

Conditioning and different types of conditioner

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Feed Processing is defined as any changes and processing conducted on feed ingredients before ingested by animals. The commonest feed processing is pelleting. One of the important steps of pelleting is conditioning which is adding steam to the mash feed. In fact, in the later process, heat and moisture are added to the mash feed in order to prepare feed for further physical and chemical changes in next steps. Conditioning pursues two aims: 1. destroying microorganism, 2. beginning the process of gelatinization. Conditioning requires time, moisture, heat and pressure.

Adding moisture to the pelleting is a sensitive step, because mash feed should have about 18% moisture in the conditioner, while this amount of moisture cannot be reachable only in the conditioner and the primary moisture content of ingredients also plays very important role. Adding moisture to the low moisture content feed ingredients leads to high quality pellet. In fact, moisture helps feed passing easily through the die and increasing pellet density. Generally, the ideal moisture content in conditioned feed is 16.5-17%.

Nowadays, retention time in the conditioner is two minutes or less, while this period has been decreased to 30 seconds in some feed mills.

The most important purpose of every feed mill is to use the maximum capacity of manufacturing facilities, while the feed has high quality standards. One of the

effective factors on pellet quality is feed conditioning. Several advantages has been reported for conditioning as follows:

- Pellet durability index (PDI)
- Eliminating feed pathogens
- Eliminating insects' egg
- Improving feed conversion ratio
- Reducing processing costs
- Increasing starch gelatinization
- Increasing nutrient digestibility

In conditioning, mash feed is mixed with steam and pressure for a defined period of time. During conditioning, feed moisture increases 4 to 5 percent and feed temperature receives to 70 to 90 °C. Steam add to the feed in the conditioner.

Different types of conditioner

- Single and simple horizontal conditioner
- Double and three stages conditioner
- Long term conditioner
- Super conditioner

Nowadays, the conditioner is one the main components of animal feed manufacturing. Time and temperature is different from one conditioner to the other one. Also, conditioners differs from various points like length, diameter, type, number of equipment, place, angle, steam entering, the presence of blades and their positions. Any changes in these factors can affect the durability of materials in the

conditioner. Since, there are various factors influencing performance and maintenance of conditioners:

- Controlling steam stream from boiling pot to the conditioner
- Appropriate steam pressure
- Appropriate position of peddles
- Durability

Generally, first two points includes steam controlling, while second two points considers the conditioner performance. The most important aspect of feed processing is adjusting steam addition. The latter process is performed through the effective control of steam from steam pot to the conditioner. Steam monitoring in its way to the conditioner is a routine job in the industry. The aim of controlling steam is to provide clean and adjusted steam for the conditioner.

The stainless steel should be used to make the conditioner body. The main components of a simple conditioner are:

1. Metal cylinder
2. Shaft
3. Peddles
4. Feeder
5. Electromotor
6. Steam inlet

Temperature in simple conditioner should be between 50 to 85 °C and retention time is between 50 to 70 seconds. The length of cylinder is different between the producers, while diameter can be 38 to 76 cm and length can be varied from 1.5 to 4.6m. Moving shaft is equipped to some peddles for movement that can be adjusted or changed when required.



Single and simple horizontal conditioner



Double stages conditioner



Three stages conditioner

Double and triple conditioners contains two or three cylinders, respectively, which each cylinder can have one or two moving shafts. In these conditioners, retention time increases and consequently feed cooking happens more deeply.

In long term conditioners, time can be increased to 4 minutes. This conditioner contains steam mixer, automatic control of steam quality, and retention for long time which has a remarkable role in improvement of cooking process. This cooking method can improve nutritional quality of feed and also increase pellet quality.



Long term conditioner

Advantages of long term conditioners

- Enhancing physical (hardness and durability) and chemical (gelatinization) characteristics of feed
- Increasing retention time to more than 4 minutes and temperature to 90 °C
- Improving feed processing through first in- first out principle
- Consuming less energy (less than 2.5 KWh per ton)
- Increasing pellet mill capacity to more than 20%
- 20% Reducing electrical energy usage
- Applicable to use for wide range of materials (even for ones with low gelatinization capacity)
- Improving animal performance (growth, feed efficiency and health)
- Applicable in low-rise buildings, gap between entrance and exit only 1230mm

Super conditioner is a slope cylinder which improves mixing, filling the tank and retention time. Materials are mixed by rotor peddles. Steam is directly injected and constant cooking takes place. Retention time is more than 6 minutes and cooking temperature can be controlled in a wider range. This type of conditioners drastically improves nutrients digestibility, physical quality of pellets and reduces energy expenditure in production line.



Super conditioner

Other advantages of super conditioner include cereal conditioning, manufacturing processed mash feed (breeders and layers), processing feed byproducts or low value products to improve nutritional value.