Pelleting Process

Evolution of fish feeds:

- Moist feeds; beef liver, spleen 1960
- Powder mixture
- Semi moist feeds; trash fish and powder 1970
- Dry pelleted feeds with lots of fines 1980
- Extruded feeds 1990

Pelleting: to give a cylinder shape to the mixed ingredients under temperature, pressure and moisture.

Why we pellet the ingredients? Because:

- Pelleting process requires temperature, moisture and pressing; so pelleted feeds have a special smell and odour. It is sensed as attractant by the fish.
- We need to use homogenous nutritional value in feeds,
- Pelleted feeds are less influenced by external factors; such as oxidation, moisture etc...
- It is easy to carry and store pelleted feeds
Pelleting Process

• What we do to pellet the mix?
• We use pellet mill and extruder

Pelleting Process (Pellet Mill)

• **Working principles of pellet mill**
  • There are two rollers turn separate ways (to left and right)
  • Both of them press the mix and provide them to pass in to the die.
  • The basic principle is pressing the mix and giving the pellet shape.
If you buy new pellet mill, it will be your first and last sight clean like them...😊
Pelleting Process (Pellet Mill)

- **Characteristics of feeds are produced by pellet mill**
  - We can produce sinking feeds,
  - Cooking rate is about 50%,
  - Moisture content is about 16-17%,
  - Additives like pellet binder should be used about 2-3%,
  - There are fines in last product (it is acceptable until 5%),
  - There is a risk to see a bacterial contamination in last product,
  - It is hard to use different fish feed formulations (e.g. to increase the level of plant origin ingredients),
  - The level of crude fat is limited with 12-15%,
  - First investment of pellet mill seems cheaper or there is second hand chance to find and buy (It is about 200.000 Euros, if talk about complete fish feed plant – pellet mill system).
• **Working principles of extruder**

• Extrusion means to cook the mix of ingredients under temperature, moisture and pressure in extruder.

• Historically, it has been using since 1960’s to treat the soybean meal in U.S.A. (remember trypsin inhibitor)

• The production system is the same until shaping in pellet mill or extruder.
Pelleting Process (Extrusion)

- After conditioning what happens in the extruder?
- The mix spills into the extruder,
- The screw presses the material,
- The steam is injected inside the extruder (moisture is about 35-40%),
- Turning screw in the barrel causes a thermal energy (temperature is 110-130 C)
- Finally; we have cooked and well treated fish feeds

Pelleting Process (Extrusion)

Feeding part  Molding and cooking part  Last cooking part
Pelleting Process (Extrusion)

- **Characteristics of feeds are produced by extruder**
  - We can produce floating, sinking slow sinking feeds (remember feeding characteristics and habits of fish); because we can control the density using different types of screws (screws on the left are for floating feeds, screws on the right for sinking feeds).

Pelleting Process (Extrusion)

- Whenever we want we can change the length of extruder and screw type; it gives us more flexible feed densities.
Pelleting Process (Extrusion)

- **What does an extruder do more different than a pellet mill?**
- It can produce fish feed in every densities
- It can also produce unlimited types of feeds (especially pet foods)
- It can process high level moisture mixes and ingredients (until 55%)
- Cooking rate is higher than 90%
- There is no bacterial contamination, because of high temperature application.
- It can process highly plant origin ingredients, high temperature and pressure increase gelatinization. That’s why digestibility increase.
- We can add high level fat before extrusion (25-30%)
- First investment is expensive; but the quality is top, second hand is still ???? (400.000 Euro)