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Minimizing shrink at feed centers for greater profitability

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Feed shrink represents the amount of feed produced or delivered that is never consumed by animals (Radunz, 2010). Any feed input purchased by the operation, but not fed, can be considered a drain on profit. While some loss is expected, there is a tipping point for each operation that makes focusing on reducing shrink losses important.

Shrink is often referred to as an "invisible loss" where feed leaves the farm as dust on trucks, for example, rather than as gains. Shrink also can occur due to simple accounting or weighing errors that leave producers with inaccurate measurements (Emmerson, 2005). Feed manufacturers have long sought to measure, manage, and reduce shrink. Some of their techniques and processes can be adapted to on-farm feed mills and ration mixing for all types of operations.

Cost of shrink

Feed is typically the greatest expense on any farm. Yet, the exact cost of shrink can vary with the species of animal, type of feed inputs, cost of feed, and market price of livestock. Shrink is estimated to be a multi-million-dollar problem for the U.S. feed industry. Ultimately, this reduces profits as high-value inputs are diverted away from performance gains. However, shrink can be controlled (Schofield, 2005).

Establishing goals for reducing shrink requires operations to first measure what is happening in their operation. Most feed manufacturers aim for zero shrink. Yet, surveys indicate the average shrink loss is closer to 0.81%, ranging from 2.5% shrink to 1.09% gain (McEllhiney, 1994). These figures are nearly 30 years old, and both feed manufacturers and operations could use updated industry benchmarks using today's equipment and processes.

Radunz (2010) estimates feed shrink on feedlot beef operations to range from 2% to up to 20% in extreme cases. In feedlots, losses can differ from 3% to 7% for dry ingredients and between 15% to 35% for wet ingredients.

Even using estimates from 1994, calculations show controlling shrink can impact the bottom line. For example, 100,000 tons of feed with an average shrink of 0.81% would mean a single operation could lose up to 810 tons of feed each year. At an average value of $200 per ton, the monetary loss would be $162,000 a year.

These figures help make the case for investing in identifying, measuring, and controlling sources of shrink on any operation. It also gives producers a budget for upgrades to equipment that can help reduce losses.

Measuring shrink
Operations simply cannot manage what is not measured. The typical formula for managing shrink can be expressed by either weight or as a percentage. Ultimately, this can be translated into dollars for monetary accounting.

> Expressed by weight = (beginning inventory + receipts) – (Ending inventory + shipments) = shrink
>
> Expressed by percentage = (shrink by weight / shipments by weight) x 100 = % shrink
>
> Expressed by monetary value = Shrink by weight x (monetary value / weight unit) = $ shrink

Causes of shrink
Shrinkage can occur in nearly any part of the process: receiving, grain processing, mixing, bulk feed loadout, and feed delivery (Figure 1). There is no single source of shrink that can be corrected on an operation. Each source must be identified and managed to reduce the overall loss.

Receiving
Shrink can occur nearly immediately when inputs arrive on the operation. Scaling errors can result in on-paper losses, which leaves managers without a solid understanding of the operation's true inventory. Nearly every operation encounters dust or spillage during unloading, which should also be understood as part of the shrinkage puzzle. Bags of various inputs can arrive broken, or employees can miscount the inventory (Emmerson, 2005).

Grain processing
Moisture loss during handling and processing is a major cause of shrinkage in feed manufacturing. Hammermill grinding of grain can result in moisture loss in excess of 1%. Part of this loss is due to heating generated by the grinding process. Mechanical handling of ground grain after the grinding process generally results in less moisture loss than pneumatic conveying (Schofield, 2005).

The pelleting process can be a cause of shrinkage in operations. A major portion of that shrink may be due to moisture loss during the pellet cooling operation. Another source of shrinkage can be dust emission at cooler air discharge related to either improper design or maintenance of the pellet-cooling system (Schofield, 2005).

Mixing
Moisture loss can also occur in this stage, and goals for improving scale accuracy should carry over to this process as well. A quick check for losses at this stage is to determine how long it should be between deliveries of feedstuffs. Dividing the amount of product delivered by the amount fed each day should give an estimate of when the next shipment should be needed. If deliveries are needed sooner, the shrink loss at mixing can be estimated using the additional amount required (Brouk, 2009).

Bulk feed loadout
Transit losses from leaking augers, spills, or dust can cause shrinkage all the way to the feed bunk.

Reducing Shrink
Adapting recommendations for reducing shrink from feed manufacturing centers to on-farm operations can give producers a checklist for making improvements. These areas should be considered regularly — especially if shrink measurements increase.

Inbound products
Correctly accounting for incoming materials helps guarantee accurate shrink benchmarks for the operation. Ensure each input is stored and handled according to package guidelines. Often, products will require temperature-controlled environments. Maintain receiving equipment and schedule regular maintenance. In addition, check to make sure all goods coming into the operation are free from damage or moisture that could expedite spoilage (Schofield, 2005).

Ingredient quality
Rotate inventory to help prevent spoilage. Plus, clean bins and bays routinely to help prevent contamination from spoilage or buildup.

Pest control
Keep storage, mixing, and handling areas clean to eliminate areas that harbor pests. Trim weeds and tall grass around buildings and bunks (Radunz, 2010). Establish baiting, trapping, and control procedures to eradicate and control rodent populations. Fumigation procedures can help control losses from insect infestations (Schofield, 2005).

Birds and rodents not only cause feed loss, but their presence can put animals at risk for various diseases. Keeping birds out of buildings also can help control shrink. Previous research reported starlings consumed about 2 pounds of feed per month, and flocks can range from several hundred to several thousand birds (Radunz, 2010).

Calibration
Proper calibration of all bins, tanks, and silos can help reduce shrink losses as well (Schofield, 2005). Weighing errors due to improperly calibrated scales can cause shrink. Many mixer scales are only precise to plus or minus 10 pounds, and the accuracy error is typically about 1%.

Challenges to proper calibration can include worn weigh bars and load cells, binding mounts, rust, and/or caked mud and dirt (Hartschuh, 2016).

Dust control
Make routine audits of all equipment for dust collection and/or control to be sure that it functions as designed. Evaluate all sources of dust emission not adequately controlled. Replace or repair leaking spouts, elevator legs, conveyors, and other material-handling equipment. Dust collection systems also can help. Dust depressant systems can use mineral oil, tallow, or water to help reduce emissions and losses. Enclosing receiving and shipping areas can help reduce losses from wind and rain (Schofield, 2005).

Covers can be placed over drop spouts to help prevent dust from falling feed. Grinding feed ingredients to smaller sizes may increase the formation of dust. For example, grinding grains smaller than 600 microns can increase dust and increase the risk of gastric ulcers in pig feed. On the other hand, leaving particle sizes larger than 800 microns can increase the rate of feed sorting and wastage (Schell, 2006).

Processing
Control what you can at this stage. This includes fixing leaks and maintaining equipment to prevent new leaks. Consider the estimated range of shrink losses to help make the case for new or improved equipment investments.

Outbound finished products
Weigh all trucks, empty and loaded, as they enter and leave the plant. Insist on a first-in, first-out rotation of packaged products to reduce the incidence of out-of-condition products. Date code all manufactured (packaged) products to assist in the rotation of stock (Emmerson, 2005).

Return all damaged or broken bags to the mixer or bagger while they can still be identified. Intermingled feed material results in a monetary shrink, and, in some instances, weight shrink if the products must be discarded. Check shipping (loadout) practices and procedures to be certain that payment is received for every unit shipped (sold) (Emmerson, 2005).

Security
In addition, shrink can occur through theft. Improving the operation's security can help reduce the possibility of theft. Establish policies for the removal of damaged feed or grain. Removal should require a weight certificate and an invoice (Schofield, 2005).

Shrink reporting
Establish a company-wide, standardized procedure for reporting shrink. Set shrink standards by location and establish shrink reduction goals for each facility. Include the cost of shrink in product pricing (Schofield, 2005).

Conclusion

Reducing shrink is a task that requires attention to nearly every aspect of feed handling on the operation. However, the returns can be substantial when reducing even a fraction of the percentage of feed inputs lost.

Figure 1. Potential causes of shrink.

Process		***Cause***
Receiving	Bulk	• Dust/spillage loss during unloading • Scaling errors • Loss in transit • Railcar/truck/ship cleanout • Shipper practices (water, foreign material, overall quality)
	Bagged	• Broken bags • Underweight bags • Count errors
Grain Processing	Grinding/cracking/flaking	• Dust loss • Moisture loss • Spoilage • Spills/leaks
Mixing		• Moisture loss • Scale accuracy • Spills/leaks • Dust loss • Flush material loss
Bulk feed loadout		• Dust/wind loss • Spills/leaks • Weather • Scaling errors
Feed delivery		• Transit losses • Dust/spills during unloading

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