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Wheat Silage for Beef Cattle

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Some Missouri cattle feeders are cutting wheat for silage then planting the field with corn silage or grain sorghum to produce a large tonnage of feed per acre. When wheat is cut early for silage instead of grain, there is more time for growing the second crop. Cattle feeders have produced 70 to 120 bushels of grain sorghum per acre after harvesting 7 to 9 tons of wheat silage per acre.

Harvest of wheat and other small grain silages comes at a time when corn silage supplies usually are depleted. Also, wheat silage can be a hedge against drought because it matures before the dry summer months.

Wheat vs. corn silage

Wheat, barley and oat silages are often underrated as feed for growing and finishing beef cattle. Six years of study at Kansas State University showed that the performance level of beef cattle on rations high in wheat silage were about 80 percent of the performance level of beef cattle on corn silage rations. Studies show barley silage as being equal to corn silage, but they show that oat silage has about 50 percent the value of corn silage in beef rations. The higher the grain content of the small grain silage, the higher the feeding value. A lower grain content is the reason studies show oat silage to be inferior to other small grain silages for beef cattle feed. In the Kansas studies, steers with initial weights of 500 to 670 pounds that were fed corn or barley silage for 90 to 120 days gained from 1.9 to 2.7 pounds daily. Compare that with the 1.5 to 2.3 pounds gained daily by those fed wheat silage rations. About 86 percent of the dry matter in the rations came from the silages. The cattle ate from 2.1 to 2.7 pounds per head daily of a soybean meal-milo supplement. From 0.6 to 0.8 pounds of the supplement was soybean meal or the protein equivalent of soybean meal and urea.

Moisture to harvest

The most desirable fermentation occurs when silage has a moisture level of 55 to 70 percent; 60 to 65 percent is optimum. Large upright silos, deep trench or bunker silos and oxygen-limiting silos permit drier material to be stored.

Forage that is too dry will not pack enough to exclude air and provide desirable fermentation. In contrast, forage that is too wet will lose soluble nutrients from excessive seepage and will produce an unpalatable silage high in butyric acid.

Because cereal straws are hollow and air filled, fine chopping is necessary for good packing and exclusion of air. Fill the silo rapidly. Plastic covers applied immediately after filling reduce top spoilage in open air silos.

When to harvest

Kansas State University studies indicated that wheat, barley and oat silages harvested in the mid-dough stage of maturity produced the greatest total digestible nutrients (TDN) and the best beef gain per acre when fed to cattle (Table 1).

Table 1

Maturity effects on wheat silage.¹

| Stage | Dry matter | Crude ² protein | IVDMD ³ | IVDMD ⁴ ton per acre |
|-------|--------------|----------------------------|--------------------|---------------------------------|
| Boot | 15.8 percent | 15.3 percent | 62.9 percent | 1.76 percent |
| Milk | 29.0 percent | 11.0 percent | 57.8 percent | 2.72 percent |
| Dough | 40.0 percent | 9.5 percent | 56.1 percent | 2.95 percent |

¹Kansas State University Bulletin 613, January 1978.

²DM basis.

³In vitro dry matter digestibility.

⁴In vitro digestible dry matter.

Note

Here in vitro means artificial rumen.

When cereals were harvested in the mid-dough stage, yields were 6 to 9 tons per acre with protein about 2 percentage points higher than corn silage in dry matter. When wheat and other cereals are direct cut at mid-dough maturity, they will produce forage with 60 to 65 percent moisture. Silage cut at the bloom stage must be wilted to reduce moisture.

Remember that the stage of maturity of the grain at harvest affect forage yield and feeding value. As the plant matures, the yield of dry matter per acre increases, but the quality decreases. Silage at the dough stage will be lower in crude protein, but it will produce 30 to 60 percent more dry matter tonnage per acre than silage cut in the boot stage (Table 1).

If you have much acreage, you will need to start harvesting in the late milk or early dough stage to keep forage from getting too dry. The boot stage lasts about 10 days, the milk stage 10 to 14 days and the dough stage 10 to 14 days.

Remember that 60 to 65 percent moisture is desirable for most silos. You can get by with 50 to 60 percent moisture in large or oxygen-limiting

silos. Start adding moisture when the silage drops below 60 percent moisture in the late dough stage. Table 2 gives the amount of water to add to forages at various moisture levels.

Table 2

Water needed to bring a ton of forage to 65 percent moisture

| Moisture in forage | Pounds per ton | Gallons per ton |
|--------------------|----------------|-----------------|
| 40 percent | 1,428 | 171 |
| 42 percent | 1,314 | 156 |
| 44 percent | 1,200 | 144 |
| 46 percent | 1,086 | 130 |
| 48 percent | 971 | 117 |
| 50 percent | 857 | 103 |
| 52 percent | 743 | 90 |
| 54 percent | 629 | 75 |
| 56 percent | 514 | 62 |
| 58 percent | 400 | 48 |

Harvesting tips

- Harvest in the mid-dough stage for maximum TDN and beef gain per acre.
- Direct cut and chop fine — use a recutter screen if necessary.
- Ensilage at about 60 to 65 percent moisture. Add water if forage moisture drops lower. You can mix it into a wetter forage such as alfalfa.
- Fill the silo rapidly and pack well to exclude air from the hollow stems.
- Cover and seal immediately after filling to reduce top spoilage.

Finishing rations

Wheat silage can be substituted for corn silage and other roughages in high-grain finishing rations. When the two were compared in two trials, wheat silage was almost equal to corn silage when fed as 10 and 20 percent of the dry matter in high grain rations. Steers ate similar amounts of the rations, but those fed corn silage gained slightly faster (0.08 to 0.19 pounds per day).

Feeding tips

Wheat silage usually has 9 to 11 percent protein on a dry matter basis. This is about 2 percentage units higher than corn silage. Remember that maturity, variety and fertilization greatly change the level of protein and energy in wheat silages. You should test the silage to measure the amount of protein and other nutrients to formulate better rations. If cattle are consuming 12 pounds of silage dry matter a day, a 2 percentage unit higher protein content would provide 0.24 pounds of crude protein. This is equivalent to the protein supplied by 0.6 pounds of a 40 percent protein supplement.

Urea can supply all of the supplemental protein fed with wheat silage to cattle weighing 600 pounds or more. Rate of gain may be slightly less when urea provides all the supplemental protein, but its lower cost often provides cheaper cost of gain for cattle of this weight or larger.

Summary

Wheat silage is an excellent feed for growing cattle. Yearling cattle fed rations containing 85 percent of the dry matter from wheat silage will gain 1.5 to 2.5 pounds daily. Feed 500-pound calves 80 percent silage and 20 percent concentrates for 1.5 to 2.0 pounds daily gain.

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Related MU Extension publications

- G2061, Corn Silage for Beef Cattle
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G2061>
- G2066, Rations for Growing and Finishing Beef Cattle
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G2066>
- G3260, Wheat Silage for Dairy Cattle
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G3260>
- G4590, Corn Silage
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G4590>
- G4591, Estimating Silage Value to the Crop Producer
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G4591>

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