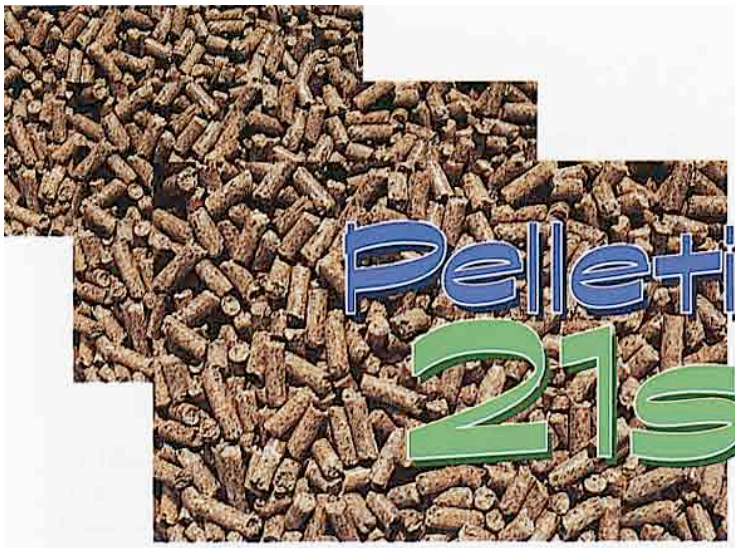

Pelleting into the 21st century

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As we approach the 21st century, there are many ideas regarding pellet quality and stability, the majority of which focus on one or two areas of the pelleting process. However, pelleting must be viewed as a total process.

Pellet quality starts with good quality ingredients in the formulations. It continues with consistent particle size reduction; a well-maintained supply of quality steam; the right conditioning parameters; a well-designed pellet mill with the right die specifications; a cooling process that enhances pellet quality; and mechanical transfers that don't negate all the hard work. Finally, the complete process flow needs considerable attention.

Pelletability

The efficient use of byproducts for ingredient feed formulation continues to grow. The pelletability of these ingredients is an important consideration when predicting the final pellet quality of a particular feed formulation. (Several ingredient pelletability indexes are found on page 123 of *Feed Manufacturing Technology IV*).

Typically, production of a high-quality pellet requires an average micron particle size of 700 or less. However, most ingredients and byproducts are purchased on a specification of 95% through a standard U.S. 10-mesh screen. Ten mesh is 2,000 microns. Most cereal grains are ground to a 700 or less micron before batching. This method produces a formulation that has an approximate 1,000-micron average.

Post-mix grind

This flow enables ingredients to be purchased to wider specification. The total ration is ground through a 3- to 2-millimeter screen for a 400- to 700-micron total-granulation particle size. This enables the ration to accept a better steam conditioning and produces a more stable pellet.

The feed formulation accepts the moisture and heat from the steam uniformly when the particle size is properly prepared. You must have enough moisture (saturated steam) to transfer the heat to do the cooking.

Preparation

A properly prepared ration doesn't need double conditioners, expanders or superheated steam systems. A simple system utilizing a post-mix grind or post-grind flow, in addition to utilizing equipment that has been properly sized for the application, can efficiently produce a quality stable pellet.

Steam

You'll want a system that will supply steam to the pellet mill conditioning chamber in a state in which it left the boiler. The size, maintenance and chemical treatment of the boiler needs to be closely monitored. The valves and controls need to be maintained at all times. A poor-quality steam will make it impossible to achieve a quality stable pellet.

Conditioning

Ideally, the conditioning process requires 95% to 100% pure, saturated steam that's free of water droplets. The proper steam can penetrate a properly prepared feed ration with the moisture needed to hydrate, and in turn, allow the heat transfer to produce a well-conditioned formulation ready for immediate forming of the pellet mill die.

The conditioning itself will need to have the proper tip speed on the picks and the

proper face orientation of the picks to allow the proper parameters for the steam to be mixed with the ration.

Pelleting

The pelleting process is fairly straightforward when the ration has the proper particle size, provision of quality steam and correct parameters used in the conditioning. The key is to have a pellet press that's energy-efficient, has a robust design with few moving parts and is easy to operate and maintain. The design should have a slow die speed to transfer as much energy as possible to the forming pellets.

A properly prepared ration will lower energy consumption and cost on wear parts. Because the pellet mill will act as a forming device instead of a grinder, it will operate longer, and at a lower cost.

At this point in the process, the die specifications to improve pellet quality are usually at the expense of production capacity. This is assuming that your die specification is "in the ball park" to start with.

Cooling

The cooling process can add or subtract as much as 7% to the quality of the pellet. The pellet needs a tempered cooling. The moisture and heat must be able to migrate from the center of the pellet to the surface.

The process of hot air moving across hot pellets, warm air across warm pellets and cool air across cool pellets produce the best conditions for evaporative-type cooling that allows this gradual movement of heat/moisture. This results in a more stable, quality pellet that will hold together.

Transfer

Often, transfer systems are nothing but grinders disguised as conveying devices. Feed pellets have a high grind index, so it doesn't take very high tip speed to crumble/reduce a pellet back into granular form.

More attention should be given to feeding transfer points as well as the speeds at which the conveying devices are set up to run. Investment in the next larger size will return great dividends, especially when screening and repelleting the fines.

Conclusion

Pellet quality cannot be specific to just one machine or aspect of the process. It starts with the ingredients in the formulation and continues through the entire process. Any one step left out will sabotage the entire process. It's a total process that requires a total solution. F&G

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