University of California
Agriculture and Natural Resources

California Dairy Newsletter

Vol. 9, Issue 3 August 2017

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Monitoring Forage Particle Length – How and Why?

Jennifer Heguy, UC Dairy Advisor - Merced, Stanislaus & San Joaquin

Summer forage harvest is upon us, and so is a flurry of silage choppers, trucks and packing tractors. Putting feed up quickly is imperative to the ensiling process, making monitoring during harvest equally important. A dairy can harvest and ensile a year's worth of forage in as little as a few days; if the desired chop length is not met, or kernel processing is not adequate, there could be issues with how the forage performs in the ration.

Chop length of forages can be measured as it's delivered to the silage structure. In a recent corn silage management survey, 80% of dairies reported monitoring chop length during harvest with 97% of those dairies doing so visually. Another, less popular but more precise method of evaluating chop length on farm is the Penn State Particle Separator (PSPS) analysis.

What is a PSPS?

In figure 1 (figures and tables are on page 2), there are four numbered piles which correspond to the trays of the PSPS (figure 2). The top 3 trays have openings for material to pass through (Table 1), becoming gradually smaller with a solid bottom tray to catch the "fine" material. For reference, recommended ranges for corn silage and haylage are also included in table 1.

How do I use a PSPS box?

A sample of harvested forage is placed in the top tray of the PSPS (with the other trays stacked under) and "shaken" and rotated according to the instructions. Then, material in each of the trays is weighed and calculated as a percentage of the total weight. The entire process can be completed on farm, in about 5 minutes. For more information: http://extension.psu.edu/animals/dairy/nutrition/forages/forage-quality-physical/separator

PSPS results from harvested sorghum

Last summer, 16 fields of sorghum chopped for silage (nutrient and management information was presented in the April 2017 newsletter) were sampled. There isn't a lot of information available on desired sorghum chop length, but the results were still interesting. Table 2 includes the average, median, minimum and maximum percentages of the 16 chopped sorghum samples at harvest. Compared to corn silage, these sorghum samples were chopped much coarser than typical corn silage and evidenced by the large percentage of material found in tray 1. Tray 3 contained less material than typical corn silages, which may be due, in part, to the lack of starch (sorghum grain) as compared to corn silage. Individual results from the PSPS analysis (including pictures) can be found here: http://ucanr.edu/casorghum16.

Figure 1: PSPS tray forage fractions.

Figure 2: PSPS showing trays

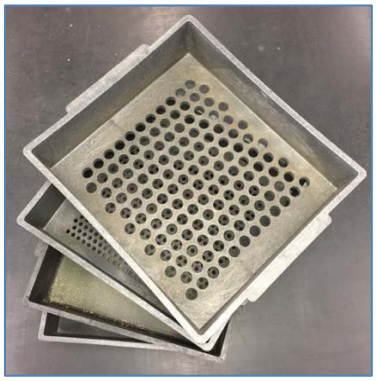

Table 1. Forage separator characteristics (2002 model) and recommendations for corn silage and haylage.
From Penn State Extension: http://extension.psu.edu/animals/dairy/nutrition/forages/forage-quality-physical/separator

	Pore Size (in)	Particle Size (in)	Corn Silage	Haylage
Tray 1	0.75	>0.75	3% to 8%	10% to 20%
Tray 2	0.31	0.31 to 0.75	45% to 65%	45% to 75%
Tray 3	0.05	0.07 to 0.31	30% to 40%	20% to 30%
Tray 4	solid bottom	<0.07	<5%	<5%

Table 2. PSPS results of chopped sorghum (n=16) taken at harvest

	Average	Median	Minimum	Maximum
Tray 1	28%	27%	3%	59%
Tray 2	51%	52%	17%	70%
Tray 3	20%	21%	7%	29%
Tray 4	2%	2%	0.3%	4%

Take home thought

Desired chop length can vary, depending on several factors, including end user (heifers vs. lactating cows) and presence/absence of other forages in the ration that can provide long particles. When particles are too long, sorting may become an issue; too short and rumen issues may occur. Talk with your nutritionist to determine the desired chop length of your summer forages, and monitor chop length throughout harvest to ensure your end product meets your dairy's needs.

Disbudding with Caustic Paste

Betsy Karle, UC Dairy Advisor - Northern Sacramento Valley

As unpleasant of a task as it is, removing horns from dairy cattle is vital for animal welfare and human safety. Many different methods are available, including the use of caustic paste at an early age. This method is only effective if properly utilized before the horn has attached to the skull. Best practices suggest applying as soon as the horn bud can be felt, within the first week of age.

Proper application of the paste is vital. Disbudding calves with caustic paste is still a painful procedure, but, when extreme care is taken to ensure the procedure is precisely followed, the calf's discomfort is lessened. The following tips will help to minimize pain and maximize effectiveness.

- Younger is better. After calves are a few days old, they figure out how to rub and scratch their heads, potentially removing the paste.
- Clip the hair on and around the horn bud before applying paste.
- Consider applying a ring of udder balm or Vaseline around the horn bud to protect the skin outside of the treatment area.
- Don't use too much paste. Only a small amount applied in a thin, even coating, is needed for a young calf.
- Protect calves from rain for 6-24 hours, until the paste is dry. Rain could cause the paste to run into the calf's eye, potentially causing blindness.
- Keep calf away from other animals until the paste is dry to prevent injury when calves rub on one another.
- Apply paste immediately prior to feeding calves milk. Nursing the bottle may alleviate some of the discomfort associated with the paste activation.
- Only apply paste once.
- Consult your veterinarian about pain management protocols.

Oregon State University published an excellent bilingual reference guide about using caustic paste to disbud calves. It is accessible at: http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/20420/pnw626.pdf.

Properly applied caustic paste on a day old calf

Managing Lagoons When There's Water!

Deanne Meyer, Livestock Waste Management Specialist

Water, water everywhere! That was the winter of 2017. Water's been flowing in irrigation ditches and canals since early winter. It's been so long since surface water has been available, it's good to review nutrient management strategies. Many dairy operators will use this abundance of surface water to dilute ponds during the irrigation season. It's important to manage this magnificent opportunity and potentially sample your liquid manure more frequently.

Here's why you may want to sample your liquid manure more frequently than once a quarter if you're using surface water to dilute your pond. Liquid manure nutrient concentration is a function of the amount of manure that is collected and the amount of water than ends up in the liquid system. The liquid manure nutrient content decreases when the same amount of manure is collected and more water enters the lagoon. Use of feedline or holding area soakers, or addition of irrigation water to lagoons usually results in a decrease in liquid manure nutrient content. If you overestimate liquid manure nutrient content, then you end up providing fewer nutrients for your growing crop.

Let's look at an example. You're planning to apply 3 inches of liquid manure per acre (nitrogen concentration is 450 mg/l) over the course of summer. This should apply about 306 lbs of nitrogen (N) per acre to your corn crop. [Note—with expected yields of 225 lbs of N per acre, the 306 lbs of N applied per acre is roughly at the targeted 1.4 N applied to N removed ratio]. That's a reasonable target. If the first inch of liquid manure applied is near the date of sampling, you have confidence that you applied about 100 lbs of N per acre. After adding surface water to your lagoon, the concentration of N will drop. If it drops to 250 mg/l before the remainder of the applications, the other 2 inches of liquid manure will contain less N. Two inches of water applied per acre at 250 mg/l of N provided 113 lbs of N per acre instead of your anticipated 204 lbs of N per acre. This difference ends up shorting your crop of N for growth. Your target value of 306 lbs of N applied per acre is missed when only 213 pounds of total N are applied per acre (the 100 lbs of N in the first inch of liquid manure plus the 113 lbs of N in the remaining two inches of liquid manure applied per acre). Since your expected yields were in the 225 lbs of N per acre range, the diluted manure application results in under application of N for your crop.

Importance of having representative samples of liquid manure to use in determining nutrient applications. Pounds of nitrogen (N) in liquid manure when the pond is diluted between first application and remaining applications of liquid manure. Estimated total N to apply is near 315 lbs of N/acre.

	What I thought I had	**What I ended up with**
First inch of liquid manure applied	102 lbs of N applied/acre	102 lbs of N applied/acre
Next two inches of liquid manure applied	204 lbs of N applied/acre	113 lbs of N applied/acre
Total pounds of Nitrogen applied per acre	306 lbs of N applied/acre	215 lbs of N applied/acre

For a mere cost of another sample of liquid manure, you would be more informed about the nutrient content of your liquid manure and be able to more closely apply N to meet crop needs.

Be on the Lookout for Sugarcane Aphid This Summer

Nicholas Clark, Agronomy & Nutrient Management. Advisor – Kings, Tulare, & Fresno Counties

Last year many forage sorghum fields were heavily infested and damaged by Sugarcane Aphid (SCA) (Figure 1) – *Melanaphis sacchari* – feeding. Most calls came in around early July of 2016 with reports of aphids that were not well controlled using broad spectrum materials such as malathion, chlorpyrifos, or dimethoate. These calls triggered investigations which confirmed the invasion of the new species of aphid to California.

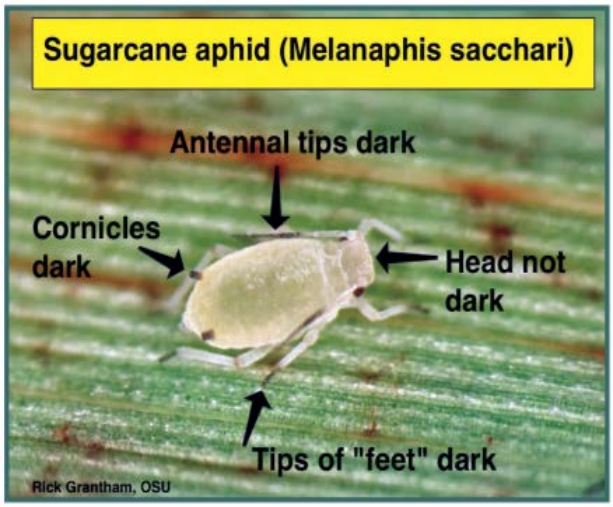

Figure 1: Distinguishing features of the sugarcane aphid. Borrowed from Knutson, Bowling, Brewer, Bynum, and Porter of Texas A&M. ENTO-035 4/16.

Based on field research and extension material from the US states in the South and Southwest, some basic guidelines for spotting, scouting, and treating SCA can be outlined for potential best management practices in our CA forage sorghum production system.

Identification: The SCA is distinguishable from the greenbug aphid – *Schizaphis graminum* – by the color of its body and cornicles, or "tailpipes" (Figure 2). The sugarcane aphid nymph body tends to be yellow to orange with black cornicles. Tips of the legs and antennae are also colored black. SCA can be found on the underside of leaves protected from direct sunlight. SCA and Greenbug are known to co-infest sorghum. It's unclear what initial infestation patterns within a field are, so scouting throughout the field – as opposed to only edges – until the insect is found is the best possible practice for now.

Hosts: SCA will infest, feed, and reproduce on sorghum, Sorghum-Sudan hybrids, Sudangrass, and Johnsongrass. It will not feed and reproduce on corn or small grains.

Damage: SCA feed by piercing and sucking phloem sap. Removal of photosynthates from the plant causes stunting, desiccation or early senescence of leaves, delayed or reduced grain fill, and even plant death. Additionally, honeydew – excrement from aphids – deposited on leaves will support the growth of sooty mold which will block sunlight from reaching leaves, further reducing photosynthetic efficiency of the plants. A small sample size (n = 16) of silage sorghum sampled at harvest from dairies in the San Joaquin Valley in 2016 as part of Merced Dairy Advisor Jennifer Heguy's research revealed some significant differences in feed value. Of the 16 dairies, 6 had no SCA observed and 10 were infested with SCA. Nutrient analyses of the harvests revealed that where the SCA were present crude protein was significantly increased, acid detergent fiber was significantly increased, ash was significantly increased, starch was significantly decreased, and non-fibrous carbohydrates were significantly decreased in harvests. For more information on this study, visit http://cestanislaus.ucanr.edu/files/258564.pdf to view the full presentation. Growers should consider the potential loss in feed quality of sorghum from SCA infestation when making pest management decisions.

Scouting: When plants reach the 4-5 leaf stage, begin scouting once per week. Choose four locations in the field, at least 25 feet from a field edge, and sample plants along a 50 foot transect into the field. The presence of honeydew is a good indicator of aphid presence. At each sampling location, examine the underside of upper and lower green leaves of 15 to 20 plants. When SCA are detected, begin scouting twice per week until a treatment threshold is reached. It is prudent to also examine nearby locations known to host Johnsongrass for SCA presence.

Treatment threshold: Two established treatment thresholds exist that were developed for grain sorghum in Texas. The most conservative of the two is described here and is recommended for the interim since no research information currently exists on the potential economic damage of SCA to forage sorghum. These are the modified steps to determine insecticide treatment timing:

1. Select 5 random plants from each of 4 sampling locations.
2. Examine an upper and lower green leaf from each plant (40 leaves total), and estimate the total number of aphids on each leaf.
3. Calculate the average number of aphids per leaf (total aphids counted / 40 leaves = average aphids / leaf).
4. When the average number of aphids per leaf reaches 50, treatment should generally be made within a week.

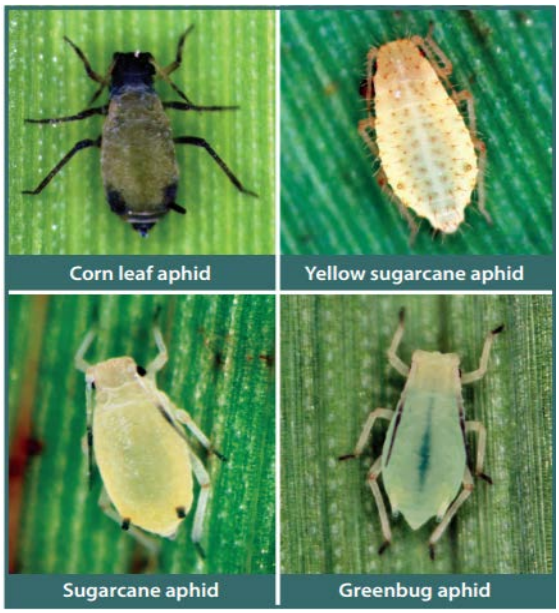

Figure 2: Visual comparison of the SCA to other sorghum inhabiting aphids. From Knutson, Bowling, Brewer, Bynum, and Porter of Texas A&M, ENTO-035

This treatment threshold is especially conservative considering research shows that SCA infestation at early stages of sorghum growth are more damaging to yield than infestations at later stages when left untreated. So, it's also advisable to consider infestation timing in crop time to decide whether an early harvest to avoid excessive losses is more cost effective than an insecticide treatment.

Insecticide treatment options: A significant number of CA sorghum growers have opted to purchase insecticide treated seed for the 2017 growing season. Imidacloprid or clothianidin coated seed have been shown to offer protection for up to 40 days after planting. This tactic will probably offer the greatest protection to later planted sorghum, but seed treatment for any planting date is not discouraged since infestation timing is not well understood in CA yet.

For in-season insecticide treatment, the University of CA Cooperative Extension is discouraging the use of broad spectrum materials such as malathion, dimethoate, or chlorphyrifos to control SCA. Of the two insecticides that have shown acceptable efficacy in SCA control in sorghum – flupyradifuron and sulfoxaflor – only flupyradifuron is registered for use on sorghum in CA. Always consult the specimen label for use requirements and a Pest Control Advisor for advice and recommendations when considering an insecticide treatment.

Cultural control options: Cultural practices that promote plant health and vigor will provide a strong basis of control against SCA. Early planting into adequate moisture when soil temperatures are at least 60 degrees F at a targeted population of 100,000 plants/acre is highly recommended. Control weeds, especially Johnsongrass, to promote early plant vigor. Consult a seed dealer for information on SCA tolerant or resistant varieties of sorghum. Research has shown significant grain yield protection exists from planting SCA resistant varieties. Maintain adequate fertility and soil moisture to avoid nutrient deficiencies and drought stress.

Local resources: For more information on SCA and sorghum production, visit http://cestanislaus.ucanr.edu/Agriculture/Dairy_Science/Sorghum_Silage_for_California_Dairies_2017/.
For general information on SCA, visit http://www.sorghumcheckoff.com/newsroom/2016/03/28/sugarcane-aphid/.

For information on sorghum varieties, nutrient, and water requirements, visit http://sorghum.ucanr.edu/.

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California Dairy Newsletter
August 2017

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