

Put Up Quality Silage

Researcher and cattlemen give tips to improve silage quality.

by Kasey Brown, associate editor

► Luke Jenkins, farm manager at 44 Farms in Cameron, Texas, says they chopped sorghum at 11-12 ft. tall with the seedhead.

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Winter can send chills in more ways than one. Disney's movie *Frozen* does not give an accurate portrayal of winter for cattlemen. Just the thought of a windburned face, cracked hands, breaking ice, thawing water tanks and feeding cows can bring on a cold sweat. Though singing "Let it Go" will not get your cows fed, planning ahead while the weather is warmer will put you in better shape when the snowflakes begin to fall.

Silage is a good option for winter feed because, if put up correctly, the fermentation preserves it for a long time and provides a solid source of nutrition, says Galen Erickson, professor of ruminant nutrition at the University of Nebraska–Lincoln. As grain is more expensive, silage becomes a competitive feed option economically.

Silage basics

What makes silage silage? Silage is fermented grain or roughage, depending on what type of silage you choose. It is harvested and put up with fairly high moisture content, packed tightly in an anaerobic structure and allowed to ferment for about three to four weeks, explains Erickson.

Bacteria ferment the feed much like an animal's rumen functions. The fermentation produces acids — acetic, propionic, lactic and lactate — that slows down bacteria growth and preserves the silage. In this anaerobic fermentation, the acid preserves itself, he notes. The fermentation prevents spoiling and preserves the feed for many months.

As a feed source, silage is a high-quality choice. Erickson explains that corn silage is about 80%-85% the value of corn in terms of nutrition. In total digestible nutrients (TDN), if corn has 90% TDN, then silage would have 75%. It also has comparable protein content to corn, at about 7%-8% crude protein (CP). It is an excellent forage source with 10%-15% forage on a dry-matter basis.

Silage works well for growing cattle, though Erickson warns that it is too nutrient-dense to feed to maintaining cows without mixing or limit-feeding. He adds that newly weaned calves generally do not like silage, though weaned calves that already eat well seem to like it.

"It seems to be an acquired taste. It's a lot like the taste of beer for humans," he notes.

Erickson is part of a research team that is investigating the option of letting corn mature longer and putting up silage at drier levels. Additional research is looking into



the economics of feeding steers a higher percentage of silage in the diet.

"When corn is higher than \$5 per bushel, more silage would be a useful option," he explains. For more information on determining whether silage is an economical feeding option, check out Rick Rasby's September 2013 "Ridin' Herd" column titled "Corn silage may be economical cow feed this winter." It can be found here www.angusjournal.com/ArticlePDF/Ridin%20Herd%2009.13.pdf.

There are many types of silage, and deciding which to put up will depend on your own preference, area of the country, time of year and economics. Moisture levels also play a large part in the silage planning process. Erickson says corn silage is the most prevalent, and it is generally 52% grain and 48% forage. Forage raised for hay, like alfalfa, is often called haylage. Grass silage, while less popular in the Midwest, is also a viable

option. These two options are drier than corn silage, at about 45% dry matter.

There are other options, though they are more complicated, he says. Husklage includes the ear corn, husk, cob and grain at 30%-35% moisture. Shredlage or stocklage harvests high-moisture corn with the rest of the plant at 60% moisture.

"All work fine, they are just different. As long as you pack each well enough with enough moisture, each type of silage works well," Erickson says.

For more information on putting up quality silage, talk with a local extension agent. Erickson recommends two webinars on the UNL Beef website, "Keys for Harvesting and Storing Quality Silage" and "Silage Pricing and Nutrition — Economics of Use in Forage Fed Cattle." Both free webinars are available at <http://beef.unl.edu/beef-webinars-2013>.



PHOTOS BY TADD MYERS, WWW.TADDMYERS.COM/

►Jenkins says, “We’ll determine the nutritional value on this forage sorghum and then we will mix our rations accordingly.”

The process

The process of putting up silage is essentially the same for each type of silage, with some minor differences in timing, chopping and managing moisture.

Erickson explains that for corn silage, you want fields with an excellent yield cut at 12 inches (in.) tall. Then the corn is chopped at about $\frac{1}{4}$ - $\frac{3}{8}$ in. fineness. The chopped corn is transported to a bunker, upright silo or silage bags.

The key is in packing. He recommends filling the bunker (or whichever storage you use) 6 in. at a time and continuously packing it. A common packing method is driving a tractor over it repeatedly. The target is to have 14-15 pounds (lb.) per cubic foot of dry matter.

“It is essential to make sure there is enough

moisture to pack. I recommend covering the silage to minimize spoilage and losses,” Erickson says.

Sometimes there will be 1-2 in. of spoilage on the top, and that generally seals the rest off, he notes. Most producers feed that layer without many problems. However, if there is extreme spoilage, the value of the silage lessens.

When you put up silage, you must account for shrink losses, he warns. If it is not put up well, then 15%-20% could be lost to shrink. If it is put up well, you should still account for 5%-10% loss.

He recommends leaving it undisturbed 3-4 weeks. Once the fermentation is done, then test for density and acidity. Testing can also determine its nutrient content to aid in ration development.

A common mistake he sees is using a bunker that is too wide when it comes time to start feeding the silage.

“The best bunker to use is one that is narrow enough to feed 3-6 in. every day. Anything bigger than that will leave too much of the face open for spoilage. This avoids leaving loose silage at the bottom, too,” he says.

Practical applications

Grass haylage. Dennis Byrne, manager at Herr Angus Farms in Nottingham, Pa., uses his resources to his advantage. Herr Angus Farms is part of Herr Foods, which makes potato chips. Potato chip production uses a lot of water, about 1 million gallons a week. They clean the water and use it to irrigate hay fields.

They grow Reed Canarygrass, which has an extensive root system and can take a lot of water. Byrne explains that they irrigate year-round when conditions are good, which they can do with grass but not corn.

The silage process “starts at the beginning,” Byrne explains. Soil conditions are monitored and fertilizer is applied according to those conditions. They cut grass while it is in an early seedhead stage. This gets close to maximum tonnage and high-quality forage, especially in terms of CP. If they cut later, he’s found that they end up feeding a lot of roughage without much nutritional power behind it. Monitoring grass and cutting at the appropriate time if weather permits is essential, he asserts.

After cutting, he and his crew of four let it dry for 24 hours and then rake two windrows together. When the roughage is approximately 50% moisture, he says, he cuts it to $\frac{1}{2}$ - $\frac{3}{4}$ in. with a chopper.

Byrne says they use an upright metal oxygen-limiting silo. Once the wagons transport the chopped forage to the silo, the roughage is transported from the wagons to the silo through a blower pipe.

“We fill it as fast as we can to push the air out and to pack it tight. While we are filling, we add a product called *Lactobacillus buchneri* and a bit of molasses. The sugar and lactobacillus produces lactic acid and drops the pH in the silo. Our acidity is about 4.2 to 4.5. This makes sure that no mold, yeast and fungus can grow in that environment,” Byrne explains.

“The lactobacillus produces heat. It usually completes the process in about two weeks in our part of the country. We know it’s ready when the heat is gone,” he adds.

There is no good way to know if the silage is fermenting well while it is happening. “If the TDN is not good enough, then we have to go back and figure out why. If the pH is too

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high, then the silo didn't pack as tight as we needed. The key is getting the air out of the silo. If that doesn't happen, then the whole crop is wasted," he says.

"Proper fermentation also reduces silage waste in the feedbunk. Spoiled feed in the bunk reduces cattle intake and performance, and requires hand-shoveling to clean it out," he points out.

The final product has tested to have 12%-14% CP and 58%-60% TDN. Byrne explains that they feed steers with the goal of reaching *Certified Angus Beef*[®] (CAB[®]) brand acceptance. They mix their haylage with corn, minerals and their "steer party mix," byproducts of the snack foods that Herr Foods creates. The steers gain well with the haylage in the mix.

Dryland sorghum silage. With grain prices so high, corn silage was too expensive, says Mike Molitor, Molitor Angus Ranch, Zenda, Kan. He switched to a dual-purpose dryland sorghum silage instead.

He explains that he gets the ground ready like normal and applies a good amount of nitrogen as prep work. He plants 30-in. rows at the end of May, and uses a pre-emergent herbicide to keep weeds down.

Then, "We pray for rain," he adds.

In October, he uses local help for a crew of four to five people. They chop the sorghum when it has a moisture content of 65%-68%. He chops it as fine as possible and hauls it to his trench silo.

"We level it out with every truckload and pack it a little bit at a time with our bi-directional tractor to get it good and tight. That gets the air out of it. Then we seal it up and don't bother it," Molitor explains.

They use an enzyme inoculant that helps keep good color and preserves the silage better. He says it helps prevent too much heat

while fermenting, because too much internal heat can damage the silage, too.

"We pull samples while chopping and after it has fermented to see how the heat affected it. If it's put up too wet, then it will be too dark and smell. Too dry when it goes in the silo is better than too wet. The moisture level is key," he adds.

Molitor likes using silage because its partly fermented nature lets animals use less energy to process the feed themselves.

"It takes more energy for the animal to digest dry hay," he notes. They can mix undesirable things with the silage, like dry hay and distillers' grains, to complete the ration.

He hasn't always used sorghum silage, but grain prices and weather have sparked some creativity.

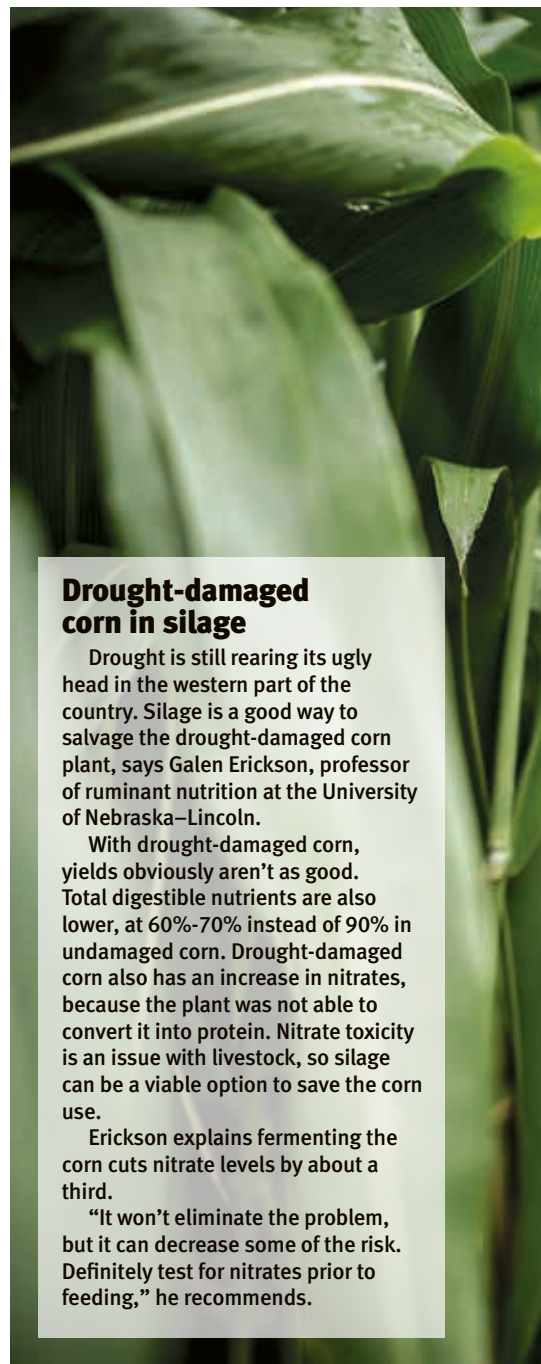
"We do whatever we can to get the silo full," he adds.

Timing and weather play big parts in putting up silage. Upon making the switch to sorghum, he recommends researching varieties that will work in your area. There is not as much research in developing new sorghum silage seed development. Molitor says he hopes that changes in the future.

Luke Jenkins, farm manager at 44 Farms in Cameron, Texas, used to put up corn silage. He would double-crop some fields with wheat and corn, but this year decided to plant wheat and a drought-resistant sorghum instead.

When he did put up corn silage, Jenkins explains that in Central Texas, weather allowed him to plant mid-February to mid-March and chop corn around July 4. He says it was chopped as finely as possible to use the whole plant and still be palatable to the cattle. By using the whole plant, they received more fiber from the cobs and very little was wasted.

However, input costs on corn are on the



Drought-damaged corn in silage

Drought is still rearing its ugly head in the western part of the country. Silage is a good way to salvage the drought-damaged corn plant, says Galen Erickson, professor of ruminant nutrition at the University of Nebraska-Lincoln.

With drought-damaged corn, yields obviously aren't as good. Total digestible nutrients are also lower, at 60%-70% instead of 90% in undamaged corn. Drought-damaged corn also has an increase in nitrates, because the plant was not able to convert it into protein. Nitrate toxicity is an issue with livestock, so silage can be a viable option to save the corn use.

Erickson explains fermenting the corn cuts nitrate levels by about a third.

"It won't eliminate the problem, but it can decrease some of the risk. Definitely test for nitrates prior to feeding," he recommends.

Top 12 forage tips

1. Prepare the fields. Remove stones and get the surface as flat as possible to reduce the risk of equipment damage and the potential for picking up soil when cutting.
2. Select the right crop and variety to meet your objectives (i.e., yield, protein and energy levels) and to suit your location.
3. Make sure equipment, silos and bunkers are in good repair. Downtime is costly and can seriously affect silage quality!
4. Avoid overusing fertilizer and make sure applications are timed correctly.
5. Harvest at optimum stage of growth.
6. Harvest at optimum plant moisture — Too dry can cause heat and molds; too wet can cause clostridial spoilage.
7. Use optimum chop length, 1/4 inch (in.) to 3/8 in.
8. Use a proven inoculant with good independent data. Make sure it is packaged and handled correctly.
9. Fill the tower silo or bunker quickly, consolidate thoroughly and pack every load properly (14 pounds per cubic foot).
10. Cover and seal the silage: Keep air out!
11. Maintain appropriate feedout rate, and keep surface smooth and tidy.
12. Balance the ration properly. Once produced, the quality of your silage is fixed; the rest of the ration can and should be adjusted to give you the best performance.

— **Lallemand Animal Nutrition**, <http://qualitysilage.com>



rise, so Jenkins decided to switch to sorghum after a friend and neighbor had a successful year using sorghum silage.

Planting sorghum occurred much later, this year in April since it is not as cold-tolerant. It was chopped at 11-12 feet (ft.) tall with the seedhead.

"It chopped the same as the corn," Jenkins says. "So far, it looks to us to pack the same way as corn, and it actually looks almost the same as corn in the pit right now."

Jenkins admits to letting his silage ferment longer, for at least five to six weeks, before pulling a sample.

He says 44 Farms has used tarps to seal the silage; they have also left it uncovered, and they have tried silage bags. Jenkins notes that

► Sorghum silage is another option when corn prices are high. It is recommended more research be done on sorghum silages.

the spoilage amount was comparable with both the covering and uncovering methods, so they don't bother using a tarp to seal it anymore. When it is left uncovered in the farm's three silage pits, it does form a crust on the top layer. He says it isn't moldy, the texture is just different. Cattle don't balk at eating it when it is mixed into the rations. With three silage pits, they are able to put up enough silage to feed it year-round.

"We have not tested the sorghum silage yet, but we're not in a hurry for that. We'll determine the nutritional value on this forage sorghum, and then we will mix our rations

accordingly," Jenkins says. "The real positive side of this sorghum silage vs. the corn silage so far is that our input costs were probably halved. On our best year in corn, we would get around 14 tons with the corn. This year, we averaged about 19 tons with this forage sorghum. We were 4 to 5 tons more per acre on less than half of the input costs.

"If it tests nutritionally, even if it doesn't test as well as the corn silage, we still have some room to supplement and still come out financially well with this forage sorghum."

