



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

<p>(51) International Patent Classification <sup>5</sup> : A23L 1/0522</p>	<p>A1</p>	<p>(11) International Publication Number: <b>WO 94/12054</b> (43) International Publication Date: 9 June 1994 (09.06.94)</p>
<p>(21) International Application Number: PCT/US93/11646 (22) International Filing Date: 1 December 1993 (01.12.93) (30) Priority Data: 07/983,704 1 December 1992 (01.12.92) US (60) Parent Application or Grant (63) Related by Continuation US 07/983,704 (CON) Filed on 1 December 1993 (01.12.93) (71) Applicant (for all designated States except US): ORCHID ISLAND TECHNOLOGIES, INC. [US/US]; 40 Royal Palm Boulevard, Suite 245, Vero Beach, FL 32960 (US). (72) Inventor; and (75) Inventor/Applicant (for US only): VANDERVEER, Fred [US/US]; 1130 Olde Doubloon Drive, Vero Beach, FL 32964 (US). (74) Agents: STEELE, J., Rodman, Jr. et al.; Quarles &amp; Brady, Esperante Building, 4th floor, 222 Lakeview Avenue, P.O. Box 3188, West Palm Beach, FL 33402-31 (US).</p>		<p>(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  Published With international search report.</p>
<p>(54) Title: COMPOSITION AND METHOD FOR PREPARING REDUCED FAT FOOD PRODUCTS</p>		
<p>(57) Abstract</p> <p>A composition and method for preparing reduced fat food products having acceptable taste, texture, and consistency characteristics. The composition includes an edible viscous liquid, a liquid humectant, a starch and a fiber. Lecithin and an emulsifier can also be included. The edible viscous liquid is most preferably corn syrup and the liquid humectant is most preferably glycerin.</p>		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

**COMPOSITION AND METHOD FOR  
PREPARING REDUCED FAT FOOD PRODUCTS**

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to foods and ingredients for foods, and more particularly to compositions and methods for preparing reduced fat food products.

Description of the Relevant Art

5           Concerns over the adverse health effects of dietary unsaturated fats have created a demand for reduced fat food products. Fats impart a number of qualities to foods, including taste, texture, and consistency. It is desirable that reduced-fat food products maintain as much and as many of these qualities  
10 as possible. It is also desirable that fat-reducing compositions have a satisfactory shelf life, and have physical characteristics which will permit use in a variety of food products with a variety of different ingredients.

          The water activity ( $a_w$ ) is a measure of the free water  
15 available in a food product. The water activity is significant in the food industry because microbial spoilage is facilitated at higher water activities, and retarded at lower water activities. Bacteria generally do not survive where the  $a_w$  is .85 or less. Molds do not survive well at an  $a_w$  of .75 or below,  
20 except for one or two varieties which can survive to an  $a_w$  of about .70. Some yeasts have been found which can survive to an  $a_w$  levels of around .62, but most are unable to survive below an  $a_w$  of about .75. It is therefore desirable to produce food products with as low an  $a_w$  as possible. Efforts to lower the  $a_w$ ,  
25 however, can have a deleterious effect on the eating quality of the resulting food product.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a method and composition for preparing reduced fat food products which will have acceptable taste characteristics.

5 It is another object of the invention to provide a method and composition for preparing reduced fat food products which will have acceptable texture characteristics.

10 It is still another object of the invention to provide a method and composition for preparing reduced fat food products which will have an acceptable consistency.

It is yet another object of the invention to provide a method and composition for preparing reduced fat food products which can be utilized to create a variety of different food products.

15 It is another object of the invention to provide a method and composition for preparing reduced fat food products which will have a relatively low  $a_w$ .

20 These and other objects are provided by a method and composition for preparing reduced fat food products in which an edible viscous liquid is provided with a liquid humectant, a starch, and a fiber. The edible viscous liquid is most preferably high fructose corn syrup. The liquid humectant is most preferably glycerin. The starch and fiber can be selected from a number suitable products.

25 A preferred composition is based upon 100 parts by weight of edible viscous liquid. The liquid humectant is preferably present in an amount between about 10-50 parts by weight. The starch is preferably present in an amount between about 5-25 parts by weight. The fiber is preferably present in an amount  
30 between about 1-15 parts by weight.

An emulsifier can be provided in compositions according to the invention. The emulsifier, if present, is preferably provided in amounts up to about 10 parts by weight of the above-described composition. Lecithin can also be included, and is  
35 preferably provided in amounts up to about 10 parts by weight.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The proportions of the edible viscous liquid, liquid humectant, starch and fiber components of the invention can vary. Different foods having different ingredients and product characteristics, and made according to different processes and at different temperatures, may require adjustments to the proportions. Such would largely be determined on an empirical basis for the proportions that yield the most desirable product.

The following preferred component ranges are based upon 100 parts by weight of edible viscous liquid. The invention preferably comprises between about 10-50 parts by weight of liquid humectant, between about 5-25 parts by weight of starch, and between about 1-15 parts by weight of fiber. The invention can include additional components. An emulsifier can be provided. The emulsifier is preferably provided in amounts up to about 10 parts by weight of the above-described composition. Lecithin can also be provided, preferably in amounts up to about 10 parts by weight. Flavoring agents can be added to the above composition, if desired.

Edible viscous liquids suitable for the invention include, but are not limited to, high fructose corn syrup, sucrose solutions, invert syrup, sucrose syrup, honey, molasses, and mixtures thereof. A currently preferred edible viscous liquid is high fructose corn syrup (HFCS). A number of varieties of high fructose corn syrup products are available, and are sometimes classified by the percentage of solids in the syrup. Corn syrups having 40%-90% solids are presently preferred.

Examples of suitable humectants include, but are not limited to, glycerin, 1, 3-butylene glycol, mannitol, propylene glycol, sodium lactate, sorbitol, and mixtures thereof. Corn sweeteners such as corn syrup, as well as other products, can also function as suitable humectants. Glycerin is a currently preferred liquid humectant.

Starches suitable for use in the invention can be selected from a variety of sources. These include, but are not limited

to, arrowroot, corn, high amylose, pea, potato, rice, tapioca, waxy maize, wheat, and mixtures thereof.

Fibers suitable for the invention include, but are not limited to, amaranth bran, apple, barley, cellulose, citrus, 5 cocoa bran, corn bran, fruit (low moisture), multigrain, mustard, oat bran, pea bran, peanut bran, pear, psyllium, rice bran, soy bran, sugar beet, sunflower, tomato, vegetable, wheat bran, and mixtures thereof.

Emulsifiers suitable for use with the invention can be selected from a number of known edible emulsifiers. Suitable 10 emulsifiers include, but are not limited to, lecithin, acetylated monoglycerides, glycerol esters, mono-glycerides and diglycerides, polyglycerol esters, propylene glycol esters, polyoxyethylene sorbitan esters, sorbitan esters, sodium citrate, 15 sodium lactate, sodium stearyl-2-lactylate, stearyl-2-lactylic acid, and mixtures thereof. Lecithin is a currently preferred emulsifier. Hydrates are preferable where possible.

#### Example 1

A composition according to the invention is prepared with 20 the following components:

<u>Component</u>	<u>Grams</u>
HFCS (42% fructose)	1000
Glycerine	250
Emulsifier Hydrate	45
25 Lecithin	20
Starch (pregelatinized) Miragel 463	157
Fiber (soy) Fibrum 1450	43

Fibrum 1450 is a trademark of Protein Technologies International, St. Louis, MO for soy fiber products. Miragel 463 starch is a 30 trademark of A.E. Staley Mfg. Co., Decatur, IL. Emulsifier hydrate contains sorbitan monostearate and polysorbate 60.

The product has a moisture feel and texture that is characteristic of fat. The product prevents unwanted hardness of the resulting food product, as does fat, and has an acceptable 35 shelf life of approximately 4-6 months.

Example 2

The fat replacer of Example 1 was incorporated into a soft-type sugar cookie. The cookie had the following composition:

	<u>Component</u>	<u>Grams</u>
5	Sugar (fine granulated)	260
	Skim Milk Powder (high heat)	12
	Fat Replacer	125
	Water	100
	Salt	4
10	Flour (unbleached wheat flour 8 1/2% protein)	450
	Baking Powder	5

Baking powders commonly comprise sodium bicarbonate, and one or more leavening acids. The product was baked in an oven at 400°F for approximately 12 minutes. The resulting product had a fat content of approximately 0.14 grams per 30 gram serving. The moisture content was 13.2% and the  $a_w$  was .65.

Example 3

The fat replacer of Example 1 was incorporated into soft-type oatmeal raisin cookies. The cookie had the following composition:

	<u>Component</u>	<u>Grams</u>
	Fat Replacer	100
	Raisin Paste	30
	Sugar (fine granulated)	80
25	Skim M.P.	6
	Salt	4
	Cinnamon	5
	HFCS	80
	Molasses	20
30	Vanilla	0.75
	Spice Blend 2401	1
	Water	40
	Flour	175
	Rolled Oats	30
35	Quick Oats	30
	Baking Power	6
	Raisins	45
	Pure Corn Starch	50

The sample was judged to have good taste, texture and consistency. This product was baked in a 300°F oven for 5 minutes and had a moisture content of 13.8 percent, and an  $a_w$  of .625. The product had a fat content of about 0.225 grams per 30 gram serving.

Example 4

The fat replacer of Example 1 was incorporated in a soft-type oatmeal raisin cookie. The cookie had the following composition:

10	<u>Component</u>	<u>Grams</u>
	Fat Replacer	400
	Raisin Paste	150
	Sugar (fine granulated)	400
	Whey	30
15	Salt	20
	Cinnamon	25
	HFCS	400
	Molasses	100
	Vanilla	4
20	Water	200
	Flour	800
	Pure Corn Starch	325
	Baby Oats	150
	Quick Cooking Rolled Oats	150
25	Baking Powder	55
	Raisins	225

This composition was baked in an oven at 325°F for approximately 6 minutes. The product had a moisture content of 10.5 percent, and an  $a_w$  of .49. The fat content was about .225 grams of fat per 30 gram serving.

Example 5

The fat replacer of Example 1 was incorporated into a crisp, high fiber, high protein, no fat granola bar. The granola bar had the following composition:

35	<u>Component</u>	<u>Grams</u>
	HFCS	40

	Honey	60
	Vanilla	3.5
	Salt	5
	Water	165
5	Molasses	30
	Rolled Oats	150
	Baby Oats	150
	Soy Fiber	120
	Soy Protein	50
10	Flour	120
	Fat Replacer	100
	Brown Sugar	150

The product was baked at 315°F for approximately 30 minutes. The product contained approximately 0.63 grams of fat, 3 grams of fiber, and 3 grams of protein per 30 gram serving.

Example 6

The fat replacer of Example 1 was incorporated into an orange/apple fat free cookie. The cookie had the following composition:

20	<u>Component</u>	<u>Grams</u>
	Fat Replacer	400
	Sugar (fine granulated)	300
	HFCS	300
	Orange Juice Concentrate	340
25	Low Moisture Apple Pieces (22% moisture)	240
	Orange Flavor GB#1 (Consumers Flavor Co., NY, NY)	32
	Salt	24
	Flour	850
	Starch (Binasol 15, A.E. Staley Co.)	200
30	Baking Powder	32

The product was baked at 350°F for approximately 8 minutes. The moisture content of the product was 13.5%.

Example 7

The fat replacer of Example 1 was used to prepare a soft, fat free chocolate cookie. The cookie had the following composition:

	<u>Component</u>	<u>Grams</u>
--	------------------	--------------

	Fat Replacer	500
	Sugar (fine granulated)	400
	Whey Powder	30
	Salt	20
5	Light Dutched Cocoa	175
	HFCS	400
	Corn Syrup (62 Dextrose Equivalent)	100
	Vanilla	6
	Water	200
10	Flour	800
	Pure Corn Starch	200
	Baking Powder	50

The product was baked at about 375°F for about 5 1/2 minutes.

The moisture content of the product was 12.2%, and the product  
 15 had approximately 0.339 grams per 30 gram serving.

The invention can also be adapted for soft or firm textured products. A soft fat replacer according to the invention can have the following composition:

	<u>Component</u>	<u>Grams</u>
20	HFCS	100
	Emulsifier Hydrate	4.4
	Lecithin	200
	Glycerin	40
	Starch	10
25	Fiber	2.5

A firm fat replacer could have the following composition:

	<u>Component</u>	<u>Grams</u>
	HFCS	100
	Emulsifier	4.4
30	Lecithin	2
	Glycerin	15
	Starch	20
	Fiber	10

The particular proportions of ingredients can be varied within  
 35 or beyond these ranges, as will be determined by empirical testing on different types of products. Different types of cookies and baked products will sometimes require adjustments to

the ingredients and to their proportions, in order to arrive at the desired texture.

The invention can be incorporated into a variety of food products, including cookies and pastries, icings, candies and candy fillings, fillers, meats, salad dressing, yogurt, and ice cream. Proportions of the various components will be altered to yield the most desirable final product. The composition according to the invention is preferably substituted for a portion, but not all, of the fat that is typically included in the resulting food product. In some circumstances, the product of the invention may be used as a fat substitute for all of the fat in the food product.

The invention can be embodied in a host of different products having widely different food characteristics. Accordingly, it is anticipated that modifications to the proportions and ingredients set forth herein will sometimes be necessary to adapt the invention to a particular product. This invention can be embodied in other specific forms without departing from the spirit or essential attributes thereof, and accordingly, reference should be had to the following claims, rather than to the foregoing specification, as indicating the scope of the invention.

I Claim:

1. A composition for preparing reduced fat food products, comprising:

an edible viscous liquid;

5 a liquid humectant;

a starch; and,

a fiber.

2. The composition of Claim 1, wherein said edible viscous liquid is corn syrup.

10 3. The composition of Claim 1, wherein said liquid humectant is glycerin.

4. The composition of Claim 1, wherein said starch is selected from the group consisting of arrowroot, combinations, corn, high amylose, pea, potato, rice, tapioca, waxy maize, wheat, and mixtures thereof.

15 5. The composition of Claim 1, wherein said fiber is selected from the group consisting of amaranth bran, apple, barley, cellulose, citrus, cocoa bran, corn bran, fruit (low moisture), multigrain, mustard, oat bran, pea bran, peanut bran, pear, psyllium, rice bran, soy bran, sugar beet, sunflower, tomato, vegetable, wheat bran, and mixtures thereof.

20 6. The composition of Claim 1, further comprising an emulsifier.

7. The composition of Claim 6, wherein said emulsifier is selected from the group consisting of acetylated monoglycerides, glycerol esters, mono-glycerides and di-glycerides, polyglycerol esters, propylene glycol esters, polyoxyethylene sorbitan esters,

sorbitan esters, sodium citrate, sodium lactate, sodium stearyl-2-lactylate, stearyl-2-lactylic acid, and mixtures thereof.

8. The composition of Claim 1, further comprising lecithin.

5 9. The composition of Claim 1, wherein said edible viscous liquid comprises about 100 parts by weight of said composition, said liquid humectant comprises between about 10 and about 50 parts by weight, said starch comprises between about 5 and about 25 parts by weight, and said fiber comprises between about 1 and  
10 about 15 parts by weight.

10. The composition of Claim 9, wherein said edible viscous liquid is corn syrup.

11. The composition of Claim 9, wherein said liquid humectant is glycerin.

15 12. The composition of Claim 9, wherein said starch is selected from the group consisting of arrowroot, combinations, corn, high amylose, pea, potato, rice, tapioca, waxy maize, wheat, and mixtures thereof.

20 13. The composition of Claim 9, wherein said fiber is selected from the group consisting of amaranth bran, apple, barley, cellulose, citrus, cocoa bran, corn bran, fruit (low moisture), multigrain, mustard, oat bran, pea bran, peanut bran, pear, psyllium, rice bran, soy bran, sugar beet, sunflower, tomato, vegetable, wheat bran, and mixtures thereof.

25 14. The composition of Claim 9, further comprising an emulsifier selected from the group consisting of acetylated monoglycerides, glycerol esters, mono-glycerides and diglycerides, polyglycerol esters, propylene glycol esters,

polyoxyethylene sorbitan esters, sorbitan esters, sodium citrate, sodium lactate, sodium stearyl-2-lactylate, stearyl-2-lactylic acid, and mixtures thereof.

15. The composition of Claim 14, wherein said emulsifier  
5 comprises up to about 10 parts by weight of said composition.

16. The composition of Claim 9, further comprising lecithin.

17. The composition of Claim 16, wherein said lecithin comprises up to about 10 parts by weight of said composition.

10 18. A method for preparing reduced fat food products, comprising the step of substituting for at least a portion of the fat of the food product a composition comprising an edible viscous liquid, a liquid humectant, a starch, and fiber.

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US93/11646

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(5) :A23L 1/0522 US CL : 426/573, 653, 661 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 426/573, 578, 653, 658, 661, 804 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched NONE Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) NONE		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	US, A, 4,698,232 (Sheu et al.) 06 October 1989, col. 2, lines 39-44 and col. 4, line 55 to col. 5, line 18.	1-3,5-7, 18 ---- ----- 1-18
X ---- Y	US, A, 4,562,080 (Tenn) 31 December 1985, col. 6, lines 48-53; col. 7, lines 28-41; col. 10, lines 34-42.	1-5,9-13,18 ----- 1-18
Y	US, A, 4,444,799 (Vanderveer et al.), 24 April 1984, col. 2, line 45 to col. 3, line 54.	1-18
Y	US, A, 4,575,461 (Friedman) 11 March 1986, col. 2, lines 62-65.	1-18
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* *A* *E* *L* *O* *P*	Special categories of cited documents: document defining the general state of the art which is not considered to be part of particular relevance earlier document published on or after the international filing date 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) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	*T* *X* *Y* *&* 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 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 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 05 FEBRUARY 1994		Date of mailing of the international search report 16 FEB 1994
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. N/A		Authorized officer Michael Ball <i>Michael Ball</i> Telephone No. (703) 308-0651

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US93/11646

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 5,106,644 (El-Nokaly) 21 April 1992, Abstract	1-18
A	US, A, 5,094,872 (Furcsik) 10 March 1992, Abstract	1-18