



An Overview of a Fish Feed Industry and Its Operational & Management Approaches



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1. Summery

A study was conducted in SHUSOMO Feed Industries to observe the overall procedure of producing quality fish feed, operation of the plant and overall management approaches for three months. Raw material collection testing in laboratory, feed production system, maintaining nutritional and quality aspects of feed, packaging, storage distribution, and marketing system were critically reviewed. Production cost management relation with nutritional quality was studied. Nutritional composition and digestibility of various feed ingredients and finished feed were studied during the period. Production of feed in previous year relation with demand of feed in fish culture unit was also studied.

2. Background

Bangladesh is one of the world's leading inland fisheries producer with a production of 2,715,296 tons in 2009 (DoF-FRSS, 2009) with marine catch of 497573 tones and aquaculture production of 1,005,542 tons during 2008. Total fish production of the country in 2008 was 2.72 million tones (DoF, 2009). In 2008 FAO ranked Bangladesh as the 6th largest aquaculture producing country in the world. Aquaculture accounted for about 39 percent of the total fish production during 2008, with inland open water fisheries contributed 42 percent (DoF, 2008). Due to increased aquaculture practice, demand of good quality feed is increasing day by day. Prime quality feed is essential for fish growth. Maintain feed conversion ration (FCR) close to 1 is highly depends upon good feed. Feed should have adequate protein content which facilitates high growth. Net protein utilization should be around 27 percent. Feed should also contain suitable amounts of energy source, minerals and vitamins. With the aim of increased aquaculture production through applying adequate feed large numbers of feed industries are developed in the country. But most of the feed industries fail to produce high quality feed due to unavailability of quality feed ingredients, presence of adulterated ingredients, presence of harmful antibiotics etc. On the other hand feed and labor comprise the two most important components of the total operating cost for most culture systems in Bangladesh, each accounting for approximately 20 percent and 17 percent, respectively of the total operating costs. To maintain high quality of finished feed,

good administrative structure of a feed industry committed to produce quality feed is important. As a student of fisheries sciences it is essential to have field level experience on fish feed industry operation. Aqua-internship program brings that opportunity to gather practical experiences about production technique of fish feed, feed ingredients, composition of fish feed, types of fish feed, storage of fish feed, distribution and marketing of fish feeds.

3. Objectives

1. To gather knowledge on the feed production system from a fish feed industry.
2. To know about the raw material collection to produce good quality feed
3. To gather knowledge on the maintenance of nutritional quality of raw material as well as finally produced feed
4. To understand packaging, distribution and marketing system of feed
5. To know the administrative structure of a fish feed industry.

4. Description of Activities

4.1 Starting with SHUSHAMA Feed Industry

. I started my works from 05.07.10 in the shushama fish feed industry and worked there about 3 months. Firstly, I observed the fish feed production procedure and then collected informations about different fish feed ingredients and the formulation method of these ingredients to make finished goods. These raw materials are brought from different areas of our country and some ingredients are imported from abroad as well. After that I worked in the newly opened nutrition lab to assess the nutritional value of imported raw materials as well as the finished goods or feeds. I assessed nutritional value of different raw materials and finished goods also in this lab with my own hand. Finally I have tried to learn the maintenance technique of nutritional values of fish feed and the management approaches of the industry.

4.2 About SHUSHAMA Feed Industry

SHUSHAMA feed industry was established in 2005 and production was started at September 2005. Infrastructure was designed by Thailand expert engineer and most of the machineries were imported from Germany, England and Switzerland. Total production capacity of the plant in 10 ton per hour, each production cycle produced 1 ton. Normally fungus grower, starter, koi grower, and broiler feed are produced



Figure1. The outside and inside view of SHUSHAMA feed Limited.

4.2 Organogram of the Company

Successful operation of any industry mostly depends upon its organizational structure, which responsible to maintain the overall activity needed for successful operation of the industry. For this reason organizational setup of SHUSHAMA Feed Limited are studied and shown in the following diagram.

■ Organizational set up



4.3 Production Procedure

4.3.1. Collection of Raw Material

In SHUSHAMA fish feed industry high quality feed ingredients are used with the aim to produce feed having high protein and lipid content. Ingredients are mainly coming from Portugal, Netherlands, India, Belgium and the dry fish which is main source of protein are coming from Chittagong, during receiving of raw materials a weight bridge is use to take weight. Rice bran, rice polish, rapeseed meal, oil cake and soybean meal are normally used.



4.3.2. Nutritional test of raw materials

After receiving the raw materials they are taken in to the laboratory for the test of nutritional composition. I SHUSHAMA fish feed industry, mainly protein, lipid, moisture are tested by expert personnel in their own laboratory. If the composition of raw materials being satisfied, then that's are allowed to enter to the production unit. If not the raw materials are sent back to the supplier.



4.3.2. In the production unit

After receiving the raw materials they are taken in to the production unit and feed are produced in the following way-

- 1) SHUSHAMA fish feed industry is a sophisticated industry with highly sophisticated machineries and all the activities in the industry including raw materials receiving to

manufacture of finished good are operated by a computer software, skillful personnel operate the software and maintain the whole production. A flow chart is used for operation of production system; different indicator used which indicate the status of production systems requirements.



Figure2. Control room of the industry and flow chart of production operation.

- 2) At first the ingredients are received by the intake unit and bucket elevator bring the raw materials into the storage bean. There are 11 storage bean are used. First two beans are used for storing of large particle and rest nine bean are used for storing of fine particle ingredients.
- 3) Large particle ingredients are passed through the hammer meal. After crushing, crushed materials are brought to the storage bean. Before raw materials are received into storage bean a drum sieve remove all dust from the ingredient and a magnet used to remove the metal substances.
- 4) By using the turn head a particular bean is selected in which crushed materials are stored for mixing. Amount of ingredient a taken in to each storage bean is determined by scaling. Scaling is done for 3- 4 minute. The large particles are return back to the hammer meal which is crushed for the next batch production.
- 5) Before mixing the ingredients, essentials feed elements such as vitamin, oil, salt is added manually.

- 6) Then all of the ingredients are mixed by mixture machine at 1400 rpm for 120 second and cooked at a temp 85 to 90°C. As a result most of the heat sensitive microbes and toxic compounds are destroyed and digestibility of feed increased. They are then passed in to pelleting bean where 7 dies 1.8, 2, 2.2, 2.5, 3, 3.5, 4 in diameter are used for the production of pellet.



Figure3. Plleting machine and cooling machine.

- 7) All the pellets are cooled by using air flow with high pressure in a cooling machine. Low level indicator and high level indicator are control the discharge of pellet in the cooling unit.
- 8) By using pellet sieve dust of the pellet are separated. Crumble feed are produced by crushing the pellet in crumble machine.
- 9) Produced feed are passed into finished good bean and packaged in a marketable size polythene pack. Then they are stored in a cool dry place from where they are distributed for marketing.
- 10) A way bridge is operated by computer software. When raw materials are received into industry, truck carrying raw materials are passed over the bridge and weight is taken into the computer. After unloading the weight of empty truck is also taken as same way and the weight of raw materials are measured.

The whole process can be shown by the following diagram

Ingredients are received into intake unit by manually



Intake unit

Bucket elevator bring the raw materials into storage bean. There are 11 storage bean



Storage bean

Large particle ingredients are passed through the hammer meal for crushing



Hammer meal

Passed into mixture machine, mixed for 2 minute at 1400 rpm and cooked at a temp 85 to 90°C



Mixing Machine

Cooked Ingredients are passed in to pelleting bean where 7 dies are used for production pellet.



Pelleting Machine

pellets are cooled by using air flow with high pressure in a cooling machine



Cooling Machine

Pellet are passed into finished good bean and packaged in a marketable size polythene pack.



Packaging

4.4. Marketing system

The finished products are then brought to the nutrition laboratory to test the nutritional quality and then marketed. Marketing of finished product is one of the most important factors for gaining ultimate benefit. For successful marketing it is necessary to ensure the high quality of feed, which will help to achieve the farmer's confidence. Any complain of finished feed will destroy the market of the products. Easy transportation, proper supply of feed and easy access of feed to market is also crucial for successful marketing. SHUSHAMA Feed Limited produced feed mainly for their own culture units which consequence about 60% of their total production and the rest 40% are sold in market. A Marketing Officer and Assistant Marketing Officer are responsible for marketing. SHUSHAMA feed have their own sells centre in Valuka and Netrokona from where the feed are distributed to the culture units of greater Mymensingh region.

5. Results

The study was conducted to achieve detailed knowledge about all the activities practiced in SHUSHAMA Feed Limited. To determine the quality of raw materials proximate composition of feed ingredients was analyzed. Meat and bone meal, fish meal, rape seed, soybean meal has high protein content and mainly used as the sources of protein and the rice polish are used as energy source (Table 1). Although lime stone, vitamin, salt, oil, flower are also used. Quality of feed was determined for analyzing their nutritional status as they are used as pungus grower, starter, koi grower and broiler was analyzed. Figure (5) showing the comparison of nutritional composition of pungus grower, pungus starter, koi grower and broiler feed. Feed production is highly depends upon season of a year. Feed production is generally highest in June, July, August and September and then the production is gradually decreased. Figure (6) shows the annual production of feed form 2005-2010 in SHUSHAMA feed limited.

6. Tables and Graphs

Feed ingredients	Moisture (%)	Ash (%)	Lipid (%)	Protein (%)
Meat and bone meal	5.86 ± 1	16.80 ± 1	16.06 ± 1	53.22 ± 1
Dry fish	11.84 ± 1	43.55 ± 1	6.57 ± 1	27.47 ± 1
Fish meal	12.67 ± 1	10.13 ± 1	8.96 ± 1	58.79 ± 1
Rice bran	9.86 ± 1	13.25 ± 1	2.74 ± 1	21.28 ± 1
Rice polish	6.15 ± 1	15.83 ± 1	12.63 ± 1	9.95 ± 1
Rape seed	11.25 ± 1	6.49 ± 1	5.88 ± 1	41.67 ± 1
Soybean meal	10.80 ± 1	9.21 ± 1	1.69 ± 1	46.16 ± 1
Flower	11.24 ± 1	1.86 ± 1	1.88 ± 1	12.05 ± 1

Table1. Proximate composition of ingredients that are used for feed preparation

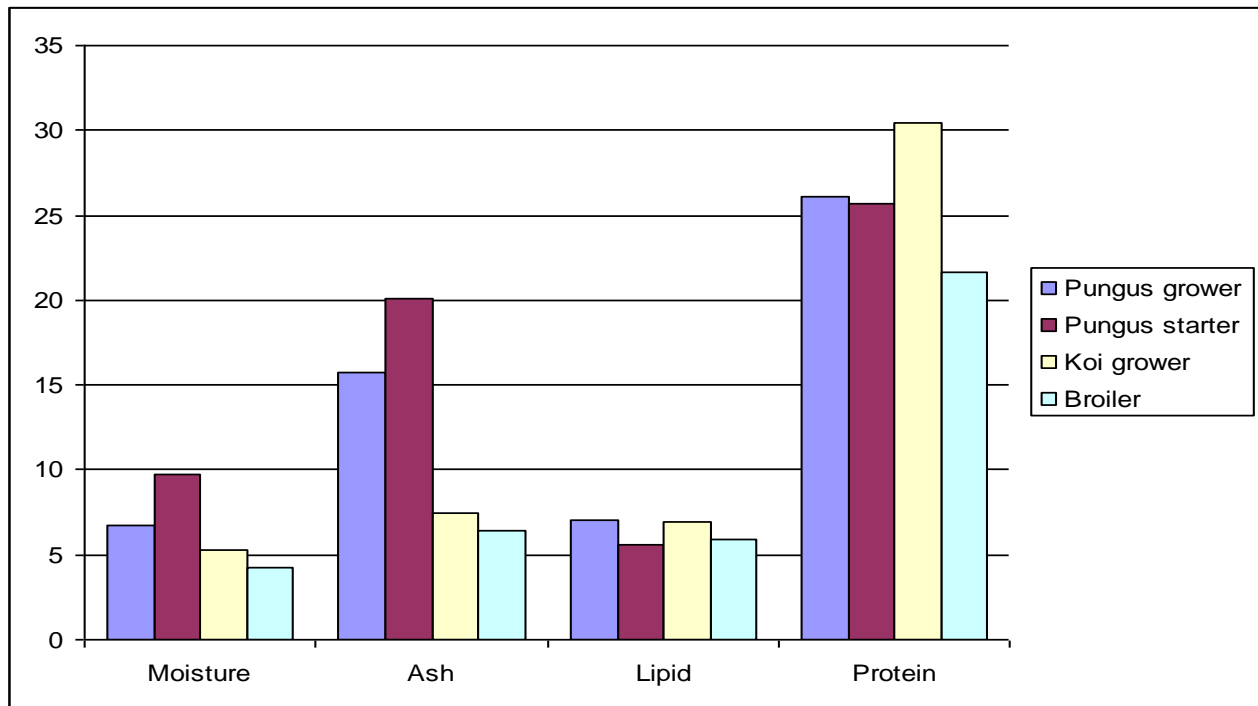


Figure 5. Comparison of nutritional composition of pungus grower, pungus starter, koi grower and broiler.

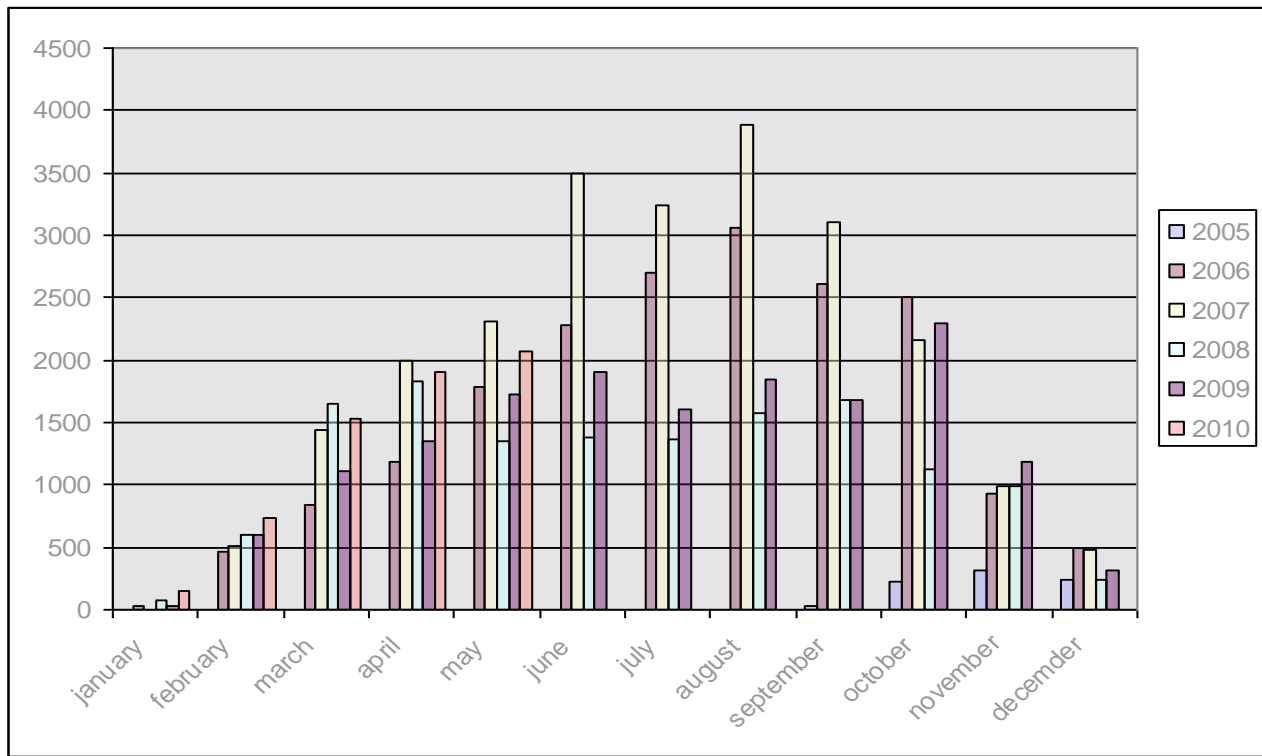


Figure 6. Annual production of feed form 2005-2010 in SHUSHAMA feed limited.

7. Discussion

A field level study on fish feed industry operation (SHUSOMO feed limited) was carried out to know the feed formulation procedure and plant operation.. During manufacture of feed meat and bone meal, dry fish, fish meal, Rape seed, soybean meal having high content of protein are used as protein sources and rice polish, oil are used as lipid source and flour is used as binder. Different types of vitamin are used for example fish grower contains vitamin A, D, E, K, pantothenic acid, folic acid, biotin. The fish grower also contain mineral like copper, iron, manganese, zinc, amino acid like lysine, all are used for growth promoter of fish. Pangus grower has protein content near about 27 percent which is lower then pungus starter, pungus starter has protein content near about 29 percent. On the other hand koi feed have high proteins approximately 30 percent compared then pungus grower. Protein requirement generally high during early stage of fish. Quality of feed that are produced by SHUSHAMA feed are very good and growth performance of the feed is also good.

Production of feed is depending upon the season. In winter season fish grow slowly and take little amount of feed, thus requirement is low .while in summer season fish take more feed and grow rapidly thus requirement is high.

8. Constraints:

1. Electricity(load shedding)
2. Quality of feed ingredients
3. Lack of training facilities
4. Facilities for personnel
5. Lacks of extension facilities
6. Lacks of facilities for research activities

9. Recommendation

The following recommendation should be followed by this industry

- Use good quality ingredients for formulation of feed. This is the only one way to improve the quality of feed. Feed ingredients having high protein content should be use. By using ingredients with high level of protein able to produced high protein content finished feed.
- Any types of hormone, antibiotics, chemicals and growth promoter should not be used to ensure public health security
- Production coding system should be developed as for example uses lot no. or batch no. This will help to take appropriate corrective action with particular feed having problem.

9. Benefits:For Myself:

1. Knowledge about the problems faced during production of feed and their mitigation measures.
2. Practical experience about organogram of a feed industry
3. Gathering knowledge about operational issues of a fish industry
4. Informed about various management techniques consulting with personnel
5. Gathered knowledge about nutritional quality testing.
6. Consultation with the personnel involved in fish industry.
7. Marketing of various fish feed.
8. Overall management practices of a fish farm.

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