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ESTIMATING THE value of CORN or GRAIN SORGHUM SILAGE

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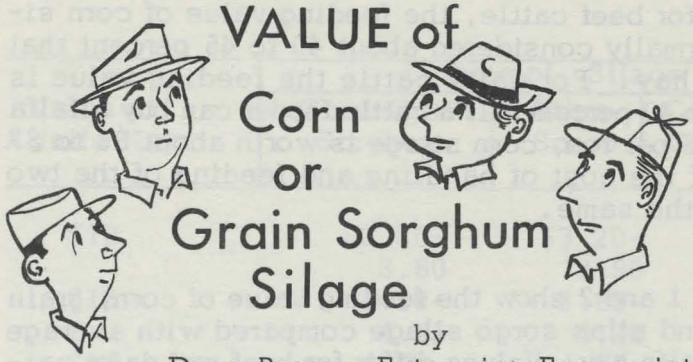
ESTIMATING THE VALUE of Corn or Grain Sorghum Silage



by
Dean Brown, Extension Economist

"How much is silage worth?" The answer to this question is an annual problem for many farmers. Since there is no established market price for grain sorghum or corn silage, it is hard to put a value on it. It must be done through an evaluation and bargaining procedure by the buyer and seller.

The question of silage worth is asked by livestock producers interested in buying silage to feed, by farm operators with crops to sell, and by parties involved in landlord-tenant relationships. Each group has different objectives. As a result, no one method or procedure will satisfy all situations. The question: "What is silage worth?" must be answered separately for each group.

This circular provides a method whereby the reader can establish a value to satisfy his particular situation.

Buying Silage From Your Neighbor

A livestock producer buying silage is primarily concerned with how much he can afford to pay for silage in relation to the value of hay or some other substitute. The value of hay and the costs of concentrates to replace the grain in corn or sorghum silage will affect the price he can afford to pay for silage.

When compared to other types of forages, silage can be evaluated in terms of its relative feeding value. For example, for beef cattle, the feeding value of corn silage is normally considered about 40 to 45 percent that of alfalfa hay. For dairy cattle the feeding value is about 35 to 40 percent. If a cattle feeder can buy alfalfa hay for $15 per ton, corn silage is worth about $6 to $7 per ton, if the cost of handling and feeding of the two are about the same.

Tables 1 and 2 show the feeding value of corn, grain sorghum and atlas sorgo silage compared with average quality alfalfa hay. Values differ for beef and dairy cattle since it takes more silage to replace a ton of hay in the dairy ration than in the beef ration.

Table 1. Comparative Feed Value of Silages, with Alfalfa Hay at Various Prices (Per Ton), for Cattle Feeding

Value of Alfalfa Hay	Type of Silage		
	Corn-Grain Sorghum	Atlas Sorgo	Corn-Atlas Sorgo Mix
$10	$4.00-4.50	$3.60-3.90	$3.75-4.00
$12	4.80-5.40	4.30-4.70	4.50-4.80
$14	5.60-6.30	5.05-5.45	5.25-5.60
$16	6.40-7.20	5.75-6.25	6.00-6.40
$18	7.20-8.10	6.50-7.00	6.75-7.20
$20	8.00-9.00	7.20-7.80	7.50-8.00
$22	8.80-9.90	7.80-8.60	8.25-8.80
$24	9.60-10.80	8.60-9.40	9.00-9.60

Table 2. Comparative Feed Value of Silages, with Alfalfa Hay at Various Prices (Per Ton) for Dairy Cattle

Value of Alfalfa Hay	Type of Silage		
	Corn-Grain Sorghum	Atlas Sorgo	Corn-Atlas Sorgo Mix
$10	$3.50-3.80	$3.20-3.50	$3.30-3.60
$12	4.20-4.55	3.85-4.20	3.95-4.30
$14	4.90-5.30	4.50-4.90	4.60-5.05
$16	5.60-6.05	5.10-5.60	5.25-5.75
$18	6.30-6.80	5.75-6.30	5.90-6.45
$20	7.00-7.60	6.40-7.00	6.60-7.20
$22	7.70-8.35	7.05-7.70	7.25-7.90
$24	8.40-9.10	7.70-8.40	7.90-8.60

Other Considerations

In buying silage (or hay) for roughage, the feeder must consider:

1. The cost of hauling and handling forage if the selling price does not include delivery.

2. The cost of storing and feeding silage, compared to hay. If storage and handling facilities are already available these costs can be ignored.

3. Losses due to spoilage. If hay is protected from the weather, the loss in feed value will be fairly small during the feeding period. Baled and stacked outside, losses due to deterioration and spoilage usually do not exceed 10 to 12 percent.

The cost of silage losses can be much greater (Table 3). When compared with losses for hay stored outside, storage losses of silage in gas-tight and concrete silos are not excessive. If this type of storage is available, such losses can be ignored in comparing the cost or value of silage with hay. If silage is to be stored for several months, or fed over a long period of time, higher storage losses for silage in the bunker or stack should be considered. To compensate for the heavier silage losses, the comparative feed values shown in Tables 1 and 2 need to be reduced by about 8 to 10 percent for bunker silo storage and 15 to 20 percent for silage stored in stacks.

Table 3. Silage Losses, with Various Storing Methods[1/]

Type of Silo	Top Spoilage	Fermen-tation	Seep-age	Total
Gas Tight	---	6%	---	6%
Concrete State:				
Covered	---	7%	1%	8%
Uncovered	4%	7%	1%	12%
Concrete Bunker:				
Covered	3%	9%	2%	14%
Uncovered	10%	9%	2%	21%
Stack (Uncovered)	16%	11%	3%	30%

[1/] The losses listed are for silage going directly into storage facilities from the field. No attempt has been made to determine what the total losses would be for stored silage moved and re-stored.

Selling Silage To Your Neighbor

A farmer selling corn or sorghum for silage is chiefly concerned with the question: "Can I make as much or more from the silage as I can if the crop is harvested as grain?"

Pricing the grain involves consideration of storage and handling costs of harvesting the crop as grain. To establish a reasonable price per bushel deduct such costs as harvesting, hauling to market, drying high moisture grain and storage losses from the expected market price. On the other hand, the seller should include in the value of the silage the costs of harvesting and hauling.

The value of fertilizer and crop residue lost when the silage leaves the farm also may be considered in arriving at the per acre crop value. The cost of fertilizer to replace the fertility sold with the stover and the value of the organic matter in the stover should be weighed. Other considerations may be important, depending on the farm situation. The following steps will help in establishing a value of the corn or milo. A more detailed explanation and budget procedure has been included in the Appendix.

1. Determine yield of grain per acre by taking check samples of the field to be cut for silage. Be sure sufficient samples are taken to get a good representation of the field. In taking samples, cut the grain sorghum just below the head. Multiply the weight of the heads by 80 percent to get the weight of the grain.

2. Test the grain for moisture content, and correct the weight of the grain for excess moisture.

3. Establish price for determining value per acre. This price times the check yield will determine the value of the grain.

4. Determine the amount and value of fertilizer and organic matter of the stover removed through the ensiling process.

5. Add the value of the grain (step 3) and the value of the stover together. If costs of harvesting, storing and marketing the grain have been deducted in step 3, the seller should include any ensiling costs in determining the value of the silage.

Settlements Between Landlord and Tenant

The problem of settlement is most apt to arise when the lease specifies the landlord shall receive a certain share of the corn or milo produced. If the crop is to be divided on an acre basis, the tenant should subtract one acre of grain from his original share for each acre of corn or milo harvested as silage.

Sometimes the actual quantity of the landlord's and tenant's share of corn or milo is not determined until the grain is marketed. In these cases, settlement can be made by increasing the landlord's share of the grain marketed to offset the acres of silage utilized by the tenant. This can be done in the following manner:

1. On the basis of the sharing arrangements of the lease, determine the landlord's and tenant's share of the acres. If 120 acres of corn was planted and the parties were to share on a 50-50 basis, each party's share would be 60 acres. This number over the total acres (6/120) becomes the fraction indicating each party's share of the production.

2. For each acre of corn (or milo) harvested by the tenant as silage, subtract one (1) from the denominator for the landlord. This increases the landlord's share of the grain actually harvested to offset the reduction in acres harvested.

Example: If the tenant harvests 20 acres of the 120 acres as silage, this reduces the denominator to 100 (120 minus 20), and increases the landlord's share of the harvested crop to 60/100 or three-fifths. If 7,500 bushels of grain are harvested, the landlord's share would be 4,500.

If settlement between the landlord and tenant is to be made on the basis of determining the value of the silage,

directions suggested in "Selling Silage to Your Neighbor" would apply. Two exceptions or special factors should be noted.

1. If the silage is to be fed on the same farm unit from which it is harvested, there is no basis for adding the fertilizer value of the stalks to the cost of the silage. It would be logical in most landlord-tenant leasing arrangements to ignore this computation.

2. In determining the unit price of corn or milo, only those costs which the landlord would incur in harvesting, storing and getting the crop to market should be deducted from the expected market price. If the tenant is responsible for all costs connected with harvesting and delivering the landlord's crop to market, these costs should not be deducted.

APPENDIX

Procedure and Budgeting Method for Determining Yield and Value Per Acre

Selling Silage to Your Neighbor

1. Determine number of feet required to make 1/100 or 1/200 of an acre (based on row spacing). See Table 4.

Table 4. Number of Feet of Row Required for Checking Yields

Row Spacing	Number of Feet of Row in One Acre	Feet required to make:	
		1/100 acre	1/200 acre
2'6" (30")	17,424	174	87
2'8" (32")	16,335	163	82
3'0" (36")	14,520	145	72
3'2" (38")	13,756	137	68
3'4" (40")	13,068	130	65
3'6" (42")	12,446	124	62

2. Cut sorghum heads or pick corn from the number of feet required, and weigh each sample.

3. Repeat process a sufficient number of times to get good representation of field.

(a) Using 1/100 of acre for yield check: take at least 3 checks for area to be cut, but not less than one for each 5 acres.

(b) Using 1/200 of acre for yield check: take at least 4 checks, but not less than one for each 3 acres.

4. Add all weights and divide by the number of checks to get average for the field. Multiply by 100 (or 200) to get weight per acre.

5. Thresh several representative ears (or heads) from each check to make sample for moisture test. Mix grain thoroughly and take sample for moisture content. Moisture test should be made as soon as possible after weighing the check yield samples.

6. Determine amount of field weight required to yield 56 pounds of shelled corn containing 15 percent moisture, or amount of field weight required to yield 100 pounds of grain sorghum containing 14 percent moisture (Table 5). This is the "moisture conversion factor:"

Table 5. Corn and Grain Sorghum Moisture Conversion Table

Percent Moisture in Grain	Field Weight Required For:	
	56 lbs. Shelled Corn (15%)	100 lbs. Grain Sorghum (14%)
14%	68.4	125.0
15%	69.6	126.5
16%	70.8	128.0
17%	72.0	129.6
18%	73.2	131.1
19%	74.5	132.7
20%	75.8	134.4

Percent Moisture in Grain	Field Weight Required For:	
	56 lbs. Shelled Corn (15%)	100 lbs. Grain Sorghum (14%)
21%	78.0	136.1
22%	79.3	137.9
23%	80.7	139.6
24%	82.1	141.5
25%	83.6	143.4
26%	85.0	145.1
27%	86.5	147.0
28%	88.0	149.1
29%	89.5	151.2
30%	91.0	153.4
31%	92.5	155.6
32%	94.0	157.9
33%	95.5	160.3
34%	97.0	162.7
35%	98.6	165.2
36%	100.2	167.7
37%	101.8	170.3
38%	103.4	173.0
39%	104.9	175.8
40%	106.5	178.7

Now the yield can be figured by using the following formula:

$$\frac{\text{check yield weight}}{\text{moisture conversion factor}} \times \text{100 (or 200, depending on size of field checks)} = \text{Yield Per acre in bushel or cwt.}$$

Adjust the estimated yield per acre downward to allow for normal field losses. A realistic figure to allow would be around 5 percent.

7. Establish price for determining value per acre. If the costs of ensiling the crop are included in determining the silage value, deduct the cost of harvesting the grain from the expected market price to get the price per bushel in the field. Other costs to deduct include costs of shelling, hauling and storage losses. If the corn or grain sorghum needs to be artifically dried before storing deduct the cost of drying to establish the mini-

mum selling price per acre. Use the following table of costs as a guide, but adjust for local conditions.

Table 6. Estimates of Harvesting and Marketing Costs

Operation	Per Bushel		Per Cwt.	
Grain Harvesting:	Range	Ave.	Range	Ave.
Cost of Harvest (operation costs)	2- 5¢	3¢	3- 7¢	5¢
Cost of Shelling	2- 3¢	3¢	3- 5¢	4 1/2¢
Cost of Hauling to Market	2- 4¢	3¢	2- 5¢	4¢
Misc. Cost & Storage Losses	3- 5¢	4¢	4- 8¢	6¢
Drying Costs	7-15¢	10¢	12-25¢	20¢

8. Organic fertilizer value of stover. Estimate the amount of stover per acre by using the estimated production of grain per acre. Normally, you can figure about one ton of stover for each 30 bushels of corn yield; for grain sorghum, one ton for each 45 bushels or 2,500 pounds of grain. The amount of fertilizer elements per ton of corn or grain sorghum stover is shown in Table 7.

Table 7. Pounds of Fertilizer Elements Per Ton of Stover

	Corn	Grain Sorghum	Value Per Pound
Nitrogen	16-20#	12-15#	8-12¢
Phosphorous	5- 8#	3- 5#	7- 9¢
Potassium	18-25#	19-26#[1/]	5- 7¢
Estimate of value per ton	$2.25-$3.50	$1.75-$3.00	

1/ In areas where potassium fertilizer applications are not usually recommended, ignore the evaluation of potassium.

From this information, the fertilizer value of the stover can be figured, using the following formula.

Tons, Stover	X	Pounds, Nutrient	X	Value Per Pound	=	Value
_____	X	N	X	$_____	=	$_____
_____	X	P	X	$_____	=	$_____
_____	X	K	X	$_____	=	$_____
				Total Value Per Acre	=	$_____

9. Cost of Harvesting Silage. If the seller helps harvest the silage, include his harvesting costs to determine the total value of silage sold. Charge for the services provided and add this to the value of the total amount of silage sold. Ranges of silage harvesting costs:

Table 8. Range of Silage Harvesting Costs

Silage Harvesting Operations	Cost Per Hour
Forage Harvester (tractor, cutter and operator)	$6.00 to $7.00
Hauling Silage	
Wagon	1.00 to 1.50
Two-plow tractor	1.25 to 1.50
Operator	1.00 to 1.50
Unloading Silage (blower, tractor and operator)	4.00 to 5.00

BUDGET EXAMPLE: Asume, from the previous steps, that the corn yield cut for silage was estimated at 90 bushels per acre. Allowing for a 5 percent harvesting loss for grain, the "corrected" yield would be 85 bushels. Based on one ton of stover per 30 bushels of grain, the corn would produce 3 tons of stover per acre. If the

market price is $1.00 per bushel, deduct costs of harvesting (4¢), shelling (3¢), hauling to market (3¢), and storage losses (5¢). The net price would be $0.85 per bushel.

1. Value of grain:

Yield per acre	times	Price Per Unit	=	Value of Grain
85 bushels	X	$0.85	=	$72.25

2. Value of stover:

Tons Per Acre	times	Pounds Nutrients	times	Price	=	Value
3 tons	X	18# N	X	10¢	=	$ 5.40
3 tons	X	6# P	X	8¢	=	1.44
3 tons	X	20# K	X	6¢	=	3.60
		Total Value of Nutrients			=	$10.44

$72.25 Plus $10.44 = $82.69 Per Acre

This value, multiplied by the number of acres, plus any charges for harvesting the silage, will determine the total charge for the corn silage sold.