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Farm Financial Position

Michigan State University

Cooperative Extension Service

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# FARM \$ FINANCIAL POSITION

**T**his bulletin was designed to help farmers pull together financial information on their farms to analyze business performance, and work with credit institutions, government agencies such as ASCS and FMHA, and the Cooperative Extension Service. Such information is critical if you are trying to develop a number of alternative farm plans for the future. If you need additional assistance or have questions, please call your local Cooperative Extension Service office. All offices are utilizing the same financial sheets and will answer questions from other counties as well.

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# BALANCE SHEET: ASSETS

Beginning of the year

End of the year

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

## ■ CURRENT ASSETS:

1. Checking account balance	\$ _____	\$ _____
2. Savings account balance	_____	_____
3. CDs, stocks, bonds, etc.	_____	_____
4. Cash value of life insurance, IRA certificates	_____	_____
5. Deficiency payments (due you), PIK certificates., etc.	_____	_____
6. Household and personal goods	_____	_____

## ■ CROPS IN STORAGE:

A. Corn	( _____ bu. x _____ \$/bu.)	_____	_____
B. Dry beans	( _____ cwt. x _____ \$/cwt.)	_____	_____
C. Sugar beets	( _____ ton x _____ \$/ton)	_____	_____
D. Soybeans	( _____ bu. x _____ \$/bu.)	_____	_____
E. Wheat	( _____ bu. x _____ \$/bu.)	_____	_____
F. Hay	( _____ ton x _____ \$/ton)	_____	_____
G. Haylage	( _____ ton x _____ \$/ton)	_____	_____
H. Corn silage	( _____ ton x _____ \$/ton)	_____	_____
I. Other	( _____ bu. x _____ \$/bu.)	_____	_____
J. Other	( _____ bu. x _____ \$/bu.)	_____	_____
<b>7. Total value crops in storage (add A thru J)</b>		_____	_____
8. CRP acres	( _____ acres x _____ \$/A)	_____	_____

## ■ VALUE OF GROWING CROPS (cash involved)

CROP	ACRES	\$/A	\$ TOTAL
A.	_____ x _____	=	_____
B.	_____ x _____	=	_____
C.	_____ x _____	=	_____
<b>9. Total values of growing crops (A + B + C)</b>			_____

## ■ SUPPLIES ON HAND (at cost)

Chemicals	_____ quantity x _____ \$/unit	_____	_____
Fuel	_____ quantity x _____ \$/unit	_____	_____
Fertilizer	_____ quantity x _____ \$/unit	_____	_____
Medical	_____ quantity x _____ \$/unit	_____	_____
Bedding	_____ quantity x _____ \$/unit	_____	_____
Other	_____ quantity x _____ \$/unit	_____	_____
<b>10. Total supplies on hand</b>		_____	_____

Beginning of the year

End of the year

Date:

Date:

**■ FEEDER LIVESTOCK HELD FOR SALE**

Feeder steers	_____ number x _____ \$/head	_____	_____
Feeder heifers	_____ number x _____ \$/head	_____	_____
Nursing pigs	_____ number x _____ \$/head	_____	_____
Pigs in nursery	_____ number x _____ \$/head	_____	_____
Growing pigs	_____ number x _____ \$/head	_____	_____
Finishing pigs	_____ number x _____ \$/head	_____	_____
Feeder lambs	_____ number x _____ \$/head	_____	_____
<b>11. Total feeder livestock held for sale</b>		_____	_____
<b>12. Total current assets (add lines 1 thru 11)</b>		_____	_____

**■ INTERMEDIATE ASSETS**

A. Dairy cows	( _____ no. x _____ \$/hd.)	_____	_____
B. Beef cows	( _____ no. x _____ \$/hd.)	_____	_____
C. Bred heifers	( _____ no. x _____ \$/hd.)	_____	_____
D. Youngstock	( _____ no. x _____ \$/hd.)	_____	_____
E. Sheep	( _____ no. x _____ \$/hd.)	_____	_____
F. Sows	( _____ no. x _____ \$/hd.)	_____	_____
G. Replacement gilts	( _____ no. x _____ \$/hd.)	_____	_____
H. Boars	( _____ no. x _____ \$/hd.)	_____	_____
I. Horses	( _____ no. x _____ \$/hd.)	_____	_____
J. Other	( _____ no. x _____ \$/hd.)	_____	_____
<b>13. Total value livestock (add A thru J above)</b>		_____	_____
14. Machinery - equipment		_____	_____
15. Vehicles		_____	_____
16. Co-op stock (PCA, elevator, MMPA, etc.)		_____	_____
<b>17. Total intermediate assets (add 13 thru 16)</b>		_____	_____

**■ FIXED ASSETS (long-term)**

18. Real estate		_____	_____
_____ acres, with all buildings, home, silos and all storage fixtures		_____	_____
_____ acres bare land		_____	_____
19. Stock (FLB, etc.)		_____	_____
<b>20. Total fixed assets (18 + 19)</b>		_____	_____
<b>21. TOTAL ASSETS (12 + 17 + 20)</b>		_____	_____

# BALANCE SHEET: LIABILITIES & NET WORTH

Name	Beginning of the year Date:	End of the year Date:
<b>■ CURRENT DEBTS</b>		
22. Present amount owed on feed	_____	_____
23. Present amount owed on fuel	_____	_____
24. Balance owed on fertilizer & seed ( <b>A + B + C + D</b> )	_____	_____
A. Fertilizer	_____	_____
B. Seed	_____	_____
C. Chemicals	_____	_____
D. Other	_____	_____
25. Unpaid medical/household bills	_____	_____
26. Unpaid interest due to date	_____	_____
27. Credit card balances owed	_____	_____
28. Other unpaid accounts or unsecured notes	_____	_____
29. Government loans (CCC, etc.)	_____	_____
<b>30. Total current debt (add 22 thru 29)</b>	_____	_____
<b>■ INTERMEDIATE DEBTS (due between 1 and 7 years)</b>		
31. Debts owed to individuals	_____	_____
32. Debt balances on livestock	_____	_____
33. Debt balances on machinery & equipment	_____	_____
34. Debt balances on cars/trucks	_____	_____
35. Other non-real estate debts	_____	_____
<b>36. Total intermediate debts (add 31 thru 35)</b>	_____	_____
<b>■ LONG-TERM DEBTS</b>		
37. Debts owed on real estate	_____	_____
<b>38. Total debts (30 + 36 + 37)</b>	_____	_____
<b>39. NET WORTH = (total assets - total debt) (line 21 minus line 38)</b>	_____	_____
Percent owner equity ( <i>Net worth divided by total assets</i> "line 39 divided by line 21)	_____	_____

# BALANCE SHEET

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A net worth statement or balance sheet provides a summary of how funds have been invested in the business (assets) and the financing methods (liabilities) used as of a given point in time. It is a snapshot of the financial position on the date of inventory of assets and liabilities.

## Assets

Assets are only those things you own or have coming to you as of the date of the statement.

### Current Assets

Current assets are cash or other assets that you expect to realize in cash or consume (feed, etc.) in production during a business year.

#### Lines 1 thru 6

Lines 1 thru 6 are those items that deal with cash or could be converted to cash. They include any funds coming to you from government payments.

#### Line 7

Line 7 includes all crops held for feed or sale. For calculating crops in storage, refer to the inventory sheets. Sugar beets can be based on the estimated dollar value coming to you yet. The value of a ton of corn silage can be estimated by using the formula 7 times the current market price of dry shelled corn plus \$8 for harvesting and storage. The value of haylage can be calculated on the value of dry hay. The formula would be dry matter of haylage divided by the dry matter of the dry hay times the price of dry hay. Example:

Haylage dry matter (50) divided by hay dry matter (88) times the price of haylage/ton  $50/88 = .568$  x \$60/ton (price of dry hay) = \$34/ton for haylage.

#### Special note

A crop under loan can be valued and listed with crops held for sale only if you offset its value later by a loan against it in the liability section.

#### Line 8

The CRP acres have value. Your local ASCS can help you with this number.

#### Line 9

Line 9 includes only the cash involved in a growing crop. An example would be wheat.

#### Line 10

Total supplies on hand should be priced at their cost.

#### Line 11

Livestock held for resale are the only animals in the current asset section. The market value on date of balance sheet must be used. Breeding livestock will be placed in the intermediate asset section.

### Intermediate Assets

Intermediate-term assets are those resources that support production—they are not intended for immediate sale. Such assets are expected to have a useful life of 1 to 7 years. They include machinery and equipment (marketable value or undepreciated value; be consistent year to year); breeding livestock; and securities not readily marketable. Anything financed on intermediate credit should be included.

### Long-term Assets

Long-term assets include items of a more permanent nature, such as farmland, buildings and improvements, and non-farm real estate. Values should be at the *current* market value, not at the purchase price. Line 18 allows bare land to be listed separately from the home farm with facilities on it.

## Liabilities

Liabilities are all obligations that you owe as of the statement date.

### Current

Current liabilities are those due and payable on demand or within the operating year. Commodity credit loans should be added to this section. If a loan is entered, make sure the product is listed on the asset side of the balance sheet as well.

### Intermediate

Intermediate liabilities include notes and accounts payable that are due up to 7 or 10 years. Loans for machinery and equipment purchases and breeding livestock tend to fall into this category. Long-term leases, such as on silos, should be added here.

### Long-term

Long-term liabilities are mortgages on land, buildings and sometimes equipment, if financed over 10 years. Land contracts are listed under long-term liabilities unless they are due in less than 10 years.

# INCOME STATEMENT: FARM REVENUE

NAME \_\_\_\_\_

from Jan. 1, 19 \_\_\_\_ to Dec. 31, 19 \_\_\_\_

## ■ CASH FARM INCOME

	Quantity	\$\$
40. Milk [cwt.]	_____	_____
41. Dairy cattle sold (cows and calves) [cwt. or hd.]	_____	_____
42. Other livestock sold (beef, swine, etc.) [cwt. or hd.]	_____	_____
43. Breeding livestock sold [cwt. or hd.]	_____	_____
44. Less feeder livestock purchased [cwt. or hd.]	_____	_____
<b>Crops Sold</b>		
45. Corn	bu.	_____
46. Soybeans	bu.	_____
47. Sugar beets	ton	_____
48. Dry beans	cwt.	_____
49. Wheat	bu.	_____
50. Other grains (oats, etc.)	bu.	_____
51. Hay and straw	bu.	_____
52. Other	_____	_____
53. Other cash farm income (ex., PA 116)	_____	_____
54. Government programs income	_____	_____
55. Others	_____	_____
56. Less resale items purchased	_____	_____
<b>57. Gross cash farm income (add 40 thru 43, 45 thru 55, minus 44, 56)</b>	_____	_____

## ■ NON-CASH FARM INCOME (INVENTORY CHANGES)

### Change in livestock no. (beginning to end of year)

58. Change in no. cows	+/- _____ x \$/hd. = +/- _____	_____
59. Change in no. heifers	+/- _____ x \$/hd. = +/- _____	_____
60. Change in no. calves	+/- _____ x \$/hd. = +/- _____	_____
61. Change in no. breeding swine	+/- _____ x \$/hd. = +/- _____	_____
62. Change in no. growing swine	+/- _____ x \$/hd. = +/- _____	_____
63. Change in no. breeding sheep	+/- _____ x \$/hd. = +/- _____	_____
64. Change in no. growing sheep	+/- _____ x \$/hd. = +/- _____	_____
65. Change in no. breeding beef	+/- _____ x \$/hd. = +/- _____	_____
66. Change in no. growing beef	+/- _____ x \$/hd. = +/- _____	_____
67. Change in value of other livestock (\$)		+/-
68. Less dairy cattle purchases made		= -



**NON-CASH FARM INCOME (INVENTORY CHANGES)** *continued from page 5***Change in value of stored crops (beg. to end of year)**

69. Change in no. bu. soybeans	+/- _____ x \$/bu. = +/- _____	_____
70. Change in no. bu. corn	+/- _____ x \$/bu. = +/- _____	_____
71. Change in no. bu. other grains	+/- _____ x \$/bu. = +/- _____	_____
72. Change in no. cwt. dry beans	+/- _____ x \$/cwt. = +/- _____	_____
73. Change in no. ton straw	+/- _____ x \$/ton = +/- _____	_____
74. Change in no. ton hay	+/- _____ x \$/ton = +/- _____	_____
75. Change in no. ton corn silage	+/- _____ x \$/ton = +/- _____	_____
76. Other	+/- _____ x \$/unit = +/- _____	_____
<b>77. Gross non-cash farm income (sum of 58 thru 76, allow for +/-)</b>		_____
<b>78. Gross farm income (57 + 77)</b>		_____
<b>79. Non-farm income (net)</b>		_____
<b>80. Total family cash income (57 + 79)</b>		_____

## INCOME STATEMENT

The profit and loss statement presents a summary of income, related expenses and the resultant profit or loss from operations for a given period, normally one year.

By comparing profit and loss statements for several years, you can see trends in your business. If you use a profit and loss statement along with a balance sheet, you can calculate your return on investment.

Lines 40 thru 57 are straightforward. Other cash income, such as PA 116, must be entered, as well as dividends received. A good income statement also includes adjustment for inventories. You need to concern yourself only with changes. If your number of cows has not changed, then you enter nothing.

Calculating values of stored crops will be the most difficult. Refer to inventory sheets to help calculate these values.

"Gross farm income" includes cash as well as non-cash income. When you add non-farm income, such as a spouse's wages, then you will have total family income.

The expense side of the profit and loss statement includes cash as well as non-cash costs. The cash costs are only items that were actually paid during the year. Line 106 is used to calculate the cost of input items used during the time period but not paid for during the time period. A banker will look at line 106 over the years to find out if the payables are building up and possibly misleading some of the cash costs. Use Schedule 1 on page 8 to calculate change.

The non-cash costs include depreciation and an accounting of the change in inventories of supplies from the beginning to the end of the year. Line 111 is used to recognize input items that have been paid for but not used during the accounting period. Schedule 2 on page 8 can be used to calculate this amount.

Total farm expenses are the totals of cash as well as non-cash costs.

# INCOME STATEMENT: FARM EXPENSES

NAME \_\_\_\_\_

from Jan. 1, 19 \_\_\_\_ to Dec. 31, 19 \_\_\_\_

## CASH FARM EXPENSES (for year of analysis)

81. Breeding fees paid	_____	_____
82. Chemicals paid	_____	_____
83. Conservation expenses paid	_____	_____
84. Employee benefit program	_____	_____
85. Feed paid	_____	_____
86. Fertilizer and lime paid	_____	_____
87. Freight and trucking paid	_____	_____
88. Gasoline, fuel and oil paid	_____	_____
89. Insurance paid	_____	_____
90. Labor paid	_____	_____
91. Land clearing paid	_____	_____
92. Long term leases (silos, machinery)	_____	_____
93. Machine hire paid	_____	_____
94. Marketing	_____	_____
95. Mortgage interest paid	_____	_____
96. Other interest paid	_____	_____
97. Pension and profit sharing paid	_____	_____
98. Rent of farm and pasture paid	_____	_____
99. Repairs, maintenance paid	_____	_____
100. Seeds, plants paid	_____	_____
101. Storage, warehousing	_____	_____
102. Supplies paid	_____	_____
103. Taxes paid	_____	_____
104. Utilities paid	_____	_____
105. Veterinarian fees, medicine paid	_____	_____
106. Accounts payable change*	_____	_____
107. Other	_____	_____
108. Other	_____	_____
<b>109. Total cash farm expenses (81 thru 108)</b>	_____	_____

\* Accounts payable change is the increase (or decrease) in bills owed for fertilizer, fuel, repairs, taxes, feed, etc. It does not measure the changes in dollars borrowed on depreciable property. This amount recognizes input items that have been used but for which payment has not been made. Use Schedule 1 on page 8 to calculate.

**■ NON-CASH FARM EXPENSES**

110. Depreciation	
111. Change in inventory of supplies (dollars) beg. to end of year (fertilizer, fuel, etc.) [See Schedule 2]	+/-
112. Other	
<b>113. Total non-cash farm expenses (110 thru 112)</b>	
<b>114. Total farm expenses (109 + 113)</b>	

**■ NET FARM INCOME**

<b>115. NET FARM INCOME (78 minus 114)</b>	
<b>116. NET NON-FARM INCOME (Wages, etc., line 79)</b>	
<b>117. FAMILY EXPENSES + INCOME TAXES FOR ALL FAMILIES (estimated)</b>	
<b>118. NET PROFIT (line 57 minus line 109 + line 116 minus line 117)</b>	

**SCHEDULE 1 - EXPENSE ADJUSTMENT (unpaid items)***Transfer totals from balance sheets*

	Beg. balance	End balance	Change (+ or -)
Farm accounts payable	-\$	+\$	\$
Accrued property taxes	-\$	+\$	
Accrued real estate taxes	-\$	+\$	
Accrued employer payroll withholdings	-\$	+\$	
Accrued rent & lease payments	-\$	+\$	
<b>TOTAL (enter +/- change on line 106)</b>	<b>-\$</b>	<b>+\$</b>	<b>\$</b>

**SCHEDULE 2 - EXPENSE ADJUSTMENT (unused items)***Transfer totals from balance sheets*

	Beg. balance	End balance	Change (+ or -)
Cash investment in growing crops	+\$	-\$	\$
Supplies	+\$	-\$	
Prepaid expenses	+\$	-\$	
<b>TOTAL (enter +/- change on line 111)</b>	<b>+\$</b>	<b>-\$</b>	<b>\$</b>

# DEBT STRUCTURE

Name \_\_\_\_\_

Date \_\_\_\_\_

**SHORT-TERM** (*Payable in 12 months or less*)

	CREDITOR	INTEREST RATE	YEARS LEFT	PRINCIPAL BALANCE	ACCRUED INTEREST	TOTAL YEARLY PAYMENT	NUMBER OF PAYMENTS PER YEAR
1							
2							
3							
4							
5							
6							
7							
8							

**INTERMEDIATE-TERM** (*Payable in 1-7 years*)

	CREDITOR	INTEREST RATE	YEARS LEFT	PRINCIPAL BALANCE	ACCRUED INTEREST	TOTAL YEARLY PAYMENT	NUMBER OF PAYMENTS PER YEAR
1							
2							
3							
4							
5							
6							

**LONG-TERM** (*8 or more years*)

	CREDITOR	INTEREST RATE	YEARS LEFT	PRINCIPAL BALANCE	ACCRUED INTEREST	TOTAL YEARLY PAYMENT	NUMBER OF PAYMENTS PER YEAR
1							
2							
3							
4							

# CASH FLOW SUMMARY

Name \_\_\_\_\_

Year \_\_\_\_\_

Projected

Actual

	ITEM	AMOUNT
<b>■ SOURCE OF FUNDS</b>		
119. Beginning cash balance	_____	_____
120. Gross cash farm income (line 57)	_____	_____
121. Net cash non-farm income (line 116)	_____	_____
122. New money borrowed*	_____	_____
<b>123. TOTAL CASH INFLOW (119 thru 122)</b>	_____	_____
<b>■ USE OF FUNDS</b>		
124. Total cash farm expenses (line 109)	_____	_____
125. Planned new capital purchases	_____	_____
126. Principal (repayment of borrowed money during year)	_____	_____
127. Family expenses & income taxes for all families (estimated) (line 117)	_____	_____
<b>128. TOTAL CASH OUTFLOW (124 thru 127)</b>	_____	_____
<b>129. NET CASH POSITION (inflow minus outflow) (123 minus 128)</b>	_____	_____

\*New money borrowed is critical in a projected cash flow, but in a summary or actual cash flow, the new money borrowed is already incorporated in other areas.

**130. What is your debt payment capacity as a percent of cash farm income?**

---

(Gross cash farm income - total cash farm expenses + interest paid - family living and income taxes) x 100 divided by gross cash farm income. From Income Statement, lines (57 - 109 + [95 + 96] - 117) x 100 divided by line 57 = percent of cash income.

**131. What percent is your debt payment requirement of your cash farm income?**

---

(Principal + interest + long-term leases) x 100 divided by gross cash farm income. Lines (126 + [95 + 96] + 92) x 100 divided by line 55 = percent being used.

**132. What is your ability to withstand a decrease in income or an increase in costs?**

---

(Gross farm income - total cash farm expenses - principal payments - family living and income taxes) x 100 divided by gross farm income. From Income Statement, lines (78 - 109 - 126 - 117) x 100 divided by line 78.

**133. What is your rate of return on investment (RROI)?**

---

(Net farm income - family living and taxes + change in value of real estate + interest) x 100 divided by total assets end of year. From Income Statement, lines (115 - 117 + 18 [amount at end of year minus amount at beginning of year] + 95 + 96) x 100 divided by line 21.

**134. What is your net profit per dollar invested (NET)?**

---

(Net farm income - family living and taxes + change in value of real estate) x 100 divided by total assets end of year. From Income Statement, lines (115 - 117 + 18 [amount at end of year - amount at beginning of year]) x 100 divided by line 21.

**135. What is your percent increase in equity?**

---

(Change in net worth divided by total assets [end of year] x 100). From Balance Sheet, (line [39 end - 39 beginning] divided by 21 end of year) x 100.

**136. What is your intermediate ratio?**

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(Current and intermediate assets divided by current and intermediate debt). From Balance Sheet, end of year, lines (12 + 17) divided by (lines 30 + 36).

\*See page 12 for accepted standards.

# ACCEPTED STANDARDS

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## **130. Less than 25 percent of gross cash farm income.**

This calculation is extremely important in estimating the ability to handle debt commitments. Percent varies by farm type. Dairy should be less than 25 percent, crops should be less than 20 percent, swine should be less than 30 percent.

## **131. Actual debt payment percent should be less than the debt payment capacity of the farm.**

If the percent of farm income currently used for debt repayment is greater than the debt capacity of the farm, it may be necessary to refinance debt, sell some assets, or find a way to increase income and productivity.

## **132. Should be greater than 10 percent.**

The ability to withstand fluctuations in income and costs must be considered when examining the possibility of further debt commitments. A 10 percent reduction in income can easily be caused by disease, drought or flood.

## **133. Greater than 5.**

Compare RROI of your farm with that of other farms, businesses, certificates of deposit, etc. Keep in mind your goals "personal and financial" when comparing yourself with others.

## **134. Greater than 0.**

NET reflects what you, as manager, have earned on the total resources at your disposal. It is possible for NET to be negative even when RROI is positive because RROI does not consider the interest payment made to acquire capital.

## **135. Greater than 1 percent.**

Net worth should increase at least 1 percent per year on the average. It is important that assets be valued at their real worth for this to be meaningful. Many ag-lending institutions have looked for percent equity or net worth to be greater than the age of the principal operator as a general rule of thumb in the past.

## **136. 1.75 to 1. percent.**

This ratio is considered favorable by most lending institutions. If it's less than 1.1, then current and intermediate debt are too high.

# COMPARE NEEDS WITH SUPPLY

	REQUIREMENTS NEEDED	SUPPLIES AVAILABLE	DIFFERENCE
Hay, tons DM			
Haylage, tons DM			
Corn silage, tons DM			
Total roughage			
Total grain, tons			
Corn, tons			
Protein supplement, tons			
Other cereal grains			
Other			
Other			
<b>■ Supplements</b>			
TM salt (+/- .004 DM intake)			
Mineral (+/- .005 DM intake)			
Other			

## ESTIMATED FEED NEEDS OF DAIRY COWS - 365 days<sup>1</sup>

Milk production per cow		DM consumed	FORAGE QUALITY					
			LOW		MEDIUM		HIGH	
			Forage <sup>2</sup>	Grain <sup>3</sup>	Forage <sup>2</sup>	Grain <sup>3</sup>	Forage <sup>2</sup>	Grain <sup>3</sup>
lb/yr	lb/day	lb/cow/day	ton DM	lb DM	ton DM	lb DM	ton DM	lb DM
20,000	66	47	4.7	7,300	5.1	6,600	5.3	6,200
18,000	60	45	4.7	6,800	4.9	6,500	5.1	6,000
16,000	52	43	4.7	6,200	4.9	5,700	5.1	5,400
14,000	46	41	4.6	5,700	4.9	5,200	5.2	4,600
Heifers, 1-2 yr	—	+/- 20	3.9	200	3.8	100	3.6	100
Heifers, 1 yr	—	—	1.4	1,300	1.5	1,050	1.6	900

<sup>1</sup>Values given are for DM needed/animal/365 days. This includes a dry period of 60 days for milking cows fed about 28 lb DM hay/day. A reasonable estimate of DM consumed can be obtained from the equation DM intake = (2 + [.02 x milk lb/day]) x cwt body wt. This does not include feeding and storage losses, which are included in the above table. The value from that equation can be used for any given period. That value can then be multiplied by the percent concentrate and forage in the ration (DM basis) to give lb DM of each needed for that period.

<sup>2</sup>Forage values are in tons of dry matter. To convert to as-fed basis, divide lb or ton hay DM by .87; to convert DM to lb or ton of 55% DM haylage, divide lb DM by .55; to convert DM to ton or lb of 35% DM silage, divide by .35.

<sup>3</sup>Grain values are total DM for 1 yr. A 12% grain mix requires 90% corn and 10% soybean meal (44% protein SBM) or equivalent; a 14% mix requires 15% SBM; 16% requires 20% SBM; and 18% requires 26% SBM or equivalent.

To convert lb corn DM to lb of HM corn as fed, divide lb DM obtained from table and footnote 3 by percent DM in the HM corn; ex., the cow needs 4,000 lb dry corn plus 2,000 lb SBM. Amount of HM corn is 4,000 divided by .70 (70% DM in HMSC) = 5,714 lb of HMSC.



# SILO CAPACITIES OF CORNAGE PER FOOT OF HEIGHT

APPROXIMATE BUSHELS OF DRY GRAIN (15.5%)												
Kernel moisture content	Conversion factor	Inside silo diameter (feet)										
		8	10	12	14	16	18	20	22	24	26	30
<b>SHELLED CORN (1.25 cubic feet per bushel at 15.5 percent moisture)</b>												
15.5(*)	1.0	40	63	90	123	160	204	251	304	362	424	640
24	.93	37	58	84	114	148	188	233	281	334	392	592
28	.89	35	56	80	109	142	180	224	270	320	376	568
32	.85	34	53	77	105	136	173	214	258	307	360	543
<b>GROUND EAR CORN (1.94 cubic feet per bushel at 15.5 percent kernel moisture)</b>												
15.5	1.0	26	41	59	80	103	131	162	196	233	274	413
24	.90	23	37	53	72	94	119	148	176	213	250	375
28	.86	22	35	50	69	90	114	141	169	203	238	358
32	.83	21	34	48	66	86	109	134	162	193	227	342

(\*) This first line is for dry grain and can be used to measure capacity of round bins for all small grains.

Conversion factor—For any size not listed, multiply the dry grain capacity of the storage by this factor at listed moisture content to determine equivalent in dry grain.

Density increases with depth but no allowance was made for compaction in this table. Silos 40 feet or higher may have 10 percent greater capacity than shown in table.

## CAPACITIES OF BINS AND CRIBS IN DRY GRAIN

To find the capacities in bushels, first find the volume in cubic feet:

For a crib or cube, multiply the length x width x height (all in feet).

For round bins, cribs, or silo, multiply the radius (1/2 diameter) x radius x 3.1416 x height.

Then, to convert cubic feet to bushels:

Multiply by .8 for small grain or shelled corn.

Multiply by .4 if ear corn.

Multiply by .515 if ground ear corn.

For round bins, you may use the top line in table and multiply by height in feet.

Crib capacities in bushels for ear corn per foot of length:					
Width (in feet)	Height (in feet)				
	8'	10'	12'	14'	16'
5	16	20	24	28	32
6	19.2	24	28.8	33.6	38.4

## STANDARD WEIGHTS OF FARM PRODUCTS PER BUSHEL

<i>Product</i>	<i>lb</i>	<i>Product</i>	<i>lb</i>	<i>Product</i>	<i>lb</i>
Alfalfa	60	Corn (shelled)	56	Ryegrass	24
Apples (average)	42	Corn kernel meal	50	Rye	56
Barley (common)	48	Corn (sweet)	50	Soybeans	60
Beans	60	Cowpeas	60	Spelt	30-40
Bluegrass (Kentucky)	14-28	Flax	56	Sorghum	56
Bromegrass, orchardgrass	14	Millet (grain)	50	Sudangrass	40
Buckwheat	50	Oats	32	Sunflower	24
Clover	60	Onions	52	Timothy	45
Corn (dry ear)	70	Peas	60	Wheat	60
Corn and cob meal	45	Potatoes	60	Milk, per gallon	8.6

### RULE OF THUMB ON SILO CAPACITIES

20' x 60' = 500 tons

20' x 50' = 390 tons

20' x 40' = 280 tons

20' x 70' = 575 tons

For any other size silo, the radius squared expressed as a decimal (divided by 100) times the tonnage of a 20-foot silo will give the capacity in tons.

#### Examples:

30' x 60' - 15 x 15 = 2.25 x 500, or 1,145 tons

16' x 50' - 8 x 8 = .64 x 390, or 250 tons

12' x 40' - 6 x 6 = .36 x 280, or 101 tons

### TO CONVERT HIGH MOISTURE FORAGE TO DRY HAY EQUIVALENT

#### Method A:

Read the tonnage from the silo capacity table. Then divide this figure by 3 to convert to dry hay equivalent. This will be a close estimate, regardless of the moisture content of the grass or haylage.

#### Method B:

Multiply the tonnage of green or wet material by the dry hay per ton equivalent in the following table:

<i>Hay or forage</i>	<i>Percent moisture</i>	<i>Dry hay per ton</i>
Green chop	88	.25 ton
Grass silage	70	.34
Grass silage	65	.40
Haylage	60	.45
Haylage	50	.57
Haylage	40	.68

## MEASUREMENT STANDARDS, HAY AND STRAW

	Average cu. ft/ton	Range cu. ft/ton
Hay, baled	275	250-300
Hay, chopped—field cured	425	400-450
Hay, chopped—mow cured	325	300-350
Hay, long	500	475-525
Straw, baled	450	400-500
Straw, chopped	600	575-625
Hay, loose	480	370-390
Straw, loose	800	750-850

## BUNKER SILO CAPACITY FOR CORN SILAGE, 70 PERCENT MOISTURE

### Formula:

$$\frac{\text{Average length} \times \text{width} \times \text{settled depth (all in feet)} \times 40 \text{ lb}}{2,000 \text{ lb}} = \text{Tons}$$

Weight per cubic ft will vary by amount of packing, fineness of cut, moisture content and depth of material. Use the following table to estimate pounds per cubic ft according to depth of pile:

Depth of silage (ft)	Pounds per cubic ft
6	32
8	36
12	40
20	45

## SILO CAPACITY: TONS OF CORN OR GRASS SILAGE (68% MOISTURE) IN SETTLED UNOPENED SILOS

Depth of silage (in feet)	Inside diameter of silo in feet							
	12'	14'	16'	18'	20'	24'	26'	30'
8	11	15	20	25	31	45	52	70
12	19	25	33	42	52	75	88	117
16	28	38	49	62	77	111	130	173
20	38	51	67	85	105	151	177	236
24	49	66	87	110	135	194	228	304
28	61	83	108	137	169	243	286	380
32	74	100	131	166	205	295	346	461
36	87	118	155	196	242	348	409	545
40	101	138	180	229	280	403	473	630
44	117	159	207	261	320	461	541	720
50	137	186	248	310	389	560	673	875
55	—	212	283	365	444	639	750	999
60	—	—	319	415	500	720	845	1,125
70	—	—	—	—	574	827	970	1,290
80	—	—	—	—	650	1,100	1,330	1,880
90	—	—	—	—	—	—	—	2,470

**NOTE:** When a silo is partially unloaded from the top, the remaining silage is more tightly packed and heavier than the same volume in an unopened silo. Therefore, compute the weight remaining as follows:

1. Use the table to find the original contents before the silo was opened.

*Example:* 50' of settled silage in a 20' silo = 389 tons.

2. Estimate depth of silage removed and determine its weight from table.

*Example:* Weight removed in 32' = 205 tons.

3. Subtract tonnage removed from original contents to find tonnage remaining.

*Example:* 389 tons (original contents) - 205 tons (removed in 32') = 184 tons (remaining in 18').

## CONVERSION TABLES FOR COMMON WEIGHTS AND MEASURES

### Metric conversions

- 1 pound = 454 grams
- 2.2 pounds = 1 kilogram
- 1 quart = 1 liter
- 1 gram = 15.43 grains
- 1 metric ton = 2,205 pounds
- 1 inch = 2.54 centimeters
- 1 centimeter = 10 millimeters = .39 inches
- 1 meter = 39.37 inches
- 1 acre = .406 hectare

### Bushel weights and volumes

	lb/cubic ft.	cubic ft/ton
Oats = 32 lb/bu	26	77
Barley = 48 lb/bu	38.4	53
Shelled corn = 56 lb/bu	44.8	45
Wheat = 60 lb/bu	48	42
Corn & cob meal = 70 lb/bu	28	72
Soybeans = 60 lb/bu	48	42
Rye = 56 lb/bu	44.8	45
Soybean oil meal = 54 lb		37
Dairy feed = 35 lb		57

### Weight conversions

- 8 tablespoons = 1/4 lb
- 3 teaspoons = 1 tablespoon
- 1 pint = 1 pound
- 2 pints = 1 quart
- 4 quarts = 1 gallon = 8 lb
- 2,000 lb = 1 ton
- 16 ounces = 1 pound
- 27 cubic feet = 1 cubic yard
- 1 peck = 8 quarts
- 1 bushel = 4 pecks

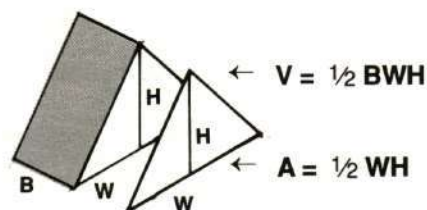
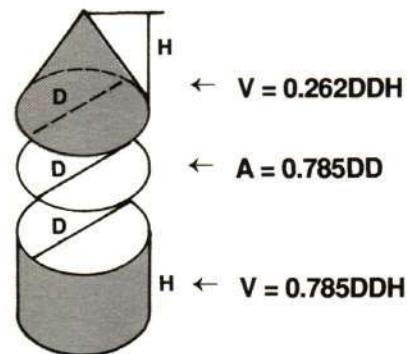
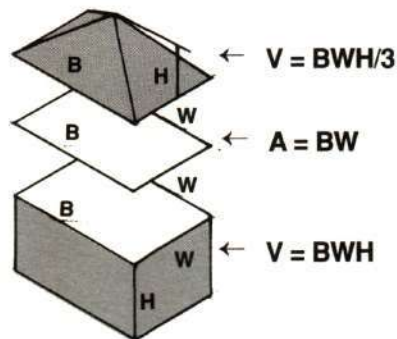
### Other conversions

- 1% = .01
- 1% = 10,000 parts per million (ppm)
- 1 Megacalorie (M-cal) = 1,000 calories
- 1 calorie (big calorie) = 1,000 calories (small calorie)
- 1 M-cal = 1 therm

## STORAGE AND FEEDING DRY MATTER LOSSES OF ALFALFA

Storage method	Storage loss	Feeding loss
Small bales, stored inside	.04	.05
Round bales, stored inside	.04	.14
Hay stacks, stored inside	.04	.16
Round bales, stored outside	.12	.14
Hay stacks, stored outside	.16	.16
Haylage, vertical silo	.07	.11
Haylage, bunk silo	.13	.11

## AREAS AND VOLUMES



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