A GROWTH PIG FUNCTIONAL PREMIX FOR PRODUCING PUFA ORGANIC PORK, ITS PREPARATION METHOD AND APPLICATION

TECHNICAL FIELD

The present invention relates to the technical field of livestock and poultry feed, in particular to a functional premix for growing pigs used for producing organic pork rich in polyunsaturated fatty acids (PUFA). Meanwhile, the present invention also relates to the preparation method of this premix and its applications.

BACKGROUND ART

With the improvement of living standards, consumers' requirements for pork quality are no longer limited to traditional flavor and tenderness, but they pay more attention to its nutritional value and health functions. Polyunsaturated fatty acids (PUFA), especially DHA (Docosahexaenoic Acid), play an important role in human brain development, eyesight protection, and cardiovascular health. Enriching DHA in muscles during the growth stage of pigs through feed nutrition regulation is an effective way to produce high - value functional pork.

At present, there are reports of attempts to add fish oil or algal oil to pig feed to increase the PUFA content in pork. However, these technical solutions have the following obvious defects: (1) The directly added oils are prone to oxidative rancidity, which not only reduces the feeding value but also generates harmful substances. (2) They have a strong fishy smell, seriously affecting the palatability of the feed and leading to a decrease in the feed intake of pigs. (3) There is a lack of targeted synergy of functional components, such as traditional Chinese medicine formulas that can promote digestion and absorption and enhance immunity to ensure the healthy growth of pigs. (4) The physical properties of the premix are unstable, it is easy to absorb moisture and agglomerate, affecting the mixing uniformity and use effect.

Therefore, developing a special premix that can effectively solve the above - mentioned problems and integrates nutrition, functionality, stability, and good palatability is of great significance for promoting the development of the functional pork industry.

CONTENTS OF THE INVENTION

The objective of the present invention is to overcome the deficiencies of the prior art and provide a functional premix for growing pigs that can significantly increase the DHA content in pork, improve the health level of pigs, and has good stability and palatability, as well as its preparation method.

To solve the above - mentioned technical problems, the present invention adopts the following technical solutions:

A functional premix for growing pigs for producing PUFA - rich organic pork is composed of the following components in weight percentage:

10 - 20% of DHA algal oil powder, 15 - 25% of functional compound powder of traditional Chinese medicine, 1 - 3% of compound vitamins, 2 - 4% of compound minerals, 5 - 8% of lysine, 1 - 3% of methionine, 2 - 4% of threonine, 0.5 - 1.5% of flavoring agent, 0.5 - 1.5% of anti - caking agent, 0.1 - 0.5% of antioxidant, 0.1 - 0.5% of mildew - proofing agent, and the balance is carrier.

As an improvement, the DHA algal oil powder is a powder subjected to micro - encapsulation treatment, and the DHA content is not less than 10%.

As an improvement, the functional compound powder of traditional Chinese medicine is prepared by ultra - fine pulverization of the following raw materials in parts by weight: 15 - 25 parts of hawthorn, 15 - 25 parts of astragalus membranaceus, 10 - 20 parts of poria cocos, 10 - 20 parts of malt, 10 - 15 parts of tangerine peel, and 5 - 10 parts of liquorice.

As an improvement, the flavoring agent is a composite of a sweetener and a flavoring essence. The sweetener is sodium saccharin, the flavoring essence is a milk - flavored or fruit - flavored flavoring essence, and the anti - caking agent is silica.

As an improvement, the carrier is one or a combination of two of defatted rice bran and wheat bran.

The present invention also discloses a preparation method of a functional premix for growing pigs for producing PUFA - rich organic pork, which comprises the following steps:

S1. Raw materials and treatment

The raw materials of traditional Chinese medicine are respectively washed, dried, ultra - finely pulverized to pass through an 80 - 100 - mesh sieve, and then mixed evenly according to the proportion to obtain the functional compound powder of traditional Chinese medicine.

S2. Hierarchical premixing

S2 - 1. Mix the flavoring agent, anti - caking agent with part of the carrier to obtain the first premix.

S2 - 2. Mix the DHA algal oil powder, functional compound powder of traditional Chinese medicine with part of the carrier to obtain the second premix.

S3. Main mixing

Put the remaining carrier, the second premix, compound minerals, lysine, methionine, and threonine into a mixer and mix for 4 - 7 minutes, then add compound vitamins and continue to mix for 1 - 3 minutes.

Then add the first premix, antioxidant, and mildew - proofing agent, and continue to mix for 10 - 15 minutes until the coefficient of variation of mixing uniformity CV ≤ 5%.

S4. Packaging

Seal and package the well - mixed product.

As an improvement, in step S2 - 1, the addition ratio of the carrier to the flavoring agent is 1.5 - 3:1; in step S2 - 2, the addition ratio of the carrier to the DHA algal oil powder is 1.5 - 2.5:1.

The premix disclosed in the present invention can be used for preparing feed for growing pigs. Specifically, the premix is added to the complete feed for growing pigs at a ratio of 1 - 2%.

The advantages of the present invention are as follows:

1. The present invention uses micro - encapsulation technology to encapsulate the DHA algal oil powder in micro - capsules. The micro - capsules can effectively protect DHA, preventing it from coming into contact with the outside world and thus avoiding oxidative rancidity. This not only ensures the nutritional value of the feed but also prevents the generation of harmful substances caused by rancidity, guaranteeing the safety and stability of the feed.

2. In the premix, the present invention additionally adds a compound powder of traditional Chinese medicine, compound vitamins, compound minerals, and essential amino acids such as lysine, methionine, and threonine. These components work together to regulate the nutritional balance of growing pigs, enhance the body's immunity, promote muscle development, and improve feed conversion efficiency. The compound of traditional Chinese medicine improves intestinal health, increases the immunity of pigs, and enhances the quality of pork through its mechanism of invigorating the spleen, regulating qi, promoting digestion, and removing food stagnation.

3. The micro - encapsulation method used in the present invention can reduce the fishy smell caused by the addition of DHA and improve the palatability of the feed. At the same time, with the addition of flavoring agents and specific traditional Chinese medicines such as tangerine peel and liquorice, the peculiar smell is further masked, increasing the feed intake of pigs. The anti - caking agent added in the present invention can effectively prevent the premix from caking due to moisture absorption and extrusion during storage and transportation.

4. The present invention adopts a hierarchical premixing process. At the hierarchical premixing stage, raw materials of different properties are uniformly dispersed step by step, avoiding mutual interference between components and ensuring the stable release of active substances. In the main mixing stage, a gradient - adding and stage - by - stage mixing process is used, effectively improving the uniformity of the distribution of each component. In addition, the compound vitamins are added in the later stage of mixing to avoid their reaction with minerals and inactivation, ensuring the stability and bioavailability of nutrients.

5. The present invention can significantly increase the daily weight gain and feed conversion rate of growing pigs, improve intestinal health, enhance immunity, successfully enrich DHA in muscles, and produce PUFA - rich organic pork with high nutritional value, bringing remarkable economic and social benefits.

DETAILED IMPLEMENTATION METHODS

To make the objectives, technical solutions, and advantages of the embodiments of the present invention clearer, the technical solutions of the present invention will be clearly and completely described in combination with the embodiments of the present invention. Apparently, the described embodiments are part of the embodiments of the present invention, not all of them. Usually, the components of the embodiments of the present invention described and shown in the drawings herein can be arranged and designed in various different configurations.

Example 1

This example discloses a functional premix for growing pigs for producing PUFA - rich organic pork. The raw materials include:

15 kg of DHA algal oil powder, 20 kg of functional compound powder of traditional Chinese medicine, 2 kg of compound vitamins, 3 kg of compound minerals, 7 kg of L - lysine, 2 kg of DL - methionine, 3 kg of L - threonine, 1 kg of flavoring agent, 1 kg of anti - caking agent, 0.3 kg of antioxidant, 0.3 kg of mildew - proofing agent, and the carrier is added to make up to 100 kg.

Among them, the functional compound powder of traditional Chinese medicine is prepared by proportioning hawthorn, astragalus membranaceus, poria cocos, malt, tangerine peel, and liquorice at a ratio of 20:20:15:15:15:10.

The flavoring agent is a composite of a sweetener and a flavoring essence. The sweetener is sodium saccharin, the flavoring essence is a milk - flavored or fruit - flavored flavoring essence, and the anti - caking agent is silica. The carrier is defatted rice bran.

The preparation method of this example includes the following steps:

S1. Raw materials and treatment

The raw materials of traditional Chinese medicine are respectively washed, dried, ultra - finely pulverized to pass through an 80 - 100 - mesh sieve, and then mixed evenly according to the proportion to obtain the functional compound powder of traditional Chinese medicine.

S2. Hierarchical premixing

S2 - 1. Mix 1 kg of flavoring agent, 1 kg of anti - caking agent with 2 kg of defatted rice bran for 5 min to obtain the first premix.

S2 - 2. Mix 15 kg of DHA algal oil powder, 20 kg of functional compound powder of traditional Chinese medicine with 30 kg of defatted rice bran for 10 min to obtain the second premix.

S3. Main mixing

Put the remaining defatted rice bran, the second premix, 3 kg of compound minerals, 7 kg of L - lysine, 2 kg of DL - methionine, and 3 kg of threonine into a mixer and mix for 4 - 7 min, then add 2 kg of compound vitamins and continue to mix for 1 - 3 minutes.

Then add the first premix, 0.3 kg of antioxidant, and 0.3 kg of mildew - proofing agent, and continue to mix for 12 minutes until the coefficient of variation of mixing uniformity CV ≤ 5%.

S4. Packaging

Seal and package the well - mixed product.

The premix disclosed in the present invention can be used for preparing feed for growing pigs. Specifically, the premix is added to the complete feed for growing pigs at a ratio of 1 - 2%.

Example 2

This example discloses a functional premix for growing pigs for producing PUFA - rich organic pork. The raw materials include:

20 kg of DHA algal oil powder, 15 kg of functional compound powder of traditional Chinese medicine, 1 kg of compound vitamins, 2 kg of compound minerals, 5 kg of L - lysine, 1 kg of DL - methionine, 4 kg of L - threonine, 0.5 kg of flavoring agent, 0.5 kg of anti - caking agent, 0.1 kg of antioxidant, 0.5 kg of mildew - proofing agent, and the carrier is added to make up to 100 kg.

Among them, the functional compound powder of traditional Chinese medicine is prepared by proportioning hawthorn, astragalus membranaceus, poria cocos, malt, tangerine peel, and liquorice at a ratio of 15:15:10:10:10:5.

The preparation method of this example is the same as that of Example 1.

Example 3

This example discloses a functional premix for growing pigs for producing PUFA - rich organic pork. The raw materials include:

10 kg of DHA algal oil powder, 25 kg of functional compound powder of traditional Chinese medicine, 3 kg of compound vitamins, 4 kg of compound minerals, 8 kg of L - lysine, 3 kg of DL - methionine, 2 kg of L - threonine, 1.5 kg of flavoring agent, 1.5 kg of anti - caking agent, 0.5 kg of antioxidant, 0.1 kg of mildew - proofing agent, and the carrier is added to make up to 100 kg.

Among them, the functional compound powder of traditional Chinese medicine is prepared by proportioning hawthorn, astragalus membranaceus, poria cocos, malt, tangerine peel, and liquorice at a ratio of 25:25:20:20:15:10.

The preparation method of this example is the same as that of Example 1.

120 healthy growing pigs with a body weight of approximately 25 kg were selected for a randomized controlled trial. The pigs were randomly divided into an experimental group and a control group, with 6 pigs in each group, and the controlled trial was repeated 10 times.

Control group: Fed a basal diet + 1% of common premix (commercially available compound premixed feed 551CF).

Experimental group: Fed a basal diet + 1% of the premix prepared by the present invention.

After 30 days of feeding, a comparative test was carried out. The results showed that after 30 days of feeding, compared with the control group, the average daily feed intake (ADFI) of the experimental group increased by 5.8%, the average daily gain (ADG) increased by 9.5%, the feed - to - gain ratio (F/G) decreased by 3.4%, the serum IgG level increased by 15.2%, and the SOD activity increased by 12.7%.

The DHA content in the longissimus muscle reached 85 mg/100g of muscle, which was more than 7 times that of the control group (12 mg/100g).

This indicates that the premix prepared by the present invention can significantly improve the production performance of growing pigs, promote the health of pigs, enhance the ability of pigs to enrich DHA, significantly increase the PUFA content in pork, and improve the quality of pork.

In conclusion, the above - mentioned content is only a preferred specific implementation mode of the present invention. However, the protection scope of the present invention is not limited thereto. Any technician familiar with the technical field, within the technical scope disclosed by the present invention, who makes equivalent substitutions or modifications according to the technical solution and inventive concept of the present invention, shall be covered within the protection scope of the present invention.