FeedFIT®

Shrink, Leachate, and Pests

GPS DAIRY® CONSULTING LLC

Objective:

Understand different ideas and or programs to manage shrink, leachate, and pests within the feeding system.

Shrink: Every dairy has shrink, but to really understand how to control it, farms need to measure it, accurately and scrupulously. Shrink has many areas of impact, and the only way to know what it is and where it is coming from, is to physically collect the data.

This data includes:

- Routine physical inventories (estimates are OK, but you really need actual weights or zero values)
- Deliveries (which weight is the dairy using – broker weight or on-site weight)
- Amount used (what is fed and whether it is recorded in feed program or not)
- Inventory used for non-feed purposes (i.e. bedding)

Shrink should be repeatedly measured over time to get an accurate assessment of actual shrink. It is not a static value; it can flex and change over time and is relative to the overall total amount of that ingredient over a given period and circumstances. Measuring shrink must involve numbers. A visual assessment does not quantify the extent of the shrink. It must be related back to total volume of the ingredient over a period of time.

Here is a list of areas to consider when evaluating shrink:

- Physical inventory
- Delivery data – what is your starting value? Using broker weight or on-site scale weight, how often are truck and feeding scales calibrated?
- Usage data
    - Feeding (recorded in feed program),
    - Feeding (outside of feed program), bedding, etc.
- Type of storage – bay, bin, pile, bunker, bags, bales, etc.
- Feeder precision, accuracy, and routines
- Cleanliness of feed area – spilled feed and where is it pushed
- Weather – wind, rain, snow, etc.
- Inventory data management
- Timing of data entry
- Ingredient DM
- Scale calibration – truck scales, feed scales, etc.
- Pests – rodents, birds, etc.

Below is a summary of actual farm data. Routine physical inventories were taken, the feed area was well maintained, and feeder performance was closely monitored. Please note that there is variation month to month and that sometimes there are positive values. These positive values and variation could be from a variety of reasons such as inaccurate estimates of physical inventories, misuse of ingredients, pushing spilled feed into inventory pile, missing/inaccurate delivery/usage data, and more.

Ingredient	12	11	10	9	8	7	6	5	4	3	2	1
Distillers, Dry	0.35%		1.10%	-3.40%	-1.50%		-0.90%	-0.95%	-0.84%		0.10%	
Corn, Ground	-0.84%		-0.40%	-0.20%	-0.60%	-0.62%	-2.70%	-3.90%	-0.92%		-1.34%	-1.40%
Premix1	0.25%	0.92%	2.30%	1.50%	2.00%	-0.18%	1.00%	0.55%	2.71%	1.58%	1.03%	
Mineral	1.27%	-5.50%	-2.90%		-7.30%	-7.52%		11.36%	-0.63%		18.00%	27.30%
Soybean Meal		-0.91%	0.40%	1.20%	0.50%	-0.57%	-2.20%	-4.83%			1.13%	1.60%
Premix2		-4.72%	-1.80%	-0.90%		-0.14%				-3.00%		
Canola	0.50%	1.42%	4.90%	-0.30%	-1.20%	-1.11%	-0.80%	-0.10%	-0.55%	-1.21%		
Corn Gluten, Wet	-4.53%	-5.86%	-3.10%	-1.60%	-6.10%	-2.17%	-6.00%	-3.20%	-5.48%	-7.22%		

Suggestions for when or how to record physical inventories:

- After feeding at the end of each month/routine monthly checks
- Any time a bay/bin is low/empty
- Weekly for ingredients with large adjustments in the previous month
- Monitor daily inventory levels in feed program to identify low inventory levels or possible delivery entry errors
- Do not forget hay and straw. Use rolling bale weight averages for estimating tons. Record usage not going through feed program (ex. straw for bedding).

You will calculate more accurate shrink values with more consistent and accurate physical inventory and usage values.

Shrink determination is based on multiple data points over time. Tracking shrink within inventory management is a mindset. Controlling it is systematic and routine. Finding someone in your operation to take ownership of inventory management will be very important to be able to calculate your shrink because only then can you work on improving your shrink by finding ways to lower these numbers.

Shrink Scorecard: Although we just discussed in the previous section ways to measure shrink accurately with numbers, sometimes this may not be a viable on-farm option. Below is an example of a shrink scorecard that was created by the GPS team to provide general feedback on areas where a dairy may have higher potential for shrink. Although this scorecard does not provide exact numbers on shrink levels, it will provide a general guideline for areas of the feeding operation that a farm should focus on to improve their shrink. This is a great starting point for farms to improve the profitability of their feeding center.

Shrink Scorecard

Survey Questions	Yes or No
Are bunker densities routinely checked?	
Is a certified truck scale available on the dairy?	
Does a manager view loading deviations?	
Are deliveries weighed on farm and recorded in feed software?	
Is usage of ingredients recorded in feed software?	
Are inventories reconciled?	
What type of feed storage is used?	

Forage	0	1	2	3	4	Score	Weighted Score
Forage covering	Uncovered pile	Sparse tire use, No O2 barrier film, pile on rough concrete or surface,	Mediocre tire weight, edges of plastic covered	Good tire coverage, edges secured	Tire to tire, O2 film+Black and white, edges secured,		0
Forage Center Flooring	No concrete or ashalt	Some solid surfaces, but many potholes and broken areas	Very rough surface but makes it unable to clean	Some rough or broken areas but managed well	Clean, smooth, solid, flooring		0
Facing	No facing, bucket gouging	Infrequent facing/raking	Facer or raked used, but still rough faces	Good facing but not consistent or face day before	Smooth faces		0
General Cleanliness/Spillage	Dribbled feed throughout the feed center, piles of random rotten feed		Some spilled feed from payloader bucket while driving. Not cleaned-up frequently.		Clean feed center, dropped feed is collected and fed		0
Packing Density	Loosly Packed		Medium Pack		Hard Pack		0
Inoculant Usage	None		Inoculant is used on occassion		Full rate of proven innoculant		0
Sampling and Frequency of DM	Never on any Feed	Rarely Take DM Samples		Weekly DM Samples Taken	DM Samples Multiple Times a Week		0
Leachate	Large flow of leachate		Some leachate		No Leachate from any piles		0
Spoilage/Mold	Excessive spoilage		Batches of mold/spoilage in corners or side		No Spoilage		0
						Total Forage	**0.0**

Commodity	0	1	2	3	4	Score	Weighted Score
Storage	Outside with no protection	Outside bay	Overflowing bays. Some mixing of ingredients	Inside, well-maintained bays	Bulk Bin		0
Loading	Loaded with large bucket outside prone to spill	Loaded outside but a windbreak is utilized	Loaded inside with bucket, little blown away	Bulk Bin with sock too short	Bulk bin with long socks		0
Liquid Ingredients	Visible liquid on the ground. Additon of liquid feed (water or whey) causes bunk instability/heating		Some liquid on ground or blows while loading.		No Liquid Ingredients or Liquid is used properly and helps prevents sorting		0
Type	Large use of wet ingredients (brew, wet distillers, wet corn gluten feed)		Large use of feed that will blow away (soy hulls, ground straw, ground hay)		Only dense commodities used		0
						Total Commodity	**0.0**

Feeding Process	0	1	2	3	4	Score	Weighted Score
Ingredient Deviations	Average >100 lb DM or >200 lb AF lb per action		Average deviation ~60 lb DM or ~120 lb AF per action or No Feeding Software		<30 lb DM or <60 lb AF per actions		0
Diligence	Full buckets spilt and dribbled		Spilt some feed, but picked up well.		Shakes excess out of bucket, cognisent of shrink		0
Prebatch	Prebatch is used. It is mixed and stored outside. Prone to spoil.	Prebatch is used. All dry ingredients. Stored inside, but move feed excessively.	Prebatch is used. Some shrink prevention measure are taken, but still have risk to shrink.		Either no prebatch or if prebatch is used, it is mixed and stored inside.		0
Mixer Performance	Worn mixer. Large amount of feed left inside mixer between batches. Overflowing mixer.		Overfilled mixer		Properly filled, well-maintained mixer		0
Scale calibration	Never checked	Checked with difference >5%			<1% difference from truck scale checked quarterly		0
Excess Moving of Ingredients and Grinding	Premix or staged forages moved often and prone to loss/Straw and hay ground and stored outside		Ground products ground outside but stored in a structure	Premix or forages staged with limited loss/Ground products ground and stored inside	No forages are staged, no premix, no ground products		0
						Total Feeding Process	**0.0**

Post Feeding	0	1	2	3	4	Score	Weighted Score
Weighback usage	Weighbacks always thrown away	Weighbacks often thrown away due to poor bunk stability	Limited weighback thrown away	Weighbacks sent to heifers	Weighbacks used in late lactation pens or sold		0
Feed Bunk	Feed is often pushed over curbs into alley		Feed occasionally pushed over curb or is pushed creating uneven distribution from end to end of bunk		Feed stays in feed bunk reachable by all animals		0
Pest	Intense amounts of bird and rodent damage		Some birds and rodent		No pests present		0
Bunk Aeorbic Stability (Bunk Heating)	Excessive Heating causing wasted feed		Bunks heat only on hot days		Bunks stay stable throughout the year		0
						Total Post Feeding	**0.0**
						Final Score	**0**

Leachate

Why such concern over silage leachate?

Leachate presents an environmental problem when it flows into surface waters. Silage leachate has an extremely high biochemical oxygen demand (BOD). This means that leachate has a very high potential for consuming oxygen, and when it's discharged into surface water, it can remove so much oxygen that fish and other aquatic creatures are impacted. As little as 1 gallon (3.8 L) of silage leachate can lower the oxygen content of 10,000 gallons (37,854 L) of river water to a critical level for fish survival. (https://www.canr.msu.edu/resources/environmental_stewardship_controlling_silage_leachage)

Below are some areas that can help to limit and/or manage leachate on farms:

1) Minimizing leachate
    a. Proper management of forage moisture is one of the best ways to minimize leachate from silage crops. Below are recommended dry matter levels for each crop:
        i. Corn Silage: 34-36% dry matter
        ii. Haylage: 38-45% dry matter
        iii. Grass Silage: 32-38% dry matter
        iv. Snaplage: 62-57% dry matter
        v. High-Moisture Corn (HMC): 71-75% dry matter
    b. Protect feed from water
        i. Cover feed if raining during filling process
        ii. Cover/wrap side walls and edges
        iii. Divert clean water away from feed storage structures
        iv. Minimize exposure when feeding
    c. Keep feed pad clean of feed and standing water

2) Leachate collection
    Most leachate collection systems consist of both a leachate collection system and a vegetative treatment area (VTA). These systems are designed with a "first flush" concept, which is believed to maximize the constituent load per volume collected. After the initial first flush collection, flow from feed storage facilities is sent to a secondary treatment, commonly a VTA.

    NRCS Code 629.V.C.1.c.1 requires all leachate to be collected on applicable farms. NRCS Code 635.V.D.1 further establishes that VTAs need to be designed to treat a minimum flow rate produced by the runoff from 25% of the peak flow of the 25-year, 24-hour storm event. The remaining portion of the 25-year, 24-hour runoff can be diverted from entering the VTA as this remaining water is expected to have negligible levels of contaminants.

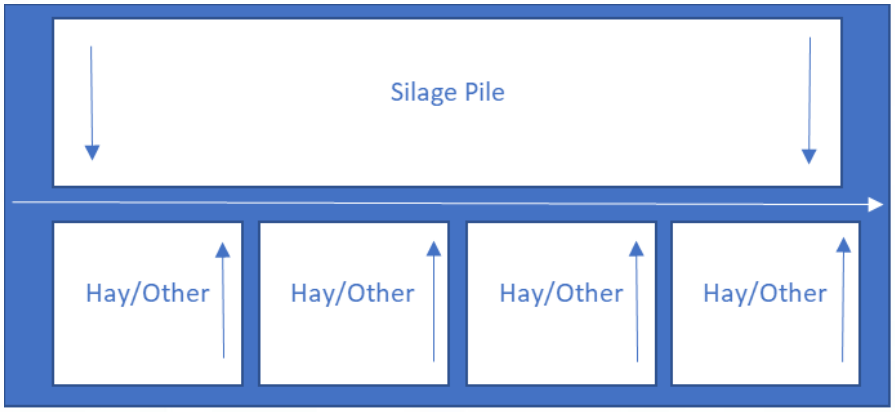
Resources:
- https://widnr.widen.net/s/xr5j59spjk/bunkersilagestorageleachateandrunoffmanagement
- https://uwdiscoveryfarms.org/wp-content/uploads/sites/1255/2020/09/Web-Leachate-Tech-Report.pdf

3) Collection designs

a. Low flow/high flow - Low flow will capture the most polluting leachate, where high flow liquid requires less treatment and can be diverted to VTA

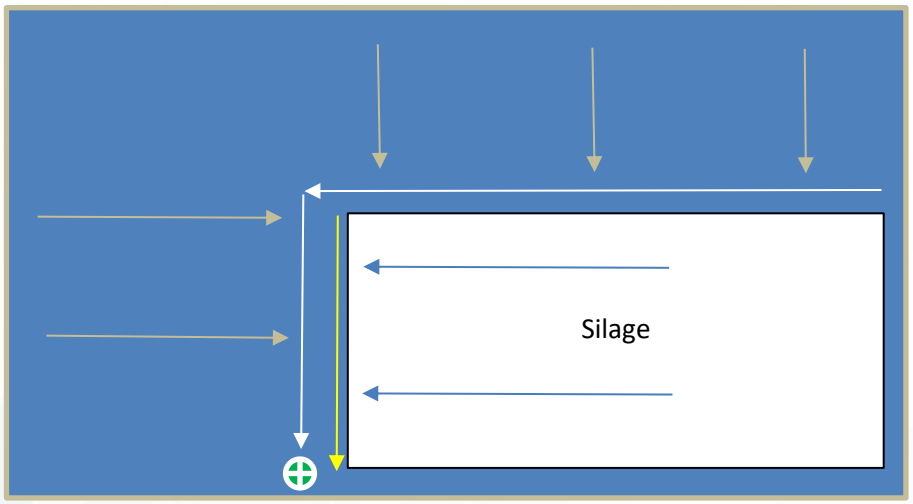
b. https://projects.sare.org/wp-content/uploads/999444managing-silage-leachate-fact-sheet-color.pdf

Figure 1. *Low-flow/high-flow separation with over-shot pipe design. Low flows trickle from upper opening into horizontal pipe and are stored. High flows drop into concrete basin and are directed to Vegetative Treament Area (VTA).*



Above is one example of a new construction project that is designed to collect leachate. The blue lines on the drawing all represent the slope of the pad towards the center while the white line through the middle indicates the slope of the pad as well as represents the tile line that collects leachate off the forages to be dumped into a collection pit. The above was designed to be a 5” (13 cm) thick asphalt pad.

Leachate/Water Separation:



Rain water

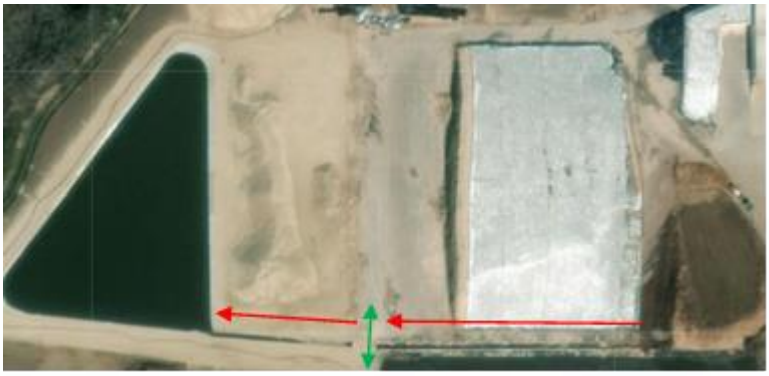
Clean water gutter

Leachate collection tile

Leachate off pile

Outflow to field drain

Leachate Collection:



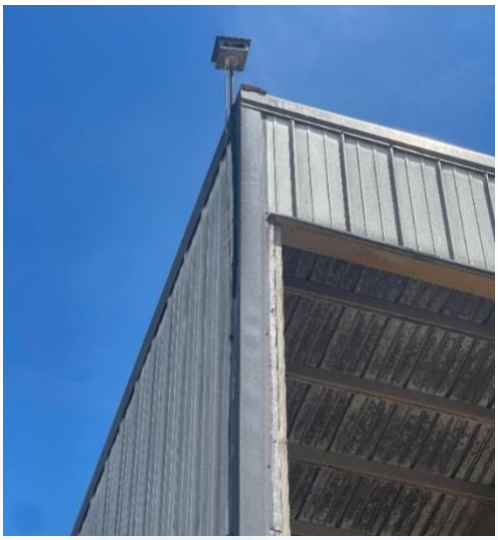
A deep, wide concrete ditch on the south side collects all leachate coming off the forage piles and directs it to a collection area. There is a bridge through the middle that allows traffic to flow through without having to travel all the way around the system. The concrete ditch is also wide enough to clean out mechanically as needed.

Pest Control - Birds

Before looking into a control program, farms should understand the laws protecting birds in their area and be able to identify specifically which birds are causing the problem. Common bird species that are found around farms include pigeons, starlings, finches, and sparrows. Below are control measures that have been used with varying degrees of success. It may take a combination of techniques to successfully control the bird population on your farm.

Keeping the silage pad and commodity area clean and free of excess feed will help to limit pests on the farm. It would also help to limit nesting opportunities within farm buildings.

Noise makers can be used to scare birds away from the feed center. A few examples include a Zon 4 noise maker, which creates a loud gunshot-like noise periodically to scare birds. Another option is a predatory bird noise maker, which creates loud predatory bird noises periodically. These tend to lose effectiveness over time, so moving the location of the device can be helpful.



Pest Control – Other Animals

Other animals, including deer, raccoons, rats, mice, and others can also cause issues around the feed center. Some ideas to help control wildlife include noise makers, inflatables, or even solar-powered electric fencers. Keeping the area clean around forage pads can be a great starting place. Keep weeds and grass to a minimum around silage piles to reduce damage from wild animals that may chew plastic. Inspect plastic on a regular basis and immediately repair any holes or damage found to limit spoilage.

Wisconsin does have a program that assists farms when wildlife damages their crops. The Wildlife Damage Abatement and Claims Program (WDACP) provides damage prevention assistance and partial compensation to farmers when wild deer, elk, bear, geese, and turkeys damage their agricultural crops. More information can be found at https://dnr.wisconsin.gov/topic/WildlifeHabitat/wdacp.html.