

FISH SILAGE

Utilisation of fish offal for animal feed or fish feed.

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Extrusion plants.

The equipment required for mixing and extrusion is relatively simple and for a plant with a capacity of 3 tons feed per hour is the space needed for the equipment without raw material silos or final product store approximate 15 meters long by 10 meters wide with free height of around 6.5 meters.



Insta-Pro fish feed extruder with shaped feeds cutter head, aquatic feeds pre-conditioner, and cutter drive

In a conventional feed mill the ingredients are mixed, ground and heated with steam to a temperature in the range 65-85°C. The mixture is then passed through a pellet mill where it is formed into cylindrical pellets of various sizes, depending on the type of animal for which they are intended.

There are problems with this traditional manufacturing method because the temperature attained in the process is sufficient to kill many bacteria, but it is not high enough to eliminate salmonella, a common source of food poisoning and an important public health concern. While feed producers would contest the claim that salmonella infection is a serious problem in the industry, there is growing pressure to ensure that animal feed products are free of contamination. Several types of heat treatment have been devised to sterilise animal feeds as an additional part of the manufacturing process, but they all require producers to invest in new and expensive processing plants.

An engineering company together with partners in Spain, the Netherlands and Denmark, launched a project to design and build an innovative pilot plant for animal feeds. The plant constructed at a feed producer in Spain, demonstrates a versatile manufacturing process that not only subjects the feed to sufficient heat to eliminate bacterial contamination, but is able to produce a much wider range of products than conventional feed mills.

The key to the project's success is the ability of the plant to combine two feed manufacturing processes that are normally quite separate - expansion and extrusion. Both processes operate at higher temperatures than traditional feed plants.

Despite the name, expansion has nothing to do with growing in size. An expander is essentially a continuous pressure cooker in which the feed mixture is cooked at around 120°C at up to 20 times atmospheric pressure. A pellet mill is not required because the product comes out of the expander in the form of crumbles. Expanders are relatively cheap to run and are useful for feeds intended for farm animals, especially poultry, pigs and horses. The crumbles are quite dense, and so are also suitable for making feeds for fish such as shrimp or sole that prefer to eat from the bottom of ponds.

The other process is extrusion. Though well-known in the plastics industry, extrusion as a process for making animal

feeds has come to Europe from the US. In an extruder, the feed mixture is compressed in a tube fitted with a fluted interior surface or containing friction-causing devices such as mixing fingers. The friction caused by the compression heats the mixture to a temperature of about 165°C.

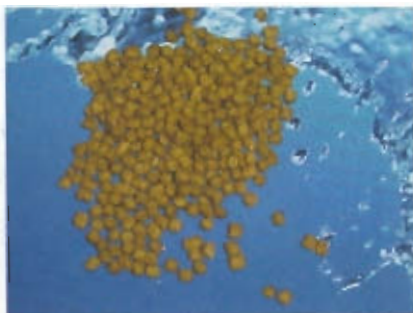
Extruders are typically small machines with a large motor attached. Because of the relatively high energy consumption per tonne of product, extrusion is not economic for bulk animal feeds, which is why it is used mainly for pet foods where the higher temperature is necessary to ensure that the starch is completely cooked. Farm animals, on the other hand, are able to digest uncooked starches.

Extrusion is also suitable for full-fat soya feeds and for tropical fish feeds that should float on the surface. The density can be controlled to produce fish feeds that slowly sink - ideal for salmon farming.

Once again there is no need for a separate pellet mill because the feed is extruded directly into pellets. The product simply needs cooling and drying before it can be packed

Factories wishing to add extruded feeds to their range of products would normally have to invest in an extruder to work alongside the expander, an expensive purchase only justified if both machines can be kept busy.

In the Unzue factory, a processing line mixes the ingredients as usual, but when it comes to the cooking stage the expander has been



Floating pellets 4 mm - Photo: InstaPro

adapted to work as either an expander or an extruder - a combi-machine. It is simply a matter of changing over the head of the machine, a modification that takes about 30 minutes. This allows even modest-sized factories to make either expanded or extruded products, and so cater to a wider range of customers. The plant can be in operation up to 24 hours a day.

However, extruded products are moister than expanded ones. The final product needs to be drier. Pet and fish feeds should contain about 8% moisture, as opposed to about 12% for farm feeds. The solution is therefore to pass the feed through a machine that functions either as a



dryer or as a cooler. When the combi-machine is working as an expander, the machine is mainly a cooler. When the combi-machine is an extruder, the machine is mainly a dryer.

As well as allowing small feed producers to achieve higher productivity without excessive costs, other benefits claimed by the partners over conventional feed processing plants are a significant saving in formulation and manufacturing costs, lower maintenance costs (because a separate pellet mill is not required) and a reduction in atmospheric dust emission. The plant in Spain could be the shape of things to come.

This was the last of 3 articles about utilisation of fish offal by turning it into silage for use in final feed mixtures.



LarEll is at the moment involved in the design and implementation of a large fish processing plant in Abu Simbel, Egypt. The processing plant is designed for a production of 20 tons Nile Perch, Tilapia and Catfish per 8 hours and the total plant will also include processing facilities for making silage and final animal or fish feed.

LarEll Associated Consultants is also - besides design and implementation of complete fish processing plants with new efficient, environmental friendly and tailor-made processing equipment - engaged with many other projects and tasks such as developing and implementing HACCP systems, Environmental Management Systems, marketing studies, total technical draft projects with investment budgets and layouts or even complete business plan developed for the individual needs.

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