



# **SEIDECOSA**

## **NATURAL PROTEIN PEOPLE**

**SEIDECOSA**

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# SEIDECOSA Silk Worm Pupae

Dried Silk Worm Pupae

Fresh Raw Wet Silk Worm Pupae

Frozen Silk Worm Pupae

Silk Worm Seeds (Eggs)

The silk worm pupae is a by-product of silk reeling industry in Karnataka (South India). The state is the largest producer and processor of 90% of the mulberry silk industry located in the cluster



pocket of Bangalore district. Generally the silkworms are raised in conformed environment where they are harvested and brought to be fed. There after the silkworms die and the silkworm pupae are easily collected. The pupae are gently dried to produce whole pupae (see picture) These pupae can be directly fed to ornamental fish like koi carps. Pupae can also be send to our solvent extraction unit for the removal of silk oil. De-oiled silkworm pupae meal can be used as supplement protein source. Large quantity of the de-oiled silkworm pupae has been used in feeding monogestric and rumminant species for many years in Asian countries. The amount of the de-oiled silkworm pupae meal that can be used is dependent upon the species its being fed too. Small quantities can be included pig and poultry diets.

Protein	48% Min
Fat	20-30%
Moisture	8% Max
Energy/Kcal	3500
Fibre	1% Max
Calcium	0.84%
Phosphorous	0.98%
Lysine	5.32%
Methionine	3.60%
Sodium	0.23%

Silkworm pupa amino acids are natural nutrition Food, which composed from a proportional small peptides and compound Amino Acids adopted direct bio-enzyme extraction technology. Good selected by high-natural silkworm than 50% (far higher than common food). Silkworm amino acids consist of 18 kinds of amino acids (8 kinds acids are the essential human acids). The content of these 8 kinds of human essential acids is twice than pork, four times than egg and ten times than milk . Because of having the advantage of balanced nutrition and appropriate proportion, these necessary human amino acids meet the requirement of FAO/WHO (UN Food and Agriculture Organization and the World Health Organization). Silkworm amino acid is a high-quality insect protein, very suitable for human's demands.

Silkworm pupae contains Potassium, Calcium, Sodium, Magnesium, Iron, Copper, Manganese, Zinc, Phosphorus , Selenium and other trace elements and vitamins A, E, B1, B2, carotene, Etc, all of these are indispensable element of the human body. Silkworm pupae has rich unsaturated fatty acids, accounting for about 72.5% of total fat. Unsaturated fatty acids play an important role in maintain the normal physiological: keeping the cell membrane relative mobility to ensure cell having normal physiological function, accelerate cholesterol esterification that reduce blood cholesterol and triglyceride, promote growth and development of infants and synthesis of prostaglandins, reduce blood clotting to improve the microcirculation, improve cell viability, enhance memory and thinking ability, promote the digestion and absorption of fat-soluble vitamins.

The pupae can be better utilized if freed from the highly unsaturated fats which affect the taste of the meat. The silkworm pupae meal has been used with the good results to replace fish meals in diets for monogastric animals. Pupae contain some chitin and high crude protein content of which only 80% is true protein. Pupae mixed with poultry feed given to hens greatly improves their egg laying capacity. In the past large quantity of pupae were provided to carps and fishes. However at present when the pupae are essentially freed from fat and fat free pupae are fed to carps and other fishes there is no significant difference in their growth compared to that when they are given fresh pupae.

The protein cake which comes out after extraction process is called De-oiled silk worm pupae meal, which is an excellent source of quality protein and is being used as one of the ingredients in aqua, poultry, cattle feed. The de-oiled silkworm pupae are better alternative protein source then fish meal or meat and bone meal. When the de- oiled silkworm pupae meal is added along with fish meal and other ingredients it improves the quality of feed and reduces cost. The product is cost effective compared to fish meal, bone & meat meal, shrimp meal and other ingredient. Energy of silk worm pupae meal is 2500kcal/kg.

## Specification of De-oiled silkworm pupae meal after extraction of oil



DE-OILED SILKWORM PUPAE

De-oiled silkworm Pupae meal

Protein	58% min
Fat	3% max
Moisture	13% max
Energy/Kcal	2900
Fibre	3.5% max
Calcium	0.29%
Phosphorous	0.59%
Lysine	4.34%
Methionine	2.4%
Sodium	0.16%

De-oiled Silkworm Pupae Pellet

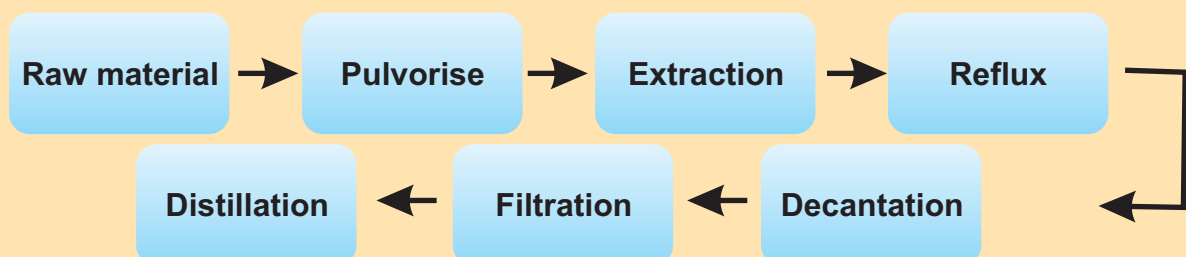
Protein	60% min
Fat	2% max
Moisture	12.5% max
Energy/Kcal	3100
Fibre	2.5% max
Calcium	0.29%
Phosphorous	0.59%
Lysine	4.34%
Methionine	2.4%
Sodium	0.16%



SILKWORM PUPAE PELLETT

Protein	50 %Min
Fat	15-25% Max
Moisture	10% Max
Energy/Kcal	3000
Fibre	4 % Max
Calcium	0.57%
Phosphorous	0.74%
Lysine	4.84%
Methionine	3%
Sodium	0.19%

## Flow chart for extraction of silkworm pupae oil



### **Technical Details:**

**Raw Materials:** Reeling waste mulberry pupae contains 30% of water. After cleaning the extraneous material, it has to be dried in hot air drier at 75°C to 80°C for 7-8 hrs. Removal of water can be identified when a glaze will appear in the pupae.

**Pulverization:** Dried pupae have to be pulverized to semi powder state before feeding into extraction tank. This semi-pulverized pupae is having bulk density 550-600kg/m<sup>3</sup>.

**Extraction:** Semi pulverized pupae is fed into solvent extraction plant. Oil thus can be extracted by running n-Hexane for 4 cycle within 3 hours at 45°C-50°C.

**Reflux:** Oil hexane solution is then refluxed in a tank with fullers earth for 30 minutes then allowed to scuttle down. The scuttled solution is then separated by decantation.

**Filter:** This solution is then passed through disk filter for filtration.

**Distillation:** Filtrate thus obtained distilled at 40°C-45°C under vacuum pressure whereby oil and solvent will be separated out.

After distillation is done we remove the oil out for packing. During this process the de-oiled silkworm pupae meal which comes out in form of cake is cleaned and repacked for exports.

As some of our customers are interested in de-oiled silkworm pupae pellet we also do the pelletisation without adding any other ingredient in the de-oiled silkworm pupae meal. Pelletisation helps in increasing the density which allows us to accommodate double the quantity in a container at time of exports.

**Packing in** –PP bags

### **Amino Acid Profile:**

Amino acid	De-oiled silk worm pupae pellet	Silk worm pupae meal	De-oiled silk worm pupae meal
Aspartic acid	7.51	3.26	6.28
Glutamic Acid	7.94	3.60	6.63
Serine	3.43	1.53	2.89
Glycine	2.90	1.45	2.72
Histidine	1.68	0.91	1.28
Arginine	3.14	1.60	2.94
Threonine	2.67	1.36	2.50
Alanine	3.66	1.47	3.13
Proline	2.60	1.10	2.10
Tyrosine	3.76	1.77	3.31
Valine	3.70	1.68	3.15
Methionine	2.10	1.03	1.80
Cystine	0.26	0.11	0.08
Isoleucine	2.85	1.25	2.41
Leucine	5.14	2.27	4.43
Phenylalanine	3.37	1.49	2.81
Lysine	4.43	2.17	4.15
Tryptophan	0.53	0.60	0.60