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该甘油三酯脂肪的重量比为至少2.0，优选至少3.0，更优选至少4.0，仍更优选至少5.0，甚至更优选至少6.0并且最优选至少13。

[0233] 38.根据实施例34所述的胶化乳剂，其特征在于它包含

[0234] -按重量计为40％-75％的量的植物甾醇酯和/或植物甾烷醇酯，

[0235] -按重量计为至多12％的量的胶凝剂，

[0236] -按重量计为6.0％-32％的量的水，

[0237] -任选地按重量计为0％-10％的量的甘油三酯脂肪，以及

[0238] -任选地按重量计为1.0％-40％的量的一种或多种多元醇。

[0239] 39.根据实施例38所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该甘油三酯脂肪的重量比为至少5.0，优选至少6.0并且最优选至少13。

[0240] 40.根据实施例38或39所述的胶化乳剂，其特征在于它包含按重量计总量为1.0％-40％，优选2.0％-40％，更优选3.0％-40％，仍更优选地4.0％-35％，甚至更优选5.0％-30％，进一步更优选5.0％-25％并且最优选5.0％-20％的一种或多种多元醇。

[0241] 41.根据实施例38至40中任一项所述的胶化乳剂，其特征在于它包含

[0242] -按重量计为45%-73%的量的植物甾醇酯和/或植物甾烷醇酯，

[0243] -按重量计为至多12%的量的胶凝剂，

[0244] -按重量计为7.0%-31%的量的水，

[0245] -任选地按重量计为0%-9.0%的量的甘油三酯脂肪，以及

[0246] -任选地按重量计为1.0%-40%的量的一种或多种多元醇。

[0247] 42.根据实施例41所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该甘油三酯脂肪的重量比为至少6.0并且最优选至少13。

[0248] 43.根据实施例34至42中任一项所述的胶化乳剂，其特征在于它不含有致龋糖。

[0249] 44.根据实施例34至43中任一项所述的胶化乳剂，其特征在于该植物甾醇酯和/或植物甾烷醇酯与该胶凝剂的重量比为至少6.0，优选至少6.5，更优选至少7.0，仍更优选至少7.5并且最优选至少8.0。

[0250] 45.根据实施例34至44中任一项所述的胶化乳剂，其特征在于该胶凝剂包含明胶并且优选为明胶。

[0251] 46.根据实施例45所述的胶化乳剂，其特征在于按该胶化乳剂中水的量的重量计，明胶的量为15%-55%，优选20%-50%，更优选22%-45%并且最优选25%-40%。

[0252] 47.根据实施例45或46所述的胶化乳剂，其特征在于按该胶化乳剂的重量计，明胶的量为3.0%-12%，优选3.5%-11%并且最优选4.0%-10%。

[0253] 48.根据实施例34-47中任一项所述的胶化乳剂，其特征在于这些多元醇包含甘油，并且按多元醇总量的重量计，甘油的量优选为至少5%，更优选至少10%，仍更优选至少15%，甚至更优选至少20%，进一步更优选至少50%，仍进一步更优选至少70%并且最优选至少85%。

[0254] 49.根据实施例34-48中任一项所述的胶化乳剂，其特征在于按重量计，水的量为8.0%-30%，优选9.0%-29%，更优选10%-28%并且最优选11%-27%。

[0255] 49B.根据实施例1至49中任一项所述的胶化乳剂，其特征在于它包含按重量计为40%-75%的量的植物甾醇酯和/或植物甾烷醇酯，按重量计为3.0%-12%的量的明胶，按重量计为11%-27%的量的水，按重量计总量为5.0%-25%的一种或多种多元醇，以及任选地按重量计为0%至2.0%的量的甘油三酯，其中该胶化乳剂的水活度a_w为至多0.80并且植物甾醇酯和/或植物甾烷醇酯与明胶的重量比为至少6.0，并且按该胶化乳剂中水的量的重量计，优选地明胶的量为22%-45%。

[0256] 50.根据实施例1至49B中任一项所述的胶化乳剂用于制备一种食用产品的用途。

[0257] 51.一种食用产品，包含根据实施例1至49B中任一项所述的胶化乳剂。

[0258] 52.根据实施例51所述的食用产品，其特征在于它是一种膳食补充剂。

[0259] 53.根据实施例51或52所述的食用产品，其特征在于它进一步包含一个涂层。

[0260] 54.根据实施例51或52所述的食用产品，其特征在于它是未包覆的。

[0261] 55.根据实施例51至54中任一项所述的食用产品，其特征在于它包装在一种泡罩中。

[0262] 56.根据实施例51至55中任一项所述的食用产品，其特征在于它是便携的并且/或者它是可咀嚼并且/或者它可以在室温下储存，并且/或者它在室温下具有一个长的储存期限。

[0263] 57.一种泡罩，包含根据实施例1至49B中任一项所述的胶化乳剂或者根据实施例51至56中任一项所述的食用产品。

[0264] 58.根据实施例1至49B中任一项所述的胶化乳剂或者根据实施例51至56中任一项所述的食用产品，用作一种药物。

[0265] 59.根据实施例1至49B中任一项所述的胶化乳剂或者根据实施例51至56中任一项所述的食用产品，用于降低血清LDL胆固醇含量。

[0266] 60.一种用于制备根据实施例1至49B中任一项所述的胶化乳剂的方法，该方法包括

[0267] a)优选地在至少40℃的温度下，通过将水与胶凝剂以及任选的其他水溶性成分混合来制备一种水相，

[0268] b)优选地在至少40℃的温度下，将植物甾醇酯和/或植物甾烷醇酯熔融，并且任选地将它与其他脂溶性成分混合，

[0269] c)优选地在至少40℃的温度下，将熔融植物甾醇酯和/或植物甾烷醇酯，或植物甾醇酯和/或植物甾烷醇酯与其他脂溶性成分的混合物与水相乳化，

[0270] d)优选地在至少40℃的温度下，将获得的乳剂给料至模具中，优选地给料至剂量单位模具中，并且

[0271] e)允许该乳剂冷却至或低于该水相的胶凝温度以获得该胶化乳剂。

[0272] 61.一种用于制备根据实施例51至56中任一项所述的食用产品的方法，该方法包括

[0273] a)优选地在至少40℃的温度下，通过将水与胶凝剂以及任选的其他水溶性成分混合来制备一种水相，

[0274] b)优选地在至少40℃的温度下，将植物甾醇酯和/或植物甾烷醇酯熔融，并且任选地将它与其他脂溶性成分混合，

[0275] c)优选地在至少40℃的温度下，将熔融植物甾醇酯和/或植物甾烷醇酯，或植物甾醇酯和/或植物甾烷醇酯与其他脂溶性成分的混合物与水相乳化，

[0276] d)优选地在至少40℃的温度下，将获得的乳剂给料至剂量单位模具中，

[0277] e)允许该乳剂冷却至或低于该水相的胶凝温度以获得一个剂量单位的该胶化乳剂，

[0278] f)任选地对该剂量单位进行包覆，

[0279] g)对获得的剂量单位进行包装。

[0280] 62.根据实施例60或61所述的方法，其特征在于步骤b是在40℃-80℃的温度下进行。

[0281] 63.根据实施例60至62中任一项所述的方法，其特征在于步骤c是在40℃-80℃，优选在45℃-70℃并且最优选在45℃-60℃的温度下进行。

[0282] 64.根据实施例61至63中任一项所述的方法，其特征在于该方法不包括包覆步骤f。

[0283] 65.根据实施例61至64中任一项所述的方法，其特征在于该剂量单位包装在一种泡罩中。