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(21) International Application Number: PCT/EP94/02998 (22) International Filing Date: 8 September 1994 (08.09.94) (30) Priority Data: 93307241.5 14 September 1993 (14.09.93) EP (34) Countries for which the regional or international application was filed: GB et al. (71) Applicant (for AU BB CA GB IE KE LK MN MW NZ SD TT only): UNILEVER PLC [GB/GB]; Unilever House, Blackfriars, London EC4 4BQ (GB). (71) Applicant (for all designated States except AU BB CA GB IE KE LK MN MW NZ SD TT): UNILEVER N.V. [NL/NL]; Weena 455, NL-3013 Al Rotterdam (NL). (72) Inventors: BUN, Godelieve, Johanna, Maria; Ericalean 22, NL-2803 BP Gouda (NL). VAN DIEREN, Frankwin; Goudsesingel 530, NL-3011 KR Rotterdam (NL). SCOTT, Glenda, Lesley; 24 Barnwell Drive, Rushden, Northants NN10 9HP (GB). YOELL, Richard, William, F.; 2 Park Cottage Village Road, Bromham, Bedfordshire MK41 8HX (GB).		(74) Agent: ROSCOE, Brian, C.; Unilever plc, Patent Division, Colworth House, Sharnbrook, Bedford MK44 1LQ (GB). (81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, UZ, 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), ARIPO patent (KE, MW, SD). Published <i>With international search report.</i>
(54) Title: EXPANDED COATING MATERIAL		
(57) Abstract A novel, smooth coating material having a defined shape and an advantageously low oil uptake on deep-frying is made by: (a) extruding a dough comprising from 10 to 60 % by dry weight protein and from 90 to 40 % by dry weight starch through an appropriately shaped die; providing that when the dough comprises from 30 to 60 % protein, the dough is extruded at a temperature of from 60 to 100 °C; and when the dough comprises below 30 % protein, the protein is substantially a fast hydrating protein and the dough is extruded at a temperature of less than 40 °C; (b) cutting the appearing extrudate into approximately equally thick sections to form a shaped pellet; and (c) expanding the pellet, preferably by frying in oil.		

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Expanded coating material.

FIELD OF THE INVENTION

5 The invention relates to a coating material for food products having a novel defined, smooth shape and an advantageously low oil uptake on deep-frying, a method of preparing such coating materials and a food product coated with such a coating material.

BACKGROUND AND PRIOR ART

10 There is a continuing need of coated food products such as coated meat, poultry, vegetables or fish. Usually, these coated food products are obtained by first wetting a raw or at least partially cooked, optionally frozen, product, for instance by glazing or dipping into, or spraying with, a fluid substance such as water or batter and, subsequent to wetting, applying a particulate breading material. If
15 desired, the steps of wetting and breading can be repeated to obtain a multi-layered coating. Before storage, the coating is pre-set, for instance by pre-frying.

20 Well known crumb coating materials contain particles of a heat-treated starchy material. Several methods for obtaining these materials have been known for a long time. One of these methods involves the baking of a loaf of bread which, after staling, is ground into conventional bread crumbs. Another method involves the cooker extrusion of a
25 mixture of flour and water, the extrudate then being ground for instance to obtain so-called Japanese crumbs.

30 The crumb coatings obtained thereby have a sandy irregular appearance. These crumb coatings absorb a substantial amount of oil when the coated food product is deep-fat
35 fried. Furthermore, although by the provision of Japanese crumb comprising differently coloured particles more

variety in appearance is provided, there is a continuing need for more variety.

5 US 4 568 550 (General Foods Corp) discloses extruding a dough having a moisture content of 20 to 40% at 60°C to 120°C while under pressures and low shear conditions and for a period of time effective to set the protein and to partially gelatinise the starch in the flour while maintaining the starch granule integrity. The extrudate is
10 then subjected to the appropriate conditions in order to puff and expand extrudate. The puffing explodes the extrudate to provide the required aerated breadlike structure. This process therefore teaches away from providing a smooth, shape-retained extrudate.

15

It is therefore an object of this invention to provide a novel shaped particulate coating material having a defined smooth shape and a low oil uptake when deep-fried.

20

DEFINITION OF THE INVENTION

Accordingly the invention provides a crisp particulate coating material having a defined smooth shape and an oil uptake of less than 40% by weight of the crumb composition,
25 comprising from 90-40% starch and from 10 to 60% protein, providing that when the protein content is less than 30% by dry weight the protein is a fast hydrating protein.

The invention also provides a method of manufacturing a
30 particulate coating material having a defined, smooth shape and an oil uptake of less than 40% by weight of the crumb composition, comprising:

a) extruding a dough comprising from 10 to 60% by dry
35 weight protein and from 90 to 40% by dry weight starch through an appropriately shaped die; providing that when the dough comprises from 30 to 60% protein, the dough is

extruded at a temperature of from 60 to 100°C; and when the dough comprises below 30% protein the protein is substantially a fast hydrating protein and the dough is extruded at a temperature of less than 40°C;

5

b) cutting the appearing extrudate into approximately equally thick sections to form a shaped pellet; and

c) a means to effect expansion of the pellet.

10

The invention further provides a food product comprising an edible core and a coating of such defined smooth shaped particles as described above.

15

By oil uptake is meant the percentage of oil absorbed/retained by the crumb composition during the process of frying in oil in order to cook the crumb coated foodstuff. Preferably the crumb has an oil uptake of less than 30% most preferably less than 25%.

20

By defined shape is meant that the particulate coating material has undergone no puffing of its structure during manufacture, in other words the original shape of the coating material has been retained during its manufacture.

25

By fast hydrating protein is meant a protein that is fully hydrated after 2 to 5 minutes at room temperature.

30

The dough composition is manufactured by admixing the required particulate ingredients with water, and preferably has a moisture content of from 23 to 45%. A dough having a protein content of from 30-60% more preferably has a moisture content from 25 to 40%, even more preferably from 28 to 33%, most preferably 30%. A dough having a protein content of less than 30% more preferably has a moisture content of from 35 to 45%.

35

The particulate components thus comprise starch and protein in a ratio of from 9:1 to 2:3. If the protein content is not fast hydrating protein the preferred ratio of starch to protein is from 2:1 to 2:3 most preferably 3:2 to 1:1. If
5 the protein content is substantially fast hydrating protein the preferred ratio of starch to protein is from 4:1 to 7:1.

Suitable proteins include vegetable proteins for example
10 soya protein, chick pea protein and particularly includes cereal proteins such as vital wheat gluten.

Suitable starches include vegetable starches for example potato starch and particularly includes cereal starches,
15 for example wheat starch, maize starch and rice starch. Preferably the starch is a waxy maize starch.

Since starch and protein are present in flours, such flours, for example cereal flour, may therefore be utilised
20 with or without further starch and/or protein addition in order to obtain the desired ratio of starch to protein, for manufacture of the dough. In particular the flour may be Canadian Wheat Red Springs flour (CWRS).

Further optional ingredients which may be included in the crumb coating include for example salt, flavouring materials, fillers, vegetable particles, sugar, fats, emulsifiers, colours, gasifying agents, food fibres and bran.
25

30 When the protein content of the dough is from 30 to 60%, the dough is extruded through an appropriately shaped die at a temperature of from 60 to 100°C, preferably from 65 to 80°C, most preferably 70°C.

35 When the protein content of the dough is less than 30%, the dough is extruded through an appropriately shaped die at a

temperature of less than 40°C, preferably less than 30°C.

The means to effect expansion of the shaped pellet, may be any suitable means known to the man skilled in the art.
5 Preferably expansion is effected via heat treatment.

The heat treatment may preferably be selected from frying in oil, heating in a hot air oven and microwaving. Most preferably the expansion is effected by frying the dried
10 pellets in oil at preferably 170°C to 220°C until suitably expanded.

Additionally a drying step may be incorporated into the manufacturing method detailed above after step (b) whereby
15 the shaped pellets are dried to a moisture content of from 5 to 30%. This is particularly advantageous when the moisture content of the dough prior to extrusion is greater than 35% because it prevents the shaped pellets from sticking together. If the protein content of the dough is
20 from 30 to 60% the shaped pellets are preferably dried to a moisture content of from 10 to 20% and more preferably 15%. Whereas if the protein content of the dough is less than 30%, the shaped pellets are preferably dried to a moisture content of from 22 to 25%.

25 The cross section of the die will determine the final shape of the crumb and may be any desired shape. However, it is preferred that the final crumb size does not exceed 12 mm and more preferably does not exceed 10 mm. Particularly
30 suitable maximum dimensions being from 3 to 8 mm having a sufficiently large size to have definition and not too large to be inconvenient when cutting or biting the final crumb product.

USE OF THE CRUMB COATING COMPOSITION

Crumb coating compositions according to the invention may be used to provide food products such as coated meat, poultry, vegetables or fish.

The crumb coating is preferably applied to a food substance which has first been wetted by glazing or dipping into, or spraying with, a fluid substance such as water or batter. The coating may be pre-set, for instance by pre-frying.

Food products coated with the crumb coating according to the invention, on heating for consumption, have a desirable crisp crumb coating, and a novel shape.

EXAMPLES

The invention will be further illustrated by the following examples. All parts and percentages are by weight unless otherwise indicated.

Examples 1-4: Comparative Examples A-C

A dough was prepared comprising vital wheat gluten, waxy maize starch, salt and water in the proportions shown in Table 1.

Table 1

Example	% By Weight of Composition			
	Protein	Starch	Salt	Water
1	22.8	45.7	1.5	30.0
2	41.1	68.5	1.5	30.0
3	34.25	34.25	1.5	30.0
4	68.5	41.1	1.5	30.0
A	17.1	51.4	1.5	30.0
B	45.7	22.8	1.5	30.0
C	51.4	17.1	1.5	30.0

The dough was extruded through a shaped die of a CLEXTRAL BC 45 cooker extruder at a temperature of 70°C. The die was star-shaped having an 8mm diameter. The appearing strand was cut into 2mm thick shaped pellets. These were dried at 70°C to a moisture content of 15%. The shaped pellets were then fried in hot oil at about 170° for 30 to 40 seconds.

Fish fingers in a frozen condition were coated with a fluid batter of the following composition:

45 parts flour
3 parts NaCl
52 parts water

Thereafter the fried coating particles were coated all around the battered fish fingers, whereafter the coated fingers were flash fried by immersing 20 seconds in hot oil at about 190 to 195°C.

The crumb coating had the properties shown in Table 2. The measurements were made after cooking the fish fingers in oil for consumption.

Example	Crumb coating characteristics	% fat uptake
1	smooth, shape-retained crisp	20
2	smooth, shape-retained, crisp, firm	20
3	smooth, shape-retained, crisp, firm	22
4	shape-retained, crisp, firm	20
A	smooth, shape-retained, not crisp starchy, fragile	25-30
B	slightly rough, firm, crisp	>40
C	very rough and hard, no shape retention	>40

It was observed that the higher the protein content, the rougher and firmer the crumb becomes and also the crumb "puffs" more on cooking and hence does not retain its shape. This results in a higher fat uptake on deep-fat frying. The higher the starch content, the smoother the crumb becomes and the better it retains its shape. However too high a starch content provides a more fragile crumb into which the oil can penetrate more easily, resulting in a higher fat uptake.

Examples 5-10

A dough was prepared comprising CWRs flour having a moisture content of 40%. The CWRs flour had a starch content of 85% and a protein content of 15%. The protein was fast hydrating protein.

The dough was extruded through a shaped die of a CLEXTAL BC 45 cooker extruder at a temperature of 33°C. The die was star shaped and had an 8mm diameter. The appearing strand was cut into 2mm thick shaped pellets and immediately dried under the conditions shown in Table 3. The shaped pellets were then fried in hot oil at about 190°C for 60 seconds.

Table 3

Example	Drying temp	Moisture content after drying	Fat Uptake
5	40°C	15%	20%
6	40°C	18%	17.4%
7	70°C	17%	21%
8	70°C	19%	19%
9	40°C	24.8%	24.1%
10	40°C	29.0%	27.6%

All crumbs were smooth, shape-retained and crisp. Example 6 crumbs were the most crisp.

Comparative Example D

5 Fish fingers were coated with a fluid batter as for Example
1. Thereafter the fish fingers were coated with
commercially available Pandora Crumb, whereafter the coated
fingers were flash fried by immersing 20 seconds in hot oil
of about 190 to 195°C before cooking the fish fingers in
10 oil for consumption. The fat uptake of the crumb was
greater than 50%.

CLAIMS

1. A method of manufacturing a particulate coating material having a defined, smooth shape and an oil uptake
5 of less than 40% by weight of the crumb composition, comprising:

10 a) extruding a dough comprising from 10 to 60% by dry weight protein and from 90 to 40% by dry weight starch through an appropriately shaped die; providing that when the dough comprises from 30 to 60% protein, the dough is extruded at a temperature of from 60 to 100°C; and when the dough comprises below 30% protein the protein is substantially a fast hydrating protein and the dough is
15 extruded at a temperature of less than 40°C;

b) cutting the appearing extrudate into approximately equally thick sections to form a shaped pellet; and

20 c) a means to effect expansion of the pellet.

2. A method according to claim 1 wherein the dough has a moisture content before extrusion of from 23% to 45%.

25 3. A method according to claim 1 or 2 additionally comprising a drying step whereby the shaped pellets are dried to a moisture content of from 5 to 30% prior to expansion.

30 4. A method according to any preceding claim wherein the protein is a cereal protein.

5. A method according to any preceding claim wherein the starch is a cereal starch.

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6. A method according to any preceding claim comprising:

a) extruding a dough comprising starch and protein in a ratio of from 2:1 to 2:3 at a temperature of from 60 to 100°C through an appropriately shaped die;

5 b) cutting the appearing extrudate into approximately equally thick sections to form a shaped pellet; and

c) effecting expansion of the pellet.

10 7. A method according to claim 6 wherein the ratio of starch to protein is from 3:2 to 1:1.

8. A method according to claim 6 or 7 wherein the dough is extruded at a temperature of from 65 to 80°C.

15

9. A method according to claim 6, 7 or 8 wherein the dough has a moisture content before extrusion of from 25 to 40%.

20 10. A method according to any one of claims 6 to 9 wherein the dough has a moisture content before extrusion of from 28 to 33%.

25 11. A method according to any one of claims 1 to 5 comprising:

30 a) extruding a dough comprising less than 30% protein, wherein substantially all the protein is a fast hydrating protein, at a temperature of less than 40°C through an appropriately shaped die;

b) cutting the appearing extrudate into approximately equally thick sections to form a shaped pellet; and

35 c) effecting expansion of the pellet.

12. A method according to claim 11 wherein the ratio of

starch to protein is from 4:1 to 7:1.

13. A method according to claim 11 or 12 wherein the dough is extruded at a temperature of less than 30°C.

5

14. A method according to claim 11, 12 or 13 wherein the dough has a moisture content before extrusion of from 35 to 45%.

10

15. A particulate coating material having a defined smooth shape and an oil uptake of less than 40% by weight of the crumb composition comprising from 10 to 60% by dry weight protein and from 90 to 40% by dry weight starch, providing that when the protein content is less than 30%,
15 substantially all the protein is a fast hydrating protein.

16. A particulate coating material having a defined smooth shape and an oil uptake of less than 40% by weight of the crumb composition obtainable by:

20

a) extruding a dough comprising from 10 to 60% by dry weight protein and from 90 to 40% by dry weight starch through an appropriately shaped die; providing that when the dough comprises from 30 to 60% protein, the dough is
25 extruded at a temperature of from 60 to 100°C; and when the dough comprises below 30% protein the protein is substantially a fast hydrating protein and the dough is extruded at a temperature of less than 40°C;

30

b) cutting the appearing extrudate into approximately equally thick sections to form a shaped pellet; and

c) a means to effect expansion of the pellet.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 94/02998

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 A23L1/176 A23L1/325

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)
 IPC 6 A23L

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	EP,A,0 565 386 (UNILEVER) 13 October 1993 see the whole document ---	15,16
X	EP,A,0 319 287 (UNILEVER) 7 June 1989 see claims 1-4,7-10 see page 3, line 27 - page 4, line 10 see example 8 ---	15,16
X	US,A,3 753 728 (W.T.BEDENK) 21 August 1973 see column 5, line 3 - column 8, line 65 ---	1-3,5-14
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A	AU,D,6 653 965 (D.H. LIPKA) 18 May 1967 see page 5 - page 9 ---	1-16
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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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,4 568 550 (C.V. FULGER) 4 February 1986 see claims 1,5-7,9,10,15 see column 2, line 15 - line 35 see column 3, line 48 - column 4, line 66 see examples 1-3 ---	1-14
A	FR,A,2 401 615 (SODES S.A.) 30 March 1979 see claims 1,2,9 see page 1, line 8 - line 14 see page 4, line 15 - page 5, line 20 ---	1-14
A	US,A,3 873 748 (E.C. SCHWAB) 25 March 1975 see claims 1,2 see column 1, line 39 - line 65 see column 3, line 11 - line 63 -----	1-14

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

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