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CHEWY CONFECTIONERY PRODUCT

The present invention relates to a chewy confectionery product, preferably a chewy sweet, such as a soft centred chew. The present invention preferably provides a chewy confectionery product which is gelatin free. The present invention further provides a method of preparing the chewy confectionery product of the invention.

Chewy sugar-based or sugar-free confectionery available in the prior art contains gelatin so that it has a chewy texture which is desirable for these products. Indeed, gelatin has been used in confectionery manufacture for many years for its diverse functional properties, in particular, its textural, gel-forming, foam stabilising and emulsification properties. Of the hydrocolloids, gelatin is the most commonly used. Hydrocolloid confectionery comprising gelatin has a unique gelatin texture which is especially desirable to consumers. Chewy sweets which contain gelatin have a long-lasting cohesive chew.

However, food-grade gelatin is obtained from bovine or porcine raw materials and the use of gelatin is undesirable not only because of concerns about bovine spongiform encephalopathy (i.e. "BSE" or "mad-cow disease"), but also for the vegetarian population, as well as for certain ethnic groups who have concerns about the nature of meat used in certain food products and/or who

observe certain dietary constraints concerning the consumption of meat and dairy products. In addition, as gelatin is a protein it is highly sensitive to thermal and highly acidic treatments and undergoes degradation causing loss in its functional properties, reduced cooking efficiencies, loss of active ingredient and possible fouling which necessitates frequent cleaning of the processing apparatus.

It is, therefore, desirable to provide a chewy confectionery product which excludes gelatin, therefore overcoming the problems associated with gelatin, but which retains the texture and properties attributed to gelatin and preferred by the consumer. In particular, it is desirable to provide a chewy sweet which still has a long-lasting cohesive chew, but in which at least a portion, preferably all, of the gelatin is replaced in the sweet.

According to the present invention, it has surprisingly been found that by substituting gelatin with oxidised starch in a chewy confectionery product, it is possible to overcome the disadvantages associated with gelatin but still provide the preferred gelatin texture.

The present invention therefore provides a chewy confectionery product comprising water, sugar, glucose syrup, and from 0.5% to 20% by weight oxidised starch.

According to an embodiment of the invention, the chewy

confectionery product is preferably gelatin-free.

According to a further embodiment of the invention, a chewy confectionery product is provided in which at least a portion of the gelatin, preferably all of the gelatin, is replaced with a combination of oxidised starch and a further hydrocolloid, preferably gum arabic.

Preferably, the chewy confectionery product of the invention is a chewy sweet, optionally, a chewy sweet which is filled with a liquid or syrup centre.

A chewy sweet may comprise a non-crystallised, semi-crystalline or crystallised material, such as, crystallised or non-crystallised sucrose, which contains ingredients that give it a certain resistance to chew prior to dissolution, for example, ingredients such as gelatin, starches, hydrocolloids e.g. gums, pectins, etc., glucose syrups, maltodextrins. Chewy sweets may be sugar-based or sugar-free, but are generally based on a matrix of sugars which form the semi-crystalline material to support the chew resistance imparting ingredients. In general, the continuous phase of the chewy sweet supports the sucrose crystals and contains ingredients such as dissolved sugar, glucose syrup etc. The mass phase of the chewy sweet contains fat as a separate phase.

A chewy sweet is distinguished from other confectionery

products such as chewing gums, which have insoluble components and are not intended to be dissolved upon chewing, toffees which contain sugars and milk derivatives as the main ingredients and are characterised by a caramelization process, gums and other hydrocolloid products, which are characterised by gelling behaviour and where sugar crystallisation is not desired, and jellies by the lack of a gel which determines the textural character.

The chewy sweet of the present invention may be a gelatin-free, centred-filled chewy sweet in which the centre filling may be, for example, a liquid or syrup centre, in particular, containing nutritional substances, such as, vitamins, minerals, herbal extracts, oligo saccharides etc. According to this embodiment of the invention, it is preferred that the gelatin is replaced by a combination of oxidised starch and gum arabic.

The property of gelatin which is replicated in a chewy sweet according to the present invention by replacing the gelatin with oxidised starch, preferably also in combination with gum arabic, is that of obtaining a long-lasting, cohesive chew.

Oxidised starch is starch obtained from any source, such as, maize, potato etc., which has undergone an oxidation reaction. For example, oxidised starch is obtained when a (aqueous) starch suspension is treated with an oxidising

agent, such as, sodium hypochlorite, which oxidises the primary alcohol group at the C6 position on the starch molecule to a carboxylic acid group. Oxidation introduces a high degree of steric hindrance into the molecule, preventing or greatly reducing the tendency for short chain fractions to reform as retrogradation bundles. The complex reaction involves hydrolysis, ring rupture and carboxylation (OH groups to COOH groups) of the starch molecule, to reduce the viscosity of the starch solution and a softer set back.

Techniques for detecting oxidised starch at a functional level (above approximately 1%) detect the carbonyl group which is specific to the oxidised starch. Suitable techniques include Fourier Transform Infra Red (FTIR) and solid state NMR.

According to the invention, the chewy confectionery product may contain from 0.5-20% (wt/wt) oxidised starch, preferably in the range of 5-10% (wt/wt). Preferably, the chewy confectionery product contains oxidised starch in combination with gum arabic, which is preferably in the range of from 0-10% (wt/wt), more preferably 1-8% (wt/wt).

In the final product, at least the major part of the oxidised starch is gelatinised through cooking. Preferably, the oxidised starch is fully gelatinised. The chewy confectionery product of the present invention may

typically comprise other ingredients selected from water, sugar, glucose syrup, crystalline sucrose, other hydrocolloids, colouring agents, flavourings and acids, in addition to oxidised starch.

When the hydrocolloid confectionery product of the present invention is sugar-based, it usually contains some 30% to 90%, preferably from 40% to 70%, of syrup or sugars by weight based on the weight of the chewy confectionery product, for example, corn syrup, glucose syrup, invert syrup, high fructose syrup, (crystalline) sucrose, fructose, maltose, and/or sugar replacements, such as, isomalt, maltitol, sorbitol, mannitol, lactitol, trehalose etc.. Different types of sugar systems can be used to manipulate the final textural properties of the chewy confectionery product. For example, the chewy sugar-based product of the present invention contains crystalline sucrose.

In addition to the oxidised starch, optionally sugar systems and other hydrocolloids, preferably gum arabic, the chewy confectionery product may contain usual ingredients such as a food-acceptable acid, for example, lactic acid, malic acid, tartaric acid, ascorbic acid, hydrochloric acid, citric acid, fruit juices, vegetable juices, fats etc. The amount added will depend on the final product but may be in the range of from 0.5% to 5%, in particular, from 1.0% to 2.5% by weight based on the

weight of the chewy confectionery product. The confectionery product may further comprise a humectant such as glycerol, flavour, artificial sweetners for sugar free, products, emulsifiers e.g. lecithin, flavour enhancers e.g. talin, colour, protein, for example, egg white or milk protein in the case of aerated systems, and other additives, the amounts and type of which will depend on the end product. Suitable amounts of these additives are from 0.1% to 5%, in particular, from 0.2-2.0% by weight based on the weight of the chewy confectionery product. The remainder of the confectionery product is water and the amount of water in the finished chewy confectionery product of the invention may be from 5% to 20%, preferably from 6% to 15% by weight based on the weight of the hydrocolloid confectionery product.

Preferably, the chewy sweet of the present invention is a composition based on a syrup matrix comprising a solution of sugars, sugar substitutes and/or starch hydrolysate syrups (glucose syrup) in water. Other ingredients may be dissolved or dispersed within the syrup matrix in order to modify the texture, flavour and appearance of the end product as desired, for example, fats, flavours, colouring agents, acids, hydrocolloids, maltodextrins, emulsifiers, sugar crystals, aerating agents etc.

Examples of other hydrocolloids which may be present in the end product are: agar agar, xanthane gum, locust bean

gum, gellan gum, pectin, carrageenan and guar gum.

The chewy confectionery products of the present invention may be prepared by conventional methods. For example, the ingredients may be blended to form a syrup, then cooked, shaped and, if necessary, dried. The processing methods selected will affect the final texture of the products. It is necessary for the products to be heated during processing in order to gelatinise at least a major part, preferably all, of the oxidised starch in the final product.

The ingredients may be blended with agitation, for example, using conventional stirrers. A syrup of sugars, oxidised starch and water is preferably blended first followed by the addition of the remaining additives, for example, acid, flavour, colour, humectants, etc. (acid, flavour etc. is normally added after cooking) to give a syrup having a desired final solids content.

The initial mixture of ingredients may be cooked by open pan boiling in, for example, by use of a jet cooker, coil cooker, plate heat exchanger or a cooker extruder. The operating conditions will vary depending on the cooking equipment, formulation ingredients etc., which are selected.

The product may then be shaped using conventional

techniques and subjected to a cooling/drying stage as required.

More elaborate manufacturing processes include a wide range of cooking processes, such as continuous evaporation and continuous starch cooking, the inclusion of an aerating stage by beating or pulling, continuous cooling, such as, by cooling rollers, and forming operations such as extrusion, rope forming, cut and wrap or dye-forming.

The following examples provide formulation and processing details for gelatin-free chewy sweets according to preferred embodiments of the invention. The examples are intended for illustrative purposes and are not intended to be limiting.

Example 1

A chewy sweet in which a combination of oxidised starch and gum arabic replaces the gelatin in the final product is produced by a method wherein 3.5% oxidised starch and 1.5% gum arabic (dry content) is cold slurried in water and then heated at 95°C. Sugar is then dissolved into the cooked mass (42.1% dry), before adding glucose syrup (45.8% dry), fat (4.0% dry) and invert syrup (3% dry). A second cooking stage follows using plate heat exchanger and flash stage to give a final moisture content of 6-7%. Further processing of the cooked mass can follow using conventional processes.

Example 2

A chewy sweet having the following formulation is produced according to the present invention.

	% by weight
crystalline sucrose	35
glucose syrup (42DE)	35
oxidised starch	5
gum arabic	5
fat	5
water	15

The chewy sweet is produced by a simple process operating the open pan method for cooking using a stirred steamed-jacketed confectionery boiling pan. The recipe water is heated to boiling (100°C) and the oxidised starch is added preferably as a dry mix with gum arabic. A high speed mixer is employed to give rapid dispersion. The oxidised starch gelatinises on dispersion in excess hot water. All of the remaining ingredients are then combined with this solution. The batch is heated using a steam jacket to obtain a boiling temperature probably in the range of 115-125°C, depending on the final texture desired. Once the final cooking temperature is reached, the mass may be cooled, for example, by casting onto a cold slab. The product can then be apportioned as required.

Example 3

The following is an example of a liquid filled chewy sweet of the invention:

COMPONENT PARTS:

		g/ww	%/ww	g/dw	%/dw
1	Crystal sugar	500.00	42.699%	499.50	55.472%
2	Glucose syrup 42° DE	500.00	42.699%	400.00	44.422%
3	Water	170.00	14.518%	0.00	0.000%
4	Citric acid	1.00	0.085%	0.95	0.106%
	TOTAL YIELD OF BASIC MIX	**1,171.00**	**100.000%**	**900.45**	**100.000%**

		g	%
SOLIDS CONTENT PREMIX		900.45	76.90%
WATER CONTENT PREMIX		270.55	23.10%
SOLIDS CONTENT LIQUOR	80	900.45	80.00%
WATER CONTENT LIQUOR	80	225.11	20.00%
LOSS		45.44	3.88%
TOTAL OUT AFTER COOKING		**1,125.56**	**96.12%**

		g/ww	%/ww	g/dw	%/dw
	Total premix taken for further cooking	1,125.56	92.596%	900.45	96.932%
5	Xylitol Syrup 70%	55.00	4.525%	10.00	1.184%
6	Sorbitol Syrup 70%	35.00	2.879%	17.50	1.884%
	TOTAL YIELD OF BASIC MIX	**1215.56**	**100.000%**	**928.95**	**100.000%**

		g	%
SOLIDS CONTENT PREMIX		928.95	76.42%
WATER CONTENT PREMIX		286.61	23.58%
SOLIDS CONTENT DEPOSITING LIQUOR	84	928.95	84.00%
WATER CONTENT DEPOSITING LIQUOR	16.0	176.94	16.00%
LOSS		109.67	9.02%
TOTAL OUT AFTER COOKING		**1,105.89**	**90.98%**

		g/ww	%/ww	g/dw	%/dw
	Total premix taken for flavouring	1,105.89	98.909%	1,078.25	99.517%
8	Functional ingredient - X	2.00	0.179%	1.90	0.175%
9	Functional ingredient - Y	5.00	0.447%	0.25	0.023%
10	Functional ingredien - Z	1.20	0.107%	1.08	0.100%
11	Functional ingredient - *	4.00	0.358%	2.00	0.185%
	TOTAL YIELD	**1,118.09**	**100.000%**	**1,083.48**	**100.000%**

	g	%
TOTAL INGRDEDIENTS IN	1,268.00	100.00%
LOSS	149.91	11.82%
TOTAL YIELD OUT FOR DEPOSITING	**1,118.09**	**88.18%**

RECIPE & PROCESSING DETAILS:

Heat and stir Sugar, Glucose, Water and Citric acid to 90°C for 1 hour before adding Sorbitol Syrup and Xylitol Syrup. Boil to a solids content of 84% beforeadding the Flavour and Colour and buffered lactic acid (and in this case funtional ingredients)

The liquid filling may alternatively comprise different syrups, for example, corn syrup, invert syrup, sorbitol syrup, xylitol syrup (or other sugar alcohol syrups) or other sugar replacers. It may also contain artificial sweeteners, fat, colours, flavour and/or flavour enhancers, acids (such as citric, malic, lactic acid etc.) These acids might be buffered with salts. These fillings have a typical solids content of 73%-92% preferably 82%-88%. The filling may be fat based (instead of water based ie syrup based) and may contain other ingredients such as sugar, sugar replacers, flavours, salts, nuts, cocoa or chocolate etc.

CLAIMS

1. A chewy confectionery product comprising water, sugar, glucose syrup, and from 0.5% to 20% by weight of oxidised starch.

2. A chewy confectionery product according to claim 1 which is gelatin-free.

3. A chewy confectionery product according to claim 1 or claim 2 which further comprises gum Arabic.

4. A chewy confectionery product according to any of claims 1-3 which is a chewy sweet.

5. A chewy confectionery product according to claim 4 in which the chewy sweet is centre-filled with a liquid or syrup centre or powder.

6. A process for the preparation of a chewy confectionery product according to claim 1 which comprises heating the oxidised starch to result in gelatinisation of the oxidised starch, mixing said gelatinised starch with remaining ingredients of the end product, cooking the formulation mixture thus obtained, and shaping the cooked mass.