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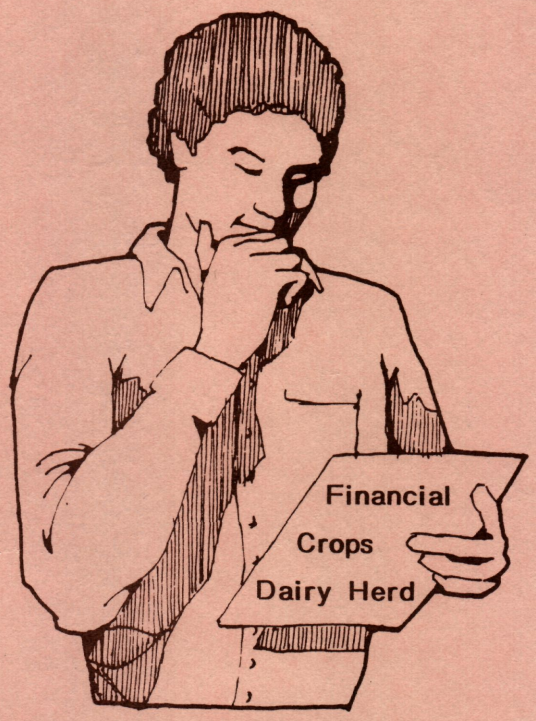

Dairy Farm Analysis Workbook

MICHIGAN STATE UNIVERSITY
CES
COOPERATIVE EXTENSION SERVICE

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INTRODUCTION

This workbook can help you analyze the current position of your dairy farm. Sound analysis requires a look at the whole business, not just part of it. It is for this reason that the workbook is divided into 4 sections. The first three deal directly with the analysis by dividing the farm business into 3 main sections: 1) Dairy Herd Management, 2) Crops Management, 3) Financial Management.

By answering questions in each section and comparing those answers to standards, you can get a feel for the strengths and weaknesses in each part of your farm business. The usefulness and reliability of this analysis is only as good as the information supplied. Accurate and complete records must be kept on farms today if they are to compete tomorrow. Section 4 of the workbook contains all of the tables and appendixes that are referred to throughout the book. We strongly encourage you to complete the workbook yearly to help evaluate the current position of the farm and set new priorities and goals for the coming year.

SECTION 1
THE DAIRY HERD

Gathering information on the dairy herd is hard work. The types of records available, such as DHIA and herd health records, will be a big help. The dairy section is divided into six subcategories: 1) General Dairy Information; 2) Herd Health and Environment; 3) Nutrition; 4) Reproduction, Breeding and Genetics; 5) Milking and Mastitis; and 6) Calf Management.

If a question cannot be answered because of lack of information, skip it and go to the next question. If a lot of blanks are left, you should take a serious look at your records, or lack of records, and plan steps to correct the situation.

Standards are set at levels that we feel are necessary to maintain a productive and profitable herd. They are given in italic before the comments. The summary sheets found at the end of this book will help you organize your thoughts about possible changes.

The summary sheet will direct you to list those areas you have excelled in. You should feel very good about these. The second part asks you to list those areas where improvement can be made. The improvements could fall into long term and short term. Long term may be changing the calving interval; short term may be feeding calves differently. Once you have your lists made, prioritize them to determine where to start. Keep in mind that this process of looking at weak and strong points must be done in each section of the workbook. This means that you will have a sheet for the dairy section, the crops section and the financial section. They all interrelate. Changes you make in one section must be conducive to changes in other sections.

Take your time and do as good a job as possible. The more accurate you are the better job you can do on setting your goals for the future. The future is what you need to plan for. Ask yourself the questions; Where am I now?, (the workbook helps you answer this), Where do I want to be? and finally, How do I get there?

GENERAL DAIRY INFORMATION

1. Total number of cows ..... _____
2. Milk shipped/cow/day (lb) ..... _____
3. Milk fat percent ..... _____
4. Is the herd on a milk testing program? (DHIA) ..... _____
5. Production/cow/year (lb) ..... _____
6. Total workers (FTE) - Full Time Equivalents ..... _____
7. Number of cows/FTE/year ..... _____
8. Total pounds of milk sold last year ..... _____
9. Lbs milk sold/FTE ..... _____
10. Peak milk yield/1st lactation animal ..... _____
11. Peak milk yield/cow, lactation 2 or greater ..... _____
12. Number of dry cows ..... _____
13. Average number of days cows are dry ..... _____
14. Number of milking cows ..... _____
15. Average number of days in milk* ..... _____
16. Number of cows fresh this month ..... _____
17. Number of cows expected fresh next month ..... _____
18. How many animals started their first lactation in the last year? _____

*See Appendix 1 to calculate these numbers if not using DHIA records.

Standard (underlined) and comments

1. *no standard*--Average number of cows over the year.

2. *more than 45 lb/day*--The amount shipped/day x 365 days gives an estimate of the herd average at this particular time.

3. *more than 3.6%*--Values less than this are not uncommon during hot months. Very often, low milk fat is associated with a low fiber ration (See Nutrition Section).

4. *yes*--If no, use a good substitute. Saying you're going to weigh the milk once a month yourself only gives limited information on production and nothing on butterfat, protein, somatic cells, reproduction, or herd management information.

5. *more than 16,000 lb/cow*--Michigan DHIA Holstein cows average over 16,000 lb/yr.

6. *no standard*--This includes unpaid family labor; 3,000 hours = one FTE (Full Time Equivalent).

7. *35*--The range is 20-50 depending on mechanization and type of system.

8. *no standard*--Add all milk check stubs for the year.

9. *500,000 lb/FTE*--This amount demands that smaller herds produce more milk per cow. (See question 125.)

10. *60-65 lb***--Culling less than 30% of 2 year olds will tend to pull down the future herd average.

11. *80 lb***--To achieve a 16,000+ herd average, all 2nd lactation and greater animals must reach this level.

12. *10-15% of total cows*--Seasonal variations may occur especially when freshening heifers at one time of year.

13. *45-60 days*--Less than 45 or greater than 65 decreases lifetime milk production.

14. *85-90% of total cows*

15. *150-170*--Over 160 indicates a breeding problem or may be due to seasonal calving.

16. *7-8% of total cows*--This assumes you are calving cows evenly throughout the year.

17. *7-8% of total cows*--If the number is not known, inadequate cow records are being kept.

18. *35-40% of total cows*--If lower than 35%, there is a calf mortality or breeding problem, or heifers are being sold or freshened older than 24 months. DHIA management sheets contain this information.

**See TABLE 2 for lactation yield based on peak production.

19. Number of cows sold (last 12 months) for non-dairy purposes _____

20. Number of first lactation animals sold for non-dairy purposes in the last year _____

21. Number of cows died (last 12 months) ..... _____

22. Number of cows purchased (last 12 months) ..... _____

23. Average age (all cows) ..... _____

24. Calving interval* ..... _____

25. Total number of heifers from birth to freshening ..... _____

26. Number of heifers (birth-breeding age) ..... _____

27. Number of heifers (breeding-freshening) ..... _____

28. Number of heifers purchased ..... _____

29. Number of calves born last 12 months ..... _____

30. Number heifers died (last 12 months) ..... _____

31. Number heifers died (0-3 months of age) ..... _____

32. Number of heifers died (4 or more months of age) ..... _____

33. Number of heifers sold ..... _____

HERD HEALTH AND ENVIRONMENT

34. What is your age goal for first service on heifers? ... _____

*See Appendix 1 to calculate these numbers if not using DHIA records.

19. *26-30% of total cows*--Culling rates less than 26% may result as a consequence of expanding the herd size, an excessively long calving interval or high calf mortality.

20. *30% of first lactation animals freshened in the last year*--If lower than 30%, you are not culling a sufficient number of 2-year olds.

21. *less than 2% of total cows*--A reason for all cow deaths must be written in the herd disposal book.

22. *no standard*--Are cows being purchased to increase the size of the herd or to keep it stable?

23. *48-52 months*--If greater than 52, look at culling rates, calving, interval, calf mortality and age at first calving.

24. *less than 390 days*--Intervals greater than this indicate breeding problems--see Reproduction Section.

25. *more than the total number of cows*--Less than this will not allow recommended culling rates while maintaining herd size.

26. *55-65% of the total number of cows*--If less than this, you will have insufficient replacement heifers for culling 1 1/2 years from now. Options are to purchase calves, decrease herd size, or decrease culling rate.

27. *35-45% of total number of cows*--Numbers less than this indicate insufficient replacements for the current year.

28. *no standard*--If not expanding herd size, this number should be zero.

29. *1-1.2 per cow*--This is estimated as the total number of calves born in last 12 months divided by the average number of cows. If less than 1.0, you can expect insufficient replacement numbers to maintain herd size without lowering the culling rate or production.

30. *less than 8% of total heifers*--Are the reasons known and listed in the herd disposal book?

31. *less than 5% of the calves born during the last 12 months*--If greater than 5%, check the total calf raising program to determine whether deaths are due to nutrition, disease, or housing/environment.

32. *less than 3% of total calves born during last 12 months*--Calf losses after 4 months of age are not common.

33. *no standard*--Heifers should not be sold unless the number of heifers exceeds the total number of cows. To maintain herd size and select for increased production, freshen all heifers and cull low producers.

HERD HEALTH AND ENVIRONMENT

34. *no standard*--A good youngstock management plan includes an age goal when all heifers will be serviced for the first time. Holstein heifers should be pregnant by 15 months of age and weigh 750 lb.

35. Number of heifers that exceed the age goal ..... _____

36. Average age when heifers freshen (months) ..... _____

37. Are you on a herd health program? ..... _____

38. Are cows alert? ..... _____

39. Do you consult your local veterinarian on vaccination programs? _____

40. Do you keep a herd disposal book? ..... _____

41. What percent of the animals that die on the farm are given a post-mortem exam by a veterinarian? _____

42. Do you have a permanent herd health folder for each animal, starting at birth? _____

43. What percent of your cows would be affected by the following health problems?

mastitis (new cases treated this past month) ..... _____

cystic ovaries ..... _____

displaced abomasum (twisted stomach) ..... _____

retained placenta (not cleaning) ..... _____

metritis (uterine infections) ..... _____

milk fever ..... _____

ketosis ..... _____

hardware ..... _____

udder edema ..... _____

off-feed ..... _____

35. *no standard*--If the number exceeds your goal but is low, your heat detection is good but your standard may need to be changed. If the number is large, the goal may be alright, but heat detection may be the problem.

36. *24-26 months*--If less than 24 months, lifetime production will decrease. If greater than this, check nutrition and breeding programs. Fat heifers are common when freshening older than 27 months of age.

37. *yes*--Planned programs make things happen.

38. *yes*--Judgement call. If cows are not alert, a nutrition, disease or housing problem exists.

39. *yes*--Planned vaccination programs insure that they are carried out on time rather than hit and miss and prevent disease outbreaks.

40. *yes*--It is critical to historically trace why cattle leave the herd (e.g., She left for low production caused by a breeding problem).

41. *100%*--Post-mortem exams are needed to determine causes of death. Helps indicate a beginning disease outbreak.

42. *yes*--Records should give a chronological history of everything that is done to an animal.

43.

less than 3% of total--If greater than this, see questions 108 through 120 on Milking and Mastitis.

less than 10%--If greater: 1) What is the overall incidence? 2) How long do the cysts persist? 3) Are they present at the time of first insemination? How many cows would be considered cystic? Unless you are on a regularly scheduled reproductive exam program you cannot identify the problem.

less than 3%--If greater than 3%, check the fiber level in the ration. It should be above 18% ADF. Evaluate the dry cow and fresh cow nutrition program.

less than 8%--If greater, check the selenium and vitamin levels in the ration. Random blood samples give an indication of selenium in the blood. Check the calving area for cleanliness.

less than 5%--If greater, check calving area and free-stall or comfort-stall area for cleanliness.

less than 2%--If greater, check phosphorus, calcium, magnesium and vitamin D levels of the ration, especially dry and just fresh cows.

less than 2%--If greater, check the energy level of the ration, especially for cows in early lactation. Are cows offered sufficient feed?

less than 1%--Hardware is a totally preventable disease.

less than 1%--If greater, check nutrition program for too much salt or too much grain prior to calving.

less than 5%--If greater, check the fiber level of the ration and the pH of feeds. High moisture and fermented feeds have low pH's. pH affects rumen fermentation.

44. How many cows are showing signs of sore feet or legs? _____

45. Do you notice cows slipping on concrete in free stall area, holding area or feed bunk area? _____

46. How often are hooves trimmed? ..... _____

47. Do dry cows have opportunity to get off concrete? ..... _____

48. How many maternity pens do you have and what size are they? _____

49. Is the bedding in maternity pens clean? ..... _____

50. What do you vaccinate calves for? When? ..... _____

51. What do you vaccinate cows for? At what interval? ..... _____

52. Are cows huddled in certain areas of the barn? ..... _____

53. Are cows clean? ..... _____

54. Do you detect ammonia odors in barns? ..... _____

55. Is the haircoat of animals moist? ..... _____

56. Are there birds in the barn? ..... _____

NUTRITION

57. Are rations balanced? By whom? ..... _____

58. How often are rations balanced? ..... _____

59. Are forages tested? ..... _____

60. How often are forages tested? ..... _____

61. List the feeds fed to the lactating herd .....

	Feed	Quantity	Comments
1.			
2.			
3.			
4.			
5.			
6.			

44. *less than 5%*--Look for arched backs as cattle walk. Examine condition of stalls and barnyard.

45. *no*--Concrete must not be smooth. Estrus detection is inhibited with slippery surfaces.

46. *when needed*--If only scheduled at specific times, cattle in need of help must wait. Production may slip severely. Foot baths may be needed.

47. *yes*--Cattle feet, pasterns and legs need a break from wet, hard concrete surfaces.

48. *at least a 10' x 12' stall with one stall available per 25 cows*--Smaller than this results in wet pens plus the possibility of injury to the cow or calf at calving.

49. *yes, clean and dry*--High moisture bedding has a direct correlation to high calf mortality. Long straw is the best choice of bedding for maternity pens.

50. *IBR, BVD, PI$_3$, Brucellosis & clostridium*--See Appendix 2.

51. *IBR, BVD, PI$_3$*--See Appendix 2.

52. *no*--If answer is "yes," ventilation may be inadequate.

53. *yes*--If "no," a housing management problem exists (for example: dirty stalls or overcrowding of facilities).

54. *no*--If "yes," the ventilation system must be checked. High humidity and ammonia odors can cause a decrease in milk production and an increase in disease problems. Pneumonia is a common disease problem with high humidity barns.

55. *no*--If "yes," the humidity level is too high and there is not enough air movement to remove moisture.

56. *no*--It's almost impossible to keep all birds out, but efforts should be made to control pigeons, blackbirds, sparrows, etc. Birds are sources of disease.

NUTRITION

57. *yes, by a qualified person*--Profitable dairying starts with well balanced ration. Costs should be monitored. Ration calculations should be checked by another person. You are responsible for what you feed.

58. *whenever feeds change*

59. *yes*--Forage testing can save substantial protein and mineral costs.

60. *whenever the ration is going to be re-balanced*--Feed quality varies from field to field and the amount of feed varies with the percent moisture.

61. *no standard*--Are the rations balanced? A feed needs plan can be developed from these charts. Calculate the tons of each ingredient you need for the year. Then calculate the acres of each crop to be grown to provide this. Coordinate these answers with the crop section.

62. What is the percent protein of the ration for cows in milk? Fill in the appropriate blanks in the table at the right. If grouped by production level, fill in spaces for each group. _____

63. What percent of the ration is fiber? ADF = acid detergent fiber*

64. What is the average dry matter intake (DMI) pounds per cow per day?

	NUTRIENT LEVELS		
Pounds Milk	% CP	% ADF	lb DMI
40			
50			
60			
70			
80			

65. What percent of the ration dry matter is forage? ..... _____

66. How much grain is fed per pound of milk produced? ..... _____

67. How soon are cows brought onto full feed after calving? _____

68. How soon are cows moved to the high group after calving? _____

69. Are dry cows fed separately from the lactating herd? ... _____

70. Are dry cows on a long hay ration? ..... _____

71. List the feeds fed to dry cows .....

	Feed	Quantity	Comments
1.			
2.			
3.			
4.			

72. Are dry cows' rations balanced for minerals? ..... _____

73. Do dry cows get grain prior to calving? How much? ..... _____

74. At what age are heifers weaned from milk? ..... _____

*Acid detergent fiber is a better indicator of forage quality than crude fiber. If ADF of forages are not known, they can be approximated if the crude fiber content is known. For forages: approximate ADF = 1.2 x Crude Fiber.

62. *12-17%*--12% will support 40 lb of milk, whereas 17% will support high levels of milk production (above 90 lb). Dry matter intake must be monitored to determine if cows are eating to their potential.

63. *18% ADF (Acid Detergent Fiber)**--Levels lower than 18% could result in a low milk-fat test and cause digestive problems. Review the incidence of D.A.'s. Buffers may be added to offset low fiber. This is only a temporary measure.

64. *2+ (.02 x lb of milk) x cwt. of body wt.**--Intake should be within 10% of the calculated value. Higher intake occurs in winter and lower in hot months. There is no way to know if cows are receiving a balanced ration unless intake is measured. This is very important.

65. *50% or greater*--Less than this indicates low fiber levels and may result in low milk-fat tests.

66. *one pound of grain per 2.5-3.0 lb of milk*--More grain than this could result in ruminitis (cows off-feed) and low butterfat tests.

67. *by 3-5 weeks after calving*--Bringing cows on full feed too slowly results in decreased total lactation milk yield and predisposes cows to ketosis; too rapidly can result in off-feed problems, acidosis or ketosis.

68. *Same answer and comments as above*

69. *yes*--Dry cows need lower energy diets and less calcium and phosphorus supplementation than milking cows.

70. *yes*--This provides plenty of bulk and a lower energy intake. This keeps cows from becoming over-conditioned during the dry period.

71. *no standard*--Are the rations balanced? Rations for dry cows should be balanced for maintenance and pregnancy only. If corn silage is fed, the amount needs to be limited.

72. *yes*--May need to supplement minerals depending on forage quality.

73. *yes*--Introduction of grain into the ration may help to condition the cow for production. Too much grain will lead to post-calving problems.

74. *3-7 weeks of age*--Heifers can be weaned when consuming 1.5-2 lb of grain per day.

---

*See TABLE 1 for nutritional requirements for milk production.

75a. List the feeds fed to youngstock .....

a) 4 to 14 months of age

	Feed	Quantity	Comments
1.			
2.			
3.			
4.			
5.			
6.			

75b.

b) 14 months to freshening .....

	Feed	Quantity	Comments
1.			
2.			
3.			
4.			
5.			
6.			

76. At what weight are heifers bred? ..... _____

77. Approximately how old are they at breeding time? ..... _____

78. Are bred heifers separate from dry cows? ..... _____

79. How many cows would you classify as fat? ..... _____

80. Number of cows/waterer ..... _____

75a. *no standard*--Are the rations balanced? Holstein heifers should weigh a minimum of 750-800 lb by 14 or 15 months of age. Use a tape or scales to determine weights at various ages. See TABLE 3 for a growth guide on dairy heifers. Replacements should be grouped according to age: (2-4 mo.), (4-7 mo.), (7-14 mo.), (breeding group), (pregnant heifers).

75b. *no standard*--Are the rations balanced? Adequate nutrition for growth is needed. If the only forage is corn silage, you have to limit the feed so that animals are not fattened. Fat heifers will result in difficult calving and low milk production.

76. *750-800 lb for Holsteins*--Heavier than 850 lb indicates over-fattening of the heifers or delayed breeding. See TABLE 4, page 41.

77. *14-15 months*--Proper feeding and nutrition will insure that Holstein heifers reach 750-800 lb by this age.

78. *yes*--Rations for heifers need to provide for adequate growth, and dry cow rations may not contain enough energy.

79. *less than 10%*--See Appendix 3. Fat cows have difficulty calving and don't milk to their potential. Evaluation should be done by a qualified, unbiased individual (veterinarian, extension agent, classifier, or other farmer).

80. *less than 50*--3-4 lb of water are needed for every lb of milk produced. Water must be available at all times and be of good quality.

81. How many times a day are set aside specifically for heat detection? _____

82. How long a period each time? At what time of day? .... _____

83. Number of observed heats (this last month) ..... _____

84. Number of expected heats (this last month) ..... _____

85. Do you use a bull to service heifers? ..... _____

86. What percent of the heifers are serviced by a bull? ... _____

87. Do you use a bull to service cows? ..... _____

88. What percent of the cows are serviced by a bull? ..... _____

89. Do you record all services? ..... _____

90. Number of services per conception (How many times are cows bred before they become pregnant)? _____

91. Number of cows diagnosed pregnant in the last month ... _____

92. What is your goal for days from freshening to first service? _____

93. Number of cows beyond this goal which have not been serviced yet _____

94. Average number of days from freshening to first service in the last year _____

95. Number of cows open more than 120 days ..... _____

96. Number of cows inseminated more than 3 times ..... _____

97. Number of cows culled for reproductive reasons (cystic, uterine infection, etc.) _____

81. *at least 2 times/day, preferably 3*--Time should be set aside specifically for heat detection.

82. *more than 20 minutes/time*--The best time for heat detection is between 9 p.m. and 6 a.m. Seventy-five percent of all cows will show signs of heat between these times.

83. *18% of total number of cows*--This assumes calving evenly throughout the year. All heats should be recorded, even if the animal is not inseminated.

84. *18% of total number of cows*--Good reproductive records, plus a good monthly herd health program, help insure prediction and observation of estrus match.

85. *no*--Using A.I. on all heifers results in a 10% increase in genetic gain of the total herd. The conception rate on heifers is higher than for older cows.

86. *0*--If using a bull for clean-up purposes, less than 10% should be serviced by a bull.

87. *no!*--Many farms utilize clean-up bulls because they are not doing a good job of heat detection or are using improper breeding techniques.

88. *0*--If using a bull for clean-up purposes, less than 10% should be serviced by a bull.

89. *yes*--If "no," the record-keeping system is inadequate. Unrecorded services cause problems at calving and may be a factor in calf mortality and cow infections. Without records, you are less sure of the expected calving date.

90. *less than 1.7*--Greater than this indicates a poor breeding technique, poor heat detection, or a disease problem.

91. *8-10% of total number of cows*--Pregnancy checks should be made from 40-50 days after insemination.

92. *40-70 days from freshening*--All dairy farms need to set goals. They become flags for action.

93. *not greater than 10% of the total cows*--Numbers greater than this indicate a heat detection problem.

94. *40-70*--First observed estrus typically occurs 15-21 days after calving (and should be recorded). We can predict second heat at approximately 36 to 42 days after calving (15+21 days = 36).

95. *less than 15% of total number of cows*--If more than 15%, there is a problem in heat detection, breeding procedures, or a disease problem exists. Monthly herd health programs are important to monitor the reproductive status of the herd. See also questions 37, 43, 81 and 82.

96. *less than 15% of total number of cows*--Problem breeders increase the calving interval and decreases future herd milk production. See also question 95.

97. *less than 8% of total number of cows*--Greater than this decreases the number that can be voluntarily culled for low production and decreases the rate of genetic gain. Is the reason for reproductive culls due to disease or mismanagement?

98. Number of abortions ..... _____

99. Number of cases of dystocia (difficult calving) ..... _____

100. What percent of cows receive a post-calving check within 20-40 days after calving? _____

101. Average veterinarian and medical costs/cow/year ..... _____

102. Average PD milk of sires of cows (1984 PD base) ..... _____

103. Average PD milk of sires of heifers (0-1 year of age) (1984 PD base) _____

104. Average PD milk of service sires (last 9 months) ..... _____

105. What percent of sires and dams of all heifers are recorded? _____

106. Average dollars spent on semen/cow ..... _____

107. Average dollars spent/unit of semen ..... _____

MILKING AND MASTITIS

108. Cell Count (last 12 samples from the herd) From MDA or DHIA .....

_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

109. Raw bacteria count (on milk check stub) ..... _____

110. Antibiotic history (what drugs do you use on cows for mastitis?) _____

111. Are organisms cultured from infected cows? ..... _____

98. *less than 2% of total number of cows*--If greater than this, a veterinarian should be consulted. This should be discussed during monthly herd health visits.

99. *less than 10%*--Difficult calving is commonly associated with fat cows or heifers. (See Appendix 3.)

100. *100%*--This is important to keep on top of potential reproductive health problems.

101. *approximately $50/cow/year*--See line 39 of the Income Statement of the Financial Section of this workbook. High producing herds usually experience higher veterinary costs. (See TABLE 7-b.)

102. *200+*--Add 120 lb to this each year after 1984.

103. *700+*--Add 120 lb to this each year after 1984.

104. *820+*--Add 120 to this each year after 1984. You have control over service sires you pick. Be sure you are selecting them at, or above, this level to insure adequate genetic progress.

105. *100%*--Good reproductive records contain this information.

106. *more than $29.00*--See line 38 of the Income Statement of the Financial Section.

107. *$14.00-$17.00*--It takes a substantial investment in semen to achieve genetic progress in milk production.

MILKING AND MASTITIS

108. *less than 2 (that is 200,000 cells). WMT and somatic cells are the same*--If less than 2, you're in good shape. But this does not mean you have no mastitis problem. Information can be obtained from Michigan Department of Agriculture. Historical data is important to trace trends by months to identify seasonal problems. Try to correlate seasonal problems with other activities on the farm. For example, are cows neglected during planting season? A high percentage of fresh cows or cows close to dry-off, or hot summer months, will push the cell count up. (See Appendix 4.)

109. *less than 2*--This is found on your monthly milk check.

110. *no standard*--It is necessary to keep track of types of antibiotics and their effectiveness.

111. *yes, if a mastitis problem exists*--Many antibiotics are specific for particular organisms and are ineffective against others. Some organisms require disposal of infected animals to eliminate the problem.

112. Condition of bedding in the: 1) dry cow area, 2) maternity area, 3) lactating cow area. _____

113. Number of cows treated for mastitis in early lactation (0-30 days) _____

114. Number of new cases of mastitis treated this month ... _____

115. Number of cows treated more than 3 times ..... _____

116. What percent of cows are dry treated? With what? .... _____

117. Are you teat dipping after milking? With what? ..... _____

118. Number of 2-year olds treated for mastitis ..... _____

119. How frequently do you have your milking system checked for performance? _____

120. When was the last time the milking system was checked? _____

CALF MANAGEMENT

121. Are calves identified at birth? ..... _____

122. What percent of all calves' navels are disinfected immediately after birth? With what? _____

123. What percent of all calves receive colostrum within one half hour after birth? _____

124. How much milk or milk replacer do you feed each calf per day? _____

125. Are extra teats removed from calves? ..... _____

126. Are all calves dehorned? At what age? ..... _____

127. How many calves have had scours this past month? ..... _____

112. *clean*--The important factor in minimizing mastitis is EXPOSURE, that is the number of bacteria the udder is exposed to. Bacteria thrive in a moist, dirty environment.

113. *0*--If cows are dry-treated and the number is greater than zero, there is a problem with the environment. Housing environment includes outside lots and pasture. If cows are not dry-treated, you can't be sure what the problem is.

114. *less than 2% of the total herd*--If greater than 2%, an infection problem exists.

115. *none*--Dispose of all cows if they do not respond to 3 treatments. However, be sure you are treating with the proper antibiotics!

116. *100% (with an oil based product)*--This is a good preventive measure.

117. *yes (with an effective or proven teat dip)*--Teat ends must be well covered with teat dip immediately after milking.

118. *less than 1% of 2-year olds*--If greater than this, you should be concerned with your mastitis control management practices. Sources of infection include: 1) older cows, 2) dirty dry cow and calving area, 3) group penned calves fed mastitic milk.

119. *at least 2 times/year*--Improperly maintained milking equipment results in high somatic cell counts.

120. *date should be within the last 12 months*.

CALF MANAGEMENT

121. *yes*--Calves should be identified immediately after birth. This information can be placed on a permanent herd health folder. DHIA has a very useful record sheet.

122. *100% with 7% tincture of iodine*--This will prevent naval infection and promote drying of the naval.

123. *100%*--Timing is critical to insure absorption of antibodies to fight off disease. It is important to have antibody protection prior to being exposed to disease organisms. Calves should receive 1 qt within 15-30 minutes after birth, and an additional quart within 12 hours after birth.

124. *8% of body weight*--This is approximately 1 gal of milk or milk replacer for a newborn calf.

125. *yes*--Should be removed prior to 8 weeks of age.

126. *yes (prior to 8 weeks old)*--Dehorning is important to prevent cattle from injuring each other or people. Dehorning at an early age is less stressful on both animals and farmers.

127. *less than 5%*--If greater, check calf management practices.

128. How many calves have had pneumonia this past month? _____

129. Does the calf area have an ammonia odor? ..... _____

130. Are the haircoats on calves dry? ..... _____

131. Are calves in direct drafts? ..... _____

132. Do you use milk replacer? ..... _____

What is the percent fiber in it? ..... _____

What is the percent protein in it? ..... _____

What is the percent fat in it? ..... _____

133. How many calves do you notice coughing? ..... _____

134. At what age is grain and/or hay introduced to the calf? _____

135. What determines when a calf is weaned? ..... _____

128. *less than 1%*--Pneumonia is an indication of poor ventilation in the calf housing area. Pneumonia is a common secondary infection to scours.

129. *no*--Ammonia odors indicate poor ventilation.

130. *yes*--Moist hair coat indicates high humidity and lack of air movement through a facility. In the winter, 15 cu ft/minute (CFM) of air needs to be removed per 100 lb of body weight in the building. This must be continuous. An additional 25 CFM need to be added whenever inside temperatures reach 50°F or outside temperatures reach 25-30°F. Fresh air to the calf facility should come from the outside.

131. *no*--Direct drafts will drop a calf's body temperature and reduce its ability to fight off disease.

132. *yes or no, depending on preference*--Milk replacer can be as nutritious as fresh milk.

.25-.5% fiber--Higher fiber indicates non-digestible components.

20-24% protein--The protein sources should be primarily milk products such as whey, buttermilk, skim milk and casein.

15-20% fat--A higher fat percent should be fed if calves are in hutches during cold weather. Feeding lower than 15% fat milk replacers increases the incidence of scours and results in poor growth.

133. *none*--Coughing indicates lung or throat irritations due to poor environment or disease.

134. *3 days of age for grain, 2 weeks of age for hay*--Grain and hay help develop the rumen which allows for early weaning of calves.

135. *when consuming 1 1/2 to 2 lb starter mix/day*--Good starter mixes contain coarse grains, molasses, a protein supplement, vitamins and minerals. Starter mixes should contain 18% protein.

Section 2

CROPS

SECTION 2
CROPS

It is important to plan ahead to supply feed needs for the dairy herd. We want to supply feeds which will maximize the amount of milk at the lowest possible cost. Feed costs for a dairy cow and replacement typically amount to 50% of milk income and whatever can be done to lower this cost will substantially increase income. Lowering feed costs begins with the cropping program. The forage program is the most critical area of concern. It is almost impossible to cut purchased feed costs when forage quality is poor. The most expensive ingredients in the ration are typically protein and energy. High quality forages (especially alfalfa) are excellent sources of these nutrients. The combination of crops to grow and number of acres to grow depends upon: the desired feeding strategy for the dairy herd, the advantages of particular crops and crop combinations (in regard to yield, availability of labor, timeliness of cropping operation, manure management strategy) and costs per acre to grow the various crops. It is difficult to evaluate a cropping program without production cost records for each crop. Costs of fertilizer and lime can be minimized by regular soil testing (at least every three years for each field). Variety selection and herbicide choices also greatly influence the cost per acre.*

Once feed preferences are selected and rations balanced, the next step is to calculate the amounts of each feed needed per year for the herd. The quantities needed, divided by the average yields per acre (based on your field history) gives an indication of the number of acres of each crop to be grown. Storage and feeding losses need to be accounted for in feed needs. (See page 1 of Appendix 5). Once the cropping program has been planned, you can determine and plan your purchase feed needs.

---

*An example of a field record sheet is included. See Appendix 6.

ALFALFA

No. acres _____

1. Principle soil type ..... _____
2. Number of cuttings/year .... _____
3. Average yield/acre (tons hay equivalent) _____
4. Amount harvested as dry hay _____

Tons hay equiv

5. Amount harvested as haylage ____x____%DM ÷ 88 = _____
6. Amount sold (tons hay equivalent) _____ _____
7. Amount purchased (tons hay) _____ _____
8. Net amount available for feed (Lines 4+5+7-6) _____
9. Stage of maturity (quality) of most of the hay crop _____

Grade	Maturity at Cutting	NUTRIENT CONTENT (100% dry matter basis) CP %	ADF %	NE Mcal/lb
Prime	Prebloom	19	30	.64
1	1/10 bloom	17-19	31-35	.60
2	1/2 bloom	14-16	35-40	.57
3	full bloom	13	41	.53

10. Fertilizer, lime and chemical cost per acre* _____
11. Soil pH ..... _____
12. When was the last time soil was tested? ..... _____
13. Stage of growth at first cutting ..... _____

*See TABLE 6 for projected costs

No. acres _____

1. Principal soil type ..... _____
2. Number of cuttings/year ..... _____
3. Average yield/acre (tons hay equiv) ..... _____
4. Amount harvested as dry hay ..... _____

Tons hay equiv

5. Amount harvested as haylage _____ x _____ %DM ÷ 88 _____
6. Amount sold (tons hay equivalent) ..... _____
7. Amount purchased (tons hay equivalent) ..... _____
8. Net amount available for feed (Lines 4+5+7-6) _____
9. Quality of most hay crop (See Table below) .... _____

Grade	Quality	NUTRIENT CONTENT (100% dry matter basis) CP %	ADF %	NE Mcal/lb
2	Mid Bloom Alf. 20% grass	14-16	36-40	.57
3	Full Bloom Alf. 30% grass	11-13	40-42	.55
4	Mid Bloom Alf. 50% grass	8-10	43-45	.52
5	Mostly grass	10	46	.48

10. Fertilizer, lime and chemical costs/acre* ..... _____
11. Soil pH ..... _____
12. When was the last time soil was tested? ..... _____
13. Date of first cutting ..... _____

*See TABLE 6 for projected cash costs to produce crops based on yield.

CORN GRAIN

No. acres _____

1. Principal soil type ..... _____
2. Average yield/acre (bu) ..... _____
3. Amount harvested as shelled corn (bu) ..... _____
4. Amount harvested as ear corn (bu) ..... _____
5. Amount of corn sold (bu) ..... _____
6. Amount of corn purchased (bu) ..... _____
7. Net bushels of corn available for feed (Lines 3+4+6-5) _____
8. Fertilizer, lime and chemical costs per acre ... _____
9. Soil pH ..... _____
10. When was the last time soil was tested? ..... _____
11. Planting dates (beginning to end of planting season) _____

CORN SILAGE

No. acres _____

1. Principal soil type ..... _____
2. Yield/acre (tons)* ..... _____

Tons hay equiv.

3. Amount harvested (total tons) ____ x ____ %DM ÷ 88 _____
4. Amount sold as cash crop ____ x ____ %DM ÷ 88 _____
5. Amount purchased ____ x ____ %DM ÷ 88 _____
6. Net tons hay equivalent available for feed (Lines 3, 4 + 5) _____
7. (a) Is NPN added to corn silage? ..... _____
   (b) What form of NPN? ..... _____
   (c) How much NPN/ton? ..... _____
8. Fertilizer, lime and chemical cost/acre** ..... _____
9. Soil pH ..... _____
10. When was the last time soil was tested? ..... _____

*To estimate tons/acre:
Avg. bushels grain/acre ÷ 6.5 = tons/acre

**See TABLE 6 for projected cash costs to produce crops.

OTHER GRAIN

Kind _____
No. acres _____

1. Principal soil type	_____
2. Yield/acre (grain)	_____
3. Yield/acre (straw)	_____
4. Amount harvested (bu)	_____
5. Amount sold	_____
6. Amount purchased	_____
7. Net bushels available for feed (Lines 4, 5 + 6)	_____
8. Fertilizer, lime and chemical cost/acre*	_____
9. Soil pH	_____
10. When was the last time soil was tested?	_____

*See TABLE 6 for projected cash costs to produce crops.

Section 3

FINANCE

SECTION 3
FINANCE

Enumerating costs and returns on an income statement, estimating farm growth and debt position on a balance sheet and examining the cash flow situation are all required to determine how well a farm is doing.

An income statement includes all cash and non-cash income and expenses. Comparing costs to other farms indicates if costs are out of line. Key costs to examine on the income statement include: purchased feed, depreciation, interest, labor, repairs, fertilizer, and fuel and oil.

Examining the balance sheet (net worth statement) reveals the debt situation of the farm and how the debt is structured into short-term, intermediate-term and long-term financing. The balance sheet is essentially a "snapshot" of the business at any point in time. Comparing the balance sheet from year to year allows one to determine if the farm is growing and increasing or decreasing the owners' equity position.

The cash flow summary indicates whether or not the farm is able to meet cash commitments over the year. A detailed cash flow statement (month by month) is needed to determine the cash flow position at various times within the year and when borrowed operating capital will be needed.

___ Projected

___ Actual

DAIRY FARM
INCOME STATEMENT

NAME _____ FROM Jan. 1, 19__ to Dec. 31, 19__

FARM REVENUE

CASH FARM INCOME

1.	Milk (IRS Tax Form: Sched. F, Part I, Line 9)	_____
2.	Dairy Cattle Sold (cows & calves) (From IRS Form 4797, Capital Sales)	_____
3.	Other Livestock Sold (Sched. F, Part I, Lines 5 thru 8)	_____
4.	Crops Sold (Sched. F, Part I, Lines 12 thru 19)	_____
5.	soybeans	_____
6.	corn	_____
7.	other grains	_____
8.	hay and straw	_____
9.	other	_____
10.	other	_____
11.	Other Cash Farm Income	_____
12.	Less Re-Sale Items Purchased	_____
13.	Government Programs Income	_____
14.	Gross Cash Farm Income (1 thru 13)	_____

NON-CASH FARM INCOME (INVENTORY CHANGES)

	Change in livestock no. (beginning to end of year)						
15.	change in no. cows	± ____	x $/hd	____	=	±	_____
16.	change in no. heifers	± ____	x $/hd	____	=	±	_____
17.	change in no. calves	± ____	x $/hd	____	=	±	_____
18.	change in value of other livestock ($)					±	_____
19.	Less dairy cattle purchases made				=	-	_____
	Change in value of stored crops (beginning to end of year)						
20.	change in no. bu soybeans	± ____	x $/bu	____	=	±	_____
21.	change in no. bu corn	± ____	x $/bu	____	=	±	_____
22.	change in no. bu other grains	± ____	x $/bu	____	=	±	_____
23.	change in tons of corn silage	± ____	x $/ton	____	=	±	_____
24.	change in tons dry hay equiv.	± ____	x $/ton	____	=	±	_____
25.	change in tons straw	∓ ____	x $/ton	____	=	±	_____
26.	other						
27.	Gross Non-Cash Farm Income (15 thru 26)						_____
28.	Gross Farm Income (14 + 27)						_____

(Continued p. 31)

FARM EXPENSES

CASH FARM EXPENSES (For year of analysis) (Sched. F, Part II, Lines 32-52 Line 54)

29.	Labor paid	
30.	Repairs and maintenance paid	
31.	Interest paid	
32.	Land rent paid	
33.	Feed paid	
34.	Seeds, plants paid	
35.	Fertilizer, lime and chemicals paid	
36.	Custom hire paid	
37.	Supplies paid	
38.	Breeding fees paid	
39.	Veterinary fees, medicine paid	
40.	Gasoline, fuel, oil paid	
41.	Storage, warehousing paid	
42.	Taxes paid (property, etc.)	
43.	Insurance paid	
44.	Utilities paid	
45.	Freight & trucking paid	
46.	Conservation expenses paid	
47.	Land clearing paid	
48.	Pension and profit sharing paid	
49.	Employee benefit programs paid	
50.	Marketing	
51.	Accounts payable change* (beginning to end of year)	
52.	Long term leases (silos, machinery, etc.)	
53.	Other	
54.	Total cash farm expenses (29 thru 53)	

NON-CASH FARM EXPENSES

55.	Depreciation	
56.	Change in inventory of supplies (dollars) beginning to end of year (fertilizer, fuel, etc.)	±
57.	Other	
58.	Total non-cash farm expenses (55 thru 57)	
59.	Total Farm Expenses (54 + 58)	

NET FARM INCOME

60.	NET FARM INCOME (28 - 59)	
61.	NET NON-FARM INCOME (Wages, etc.)	
62.	FAMILY EXPENSES + INCOME TAXES FOR ALL FAMILIES (estimated)	
63.	NET PROFIT (60 + 61 - 62)	

*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.

COMPARATIVE DAIRY FARM

BALANCE SHEET

Assets

NAME _____ DATE _____ DATE _____

		Amount previous year	Amount this year
CURRENT ASSETS			
64.	Checking account balance		
65.	Savings account balance		
66.	CD's, stocks, bonds, etc.		
67.	Collectible accounts owed to you		
	Crops in storage		
68.	soybeans (___bu x ___$/bu)		
69.	corn (___bu x ___$/bu)		
70.	other grains (___bu x ___$/bu)		
71.	hay (___ton x ___$/ton)		
72.	hay silage (___ton x ___$/ton)		
73.	corn silage (___ton x ___$/ton)		
74.	other crops on hand		
75.	Value of growing crops (cash inv.)		
76.	supplies on hand (at cost)		
77.	twine, fertilizer, chemicals		
78.	fuel		
79.	other		
80.	Feeder livestock		
81.	TOTAL CURRENT ASSETS (64 thru 80)		
INTERMEDIATE ASSETS			
82.	cows (___no. x ___ $/hd)		
83.	bred heifers (___no. x ___ $/hd)		
84.	youngstock (___no. x ___ $/hd)		
85.	other cattle (breeder) (___no. x ___ $/hd)		
86.	Machinery-equipment		
87.	Vehicles		
88.	Co-op stock (PCA-Elevators, etc.)		
89.	TOTAL INTERMEDIATE ASSEST (82 thru 88)		
FIXED ASSETS (long term)			
90.	Real estate _____ acres, with all buildings, home, silos and all storage fixtures		
91.	Stock (FLB etc.)		
92.	TOTAL FIXED ASSETS (90 + 91)		
93.	TOTAL ASSETS (81 + 89 + 92)		

COMPARATIVE DAIRY FARM BALANCE SHEET

Liabilities & Net Worth

DATE _____ DATE _____

NAME _____

		Amount previous year	Amount this year
CURRENT DEBTS			
94.	Present amount owed on feed		
95.	Present amount owed on fuel		
96.	Balance owed on fertilizer & seed		
97.	Balance past-due on taxes		
98.	Balance owed on repairs, rent, etc.		
99.	Unpaid medical/household bills		
100.	Unpaid interest due to date		
101.	Credit card balances owed		
102.	Other unpaid accounts or unsecured notes		
103.	TOTAL CURRENT DEBT (94 thru 102)		
INTERMEDIATE DEBTS (due between 1-7 years)			
104.	Debts owed to relatives		
105.	Debt balances on cattle and machinery		
106.	Debt balances on cars/trucks		
107.	Other non-real estate debts		
108.	TOTAL INTERMEDIATE DEBTS (104 thru 107)		
LONG TERM DEBTS			
109.	Debts owed on real estate		
110.	TOTAL DEBTS (103 + 108 + 109) =		
111.	NET WORTH (total assets - total debt) (owner's equity) =		
112.	CHANGE IN NET WORTH (this year's net worth - previous year's net worth)		

____ Projected

____ Actual

DAIRY CASH-FLOW SUMMARY

NAME _____ YEAR

	Item	Amount
	SOURCE OF FUNDS	
113.	Beginning cash balance	_____
114.	Gross cash farm income (14)	_____
115.	Net cash non-farm income (61)	_____
116.	New money borrowed	_____
117	TOTAL CASH INFLOW (113 thru 116)	_____
	USE OF FUNDS	
118.	Total cash farm expenses (excluding interest paid) (54) - (31)	_____
119.	New purchases	_____
	Repayment of borrowed money	
120.	Interest	_____
121.	Principal	_____
122.	Family expenses & income taxes for all families (estimated) (62)	_____
123.	TOTAL CASH OUTFLOW (118 thru 122)	_____
124.	NET CASH POSITION (Inflow-outflow) (117 - 123)	_____

125. How many pounds of milk are shipped/FTE/year? (include hired, operator and family labor) 1 FTE (full time equivalent) = 3,000 hours. _____

126. What is the number of acres farmed/cow? ..... _____

127. What are your semen and breeding costs/cwt milk sold? _____

128. What are your veterinary and medicine costs/cwt milk sold? _____

129. What is your purchased feed cost/cwt milk sold? (Line 33 of Income Statement + feed purchases not yet paid) ÷ Cwt Milk Sold this past year. _____

130. What is your cost to produce 100 lb milk? (Total farm expenses - Gross Farm Income + Milk Sales + Family Expenses) ÷ Cwt Milk Sold this past year. From Income Statement, Lines: (59 - 28 + 62) ÷ cwt milk shipped/year. _____

131. What is your depreciation and interest cost/cwt milk sold? _____

132. What is your debt per cow? ..... _____

133. What is your machinery investment/acre farmed? ..... _____

Standard (underlined) and comments

125. *more than 500,000 lb for confined-stall housing systems; more than 600,000 lb for free stall housing system*--Labor includes all labor (hired + family + operator) needed for milk and crop production. If crops are not grown, or minimal amounts are grown, more than 850,000 lb of milk should be shipped/FTE/Year.

126. *3.5 to 5*--It typically requires 3.5 to 4.5 acres to grow forages and grain to supply the needs for a cow and replacement in Michigan. This is dependent upon the crop potential of the soil, drainage and weather conditions. Approximately 1.5 to 2.5 acres are needed for forage production alone.

127. *$.16-.21/cwt*--See TABLE 7. Increased production relies heavily on genetic improvement. This requires a substantial investment in semen of high PD milk bulls. See: Breeding, Genetics and Reproduction sections. Excessive semen and breeding costs will commonly result if not on a 30-day post-calving exam schedule, or if handling semen and inseminating improperly.

128. *$.30-.35/cwt*--Veterinary costs/cwt milk increase as production level increases. Increased veterinary costs are typically more than compensated for by increased milk income. If costs/cwt milk exceed $.35, you should review the herd health, nutrition and calf management sections of the Dairy Herd Analysis to pinpoint specific health problems. See TABLE 7 on costs/cwt of milk.

129. *$2.50-2.65/cwt*--Purchased feed costs/cow increase with the level of production, but actually decrease/cwt of milk sold, as is evidenced in TABLE 7. Purchased feed costs depend upon the number of acres farmed/cow, combination of crops grown and crop yields. Farms which purchase most feeds will have higher purchased feed costs/cwt milk sold, but should also have lower costs associated with crop production. See TABLES 8-10.

130. *less than the price received/cwt of milk*--This method of calculation considers all production costs, including family living expenses. Income from crop sales, cattle sales and other farm income are credited against expenses in estimating the cost to produce 100 lb of milk. See TABLES 8-10 on costs to produce 100 lb of milk.

131. *$3.00-4.50/cwt*--Interest and depreciation are major cost items. Because there are such a variety of methods to calculate depreciation, it is difficult to establish a standard. As herd size and production levels increase, interest and depreciation costs should decrease/cwt of milk produced. Depreciation is a real cost which must be included in expenses when examining the long-term profitability of a business. Capital items which depreciate will have to be replaced in the long run. See TABLES 8-10.

132. *less than $3,400*--The amount of debt a cow can carry depends on the net profit/cow (excluding interest and principal payments), the interest rate and the payback period. See TABLE 11.

133. *less than $250/acre*--It is not uncommon to over-invest in crop machinery. This can be a serious mistake, especially for beginning farmers. It is important to evaluate the changes in costs and returns for potential machinery purchases and the effect purchases have on cash-flow commitments. Many times, it is cheaper to hire custom work than to own machinery.

134. What is your debt 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 ÷ Gross cash farm income. From Income Statement, Lines (14 - 54 + 31 - 62) x 100% ÷ line 14. _____

135. What percent of your cash farm income is actually being used for debt repayment? (Principal + interest + long term leases) x 100 ÷ Gross cash farm income. From Income Statement, Lines (121 + 120 + 52) x 100% ÷ line 14. _____

136. 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 ÷ Gross farm income. From Income Statement, Lines (14 - 54 - 121 - 62) x 100% ÷ line 14. _____

137. 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 ÷ total assets, end of year. From Income Statement, Lines: [60 - 62 + 90 (amt this yr - amt prev. yr) + 31] x 100% ÷ line 93. _____

138. What is your net profit per dollar invested (NET)? (Net farm income - Family living and taxes + change in value of real estate) x 100 ÷ Total assets end of year. From Income Statement, Lines: [60 - 62 + 90 (amt this yr - amt prev. yr)] x 100% ÷ line 93. _____

139. What is your percent increase in equity? (Change in Net Worth ÷ Total Assets, (end of year) x 100). From Income Statement, Lines: (112 ÷ 93) x 100% _____

140. What is your intermediate ratio? (Current and Intermediate Assets ÷ Current and Intermediate Debt). From Income Statement, Lines: (81 + 89) ÷ (103 + 108) _____

134. *less than 25% of Gross Cash Farm Income (or approximately 30% of the milk income on typical Michigan dairy farms*--This calculation is extremely important in estimating the ability to handle debt commitments. See TABLE 12.

135. *actual debt payment percent should be less than the debt payment capacity of the farm. Q-134*--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 re-finance debt, sell some assets, or find a way to increase income and productivity.

136. *should be greater than 10%*--The ability to withstand fluctuations in income and costs must be considered when examining the possibility of further debt commitments. A 10% reduction in income can be easily caused by disease or drought.

137. *greater than 0*--Compare RROI of your farm to other farms, businesses, certificates of deposit, etc. Keep in mind your goals--personal and financial--when comparing yourself to others.

138. *greater than 0*--NET reflects what you, as a 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.

139. *greater than 1%*--Net worth should increase at least 1% 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 look for percent equity or (net worth) to be greater than the age of the principal operator as a general rule of thumb.

140. *1.75 to 1*--This ratio is considered favorable by most lending institutions. If less than 1:1 then current and intermediate debt is too high.

Section 4

TABLES, APPENDIXES

AND

MISC. INFORMATION

SECTION 4

TABLES, APPENDIXES
AND
MISCELLANEOUS INFORMATION

TABLE 1

HOLSTEIN PRODUCTION REQUIREMENTS*

MILK/COW/DAY (LB)	DRY MATTER INTAKE DMI	CRUDE PROTEIN CP	NET ENERGY NE	ACID DETERGENT FIBER ADF	CALCIUM Ca	PHOSPHORUS P
	lb	%	Mcal/Lb	%	%	%
30	35.8	10.1	.56	18	.48	.26
40	38.7	11.4	.60	18	.54	.29
50	41.6	12.6	.64	18	.59	.32
60	44.5	13.6	.67	18	.64	.34
70	47.4	14.5	.70	18	.68	.36
80	50.4	15.3	.72	18	.72	.37
90	53.3	16.0	.74	18	.75	.39
100	56.2	16.6	.76	18	.78	.40

*Estimates are based on a 1,350 lb cow, 3.6% fat test. All numbers are on a 100% dry matter basis.

TABLE 2

ACTUAL 305-DAY YIELD FOR LACTATIONS 1, 2 AND 3+ BY PEAK MILK FOR HOLSTEIN COWS

PEAK MILK PRODUCTION* IN POUNDS	LACTATION NUMBER		
	1	2	3
45	11,076	9,971	10,611
50	12,196	11,341	11,347
55	13,310	12,381	12,224
60	14,439	13,389	13,230
65	15,592	14,561	14,284
70	16,630	15,476	15,358
75	17,530	16,437	16,281
80	18,355	17,377	17,230
85	19,392	18,324	18,047
90	---	19,178	19,128
95	---	19,938	20,130
100	---	22,033	22,174

*Peak milk production typically occurs 4-7 weeks after calving.

TABLE 3

GROWTH GUIDE FOR DAIRY CALVES AND HEIFERS

Age	Holstein		Ayrshire		Guernsey		Jersey	
	Girth	Wt	Girth	Wt	Girth	Wt	Girth	Wt
(Months)	(inches)	(lb)	(inches)	(lb)	(inches)	(lb)	(inches)	(lb)
Birth	31	96	29	72	29	66	24	56
2	37	161	35	132	34	122	32	102
4	43	272	43	236	41	217	38	181
6	50	396	48	340	47	304	44	277
9	57	559	55	485	54	448	52	409
12	62	714	59	583	58	549	56	520
15	65	805	63	703	62	640	59	585
18	68	912	66	781	65	727	61	660
21	71	1,025	68	885	67	816	64	740
24	74	1,150	70	989	69	905	66	820

NOTE: The majority of heifers should fall within ± 10% of the bodyweights indicated. Flesh or condition should also be considered. Excessively thin or over-conditioned animals should be avoided.

TABLE 4

RECOMMENDED BREEDING SIZE FOR DAIRY HEIFERS
(15 months of age)

Breed	Bodyweight	Heart girth
	(lb)	(inches)
Ayrshire	650 to 700	62 to 64
Brown Swiss	750 to 800	64 to 66
Guernsey	600 to 650	61 to 63
Holstein	750 to 800	64 to 66
Jersey	550 to 600	58 to 60

TABLE 5

AVERAGE YIELD POTENTIAL/ACRE BY SOIL TYPE FOR TYPICAL CROPS GROWN ON MICHIGAN DAIRY FARMS

	Southern Michigan			
	Clay Loam	Loam	Sandy Loam	Loamy Sand
Corn - bu.	105-125*	110-130	95-110	75-90
Corn Silage-ton	17-19	17-20	16-17	13-15
Wheat - bu.	55-60	60-65	45-55	30-45
Oats - bu.	85-100	90-110	80-95	60-75
Soybeans - bu.	35-42	35-45	30-35	25-32
Alfalfa (3 cut)	5-6	4.8-5.5	4.0-4.8	3.5-4.0

	Northern Michigan (less than 140 frost-free days)			
	Clay Loam	Loam	Sandy Loam	Loamy Sand
Corn	80-90*	90-95	75-85	70-75
Corn Silage	13-15	15-16	12-14	11-12
Wheat	40-45	45-50	35-40	28-35
Oats	75-85	80-90	75-85	60-70
Alfalfa (2 cut)	3.7-4.0	4.0-4.5	3.5	3.0

*The second number indicates yield potential on tiled ground.

TABLE 6

APPROXIMATE CASH COSTS TO PRODUCE VARIOUS CROPS IN MICHIGAN

(Costs include - all cash costs plus labor. If crops are grown on rented ground, rental cost must be added, (e.g., 90 bu. corn yield/acre on $50.00/acre land equals .55¢ production cost added/bu.

$2.07/bu + $ .55/bu = $2.62/bu

Cash Cost to grow + Rental cost

These costs do not include depreciation, interest on machinery investment, or a charge for owned land).

CORN

Yield/acre (bu)	70	80	90	100	110	120	130
Production cost/bu.	$2.39	2.23	2.07	1.91	1.83	1.75	1.67

WHEAT

Yield/acre (bu)	30	40	50	60	70	80	90
Production cost/bu.	$2.38	2.26	2.07	1.85	1.70	1.61	1.53

SOYBEANS

Yield/acre (bu)	20	30	40	50
Production cost/bu.	$5.12	3.87	3.21	2.78

OATS

Yield/acre (bu)	50	75	100	125
Production cost/bu.	$1.73	1.36	1.08	.90

ALFALFA HAY

Yield/acre (tons)	3	4	5	6	7
Production cost/ton	$34.00	32.50	31.60	31.00	30.00

MIXED HAY

Yield/acre (tons)	2	3	4	5
Production cost/ton	$52.00	40.00	35.00	31.00

TABLE 7-a

PURCHASED FEED, VETERINARY AND MEDICINE AND BREEDING COSTS PER CWT MILK PER YEAR BY LEVEL OF PRODUCTION*

Milk Sold/Cow/Yr	Purchased Feed ($/cwt)	Vet. and Med. ($/cwt)	Semen and Breeding ($/cwt)
12,000	2.75	.24	.10
13,000	2.69	.27	.12
14,000	2.65	.28	.14
15,000	2.61	.30	.15
16,000	2.58	.31	.16
17,000	2.55	.33	.17
18,000	2.53	.34	.18
19,000	2.51	.35	.21

*These costs are estimated from 1983 Telfarm records.

TABLE 7-b

PURCHASED FEED, VETERINARY AND MEDICINE AND BREEDING COSTS PER COW*

Milk Sold/Cow/Yr**	Purchased Feed ($/Cow)	Vet. and Med. ($/Cow)	Semen and Breeding ($/Cow)
12,000	330	29.00	12.50
13,000	350	34.40	15.85
14,000	371	39.60	19.20
15,000	392	45.00	22.55
16,000	413	50.30	25.91
17,000	434	55.60	29.26
18,000	455	60.90	32.61
19,000	476	66.20	39.32

*These costs are estimated from 1983 Michigan Telfarm records.

**Milk sold per cow per year usually amounts to 1,000 lb less than the DHIA herd average.

TABLE 8

AVERAGE COSTS TO PRODUCE 100 LB MILK BY PRODUCTION LEVEL
(HERD SIZE = 45 COWS)

	Milk Sold/Cow/Year		
Farm Expenses	12,000 lb	15,000 lb	17,500 lb
Purchased Feed	$2.53	$2.54	$2.88
+Depreciation	2.52	3.03	2.25
+Interest	2.16	1.47	1.10
+Labor (hired)	.95	.79	1.19
+Crops Costs*	1.51	1.79	1.15
+Repairs & Maintenance	1.23	1.26	.99
+Fuel and Oil	.79	.76	.58
+Livestock**	1.81	1.83	1.96
+Other***	2.03	2.06	1.55
+Value of Operator & Family Labor	2.52	2.35	1.97
-Cash Crop Income	-1.77	-2.35	-1.05
-Cattle Income	- .46	-1.59	-1.40
-Other Farm Income	- .80	- .65	- .42
Total Adjusted Cost to Produce 100 lb Milk	$15.02	$13.31	$12.75

*Crop costs include: Fertilizer, chemicals, seeds and supplies.

**Livestock costs include: Semen and breeding, vet and medicine, and livestock marketing and supplies.

***Other costs include: Custom hire and lease, conservation, insurance, building and land lease, taxes and utilities, and crop marketing.

Source: 1983 Telefarm records.

TABLE 9

AVERAGE COSTS TO PRODUCE 100 LB MILK BY PRODUCTION LEVEL
(HERD SIZE = 85 COWS)

	Milk Sold/Cow/Year		
Farm Expenses	12,000 lb	15,000 lb	17,500 lb
Purchased Feed	$2.73	$2.64	$2.37
+Depreciation	2.70	2.38	2.47
+Interest	1.95	1.81	1.26
+Labor (hired)	1.24	1.27	1.26
+Crops Costs*	1.60	1.50	1.58
+Repairs & Maintenance	1.24	1.04	1.11
+Fuel and Oil	.72	.55	.58
+Livestock**	1.72	1.81	2.01
+Other***	2.05	1.94	1.65
+Value of Operator & Family Labor	1.99	1.36	1.06
-Cash Crop Income	-1.50	-1.54	-1.57
-Cattle Income	- .87	-1.10	-1.12
-Other Farm Income	- .72	- .83	- .59
Total Adjusted Cost to Produce 100 lb Milk	$14.85	$12.83	$12.07

*Crop costs include: Fertilizer, chemicals, seeds and supplies.

**Livestock costs include: Semen and breeding, vet and medicine, and livestock marketing and supplies.

***Other costs include: Custom hire and lease, conservation, insurance, building and land lease, taxes and utilities, and crop marketing.

Source: 1983 Telfarm records

TABLE 10

AVERAGE COSTS TO PRODUCE 100 LB MILK BY PRODUCTION LEVEL
(HERD SIZE = 170 COWS)

	Milk Sold/Cow/Year		
Farm Expenses	12,000 lb	15,000 lb	17,500 lb
Purchased Feed	$3.13	$2.50	$2.57
+Depreciation	2.84	2.19	2.27
+Interest	2.17	1.21	1.05
+Labor (hired)	1.34	1.25	1.53
+Crops Costs*	1.49	1.53	1.32
+Repairs & Maintenance	1.34	1.00	.92
+Fuel and Oil	.51	.53	.47
+Livestock**	1.93	1.80	1.96
+Other***	1.90	1.74	1.59
+Value of Operator & Family Labor	1.23	.96	.84
-Cash Crop Income	-1.79	-1.79	-1.06
-Cattle Income	- .92	- .85	-1.54
-Other Farm Income	- .70	- .43	- .34
Total Adjusted Cost to Produce 100 lb Milk	$14.47	$11.64	$11.58

*Crop costs include: Fertilizer, chemicals, seeds and supplies.

**Livestock costs include: Semen and breeding, vet and medicine, and livestock marketing and supplies.

***Other costs include: Custom hire and lease, conservation, insurance, building and land lease, taxes and utilities, and crop marketing.

Source: 1983 Telfarm records.

TABLE 11

GUIDELINES FOR TOTAL DEBT PER COW
BY HERD SIZE AND PRODUCTION LEVEL*

Milk Sales Per Cow Per Year (lb)	Herd Size (No. of Cows)		
	45	85	170
12,000	$1,900	$2,300	$2,600
15,000	$2,900	$3,400	$3,400
17,500	$3,100	$4,000	$4,000

*This is based on 1983 Michigan Telfarm cost data and is estimated based on a milk price of $12.80/cwt and a cash corn crop price of $2.70/bu. These are guidelines and not to be considered absolute rules. This considers a capital cost (interest + depreciation) of 18%.

TABLE 12

DEBT PAYMENT CAPACITY
AS A PERCENT OF CASH FARM INCOME*

Milk Sales Per Cow Per Year (lb)	Herd Size		
	45 Cows	85 Cows	170 Cows
12,000	17.2	19.8	22.0
15,000	20.7	25.2	26.6
17,500	20.6	25.7	26.4

*These estimates are based on 1983 Michigan Telfarm records. Income was adjusted considering a milk price of $12.80/cwt and $2.70/bu for cash corn crop sales. Costs included a charge for family living expenses estimated as $3.50/hr times the reported hours of the operator and family labor.

APPENDIX 1

FORMULAS FOR CALCULATING DAIRY HERD

MANAGEMENT FACTORS

Make a list of all cows currently in the herd by their calving date. For cows of lactation 2 or later, include the date of calving for the previous lactation also. This list will serve as a basis for calculations.

EXAMPLE

Calving Date	Cow	Previous Calving Date
1/20/84	Jenny (1st calf heifer)	-----
2/14/84	Molly	1/19/83

Calving Interval - The length of time (number of days) from one calving to the next. Only cows of lactation 2 or later are included in these estimations.

To calculate:

1. List all cows of second or more lactation.
2. Write down the most recent calving date for each.
3. Write down previous calving date for each.
4. Calculate the days between the most recent calving and the one previous for each cow. This is the calving interval for each cow.
5. Add all calving intervals and divide by the number of cows included in the calculation. This is a herd average calving interval.

Average Number of Days Open - This is the average number of days from freshening until the next pregnancy begins.

To calculate:

1. List all cows in the herd by their most recent calving date.
2. List the date when last bred or diagnosed pregnant (or today's date if the cow hasn't been inseminated since her last calving).
3. The difference between the pregnancy date or breeding date (or today's date) from her last calving is the days open for each cow.
4. Adding all of these days together and dividing by the number of cows included in the calculation equals the average number of days open.

For example: Cow #83 calved 2/14/84 (day 45). She was serviced 2 times. She was diagnosed pregnant on 4/23 (day 113). Days open: 68 (113 - 45 = 68). Cow #72 calved 7/1/84 (day 182). She was inseminated on 9/14/84 (day 257). We assume she is pregnant. Her estimated days open are 75 days. Cow #61 freshened 5/26/84 (day 146). She has not been serviced yet. Her open days are from 5/26/84 to today's date of 9/26/84 (day 268). Her number of days open is 122. The average days open is the sum for all 3 cows divided by 3. (68 + 75 + 122) divided by 3 = 88 days open on the average.

It is easy to use the first day of each month as a day of the year number.

		Day of Year
January 1	=	day 1
February 1	=	day 32
March 1	=	day 60
April 1	=	day 91
May 1	=	day 121
June 1	=	day 152
July 1	=	day 182
August 1	=	day 213
September 1	=	day 244
October 1	=	day 274
November 1	=	day 305
December 1	=	day 335

Average Days in Milk - This is the average number of days from freshening to today's date for those cows in milk.

To calculate:

1. List all cows in milk.
2. Write down most recent calving date for each.
3. Calculate the number of days from calving date to today's date for each cow. This is the days in milk for each cow.
4. Add days together for all cows.
5. Divide by the number of cows in milk.

Number of cows open over 120 days

Take the list of cows by calving date and calculate 120 days back from today's date. All animals that freshened prior to that date and not yet serviced or diagnosed pregnant are considered open.

APPENDIX 2

DAIRY HERD HEALTH PROGRAMS

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INTRODUCTION

There are three basic goals of a dairy herd health program: 1) Reduction of losses from the direct effects of disease. These losses include decreased production, clinical illness and mortality. 2) Reduction of losses from the indirect effects of disease. This includes reduced growth rate, feed efficiency, reproductive rate and genetic potential. 3) Maintenance of the herd in a state of health appropriate for optimum economic returns on investment.

Planning a dairy herd health program is an individual endeavor. Phases of disease control and prevention must include establishment and evaluation of herd records concerning: 1) Reproduction; 2) Management practices; 3) Metabolic diseases; 4) Subclinical diseases; 5) Herd prophylactic measures; 6) Vaccination schedules; and 7) Clinical therapy.

The success of a dairy herd health program cannot be measured by single criterium. Factors which influence net income which must be considered include: 1) Reduced losses of potential milk production; 2) Increased milk production; 3) Less contaminated milk; 4) Increased numbers of calves born; 5) Reduced loss of genetic potential; 6) Increased rate of gain and feed efficiency; 7) Reduced weight loss during sickness; 8) Reduced losses from sale of "chronics"; 9) Reduced labor cost for care of treated cattle; and 10) Reduced cost of medicine for treatment.

PREVENTIVE MEDICINE FLOW SHEETS

There are certain management considerations which must be addressed in every herd. These considerations have been outlined so that they may receive attention as groups of animals reach specific ages or times.

THE REPLACEMENT HEIFER CALF - BIRTH TO YEARLING

Time Line in Weeks	Management Considerations
0	Colostrum within 15 minutes
	Dip navel with 7% tincture of iodine
	Identification
	Vaccination - rota-corona virus vaccine for scours (live vaccine)
2 - 8	Dehorn
	Check for sucking when calves are grouped
12	Remove supernumery teats
	Examine for internal and external parasites*
	Vaccination:*
	Brucellosis Blackleg Malignant Edema Leptospirosis
24	Examine for internal and external parasites
36 - 52	Vaccination:*
	IBR, BVD, PI_3 Blackleg** Malignant Edema** Leptospirosis
	Examine for internal and external parasites

THE REPLACEMENT HEIFER - YEARLING TO FIRST CALF

Breeding

15 months (750-800 lb body weight - Holsteins).

Insert Magnet

15 months - only if hardware has been a problem on your farm.

Deworming

Twice (spring and fall) if on pasture.

---

*Veterinary consultation recommended for disease incidence in your area and vaccination program.

**7-way clostridium vaccine available and indicated in some situations.

Grub control

Early fall.

External parasite surveillance (Ivermectin or other products)

Treatment for lice at the start of the barn season and when indicated.

Fly control

(1) Spray or dust every 10 days if practical.
or use back rubbers
or
dust bags
(2) Buildings and fences may be sprayed with residual spray.

Vaccination:* Leptospirosis (5-way)
BVD, IBR and PI_3 (can use killed or modified vaccine)
Hemophilus
Once yearly.

THE COW HERD

Three weeks prior to calving

Low calcium diet if possible. Introduce grain to animals at a rate of 1 lb per day. Increase this level with an additional 1 lb of grain up to 6 to 8 lb per day.

Calving

Sanitation - clean pens (when used) prior to each cow
- clip and wash udder if necessary.

Dry cow treatment*

End every lactation with all 4 quarters treated.

Vaccination program*

Entire herd:
Once/year IBR, PI_3, BVD, leptospirosis, annual booster.
Use modified live virus on open cows only.
Use killed vaccines on pregnant animals.
E. Coli (K-99) to dry cows to prevent scours in calves.

Diagnostic surveillance*

Brucellosis
Anaplasmosis if required by Michigan Department of Agriculture
Tuberculosis

External parasite surveillance

Flies - spray or dust as indicated, or use backrubber
Lice

---

*Veterinary consultation recommended.

MILKING PROGRAM

UDDER WASH - stimulation of milk letdown.

SINGLE SERVICE TOWELS - a dry udder is essential to maintain milk quality and udder health.

FOREMILK REMOVAL - aids in milk letdown, detection of clincial mastitis, and maintenance of quality milk.

MACHINE ATTACHMENT - milk letdown occurs 45-60 seconds after stimulation by massage and foremilk removal. Machine attachment should be completed by 60 seconds after prepping.

MACHINE STRIPPING - downward, forward tension for 15-20 seconds.

MACHINE REMOVAL AS SOON AS MILKING IS COMPLETED - milk letdown is over in less than 8 minutes.

USE OF AN EFFECTIVE TEAT DIP IMMEDIATELY AFTER MACHINE REMOVAL* - choose a teat dip that has research data to indicate it does reduce the new infection rate.

DRY COW TREATMENT* - all quarters, all cows, last milking. Use a product proven effective in removing infection and preventing new infections.

TREATMENT OF CLINICAL MASTITIS* - sensitivity test results used to develop herd experience.

VACCINATION FOR MASTITIS* - rarely indicated.

MILKING SYSTEM ANALYSIS - twice yearly by a qualified serviceman.

REPRODUCTIVE PROGRAM

Cows with retained placenta should be examined by a veterinarian and he will decide on treatment 24 to 74 hours after calving. They should be removed 2 or 3 times prior to breeding.*

Cows should be examined 20-40 days after calving prior to breeding.

Cows with an abnormal discharge or cloudy mucus during heat should be examined.

Cows that have not exhibited heat signs 45 to 60 days after calving should be examined.

Cows with abnormal heat cycles or signs of heat should be examined.

Cows bred 2 or 3 times should be examined.

Cows should be examined for pregnancy 45 to 60 days following breeding.

---

*Veterinary consultation recommended.

EQUIPMENT AND SUPPLIES GUIDE

Clinical thermometers

Balling gun (large and small)

30" obstetrical chain

45" obstetrical chain

Obstetrical chain handle (2)

Intravenous outfit (2)

Electric calf dehorner
(or other dehorning device)

Surgical scissors

Hoof knife

Hoof trimmer

Nose lead

Rope halter

Stomach tubes

Frick speculum

Liquid soap or detergent

Disinfectant

Teat Dip

Lactation treatment
(udder infusion product)

Disposable teat dilators

Disposable teat cannulas

Disposable syringes

Disposable hypodermic needles

Disposable gloves (shoulder-length)

Lubricant

Oral calf scour treatment

Oral electrolytes

Esophageal probe and feeder bag

Inseminating pipettes

Injectable antibiotics

Oral sulfa boluses

Screw worm repellent

Antibiotic ophthalmic ointment

Medicated ointment

Clean bucket in which to disinfect equipment

Fly spray

Dewormer

Ear tags

Whirl-pak sample bags (fecal samples)

Milk culture tubes

Calcium dextrose solution

Dextrose (50%) solution

Ketone test solution

Propylene glycol solution

Tincture of iodine, stronger (7%)

Alcohol, 70%

Kopertox

Vitamin A and D injectable

Cotton

Electrical stock prod

Cow magnets

Prescription drugs that veterinarian may prescribe:

Dry cow treatment (udder infusion product)
Oxytocin
Antihistamine solution
Selenium-vitamin E injectable
Intrauterine medication

Last but not least

A CLEAN ORDERLY PLACE TO KEEP EVERYTHING

ADJUSTMENT OF TAILHEAD SCORES

If the difference between the tailhead and loin scores is one point or more, adjust the tailhead score accordingly by no more than half a point. For example:

Tailhead score	Loin score	Difference	Adjustment	Adjusted tailhead score
4	2½	1½	-½	3½
1½	2½	1	+½	2
3	2½	½	none	3

CONDITION SCORING AND DAIRY COW MANAGEMENT

The method described is simple, can be carried out quickly and with a little practice provides consistent scores. Cows can be scored when standing in parlours, cubicles, crushes or insemination stalls where the scorer can stand directly behind the cow. The same scale can be used for dairy heifers. Research is being carried out on the relationships between body condition scores and reproductive efficiency, milk yield and milk composition and this will indicate the best ways in which body condition scores should be interpreted. In the meantime the following information is given as a guide for the use of condition scoring in Friesian dairy herds.

Condition scoring will indicate the average condition of the cows in a herd and, perhaps more important, whether they are gaining or losing condition. Measure scores regularly on each animal, including dry cows, preferably once a month. If this is impractical score at calving, at peak lactation or at first insemination and in late lactation. If cows are not to fall below condition score 2 it is necessary for them to calve in good condition (score 3) because most cows will lose condition in early lactation. A late lactation score will indicate the level of feeding necessary during late pregnancy.

Further copies may be obtained from The Librarian, National Institute for Research in Dairying, Shinfield, Reading RG2 9AT, quoting NIRD Paper No. 4468.

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NIRD

Technical Leaflet

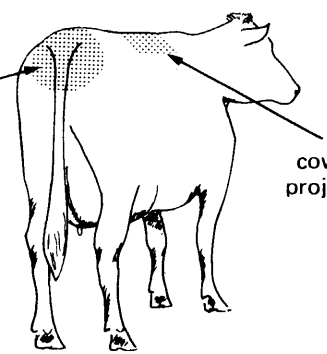
DAIRY COW CONDITION SCORING

Patrick Mulvany

Body condition scores are estimates of the quantity of fatty tissue under the skin of certain areas of a cow's body and are an indication of body reserves. Much interest is being taken in their relationship with productivity and they promise to be valuable in dairy herd management. The scoring technique described is based on the method for beef suckler cows devised by the East of Scotland College of Agriculture (ESCA Bulletin No. 6).

The dairy cow condition scoring method is an arbitrary scale of assessing the fatness at the tailhead and loin from 0 (very poor) to 5 (grossly fat) with half scores to give an 11 point scale. In most cases the tailhead score is used but this is adjusted if it differs greatly from the loin score.

SCORE AREAS

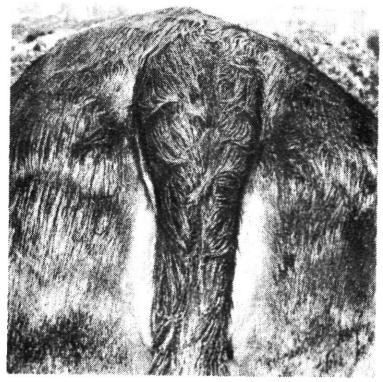


SCORING METHOD

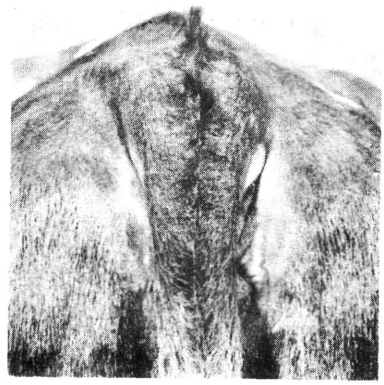
1. Stand directly behind the cow to score both areas.
2. Score the tailhead area by feeling the amount of fatness. This gives a better estimate than visual inspection alone because of the set of tailhead and thickness of coat. Always use the same hand.
3. Score the loin area in a similar way, using the same hand, when the cow is relaxed.
4. Assess the scores to the nearest half point.
5. Adjust tailhead score by half a point if it differs from the loin score by one point or more. (see back page)
6. The adjusted tailhead score is used as the condition score.

NIRD DAIRY COW CONDITION SCORING

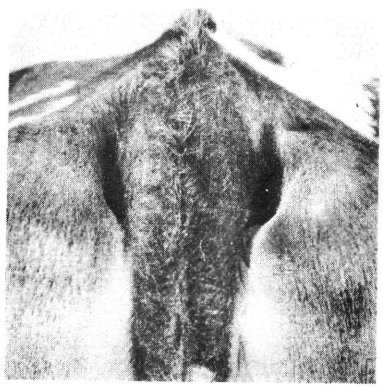
Score	5
Condition	**Grossly fat**
Tailhead area	Tailhead buried in fatty tissue. Skin distended. No part of pelvis felt even with firm pressure.
Loin area	Folds of fatty tissue over transverse processes. Bone structure cannot be felt.



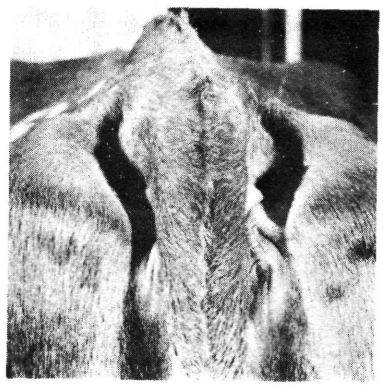
	4
	Fat
	Folds of soft fatty tissue present. Patches of fat apparent under skin. Pelvis felt only with firm pressure.
	Transverse processes cannot be felt even with firm pressure. No depression visible in loin between backbone and hip bones.



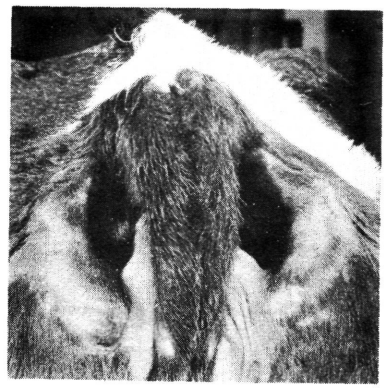
	3
	Good
	Fatty tissue easily felt over the whole area. Skin appears smooth but pelvis can be felt.
	Ends of transverse processes can be felt with pressure but thick layer of tissue on top. Slight depression visible in loin.



Score	2
Condition	**Moderate**
Tailhead area	Shallow cavity lined with fatty tissue apparent at tailhead. Some fatty tissue felt under the skin. Pelvis felt easily.
Loin area	Ends of transverse processes feel rounded but upper surfaces felt only with pressure. Depression visible in loin.



	1
	Poor
	Cavity present around tailhead. No fatty tissue felt between skin and pelvis but skin is supple
	Ends of transverse processes sharp to touch and upper surfaces can be felt easily. Deep depression in loin.



	0
	Very poor
	Deep cavity under tail and around tailhead. Skin drawn tight over pelvis with no tissue detectable in between
	No fatty tissue felt. Shapes of transverse processes clearly visible. Animal appears emaciated.

COWS MUST BE HANDLED FOR ACCURATE ASSESSMENT OF HALF SCORES

APPENDIX 4

BULK TANK SOMATIC CELL COUNTS (BTSCC)

Each month Michigan dairymen receive a herd WMT or SCC reading (based on milk shipped) on their milk check. In addition, Michigan dairymen receive a PRODUCER HISTORY CARD at least twice per year which lists the last twelve legal readings by Michigan Department of Agriculture for somatic cell count, bacteria count and antibiotic residue.

SCC stands for somatic cell count and represents leucocytes and epithelial cells (secretory cells) present in milk. An increase in milk SCC indicates an increase number of cows or quarters infected (Table 1). Each SCC increment of 1 equals 100,000 cells per ml milk; therefore, 1 = 100,000, 10 = 1,000,000 and 15 = 1,500,000. Milk cooperatives report the bulk tank somatic cell count in various ways. MMPA reports SCC (Fossomatic analysis) on milk checks while other cooperatives report the cell count as WMT. WMT stands for Wisconsin Mastitis Test which is an indirect assay for estimating somatic cells in bulk tank milk. All Michigan plants using the WMT to estimate BTSCC will report WMT in increments of 1 = 100,000 while Milk Marketing, Incorporated of Ohio reports WMT scores in mm. A bulk tank WMT reading of 20 mm would equal a SCC of 700,000 to 900,000.

Table 1. PREDICTED PREVALENCE OF INFECTION

BTSCC	% Quarters Infected
200	6
500	16
1000	32
1500	48

Eberhart, et al.
J. Food Prot. (in press)

A normal or ideal BTSCC would be a SCC or WMT (base 100,000) of 200,000 or less (SCC or WMT = 2) or WMT (mm) of 6 or less. A BTSCC of 400,000 to 700,000 would indicate that approximately 40% of cows (20% of quarters) are infected with a milk loss of 6-8% (Table 2). BTSCC of 1,000,000 to 1,500,000 indicates that approximately 60% or more of cows are infected with milk losses per cow of 18 to 30%. In comparision, the present legal limit for somatic cell counts is 1,500,000.

Table 2. PRODUCTION LOSS RELATIVE TO A BTSCC OF 200,000 CELLS/ML

BTSCC	Daily Milk	% Loss
200	50.8	
500	47.5	6.5
1000	41.8	17.7
1500	36.2	28.7

Eberhart, et al.
J. Food Prot. in press

The BTSCC can be used as a monthly herd mastitis guide when combined with information on rate of clinical mastitis. The following chart summarizes conclusionsbased on BTSCC and clinical information.

BTSCC	Clinical Rate	Suggested Conclusion
<200,000	1% or less throughout lactation	Subclinical mastitis not a herd problem; very few or no S. agalactiae and S. aureus infections. An occasional clinical case caused by an environmental organism. Good mastitis control program.
200,000	5% and/or high clinical rate during 1st 90 days of lactation. Some acute cases.	Very few or no S. agalactiae or S. aureus infections. Sanitation problem in dry cow area, maternity area or bedded area for lactating cows 1-ading to increased infections by S. uberis, coliform species, etc.
400,000 to 800,000	2 to 3%	Potential that 40% of cows infected with S. agalactiae and/or S. aureus. Strep. non-agalactiae infections could also be present.
>800,000	2 to 3%	Potential that 60 to 100% of cows infected. Major subclinical mastitis problem with S. agalactiae and S. aureus.

A dairy management scheme should include the monthly BTSCC score. An increased BTSCC should alert a dairyman to check his mastitis control program for strep. and staph. bacteria. An increase in clinical mastitis without an increase in BTSCC would indicate that only individual cows are becoming infected.

Suggested program to maintain BTSCC at 200,000 or less and a clinical rate of 1% or less.

1. Check nutrition program for dry and milking cows. Feed adequate amounts of a ration balanced for protein, energy, minerals and vitamins.

2. Maintain or initiate vaccination program for brucellosis, leptospirosis, viral infections and other diseases deemed necessary by veterinarian.

3. Start a strict sanitation program for all ages of dairy. Special attention must be given to the dry cow housing area and maternity area. Maternity area should be clean and dry.

4. Cull older cows that have a history of mastitis, repeated high DHI SCC of greater than 500,000 or that have not responded to antibiotic treatment.

5. Have a qualified person analyze milking equipment twice per year and have milking routine reviewed by fieldperson.

6. Parlor or stanchion milking routine should consist of:
   a) 3 or 4 units per person unless automatic take-offs are installed in parlor and 2 or 3 units/person in stanchion barn.
   b) 20 second prep with running water and sanitizer for parlor and wet paper towel + sanitizer for stanchion barn.
   c) Drying teats completely with paper towels.
   d) Attachment of machine immediately or within 30 seconds after prepping.
   e) Shutting off vacuum before removing machine.
   f) Dip all cows' teats after machine removal with approved teat dip.
7. Dry cow treat all quarters of all cows with antibiotic preparations approved specifically for dry cow treatment at last milking prior to dry period. Use single, sterile prepackaged syringes.
8. Randomly collect 15 sterile composite milk samples for culture at M.S.U. Microbiology Lab. Culturing should be used to identify problems which do not respond to the above program, or culturing should be used to identify possible antibiotics to use for intramammary therapy.
9. Keep records of all cows infected (quarters, treatments, and effect on production).
10. Maintain closed herd; that is, no purchases of cows from other herds.
11. Calves should be housed separately until after weaning.
12. Help and advice can be obtained from your veterinarian, fieldman, or extension personnel

APPENDIX 5

PLAN YOUR DAIRY FEED SUPPLY

J. W. Thomas

An appraisal of your feed supply situation allows you to manage your feed supply for highest returns and lowest cost. Aim to plan the cropping systems to furnish feeds needed during the entire year for the entire herd. Knowledge of feed needs will also allow one to purchase at the seasonally low market price or hold any surplus for sale at higher prices. For instance, corn is normally 15¢ per bushel less in November than in May. Protein supplement needs can usually be purchased on contract in large quantities at lower cost than if purchased by the bag as needed.

Outline for Planning Annual Dairy Feed Supply:

I. Estimate Feed Requirements for Your Herd (Schedule I). See pg. 67 or other information for estimating feed required per cow based on your forage quality, expected level of production, etc.

II. Make an inventory of your current feed supply (Schedule II). Use material in Appendix 6 for estimating storage capacities.

III. Determine your shortage or surplus by the difference between inventory and requirements.

Schedule I — FEED NEEDS FOR THE HERD

A. Use of Standard Feed Needs (see TABLE 13, pg. 67).

	No. of head	Forage Needs T DM/head	Forage Needs T/Yr.	Grain Needs lb DM/head	Grain Needs lb/yr
1. Cows (milking + dry)	_____	_____	_____	_____	_____
2. Heifers, 1-2 yr.	_____	_____	_____	_____	_____
3. Heifers, <1 yr.	_____	_____	_____	_____	_____
4. Others (steers)	_____	_____		_____	
5. Sum of needs for the herd			[ ]		[ ]

Hay _____% of total forage _____

Haylage _____% of total forage _____

Corn silage _____% of total forage _____

Other _____% of total forage _____

Corn _____% of total grain _____

Protein supplement _____% of total grain _____

Other _____% of total grain _____

Other _____% of total grain _____

B. Use of Feed Ration	lb/cow/day	No. of milking cows	Daily feed needs lb	Day/ year (X365)	Total need in ton (÷ 2000)
1. Feeds fed milking cows, avg.					
a) Hay					
b) Haylage					
c) Corn silage					
d) Corn					
e) Protein supplement					
f) Other					
g) Other					
2. Feed needs for dry cows, avg.					
a) Hay					
b) Haylage					
c) Corn silage					
d) Grain					
e) Protein supplement					
f) Other					
g) Other					

3. Feeds for heifers, 1-2 yr	Avg. lb/ day/heifer	No. heifers	Daily feed needs lb	Days per year	Total needs
a) Hay	____	____	____	____	____
b) Haylage	____	____	____	____	____
c) Corn silage	____	____	____	____	____
d) Corn	____	____	____	____	____
e) Other	____	____	____	____	____
f) Other	____	____	____	____	____
4. Feeds for heifers, <1 yr					
a) Hay	____	____	____	____	____
b) Haylage	____	____	____	____	____
c) Corn silage	____	____	____	____	____
d) Grain	____	____	____	____	____
e) Other	____	____	____	____	____
f) Other	____	____	____	____	____

5. Sum of feed needs (tons) from amounts fed (B1-4 above)

a) Hay _____
b) Haylage _____
c) Corn silage _____ _____
d) Corn _____
e) Protein supplement _____
f) Other _____ _____
g) Other _____
h) Other _____

Schedule II ESTIMATE STORAGE CAPACITY OR INVENTORY OF FEEDS ON HAND

A. Hay

	bales/year	lb/bale	Tons(÷ 2000)
1.			
2.			
3.			
4.			

Total hay per year

[ ] x .87 = [ ]

ton air dry ton DM/yr.

B. Haylage (silo capacities are in #39, tables 2 or 3 or calculate)

Silo #	Settled silage height	Dia.	Amount in silo (tons) As is	% DM	100% DM
1					
2					
3					
4					
5					

Total haylage/yr

[ ] [ ]

ton, as is ton DM

C. Corn silage (silo capacities are in tables 2 and 3 and #39 or calculate)

Silo #	Settled silo height	Size (or dia)	Amount in silo (tons) as is	% DM	100% DM
1					
2					
3					
4					

total corn silage/yr

[ ] [ ]

ton,as is ton DM

Total Ton Forage DM(A+B+C) [ ]

D. Corn (silo capacities in #39 or table 4)

Silo or structure #	Height	Size (or dia)	Amount in silo or other structure as is	% DM	100% DM (ton)
1	____	____	_____	__	_____
2	____	____	_____	__	_____
3	____	____	_____	__	_____
4	____	____	_____	__	_____
5	____	____	_____	__	_____
6	____	____	_____	__	_____

E. Other cereals

			ton, as is	DM	ton DM
Oats	_____bu x 32 - 2000	=	_____	88	_____
Barley	_____bu x 48 - 2000	=	_____	88	_____
Wheat	_____bu x 60 - 2000	=	_____	88	_____
Other	_____ __		_____		_____
Total cereal/yr					

F. Other _____ _____

Schedule III COMPARE NEEDS WITH SUPPLY

	NEED	SUPPLY	DIFFERENCE
Hay, ton DM			
Haylage, ton DM			
Corn silage ton DM			
Total roughage			
Total grain, tons			
Corn, ton			
Protein supplement, tons			
Other cereal			
Other_____			
Other_____			
Supplements:			
TM salt (±.004 DM intake			
Mineral (±.005 DM intake			
Other			

TABLE 13

Estimated Feed Needs of Dairy Cows - 365 days[1]

Milk production per cow		D.M. consumed	Forage Quality					
			Low		Medium		High	
			Forage[2]	Grain[3]	Forage[2]	Grain[3]	Forage[2]	Grain[3]
lb/yr	lb/day	lb/cow/day	ton DM	lb DM	ton DM	lb DM	tonDM	lb DM
20,000	66	47	4.7	7300	5.1	6600	5.3	6200
18,000	60	45	4.7	6800	4.9	6500	5.1	6000
16,000	52	43	4.7	6200	4.9	5700	5.1	5400
14,000	46	41	4.6	5700	4.9	5200	5.2	4600
Heifers, 1-2 yr	--	±20	3.9	200	3.8	100	3.6	100
Heifers, 1 yr	--	--	1.4	1300	1.5	1050	1.6	900

[1]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.

[2]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.

[3]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% 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 % DM in the HM corn; i.e. the cow needs 4000 lb dry corn plus 2000 lb SBM. Amount of HM corn is 4000 ÷ .70 (70% DM in HMSC) = 5714 lb of HMSC.

APPENDIX 6

MISCELLANEOUS TABLES AND INFORMATION

ESTIMATING AMOUNTS OF HAY IN MOWS OR SILAGE IN HORIZONTAL SILOS

Material	(lb/cu ft)	(cu ft/ton)
Loose hay		
Shallow mow	3.9	510
Deep mow	4.7	425
Baled hay		
Loose bales, random pack	6.2	325
Loose bales	7.2	275
Tight bales	10.0	170
Chopped hay		
Long (approximately 3 in)	6.5	305
Short (1-2 in)	8.9	225
Silage in horizontal silos	40.0	50
Straw, baled	8.0	250
Shavings, baled	20.0	100

Estimating Feed Supplies in Bulk

1. To find the number of bushels of grain or shelled corn in a bin: Multiply the length by the width by the depth (all in feet) and multiply by .80.

2. To find the number of bushels of ear corn in a crib: (This is the ear corn equivalent of shelled corn or a double bushel). Multiply the length by the width by the average depth (all in feet) and multiply by .40. If the crib is round, multiply the distance around the crib by the diameter, by the depth (all in feet) and divide by 10.

3. To find the number of tons of hay in a mow or silage in a horizontal silo: Multiply the length by the width by the height (all in feet) and divide by the cubic feet required per ton. Use the average width of trench or bunker silos in these computations (top width plus bottom width divided by 2). If the number of bales of hay is known, multiply by the average weight and divide by 2,000 pounds.

4. To determine the weight of feed or grain in a bin: Multiply the length by the width by the height and multiply by pounds per cubic foot for the feed or grain being measured.

APPROXIMATE BUSHELS OF CORN PER FOOT OF SILO HEIGHT[1]

Moisture content	Weight	Space	Silo diameter (feet)						
			10	12	14	16	17	18	20
(%)	(lb/bu)	(cu ft/bu)	approx bushels per foot of silo height						
Shelled corn*									
15.5	56.0	1.25	63	90	123	161	182	203	251
25.0	63.1	1.50	52	75	102	134	151	169	209
30.0	67.5	1.60	49	71	96	126	142	159	197
35.0	72.8	1.70	46	66	91	118	134	149	185
Ear Corn**									
15.5	70.0	1.40	56	80	110	144	162	182	224
25.0	81.0	1.66	47	68	93	121	136	153	190
30.0	89.0	1.78	44	63	87	113	127	143	176
35.0	95.0	1.90	41	59	81	106	119	134	165

[1]Extension Bulletin E-422. Michigan State University.
*Stored as whole shelled corn. For ground shelled corn, capacity increases 14%.
**Stored as ground ear corn.

Ensiling High-Moisture Corn

Farmers considering storage structures for high-moisture corn should remember that when feeding is begun, a minimum of 3 inches should be removed daily from the top of conventional silos to prevent spoilage in warm weather. In cold weather, spoilage is not a problem and in dry weather the material tends to dry out on top rather than spoil.

Repairing and Banding Conventional Silos. It is essential that clay tile, concrete, or steel silos have side walls in good repair so that there is no air leakage. Extra reinforcement may be needed because there is more pressure on silo walls from the corn than from silage. Whenever possible, specific recommendation should be obtained from the company that erected the silo.

CONVERSION TABLES FOR COMMON WEIGHTS AND MEASURES

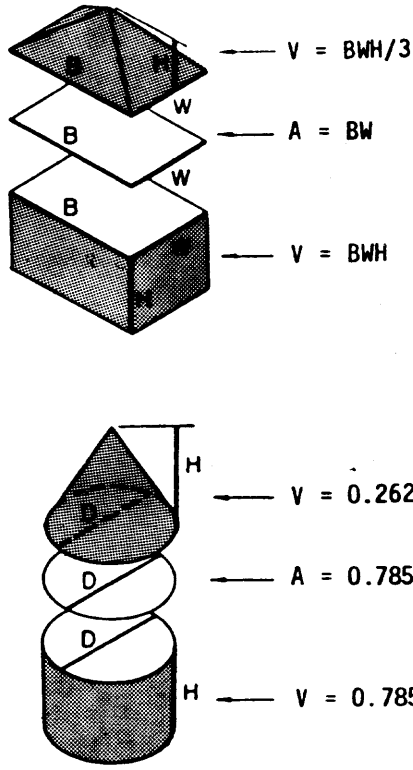
Metric conversions
1 pound = 454 grams
2.2 pounds = 1 kilogram
1 quart = 1 liter
1 gram = 15.43 grains
1 metric ton = 2.205 bands
1 inch = 2.54 centimeters
1 centimeter = 10 millimeters = .39 inches
1 meter = 39.37 inches
1 acre = .406 hectare

Bushel weights and volumes	lb/cu ft	cu 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
2000 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) = 1000 calories
1 calorie (big calorie) = 1000 calories(small calorie)
1 M-cal = 1 therm

AREAS & VOLUMES



STORAGE AND FEEDING DRY MATTER LOSSES OF ALFALFA

	Storage method	Storage loss	Feeding loss
1.	Small bales, stored inside	.04	.05
2.	Round bales, stored inside	.04	.14
3.	Hay stacks,stored inside	.04	.16
4.	Round bales,stored outside	.12	.14
5.	Hay stacks, stored outside	.16	.16
6.	Haylage, vertical silo	.07	.11
7.	Haylage, bunk silo	.13	.11

OTHER FEED STORAGE CAPACITIES, TABLES AND CONVERSIONS

RULE OF THUMB ON SILO CAPACITIES:

20′ x 60′ = 500 T.
20′ x 50′ = 390 T.
20′ x 40′ = 280 T.
20′ x 70′ = 575 T.

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

Examples:

30′ x 60′—15 x 15 = 2.25 x 500 or 1145 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:

Hay or Forage	Percent Moisture	Dry Hay Per Ton
Green chop	88	.25 tons
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

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

Depth of silage	Inside diameter of silo in feet							
(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	1125
70	—	—	—	—	574	827	970	1290
80	—	—	—	—	650	1100	1330	1880
90	—	—	—	—	—	—	—	2470

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:

	EXAMPLE:
1. Use the table to find the original contents before the silo was opened.	50′ of settled silage in a 20′ silo weight 389 T.
2. Estimate depth of silage removed and determine its weight from table.	Weight removed in 32′ = 205 Tons.
3. Subtract tonnage removed from original contents to find tonnage remaining.	389 T. (original contents) —205 T. (removed in 32′) 184 T. (remaining in 18′)

BUNKER SILO—Capacity For Corn Silage, 70 Percent Moisture

Formula:

$$\frac{\text{Average length x width x settled depth (all in feet) x 40 lbs.}}{\text{2000 lbs.}} = \text{Tons}$$

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

Depth of silage	Pounds per cu. ft.
6 ft.	32 lbs.
8	36
12	40
20	45

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
SHELLED CORN (1.25 cubic feet per bushel at 15.5 per cent moisture)												
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
GROUND EAR CORN (1.94 cubic feet per bushel at 15.5 percent kernel moisture)												
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 (½ 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

	lbs.		lbs.		lbs.
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, Orchard grass	14	Millet (grain)	50	Sudan grass	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

A6-6

Field Number _____

CROP PRODUCTION RECORD

#Acres _____ Township _____ Section _____

Rented From _____

Detailed Description _____

	History			
Year				
Crop Grown				
Variety				
Cost/Unit				
Seeding Rate				
Fertilizer				
Preplant lbs + Analysis				
Cost/Unit				
Row lbs + Analysis				
Cost/Unit				
Sidedress lbs + Analysis				
Cost/Unit				
Lime lbs				
Cost/Unit				
Pesticides				
PPI (lbs + Chem)				
Cost/Unit				
PPI (lbs + Chem)				
Cost/Unit				
Pre-emerge (lbs + Chem)				
Cost/Unit				
Pre-emerge (lbs + Chem)				
Post-emerge (lbs + Chem)				
Cost/Unit				
Insecticides & Fungicides (lbs + Chem)				
Cost/Unit				
Harvest Date				
Yield				

Soil Test Information

Year Tested _____

P.H. _____ P _____ Mn _____

N _____ K _____ Zn _____

Organic Matter %

Year				
Crop Grown				
Rent Cost/Acre				
Seed Cost/Acre				
Fertilizer Cost/Acre				
Pesticide Cost/Acre				
Other Costs (Fuel, etc.)				
Total Cash Cost				
Cash Cost/Bu. Yield				

Other Comments:

Summary Sheet

Date completed_____

Dairy

Strengths	Weaknesses

Crops

Strengths	Weaknesses

Financial

Strengths	Weaknesses

Total Farm Summary

Short Term changes to be made

1.

2.

3.

4.

5.

6.

7.

8.

Long Term changes to be made

1.

2.

3.

4.

Summary Sheet

Date completed_____

Dairy

Strengths	Weaknesses

Crops

Strengths	Weaknesses

Financial

Strengths	Weaknesses

Total Farm Summary

Short Term changes to be made

1.

2.

3.

4.

5.

6.

7.

8.

Long Term changes to be made

1.

2.

3.

4.

Summary Sheet

Date completed_____

Dairy

Strengths	Weaknesses

Crops

Strengths	Weaknesses

Financial

Strengths	Weaknesses

Total Farm Summary

Short Term changes to be made

1.

2.

3.

4.

5.

6.

7.

8.

Long Term changes to be made

1.

2.

3.

4.