

# **From hard pellets to puffed materials Is it the development of the feed industry or the transformation of the aquatic industry?**

What is an extruder?

Puffed feed, also known as cooked feed, is a new type of feed processed by puffing technology. After the raw materials are puffed, they form a "popcorn" state, which not only changes the physical state such as the shape, but also changes the internal molecular structure of the organic matter, making starch easier to digest and protein easier to use.

Puffed feed is processed at a high temperature of 130 to 160 degrees during the manufacturing process, similar to the process of cooking rice. The function of cooked rice with raw rice is to allow us to absorb the nutrients in the rice more easily. As a lower animal, fish has a relatively simple digestive system and low absorption rate. The use of high temperature can destroy and soften the fiber structure, destroy anti-nutritional factors, and increase the degree of starch gelatinization, which can improve the absorption capacity of fish and reduce waste. In addition, the process of high temperature treatment can kill the pathogenic bacteria, parasites and eggs in the feed, which can prevent diseases and effectively protect the health of fish. Therefore, it is said that the extrusion process makes raw materials mature, which is an epoch-making change in the feed industry.

	Advantages of expanded feed
1	The puffing process has very high requirements on raw materials, and high-quality raw materials must be used to ensure the effect of puffing. For example, cotton meal uses only 46% crude protein. Rapeseed meal is more likely to be imported from Canada or domestically produced high-quality type 200 rapeseed meal.
2	Due to the combination of protein and starch matrix, it is not easy to be lost during feeding. Only when the digestive enzymes in the animal break down the starch, the protein is released and the protein potency is improved. The puffing process also denatures the protein and shortens the protein hydrolysis time in the intestine.
3	The puffing treatment releases the encapsulated oil in the raw material molecules, which improves the heat value of the fat. Puffing also forms fat together with starch or protein to form a complex product lipoprotein or lipopolysaccharide, which reduces the content of free fatty acids and reduces the rancidity and spoilage of oil and fat components during product storage and transportation. At the same time, the puffing treatment also reduces the content of bacteria, mold and fungi in the raw materials, improves the hygienic quality of the feed, and further ensures the safety of the feed.
4	Extruded feed is safer and more nutritious, easy to digest and absorb, and can also improve the palatability and flavor of the product. It is also conducive to preservation, breeding management, and has little pollution to water quality.
5	The floatability of the puffed feed is good. Due to the floatability of the puffed feed, the staff only needs to pour the feed into the water. The feeding situation of bait is clear, not only the workload is greatly reduced, but also the feed is not wasted, thereby saving costs.

The main difference between pellets and puffed materials

Puffed feed is a puffed porous feed obtained after the pressure of the puffing machine is suddenly reduced after high temperature and high pressure. The pellet feed is generally a pellet

feed extruded by the die-pressing roller of the pelletizer, and is generally in the shape of a cylinder. Both puffed feed and pellet feed can be used as feed for fish. Puffed feed is better used for reasons such as good palatability and high digestibility, but the price is much more expensive. General freshwater fish can use pellet feed, and special high-grade fish only use puffed feed.

The main difference between puffed material and granular material is the process of conditioning, puffing and liquid spraying: in the process of feed conditioning, the production process of puffed material is to add water and steam together, and the moisture content after conditioning is about 25%. However, the pellets produced only need to be steamed, and the moisture content after conditioning is about 17%. In addition, there is no puffing process and liquid external spraying process for granule production, but a granulation process.

The reason why puffed material can improve its digestion utilization rate. Mainly because the processing technology requires finer raw materials to be crushed, and the high temperature of the processing process using the puffing machine improves the maturity of starch, which is conducive to the digestion and absorption of feed by fish; secondly, the stability of puffed material in water for 12-36 hours, It is easy to visually check the feeding status of fish and reduce water pollution; again, the strong high-temperature and high-humidity instant rubbing during the puffing process can kill some harmful bacteria in the raw materials. Even with such obvious advantages, its new processing technology has also been recognized by many feed manufacturers, but due to the relatively large one-time investment in the puffed material production line, many feed processing enterprises in the development stage are discouraged.

## How to efficiently feed and mix hard granules and puffed materials

The advantages of using mixed feeding methods: not only can better adjust the water quality, not to make the water body too fat or too thin, but also can increase the growth rate of the main breeds and adjust their body shape and physique, and increase the yield of the breed.

1. Feed hard pellet feed first, then feed puffed feed. The advantage of this farming method is that farmers can see the fish eating, so as to reasonably control the amount of fish eaten and reduce feed waste.
2. Feed submerged feed in spring and winter (year and end) and puffed feed in summer and autumn. This feeding method is very popular in Jiaying, Huzhou, Zhejiang. In summer and autumn, the water temperature is high, the fish grows vigorously, and the effect of feeding puffed material is obvious; while in spring and winter, the water temperature is low, the fish generally feed on the bottom of the pond, and the submerged material just meets the feeding habits of the fish, so the fish raised by this feeding method By the end of the year, it will be in good shape, full weight, and resistant to transportation.
3. Grass carp fingerlings are mainly concentrated in Huangpu Town, Zhongshan City. Because farmers consider the high temperature season and the fishes are fierce, they adopt the method of mixing hard pellets and puffed materials and feeding them. In autumn and winter, the water temperature is low, the fish feed is slow, and the hard granules in the small fish stage have a short water resistance time (generally less than 3 minutes) and are easily soluble. At this time, the proportion of farmers feeding puffed material is higher than that of hard granules. It can reduce feed waste and increase economic benefits.
4. Feed hard pellet feed in the morning and puffed feed in the afternoon.
5. Feed puffed feed first, followed by hard pellet feed. The reason for using this method is that farmers believe that puffed feed is more fragrant and better in palatability. After eating hard pellets, the fish will eat a lot of puffed food It is expected that this will cause the fish to overeat and affect digestion, causing intestinal diseases.