

Finished Feed

The transportation and unloading process of finished feed can be time consuming and challenging to maintain feed quality. Efforts should be made to minimize delivery mistakes through sampling, documentation, and attention to detail. Making sure feed is delivered to the correct location at the correct time so pigs are fed expected feed after it has left the feed mill is essential for pig performance.

Sample Collection

Frequency, storage, and labeling

Sample collection for finished feed should be placed as close to the loadout bins as possible to evaluate feed quality leaving the mill. However, obtaining a representative sample and the safety of the sampler is most important. Depending on which method works for each individual location, additional options for finished feed sampling include taking samples throughout the sacking run (bags) or successive mixer samples near mixer discharge. Please refer to sampling procedures as outlined in the *KSU Quality Feed Manufacturing Guide: Ingredient Receiving and Sampling* guide. Using pelican samplers or PVC cut stream sampling from loadout or bin discharge will help ensure a representative sample. Collection from the stream should be timed with how long it takes the mixer, sack off, or load out bins to become empty. A sample of about one pound should be collected from five subsamples from the stream of finished feed. If storage space is available a sample should be obtained from each production run of each finished feed formula. At a minimum, it is recommended to sample each formula once per week or 1 sample per 100 tons of production, whichever will provide more samples (Jones, 2006). Finished feed samples should be retained as composites for 6 months or 1 year for medicated feeds. New VFDs for category II medicated feed must be sampled and assayed three times in the

first year and once annually after that. Records must be kept for 1 year for finished feed and 2 years for VFD's. Samples should be evaluated for texture, pellet quality, color, and odor. Anything unusual should be recorded and addressed. Samples should be stored in a way to maintain the integrity of the sample - in a cool, dry area with low humidity. Sample labeling should include 1) date, 2) formula and amount, 3) delivery site, and 4) sampler ID. All finished feed should be labeled properly with a tag either sewn to the bag or accompanying bill of lading for bulk delivery (Table 1).

- If problems arise with finished feed, processes should be discussed with feed mill employees and double checked by (Jones, 2006):
 - ✓ Retesting sampled finished feed,
 - ✓ Resampling if feed is available,
 - ✓ Checking ingredient tolerances (batching records),
 - ✓ Checking ingredient inventory,
 - ✓ Checking scales and meters,
 - ✓ Checking bins for bridging,
 - ✓ Checking mixing time,
 - ✓ Checking ingredient assays from suppliers,
 - ✓ Checking formula matrix values

Table 1. Finished product sample label

Date	
Time	
Formula ID	
Amount delivered (tons)	
Site	
Delivery ID	

Testing

Nutrient composition of finished feed can be evaluated using near infrared spectroscopy (NIRS) or a commercial laboratory. The NIRS technology can serve as an internal assessment before delivery or for problems with finished feed. This

provides quick answers with minimal sample preparation, and low cost after initial investment. There are tabletop and in-line options for quicker results. In some cases, NIRS technologies can be managed remotely via companies able to maintain calibration and provide data management. Pellet quality, as described in *KSU Quality Feed Manufacturing Guide: Pelleting*, should also be evaluated prior to loadout. Additional laboratory testing should be performed if there are problems with finished feed quality and can be done by a commercial laboratory.

Minimum testing schedule

It is recommended to collect 3 samples each week from each feed type to evaluate moisture, crude protein and fat, Then, 4 to 6 samples of each feed type should be evaluated monthly for calcium, phosphorus, and sodium.

Feed delivery procedure

Prior to loading

Empty truck weight should be obtained to verify total amount of feed being delivered. Legal hauling limits will depend on state department of transportation laws for the delivery area. Questions about existing feed storage or bin condition should be addressed with management prior to delivery. There should be documentation of the formula, amount of feed in each individual truck compartment, and where each compartment should be delivered (site and bin location/number). Compartments should be clearly identified, free of leaks, empty from previous loads, and have properly sealing gates. Trucks must also be clean, with properly sealing gates, and sanitized when necessary. If a contract driver's truck is not clean, they should be asked to clean it. Issues with truck equipment should be reported and trucks should not be loaded. If delivering to a site with disease, trucks must be washed, sanitized or provided down time prior to returning to the mill. Truck sanitation should be performed when delivering feed to a health compromised site or out of production order (multipliers, sows, nursery, finisher).

Loading trucks

Every effort should be made to load trucks with like formulas to be delivered to the same production stage to maintain biosecurity. Additionally, swine grower or finisher diets should not be loaded on the same truck as withdrawal medications. If this does happen, sequencing the unloading order should be done so that the complete swine grower or finisher feed is unloaded first. If that is not possible, the complete system should be flushed before unloading swine grower finisher. If truck has delivered Category II medicated feed, sequencing, flushing or clean out should be performed before carrying subsequent loads.

Prior to leaving the mill

Drivers should be in clean clothing with clean, sanitized boots that have not been in contact with the floor of the mill or disposable booties were used. Drivers should also be equipped with clear driving directions and maps of bin locations where feed is to be unloaded. Clear delivery instructions should be obtained from site owners or managers. Empty truck weight and amount of feed added to empty truck weight can provide information for deviation. Deviation in expected vs actual truck weight by more than $\pm 2\%$ of the load should be investigated. Potential hang up in loadout bins, conveyors or even the mixer are possible and will influence subsequent loads. Documentation for delivery should include date and time, formula number, site name, bulk finished product bin ID, net weight loaded, truck compartment, planned route of travel, previous load location, amount to be loaded in each bin and loadout personnel ID (Table 2).

Table 2. Delivery ticket	
Date and time	
Formula number	
Site name	
Bulk finished product bin ID	
Net weight loaded	
Truck compartment number	
Planned route of travel	
Previous load location	
Amount to be loaded in each bin	
Loadout personnel ID	

Arriving at the location

Ensure the area is safe for unloading free of electrical lines, weeds, and wildlife. Double check the bill of lading for accurate locations of bins. Make sure the bin opening is of an appropriate size for the unloading auger. Bulk bins at each site should be verified empty prior to unloading by farm site manager. Order of unloading should be documented on the truck log. Unloading should take place from rear to front to reduce strain on the delivery system. It is critical that biosecurity measures should be taken to prevent spread of disease. On trucks with multiple feed formulas delivery order should be multiplication units, nursery, grower, and finisher feeds. If trucks go out of order, the outside of trucks and inside of truck cabs should be thoroughly cleaned and disinfected. Drivers should always wear proper footwear and shoe coverings, disinfecting before leaving the site. Never enter a barn on-site. For bagged deliveries, damaged bags should be noted and fixed on arrival. Pallets should be unloaded by site personnel only.

- Delivering feed to the correct bin at the correct site is a pivotal step in getting pigs the feed precision formulated for their needs. While this may seem simple, deliveries to the wrong bin can happen by accident. Feed delivered to

the wrong bin must either be fed to pigs at the different growth stage, blended with existing feed, or removed from bin. These tasks require a lot of time and money with potential losses in performance. Options for use of automation systems such as barcodes for loading and unloading and GPS systems can be utilized to minimize risk of incorrect feed being delivered.

Prior to unloading

Thoroughly evaluate bin structure for broken parts and holes which would compromise the bins ability to hold feed. Opening one truck compartment at a time will alleviate chances of error. Bin lids must be closed immediately after unloading. Delivery tickets should be left at location specified by site owner and a copy retained at feed mill with signatures of driver and if possible, site owner. Delivery errors and spills should be reported immediately to management. Due to biosecurity concerns, if a delivery error occurs, product should not be returned to the feed mill.

Returning to the mill

Trucks may need to be washed, disinfected, and heated especially if delivery to a health compromised site. If delivering medicated feed, flushing with 50 to 100 lbs of ground grain should be used and disposed. Make sure truck compartments are empty for the next load of feed. Fill out the truck logbook and complete delivery paperwork which should include 1) mileage, 2) number of stops, 3) names of site owners, and 4) quantity of bulk or bagged feed delivered. Report any issue with delivery or observed issue with the site.

Summary

Physical feed characteristics can change until feed consumption. Documentation and preparation can decrease error and ensure feed is delivered to the correct location. Factors that influence feed from the feed mill to the feeder include auguring, transportation, and feed movement which can

ultimately affect pig performance and economic return.

References

Jones, F. T. (2006). Quality Control In Feed Manufacturing. Retrieved January 28, 2021, from <https://www.thepoultrysite.com/articles/quality-control-in-feed-manufacturing>.