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Determining the Value of Drought-Stressed Corn

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Drought-stressed corn for grain or silage does not automatically signal disaster, as both crops can provide high-quality forage for ruminant animals.

Drought-stressed corn or corn that is unpollinated will produce little or no grain crop for the crop farmer to sell, but dairy producers can use the unpollinated corn for silage. On a dry matter basis, the drought-stressed corn will be approximately equal in feeding value to normal corn silage.

The feeding value of drought-stressed corn

Results of feeding trials indicate that silage made from plants with few or no ears has 65 to 100% of the value of normal silage, when comparing feed efficiency, milk production, and growth rate. (These comparisons were made on a dry matter basis.) The moisture content of silage made from barren stalks may be high, which can lead to reduced daily dry matter intake and animal performance.

The best way to determine the feeding value of drought-stressed silage is to test the forage. Forage analysis is useful for buying, selling, or using the silage for ration balancing. Table 1 is a comparison of forage analyses for normal and drought-stressed silage.

Because of the higher crude protein, and only slightly lower TDN values of drought-stressed silage, buyers of such silage should be willing to pay almost the same price as they do for well-eared silage of equal dry matter content.

Dollar value of drought-stressed silage

There are several ways to determine the dollar value of drought-stressed silage, including pricing formulas and least-cost ration balancing programs. Regardless of the pricing method, both the seller and buyer must value the silage according to how they will use it in their operations. Dairy producers can use silage for needed forage, and crop farmers can use the drought-stressed silage to recover some of the cost of producing the crop.

Table 1. Comparison of forage analyses for normal and drought-stressed silage.

Type of silage	*DM (%)*	*CP*	*ADF*	*TDN*
		percentage dry matter		
Normal silage	35	8.5	28	68
Stressed silage	25	10.0	34	62

Pricing formulas

One common pricing formula for silage of approximately 30% dry matter is to multiply the market price of corn by six, then add $10 to $12 per ton to cover the costs of harvesting and storing the silage.

The market price of corn is the price the livestock producer must pay for the grain. If the market price for corn is $1.40/bu, the silage would be valued at $19 to $21 per ton.

To determine the price of silage based on feeding value, approximately 1 ton of 30% dry matter silage is equal to 1/3 ton of hay or 8 to 10 bushels of corn. Assuming a hay price of $110/ton or a corn price of $1.40/bu, the silage would be worth approximately $37 and $14 per ton, respectively. Therefore, given the feeding value of the drought-stressed corn and the relative prices for hay and corn, the silage would be worth an average of $25/ton.

Petersen's constants for corn and soybean oil meal provide a convenient way to determine feeding values for many feeds. In the Petersen method, the value of any feed depends partly on the price of a standard or base carbohydrate-rich feed (corn) and partly on the price of a base protein-rich feed (soybean oil meal).

Two factors (constants) are used for each feed that is to be valued. The constant for corn shows the extent to which the price of corn affects the value of the given feed in question (drought-stressed corn silage in this case). The constant for soybean oil meal shows the extent to which the price of soybean oil meal affects the value of the given feed in question.

The Feed Valuation Template developed by Pennsylvania State University Cooperative Extension uses Petersen's constants along with adjustments for fiber requirements to determine the value of feeds relative to shelled corn, 44% soybean meal, and average analysis legume hay as the energy, protein, and forage alternatives, respectively. The data in Table 2 show the value of corn silage with different corn and soybean meal prices and with legume hay priced at $110/ton. Silage analysis was as described previously for "typical" drought-stressed silage and the hay 85% dry matter, 18% crude protein, and 50% neutral detergent fiber (NDF).

Since corn silage is an energy feed, the value of corn silage will increase as the price of shelled corn increases and soybean meal and hay prices remain constant. Likewise, the value will decrease as the price of soybean meal increases and the prices of corn and hay remain constant. This is reflected in Table 2.

Table 2. Corn silage value using the Pennsylvania State Feed Valuation Template for corn and soybean meal with average analysis legume hay at $110/ton.[1]

Price of shelled corn ($/bu)	*Price of 44% soybean meal ($/ton)*		
	140	*160*	*180*
		($/ton)	
1.10	27.00	25.50	24.00
1.40	27.50	26.00	25.00
1.80	28.50	27.50	25.50
2.20	29.00	27.50	26.50

[1] Add (subtract) $4.50/ton for each $10/ton increase (decrease in hay price.

Least-cost ration balancing programs

One objective of least-cost ration balancing is to provide a specific level of nutrients for the least amount of dollars while maintaining animal performance.

The output from least-cost rations can be a valuable tool for pricing feeds relative to each other for a given level of animal performance. The economic value of feeds used and not used in the ration are calculated based on the price and nutrient content of all feeds and how they best meet the nutrient requirements of the animal.

In any dairy ration balancing program that will formulate least-cost rations, the value of drought-stressed silage can be determined for a specific feeding program on a given dairy. In other words, the silage will be valued relative to the cost and nutrient content of all the feeds used on the farm for a group or groups of animals.

Dairy producers with adequate hay supplies should use the lower hay price to value the silage. If hay supplies are limited, the higher hay price should be used. The increasing value of the silage as corn prices increase is an expected result, since the silage and corn are competing sources of energy.

When drought-stressed silage and the hay used in an analysis are similar in TDN value, at the higher hay prices the hay is less competitive as an energy source, thereby increasing the value of the silage. To best determine the value of silage in a dairy operation, a customized least-cost ration program is suggested for individual situations.

All four methods for pricing the silage have generated similar answers that can be used by both the seller and buyer. These values are only guidelines to suggest what a buyer could pay for the feed being delivered to the livestock. They are not intended to be absolute values to be demanded by sellers, since there are other considerations.

The values calculated in this fact sheet are for fermented silage ready to be fed to livestock.

To place a value on standing corn, use the methods described above and then adjust the price for harvest and storage losses.

For example, if a dairy producer will be chopping, hauling, and filling the trench silo with corn purchased from neighboring grain farmers, the dairy producer wold discount the calculated silage price by $6 to $7 to cover harvesting costs and $4 to $5 to cover storage losses.

The seller must evaluate the value of the crop to sell as grain, as plow down, or on which to receive disaster insurance payments. One or all of these alternatives should be explored in the current market conditions.

Finally, the actual selling price of drought-stressed silage varies according to geographic location and the demand for the crop for dairy or livestock feeding.

Problems associated with drought-stressed corn

While drought-stressed corn is valuable to both dairy and livestock producers, there are problems related to its use.

1. Because drought-stressed corn has the potential to accumulate nitrates, nitrate toxicity of animals is possible. (For more information, see ExEx 4017, Harvesting and feeding drought-stressed corn, and ExEx 4015, Nitrate poisoning of livestock: causes and prevention.)

2. Nitrogen oxide gas may build up during fermentation of drought-stressed silage. Precautions must be taken when ensiling and when removing the silage from the silo for feeding.

3. The use of nonprotein nitrogen (NPN) on drought-stressed silage is not recommended.

Conclusion

Drought-stressed silage is not necessarily a totally lost or failed crop, but properly managed can provide necessary feed for the dairy or livestock operation and recovered income for the crop farmer.

This publication and others can be accessed electronically from the SDSU College of Agriculture & Biological Sciences publications page, which is at http://agbiopubs.sdstate.edu/articles/ExEx4018.pdf or from the Extension Service Drought Information Website at http://sdces.sdstate.edu/drought/

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