

Fish Feed Technology

PhD. student

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- 1- Introduction: Chemical composition and ingredients.
- 2- Feed categories 4

**An example of poor feed ingredient storage
in the open in Egypt**



FIGURE 30

Examples of feed storage on striped catfish farms in Viet Nam
(Note that the feed bags off floor on pallets and away from walls.)



المواد الغذائية تقسم الى عدة تقسيمات منها

1

Energy Feedstuffs

- اقل من 20% بروتين خام
- مصادر نباتية

Protein Feedstuffs

- بروتين اكبر من 20%
- نباتية وحيوانية

المواد الغذائية تقسم الى عدة تقسيمات وتعطى رمز منها حسب :
المصطلحات الدولية للأغذية

“International Feed Vocabulary” (IFN)

هذا التقسيم يعطي لكل مادة غذائية رمز شامل مختصر بحيث لا يحدث داخل بين المواد المختلفة، يتألف الرمز من خمسة الى ستة عناصر كمثال:

- Soybean, Glycine max, seeds without hulls, meal, solvent extracted: 5-04-612
- Fish, anchovy, *Engraulis ringens*, meal, mechanically extracted:5-01-985

او تقسم الى ثمانية اقسام حسب التركيب الكيميائي والاستخدام في العليقة:

1. محاصيل علفية Roughages
2. نباتات عشبية Pasture
3. سايلاج Silages
4. أغذية طاقة Energy feeds
5. اغذية تجهز بروتين Protein supplements
6. اغذية تجهز معادن Mineral supplements
7. اغذية تجهز فيتامينات Vitamin supplements
8. إضافات Additives

• المواد الغذائية المستخدمة عمليا في العليقة:

① مصادر بروتين (احماض امينية)

② مصادر طاقة (COH)

③ مصادر دهن (EFAs)

④ خلطة فيتامينات

④ خلطة معادن

المواد الاولية

مواد ذات اصل حيواني

- **Fish by-products** (IFN 5-14-509 Fish process residue fresh) مخلفات تصنيع الأسماك
- **Fishmeal** (IFN 5-01-977 Fishmeal mechanical extracted) مسحوق الأسماك
- **Fish protein concentrate** (IFN 5-09-334 Fish protein concentrate solvent extracted) • مركز بروتين الأسماك
- **Shrimp meal** (IFN 5-04-226 Shrimp process residue meal) مسحوق الروبيان
- **Animal by-product meal** (IFN 5-08-786) مخلفات تصنيع الحيوانات
- **Blood meal, flash dried** (IFN 5-26-006 Animal blood meal flash dehydrated) • مسحوق الدم
- **Hydrolyzed poultry feathers** (IFN 5-03-795 Poultry feathers meal hydrolyzed) • مسحوق مخلفات دواجن
- **Meat and bone meal** (IFN 5-00-388 Animal meat with bone rendered) • مسحوق لحم وعظم
- **Fish oil** (IFN 7-01-965 Fish oil) زيت سمك

المواد الاولية

مواد ذات اصل نباتي

- **Cottonseed meal** (5-01-625 Cotton seeds meal mechanical extracted 36 percent protein)
- **Soybean meal** (IFN 5-04-600 Soybean seeds meal mechanical extracted)
- **Grass, ground** (IFN I-02-215 Grass hay sun-cured ground)
- **Sunflower meal** (IFN 5-30-033 Sunflower seeds without hulls meal mechanical extracted)
- **Rice bran** (IFN 4-03-928 Rice bran with germs)
- **Tomato pomace, dried** (IFN 5-05-041 Tomato pomace dehydrated)
- **Wheat bran** (IFN 4-05-190 Wheat bran)
- **Wheat flour** (IFN 4-05-199 Wheat flour less than 1.5 percent fibre)

Feed Ingredients

Animal and fish feed ingredients are, for the most part, by-products of food processing obtained when high-value food for humans is extracted from a raw material. Once the high-value products have been removed, the remaining material is further processed, usually by drying, to produce a material that itself becomes an article of commerce. These ingredients are normally available throughout the year, with prices depending on the forces of supply and demand.

Not all feed ingredients are by-products; some are produced directly from raw materials. Examples of these include anchovy meal, menhaden meal, and ground whole grains. Practical and economic factors determine the fate of these products. Feed ingredients for fish diets are chosen for a number of reasons already mentioned, including the nutrient content, cost, availability, and physical properties. Proximate composition is the primary means of evaluating feed ingredients. In industry, proximate composition is expressed on an as-is basis, which generally means a moisture content of 7–9%.

Feed Nomenclature

Feed ingredient nomenclature and classification began in Germany in the early 19th century, when methods of determining chemical composition were developed. Feed ingredients were first classified on the basis of **nitrogen or digestible nutrient content**. Nomenclature was originally based on common names, but as the number of by-products from a single, raw material increased, the use of common names became confusing. A systematic investigation during the early development of today's nomenclature system revealed that more than **20%** of the common names in use for feeds were simply different names for the same product. Today's system of nomenclature is called the **International Feed Vocabulary (IFV)** and it is accepted worldwide . It has assigned a comprehensive name and number to each ingredient using descriptions from one or more of six categories. The categories are (1) origin, which includes the scientific and common names for specific plants and animals, poultry, fish, cereals, grass, minerals, chemical products, and drugs or other names for nonspecific materials; (2) part fed to animal as affected by processing; (3) process(es) and treatment(s) to which the feed ingredient was subjected; (4) stages of maturity and development; (5) cutting (for forage crops); and (6) grade. Using this system, herring meal is described as fish herring, *Clupea harengus*, meal, mechanically extracted, International Feed Number 5-02-000.

Wheat mill run is described as wheat, *Triticum aestivum*, flour by-product, less than 9.5% fiber, International Feed Number 4-05-205. The last five numbers in the International Feed Number are assigned to each ingredient name, the first number being a code for the feed class. Over **18,000** feed ingredients have been assigned numbers using this system

Classes of Feed Ingredients

1. Dry forages and roughages
 2. Pasture, range plants, and forages fed green
 3. Silages (ensiled forages only)
 4. Energy feeds
 - Less than 20% protein (dry basis)
 - Less than 18% crude fiber (dry basis)
 5. Protein supplements: more than 20% protein (dry basis)
 6. Mineral supplements
 7. Vitamin supplements
 8. Additives: antibiotics, coloring materials, flavors, hormones, and medications
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Aims and Strategy of Fish Feed Production

Protein Supplements

As indicated protein supplements are feed ingredients having a **protein content above 20%**, on an **as-fed** or wet weight basis. There are three general groups. The **first** group is made up of ingredients having a protein content of **20–30%** which contain materials of **plant origin** that are by-products of the brewing and distilling industries, wheat germ meal and corn gluten feed. The **second** group is composed of ingredients having a protein content of **30–50%** and includes the **oilseed meals**, **crab meal**, and **dried milk** products. The **third** group contains ingredients of **over 50%** protein and includes **fish meals**, **blood meal**, **feather meal**, meat and bone meal, yeast products, shrimp meal, poultry by-product meal, soy protein concentrate, wheat gluten, corn gluten meal, and casein.

Quality Standards for Fish Meal Required for Salmonid Diets^a

Component	Level
Crude protein (N × 6.25)	>68%
Lipid	<10%
Ash	<13%
Salt (NaCl)	<3%
Moisture	<10%
Ammonia–nitrogen	<0.2%
Antioxidant	<200 μg/g

Quality Standards for Fish Oil Required for Salmonid Diets^a

Component	Level
Iodine value	Report value
Peroxide value	<5 mEq/kg
Pesticides (total)	<0.4 μg/g
Nitrogen	<1.0%
Moisture	<1.0%
Antioxidant	<500 μg/g