



Interpreting a Fish Food Package Label¹

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A name or brand, as well as a clear description of the item or merchandise, are the most important marketing qualities that affect purchasing decisions of consumers. To ensure honesty and accuracy, and to provide the consumer with knowledge of the ingredients in consumable goods, the US Food and Drug Administration (FDA) regulates the manufacture, distribution, and sale of many essential commodities such as human and animal food items, drugs, cosmetics, chemicals, medical devices, and biological products like vaccines, (regulatory provisions from the Federal Food, Drug, and Cosmetic Act, FFDA). These commodities must also be properly identified and labeled (Nutrition Labeling and Education Act, NLEA). In addition, every state has rules and regulations of compliance for food and remedy products. Such laws and regulations benefit both the manufacturer, and most importantly, the health and safety of the people and animals. The rules protect people from unsafe, inferior, or fraudulent products.

The most common and simple method used by companies to register, identify, and market a fish food item is to disclose a label or feed tag. The label then serves as an advertising icon and legal document. A food label also can be used as an educational tool. In

this publication, we provide a guide to interpreting the information on food labels. Since food selection is generally made on the basis of cost and perceived quality, the farmer or pet owner can use the label to assist in selecting the appropriate food, especially since there are considerable differences from product to product in food quality and cost. From the analysis of nutrients and listing of ingredients in the food label, the user can select different formula foods for specific needs. Selecting and buying different formula foods for different needs can result in savings and reduced waste. Any reduction of food costs will have a significant beneficial impact on farm profits, since the cost of food may range from 30 to 60 percent of the annual variable operating costs in aquaculture production. Selection of an appropriate and high quality food can also greatly reduce the impact aquaculture has on the environment because poor feed management is often the primary reason for the deterioration of water quality. Likewise, maintenance of water clarity and healthy livestock in an aquarium is impossible without a source of high quality food.

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The Food Label or Tag

When purchasing fish food, look for the label first. A container of fish food usually comes with an attached food label (NLEA); that label abides by a minimum set of federal regulations (FDA) administered by the Center for Veterinary Medicine, CVM, and guidelines established by the Association of American Feed Control Officials, AAFCO.

Although most commercial foods will have a label, exemptions or special labeling are permissible (FDA, Food Labeling Guide). For example, under specific criteria, provisions are offered to certified small businesses in cases when low volumes of foods are traded, when there is no interstate commerce, and when the food bears no claims. All imported fish foods are required to have some sort of nutrition labeling unless the manufacturer/packer/distributor meets specified exemptions or special labeling provisions established by the FDA. Inquiries and special consultation about these exceptions should be directly addressed to the CVM and AAFCO authorities.

First and foremost a food label must display the name and address of the manufacturer/packer/distributor; a description of the food product; and directions for its proper use if the food is formulated for a specific purpose (e.g., medication, color enhancement). The label may be displayed printed on the package or attached in the form of a tag. Most commonly the required information on the label is illustrated in tabular format (Figure 1).

Major considerations for the selection of commercial foods are the specific needs of the animal, quality of the food, cost, and reputation of the manufacturer. From a functional perspective, the most important considerations are appropriate diet formulation, palatability, pellet or flake size, and density. Of course the definitive approach is to test the food and observe animal performance, however this is not always possible.

Nutrient content and quality of the feed in relation to its cost is the most valuable information displayed on the label, and frequently the most confusing. Quality in relation to cost can be difficult

NET WEIGHT 50 POUNDS OR 22.7 KILOS

MERMAID AQUAFEEDS

STURGEON GROWOUT PELLETS
4.0 MM SLOW SINKING PELLETS

GUARANTEED ANALYSIS

Crude protein, minimum.....	36%
Crude fat, minimum.....	7%
Crude fiber, maximum.....	4%
Moisture, not more than	10%

INGREDIENTS

Plant protein products (including soybean meal, wheat germ), Marine protein products (including fish meal), Dried yeast culture, Fish oil, Dicalcium phosphate, Vitamin and Mineral premix containing a stabilized source of Ascorbic acid (Vitamin C), Ethoxyquin (anti-oxidant).

WARNING

Store in a dry, well ventilated area, free from rodents and insects.
Do not use moldy feed
Use within 90 days of production date.

MANUFACTURED BY MERMAID AQUAFEEDS

Pierson - Florida
2356 State Rd 415

800.256.3478 - sales@mermaidfeeds.com

Figure 1. Example of a typical fish food label.

to determine and often cannot be estimated at all. The information is essential, because though almost all commercial fish foods are nutritionally adequate, there are significant differences in the type of ingredients and quality of nutrients various foods contain.

The Product name and/or Brand (a trademark) provides contact information for the manufacturer or distributor and should be apparent on the label. Many types of fish foods are available in the market-place, but reputation and loyalty of the customers is dependent on companies that are continually improving existing products and developing new ones.

The product name often identifies the intended purpose or specific use for the food. Prepared foods destined for animal consumption, including fishes, are commonly referred to as "feeds," and those destined for ornamental "aquarium" fishes are considered "specialty pet foods" in the commercial food industry.

No single fish feed is suited for use by all species, and food should be selected with special consideration given to the developmental growth stage of the fish. There are starter feeds for larvae and juveniles, grower (production) feeds, and broodstock feeds (broodstock are animals that are used for propagation and selective breeding of the cultured species). Commercial feeds for use in aquaculture are

formulated primarily for growth. Finishing diets (e.g., for color enhancement in salmon and trout) are also popular. Most feeds for aquarium fishes are formulated simply for maintenance and emphasize proper feeding management to preserve water clarity and enhance fish pigmentation. The feeds are formed mostly into pellets of different sizes and flakes that either float or sink; the pellets may, at times, be crumbled into smaller sizes. In addition, a wide variety of whole, frozen and freeze-dried items such as krill, brine shrimp, and mysids are commonly available. Selection should be based on the size and feeding behavior of the fish for which the food is intended. The shape and size of the pellets should be uniform. Choose pellet sizes and shapes according to how easily they can be ingested instead of how wide your fish can open their mouths.

Most commercial fish feeds are manufactured as dry pellets, which contain approximately 13% moisture, or less. Because of their low moisture content they can be stored at room temperature for prolonged periods of time: as a general rule for at least 90 days from manufacture. Semi-moist feeds are also available, but they often require refrigeration and have a shorter shelf life: ordinarily less than 90 days after opening. Semi-moist feeds are more expensive than the dry pellets but they are often worth their higher cost because they are usually prepared with higher quality ingredients and the feed itself is more palatable, especially to young and small fish. The energy and nutrient content of the feed are expressed either on a dry matter basis (0% moisture) or on an as-fed basis (i.e., the reported dietary moisture content).

The "Guaranteed Analysis" section on the label represents recommended profiles for nutrient requirements of fish. These profiles are based on recommendations for the two main groups of fishes cultured in the United States, the catfish and salmonids (i.e., salmon and trout), published by the National Research Council. Companies also utilize information published in the scientific literature and results from their own research and development departments. The guaranteed analysis chart should provide at least the minimum content or chemical composition of the feed in regard to two specific nutrients, protein and lipid (fat or oil). The protein

value found on food labels is expressed as percent crude protein. Crude protein simply means total protein. Laboratory chemical analysis determines the total amount of nitrogen in the sample, coming from protein as well as from non-protein sources.

In general, most feed ingredients used in the aquaculture industry contain an average of 16% nitrogen; hence $100 \div 16 = 6.25$. The factor of 6.25 is then used to determine percent crude protein simply by multiplying this factor by the percent nitrogen in the sample. Typical values for crude protein in fish production feeds normally range from 36% to 42%, for lipid 6% to 15%, and for crude fiber 3% to 5%. Feeds with high protein and lipid content coupled with low fiber are generally considered to be of higher quality than those with a high fiber content. Fish have no specific requirement for fiber, and feeds with high fiber content (higher than 8%) are of low feeding value simply because of the diluting effect of fiber in the diet.

The percentage of ash presented on the label represents the mineral matter of the feed, which normally contains minerals such as calcium, phosphorus, potassium, and magnesium. The normal ash content of fish feeds ranges from 7% to 12% when expressed on a dry matter basis instead of an "as-fed" basis. Percent ash is a quantitative rather than a qualitative value, which is to say, it indicates only the total amount of minerals present in the food, not which minerals. Some labels do provide the levels of certain minerals such as sodium and phosphorus, even though there are no official established standards for these two minerals. Mention of these two minerals on the label is specifically required by some states.

The Ingredients and chemical makeup of the feed reflect its nutritional value. However, feed ingredients used in the formulation of the feed are simply "vehicles" that provide the nutrients and energy to the animal. The quality of any feed is a direct reflection of the quality of the ingredients in the feed. Therefore, a high-quality formulated feed cannot be produced from poor-quality feed ingredients.

Most commercial feeds are closed-formula diets for which the quantitative formulation of ingredients or their proportions is proprietary and not revealed to the public. Instead, most labels simply provide a listing of ingredients in descending order from most to least weight. Also, individual feed ingredients that provide a similar function in the feed are often collectively grouped; for instance, shrimp meal, fish meal, meat meal, dried fish solubles, crab meal, and more of the like, may be collectively listed simply as "animal protein products." Similarly, corn barley, oats, rice, wheat, and the like may be listed collectively as "grain products." We encourage manufacturers to list specific ingredients instead of simply grouping them into products of animal or plant origin.

Even though the percent of each ingredient used in the formulation of the feed is not known, the list of particular ingredients provides a hint to the composition of the feed and its quality because most manufacturers adhere to the definitions of ingredients stipulated by AAFCO. For example, animal protein products supply a high concentration of high-quality protein to the diet and grain products supply most of the energy. If the grain products are cooked, many fish species are better able to use the carbohydrates for energy, and spare the protein; if the fish don't have to use protein for energy, they can use it for muscle deposition during growth.

The protein ingredients and the vitamin-mineral premix are the most costly ingredients in a feed formulation. Proteins consist of building blocks known as amino acids which are critical to life and serve to form muscle. Animals cannot synthesize all of the amino acids and those that cannot be synthesized are known as essential amino acids and must be obtained from food. Properly processed fish meal is an example of a high-quality animal protein feed ingredient of high digestibility that supplies all of the essential amino acids in proper proportions to one another to meet the animal's amino acid requirement. In general, high-quality proteins are found in ingredients of animal origin and lower quality proteins are found in ingredients of plant origin. If you're relying on a primarily plant protein-based diet, include some animal proteins to enhance the overall quality of the dietary protein.

Other ingredients sometimes listed in fish feed labels are pellet binders such as alginates, various gums, calcium bentonite, lignin sulfonate. The addition of a proper binder is important to maintain the integrity of the diet in water as well as to reduce rapid leaching of nutrients into the water by diffusion.

Particulars of "Directions for Use" are displayed in feed labels for terrestrial food animals and pets, directions on how to use the feed are rare in fish food labels, except for medicated feeds or when specialty ingredients are added to the feed.

Medication information will be provided on the label when the feed contains drug ingredients for the treatment or prevention of disease, and when specialty ingredients like pigments or steroid hormones are added to the formulation.

Precautionary Warnings for the safe and effective use of the feed are required to be listed on the label. The purpose of the medication, restrictions of use, and quantity of active ingredients should be provided. Certain medicated feeds cannot be fed to the fish for a specified period of time before the fish are consumed (e.g., a 21-day withdrawal period). Often the drug is provided separately and must be mixed with the feed. Depending on the type of medication, they can be dissolved in water, vegetable oil, or alcohol to form a slurry that can be applied evenly on top of the feed, and a small hand or electrical cement mixer can greatly facilitate thorough mixing of the chemical and feed.

The Quantity Statement is the actual amount or net weight of the feed contained in the container, bag, or package. The quantity is usually presented in tons, and/or pounds and kilograms for large amounts, and/or in ounces and grams for smaller amounts depending on the specific type or use of the feed.

The amount of feed or net weight contained in the package permits calculation of the real cost of the feed to be purchased and allows the buyer to determine if it is cost efficient. For example, it is possible to compare the cost of different fish feeds on the basis of cost per unit weight (pounds or kilograms) of dry matter, energy, protein, lipids, and any other nutrient. An example:

A commercial feed formulation for grow-out fish destined for human consumption typically contains 36% to 42% protein, with an approximate moisture content of 10%.

Costs per pound (or kilo) of feed = \$ 0.25 to \$ 1 (or \$ 0.55 to \$ 2.2)

Costs per pound of protein = $0.25 \div 0.36 = \underline{\$0.69}$ to $1 \div 0.42 = \underline{\$2.38}$

Or

Costs per kilo of protein = $0.55 \div 0.36 = \underline{\$1.52}$ to $2.2 \div 0.42 = \underline{\$5.24}$

An aquarium or tropical fish feed typically contains 35% to 50% protein, with an approximate moisture content of 10%.

Costs per pound (or kilo) of feed = \$ 14 to \$ 32 (or \$ 31 to \$ 70)

Costs per pound of protein = $14 \div 0.35 = \underline{\$40}$ to $32 \div 0.50 = \underline{\$64}$

Or

Costs per kilo of protein = $31 \div 0.35 = \underline{\$88}$ to $70 \div 0.50 = \underline{\$140}$

In the above example the cost per kilo of the tropical fish feed is greater than that of the food fish (i.e., \$31 versus \$0.55). Tropical fish feed prices reflect elevated costs associated with much lower quantities of production and more detailed marketing practices. Also, tropical fish feeds are retailed in numerous stores, and in small and fancier packages.

Summary

When purchasing commercial feeds either for fish farmed for food or pet fish, the buyer is dependent on the manufacturer to provide a high quality, nutritionally balanced feed. Every container or bag of commercial feed should have a label that details what is inside and its intended use. The feed label should clearly display the brand or name of the product together with the name and contact information for the manufacturer responsible for the overall quality of the feed. The label should provide a list of ingredients used to prepare the feed with a

guaranteed chemical analysis of essential nutrients such as proteins and lipids. A precautionary statement for safe and proper use of the feed may be on the label. For example, special instructions for dosing and dispensing are provided on medicated feeds. Detailed information on the feed label, together with some simple calculations, will assist the buyer in selecting a cost-effective and nutritious feed that is appropriate for the fish to which it is intended to be fed.

Government regulations, detailed information on the nutrient requirements of fish, and high standards of quality control and manufacturing practices permit the consumer to select from a wide variety of fish feeds and guarantee the farm production of a safe and high-quality fish product destined for human consumption.

For More Information

Durborow, R. M. and R. Francis-Floyd. 1996. Medicated Feed for Food Fish. Southern Regional Aquaculture Center. SRAC Publication No. 473. http://aquanac.org/publicat/usda_rac/efs/srac/473fs.pdf

Francis-Floyd, R. 2002. Fish Nutrition. Florida Cooperative Extension Service, IFAS, University of Florida. EDIS VM114. <http://edis.ifas.ufl.edu/FA096>

Miles, R. D. and F. A. Chapman. 2006. The Benefits of Fish Meal in Aquaculture Diets. Florida Cooperative Extension Service, IFAS, University of Florida. EDIS FA122. (<http://edis.ifas.ufl.edu/pdf/files/FA/FA12200.pdf>).

Association of American Feed Control Officials, AAFCO. <http://www.aafco.org/>

Center for Veterinary Medicine, CVM. <http://www.fda.gov/AboutFDA/CentersOffices/CVM/default.htm>

FDA, Food Labeling Guide; US Food and Drug Administration, FDA. <http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/FoodLabelingNutrition/FoodLabelingGuide/ucm064904.htm> - exempt

Nutrition Labeling and Education Act, NLEA.

[http://web.archive.org/web/20071014014547/http://](http://web.archive.org/web/20071014014547/http://www.fda.gov/ora/inspect_ref/igs/nleatxt.html)

www.fda.gov/ora/inspect_ref/igs/nleatxt.html -

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