

## **SPECIFICATION**

### **MATERIAL FOR PROMOTING GROWTH IN PIGS, MATERIAL FOR IMPROVING FEED CONVERSION RATIO IN PIGS AND MATERIAL FOR RELIEVING STRESS IN PIGS**

#### **TECHNICAL FIELD**

[0001]

The present invention relates to a material for promoting growth in pigs, a material for improving a feed conversion ratio in pigs and a material for relieving stress in pigs, each containing a component extracted from EFB.

#### **BACKGROUND ART**

[0002]

Patent Document 1 discloses an additive for a feed which contains at least one or two or more of polyphenols extracted from EFB,  $\alpha$ -tocopherol extracted from EFB and xyloses extracted from EFB. EFB means an empty fruit bunches after squeezing the oil out of fresh fruits of oil palms.

[0003]

In the Patent Document 1, the effects of the additive for feed to chicken have been demonstrated.

#### **PRIOR ART DOCUMENT**

##### **PATENT DOCUMENT**

[0004]

Patent Document 1: Japanese Patent Application No. 2012-131308  
(JP2013-252120A)

#### **SUMMARY OF THE INVENTION**

##### **PROBLEMS TO BE SOLVED BY THE INVENTION**

[0005]

The applicant has carried out a test by weaning piglets suckled by the mother and administering the EFB extract with feed to the piglets.

[0006]

It has been found from the analysis of the test result that a function of the feed promoting the body weight gain in the pigs (a function of improving feed conversion in pigs), and a function of relieving pigs under stress (a function of activating stress resistance in pigs) can be developed by administering the EFB extract.

[0007]

In view of the fact that the pigs under the test are exposed to rearing environment change as weaning, the above-mentioned functions can be considered to be an expressed form of the function to promote adaptability to the change in the rearing environment of the pigs. According to this function, a specific function (a function promoting growth in pigs) promoting growth in pigs can be developed.

[0008]

Thus, an object of the present invention is to provide a material for promoting growth in pigs, a material for improving a feed conversion ratio in pigs and a material for relieving stress in pigs.

[0009]

Other objects of the present invention will be apparent from the descriptions below.

#### **MEANS FOR SOLVING PROBLEM**

[0010]

The above-described problems are solved by the following respective inventions.

[0011]

1. A material for promoting growth in pigs which contains at least one or two or more of a polyphenols from EFB,  $\alpha$ -tocopherol from EFB and xyloses from EFB, and growth in pigs being promoted by administering the same to the pigs.

[0012]

2. A material for improving feed conversion ratio in pigs, the ration calcurated by the following formila (1), which contains the material for promoting growth in pigs according to 1,

Feed conversion ratio (-)=Feed intake amount (kg)/Body weight gain (kg) ·····(1)

[0013]

3. A material for relieving stress in pigs which contains the material for promoting growth in pigs according to 1, and stress in pigs being relieved.

#### **EFFECTS OF THE INVENTION**

[0014]

According to the present invention, a material for promoting growth in pigs, a material for improving a feed conversion ratio in pigs and a material for relieving stress in pigs can be provided.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0015]

Fig. 1 is a graph showing growth curves of test and control groups.

Fig. 2 is a graph showing growth amounts of the body weight gain of individual generated diarrhea in test and control groups.

## **EMBODIMENTS TO CARRY OUT THE INVENTION**

[0016]

In the following, embodiments to carry out the present invention are explained.

[0017]

The material for promoting growth in pigs of the present invention promotes growth in pigs by administering the same to the pigs.

[0018]

A function of promoting growth in pigs can be estimated to be developed by enhancing adaptation of pigs to the change in rearing environment, etc.

[0019]

In one embodiment (effect), in the viewpoint that "the feed is to efficiently contribute to the body weight gain of the pigs (i.e., to improve a feed conversion ratio)", the material for promoting growth in pigs of the present invention can be a material for improving a feed conversion ratio in pigs.

[0020]

In another embodiment (effect), in the viewpoint of "relieving stress in pigs", the material for promoting growth in pigs of the present invention can be a material for relieving stress in pigs.

[0021]

### **1. Material for promoting growth in pigs**

The material for promoting growth in pigs of the present invention contains at least one or two or more of polyphenols extracted from EFB,  $\alpha$ -tocopherol extracted from EFB and xyloses extracted from EFB, and enhances adaptation to the change in rearing environment by administering it to the pigs.

[0022]

The polyphenols from EFB,  $\alpha$ -tocopherol from EFB and

xyloses from EFB are materials contained in the EFB extract extracted from the EFB, and the EFB extract can be obtained, for example, by processing the EFB to the hydrothermal treatment.

[0023]

The terms "from EFB" or "derived from EFB" mean the EFB extract is used as such, or used as a material for promoting growth in pigs after suitable treatment(s).

[0024]

The material for promoting growth in pigs may be any form either of a liquid state or a solid state.

[0025]

The polyphenols from EFB generically refers to a compound having a plural number of phenolic hydroxyl groups in one molecule contained in the EFB extract, and specific examples thereof may be exemplified by flavonoids such as catechins, anthocyanin, flavone, isoflavone, flavan, flavanone, etc., phenols such as chlorogenic acid, etc., and those which are generally classified into polyphenols such as ellagic acid, lignan, curcumin, coumarin, etc.

[0026]

The material for promoting growth in pigs preferably contains 1 to 15% by weight of a polyphenols in dry basis. "% by weight in dry basis" means % by weight of a material from which water is removed to the material for promoting growth in pigs (herein after the same).

[0027]

The content of the above-mentioned polyphenols is a value in which 80% ethanol solution is added to the material for promoting growth in pigs, the mixture is heated by hot bath at 80°C for 30 minutes, then, subjected to centrifugation at 1600×g for 10 minutes, and the obtained supernatant is used as a sample

solution and measured by the Folin-Denis method to obtain the content equivalent to gallic acid.

[0028]

The  $\alpha$ -tocopherol from EFB means  $\alpha$ -tocopherol contained in the EFB extract, and the specific examples thereof may be exemplified by DL- $\alpha$ -tocopherol, DL- $\alpha$ -tocopherol acetate, DL- $\alpha$ -tocopherol succinate, etc.

[0029]

The material for promoting growth in pigs preferably contains 1 to 30 mg/100 g of  $\alpha$ -tocopherol in dry basis. "mg/100 g in dry basis" means % by weight of a material from which water is removed to the material for promoting growth in pigs.

[0030]

The above-mentioned content of the  $\alpha$ -tocopherol is a value measured by the HPLC method.

[0031]

The xyloses from EFB means xylose or a compound containing xylose as elements contained in the EFB extract. The compound from xylose as elements may be exemplified by an oligomer and a polymer of xylose, etc. In particular, the xyloses originating EFB preferably contains xylooligosaccharide. As the xyloses from EFB, the presence of the xylooligosaccharide has been identified therein by the analysis. The xylooligosaccharide contributes to make intestines of pigs healthy by acting thereon as the so-called prebiotics, and according to this, from the direct effect to diarrhea or constipation, a wide range of health effects such as prevention of infection, adjustment of immunoresponse, etc., can be developed.

[0032]

The material for promoting growth in pigs preferably contains 1 to 15% by weight of xyloses in dry basis.

[0033]

The content of the above-mentioned xyloses is a value obtained by stirring the material for promoting growth in pigs under 72% to 45% sulfuric acid at room temperature for 1 hour, diluting the sulfuric acid concentration to 2%, subjecting to an autoclave treatment at 121°C for 1 hour, and an amount of the xylose in the resulting liquid is determined by the high performance liquid chromatography method (HPLC method). That is, a value of the xylose contained in the material for promoting growth in pigs as well as the xylose formed by decomposition of the compound containing xylose as elements.

[0034]

The material for promoting growth in pigs preferably contains two kinds of polyphenols from EFB and xyloses from EFB, two kinds of polyphenols from EFB and  $\alpha$ -tocopherol from EFB, or two kinds of xyloses from EFB and  $\alpha$ -tocopherol from EFB, particularly preferably three kinds of polyphenols from EFB,  $\alpha$ -tocopherol from EFB and xyloses from EFB.

[0035]

According to the material for promoting growth in pigs of the present invention, by administering the same to the pigs, growth of the pigs can be promoted. It can be estimated that the function of promoting weight gain in pigs can be exhibited by the fact that adaptation to the change in rearing environment of the pigs is enhanced, etc.

[0036]

For example, growth can be suitably maintained at the time that piglets fed by suckling from the mother pig are weaned, and feeding thereof is changed to that using the feed, so that the body weight can be stably increased.

[0037]

In particular, a weight difference generated during the

term of piglets (growing stage) can not be easily overcome in growing after the term, so that to enhance adaptation to rearing environment contributes to quicken the weight gain.

[0038]

By being increased in the weight of the pig rapidly, for example, the term until the pigs are shipped with a predetermined weight can be shortened. By being shortened in the rearing term, there is also a merit that the feeding cost can be reduced.

[0039]

## 2. Material for improving feed conversion ratio in pigs

The material for improving a feed conversion ratio in pigs of the present invention comprises the above-mentioned material for promoting growth in pigs, and improves the feed conversion ratio calculated by the following formula (1).

[0040]

Feed conversion ratio (-) = Feed intake amount (kg) / Body weight gain (kg) ·····(1)

Here, the feed intake amount is a weight of the feed taken by an individual pig.

Also, the body weight gain is an increased amount of the body weight in an individual pig.

[0041]

That is, "to improve the feed conversion ratio" can be said that "the feed is to be made to contribute to the body weight gain of the pigs with good efficiency". According to the above, a weight of the feed for the pig consumed until it becomes the predetermined weight can be reduced. That is, an effect of reducing the cost of the feed for the pig can be obtained.

[0042]

To prevent deteriorating the feed conversion ratio to the pig that falls easily in the deteriorated feed conversion ratio

by the change in rearing environment is, in one aspect, to enhance adaptation to environmental change.

[0043]

Also, according to the material for improving a feed conversion ratio in pigs of the present invention, the effects explained in the material for promoting growth in pigs of the present invention have been also accomplished.

[0044]

### 3. Material for relieving stress in pigs

The material for relieving stress in pigs of the present invention contains the above-mentioned material for promoting growth in pigs, and relieves stress of the pigs.

[0045]

"Stress of the pigs" becomes a cause of generating, for example, diarrhea.

[0046]

"The relief of stress in pigs" may be mentioned, for example, to prevent declining in the body weight gain of pigs under the stress.

[0047]

By relieving the stress of the pigs, an effect of stably increasing the body weight gain of the pigs can be obtained.

[0048]

In addition, according to the above, the body weight gain of the pigs can be stably increased even when, for example, the case where it is difficult to remove the cause of the stress. For example, even when generation of diarrhea is not lessened, the body weight gain can be stably increased.

[0049]

To relieve the above to the pig that is easily received a stress by the change in rearing environment is, in one aspect, to enhance adaptation to environmental change.

[0050]

In addition, according to the material for relieving stress in pigs of the present invention, the effects explained in the material for promoting growth in pigs of the present invention have been also accomplished.

[0051]

#### 4. Administration; addition to feed

In the following, administration of the material for promoting growth in pigs to the pigs is explained, and it is the same as in the cases of the material for improving feed conversion ratio in pigs and the material for relieving stress in pigs.

[0052]

The material for promoting growth in pigs is preferably administered to the pigs by adding it to the feed for the pigs, in particular, it is preferred to administer the same to the pigs by substituting for a part of the grain contained in the feed for the pigs as a main component. The grain as an object to be substituted may be preferably exemplified by, for example, corn.

[0053]

When the material for promoting growth in pigs is administered to the pigs by adding to the feed for the pigs, the formulation ratio of the material for promoting growth in pigs to the feed for the pigs is not particularly limited, and it is preferably in the range of 0.05 to 20% by weight in dry basis, more preferably in the range of 0.15 to 10% by weight in dry basis, and most preferably in the range of 0.25 to 5% by weight in dry basis.

[0054]

In addition, for example, when a part of the corn in the feed for the pigs is substituted by the material for promoting

growth in pigs, an amount of corn to be substituted (or a reduced amount) is not particularly limited, and it is preferably in the range of 0.1 to 40% by weight.

[0055]

According to the material for promoting growth in pigs, it can accomplish the effect that lowering in efficiency of the feed for the pig by the substitution is not easily generated at the time of substituting a part of the grain in the feed for the pig. More specifically, the feed conversion ratio of the substituted feed for the pig can be made substantially the same value to or a smaller value than the feed conversion ratio of the feed for the pig which has not been substituted. That is, a part of the grain can be substituted without deteriorating the feed conversion ratio of the feed for the pig.

[0056]

According to the above, the grain in the feed for the pig can be suitably substituted by the EFB extract which can be relatively inexpensively obtained, so that cost reduction can be realized without impairing the performance of the feed for the pig.

[0057]

#### 5. Others: meaning to reduce grain dependence

There is a great meaning in capable of reducing an amount of the grain to be used in the feed for the pig.

[0058]

In recent years, as a globally important problem, food shortages due to population growth or depletion of fossil fuels is becoming serious. This is, in the development of industry, and even more for the human race, it can be said to be a critical situation.

[0059]

On the other hand, there is the present status that

breeding of pigs has been spread around the world, and a huge amount of the grains has been consumed as the feed for the pigs.  
[0060]

To reduce grain dependence of the feed for the pig is relatively able to increase grains capable of supplying as foods for humans, or as a starting material for a biofuel (bioethanol, etc.) substituting for fossil fuels.  
[0061]

Only when a part of the grain in the feed for the pig is cut, if the technique is spread worldwide, then, consumption of a large amount of the grain can be suppressed. In addition, substitution by the EFB extract can realize cost reduction without impairing the performance of the feed for the pig, a burden of the industry of the pig farming can be reduced, so that the technique has a possibility of spreading worldwide. According to this, it can be expected to alleviate the problem of food shortages due to population growth or depletion of fossil fuels.

#### **EXAMPLES**

[0062]

In the following, Examples of the present invention are explained, but the present invention is not limited by these Examples.

[0063]

In the following feeding test, effects on the growth, etc., when the material for promoting growth in pigs is fed to pigs (piglets at the sucking period) were inspected.

[0064]

The test was carried out using about 24 days-old LW•D species castrated 24 piglets, setting two districts one of which is Control district (Comparative example 1) which fed Control

feed to which no material for promoting growth in pigs had been added and the other of which is Test district (Example 1) which fed a test feed in which 6% amount of corn in the Control feed had been substituted by the material for promoting growth in pigs, dividing each 4 pigs to be supplied to the test, and examined growth results by ceaselessly feeding each feed for 28 days. This was made one block and three blocks in total were carried out.

[0065]

#### 1. Material and method

##### (1) Pigs supplied to the test

About 24 days-old LW·D species castrated 24 piglets (body weight: 6.8 to 8.1 kg) were introduced by dividing into two. That is, they were divided into 8 pigs (Block 1) at the first time and 16 pigs (Block 2 and Block 3) at the second time. After quarantine at the time of introduction, they were divided into 6 groups with each 4 pigs, the control feed mentioned later was fed for 2 days in Block 1, and for 3 days in Block 2 and Block 3 to carry out provisional feeding, then, they were used for the test.

[0066]

##### (2) Material for promoting growth in pigs

The used material for promoting growth in pigs had been confirmed to contain, in wet basis (water content: 48.5%), 3.22% by weight of polyphenols from EFB, 7.8 mg/100 g of  $\alpha$ -tocopherol from EFB and 2.25% by weight of xyloses from EFB. When the above is recalculated with the dry basis, it contains 6.25% by weight of polyphenols from EFB, 15.1 mg/100 g of  $\alpha$ -tocopherol from EFB and 4.37% by weight of xyloses from EFB.

[0067]

##### (3) Setting of test district, etc.

There were set two district one of which is Control

district which fed Control feed to which no material for promoting growth in pigs had been added, and the other of which is Test district which fed a test feed (a formulation ratio of the material for promoting growth in pigs in the test feed was 3.11% by weight) in which 6% amount of corn in the Control feed had been substituted by the material for promoting growth in pigs. The pigs to be supplied to the test were so apportioned to the respective groups that the distribution of the body weight in one group became substantially uniform, and bred for 28 days. This was made one block and three blocks in total were carried out.

[0068]

A formulation ratio of the feed to be supplied to Test district and Control district is as shown in Table 1.

[0069]

Table 1

| Formulation ratio (% by weight)                       |                                |                                                |
|-------------------------------------------------------|--------------------------------|------------------------------------------------|
|                                                       | Tested district<br>(Example 1) | Control district<br>(Comparative<br>example 1) |
| Corn                                                  | 48.78                          | 51.89                                          |
| Material for<br>promoting body<br>weight gain in pigs | 3.11                           | —                                              |
| Wheat powder (for<br>feed)                            | 10.00                          | 10.00                                          |
| Soybean cake                                          | 13.80                          | 13.80                                          |
| Fish powder (CP<br>65%)                               | 5.00                           | 5.00                                           |
| Powdered skim milk                                    | 5.00                           | 5.00                                           |
| Concentrated<br>soybean protein                       | 2.00                           | 2.00                                           |
| Powdered oil and<br>fats                              | 3.50                           | 3.50                                           |
| Sugar                                                 | 2.00                           | 2.00                                           |
| Lactose                                               | 1.00                           | 1.00                                           |
| Glucose                                               | 2.00                           | 2.00                                           |
| Calcium secondary<br>phosphate                        | 0.65                           | 0.65                                           |
| Calcium carbonate                                     | 0.68                           | 0.68                                           |
| Table salt                                            | 0.20                           | 0.20                                           |
| Vitamin B's group<br>mixture                          | 0.20                           | 0.20                                           |
| Vitamin A, D and E<br>mixture                         | 0.20                           | 0.20                                           |
| Minor amount<br>mineral mixture                       | 0.20                           | 0.20                                           |
| DL-methionine                                         | 0.43                           | 0.43                                           |
| L-lysine<br>hydrochloride                             | 0.55                           | 0.55                                           |
| L-tryptophan                                          | 0.01                           | 0.01                                           |
| L-threonine                                           | 0.49                           | 0.49                                           |
| Copper sulfate<br>(Cu 5%)                             | 0.20                           | 0.20                                           |
| Total                                                 | 100                            | 100                                            |

[0070]

In Table 1, Vitamin B's group mixture contains 1.0 g of thiamine nitrate, 7.0 g of riboflavin, 0.5 g of pyridoxine hydrochloride, 6.0 g of nicotinamide, 10.9 g of calcium D-pantoate and 57.6 g of choline hydrochloride in 1 kg thereof.

[0071]

In Table 1, Vitamin A, D and E mixture contains 10,000 IU of Vitamin A oil, 2,000 IU of Vitamin D3 oil and 10 mg of dl- $\alpha$ -tocopherol acetate in 1 kg thereof.

[0072]

In Table 1, the minor amount mineral mixture contains 50 g of Mn, 50 g of Fe, 10 g of Cu, 60 g of Zn and 1 g of I in 1 kg thereof.

[0073]

#### (4) Breeding control

The pigs to be supplied to the test were fed with groups by each district in a pig house with concrete floor having 1.8x2.7 m in an open type pigpen. The feed and the drinking water were ceaselessly fed. Sawdust was used as bedding, and a warming mat and a warming box were set in the respective pig houses. In addition, an oilstove was set at the passage in the pigpen, and it was heated for 24 hours. No vaccination was carried out.

[0074]

## 2. Examined items

### (1) Body weight and body weight gain

The body weight of the individual was measured with an interval of one week from the time of starting the test, and the body weight gain was calculated.

[0075]

### (2) Feed intake amount and feed conversion ratio

The feed intake amount between the respective days on which the body weight had been measured was measured with each district, and the feed intake amount and the feed conversion ratio per a pig were calculated.

[0076]

### (3) Health state

Health state of the respective individuals was observed twice in the morning and the evening every day at substantially the constant time. The generated state of the diarrhea was observed by classifying to the following evaluation standard with four grades. In addition, up to the grade "1: Soft fetes" can be evaluated within the normal range.

[0077]

<Evaluation standard>

0: Normal feces (normal)

1: Soft feces (slightly good)

2: Muddy feces (slightly poor)

3: Watery feces (poor)

[0078]

### 3. Term of implementation of test (Breeding term)

·Block 1; January 16 to February 13, 2014

·Block 2; January 24 to February 21, 2014

·Block 3; January 24 to February 21, 2014

[0079]

### 4. Place that test has carried out

Japan Scientific Feeds Association Scientific Feeds  
Research Center (821 Yoshikura Narita, Chiba)

[0080]

### 5. Test results and evaluation

The test results explaining in the following are based on the data of the measured values shown in Table 5 to Table 9 later. For the analyses of the results, with regard to the

body weight gain, individuals (No.64 in Test district of Block 1, and No.76 in Control district and No.77 in Test district of Block 3) which had been judged to be abnormal values were removed retroactively at the start of the test by subjecting to the rejection test with each group, and after summarizing the test results, the differences between the both districts were investigated on the body weight gain, the feed intake amount and the feed conversion ratio.

[0081]

·Growth curve

The growth curves in average of three blocks of both districts were shown in Fig. 1. From Fig. 1, it can be understood that the growth curves were changed substantially smoothly in both districts.

[0082]

·Growth result

As the growth result, the results of the respective items of the body weight gain, the feed intake amount and the feed conversion ratio were shown in Table 2.

[0083]

Table 2

| Item                        | District         | Block      |            |            | Average    |
|-----------------------------|------------------|------------|------------|------------|------------|
|                             |                  | 1          | 2          | 3          |            |
| Body weight gain (kg/pig)   | Control district | 10.5 (100) | 9.8 (100)  | 10.8 (100) | 10.4 (100) |
|                             | Test district    | 12.5 (119) | 10.3 (105) | 13.8 (128) | 12.2 (117) |
| Feed intake amount (kg/pig) | Control district | 17.6 (100) | 15.7 (100) | 16.2 (100) | 16.5 (100) |
|                             | Test district    | 20.4 (116) | 15.9 (101) | 21.4 (132) | 19.2 (116) |
| Feed conversion ratio       | Control district | 1.68 (100) | 1.60 (100) | 1.50 (100) | 1.59 (100) |
|                             | Test district    | 1.63 (97)  | 1.54 (96)  | 1.55 (103) | 1.57 (99)  |

[0084]

In Table 2, the number in the parentheses is an index when Control district is made 100.

The body weight gain is an average value of three blocks, and the value of Test district was 17% larger than that of Control district.

The feed intake amount is an average value of three blocks, and the value of Test district was 16% larger than that of Control district.

The feed conversion ratio is a value in which the feed intake amount (kg/pig) is divided by the body weight gain (kg/pig), and a smaller value is preferred. The feed conversion ratio is an average value of three blocks, and the results that the value of Test district is superior (smaller) to that of Control district were shown.

[0085]

From these results, it can be understood that the material for promoting growth in pigs acts as the material for reducing a feed conversion ratio in pigs.

[0086]

·Health state

In the observation of the health state, excretion of muddy faces was continuously admitted from immediately after starting the test to the end of the test in one pig (individual number 82 in the data of measured values shown in Table 5 to 9) of Control district in Block 2. No abnormality in activity of said individual was admitted, but the coat was rough and brittle.

[0087]

Generated states of the diarrhea are shown in Table 3. Table 3 shows a ratio (%) of the observed days based on the total number of days tabulated a heavier result (the results with heavier in the degree of symptoms) among the observations twice a day as the observation result of the day. In both districts, individuals that could be admitted to excrete soft faces to muddy faces were observed in some cases.

[0088]

Table 3

| Classification | District         | Block         |               |               | Average       |
|----------------|------------------|---------------|---------------|---------------|---------------|
|                |                  | 1             | 2             | 3             |               |
| Soft fetes     | Control district | 6.3<br>(100)  | 4.5<br>(100)  | 3.6<br>(100)  | 4.8<br>(100)  |
|                | Test district    | 11.9<br>(189) | 9.8<br>(218)  | 3.6<br>(100)  | 8.4<br>(175)  |
| Muddy fetes    | Control district | 8.9<br>(100)  | 23.2<br>(100) | 4.8<br>(100)  | 12.3<br>(100) |
|                | Test district    | 15.5<br>(174) | 13.4<br>(58)  | 10.7<br>(223) | 13.2<br>(107) |
| Watery fetes   | Control district | 0.0           | 0.0           | 0.0           | 0.0           |
|                | Test district    | 0.0           | 0.0           | 0.0           | 0.0           |

[0089]

In Table 3, the number in the parentheses is an index when Control district is made 100.

[0090]

·Body weight gain in individual that generated diarrhea

Body weight gain in the individual that generated diarrhea was shown in Table 4. Here, the pig that showed the symptom of "2: muddy faces" or more in the evaluation standard of the above-mentioned generated states of the diarrhea was classified into the individual that generated diarrhea. More specifically, the individual numbers 66, 68, 71, 74, 82, 86, 79 and 81 in the data of the measurement values shown in Tables 5 to 9 were classified to the individuals that generated diarrhea in Control district, and the individual numbers 65, 70, 72, 80, 84, 88, 73 and 89 were made individuals that generated diarrhea in Test district.

[0091]

Table 4

|                  | Average (kg/pig) in<br>body weight gain in<br>all individuals | Average (kg/pig) in<br>body weight gain in<br>individual that<br>generated diarrhea |
|------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Control district | 10.4 (100)                                                    | 10.0 (96)                                                                           |
| Test district    | 12.2 (117)                                                    | 12.2 (117)                                                                          |

[0092]

In Table 4, the number in the parentheses is an index when an average of the body weight gain of the all individuals in Control district is made 100. The index was shown as a bar graph in Fig. 2.

[0093]

From Table 4 and Fig. 2, in Control district, the average of the body weight gain was decreased in the individual that generated diarrhea. To the contrary, in Test district, decrease in the average of the body weight gain was prevented in the individual that generated diarrhea.

[0094]

From these results, it can be understood that the material for promoting growth in pigs acts as the material for suppressing stress in pigs.

[0095]

The data for the measured values in the respective tests are as shown in the following Table 5 to Table 9.

[0096]

Table 5

Transition in body weight and body weight gain (kg)

| Block | District         | Individual number | Transition in body weight |        |         |         |         | Body weight gain |
|-------|------------------|-------------------|---------------------------|--------|---------|---------|---------|------------------|
|       |                  |                   | Start                     | 1 week | 2 weeks | 3 weeks | 4 weeks |                  |
| 1     | Control district | 66                | 8.6                       | 8.9    | 10.8    | 15.3    | 20.1    | 11.5             |
|       |                  | 68                | 8.1                       | 8.5    | 10.7    | 13.4    | 17.2    | 9.1              |
|       |                  | 69                | 7.8                       | 8.1    | 11.2    | 13.5    | 17.7    | 9.9              |
|       |                  | 71                | 7.4                       | 7.8    | 10.0    | 14.2    | 18.9    | 11.5             |
|       |                  | Average           | 8.0                       | 8.3    | 10.7    | 14.1    | 18.5    | 10.5             |
|       | Test district    | 64*               | 7.6                       | 7.1    | 8.6     | 9.7     | 11.4    | 3.8              |
|       |                  | 65                | 8.7                       | 9.8    | 13.4    | 15.3    | 20.7    | 12.0             |
|       |                  | 70                | 8.4                       | 10.5   | 12.5    | 17.1    | 22.1    | 13.7             |
|       |                  | 72                | 7.8                       | 9.4    | 12.1    | 15.1    | 19.7    | 11.9             |
|       |                  | Average           | 8.3                       | 9.9    | 12.7    | 15.8    | 20.8    | 12.5             |
| 2     | Control district | 74                | 7.3                       | 7.4    | 10.5    | 14.1    | 17.4    | 10.1             |
|       |                  | 82                | 6.4                       | 6.1    | 7.1     | 11.1    | 15.1    | 8.7              |
|       |                  | 83                | 7.7                       | 9.1    | 12.1    | 16.2    | 19.8    | 12.1             |
|       |                  | 86                | 8.0                       | 7.4    | 10.3    | 13.6    | 16.1    | 8.1              |
|       |                  | Average           | 7.4                       | 7.5    | 10.2    | 13.8    | 17.1    | 9.8              |
|       | Test district    | 80                | 6.9                       | 7.8    | 10.8    | 14.8    | 19.2    | 12.3             |
|       |                  | 84                | 7.9                       | 8.4    | 10.9    | 14.2    | 18.7    | 10.8             |
|       |                  | 87                | 7.6                       | 8.7    | 10.8    | 13.5    | 16.4    | 8.8              |
|       |                  | 88                | 8.1                       | 8.6    | 10.5    | 13.6    | 17.5    | 9.4              |
|       |                  | Average           | 7.6                       | 8.4    | 10.8    | 14.0    | 18.0    | 10.3             |
| 3     | Control district | 75                | 7.3                       | 7.4    | 10.5    | 13.8    | 18.7    | 11.4             |
|       |                  | 76*               | 8.4                       | 10.2   | 14.0    | 19.2    | 26.0    | 17.6             |
|       |                  | 79                | 7.3                       | 7.1    | 10.1    | 13.8    | 18.0    | 10.7             |
|       |                  | 81                | 8.4                       | 9.7    | 12.0    | 14.5    | 18.7    | 10.3             |
|       |                  | Average           | 7.7                       | 8.1    | 10.9    | 14.0    | 18.5    | 10.8             |
|       | Test district    | 73                | 7.3                       | 8.6    | 11.5    | 16.0    | 21.6    | 14.3             |
|       |                  | 77*               | 7.5                       | 7.7    | 10.9    | 13.0    | 16.8    | 9.3              |
|       |                  | 85                | 8.1                       | 9.9    | 13.2    | 17.0    | 22.1    | 14.0             |
|       |                  | 89                | 8.2                       | 9.5    | 13.2    | 16.6    | 21.4    | 13.2             |
|       |                  | Average           | 7.9                       | 9.3    | 12.6    | 16.5    | 21.7    | 13.8             |

[0097]

Table 6

Feed intake amount and feed conversion ratio

| Block   | District         | Feed intake amount (kg) |         |         |         |       | Feed conversion ratio |
|---------|------------------|-------------------------|---------|---------|---------|-------|-----------------------|
|         |                  | 1 week                  | 2 weeks | 3 weeks | 4 weeks | Total |                       |
| 1       | Control district | 1.4                     | 3.5     | 5.4     | 7.3     | 17.6  | 1.68                  |
|         | Test district    | 2.9                     | 4.0     | 5.2     | 8.3     | 20.4  | 1.63                  |
| 2       | Control district | 1.6                     | 3.4     | 5.5     | 5.2     | 15.7  | 1.60                  |
|         | Test district    | 1.6                     | 3.3     | 4.7     | 6.3     | 15.9  | 1.54                  |
| 3       | Control district | 1.0                     | 3.4     | 5.0     | 6.8     | 16.2  | 1.50                  |
|         | Test district    | 2.8                     | 4.3     | 6.5     | 7.8     | 21.4  | 1.55                  |
| Average | Control district | 1.3                     | 3.4     | 5.3     | 6.4     | 16.5  | 1.59                  |
|         | Test district    | 2.4                     | 3.9     | 5.5     | 7.5     | 19.2  | 1.57                  |

[0098]

Table 7

Generated state of diarrhea (Block 1)

| Dis-<br>trict           | Indi-<br>vidu-<br>al<br>num-<br>ber | After starting test (Day(s)) |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-------------------------|-------------------------------------|------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|
|                         |                                     | 1                            | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 |
| Contro<br>dis-<br>trict | 66                                  | 0                            | 0  | 0  | 1  | 0  | 0  | 0  | 1  | 0  | 0  | 2  | 0  | 2  | 2  |
|                         | 68                                  | 2                            | 2  | 0  | 0  | 2  | 2  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  |
|                         | 69                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                         | 71                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Test<br>dis-<br>trict   | 64                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  |
|                         | 65                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 2  | 1  | 1  | 0  |
|                         | 70                                  | 0                            | 0  | 0  | 0  | 0  | 2  | 2  | 1  | 2  | 2  | 2  | 1  | 1  | 0  |
|                         | 72                                  | 0                            | 0  | 0  | 0  | 0  | 2  | 2  | 1  | 0  | 0  | 0  | 0  | 0  | 0  |
| Dis-<br>trict           | Indi-<br>vidu-<br>al<br>num-<br>ber | After starting test (Days)   |    |    |    |    |    |    |    |    |    |    |    |    |    |
|                         |                                     | 15                           | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Contro<br>dis-<br>trict | 66                                  | 2                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                         | 68                                  | 0                            | 0  | 0  | 0  | 2  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                         | 69                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                         | 71                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 2  | 1  | 1  | 0  | 0  | 0  |
| Test<br>dis-<br>trict   | 64                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                         | 65                                  | 0                            | 0  | 0  | 2  | 2  | 2  | 2  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                         | 70                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                         | 72                                  | 1                            | 2  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

[0099]

Table 8  
Generated state of diarrhea (Block 2)

| Dis-<br>trict            | Indi-<br>vidu-<br>al<br>num-<br>ber | After starting test (Day(s)) |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--------------------------|-------------------------------------|------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|
|                          |                                     | 1                            | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 |
| Control<br>dis-<br>trict | 74                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 82                                  | 0                            | 0  | 2  | 2  | 2  | 2  | 2  | 2  | 0  | 0  | 0  | 0  | 0  | 2  |
|                          | 83                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 86                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 2  | 2  | 2  | 0  | 0  | 0  | 0  |
| Test<br>dis-<br>trict    | 80                                  | 1                            | 1  | 1  | 0  | 0  | 2  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 84                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 2  | 1  | 1  | 2  | 0  | 1  | 2  |
|                          | 87                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 88                                  | 0                            | 0  | 0  | 2  | 2  | 2  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Dis-<br>trict            | Indi-<br>vidu-<br>al<br>num-<br>ber | After starting test (Days)   |    |    |    |    |    |    |    |    |    |    |    |    |    |
|                          |                                     | 15                           | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Control<br>dis-<br>trict | 74                                  | 0                            | 2  | 2  | 2  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 2  | 2  | 2  |
|                          | 82                                  | 1                            | 2  | 2  | 2  | 1  | 0  | 0  | 2  | 2  | 1  | 2  | 2  | 2  | 2  |
|                          | 83                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 86                                  | 0                            | 0  | 0  | 0  | 0  | 2  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Test<br>dis-<br>trict    | 80                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 84                                  | 2                            | 1  | 1  | 1  | 2  | 2  | 2  | 2  | 2  | 0  | 0  | 0  | 0  | 0  |
|                          | 87                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 88                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 2  | 2  | 1  | 0  | 0  | 0  | 0  | 0  |

[0100]

Table 9

Generated state of diarrhea (Block 3)

| Dis-<br>trict            | Indi-<br>vidu-<br>al<br>num-<br>ber | After starting test (Day(s)) |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--------------------------|-------------------------------------|------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|
|                          |                                     | 1                            | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 |
| Control<br>dis-<br>trict | 75                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 76                                  | 2                            | 1  | 2  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 79                                  | 0                            | 0  | 0  | 0  | 2  | 2  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  |
|                          | 81                                  | 2                            | 2  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Test<br>dis-<br>trict    | 73                                  | 0                            | 0  | 2  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 77                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 2  | 1  | 0  | 0  | 0  |
|                          | 85                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 89                                  | 0                            | 0  | 1  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 0  | 0  | 0  | 0  |
| Dis-<br>trict            | Indi-<br>vidu-<br>al<br>num-<br>ber | After starting test (Days)   |    |    |    |    |    |    |    |    |    |    |    |    |    |
|                          |                                     | 15                           | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Control<br>dis-<br>trict | 75                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 76                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 0  | 0  | 0  | 0  | 0  |
|                          | 79                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 81                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Test<br>dis-<br>trict    | 73                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 77                                  | 0                            | 2  | 2  | 2  | 1  | 1  | 2  | 0  | 1  | 2  | 1  | 0  | 1  | 2  |
|                          | 85                                  | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                          | 89                                  | 0                            | 2  | 2  | 2  | 2  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

### CLAIMS

1. A material for promoting growth in pigs which contains at least one or two or more of polyphenols from EFB,  $\alpha$ -tocopherol from EFB and xyloses from EFB, and growth in pigs being promoted by administering the same to the pigs.

2. A material for improving feed conversion ratio in pigs which contains the material for promoting growth in pigs according to claim 1, and the feed conversion ratio calculated by the following formula (1):

Feed conversion ratio (-)=Feed intake amount (kg)/Body weight gain (kg) ·····(1)

3. A material for relieving stress in pigs which contains the material for promoting growth in pigs according to claim 1, and stress in pigs being relieved.