

## **Description**

**Title of Invention: INSTANT FRIED NOODLES**

### 5 **Technical Field**

[0001]

The present invention relates to instant fried noodles.

### 10 **Background Art**

[0002]

Instant noodles can be roughly divided into fried noodles and non-fried noodles. The fried noodles are produced by gelatinizing raw noodles, and drying the  
15 gelatinized noodles by performing a frying process in an oil at a temperature about 150°C. On the other hand, the non-fried noodles are produced by gelatinizing raw noodles and drying the gelatinized noodles by a method excluding the frying process performed in an oil. There  
20 are several methods for producing the non-fried noodles, and a hot-air drying method in which raw noodles are exposed to hot air at an air velocity of about 4 m/s or less and at about 70 to 100°C for about 30 to 90 minutes for drying the noodles is generally employed (for example,  
25 Patent Literature 1).

[0003]

The fried noodles have high reconstitutability because moisture within the noodles evaporate during the frying process to form a porous structure and are  
30 characterized by snack-like flavor derived from an oil peculiar to the fried noodles, and a variety of fried noodles are now commercially available as instant noodles

sold in plastic bags or cups. The fried noodles contain, however, a large amount of oils, and hence have a higher calorie content than the non-fried noodles. Therefore, attempts have been made for developing fried noodles  
5 having a reduced fat or oil content.

[0004]

Patent Literature 2 describes the following technique as a method for producing fried noodles having a reduced fat or oil content and free from browning  
10 caused by kansui: Dough with pH 7.5 to 8.5 is prepared by mixing 0.3 to 0.6% by weight of sodium carbonate and/or potassium carbonate and an acidic substance with a noodle material powder, raw noodle strings are obtained by extruding or rolling out the dough and cutting the  
15 resultant, and then, the raw noodle strings are steamed, flavored and dried by frying. This method is an excellent method for reducing a fat or oil content of fried noodles, but it is necessary to use large amounts of kansui and the acidic substance for pH adjustment.

20

## **Citation List**

### **Patent Literature**

[0005]

Patent Literature 1: Japanese Patent No. 3950603

25 Patent Literature 2: Japanese Patent No. 5039716

## **Summary of Invention**

### **Technical Problem**

[0006]

30 An object of the present invention is to provide instant fried noodles having a characteristic that a fat

or oil content is low owing to a small number of pores and a low porosity.

### **Solution to Problem**

5 [0007]

As a result of earnest studies on the relationship between a porous structure of noodle strings and a fat or oil content of instant fried noodles, the inventors have found that a layered gluten network structure is formed within a noodle belt when rolled out, and that the number of pores included in the porous structure of a noodle string is reduced and a fat or oil content is reduced by inhibiting the formation of the layered gluten network structure, resulting in inventing instant fried noodles having a low fat or oil content.

[0008]

Specifically, the present invention provides instant fried noodles having a porous structure in which the number of pores of  $100\ \mu\text{m}^2$  or larger present per unit area of  $1\ \text{mm}^2$  in a cross section of each noodle string cut in a direction perpendicular to the lengthwise direction of the noodle string is 250 or less, and more preferably 150 or less.

[0009]

25 A total area of the pores of  $100\ \mu\text{m}^2$  or larger present in the cross section of the noodle string is 25% or less, and more preferably 19% or less of an area of the cross section of the noodle string (porosity).

[0010]

30 An average area of the pores of  $100\ \mu\text{m}^2$  or larger present in the cross section of the noodle string is

0.14% or less of the area of the cross section of the noodle string (average porosity).

[0011]

A fat or oil content of the noodle string is 15% or less, and more preferably 13% or less.

[0012]

The fried noodles of the present invention have the above-described porous structure, and hence, its fat or oil content can be reduced without causing a blister on the surface of the noodle string.

#### Brief Description of Drawings

[0013]

[Figure 1] Figure 1 is an electron micrograph of a cross section of a noodle string included in instant fried noodles produced in Example 1-1 (a normal pressure mixer, usual compounding, rolled out once).

[Figure 2] Figure 2 is an electron micrograph of a cross section of a noodle string included in instant fried noodles produced in Example 1-2 (a normal pressure mixer, usual compounding, rolled out twice).

[Figure 3] Figure 3 is an electron micrograph of a cross section of a noodle string included in instant fried noodles produced in Example 1-3 (a vacuum mixer, usual compounding, rolled out once).

[Figure 4] Figure 4 is an electron micrograph of a cross section of a noodle string included in instant fried noodles produced in Example 1-4 (a vacuum mixer, usual compounding, rolled out twice).

[Figure 5] Figure 5 is an electron micrograph of a cross section of a noodle string included in instant fried

noodles produced in Example 2-1 (a normal pressure mixer, noodle belt extrusion, rolled out once).

[Figure 6] Figure 6 is an electron micrograph of a cross section of a noodle string included in instant fried  
5 noodles produced in Example 2-2 (a normal pressure mixer, noodle belt extrusion, rolled out twice).

[Figure 7] Figure 7 is an electron micrograph of a cross section of a noodle string included in instant fried  
noodles produced in Example 2-3 (a vacuum mixer, noodle  
10 belt extrusion, rolled out once).

[Figure 8] Figure 8 is an electron micrograph of a cross section of a noodle string included in instant fried  
noodles produced in Example 2-4 (a vacuum mixer, noodle  
belt extrusion, rolled out twice).

15 [Figure 9] Figure 9 is an electron micrograph of a cross section of a noodle string included in instant fried  
noodles produced in Example 3-1 (a normal pressure mixer, small dough lump extrusion, rolled out once).

[Figure 10] Figure 10 is an electron micrograph of a  
20 cross section of a noodle string included in instant  
fried noodles produced in Example 3-2 (a normal pressure  
mixer, small dough lump extrusion, rolled out twice).

[Figure 11] Figure 11 is an electron micrograph of a  
cross section of a noodle string included in instant  
25 fried noodles produced in Example 3-3 (a vacuum mixer,  
small dough lump extrusion, rolled out once).

[Figure 12] Figure 12 is an electron micrograph of a  
cross section of a noodle string included in instant  
fried noodles produced in Example 3-4 (a vacuum mixer,  
30 small dough lump extrusion, rolled out twice).

[Figure 13] Figure 13 is an electron micrograph of a  
cross section of a noodle string included in instant

fried noodles produced in Comparative Example 1 (a normal pressure mixer, usual compounding, rolled out six times).

### **Description of Embodiments**

5 [0014]

The present invention will now be described in detail. It is noted that the type of instant fried noodles of the present invention is not particularly limited, and in general, can be any of those known in  
10 this technical field. Examples include udon (Japanese wheat noodles), soba (buckwheat noodles), Chinese noodles and pastas.

[0015]

The instant fried noodles of the present invention  
15 are produced, for example, as follows: Dough is first prepared by using a normal pressure mixer or a vacuum mixer, and then, the dough is formed into a noodle belt by any of the following methods (1) to (3): (1) The dough is formed into a crude noodle belt by using a usual  
20 shaping roll and the resultant is allowed to pass through a compound roll to prepare the noodle belt (usual compounding); (2) the dough is extruded under ordinary pressure by using an extruding machine such as an extruder to prepare the noodle belt (noodle belt  
25 extrusion); and (3) a small dough lump is extruded by an extruding machine such as an extruder under ordinary pressure, and the small dough lump is prepared into the noodle belt by using a shaping roll (small dough lump extrusion). Subsequently, the noodle belt prepared by  
30 any of the methods (1) to (3) is rolled out into a desired thickness by using a rolling roll, the noodle belt having been rolled out is cut with a cutting blade

roll to obtain raw noodle strings, the thus obtained raw noodle strings are subjected to gelatinization and the like, and then dried by frying. In order to inhibit formation of a layered gluten network structure, for example, the number of times of performing the rolling by using the rolling roll is preferably once or twice, which is smaller than the general number of times, that is, three times to eight times. It is noted that the method for producing the fried noodles of the present invention is not limited to the aforementioned method, but any method can be employed as long as the formation of pores within a noodle string is inhibited in the production method.

[0016]

Next, a cross sectional structure of each noodle string of the instant fried noodles of the present invention will be described.

[0017]

Figures 1 to 12 are electron micrographs of cross sections of noodle strings of the instant fried noodles of the present invention cut in a direction perpendicular to the lengthwise direction of the noodle strings, and Figure 13 is an electron micrograph of a cross section of a noodle string of fried noodles produced by a conventional production method in which a noodle belt prepared by usual compounding is rolled out six times. Each cross sectional structure was observed by using an electron microscope (JSM-6380LA, 60-fold magnification) after subjecting the noodle string to an ether degreasing process.

[0018]

In producing the instant fried noodles by the conventional production method, the rolling is performed a large number of times (of, for example, six times) in a state of a noodle belt, and hence, a gluten network structure formed within a noodle string is drawn into the shape of a layer. Therefore, bubbling of moisture caused within the noodle string in frying is physically suppressed by the layered gluten network structure, and hence, a large number of fine pores are formed within the noodle string as illustrated in Figure 13. Since such a spongiform porous structure absorbs a large amount of an oil in frying, a fat or oil content in the entire instant fried noodles is unavoidably increased.

[0019]

On the other hand, as illustrated in Figures 1 to 12, the instant fried noodles of the present invention has a characteristic that the number of pores present in a cross section of each noodle string cut in the direction perpendicular to the lengthwise direction of the noodle string is smaller and porosity (the ratio of a total area of pores to the area of the cross section of the noodle string) is lower than in the instant fried noodles produced by the conventional method (Figure 13). This is probably because a layered gluten network structure is difficult to be formed in the instant fried noodles of the present invention, and hence moisture can freely bubble in frying.

[0020]

The number of pores of  $100\text{ }\mu\text{m}^2$  or larger present per unit area of  $1\text{ mm}^2$  in the cross section of the noodle string of the instant fried noodles of the present invention is 250 or less, and more preferably 150 or less.

The porosity is 25% or less, and more preferably 19% or less. The average porosity (the ratio of an average area of pores of  $100\text{ }\mu\text{m}^2$  or larger to the area of the cross section of the noodle string) is 0.14% or less.

5 [0021]

Since the instant fried noodles of the present invention have the above-described porous structure, a small amount of an oil component remains within the pores in frying. If the number of pores of  $100\text{ }\mu\text{m}^2$  or larger present per unit area of  $1\text{ mm}^2$  in the cross section of the noodle string of the instant fried noodles of the present invention is 250 or less, the fat or oil content can be 15% or less, and if the number of pores of  $100\text{ }\mu\text{m}^2$  or larger present per unit area of  $1\text{ mm}^2$  is 150 or less, the fat or oil content can be 13% or less.

[0022]

An example of a method for producing the instant fried noodles of the present invention will now be described. It is noted that the production method for the instant fried noodles of the present invention is not limited to the following method.

#### 1. Raw Material Formulation

In the instant fried noodles of the present invention, general materials of instant noodles can be used. Specifically, a single one of or a mixture of flours such as wheat flour, buckwheat flour and rice flour, various starches such as potato starch, tapioca starch and corn starch, and processed starch of any of these may be used as a raw material powder.

30 [0023]

#### 2. Preparation of Dough

The preparation of dough according to the present invention can be performed by an ordinary method. Specifically, a normal pressure mixer (a batch mixer or a flow jet mixer), a vacuum mixer or the like may be used  
5 for homogeneously mixing/kneading the noodle material powder and kneading water, and thus, crumb-like dough may be prepared.

[0024]

### 3. Preparation of Noodle Belt

10 The thus prepared dough is used for preparing a noodle belt. The noodle belt of the present invention is prepared by any of the following methods (1) to (3): (1) The dough is formed into a crude noodle belt by using a usual shaping roll and the resultant is allowed to pass  
15 through a compound roll to prepare the noodle belt (usual compounding); (2) the dough is extruded under ordinary pressure by using an extruding machine such as an extruder to prepare the noodle belt (noodle belt extrusion); and (3) a small dough lump is extruded by  
20 using an extruding machine such as an extruder under ordinary pressure, and the small dough lump is prepared into the noodle belt by using a shaping roll (small dough lump extrusion).

[0025]

### 25 4. Rolling and Cutting

Next, the prepared noodle belt is rolled out into a desired thickness by using a rolling roll. In order to inhibit formation of a layered gluten network structure in noodles, the number of times of performing the rolling  
30 is preferably once or twice, which is smaller than the general number of times, that is, three times to eight times.

[0026]

If the number of times of performing the rolling is twice, the rolling degree of the rolling is not especially limited, and the noodle belt may be rolled out  
5 by 90% or more at a time in the first rolling, followed by fine adjustment to the desired thickness performed in the second rolling, or the desired thickness may be gradually obtained with the rolling degree equally divided in accordance with the number of times of  
10 performing the rolling. The noodle belt having the desired thickness is cut with a cutting blade roll, and thus, raw noodle strings are obtained.

[0027]

#### 5. Gelatinizing Step

15 Subsequently, the thus obtained raw noodle strings are gelatinized by steaming and/or boiling by an ordinary method. As a steaming method, heating can be performed not only with saturated water vapor but also with superheated water vapor.

20 [0028]

#### 6. Flavoring Step

In the present invention, the thus gelatinized noodle strings may be flavored by adherence of a seasoning liquid (a liquid seasoning) to the noodle  
25 strings by spraying, dipping or the like. The flavoring step is not always necessary and may be omitted.

[0029]

#### 7. Cut and Input

Subsequently, the noodle strings are cut into a  
30 length of 20 to 50 cm corresponding to a single meal amount. The cut noodle strings are input to a metal

frying/drying device including a lid and a container as a fry retainer.

[0030]

#### 8. Frying/Drying Step

5       The fry retainer containing the noodles therein is moved in a metal tank, designated as a fryer, holding a cooking oil heated to about 130 to 160°C, so as to dip the noodles in the oil, and thus, moisture in the noodles is evaporated and the noodles are dried. Examples of the  
10       cooking oil used here include a palm oil and lard. The noodles are dried so as to have a moisture of 1 to 8% by weight after the frying/drying step.

[0031]

#### 9. Cooling Step

15       After the frying/drying step, the lid is removed and a noodle lump is taken out of the container. The noodle lump thus taken out is cooled for a prescribed period of time to obtain instant fried noodles.

[0032]

#### 20   10. Other Steps

      The cooled instant fried noodles are transferred to a packaging step to be packed in a cup or a bag together with soup and ingredients, and the resultant is sold as a product of the instant fried noodles.

25       [0033]

      In this manner, when the number of pores and the porosity are suppressed to fall in the prescribed ranges, instant fried noodles having a low fat or oil content can be provided.

30

#### **Examples**

[0034]

Now, the present invention will be described in more details with reference to examples.

(Experiment 1)

<Examination on Usually Compounded Noodle Belt>

5 (Example 1-1)

Powders of 900 g of wheat flour and 100 g of starch were mixed, and to the resultant, 340 ml of kneading water containing 15 g of salt, 2.3 g of kansui and 0.4 g of polyphosphate salt dissolved therein was added, and  
10 the resultant mixture was mixed/kneaded with a normal pressure twin screw mixer for 3 minutes to prepare crumb-like dough. At this point, the dough had a moisture of 35.0%.

[0035]

15 The thus prepared dough was prepared into a crude noodle belt using a usual shaping roll under normal pressure, and two crude noodle belts thus prepared were compounded using the shaping roll again to prepare a noodle belt. At this point, the noodle belt had a  
20 thickness of 8 mm.

[0036]

The thus prepared noodle belt was rolled out from the thickness of 8 mm to a thickness of 1 mm at a time using a six-sun (about 18 cm) roll (the number of times  
25 of performing the rolling: once). Besides, a rolling speed was set to 0.85 m/min, and the noodle belt thus rolled out was formed into noodle strings using a cutting blade roll of a #20 square blade.

[0037]

30 The noodle strings thus cut were immediately steamed for 2 minutes in a steam chamber into which saturated water vapor was supplied at 240 kg/h.

[0038]

The steamed noodle strings were dipped for 5 seconds in a liquid seasoning containing, per 1 L, 90 g of salt, 13.5 g of glutamic acid, 10 ml of soy sauce and 30 g of a meat extract dissolved therein, and thereafter, the resultant noodle strings were drawn and cut into a length of 30 cm.

[0039]

The cut noodle strings thus flavored were input to a cup-shaped metal container, which had an upper surface diameter of 87 mm, an underside diameter of 72.5 mm and a height of 60 mm, and had a large number of small holes of a diameter of 2.9 mm on the underside, in an amount corresponding to a weight of 100 g, the container was then covered with a metal lid also having a large number of small holes of a diameter of 2.9 mm, and the resultant was dipped in a fryer heated to 150°C for drying by frying.

[0040]

(Example 1-2)

A sample of fried noodles was produced in the same manner as in Example 1-1 except that the number of times of performing the rolling was changed to twice, so that a noodle belt with a thickness of 8 mm could be rolled out to a thickness of 1.5 mm in the first rolling and then to a thickness of 1 mm in the second rolling.

(Example 1-3)

A sample of fried noodles was produced in the same manner as in Example 1-1 except that a vacuum mixer was used, instead of the normal pressure twin screw mixer, for mixing/kneading for 15 minutes.

(Example 1-4)

A sample of fried noodles was produced in the same manner as in Example 1-1 except that a vacuum mixer was used, instead of the normal pressure twin screw mixer, for mixing/kneading for 15 minutes, and that the number of times of performing the rolling was changed to twice, so that a noodle belt with a thickness of 8 mm could be rolled out to a thickness of 1.5 mm in the first rolling and then to a thickness of 1 mm in the second rolling.

[0041]

10 (Comparative Example 1)

A sample of fried noodles was produced in the same manner as in Example 1-1 except that the number of times of performing the rolling was changed to six times, so that a noodle belt with a thickness of 8 mm could be rolled out to a thickness of 4 mm in the first rolling, to a thickness of 3 mm in the second rolling, to a thickness of 2.5 mm in the third rolling, to a thickness of 2 mm in the fourth rolling, to a thickness of 1.5 mm in the fifth rolling, and to a thickness of 1 mm in the sixth rolling, and that the rolling speed of the rolling roll was set to 18.5 m/min.

[0042]

(Experiment 2)

<Preparation of Noodle Belt by Extruder>

25 (Example 2-1)

Powders of 900 g of wheat flour and 100 g of starch were mixed, and to the resultant, 340 ml of kneading water containing 15 g of salt, 2.3 g of kansui and 0.4 g of polyphosphate salt dissolved therein was added, and the resultant mixture was mixed/kneaded with a normal pressure twin screw mixer for 3 minutes to prepare crumb-like dough.

[0043]

The thus prepared dough was extruded under normal pressure by using an extruder to prepare a noodle belt having a thickness of 8 mm.

5 [0044]

The thus prepared noodle belt was rolled out from the thickness of 8 mm to a thickness of 1 mm at a time using a six-sun (about 18 cm) roll (the number of times of performing the rolling: once). A rolling speed was  
10 set to 0.85 m/min, and the noodle belt thus rolled out was formed into noodle strings using a cutting blade roll of a #20 square blade.

[0045]

Thereafter, the production was performed in the same  
15 manner as in Example 1-1.

[0046]

(Example 2-2)

A sample of fried noodles was produced in the same manner as in Example 2-1 except that the number of times  
20 of performing the rolling was changed to twice, so that a noodle belt with a thickness of 8 mm could be rolled out to a thickness of 1.5 mm in the first rolling and then to a thickness of 1 mm in the second rolling.

(Example 2-3)

25 A sample of fried noodles was produced in the same manner as in Example 2-1 except that a vacuum mixer was used, instead of the normal pressure twin screw mixer, for mixing/kneading for 15 minutes.

(Example 2-4)

30 A sample of fried noodles was produced in the same manner as in Example 2-1 except that a vacuum mixer was used, instead of the normal pressure twin screw mixer,

for mixing/kneading for 15 minutes, and that the number of times of performing the rolling was changed to twice, so that a noodle belt with a thickness of 8 mm could be rolled out to a thickness of 1.5 mm in the first rolling and then to a thickness of 1 mm in the second rolling.

[0047]

(Experiment 3)

<Preparation of Noodle Belt using Shaping Roll after Preparing Small Dough Lump using Extruder>

10 (Example 3-1)

Powders of 900 g of wheat flour and 100 g of starch were mixed, and to the resultant, 340 ml of kneading water containing 15 g of salt, 2.3 g of kansui and 0.4 g of polyphosphate salt dissolved therein was added, and the resultant mixture was mixed/kneaded with a normal pressure twin screw mixer for 3 minutes to prepare crumb-like dough.

[0048]

The thus prepared dough was extruded under normal pressure by using an extruder to prepare a small dough lump having a diameter of 20 mm and a length of 20 mm, which was prepared into a crude noodle belt using a shaping roll, and two crude noodle belts thus prepared were compounded using the shaping roll again to prepare a noodle belt. At this point, the noodle belt had a thickness of 8 mm.

[0049]

The thus prepared noodle belt was rolled out from the thickness of 8 mm to a thickness of 1 mm at a time using a six-sun (about 18 cm) roll (the number of times of performing the rolling: once). A rolling speed was set to 0.85 m/min, and the noodle belt thus rolled out

was formed into noodle strings using a cutting blade roll of a #20 square blade.

[0050]

Thereafter, the production was performed in the same  
5 manner as in Example 1-1.

[0051]

(Example 3-2)

A sample of fried noodles was produced in the same manner as in Example 3-1 except that the number of times  
10 of performing the rolling was changed to twice, so that a noodle belt with a thickness of 8 mm could be rolled out to a thickness of 1.5 mm in the first rolling and then to a thickness of 1 mm in the second rolling.

(Example 3-3)

15 A sample of fried noodles was produced in the same manner as in Example 3-1 except that a vacuum mixer was used, instead of the normal pressure twin screw mixer, for mixing/kneading for 15 minutes.

(Example 3-4)

20 A sample of fried noodles was produced in the same manner as in Example 3-1 except that a vacuum mixer was used, instead of the normal pressure twin screw mixer, for performing mixing/kneading for 15 minutes, and that the number of times of performing the rolling was changed  
25 to twice, so that a noodle belt with a thickness of 8 mm could be rolled out to a thickness of 1.5 mm in the first rolling and then to a thickness of 1 mm in the second rolling.

[0052]

30 Evaluation of Fat or Oil Content and Characteristic of Porous Structure

The samples of the noodle strings of the instant fried noodles produced in Experiments 1 to 3 were evaluated for the fat or oil content and the presence of blister, and after subjecting the samples to the ether  
5 degreasing process, the cross sectional structures of the noodle strings were observed with an electron microscope. The results are shown in Tables 1 and 2 below. The fat or oil content was analyzed by the Soxhlet extraction method after crushing, for uniforming, the fried noodles  
10 having been dried by frying. The cross sectional structures were observed with an electron microscope (JSM-6380LA, 60-fold magnification) manufactured by JEOL Ltd., and digital images thus taken were subjected to image analysis using Image-Pro Premier 9.1 manufactured  
15 by Media Cybernetics, Inc. The number N of used samples was 5.

[0053]

In the image analysis, with respect to pores having an area of  $100 \mu\text{m}^2$  or larger visually recognizable in  
20 each digital image, the number of pores present in the cross section of each noodle string, the number of pores per unit area of  $1 \text{ mm}^2$ , porosity (the ratio of a total area of pores to the area of the cross section of the noodle string) (%), average porosity (the ratio of an  
25 average area of pores to the area of the cross section of the noodle string) (%), and maximum porosity (the ratio of an area of the largest pore present in the cross section of the noodle string to the area of the cross section of the noodle string) (%) were obtained.

30 [0054]

As shown in Tables 1 and 2, the numbers of the pores present in the cross sections of the noodle strings of

the instant fried noodles of Comparative Example 1 were 574 to 646, the numbers of pores per unit area of 1 mm<sup>2</sup> were 282 to 332, the porosity was 25.9% to 28.8%, and the average porosity was 0.04% to 0.05%, and on the contrary,  
5 the numbers of the pores present in the cross sections of the noodle strings of the instant fried noodles of Examples 1-1 to 3-4 were 101 to 403, the numbers of the pores per unit area of 1 mm<sup>2</sup> were 71 to 234, the porosity was 7.3% to 24.6%, and the average porosity was 0.03% to  
10 0.14%.

[0055]

Besides, in the instant fried noodles of Examples 1-1, 1-3, 2-1, 2-3, 3-1, 3-3 and 3-4, in which the fat or oil content is 13% or less, the numbers of pores present  
15 in the cross section of the noodle strings were 101 to 239, the numbers of pores per unit area of 1 mm<sup>2</sup> were 71 to 147, the porosity was 8.6% to 18.2%, and the average porosity was 0.06% to 0.14%.

[0056]

20 In the instant fried noodles of Comparative Example 1, since a layered gluten network structure is firmly formed within the noodle string, the bubbling of moisture within the noodle string in frying is suppressed by the layered gluten network structure, and hence, a large  
25 number of fine pores are formed within the noodle string. On the other hand, in the instant fried noodles of Examples 1-1 to 3-4, since the formation of a layered gluten network structure is inhibited, the numbers of pores present in the cross sections of the noodle strings,  
30 the numbers of pores per unit area of 1 mm<sup>2</sup>, and the porosity were all smaller than those of Comparative Example 1.

[0057]

Besides, it is understood that the average porosity is larger in the instant fried noodles of Examples 1-1, 1-3, 2-1, 2-3, 3-1, 3-3 and 3-4 than in the instant fried  
5 noodles of Comparative Example 1. This is probably because the layered gluten network structure is more difficult to be formed in the instant fried noodles of Examples 1-1, 1-3, 2-1, 2-3, 3-1, 3-3 and 3-4 than in the instant fried noodles of Examples 1-2, 1-4, 2-2, 2-4 and  
10 3-2, and hence the moisture within the noodle strings is more freely bubbled and the average sizes of individual pores are increased. On the other hand, the numbers of pores present in the cross sections of the noodle strings, the numbers of pores per unit area of 1 mm<sup>2</sup>, and the  
15 porosity are small, and therefore, the fat or oil content can be reduced by 4% or more as compared with that of Comparative Example 1.

[0058]

Furthermore, in the instant fried noodles of  
20 Examples 1-1 to 3-4, the area of the largest pore present in the cross section of each noodle string was 5% or less of the area of the cross section of the noodle string, and no blister was caused on the surface of the noodle string.

25 [0059]

The fat or oil content was 17.2% in the instant fried noodles of Comparative Example 1 but was 11.4% to 14.8% in the instant fried noodles of Examples 1-1 to 3-4, and was particularly 11.4% to 13% in the instant fried  
30 noodles of Examples 1-1, 1-3, 2-1, 2-3, 3-1, 3-3 and 3-4. Thus, when the number of pores formed within a noodle string per unit area and the porosity are reduced,

instant fried noodles having a low fat or oil content can be provided.

[0060]

In this manner, according to the present invention,  
5 the number of pores per unit area and porosity in a porous structure within a noodle string are reduced, so as to provide instant fried noodles having a fat or oil content reduced without impairing the texture and the appearance.



[Table 1 Continued]

| Conditions            |                                         | Number of times of Rolling | Fat or Oil Content | Sample  | Number of Pores | Number of Pores per unit area (1 mm <sup>2</sup> ) | Porosity | Average Porosity | Maximum Porosity | Blister |
|-----------------------|-----------------------------------------|----------------------------|--------------------|---------|-----------------|----------------------------------------------------|----------|------------------|------------------|---------|
| Example 1-3           | Usual Compounding Vacuum Mixer          | 1                          | 12.4%              | 1       | 231             | 146                                                | 17.2%    | 0.07%            | 1.2%             | none    |
|                       |                                         |                            |                    | 2       | 203             | 132                                                | 14.9%    | 0.07%            | 0.9%             | none    |
|                       |                                         |                            |                    | 3       | 203             | 130                                                | 16.8%    | 0.08%            | 1.1%             | none    |
|                       |                                         |                            |                    | 4       | 217             | 140                                                | 12.4%    | 0.06%            | 1.3%             | none    |
|                       |                                         |                            |                    | 5       | 186             | 129                                                | 15.2%    | 0.08%            | 1.8%             | none    |
|                       |                                         |                            |                    | Average | 208             | 135                                                | 15.3%    | 0.07%            | 1.3%             |         |
|                       |                                         |                            |                    |         |                 |                                                    |          |                  |                  |         |
| Example 1-4           | Usual Compounding Vacuum Mixer          | 2                          | 13.5%              | 1       | 323             | 189                                                | 14.5%    | 0.04%            | 1.2%             | none    |
|                       |                                         |                            |                    | 2       | 321             | 186                                                | 15.8%    | 0.05%            | 1.0%             | none    |
|                       |                                         |                            |                    | 3       | 384             | 211                                                | 15.1%    | 0.04%            | 1.8%             | none    |
|                       |                                         |                            |                    | 4       | 280             | 162                                                | 13.2%    | 0.05%            | 0.9%             | none    |
|                       |                                         |                            |                    | 5       | 293             | 189                                                | 17.2%    | 0.06%            | 0.8%             | none    |
|                       |                                         |                            |                    | Average | 320             | 187                                                | 15.1%    | 0.05%            | 1.1%             |         |
|                       |                                         |                            |                    |         |                 |                                                    |          |                  |                  |         |
| Comparative Example 1 | Usual Compounding Normal Pressure Mixer | 6                          | 17.2%              | 1       | 637             | 295                                                | 27.0%    | 0.04%            | 3.0%             | none    |
|                       |                                         |                            |                    | 2       | 635             | 289                                                | 28.8%    | 0.05%            | 1.9%             | none    |
|                       |                                         |                            |                    | 3       | 575             | 282                                                | 28.5%    | 0.05%            | 2.0%             | none    |
|                       |                                         |                            |                    | 4       | 574             | 291                                                | 27.2%    | 0.05%            | 3.2%             | none    |
|                       |                                         |                            |                    | 5       | 646             | 332                                                | 25.9%    | 0.04%            | 3.0%             | none    |
|                       |                                         |                            |                    | Average | 613             | 298                                                | 27.5%    | 0.04%            | 2.6%             |         |
|                       |                                         |                            |                    |         |                 |                                                    |          |                  |                  |         |

[0062] [Table 2]

| Condition   |                                             | Number of Times of Rolling | Oil or Fat Content | Sample  | Number of Pores | Number of Pores per unit area (1 mm <sup>2</sup> ) | Porosity | Average Porosity | Maximum Porosity | Blister |
|-------------|---------------------------------------------|----------------------------|--------------------|---------|-----------------|----------------------------------------------------|----------|------------------|------------------|---------|
| Example 2-1 | Noodle Belt Extrusion Normal Pressure Mixer | 1                          | 11.4%              | 1       | 165             | 111                                                | 14.0%    | 0.08%            | 0.6%             | none    |
|             |                                             |                            |                    | 2       | 160             | 103                                                | 10.2%    | 0.06%            | 0.6%             | none    |
|             |                                             |                            |                    | 3       | 138             | 95                                                 | 12.9%    | 0.09%            | 1.2%             | none    |
|             |                                             |                            |                    | 4       | 180             | 110                                                | 13.3%    | 0.07%            | 0.9%             | none    |
|             |                                             |                            |                    | 5       | 146             | 102                                                | 11.6%    | 0.08%            | 1.4%             | none    |
|             |                                             |                            |                    | Average | 158             | 104                                                | 12.4%    | 0.08%            | 0.9%             |         |
|             |                                             |                            |                    |         |                 |                                                    |          |                  |                  |         |
| Example 2-2 | Noodle Belt Extrusion Normal Pressure Mixer | 2                          | 14.5%              | 1       | 249             | 144                                                | 8.7%     | 0.04%            | 0.3%             | none    |
|             |                                             |                            |                    | 2       | 272             | 151                                                | 9.7%     | 0.04%            | 0.5%             | none    |
|             |                                             |                            |                    | 3       | 271             | 156                                                | 11.5%    | 0.04%            | 0.6%             | none    |
|             |                                             |                            |                    | 4       | 246             | 132                                                | 7.3%     | 0.03%            | 0.3%             | none    |
|             |                                             |                            |                    | 5       | 250             | 128                                                | 8.9%     | 0.04%            | 1.2%             | none    |
|             |                                             |                            |                    | Average | 258             | 143                                                | 9.2%     | 0.04%            | 0.6%             |         |
|             |                                             |                            |                    |         |                 |                                                    |          |                  |                  |         |
| Example 2-3 | Noodle Belt Extrusion Vacuum Mixer          | 1                          | 12.0%              | 1       | 146             | 100                                                | 8.6%     | 0.06%            | 0.5%             | none    |
|             |                                             |                            |                    | 2       | 118             | 81                                                 | 10.6%    | 0.09%            | 1.0%             | none    |
|             |                                             |                            |                    | 3       | 139             | 97                                                 | 11.5%    | 0.08%            | 2.2%             | none    |
|             |                                             |                            |                    | 4       | 152             | 93                                                 | 11.4%    | 0.07%            | 2.6%             | none    |
|             |                                             |                            |                    | 5       | 174             | 104                                                | 13.2%    | 0.08%            | 2.4%             | none    |
|             |                                             |                            |                    | Average | 146             | 95                                                 | 11.1%    | 0.08%            | 1.8%             |         |
|             |                                             |                            |                    |         |                 |                                                    |          |                  |                  |         |

[Table 2 Continued]

| Condition   |                                                  | Number of Times of Rolling | Oil or Fat Content | Sample  | Number of Pores | Number of Pores per unit area (1 mm <sup>2</sup> ) | Porosity | Average Porosity | Maximum Porosity | Blister |
|-------------|--------------------------------------------------|----------------------------|--------------------|---------|-----------------|----------------------------------------------------|----------|------------------|------------------|---------|
| Example 2-4 | Noodle Belt Extrusion Vacuum Mixer               | 2                          | 13.1%              | 1       | 201             | 128                                                | 10.6%    | 0.05%            | 1.2%             | none    |
|             |                                                  |                            |                    | 2       | 241             | 143                                                | 11.5%    | 0.05%            | 0.8%             | none    |
|             |                                                  |                            |                    | 3       | 236             | 153                                                | 12.0%    | 0.05%            | 0.6%             | none    |
|             |                                                  |                            |                    | 4       | 216             | 141                                                | 11.9%    | 0.06%            | 1.3%             | none    |
|             |                                                  |                            |                    | 5       | 221             | 134                                                | 13.8%    | 0.06%            | 1.7%             | none    |
|             |                                                  |                            |                    | Average | 223             | 140                                                | 12.0%    | 0.05%            | 1.1%             |         |
| Example 3-1 | Small Dough Lump Extrusion Normal Pressure Mixer | 1                          | 13.0%              | 1       | 173             | 113                                                | 12.7%    | 0.07%            | 1.0%             | none    |
|             |                                                  |                            |                    | 2       | 189             | 111                                                | 11.8%    | 0.06%            | 0.5%             | none    |
|             |                                                  |                            |                    | 3       | 169             | 95                                                 | 15.4%    | 0.09%            | 1.3%             | none    |
|             |                                                  |                            |                    | 4       | 204             | 130                                                | 14.9%    | 0.07%            | 1.0%             | none    |
|             |                                                  |                            |                    | 5       | 198             | 117                                                | 13.7%    | 0.07%            | 0.9%             | none    |
|             |                                                  |                            |                    | Average | 187             | 113                                                | 13.7%    | 0.07%            | 0.9%             |         |
| Example 3-2 | Small Dough Lump Extrusion Normal Pressure Mixer | 2                          | 14.8%              | 1       | 365             | 205                                                | 12.2%    | 0.03%            | 0.4%             | none    |
|             |                                                  |                            |                    | 2       | 340             | 188                                                | 13.0%    | 0.04%            | 0.7%             | none    |
|             |                                                  |                            |                    | 3       | 299             | 179                                                | 17.6%    | 0.06%            | 0.6%             | none    |
|             |                                                  |                            |                    | 4       | 342             | 197                                                | 14.7%    | 0.04%            | 0.4%             | none    |
|             |                                                  |                            |                    | 5       | 369             | 196                                                | 14.1%    | 0.04%            | 1.1%             | none    |
|             |                                                  |                            |                    | Average | 343             | 193                                                | 14.3%    | 0.04%            | 0.6%             |         |

[Table 2 Continued]

| Condition   |                                         | Number of Times of Rolling | Oil or Fat Content | Sample  | Number of Pores | Number of Pores per unit area (1 mm <sup>2</sup> ) | Porosity | Average Porosity | Maximum Porosity | Blister |
|-------------|-----------------------------------------|----------------------------|--------------------|---------|-----------------|----------------------------------------------------|----------|------------------|------------------|---------|
| Example 3-3 | Small Dough Lump Extrusion Vacuum Mixer | 1                          | 12.6%              | 1       | 116             | 75                                                 | 9.5%     | 0.08%            | 1.0%             | none    |
|             |                                         |                            |                    | 2       | 104             | 72                                                 | 12.1%    | 0.12%            | 2.9%             | none    |
|             |                                         |                            |                    | 3       | 103             | 78                                                 | 11.5%    | 0.11%            | 1.6%             | none    |
|             |                                         |                            |                    | 4       | 101             | 71                                                 | 14.2%    | 0.14%            | 2.0%             | none    |
|             |                                         |                            |                    | 5       | 106             | 76                                                 | 9.8%     | 0.09%            | 1.0%             | none    |
|             |                                         |                            |                    | Average | 106             | 74                                                 | 11.4%    | 0.11%            | 1.7%             |         |
| Example 3-4 | Small Dough Lump Extrusion Vacuum Mixer | 2                          | 13.0%              | 1       | 148             | 98                                                 | 12.0%    | 0.08%            | 1.5%             | none    |
|             |                                         |                            |                    | 2       | 136             | 85                                                 | 8.1%     | 0.06%            | 0.5%             | none    |
|             |                                         |                            |                    | 3       | 119             | 78                                                 | 8.7%     | 0.07%            | 0.4%             | none    |
|             |                                         |                            |                    | 4       | 154             | 106                                                | 11.6%    | 0.08%            | 0.4%             | none    |
|             |                                         |                            |                    | 5       | 136             | 91                                                 | 7.5%     | 0.06%            | 0.6%             | none    |
|             |                                         |                            |                    | Average | 139             | 92                                                 | 9.6%     | 0.07%            | 0.7%             |         |

## Claims

### [Claim 1]

Instant fried noodles having a porous structure,  
5 wherein the porous structure is constituted by a plurality of pores containing a fat or oil, and  
the number of pores of  $100\ \mu\text{m}^2$  or larger present per unit area of  $1\ \text{mm}^2$  in a cross section of a noodle string of the instant fried noodles cut in a direction perpendicular  
10 to a lengthwise direction of the noodle string is 71 to 150,  
a total area of the pores of  $100\ \mu\text{m}^2$  or larger present in the cross section of the noodle string of the instant fried noodles is 8.6% to 19% of an area of the cross section of the noodle string, and  
15 a fat or oil content of the noodle string is 11.4% to 13%.

### [Claim 2]

The instant fried noodles according to claim 1, wherein  
20 an average area of the pores of  $100\ \mu\text{m}^2$  or larger present in the cross section of the noodle string of the instant fried noodles is 0.06% to 0.14% of the area of the cross section of the noodle string.