

Process for a dried instant noodle

The present invention relates to a process for the production of a dried instant noodle. In particularly the invention relates to a process for the production of a dried instant noodle
5 using a soy protein source, Kansui salts and a combination of cereal flour and a flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof.

It is already known to have noodles which have a high protein content. Nevertheless,
10 the manufacturing of dried instant noodles with a protein content of at least 10wt% and a fiber content of at least 3 wt% has been challenging using lamination technology. It shows dough rheological and machinability issues like sticky dough, brittle dough, poor sheeting or sheet breakage, and in the finished noodles issues like strand stickiness, soft noodle texture and lack of viscoelasticity.

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Therefore, to provide nutritional benefits in dried instant noodles having protein in an amount of at least 10wt% and fiber in an amount of at least 3wt%, it is essential to explore a process having good machinability and good rheology of the noodle dough.

Summary of the invention

20 The object of the present invention is to improve the state of the art and to provide an improved or at least an alternative solution to overcome at least some of the inconveniences described above. The object of the present invention is achieved by the subject matter of the independent claims. The dependent claims further develop the idea of the present invention.

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Particularly, the object of the present invention is to provide a process for the production of a dried instant noodle having good machinability and rheology, wherein the dried instant noodle has protein in an amount of at least 10wt% and fiber in an amount of at least 3wt%.

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Accordingly, the present invention provides in a first aspect a process for the production of a dried instant noodle comprising a cereal flour, Kansui salts, a soy protein source and a flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination
35 thereof, the process comprising the steps of:

- a) Mixing the cereal flour, the soy protein source, the flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof and optionally other dry ingredients with the Kansui salts and water to form a dough;
- 5 b) Sheetting and slitting the dough to obtain noodle strands;
- c) Steaming the noodle strands from step b);
- d) Cutting the noodle strands from step c) and optionally folding;
- e) Frying the noodle strands from step d) in oil or air drying the noodle strands from step d);
- 10 f) Cooling.

In a second aspect the invention relates to a dried instant noodle comprising a cereal flour, Kansui salts, a soy protein source and a flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof, wherein the dried instant noodle has an amount of protein of at least 10wt% (by weight of the total composition) and an amount of fiber of at least 3wt% (by weight of the total composition).

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It has been surprisingly found by the inventors that by using a cereal flour, a soy protein source, Kansui salts and a flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof, existing lamination technology has acceptable to good machinability in terms of non-sticky dough, sheeting and good texture (not firm, chewy) of the obtained dried instant noodle, which is high in protein and fiber. The soy protein source acts as texturizing ingredient and can replace wheat gluten or at least reduce the amount of wheat gluten by 50%. Replacing wheat gluten by a soy protein source has the advantage that the protein digestibility-corrected amino acid score (PDCAAS) is increased, which is a method of evaluating the quality of a protein based on both the amino acid requirements of humans and their ability to digest it. Therefore, next to the higher amount of protein and fibre the overall nutritional - quality of the dried instant noodle is improved by PDCAAS.

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Detailed Description of the invention

In a first aspect the present invention pertains to a process for the production of a dried instant noodle comprising a cereal flour, Kansui salts, soy protein source and a flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut

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press cake, a flour from a barley spent grain or a combination thereof, the process comprising the steps of:

- a) Mixing the cereal flour, the soy protein source, the flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof and optionally other dry ingredients with the Kansui salts and water to form a dough;
- b) Sheetting and slitting the dough to obtain noodle strands;
- c) Steaming the noodle strands from step b);
- d) Cutting the noodle strands from step c) and optionally folding;
- e) Frying the noodle strands from step d) in oil or air drying the noodle strands from step d);
- f) Cooling.

In a preferred aspect the present invention pertains to a process for the production of a dried instant noodle comprising 10 to 70wt% of cereal flour (by weight of the total composition), 0.2 to 3.5wt% of Kansui salts (by weight of the total composition), 3 to 30wt% of soy protein source (by weight of the total composition) and 10 to 40wt% of flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof (by weight of the total composition), the process comprising the steps of:

- a) Mixing the cereal flour, the soy protein source, the flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof and optionally other dry ingredients with the Kansui salts and water to form a dough;
- b) Sheetting and slitting the dough to obtain noodle strands;
- c) Steaming the noodle strands from step b);
- d) Cutting the noodle strands from step c) and optionally folding;
- e) Frying the noodle strands from step d) in oil or air drying the noodle strands from step d);
- f) Cooling.

In a preferred aspect the present invention pertains to a process for the production of an oil-fried instant noodle comprising 10 to 70wt% of cereal flour (by weight of the total composition), 0.2 to 3.5wt% of Kansui salts (by weight of the total composition), 3 to 30wt% of soy protein source (by weight of the total composition) and 10 to 40wt% of flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press

cake, a flour from a barley spent grain or a combination thereof (by weight of the total composition), the process comprising the steps of:

- a) Mixing the cereal flour, the soy protein source, the flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof and optionally other dry ingredients with the Kansui salts and water to form a dough;
- b) Sheetting and slitting the dough to obtain noodle strands;
- c) Steaming the noodle strands from step b);
- d) Cutting the noodle strands from step c) and optionally folding;
- e) Pre-drying to remove moisture before frying;
- f) Frying in the oil;
- g) Cooling.

In a preferred aspect the present invention pertains to a process for the production of a dried instant noodle comprising 10 to 70wt% of cereal flour (by weight of the total composition), 0.2 to 3.5wt% of Kansui salts (by weight of the total composition), 3 to 30wt% of soy protein source (by weight of the total composition) and 10 to 40wt% of pulse flour (by weight of the total composition), the process comprising the steps of:

- a) Mixing the cereal flour, the soy protein source, the pulse flour and optionally other dry ingredients with the Kansui salts and water to form a dough;
- b) Sheetting and slitting the dough to obtain noodle strands;
- c) Steaming the noodle strands from step b);
- d) Cutting the noodle strands from step c) and optionally folding;
- e) Frying the noodle strands from step d) in oil or air drying the noodle strands from step d);
- f) Cooling.

In a preferred aspect the present invention pertains to a process for the production of an oil-fried instant noodle comprising 10 to 70wt% of cereal flour (by weight of the total composition), 0.2 to 3.5wt% of Kansui salts (by weight of the total composition), 3 to 30wt% of soy protein source (by weight of the total composition) and 10 to 40wt% of pulse flour (by weight of the total composition), the process comprising the steps of:

- a) Mixing the cereal flour, the soy protein source, the pulse flour and optionally other dry ingredients with the Kansui salts and water to form a dough;
- b) Sheetting and slitting the dough to obtain noodle strands;
- c) Steaming the noodle strands from step b);

- d) Cutting the noodle strands from step c) and optionally folding;
- e) Pre-drying to remove moisture before frying;
- f) Frying in the oil;
- g) Cooling.

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In a second aspect the invention relates to a dried instant noodle comprising cereal flour, Kansui salts, a soy protein source and a flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof, wherein the dried instant noodle has an amount of protein of at least 10wt% (by weight of the total composition) and an amount of fiber of at least 3wt% (by weight of the total composition).

In a preferred aspect the invention relates to a dried instant noodle comprising 10 to 70wt% of cereal flour (by weight of the total composition), 0.2 to 3.5wt% of Kansui salts (by weight of the total composition), 3 to 30wt% of soy protein source (by weight of the total composition) and 10 to 40wt% of flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof (by weight of the total composition), wherein the dried instant noodle has an amount of protein of at least 10wt% (by weight of the total composition) and an amount of fiber of at least 3wt% (by weight of the total composition)

In a preferred aspect the invention relates to a dried instant noodle comprising cereal flour, Kansui salts, a soy protein source and a flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof, wherein the dried instant noodle has an amount of protein between 10 to 30wt% (by weight of the total composition) and an amount of fiber between 3 to 10wt% (by weight of the total composition).

In a preferred aspect the invention relates to a dried instant noodle comprising 10 to 70wt% of cereal flour (by weight of the total composition), 0.2 to 3.5wt% of Kansui salts (by weight of the total composition), 3 to 30wt% of soy protein source (by weight of the total composition) and 10 to 40wt% of flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof (by weight of the total composition), wherein the dried instant noodle has an amount of protein between 10 to 30wt% (by weight of the total composition) and an amount of fiber between 3 to 10wt% (by weight of the total composition)

The term "cereal flour" according to this invention means at least one ingredient of wheat flour, oat flour, corn flour, rice flour, millet flour or combinations thereof, preferably wheat flour. In an embodiment the cereal flour is standard refined wheat flour. In an
5 embodiment the legume based dried instant noodle comprises 10 to 70 wt% of cereal flour (by weight of the total composition), preferably 10 to 65wt%, preferably 15 to 65wt%, preferably 15 to 60wt%, preferably 15 to 55wt%, preferably 15 to 50wt%, preferably 20 to 65wt%, preferably 20 to 60wt%, preferably 20 to 55wt%, preferably 20 to 50wt%, preferably 25 to 65wt%, preferably 25 to 60wt%, preferably 25 to 55wt%, preferably 25 to 50wt%,
10 preferably 30 to 65wt%, preferably 30 to 60wt%, preferably 30 to 55wt%, preferably 30 to 50wt%, (by weight of the total composition). In an embodiment the legume based dried instant noodle comprises 10 to 70 wt% of wheat flour (by weight of the total composition), preferably 10 to 65wt%, preferably 15 to 65wt%, preferably 15 to 60wt%, preferably 15 to 55wt%, preferably 15 to 50wt%, preferably 20 to 65wt%, preferably 20 to 60wt%, preferably
15 20 to 55wt%, preferably 20 to 50wt%, preferably 25 to 65wt%, preferably 25 to 60wt%, preferably 25 to 55wt%, preferably 25 to 50wt%, preferably 30 to 65wt%, preferably 30 to 60wt%, preferably 30 to 55wt%, preferably 30 to 50wt%, (by weight of the total composition).

The term "soy protein source" according to this invention means at least one
20 ingredient of soy flour, soy concentrate, soy protein isolate, soy okara, soy husk, soy chunk flour or a combination thereof, preferably soy flour, soy concentrate, soy okara, soy husk, soy chunk flour or a combination thereof, preferably soy flour, soy concentrate of a combination thereof. The person skilled in the art knows how to calculate the amount of soy protein within a soy flour, soy protein concentrates or soy protein isolate. The term "soy flour" as used
25 herein is a soy material having a protein content between 30-55% (protein on a moisture-free basis). Soy flour also contains plant fiber, typically from 3% up to 10% by weight on a moisture-free basis. The term "soy protein concentrate" as used herein is a soy material having a protein content between 55-90% (protein on a moisture-free basis), preferably between 65-75% (protein on a moisture-free basis). Soy protein concentrate also contains
30 plant fiber, typically from 3.5% up to 20% by weight on a moisture-free basis. The term soy protein isolate, as used herein is a soy material having a protein content of at least 90% (protein on a moisture free basis), preferably between 90-96% (protein on a moisture-free basis). The term "soy okara" as used herein is a soy material having a protein content between 30-50% (protein on a moisture-free basis) and a soy fiber content between 35 to
35 55%. The term soy husk refers to by-product from soy processing into protein concentrate, typically having a fiber content between 70-80%, and protein content between 7-15%. The

terms soy chunk flour refers to grinded soy chunks, typically having protein between 45-65%, and fiber content between 10-25%.

In an embodiment the dried instant noodle comprises 3 to 30wt% of a soy protein
5 source (by weight of the total composition), preferable 3 to 25wt%, preferable 3 to 20wt%,
preferably 5 to 30wt%, preferably 5 to 25wt%, preferably 5 to 20wt%, preferably 3 to 18wt%,
preferably 5 to 18wt% (by weight of the total composition).

The term "pulse flour" according to this invention means at least one ingredient of
10 chickpea flour, lentil flour, white bean flour, pigeon pea flour, cowpea flour, yellow pea flour,
lupin flour or combinations thereof, preferably chickpea flour, white bean flour, lentil flour,
pigeon pea flour, cowpea flour, yellow pea flour or combinations thereof, preferable chickpea
flour, cowpea flour, yellow pea flour or combinations thereof, more preferable chickpea flour.

15 The term "flour from an oilseed press cake" means a flour of the residues remaining
after removal of the greater part of oil from the oilseeds. The flour from an oilseed press cake
are rich in protein and fiber. In an embodiment the flour from an oilseed press cake is a
flaxseed flour, hemp flour, pumpkin flour, rapeseed flour, safflower flour, sunflower flour or a
combination thereof, preferably sunflower flour or flaxseed flour or a combination thereof,
20 more preferably a sunflower flour.

The term "flour from a nut press cake" means a flour of the residues remaining after
removal of the greater part of oil from the nut. The flour from a nut press cake are rich in
protein and fiber. In an embodiment the flour from a nut press cake is an almond flour, walnut
25 flour, peanut flour or a combination thereof.

The term "flour from a barley spent grain" means a flour from wet barley spent grains,
a side-stream from malt extract production. The wet barley spent grains are dried to remove
the moisture and then cooling before milled into flour. It is a side stream for example for the
30 production of MILO. It contains a high amount of dietary fiber (lignin, cellulose, hemicellulose
from barley husks) and is rich in protein.

In an embodiment the dried instant noodle comprises 10 to 40wt% of pulse flour, a
flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent
35 grain or a combination thereof (by weight of the total composition), preferably 10 to 35wt%,
preferably 10 to 30wt%, preferably 10 to 25wt%, preferably 10 to 20wt (by weight of the total

composition). In an embodiment the dried instant noodle comprises 10 to 40wt% of pulse flour (by weight of the total composition), preferably 10 to 35wt%, preferably 10 to 30wt%, preferably 10 to 25wt%, preferably 10 to 20wt, preferably 13 to 35wt%, preferably 13 to 30wt%, preferably 13 to 25wt% (by weight of the total composition).

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In an embodiment the pulse flour or the cereal flour or combination thereof has a particle size of 50 to 400 μm . A finer particle size could mean a high chance of starch to be damaged in the flour leading to higher water absorption. The dough would become sticky and causes operation issues. In addition, the noodle would turns sticky, starchy and non-elastic. A flour with a large particle size, on the other hand, needs longer water absorption time and often forms large dough lumps.

In an embodiment a dried instant noodle comprising an amount of protein of at least 10wt% (by weight of the total composition), preferably at least 11wt%, preferably at least 12wt%, preferably at least 13wt%, preferably between 10 to 30wt%, preferably between 11 to 30wt%, preferably between 12 to 30wt%, preferably between 13 to 30wt%, preferably between 10 to 25wt%, preferably between 11 to 25wt%, preferably between 12 to 25wt%, preferably between 13 to 25wt%, preferably between 10 to 20wt%, preferably between 11 to 20wt%, preferably between 12 to 20wt%, preferably between 13 to 20wt%, preferably between 12 to 19wt%, preferably between 12 to 18wt% (by weight of the total composition).

In an embodiment a dried instant noodle comprising an amount of fiber of at least 3wt% (by weight of the total composition), preferably at least 4wt%, preferably at least 5wt% preferably between 3 to 10wt%, preferably between 4 to 10wt%, preferably between 5 to 10wt%, preferably between 3 to 9wt%, preferably between 3 to 8wt%, preferably between 4 to 9wt%, preferably between 4 to 8wt% (by weight of the total composition).

In an embodiment the dried instant noodle further comprises 0.5 to 10 wt% of wheat gluten (by weight of the total composition), preferable 1 to 10wt%, preferably 2 to 10wt%, preferably 2 to 8wt% (by weight of the total composition).

"Starch" according to this invention has two main polysaccharides amylose and amylopectin. Starches granules can be isolated from a wide variety of plant sources, consisting of tuberous root, tuber and seeds. Based on the botanical origin, starch granules come in different shapes, sizes and have varying ratios of amylose/amylopectin. Starch according to this invention is a native starch, pre-gelatinized starch or cold swelling starch or

combination thereof, preferably a native starch. The starch according to the invention is selected from the group consisting of maize, waxy maize, high amylose maize, wheat, tapioca, rice, potato, cassava or combinations of these. In an embodiment the dried instant noodle comprises 1 to 15 wt% of starch (by weight of the total composition), preferable 2 to 15wt%, preferably 1 to 10wt%, preferably 2 to 10wt% (by weight of the total composition).

In a preferred embodiment the instant fired noodle has a ratio between starch and wheat gluten between 1.25 to 3.5.

The term "Kansui salts" comprises a mixture of alkaline salts comprising sodium chloride, potassium chloride, sodium carbonate, potassium carbonate and sodium polyphosphates. In an embodiment the instant fried noodle comprises 0.2 to 3.5wt% of kansui salts (by weight of the total composition). In a preferred embodiment the kansui salts are dissolved in water to obtain a kansui solution. The term "kansui solution" comprises a mixture of 1 to 15wt% of alkaline salts comprising sodium chloride, sodium carbonate, potassium carbonate and sodium polyphosphate (based on the total amount of the solution) in 85 to 99wt% of water (based on the total amount of the solution), preferably the kansui solution comprises 3 to 7wt% of alkaline salts and 93 to 97wt% of water (based on the total amount of the solution).

The term "oil" according to this invention is selected from the group of palm oil, sunflower oil, high oleic oils, high oleic sunflower oil (HOSO), ground nut oil, rice bran oil, mustard oil, soybean oil or a combination thereof, preferably palm oil, high oleic sunflower oil, groundnut oil or combination thereof.

The dough mixing time is between 10 to 40 minutes, preferably 15 to 30 minutes. A twin speed mixer is used. The mixing speed is between 50 to 120 rpm. High speed mixing (between 100 to 120 rpm) is recommended during the time the kansui solution is dosed to avoid localized dosing and to ensure homogeneity. For addition of small ingredients like calcium carbonate, fortificant (vitamin and/or mineral) it is recommended to make a pre-blend with flour before addition. The amount of water added has a big influence on dough formation. The moisture content of the dough after mixing should be between 20 to 40%, preferably between 25 to 35%. If too much water is added the dough will be too soft and sticky. If too less water is added the noodle will be brittle, doughy and hard-centered due to insufficient gelatinization during steaming as degree of gelatinization depends on moisture content of dough.

The term "sheeting" is a process step wherein the dough is passed through a series of rollers to obtain a final sheet of desired thickness which will then determine the noodle strand thickness. By sheeting the dough a network is developed as pressure is applied. In addition, the sheeting removes entrapped air from the dough and therefore reduces porosity and result in less oil uptake.

The slitter/cutter called "kiriha" consists of a pair of grooved cylinders which cut and separate the dough sheet into strands that are trapped in the grooves. These strands are immediately removed by a comb-like scraper, called "kasuri" which is attached in between the two rollers. The width of the noodle strand is determined by Kiriha groove width.

The purpose of steaming is to gelatinize the starch in order to eliminate the raw and doughy taste on the end-product. Steaming time and temperature along with steam pressure affect product quality and are known to the person skilled in the art. Good steaming results to obtain at least 80% starch gelatinization is giving a better association of starch granules and protein matrix as well as better continuity of protein network. The steaming time is between 0.5 to 15 minutes, preferably 0.5 to 7 minutes. A saturated steam is used. If steaming is insufficient, the final noodle will have a gritty center, doughy and raw wheat after taste (cereal note). Noodle strands coming out of the steamer are hot and tend to stick to the steamer mesh conveyor. This can lead to poor cutting and folding down the line. Therefore, the strands are cooled and slightly dried up using fans or blowers/air knives at the exit of steamer tunnel.

Seasoning means that flavor or flavors are added by a spraying or within a seasoning bath.

Cutting and folding occur after steaming the noodle strands. Cutting means that the noodle strands are cut to a desired length and folded. At this stage, the noodle is still quite flexible but is able retain its shape.

Pre-drying is used to reduce the wet cake moisture content by 2 to 10%. In addition after pre-drying an oil up take reduction by 1 to 8%, preferably 2 to 4% is achieved. A pre-drying step is done at a temperature between 50 to 120°C within 15 to 500 sec, preferably at a temperature between 60 to 100°C within 30 to 400 sec. In a preferred embodiment the noodles are pre-dried.

Frying is a process wherein moisture from cakes is removed to a desired level and doughy taste is eliminated in the end product. Steamed or pre-dried noodle cakes are conveyed to the fryer buckets which pass through the hot oil bath. The Frying in oil is done at
5 temperatures between 110 to 170 °C and a frying time between 30 to 200 seconds, preferably at temperatures between 130 to 165 °C and a frying time between 40 to 150 seconds. After oil frying the final moisture in the product is less than 10wt%, preferably between 2 to 10wt% (by weight of the total composition). The final product has a water activity < 0.6.

10 In an embodiment the legume based dried instant noodle has an amount of oil in the range of 10 to 30wt% (by weight of the total composition), preferably between 12 to 28wt%, preferably between 13 to 25wt%, preferably between 13 to 19wt% (by weight of the total composition).

15 Cooling means that the temperature of the noodle after frying in the oil is reduced. It is desirable to have the noodle cake temperature the same as or close to room temperature before wrapping, preferably between 20 to 30°C, more preferably between 20 to 25°C. Otherwise, there may be condensation of water vapor in the packet of noodles, which may lead to mould growth. A side from condensates, hot cakes also cause expansion of air within
20 the pack, subsequently causing difficulty in secondary packaging.

In a preferred embodiment, the dried instant noodle of the present invention does not include carboxymethylcellulose (CMC). In a preferred embodiment, the dried instant noodle of the present invention does not include mung bean flour or buckwheat flour. In a preferred
25 embodiment, the dried instant noodle of the present invention does not include citric acid.

Those skilled in the art will understand that they can freely combine all features of the present invention disclosed herein. In particular, features described for different embodiments of the present invention may be combined. Where known equivalents exist to specific features,
30 such equivalents are incorporated as if specifically referred to in this specification.

In an embodiment the process for the production of a dried instant noodle does not include extrusion technology.

35 **Examples**

Example 1: Process

- Standard dried instant noodle manufacturing process involves mixing of cereal flour (wheat flour), soy protein source, a flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof and kansui solution in a batch mixer. Noodle line used for the production is from CCK supplier. Dough from mixer is passed through rollers to form two sheets thereafter compounding the two dough sheets into one, reducing dough sheet to a desired thickness through a series of rollers. The final sheet is passed through the kiriha to slit the dough sheet and form the noodle strands, which are then steamed in a tunnel.
- The steamed noodles are cut, folded and moulded into pre-dryer. The pre-dryer removes moisture before frying and helps to reduce the oil uptake. The pre-dried noodle cakes are discharged from pre-dryer to frying bucket, which are then passed through a fryer where noodle cakes are fried in oil, and moisture is removed. After which, the cakes are cooled to ambient temperature before packing. This process describes a fried noodle. A skilled person can easily adapt the process to obtain an air-dried noodle cake. For example, an air dried noodle cake has some oil in the noodle dough but has no step of pre-drying and oil frying.

Below table shows details of all the process steps with the process parameters:

Process Steps	Process Parameters	Moisture
Mixing	High Speed: 90 Hz, 1 min Dry Mixing	30-31%
	High Speed: 90 Hz, 4 min Kansui Dosing	
	Low Speed: 50 Hz, 16 minute for gluten development	
Sheeting & Slitting	Final Sheet Thickness: 0.9 mm, Kiriha K 30	
Steaming	Time: 130 s, Saturated Steam	31-32%
Cut and Fold	Bag type	
Predrying	Temp: 80°C, Time: 225 s	25-27%
Frying	Temp: 150°C, Time: 70 s, Oil Uptake: 14-16%	2-6%
Cooling	Ambient temperature and Packaging	2-6%

20 **Comp. Examples 2-4:**

Comp. examples 2 to 4 are prepared according to example 1, but without wheat flour.

	Comp. Ex 2	Comp. Ex. 3	Comp. Ex. 4
Noddle dough composition			
Wheat flour [wt%]	0	0	0
Soy flour [wt%]	77	0	0

Chickpea flour [wt%]	0	77	0
Soy okara [wt%]	0	0	77
Kansui [wt%]	23	23	23
Starch [wt%]	0	0	0
Wheat gluten [wt%]	0	0	0
Oil used for oil frying	Palm oil	Palm oil	Palm oil
Total fat in noodle [wt%]	NA	NA	NA
Protein in noodle [wt%]	39.27	16.94	32.725
Fiber in noodle [wt%]	2.695	9.24	34.65
Process & Product features			
Machinability	unprocessable on noodle's line		

- Comp. examples 2 to 4 show, that in case only a soy protein source (soy flour or soy okara) or a pulse flour in combination with Kansui salts are used the corresponding noodle doughs are un-processable due to stickiness, sheet breakage and brittle dough and therefore no composition and texture of the noodle has been analyzed.
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Examples 5 to 17:

Examples 5 to 17 are prepared according to example 1.

	Ex. 5	Ex. 6	Ex. 7	Ex. 8
Noddle dough composition				
Wheat flour [wt%]	43	39	47	47
Soy flour [wt%]	15	15	15	15
Chickpea flour [wt%]	20	20	15	0
Pigeon pea flour [wt%]	0	0	0	15
Kansui [wt%]	23	23	23	23
Starch [wt%]	0	2	0	0
Wheat gluten [wt%]	0	2	0	0
Oil used for oil frying	Palm oil	Palm oil	Palm oil	Palm oil
Total fat in noodle [wt%]	14,5	14,5	14,5	14,5
Protein in noodle [wt%]	16.7	17.8	16.1	16.4
Fiber in noodle [wt%]	3.8	3.7	3.3	3.2
PDCAAS	0.92	0.92	0.89	0.89

Process & Product features				
machinability	4	5	4	5
Cooked noodle texture	4	5	5	5
Cooked noodle flavor	5	5	5	4
Overall acceptance	4	5	4	5
Comments	Good sheeting and machinability	Optimum sheeting; good texture;	Good sheeting and machinability	Optimum sheeting; good texture;

	Ex. 9	Ex. 10	Ex. 11	Ex. 12	Ex. 13
Noddle dough composition					
Wheat flour [wt%]	47	47	54	61	63
Soy flour [wt%]	15	15	0	0	0
Chickpea flour [wt%]	0	0	15	0	0
Yellow pea flour [wt%]	15	0	0	8	0
Cow pea flour [wt%]	0	15	0	0	0
Sunflower press cake flour [wt%]	0	0	0	0	10
Soy okara [wt%]	0	0	0	0	4
Soy concentrate [wt%]	0	0	8	8	0
Kansui [wt%]	23	23	23	23	23
Starch [wt%]	0	0	0	0	0
Wheat gluten [wt%]	0	0	0	0	0
Oil used for oil frying	Palm oil	Palm oil	Palm oil	Palm oil	Palm oil
Total fat in noodle [wt%]	14,5	14,5	14,5	14,5	14,5
Protein in noodle [wt%]	14.27	15.62	14.71	12.97	13.97
Fiber in noodle [wt%]	3.715	3.07	4.48	4.02	5.16
PDCAAS	0.94	0.89	-	-	-
Process & Product features					

machinability	4	4	5	5	5
Cooked noodle texture	4	5	5	4	5
Cooked noodle flavor	5	4	5	5	5
Overall acceptance	4	4	5	5	5
Comments	Good sheeting and machinability	Good sheeting and machinability	Optimum sheeting; good texture;	Optimum sheeting; good texture;	Optimum sheeting; good texture;

	Ex. 14	Ex. 15	Ex. 16	Ex. 17
Noddle dough composition				
Wheat flour [wt%]	30	45	59	46
Soy flour [wt%]	0	8	8	8
Chickpea flour [wt%]	34	0	0	0
Soy okara [wt%]	7	0	0	0
barley spent grain [wt%]	0	0	0	23
Almond press cake flour [wt%]	0	0	10	0
Flaxseed press cake flour [wt%]	0	24	0	0
Kansui [wt%]	23	23	23	23
Starch [wt%]	3	0	0	0
Wheat gluten [wt%]	3	0	0	0
Oil used for oil frying	Palm oil	Palm oil	Palm oil	Palm oil
Total fat in noodle [wt%]	14,5	14,5	14,5	14,5
Protein in noodle [wt%]	15.99	16.43	15.21	15.12
Fiber in noodle [wt%]	7.83	8.86	3.06	4.81
Process & Product features				
machinability	4	4	4	4
Cooked noodle texture	4	5	5	4

Cooked noodle flavor	4	5	5	4
Overall acceptance	4	5	5	4
Comments	Good sheeting and machinability	Acceptable sheeting;	Optimum sheeting; good texture;	Good sheeting and machinability

Examples 7 to 10 use different pulses. Examples 11 and 12 use soy concentrate as soy protein source. Example 13 and examples 15 to 16 use different press cake flours. Example 17 use barley spent grain flour. Examples 13 and 14 use soy okara as soy protein source.

Claims

1. A process for the production of a dried instant noodle comprising cereal flour, Kansui salts, soy protein source and a flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof, the process comprising the steps of:
- 5
- a) Mixing the cereal flour, the soy protein source, the flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof and optionally other dry ingredients with the Kansui salts and water to form a dough;
- 10
- b) Sheeting and slitting the dough to obtain noodle strands;
- c) Steaming the noodle strands from step b);
- 15
- d) Cutting the noodle strands from step c) and optionally folding;
- e) Frying the noodle strands from step d) in oil or air drying the noodle strands from step d);
- f) Cooling.
- 20
2. A process for the production of a dried instant noodle as claimed in claim 1, comprising 10 to 70wt% of cereal flour (by weight of the total composition), 0.2 to 3.5wt% of Kansui salts (by weight of the total composition), 3 to 20wt% of soy protein source (by weight of the total composition) and 5 to 40wt% of flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof (by weight of the total composition).
- 25
3. A process for the production of a dried instant noodle in any one of claims 1 to 2, wherein the pulse flour is chickpea flour, lentil flour, pigeon pea flour, cowpea flour, yellow pea flour, lupin flour or combinations thereof.
- 30
4. A process for the production of a dried instant noodle in any one of claims 1 to 3, wherein the cereal flour is wheat flour, oat flour, corn flour, rice flour, millet flour or combinations thereof, preferably wheat flour.
- 35

5. A process for the production of a dried instant noodle in any one of claims 1 to 4, wherein the flour from an oilseed press cake is a flaxseed flour, hemp flour, pumpkin flour, rapeseed flour, safflower flour, sunflower flour or a combination thereof.
- 5 6. A process for the production of a dried instant noodle in any one of claims 1 to 5, wherein the flour from a nut press cake is an almond flour.
- 10 7. A process for the production of a dried instant noodle in any one of claims 1 to 6, wherein the kansui salts comprises a mixture of alkaline salts comprising sodium chloride, potassium chloride, sodium carbonate, potassium carbonate, sodium polyphosphates or a combination thereof.
- 15 8. A process for the production of a dried instant noodle in any one of claims 1 to 7, wherein the kansui salts are added as a solution of 1 to 10wt% of sodium chloride, potassium chloride, sodium carbonate, potassium carbonate and sodium polyphosphate (based on the total amount of the solution) in 90 to 99wt% of water (based on the total amount of the solution).
- 20 9. A process for the production of a dried instant noodle as claimed in any one of claims 1 to 8, wherein the soy protein source is soy flour, soy protein concentrate, soy protein isolate, soy okara or a combination thereof.
- 25 10. A process for the production of a dried instant noodle as claimed in any one of claims 1 to 9, wherein the instant noodle is fried in the oil at a temperature between 110 to 170 °C and a frying time between 30 to 200 seconds.
- 30 11. A process for the production of a dried instant noodle as claimed in any one of claims 1 to 10, wherein the steaming is done by using saturated steam within 0.5 to 15min.
- 35 12. A process for the production of a dried instant noodle as claimed in any one of claims 1 to 11, wherein the pre-drying is done at a temperature between 50 to 120°C and 15 to 500sec.
13. A process for the production of a dried instant noodle as claimed in any one of claims 1 to 12, wherein the dried instant noodle does not include carboxymethyl-cellulose.

14. A dried instant noodle comprising 10 to 70wt% of cereal flour (by weight of the total composition), 0.2 to 3.5wt% of Kansui salts (by weight of the total composition), 3 to 20wt% of soy protein source (by weight of the total composition) and 5 to 40wt% of flour selected from the group of a pulse flour, a flour from an oilseed press cake, a flour from a nut press cake, a flour from a barley spent grain or a combination thereof (by weight of the total composition), wherein the dried instant noodle has an amount of protein of at least 10wt% (by weight of the total composition) and an amount of fiber of at least 6wt% (by weight of the total composition).
15. The use of the composition as claimed in claim 14 for preparing a food product.