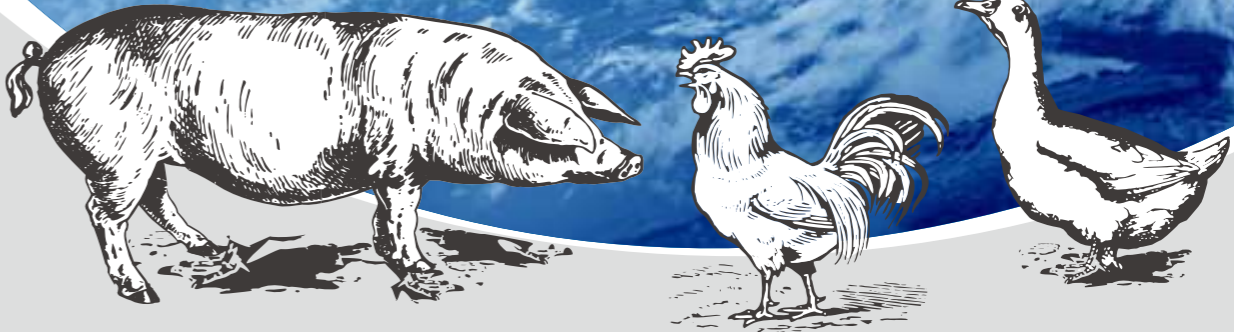




# PerPremix SNR

—Expert in Fatty Acid Nutrition



## HUNAN PERFLY BIOTECH CO., LTD.

Address: No.1038 Zhongqing Road, Jinxia Economic Development Zone, Kaifu District, Changsha, Hunan, P. R. China

Tel: +86-731-84699028/84699058/84699158

Fax: +86-731-84699030

Web: <http://www.perfly-bio.com>



PerPremix SNR is a technological achievement of Hunan Perfly Biotech Co., Ltd., produced by international leading technology of emulsification shear and enzymolysis with selected food grade coconut oil, linseed oil, rice oil and dairy products as basic raw materials. Perfly focus on fatty acids nutrition for development of the new energy source with unique effects. This product is rich in  $\omega$ -3 fatty acid, medium chain fatty acid, unsaturated fatty acid and other special nutrient, which has the important roles of animal health, development, growth, reproduction and metabolic pathway and process.

## Composition

Emulsified fat of coconut oil or linseed oil or rice oil, maltooligosaccharide, dairy products, and etc.

Table 1. The Guaranteed Analysis of Products (PerPremix SNR)

Item	Guaranteed Analysis				Dosage	Digestible Energy (Kcal/kg)
	Emulsified Fat(%)	Maltooligosaccharide (%)	Casein (%)	Moisture (%)		
PerPremix SNR (Coconut Oil)	≥50	≥42	≥1	≤3.5	1%	6600
PerPremix SNR (Linseed Oil)	≥50	≥42	≥1	≤3.5	0.5%	
PerPremix SNR (Rice Oil)	≥50	≥42	≥1	≤3.5	2-4%	
PerPremix SNR (For Piglets)	≥50	≥42	≥1	≤3.5	2-4%	
PerPremix SNR (For Sows)	≥50	≥42	≥1	≤3.5	2-4%	
PerPremix SNR (Universal II Type)	≥50	≥42	≥1	≤3.5	2-4%	

Note: Please increase or decrease the quantity of feed according to the feed ingredients, seasons, animal nutritional requirement and regional factors.

## Characteristics of Fatty Acids

### ● Linseed Oil- $\omega$ -3 Fatty Acids

PerPremix SNR (Linseed Oil)- $\omega$ -3 fatty acids has unique function:

1.  $\omega$ -3 fatty acids play unique biological roles in the body immunity, lipid metabolism, gene expression, cell membrane function and other aspects. It has a particularly important impact on the human and animal health.

2.  $\omega$ -3 fatty acids in the animal body can be converted to EPA and DHA.

2.1 EPA is the precursor of leukotriene, thromboxane and prostaglandin. With the functions of anti-inflammatory response and immune response, EPA has very good effect on animal immunity in the inflammatory status.

2.2 DHA is one of the essential components that form the brain plasmalemma, central nervous system and vascular system. Therefore, during the rapid formation of tissues (such as pregnancy, fetal growth and development), DHA is very important.

2.3 EPA and DHA can regulate the expression of a large number of genes that are involved in energy metabolism, nerve transmission and signal transduction in the brain.

A large number of studies have showed that:  $\omega$ -3 fatty acids have the following significant effects:

1. Supplement of  $\omega$ -3 fatty acids can eliminate the limiting factors to improve the milk yield and milk quality of sows. DHA is capable of promoting fetal development. DHA can cause alive litter size to increase by more than 0.5 by reducing stillbirth and mummy fetus. During the period of hybridization, supplement of  $\omega$ -3 fatty acids can cause pregnancy rate to increase by 3-4%.

2. Supplement of  $\omega$ -3 fatty acids can improve boars' libido, semen volume, sperm motility and sperm density.

3. Supplement of  $\omega$ -3 fatty acids can enhance the vitality of newborn piglets and improve the survival rate of piglets, birth weight, daily gain and weaning weight.

4. Supplement of  $\omega$ -3 fatty acids enhances immunity, anti-allergic ability and anti-stress ability of piglets, lactating sows and boars.

5. Supplement of  $\omega$ -3 fatty acids can prevent animal hoof diseases happened.

6.  $\omega$ -3 fatty acids has a strong inhibitory effect on bacillus cereus and staphylococcus aureus.  $\omega$ -3 fatty acids contain plant estrogens-phenolic compounds which have a significant role of preventing liver and kidney disease.

7.  $\omega$ -3 fatty acids have a significant effect on improving the skin color.

8.  $\omega$ -3 fatty acids improve fertilization rate and hatching rate of poultry.

9.  $\omega$ -3 fatty acids make final products (meat, eggs, milk and functional foods) rich in  $\omega$ -3 fatty acids.

## ● Coconut Oil - Medium Chain Fatty Acids (MCFA)

PerPremix SNR (Coconut Oil) has the unique functions:

1. With no need for lipase to hydrolyze, MCFA absorbed directly in the small intestine can be transported to the liver for energy supply. Absorption rate of MCFA is four times faster than long chain fatty acid (LCFA).
2. MCFA promotes the development and repair of intestinal chorion in suckling piglets by reducing the consumption of glucose in the liver and increasing the supply of glucose in epithelial cells of small intestine.
3. Through penetrating into the ring virus and the rotavirus coated with fat, MCFA blocks the virus replication.
4. MCFA enters into bacteria by penetrating the outer membrane of bacteria (lipopolysaccharide membrane) and then releases hydrogen ions in the neutral environment of the cytoplasm. The bacteria have to maintain a neutral pH in the cytoplasm, leading to the exhaustion of energy within the cell and the death of bacteria.
5. With natural coconut flavor, coconut oil is a good phagostimulant.

## ● Rice Oil - Unsaturated Fatty Acids

PerPremix SNR (Rice Oil) is rich in unsaturated fatty acids.

1. Rice oil is also called as rice bran oil. With the reputation of “golden rice”, Rice oil is the nutritive and healthy oil that is equal famous with olive oil in the developed countries, such as Europe, USA, South Korea, and Japan.
2. Rice oil contains unsaturated fatty acid as high as 80% (polyunsaturated fatty acid (PUFA) has important influence on immunity of animals’ organism). The rate of saturated fatty acid, monounsaturated fatty acid and polyunsaturated fatty acid is 1 : 2.1 : 1.8, and it is close to the optimum intake rate (1 : 2 : 1.1) recommended by the World Health Organization and the American Heart Association.
3. Natural vitamin E (tocotrienol) and oryzanol are abundant in rice oil. Natural vitamin E and oryzanol have strong antioxidant activity. Data showed that antioxidant activity of  $\alpha$ -tocotrienol is 40-60 times higher than  $\alpha$ -tocopherol.
4. Rice oil contains abundant squalene which can play the roles of reducing the blood fat and cholesterol, promoting the secretion of bile, strengthening liver function and increasing appetite.
5. Rice oil contains phytosterol which has the characteristics of anti-inflammatory to prevent ulcers.

## Characteristics of Perpremix SNR

Milky white or light yellow microencapsulated particle with comfortable milky flavor and moderate sweetness, is instant soluble in cold water, has good liquidity.

### 1. “Ideal Fatty Acid” Pattern

“Ideal fatty acids” pattern is the goal that animal nutritionists have advocated and pursued. PerPremix SNR achieves the goal of enhancing the overall level of nutrition by supplementation of scarce functional fatty acid in feed.

### 2. Instant Soluble in Cold Water

Through the most advanced international food grade emulsification technology, fat is emulsified and high-speed sheared to become fatty balls with micron size. Fatty balls are coated with maltooligosaccharide and water-soluble casein and go through spray drying and other special technology and advanced technique. PerPremix SNR are excellent water-soluble and easier to be absorbed and utilized in the gastrointestinal tract of animals.

### 3. Microcapsule Coated Technology

Emulsified fat is coated with maltooligosaccharide and casein to separate fat from the air and to prevent lipid oxidation and deterioration, which greatly extends the shelf life of fat. At the same time, coated materials such as maltooligosaccharide and casein are nutritive and instant soluble in water, which leads to high digestibility, as a result, they provide sufficient energy for beneficial bacteria.

### 4. Small Fat Particle, More Easily to be Absorbed

After high-speed shear, high-pressure homogenization and emulsification treatment, Emulsified fat has a diameter of 2 microns, it is similar to natural sows’ milk, which improves fat digestion, absorption and utilization of piglets and sows.

### 5. Multiple Effects of Maltooligosaccharide

The main coated material is maltooligosaccharide that has the special function. Mainly there are two categories: one is maltooligosaccharide with the characteristics of easy digestion, low sweetness and low permeability. It can prolong energy supply time and enhance body endurance. The other is hetero maltooligosaccharide called as “bifidus factor”. This kind of oligosaccharide entering into the large intestine as the multiplication factor of bifidus factor can effectively promote the growth and propagation of bifidobacteria. The normal multiplication of bifidobacteria in the intestinal tract can produce a large number of lactic acids to reduce pH value and to inhibit the growth of putrefactive bacteria and pathogenic bacteria, which has the effects on enhancing the intestinal tract function, promoting protein digestion and absorption, reducing harmful substances such as ammonia gas, and improving the immunity. At the same time, hetero maltooligosaccharide effectively increases the absorption of calcium, iron, zinc ions and improves lipid metabolism.



## 6. The Special Functions of Intensified Synergist

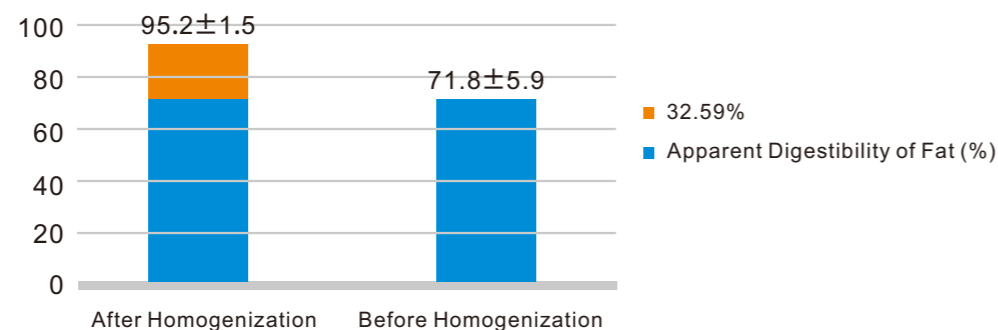
In order to pursue the best performance of PerPremix SNR, screening tests were repeated and the intensified synergist is added. Repeated tests proved that the intensified synergist in any case could participate in some very important metabolic processes as well as was involved in the detoxification and immune processes. Application of intensified synergist at young stage of livestock (especial for stress or disease) has the effects on effective relieving stress, improving immunity, accelerating intestinal tissue repair, promoting the development of intestinal villi, reducing diarrhea and promoting growth.

PerPremix SNR whose active ingredients such as oligosaccharide, VE play the roles of multiple health care and promoting growth are high-quality energy source with multiple functions. Add PerPremix SNR can lead to the less use or no use of fat, sweetener, acidifier, flavor, enzyme and antibiotics.

## Effects of High Pressure Homogenization and Microencapsulation on the Digestion Rate and Storage of Fat

### ● The Effect of Homogenization on the Digestibility of Fat (Raven and Robinson, 1980)

Figure 1. Apparent Digestibility of Fat



### ● The Oxidative Stability of Microencapsulated Linseed Oil

Figure 2. Oxidative Stability of Linseed Oil at Room Temperature

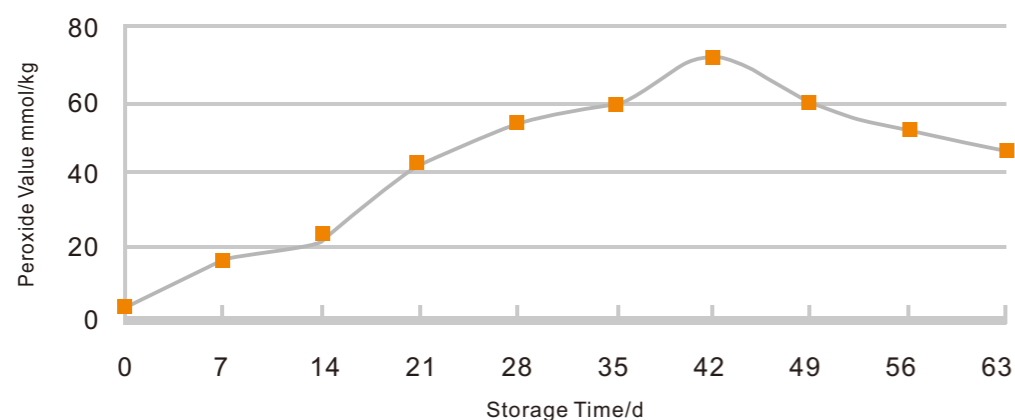
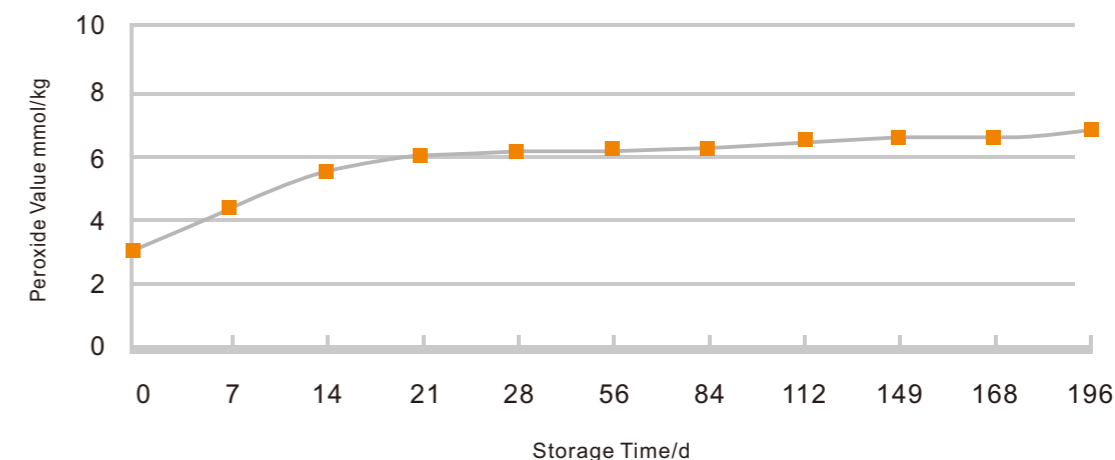
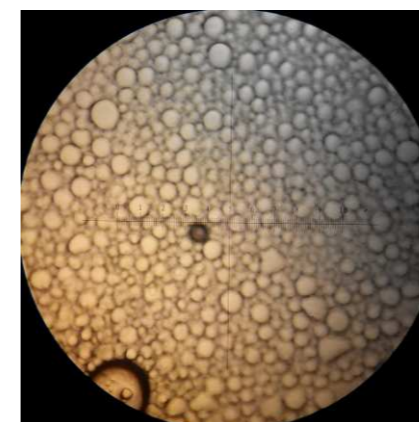


Figure 3. The Effect of Microencapsulation on Oxidative Stability at Room Temperature



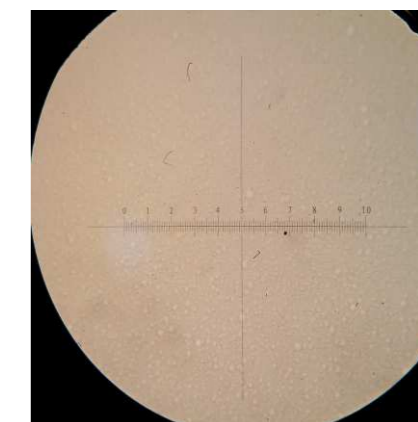
## Laboratory Microscope Observation

Particle Size: 40-80 Microns



Before Homogenization

Particle Size: Around 2 Microns



After Homogenization

## Efficacy

1. Supply energy fast: PerPremix SNR provide high-quality energy source for suckling piglets to improve the fat absorption and utilization of suckling piglets and FCR and to promote growth.
2. PerPremix SNR enhances piglets' immunity and anti-stress ability to prevent and reduce diarrhea and to improve the production performance.



3. For lactating sows, PerPremix SNR increases the lactating volume and the quality of milk products to improve the survival rate of piglets, birth weight and daily gain and weaning litter weight.

4. PerPremix SNR improves the skin color significantly and leads to ruddy skin and bright hair.

PerPremix SNR not only is high-quality energy source, but also contains the functional fatty acids, oligosaccharide, lactoprotein and active ingredients.

### Notes

1. PerPremix SNR is microencapsulated fat. The determination of fat content is according to the determination of fat in food from GB5009.6-2003 (acid hydrolysis method).

2. Mix well directly with other raw ingredients.

3. Keep away from heat, moisture and direct sunlight, not with toxic and harmful substances mixed.

### Trial Effect

1. The Determination of Apparent Digestible Energy for Growing Pigs Fed with Different Sources of Grease. (Yin Fugui, Yin Yulong, the Institute of Subtropical Agriculture, the Chinese Academy of Sciences, 2007)

#### ◆ Test animals, feed management and treatment

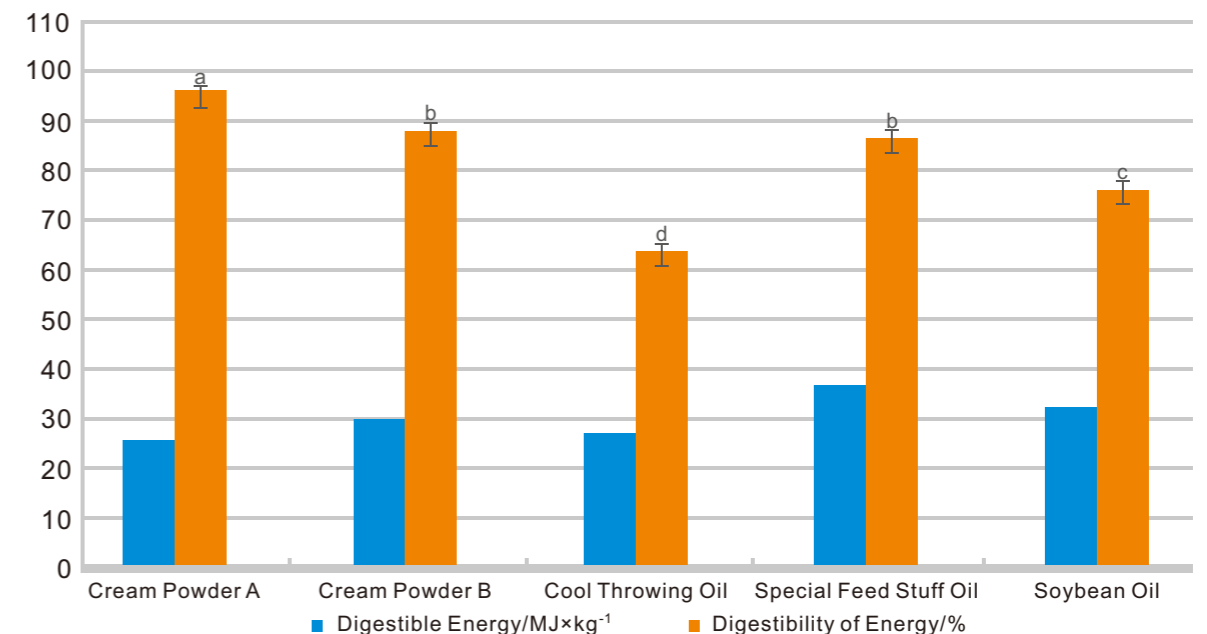
24 of Ternary crossbred boars (Duroc×Landrace×Yorkshire) were selected for test, weight was 20 kg/each. They were ad libitum divided into 6 treatments according to the weight. All treatments respectively were fed with basic feed group, cream powder A group, cream powder B group, cool throwing oil group, special feed stuff oil group and soybean oil group. Each treatment had four replicates. Each replicate had one pig according to the single factor design. They were placed in the metabolic cages (one pig was in one cage). Basic diet was formulated according to the NRC nutrition standards, 0.1% of titanium dioxide (TiO<sub>2</sub>) was evenly added in diets, 3 meals in one day. Pigs were ad libitum allowed to access to feed and water. Pre-starter period was 5 days. All fecal samples were collected in experiment. Feces were collected on the sixth day and have been collected to for 3 days continuously. All fecal samples were mixed evenly to become air dry matter in 65°C oven. After 40 meshes smashing, dry samples were placed in the sample bag and were preserved in -20°C refrigerator, waiting to be tested.

Table 2. The Effect of Different Grease on Apparent Digestible Energy

Greases	Cream Powder A	Cream Powder B	Cool Throwing Oil	Special Feed Stuff Oil	Soybean Oil
Digestible Energy (MJ×kg <sup>-1</sup> )	26.34	29.86	27.49	37.37	32.02
Digestibility of Energy (%)	96.14±1.83 <sup>a</sup>	87.92±2.70 <sup>b</sup>	64.52±2.86 <sup>d</sup>	86.61±3.14 <sup>b</sup>	76.09±3.20 <sup>c</sup>

Note: Values with different small letter superscripts mean significant difference (P < 0.05), different capital letter superscripts mean significant difference (P < 0.01), and with the same or no letter superscripts mean no significant difference (P > 0.05).

Figure 4. The Effect of Different Grease on Apparent Digestible Energy



2. Effect of Microcapsule Emulsified Fat on Growth Performance of Piglets.

2.1 The effect of PerPremix SNR (Coconut Oil) and liquid pure coconut oil on growth performance of piglets.

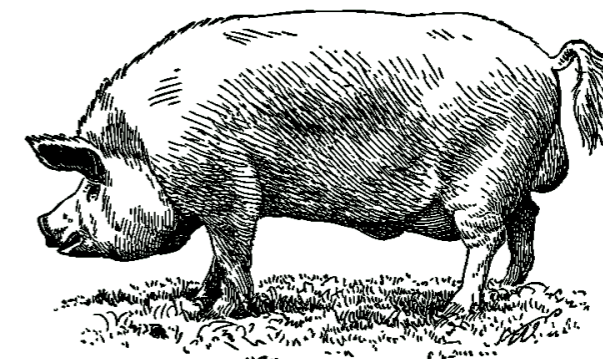




Figure 5. The Effect of PerPremix SNR (Coconut Oil) and Liquid Pure Coconut Oil on Growth Performance of Piglets

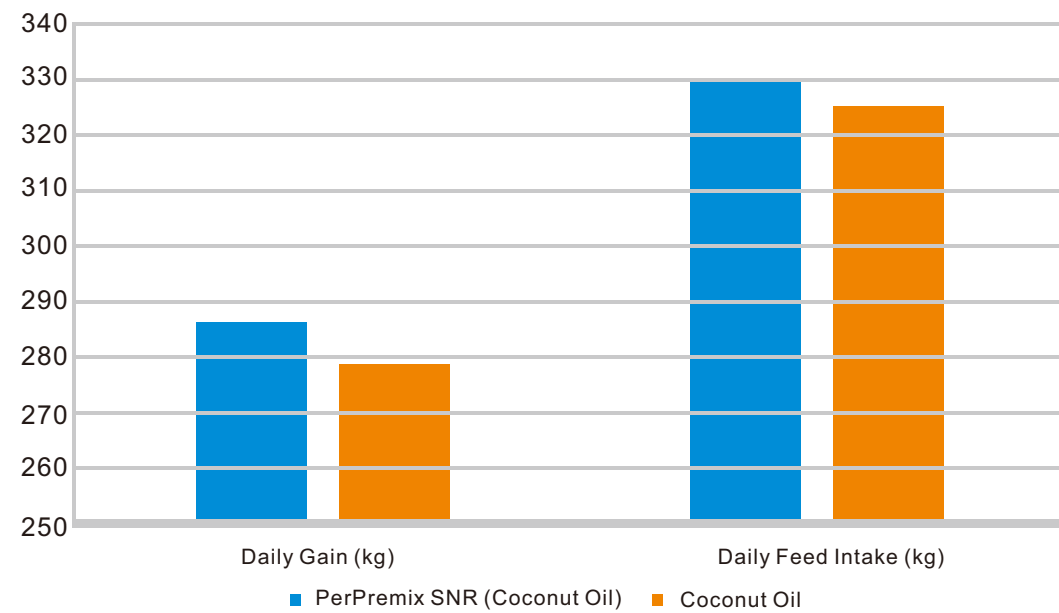
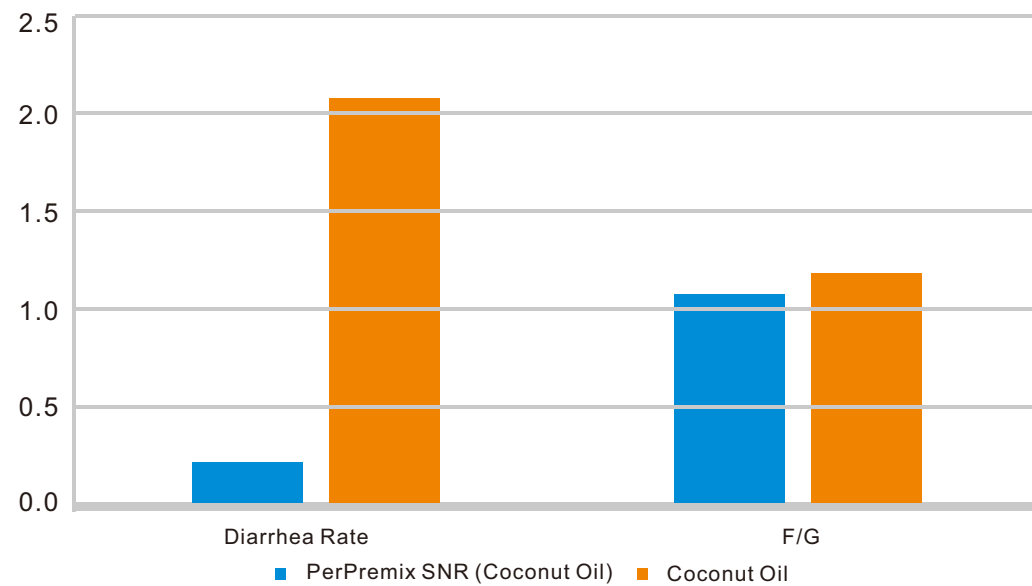


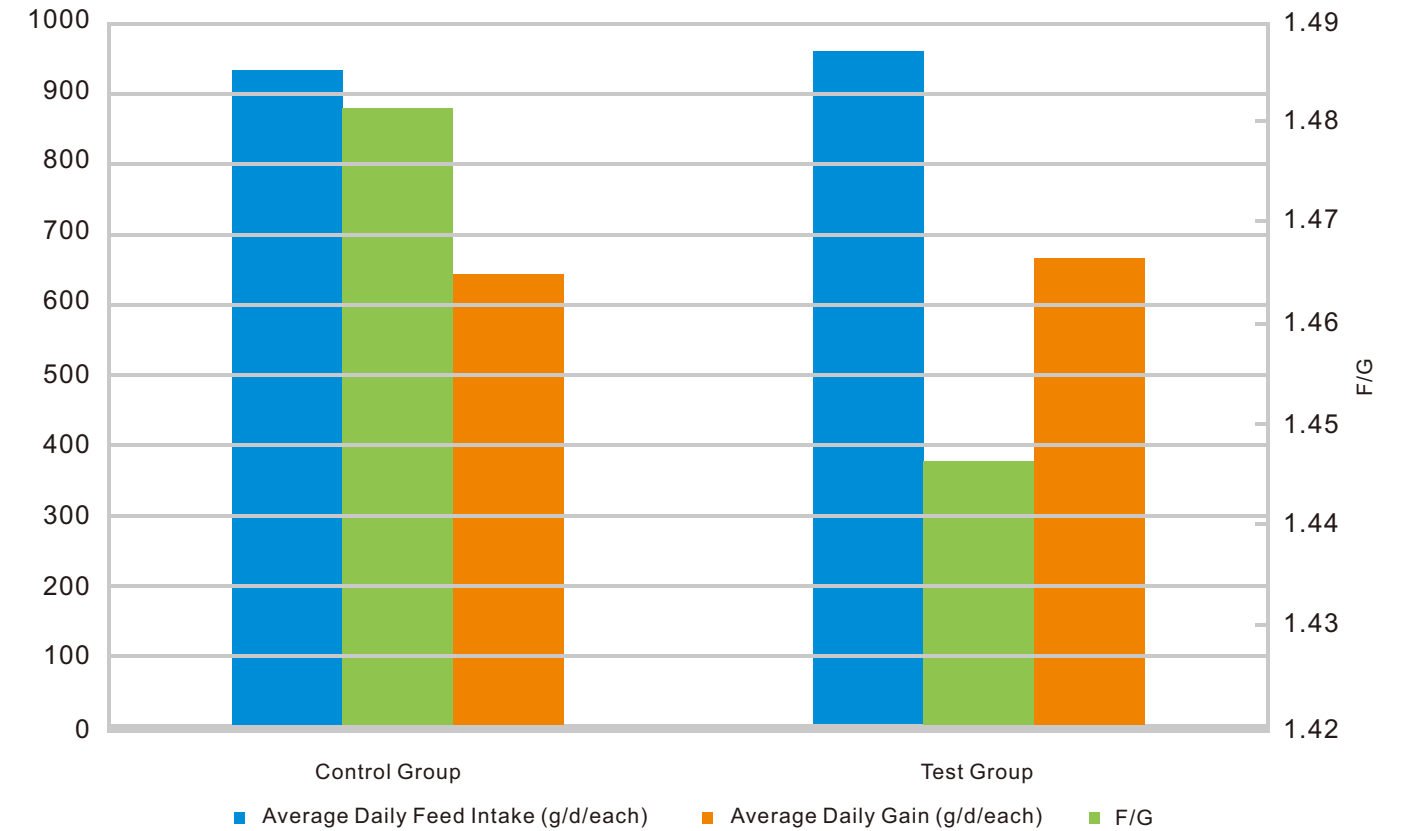
Figure 6. The Effect of PerPremix SNR (Coconut Oil) and Liquid Pure Coconut Oil on Growth and Diarrhea of Piglets



The use of 1% PerPremix SNR (Coconut Oil) (50% fat content) to replace 1% imported pure coconut oil (99.5% fat content) in piglets' diets can significantly reduce the diarrhea rate of piglets and improve the growth rate, the rate of feed to meat, feed intake and other indicators. (Test results from 160 weaning piglets in experimental pig farm of a large enterprise group in 2014)

2.2 Compared with the foreign brand of fat powder, the effects of PerPremix SNR (Rice Oil) are as follows:

Figure 7. The Effect of PerPremix SNR (Rice Oil) on the Production Performance of Piglets



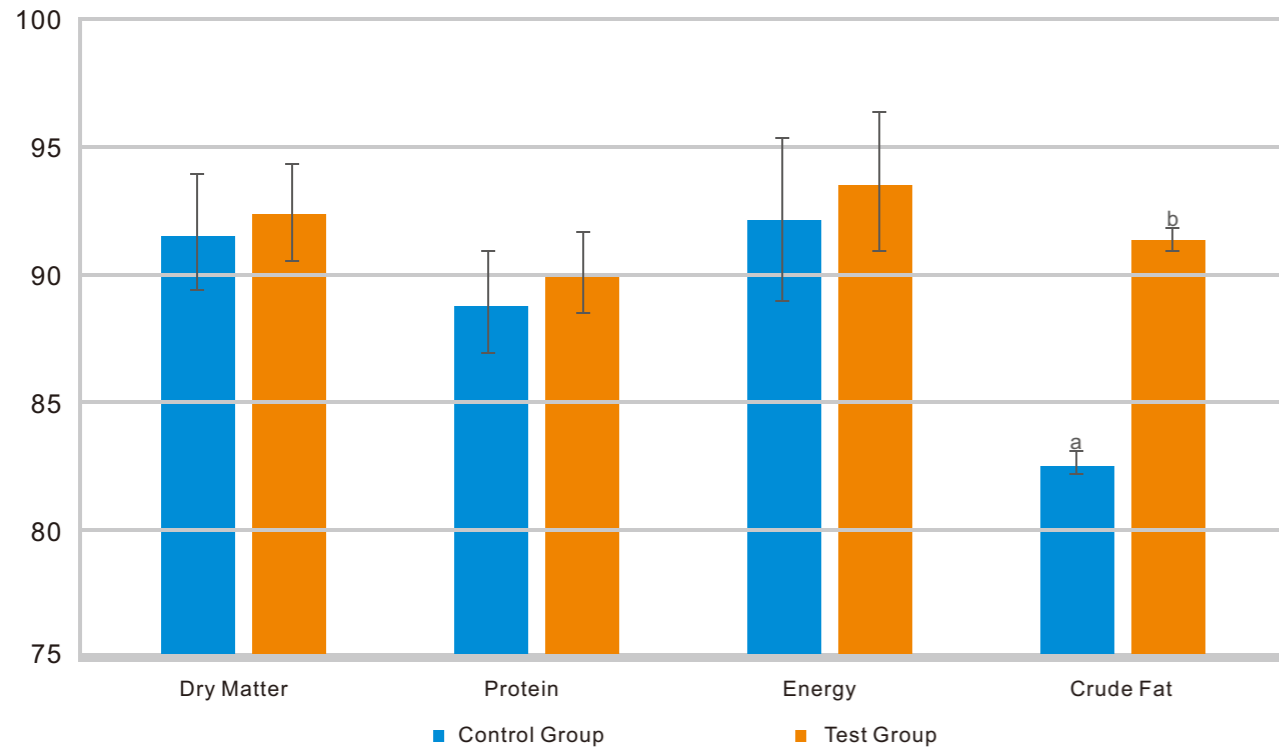
PerPremix SNR (Rice Oil) was added in control group, foreign brand fat powder was added in test group. The use of 2% PerPremix SNR (Rice Oil) to replace 2% the foreign brand fat powder (99.5% fat content) can significantly reduce piglets' F/G. (Test results from 60 weaning piglets in experimental pig farm of listed company in 2010)

2.3 The effect of PerPremix SNR (Rice Oil) on growth performance and feed nutrient digestibility of weaning piglets.

Table 3. The Effect of PerPremix SNR (Rice Oil) on Growth Performance (Dai Qiuzhong et al. Journal of livestock ecology, 2010)

Item	Control Group	Test Group
Initial Weight (kg)	8.24±0.10	8.14±0.17
Final Weight (kg)	18.75 <sup>b</sup> ±0.35	19.32 <sup>a</sup> ±0.54
Average Daily Gain (g)	350.33 <sup>b</sup> ±9.49	372.65 <sup>a</sup> ±12.87
Average Daily Feed Intake (g)	610.67±7.95	612.06±5.55
F/G	1.72 <sup>a</sup> ±0.02	1.64 <sup>b</sup> ±0.05
Diarrhea Rate (%)	13.24 <sup>a</sup> ±3.63	6.11 <sup>b</sup> ±4.11

Figure 8. The Effect of PerPremix SNR (Rice Oil) on Feed Nutrient Digestibility of Weaning Piglets



100 weaning piglets (Duroc×Landrace×Yorkshire) were selected for test, weight was 8 kg/each. They were randomly divided into two treatments, each treatment had five replicates, each replicate had 10 pigs. 1.5% soybean oil was added in control group; 3.0% PerPremix SNR (Rice Oil) (50% fat content) was added in test group; the total fat content of two groups were the same. Results showed that the addition of PerPremix SNR (Rice Oil) improved ADG ( $P \geq 0.05$ ) and significantly decreased F/G and the diarrhea rate ( $P \leq 0.05$ ). (Information quoted from Dai Qiuzhong et al. Journal of livestock ecology, 2010)

### 3. The effect of PerPremix SNR (Linseed Oil) on the reproduction performance of boars.

#### 3.1 The effect of PerPremix SNR (Linseed Oil) on the semen quality and libido of boars.

##### ◆Test Design

Pigs: (Pietrain and Duroc) Hybrid Adult Boars

Program: Feeding trial lasted for 16 weeks, semen was collected twice a week for each pig

Table 4. The Compositions of Fatty Acids in Dietary

Composition	Control Group	Test Group
n-3 PUFAs	0.40	0.81
n-6 PUFAs	2.13	1.92
n-3 : n-6	1 : 5.26	1 : 2.38

Table 5. The Effect of Linseed Oil on Libido of Boars

Item	Control Group	Test Group
No. of Boars (each)	10	10
Reaction Time (s)	154.26±8.53	118.55±8.33
Duration of Ejaculation (s)	291.41±13.86	354.38±24.44

Table 6. The Effect of Linseed Oil on Semen Parameters of Boars

Item	Control Group	Test Group
No. of Boars (each)	10	10
Semen Volume (mL)	235.42±13.89	288.69±27.35
Sperm Motility (%)	74.06±3.91	74.94±1.24
Percentage of Abnormal Sperm (%)	4.94±1.23	4.38±0.62

1.2% linseed oil added in boars' diets significantly improves the boars' libido, semen volume and sperm motility. (Datum quoted from Bai Xiaolong, Wu De et al. Journal of animal nutrition, 2011)

#### 3.2 The effect of linseed oil on reproductive performance of sows.

Table 7. The Effect of Linseed Oil on Reproductive Performance of Sows (Pettigrew, 1991)

Item	Control Group	Test Group
No. of Litters	10	10
Total Number Born (each)	12.5±1.8	12.8±2.2
Alive Number Born (each)	11.2±1.6	12.0±1.8
Adjusted for Litter Size (each)	10	10
No. of Maturity	8.8±1.2	9.6±1.3
Survival Rate (%)	89.6	93.88
Rearing Rate of Weaning (%)	87.76	96.12

Test period was divided into the late (the 103rd day to delivery) of gestation and lactation (from delivery to piglets the 21st day weaning) period. According to the needs for sows' nutrition in NRC (1998), the use of corn-soybean meal is to formulate basic diets. 1.0% linseed oil was added in test group; 1.0% soybean oil was added in control group. (Datum were cited from Pettigrew 1991)

#### 3.3 The effect of PerPremix SNR (Linseed Oil) on reproductive performance of sows.





Table 8. The Effect of PerPremix SNR (Linseed Oil) on Reproductive Performance of Sows

Item	Control Group I	Test Group	Control Group II
Pen	5-1	4-1	2-1
Average Age of Weaning (d)	20.81	20.53	24.06
No. of Sows (n)	25	25	23
Number Born Alive (each)	280	297	244
Number Born Healthy (each)	265	282	226
Number Born Weak (each)	12	11	16
Deformity (each)	3	3	2
Stillbirth (each)	37	11	24
Mummies (each)	5	3	5
Initial Weight (kg)	1.50	1.50	1.24
Average Live Pigs Per Litter (each)	11.2	11.88	10.61
Average Healthy Pigs Per Litter (n)	10.6	11.28	9.83
Weaning Weight at d 21 (kg)	5.65	5.49	6.22
Survival Rate of Weaning (%)	90.57	96.45	94.69
Daily Gain of Weaning (g)	199.53	195.06	206.96
No. of Changing Pool (n)	240	272	214

During the late period of heavy fetus and the total lactation period, adding 0.3% PerPremix SNR (Linseed Oil) (50% fat content) based on complete feed significantly improves number born alive, survival rate of weaning piglets and weaning weight of piglets. (Data from 8000 fertile sows trial in 2012)

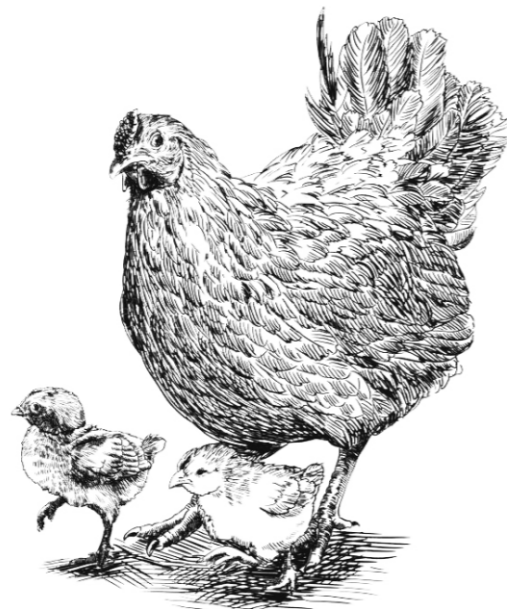


Table 9. Fatty Acid Compositions of All Kinds of Fats and Oils

Item	Soybean Oil	Corn Oil	Coconut Oil	Rice Bran Oil	LSO	Palm Oil	Stearin	Anchovy Fish	Silver Carp	Tilapia	Grass Carp	
DE	Kcal (kg)	8750	8750	8400	8720	8760	8010	8440				
Parameters	Iodine Value (g/100g)	120-143	109-133	7.5-10.5	92-115	165-204	50-55	≤48				
	Saponification Value (KOH mg/g)	188-195	187-195	248-265	179-195	189-195	190-209	193-205				
	Melting Point (°C)	-23 -- -20	-12 -- -10	24-27	0-8	-20	33-39	≥44				
Fatty Acid Composition	C6:0 Caproic Acid			0-0.8								
	C8:0 Octanoic Acid		0.1	5.0-9.0			0.2-0.6	0.13-0.9				
	C10:0 Decanoic Acid		0.1	6.0-10			0.1-1.1	0.13-1.7				
	C12:0 Lauric Acid		0.1	44-52			1.0-1.6	0.3-2.2				
	C14:0 Myristic Acid	<0.5	0.1	13-19	0.4-1.0		1.1-1.6	1.3-2.0		3.10	6.11	5.84
	C16:0 Palmitic Acid	7.0-12.0	8.0-12	6.5-11	12-18	4.0-7.0	32-47	51-64	20.23	18.00	20.97	25.70
	C16:1 Palm Oil Acid	<0.5	0.5	0-1.0	0.2-0.4	0.3	0.2-0.75	0.2-1.0		9.90	11.54	11.97
	C18:0 Stearic Acid	2.0-5.5		1.0-3.0	1-3	2.0-5.0	3-6	4.6-7.1	3.31	2.50	4.20	5.51
	C18:1 Oleic Acid	19-30	25-30	5.0-8.0	40-50	12-34	36-52	20.3-31.1	15.24	25.60	28.03	14.96
	C18:2 Linoleic Acid	48-56	55-60	0-2.5	29-42	15-42	6-10	5.3-8.4	2.02	17.72	13.41	17.78
	C18:3 Linolenic Acid	5-11	2.0		0-1	35-60	0.4-2	0.1-1.4	2.75	15.00	6.43	9.41
	C20:0 Arachidic Acid	<1.0	1.0	0-0.4		0.6	0.3-0.94	0.2-0.7	0.52			
	C20:4	< 0.5	0.5						1.27	1.59	1.55	1.58
	EPA								10.68	1.27	0.49	0.76
	DHA								15.32	2.30	2.22	2.20
								Reference1	Reference 2			

**References:**

1. Comparative Analysis of Fatty Acid Components of Different Greases and Their Applications in Aquaculture.
2. Analysis of Fatty Acids Content in Three Kinds of Freshwater Fish Oil.

**Packaging & Storage**

This product is packaged in a bag or barrel, the net weight of product is 25kg, and details see the package label.

Under the condition of original package, the shelf life is 18 months.