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Noodle product

The present invention relates to a noodle product
consisting of cooked or precooked noodle having a long
shelf life.

FR2502907 (BUIIONI) discloses the production of precooked
solid food, especially pasta products and rice, by
precooking the food in acidulated water, cooling in
acidulated water, draining off excess water, oiling,
insertion into flexible containers and heat sterilising the
sealed containers.

EP0489811 (MARS) discloses a process for preparing an acid
stabilised pasta, which comprises cooking the pasta in an
aqueous acid solution or suspension having a pH of from 2.0
to 4.0 and containing a polymeric food-acceptable acid.

EP0626137 (CPC) discloses a pasteurised, shelf-stable,
uncooked or partially cooked moist pasta product packaged
in a sealed container, the pasta having a moisture content
from about 15 to about 38% and a pH below about 4.6.

EP084083 (SOCIETE DES PRODUITS NESTLE) discloses a process
for the manufacture of noodle, in which a mixture of cereal
semolina or flour and water is prepared in a twin-screw
kneader, the mixture is converted into a band by pressing
it through a die with an oblong outlet orifice, the band is
laminated and it is cut into noodle.

A first object of the present invention is to provide a
full moisture shelf stable noodle product of outstanding
organoleptical quality which is not intended to be actually
cooked at the consumer's end but, on the contrary, is
intended to be consumed after simply heating up or very
shortly cooking.



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A second object of the present invention is to provide a process for manufacturing a full moisture shelf stable noodle product of outstanding quality which is intended to be consumed after simply heating up or very shortly cooking.

The full moisture shelf stable noodle product according to the present invention has a pH of from 3.7 to 4.5, preferably from 3.8 to 4.3, and comprises a cooked or precooked noodle having a dry matter content of from 30 to 45% by weight, an acid and an oil.

The process for manufacturing a full moisture shelf stable noodle product according to the present invention consists of preparing a mixture having a dry matter content of from 60 to 75% and comprising a cereal flour or semolina and added water, kneading the mixture to obtain a dough, sheeting the dough, laminating the sheet thus obtained, slitting the laminated sheet to obtain noodle, cutting the noodle, portioning, blanching, water cooling, dipping into an acidified water, oiling, packaging and in pack pasteurising it.

In the present text, the term "noodle" used as such denotes in the general sense any pasta or noodles based on cereal semolina or flour having the shape of a relatively thin band with a section which is generally rectangular, or curved in the form of a semi-tube, or oval, for example.

The expression "western noodles" denotes pastas having such a shape, which are generally prepared from hard wheat semolina and water, and which can be expected to have a firm texture under the teeth, in other words an "al dente" texture, after cooking in salt water for a sufficient period.

The expression "oriental noodles" denotes pastas having such a shape, which are generally prepared from soft wheat flour and kansui, and which can be expected to have a bouncy texture under the teeth after relatively brief cooking in a sufficient quantity of water with which they are intended to be consumed, for example.

The term "kansui" denotes an aqueous alkaline solution, namely water in which is dissolved a composition of salts comprising especially NaCl, carboxymethylcellulose (CMC), K₂CO₃, Na₂CO₃ and/or Na polyphosphate for example. These salts are intended to exert a stabilizing effect on the bouncy texture of oriental noodles during their traditional consumption with their cooking water. Sodium chloride is especially intended to increase the firmness and the taste of oriental noodles. Sodium and potassium carbonates are especially intended to lead to a firm and bouncy texture. Sodium polyphosphate is especially intended to improve the hydration and water holding and to lean to a clean bite. CMC is especially intended to increase the holding of the texture.

In the present noodle product, the cooked or precooked noodle may have been made of a starting raw material mixture comprising a cereal flour or semolina, especially Durum or hard wheat semolina or soft wheat flour, and possible additives such as wheat protein, especially gliadin enriched wheat protein, starch, egg material, kansui salts, a colouring agent, bakery powder, sodium chloride, polysaccharides and/or spices, for example.

The acid may be any food grade acid, especially lactic acid, phosphoric acid, citric acid or Glucono-delta-lactone, for example.

- The oil may be a vegetable oil, in an amount of from 0.5 to 5% by weight of the cooked or precooked noodle, for example. The oil may especially be peanut oil, rapeseed oil, sunflower oil, palm oil, corn oil, palm olein or mixtures thereof, for example. About from 0.5 to 2.5% of emulsifiers may advantageously be added to the oil, in % by weight of the oil, especially a monoglyceride or mixtures of monoglycerides, for example.
- 10 To implement the present process, a mixture may be prepared having a dry matter content of from 60 to 75% and comprising added water, a cereal flour or semolina, especially Durum or hard wheat semolina or soft wheat flour, and possible additives such as wheat protein, especially gliadin enriched wheat protein, oil, starch, egg material, kansui salts, a colouring agent, bakery powder, sodium chloride, polysaccharides and/or spices, for example.
- 20 It is possible to use in particular a hard wheat semolina having a particle size of 250-350 μm to manufacture western noodles, or a soft wheat flour having a particle size of 50-150 μm to prepare oriental noodles for example.
- 25 Wheat protein, especially common wheat gluten or gliadin enriched wheat protein such as the product marketed under the name Flavor Pro by the company Midwest Grain Products Inc., Atchison, Kansas, USA, may be used in an amount of from about 1 to 3% by weight of the mixture, in order to reduce stickiness and starch losses during cooking and acidification, for example.
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- 35 Egg material in the form of whole egg powder, egg white powder or liquid whole egg may be added to the mixture in order to increase the firmness of the noodle product, for example.

Bakery powder, especially a mixture of Glucono-delta lactone and sodium bicarbonate may be added to the mixture in order to create a porous noodle product, for example.

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Polysaccharides, especially guar gum, sodium alginate or propylene glycol alginate may be added to the mixture to improve the texture and its holding, for example.

10 Provision may be made, where necessary, for a premixing and prewetting stage, especially in a rapid paddle mixer which delivers a premix in the form of moistened flour or semolina lumps, such a step making it possible to save on in particular the useful free space in a mixer, for
15 example.

The semolina or flour is mixed with a quantity of water such that the mixture obtained has a water content of from 25 to 40%, preferably from 30 to 35% by weight.

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To manufacture western noodles, hard wheat semolina may be mixed with water.

To manufacture oriental noodles, soft wheat flour may be
25 mixed with kansui.

The kansui may comprise from 0.5 to 3% NaCl, up to 1% CMC, from 0.1 to 1% K₂CO₃ and/or Na₂CO₃ and up to 1% Na polyphosphate, for example. A colouring agent such as beta-carotene or riboflavin may also be added thereto, for
30 example.

For preparing the mixture, the cereal flour or semolina and added water or kansui, or the moistened flour or semolina
35 lumps obtained at a premixing and prewetting stage may be dosed, possibly together with oil, into mixing means such

as any mixer, kneader and/or extruder well known in the art of making noodle, for example.

5 The mixture obtained within these mixing means may then be kneaded to obtain a dough in any known noodle making way, especially by further treatment either within an extruder or a kneader where the mixing step was first carried out or within a further extruder or a further kneader.

10 The dough thus obtained may then be sheeted in any known noodle making way, especially by pressing the dough through an oblong orifice by means of an extruder or kneader able to press the dough through such an orifice or by means of a positive pump such as a gear pump, or by pressing the dough
15 between rollers, for example.

A sheet may be formed or obtained in this way which preferably has a thickness of from about 2 to 20 mm, for
20 example.

The sheet may then be laminated to a thickness of from about 0.6 to 1.5 mm, by passing it through a pair or a succession of pairs of rollers, especially a succession of two to five pairs of rollers with decreasing gaps, for
25 example.

Once the sheet has been laminated, it can be slit into strands or noodle of from 1 to 10 mm in width by means of adequate roller knives, for example.

30 The slit noodle may then be cut to any desired length, especially a length of from 30 to 50 cm, in order to adjust a portion size, and the cuts may be collected to portions of any desired weight, especially a weight of from 70 to
35 200 g, for example.

The step of portioning, namely cutting the noodle and collecting the cuts to portions which then will be individually packaged, may be carried out at any stage after the cutting step and before the packaging step.

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Thus, after cutting and preferably after portioning, the noodle may be hot air treated to fix the shape before blanching and to get a product firmer in bite.

10 The noodle may be blanched by steaming or by steaming and hot water-spraying, preferably hot acid water-spraying, for example, the purpose of water-spraying during steaming being to minimise starch losses during blanching.

15 The blanching step may be carried out at from 95 to 100°C for from 1 to 10 min, while steaming with steam at from 98 to 100°C and spraying water at from 95 to 98°C, preferably acidified water having a pH of from 3.5 to 5.0, for example.

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During the blanching step, the water uptake may be such that the noodle then has a dry matter content of from 35 to 52%, preferably of from 39 to 47%, for example.

25 After the blanching step, the noodle may be advantageously showered with a hot water spray. In other words the noodle may be passed under a shower of hot water, especially of water having a temperature of from about 60 to 70°C, for example, in order to loosen the strands which can be
30 slightly sticky after having been steamed.

Water cooling may be carried out in a bath of water at ambient temperature, namely at a temperature of from about 18 to 35°C, for about 30 s to 2 min, for example.

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After water cooling, excess water may be drained off for about 30 s to 2 min, for example.

5 During the water cooling step, the blanching step may be stopped completely and the water uptake may be such that the noodle has then a dry matter content of from about 30 to 45%, preferably from 33 to 42%, for example.

10 After water cooling and possibly draining off excess water, the noodle is dipped into an acidified water in order to be acidified to a final pH of from 3.7 to 4.5. To this end, the noodle may be dipped into a water containing from 0.5 to 2.0% acid, especially lactic acid, phosphoric acid, citric acid or Glucono-delta-lactone, at ambient
15 temperature, especially at a temperature of from 18 to 35°C, for from 50 to 250 s, for example.

After this acidifying step, excess acidified water may be drained off for from about 30 s to 2 min, for example.
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During the acidifying step, there is very little further water uptake. The acidification of the noodle appears to be mainly a result of osmotic equilibration.

25 The oiling step may be carried out so that the surface of the noodle is coated with oil in an amount of from 0.5 to 5% by weight of the noodle, for example. In order that the oil is well distributed in very fine particle over the noodle surface, about from 0.5 to 2% of emulsifiers, in %
30 by weight of the oil, may be added to the oil, for example.

The oiling step may be carried out either before or during the packaging step. Preferably, the noodle is packaged in a flexible pouch with controlled volume of head space. To
35 this end, the noodle may be dosed into a vertical pouch

after its bottom has been sealed and oil may be injected into the pouch before its top is sealed, for example.

5 Eventually the packaged noodle product is in pack pasteurised.

10 This in pack pasteurising step may be carried out in a steam medium, while having the temperature in the centre of the pouch reaching a temperature of from 80 to 100°C and holding it for from 1 to 80 min, for example.

15 The pouches may then be cooled either for from 5 to 15 min in cold water containing a disinfectant, or for from 30 to 60 min by chilled air, at from 5 to 15°C, for example.

20 In a particular embodiment of the present process, the steps consisting of dipping the noodle into an acidified water, oiling it, packaging it and in pack pasteurising it are replaced by steps consisting of directly oiling the noodle, packaging it and freezing it.

25 The corresponding particular embodiment of the present product does not comprise an acid but is frozen instead. This embodiment of the present product may be thawed before unpacking or afterwards, especially during heating up or very shortly cooking, for example.

30 The present process may be implemented by means of normal equipment such as mixer, single or twin screw kneader, single or twin screw extruder, kneader-sheeter equipped with corrugated rollers, rollers having a smooth surface, steeping unit, steam/water spraying blancher, water bath, shower and pasteurising unit from the noodle or noodle industry, for example.

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The present process surprisingly provides a noodle product having outstanding organoleptical properties, especially an outstanding texture, in view of the fact that it is not intended to be actually cooked again at the consumer's end but only heated up or very shortly cooked.

After unpacking, heating up or very shortly cooking the present noodle product may be carried out in a pan, in a microwave oven, or by pouring hot or boiling water onto it, for example. Alternatively, the product may be heated up in the package.

The noodle product and the process according to the present invention are illustrated in the following Examples in which the percentages and parts are by weight unless otherwise stated.

Example 1

A precooked western noodle product having a long shelf life was made from a mixture having a dry matter content of 68.2% and comprising 76% Durum semolina having a particle size of 250-300 μm , 2.35% Flavor Pro 6000 and 21.65% tap water.

Durum semolina and Flavor Pro 6000 were premixed with water in a rapid paddle mixer. The semolina lumps thus obtained were dosed into a kneader where they were further mixed, the mixture was kneaded into a dough, and the dough was sheeted by pressing it by means of a gear pump through a die having a rectangular orifice of 2 mm x 100 mm.

The kneader was a READCO-type TELEDYNE kneader and the gear pump was a VACOREX 90/90-type MAAG pump.

By circulating a heating fluid, a temperature of 48°C was maintained in the kneader barrel.

The kneader was fed with 1000 kg/h of semolina lumps.

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The speed of rotation of the kneader screws was adjusted to 70 rpm. The dough was subjected to a relative pressure of 800 kPa in the kneader.

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The speed of rotation of the toothed rollers of the gear pump was adjusted to 36 rpm. The relative pressure thus exerted by the pump on the dough was 11,000 kPa.

The sheet leaving the die had a thickness of 3-4 mm.

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The sheet was laminated to a thickness of 1.2 mm by passing through four pairs of laminating rollers with successively decreasing gaps of 2.0, 1.5, 1.3 and 1 mm.

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The laminated sheet was slit into strands or noodle of 8 mm in width which were cut to about 25 cm in length and portioned or dosed in 104 g portions.

The noodle was then blanched at about 98°C for 200 s along a tunnel blancher in which steam injection means injected steam at 99°C and water spraying means sprayed acidified water having a pH of 4.3 and a temperature of 96-97°C.

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During the blanching step, the water uptake was such that the noodle had then a dry matter content of from 41 to 45%.

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After the blanching step, the noodle was showered with a hot water spray having a temperature of from 60 to 70°C, and it was then water cooled in a bath of water at from 20 to 25°C for 45 s.

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During the water cooling step, the water uptake was such that the noodle had then a dry matter content of from 38 to 42%.

5 After water cooling, excess water was drained off for 60 s.

The noodle was then dipped into a water bath containing 1.6% lactic acid, having a pH of 2.2-2.3 and having a temperature of 30°C, for 150 s.

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During the acidifying step, the water uptake was such that the noodle had then a dry matter content of from 36 to 40%.

15 After the acidifying step, excess acidified water was drained off for 60 s.

After the acidifying step the noodle had a pH of 3.9-4.0.

20 The noodle portions then weighing about 180 g were dosed into vertical pouches after their bottoms had been sealed, and 1.8 g palmolein were injected into each pouch before their tops were sealed.

25 The noodle was in pack pasteurised in steam at 97°C, the temperature in the centre of the pouch reaching a temperature of 85°C after 20 min and this temperature being held for 10 min.

30 The pouches were then cooled for 10 min in water having a temperature of 10°C and containing a disinfectant. The pouches were subsequently stored at room temperature, namely at about 25°C.

35 The noodle product could be prepared for consumption by unpacking and heating up, for example.

The noodle did not stick together. It had outstanding organoleptical properties, especially a texture similar to the texture of fresh "al dente" cooked western noodles.

5 **Example 2**

10 A precooked oriental noodle product having a long shelf life was made from a mixture having a dry matter content of 66.6% and comprising 72.45 parts soft wheat flour having a particle size of 50-120 μm , 0.86% palmolein and 26.69% kansui having the composition indicated in Table 1.

Table 1: Kansui composition (%)

NaCl	0.65
CMC	0.12
K ₂ CO ₃	0.53
Na ₂ CO ₃	0.24
Na(PO ₃) _n	0.30
Riboflavin	0.02
Soft water	98.14

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Soft wheat flour and kansui were premixed in a rapid paddle mixer. The semolina lumps thus obtained were dosed together with the palmolein into a twin screw extruder where they were mixed and kneaded into a crumbly dough having a pH of about 8.

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The crumbly dough was then brought into a kneader-sheeter which formed a dough sheet of about 8 mm in thickness.

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The sheet was laminated to a thickness of 1.6 mm by passing through five pairs of laminating rollers with successively decreasing gaps of 4.20, 3.50, 2.40, 2.20 and 1.63 mm.

The laminated sheet was slit into strands or noodle of 2 mm in width which were cut to the length of 40 to 42 cm. The cuts were collected to portions of 80 to 82 g.

5 The noodle was then blanched at about 98°C for 180 s along a tunnel blancher in which steam injection means injected steam at 99°C and water spraying means sprayed acidified water having a pH of 3.7 and a temperature of 96-97°C.

10 During the blanching step, the water uptake was such that the noodle had then a dry matter content of from 41 to 43%.

After the blanching step, the noodle was showered with a hot water spray having a temperature of from 60 to 70°C,
15 and it was then water cooled in a bath of water at 20°C for 45 s.

During the water cooling step, the water uptake was such that the noodle had then a dry matter content of from 38 to
20 40%.

After water cooling, excess water was drained off for 60 s.

The noodle was then dipped into a water bath containing
25 1.5% lactic acid, having a pH of 2.5 and having a temperature of 30°C, for 210 s.

During the acidifying step, the water content increased by about 1% and the pH decreased to 3.9 to 4.0.

30 After the acidifying step, excess acidified water was drained off for 60 s.

The final noodle pH was 4.0 to 4.1 and the final dry matter
35 content was 39 to 41%.

The noodle portions then weighing about 132 g were dosed into vertical pouches after their bottoms had been sealed, and 1.5 g palmolein were injected into each pouch before their tops were sealed.

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The noodle was in pack pasteurised in steam at 97°C, the temperature in the centre of the pouch reaching a temperature of 85°C after 18 min and this temperature being held for 10 min.

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The pouches were then cooled for 10 min in water having a temperature of 10°C and containing a disinfectant. The pouches were subsequently stored at room temperature, namely at about 25°C.

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The noodle product could be prepared for consumption by unpacking and heating up, for example.

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The noodle did not stick together. It had outstanding organoleptical properties, especially a bouncy texture similar to the texture of fresh cooked oriental noodles.

Claims

1. A process for manufacturing a full moisture shelf stable noodle which consists of preparing a mixture having a dry matter content of from 60 to 75% and comprising a cereal flour or semolina and added water, kneading the mixture to obtain a dough, sheeting the dough, laminating the sheet thus obtained, slitting the laminated sheet to obtain noodle, cutting the noodle, portioning, blanching, water cooling, dipping into an acidified water, oiling, packaging and in pack pasteurising it, and in which the blanching step is carried out at from 95 to 100° C for from 1 to 10 min, while steaming with steam at from 98 to 100° C and spraying water at from 95 to 98° C.

2. A process according to claim 1, in which the noodle is dipped into an acidified water containing from 0.5 to 2.0% acid, especially lactic acid, phosphoric acid, citric acid or Glucono-delta-lactone, at ambient temperature, especially at a temperature of from 18 to 35° C, for from 50 to 250 s.