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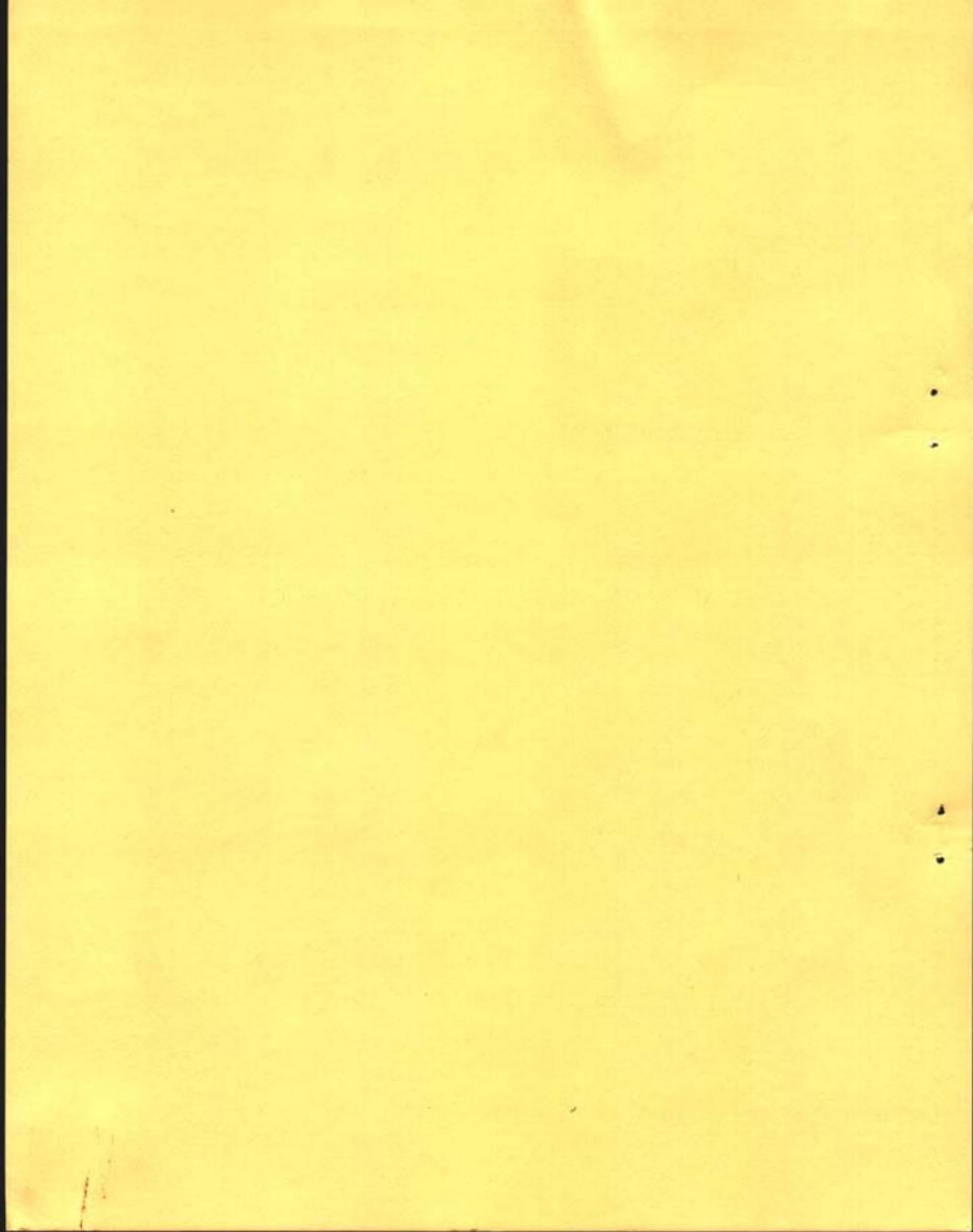
Agricultural Economics Report

REPORT NO. 191 MAY 1971

MICHIGAN FARM MANAGEMENT HANDBOOK — 1971

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FOREWARD

Many techniques or methods are available for analyzing farm management problems. Budgeting, gross margin planning, linear programming, computer simulation, and discounted cash flow analysis are examples of techniques that can potentially be used for farm planning and business analysis. These various techniques provide a means for answering such questions as: What crop and livestock enterprises are most profitable for a given farm situation? How should they be produced? How many acres of each crop and how many head of livestock should be produced?

A major limitation in applying these techniques is that a considerable amount of data on prices and various technical relationships is often needed. Information is frequently required on such items as: How much seed corn is required per acre? How much capital is required for livestock equipment and buildings? How much and what kind of feed is needed for 50 dairy cows? Such information is often not readily available for individual farm planning needs.

This handbook contains information which can be useful for analyzing various problems on Michigan farms. Included are such data as prices, investment costs and returns, and various technical relationships. There are unquestionably errors in the data, and some of the material contained herein will become out-dated over time. Also, some of the information may not be entirely applicable to a particular farm situation. However, the data do represent a useful starting point in analyzing a particular farm or some facet of a farm business. The data can also be modified for a given farm, and supplemented with more current information as it becomes available. In general, data have been selected which represent above average farm management ability, so that the figures might be useful for budgeting over the next several years. Sources of information have been indicated wherever possible to show how current the information is and to give credit where due.

In order to facilitate use of the handbook, information is arranged by enterprise and by subject matter.

The present edition was assembled by R. L. Trimble, L. J. Connor, and J. R. Brake, and supersedes A. E. Report No. 36. A number of people provided valuable assistance in preparing this report, and are identified in the various sections. The following individuals contributed major sections of the report:

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GROSS MARGIN METHOD OF PLANNING ^{1/}

Today's farming often involves a sizeable investment and frequently narrow profit margins. Therefore, the farmer who expects to attain satisfactory earnings must have records of his business for analysis and must be constantly considering his future plans.

In his analysis and planning he will want to consider how efficiently each crop and livestock enterprise is conducted; whether he has an adequate size of business, with the best combination of crop and livestock enterprises; how efficiently the fixed resources of the business are presently utilized and whether a different organization of the farm would result in an improvement; and given a change in future conditions, what new organization of the farm should be considered.

The Gross Margin method of planning for the future has certain advantages in helping a farmer reach decisions on the preceding and related questions. The basic ideas of this method are briefly as follows: The costs of farming are put into two groups--variable, or direct cash costs, which vary with the size of the enterprise or the methods used and are relatively easy to allocate to enterprises; and the fixed, or overhead costs, which are relatively constant or fixed, and are somewhat difficult to allocate to individual enterprises. The total variable costs of an enterprise are subtracted from the total returns to obtain the gross margin. This represents the contribution of the enterprise toward covering the fixed costs and producing a return for risk and management.

The principal advantages of the gross margin method are that (1) the effects of different methods or inputs in an enterprise are readily apparent in the gross margin per acre or per head, and (2) the effects of changing the acres of crops or number of livestock are clearly shown by the total farm gross margin (unless there is a change that alters fixed costs, which usually can be determined).

Using this method on one crop--Farmers having a sizeable acreage of a cash crop may find this method useful in considering various alternatives. In Table 1 a form is presented in which the total returns, variable costs and gross margin can be determined for "present methods and acres" and estimated for three changes--"New methods," an "increase in acres" and a "decrease in acres."

If, in any of these three changes, more or larger specialized machinery is used, one must move into the fixed costs section of the table to recognize this change (see Table 1a for such calculations). Also, to obtain total costs, all the fixed costs are estimated. Tables 1a and 1b should be helpful in completing Section III of Table 1. (In connection with changing acres of one crop, this usually will change the acreage of some other crop on the farm and its gross margin. This is covered in Table 3.)

^{1/}Wright, K. T. Unpublished Material. Department of Agricultural Economics, Michigan State University, January, 1971.

Using this method on dairy enterprise--Table 2 for the dairy enterprise has been set up in the same form as Table 1, except that the three illustrative examples in Budget of Changes are different. In either case, these headings can be changed to suit the circumstances.

Gross margin can be determined as previously explained, except that in this case it is somewhat more difficult to estimate both the returns and the variable costs. The labor charge, and the charge for interest on investment and taxes, Tables 2a, 2b and 2c have been prepared. If proposed changes in the dairy enterprise involve changes in buildings or equipment, this can be calculated on Table 2d.

As with the crop form, estimates of the fixed costs can be included to get total costs, and "return over all costs," "return per hour labor" and "total cost per cwt. milk" can be calculated.

Using this method on a crop farm--In the two preceding cases one enterprise was taken and provision made on that form for a comparison of three alternatives with the present situation. But especially in the case of crops, increasing or reducing the acreage of one crop generally would affect other crop acreages and their gross margins. Usually, attaining maximum gross margin from all crops is desired.

Table 3 differs from the preceding in that (a) there is no present method, and size of enterprise, and it is all budget, and (b) one selects what he thinks is the best acreages of the various crops to attain the highest total gross margin. (If he wishes to try another combination, another copy of this table would be used.) After figuring total returns and the variable costs, the gross margin per acre on each crop can be calculated.

In this table the fixed costs have been separated into two parts; first, the machinery and buildings, so the "Land, Labor and Management Return" could be calculated (line 29). Then the land and labor charges are brought in (Section IV) to get "Management Return" (line 37).

It is also possible to calculate the "Operator's Labor Income," his "Return Per Hour" and "Interest Rate Earned." Variable and total cost per acre or per unit of product can also be determined.

Thus, in this form, it is possible to stop at gross margin, or proceed further in the table as circumstances warrant.

Summary of the Year's Farm Business on the Gross Margin Basis--We have discussed the allocation of the variable costs and the determination of the gross margin on individual crops and livestock enterprises. Some may feel this is too concentrated on crops and they may have only one livestock enterprise anyway.

The form presented in Table 4 has been set up for use of the gross margin method combining all the crops into one listing and the livestock into another. This procedure gives the total gross margin on crops and likewise on livestock, and shows the contribution of each toward covering the fixed costs on the farm.

This form also differs from the others in that the fixed costs are listed first, with provision for estimating their division between crops and livestock, and their deduction from gross margin to give management return. Section B is set up to show the total crop returns, variable costs, gross margin, and then the deduction of their estimated fixed costs from gross margin to get the Management Return from Crops. In Section C the same can be done for Livestock, while Section D is for Other Income. Thus, in the form one can get the estimated Management Return from Crops, livestock and other income sources.

Table 2.

 DAIRY ENTERPRISE COSTS AND RETURNS
 ON GROSS MARGIN BASIS

Item	Present no. of cows and prod.	Budget of Changes		
		Same no. Higher prod.	Few more Higher prod.	Many More
Number of cows	\$	\$	\$	\$
Pounds milk sold per cow				
I. RETURNS				
Total pounds milk sold (cwt.)				
Price per cwt. (gross)				
Milk sales (gross)				
Sales of cull cows				
Sales of youngstock				
Total returns	\$	\$	\$	\$
II. VARIABLE COSTS				
Feed (see P. 7)	\$	\$	\$	\$
Labor hired (see P. 7)				
Bedding				
Breeding fees				
Milk testing fees				
Veterinary and medicine				
Marketing expense				
Insurance on cattle				
Building repairs & insurance				
Equipment repairs & supplies				
Other				
Total var. costs	\$	\$	\$	\$
Cross margin				
III. FIXED COSTS (See Pp. 7 and 8).				
Int. on cattle invest. @ <u> </u> %	\$	\$	\$	\$
Use of lot-land--taxes & int.				
Buildings--depr., int., & ins.				
Dairy equip.--depr. & int.				
Utilities				
Overhead expenses (share)				
Operator labor value				
Family labor value				
Total fixed costs	\$	\$	\$	\$
IV. SUMMARY--Total costs				
Return over all costs	\$	\$	\$	\$
Return per hour (fam. & oper. labor) ^{1/}				
Total cost per cwt. milk ^{1/}				

^{1/} Including youngstock costs.

Source: Wright, K. T., Ibid.

Table 2d. DAIRY BUILDINGS AND EQUIPMENT INVESTMENTS, DEPRECIATION, INTEREST AND INSURANCE

Buildings	Present Set-up		Budget of Changes	
	Invest.	Depr.	Invest.	Depr.
At Present	\$	\$	\$	\$
Dairy barn #1				
Dairy barn #2				
Outside concrete				
Milk house				
Milking parlor				
Water system				
<u>New Additions</u>				
	XX	XX		
Total investment & depreciation	XX	XX	XX	XX
Interest on investment	XX	XX	XX	XX
Insurance	XX	XX	XX	XX
Total depr., int. & ins.	XX	XX	XX	XX
<u>Equipment</u>				
Milking equipment				
Bulk tank				
Washer				
Heater				
Grain feed system				
Feed bunks				
Manure handling				
Spreader				
Tractor and blade				
<u>New Additions</u>				
Total investment & depreciation	XX	XX	XX	XX
Interest on investment	XX	XX	XX	XX
Total depr. & int.				

Table 3. ANNUAL SUMMARY OR BUDGET OF THE YEAR'S BUSINESS ON GROSS MARGIN BASIS

Item	Farm Total	Crops					
1. Acres in crops							
2. Yield per acre							
I. RETURNS							
3. Total production (1 x 2)							
4. Price							
5. Main product value (3 x 4)	\$						
6. By-product value							
7. Total Returns (5 + 6)	\$						
II. VARIABLE COSTS							
8. Seed							
9. Fertilizer							
10. Spray material							
11. Weed controller							
12. Special labor hired							
13. Custom work hired							
14. Tractor & truck operating costs							
15. Machinery operating costs							
16. Other <u>1/</u>							
17.							
18. Total variable cost	\$						
19. Total Gross Margin (7-18)	\$						
20. Gross Margin per A. (19 ÷ 1)							
III. MCHY. AND BLDGS. FIXED COSTS							
21. Tractor, Truck & Mchy.-Depr.							
22. Interest on value							
23. Buildings - Depreciation							
24. Interest on value							
25. Insurance & upkeep							
26. Other <u>2/</u>							
27. Total (21 thru 26)	\$						
28. Total var. & these (18 + 27)	\$						
29. Land, Labor & Mgt. Return (7-28)							
IV. LAND AND LABOR CHARGES							
30. Land use--Taxes or rent							
31. Interest on value--paid							
32. Labor--Regular hired							
33. Operator							
34. Family							
35. Total (30 thru 34)	\$						
V. SUMMARY							
36. Total all costs (28 + 35)	\$						
37. Management Return (7-36)							
38. Operator's Labor Income (33 + 37)							
39. Operator's Hours Labor							
40. Operator's Return/Hr. (38 ÷ 39)							
41. Invest. & Mg't. Return (37+22+24+31)							
42. Interest Rate Earned (41 ÷ invest)		x	x	x	x	x	x
VI. PER ACRE & UNIT OF PROD. SUM.							
43. Variable Cost/A. (18 ÷ 1)							
44. Total Cost/A. (36 ÷ 1)							
45. Variable Cost/Unit Prod. (18 ÷ 3)	x						
46. Total Cost/Unit Prod. (36 ÷ 3)	x						

1/ Crop insurance, interest paid on operating capital, trucking, etc.

2/ Utilities and other general overhead costs.

Table 4.

SUMMARY OF THE YEAR'S FARM BUSINESS--
ON THE GROSS MARGIN BASIS

Item	Farm Total	Estimated Crops	Amount on: Livestock	Net Mg't. Return
A. FIXED COSTS				
<u>Labor--Operator</u>	\$	\$	\$	
Family				
Hired				
<u>Depreciation--Machinery</u>				
Buildings				
<u>Charges for Assets Used</u>				
Interest paid				
Interest on own equity				
Cash rent				
<u>Other--Taxes</u>				
Bldg. repairs, ins., etc.				
Utilities				
Miscellaneous				
Total	\$	\$	\$	
B. CROP INCOME, VARIABLE COSTS & NET				
<u>Crop Returns</u>	\$	\$		
<u>Variable Costs--Seed</u>				
Fertilizer				
Spray materials				
Special labor				
Custom work hired				
Machinery expenses				
Other crop expenses				
Total	\$	\$		
<u>Gross Margin</u>		\$		
Fixed Costs on Crops				
Management Return from Crops				\$
C. LIVESTOCK INCOME, COSTS & NET				
<u>Total Returns</u>	\$		\$	
<u>Variable Costs--Livestock purch'd</u>			\$	
Purchased feed				
Value of own feed				
Other livestock expenses				
Total	\$		\$	
<u>Gross Margin</u>			\$	
Fixed Costs on Livestock				
Management Return from Livestock				\$
D. OTHER INCOME, VARIABLE COSTS & NET				
<u>Total Returns</u>	\$			
<u>Variable Costs</u>				
Total	\$			
<u>Gross Margin</u>	\$			
Management Return				\$
TOTAL MANAGEMENT RETURN				\$

Source: Wright, K. T., Ibid.

Table 5. MONTHLY PAYMENT TO AMORTIZE A LOAN OF \$100 - EVEN PAYMENT PLAN ^{1/}

No. of Months	Annual Interest Rate (Converted monthly)							
	6%	7%	8%	9%	10%	11%	12%	18%
	(Monthly payment in dollars)							
2	\$50.375	\$50.440	\$50.501	\$50.563	\$50.626	\$50.689	\$50.751	\$51.128
3	33.667	33.723	33.779	33.835	33.890	33.946	34.002	34.338
4	25.313	25.366	25.418	25.471	25.523	25.576	25.628	25.944
5	20.301	20.351	20.402	20.452	20.503	20.553	20.604	20.909
6	16.960	17.008	17.058	17.107	17.156	17.205	17.255	17.553
7	14.573	14.621	14.670	14.717	14.766	14.814	14.863	15.156
8	12.783	12.830	12.878	12.926	12.973	13.021	13.069	13.358
9	11.391	11.438	11.485	11.532	11.579	11.627	11.674	11.961
10	10.277	10.324	10.370	10.417	10.464	10.511	10.558	10.843
12	8.607	8.653	8.699	8.745	8.792	8.838	8.885	9.168
15	6.936	6.982	7.028	7.074	7.120	7.167	7.212	7.494
18	5.823	5.868	5.914	5.960	6.006	6.052	6.098	6.381
21	5.028	5.073	5.119	5.165	5.210	5.257	5.303	5.587
24	4.432	4.477	4.523	4.568	4.614	4.661	4.707	4.992
27	3.969	4.014	4.059	4.105	4.151	4.198	4.245	4.532
30	3.598	3.643	3.689	3.735	3.781	3.828	3.875	4.164
36	3.042	3.088	3.134	3.180	3.227	3.274	3.321	3.615
42	2.646	2.691	2.738	2.784	2.832	2.879	2.928	3.226
48	2.349	2.395	2.441	2.489	2.536	2.585	2.633	2.937

Example: The monthly payments on a 12 month loan of \$650 at an annual interest rate of 10% (converted monthly) would be \$57.15 (that is, $6.50 \times \$8.792$)

^{1/} Computed by the annuity formula.

Source: Wright, K. T. Ibid.

Table 6. ANNUAL PAYMENT TO AMORTIZE A LOAN OF \$1,000 - EVEN PAYMENT PLAN ^{1/}

Period in Years	5%	5 1/2%	6%	6 1/2%	7%	8%	9%
(Annual payment in dollars)							
2	\$537.80	\$541.62	\$545.44	\$549.26	\$553.09	\$560.77	\$568.48
3	367.21	370.65	374.11	377.58	381.05	388.03	395.07
4	282.01	285.29	288.59	291.90	295.23	301.92	308.70
5	230.97	234.18	237.40	240.63	243.89	250.46	257.13
6	197.02	200.18	203.36	206.57	209.80	216.32	222.97
7	172.82	175.96	179.14	182.33	185.55	192.07	198.74
10	129.50	132.67	135.87	139.10	142.38	149.03	155.89
12	112.83	116.03	119.28	122.57	125.90	132.70	139.73
15	96.34	99.63	102.96	106.35	109.79	116.83	124.15
20	80.24	83.68	87.18	90.76	94.39	101.85	109.66
25	70.95	74.55	78.23	81.98	85.81	93.68	101.93
30	65.05	68.81	72.65	76.58	80.59	88.83	97.46
35	61.07	64.97	68.97	73.06	77.23	85.80	94.75
40	58.28	62.32	66.46	70.69	75.01	83.86	93.06
Never (interest only)	50.00	55.00	60.00	65.00	70.00	80.00	90.00

Example: The annual payments on a 10-year loan for \$5,400 at 6% would be $5.4 \times \$135.87 = \733.70 . (Note: Use 5.4 because this is the number of \$1,000 units being borrowed.)

^{1/} Computed by the annuity formula.

Source: Wright, K. T. Ibid.

INTEREST RATE CALCULATOR

By J. R. BRAKE
AND M. E. WIRTH

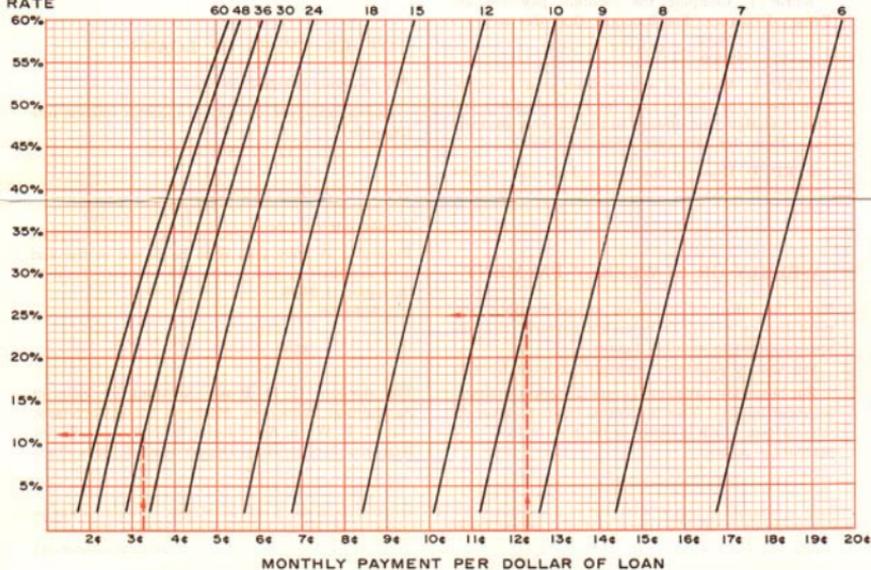
COOPERATIVE EXTENSION SERVICE—MICHIGAN STATE UNIVERSITY

You should know how to figure interest rates on installment loans so you can compare financing costs before you buy on credit. Sometimes the finance charges on loans are not clearly stated or they may seem difficult to figure. However, using this Calculator

and a few facts about the loan, you can easily figure interest rates for equal-payment loans. The simple three-step procedure for using the Calculator (below) is explained on the reverse side with typical examples showing its application to actual problems.

ANNUAL
INTEREST
RATE

NUMBER OF MONTHLY PAYMENTS



▲
Example One

▲
Example Two

How to use the INTEREST RATE CALCULATOR

To figure interest rates for equal monthly payments, you need the following information:

Principal (amount borrowed in the case of a loan) or the balance (difference between cash price and down payment in the case of an installment purchase).

Number of monthly payments required to pay off the principal or balance.

Amount of the monthly payment.

MONTHLY PAYMENT LOANS

EXAMPLE ONE: You want to buy a car or tractor for \$3,300. You can pay \$1,000 down. The balance of \$2,300 is payable at \$75.39 per month for 36 months. What interest will you pay if you buy on time?

Solution:

$$\text{Balance} = \$3,300 - \$1,000 = \$2,300$$

$$\text{Number of months} = 36$$

$$\text{Monthly payment} = \$75.39$$

To compute the interest rate, using the Calculator chart, follow these 3 simple steps:

▶ **STEP 1** Compute the monthly payment per dollar of balance. For Example One, this is:

$$\frac{\$75.39}{\$2300} = \$0.0328 = 3.28\%$$

▶ **STEP 2** Mark the answer from step 1 on the base line of the chart (3.28% for Example One) and draw a straight line upward to the monthly payment line—36 in this case (see arrows on chart).

▶ **STEP 3** Draw a line leftward to the interest rate line. For this example, the interest rate is about 11%.

WEEKLY OR BI-WEEKLY PAYMENT

Since the calculator is set up to use monthly payment figures, weekly or bi-weekly payment amounts are converted to monthly figures:

For weekly payments, multiply payment by 4.33

For bi-weekly payments (every 2 weeks) multiply payment by 2.17. This procedure, however, gives an interest rate which is likely to be in error by 1 or 2 percentage points.

EXAMPLE TWO: A television set sells for \$240 cash or for \$20 down and \$6.25 per week for 39 weeks. What rate of interest is being charged on this credit plan?

Solution:

$$\text{Balance} = \$240 - \$20 = \$220$$

$$\text{Number of months over which payments are made} = 9$$

$$(39 \text{ weeks} \div 4\frac{1}{4} \text{ weeks per month} = 9 \text{ months})$$

$$\text{Weekly payment} = \$6.25$$

$$\text{Payment per month} = \$6.25 \times 4.33 = \$27.06$$

Use the 3 steps as before:

▶ **STEP 1** Compute the "monthly" payment per dollar of loan. Using the figures from Example Two:

$$\frac{\$27.06}{220} = \$0.123 = 12.3\%$$

▶ **STEP 2** Mark the answer from step 1 on the base line of the chart and draw a straight line upward to the "monthly" payment line—(9 for example two).

▶ **STEP 3** Draw a line leftward to the interest rate line. Thus for this example, the interest rate is at least 26%.

OTHER TYPES OF LOANS

For revolving charge accounts:

Annual interest rate = $12 \times$ monthly interest rate
Example:

$$12 \times 1.5\% = 18\%$$

For loan repaid in a lump sum:

Annual interest rate = $\frac{\text{Interest charge}}{\text{Principal} \times \text{number of years}}$
Example: A \$600 loan is to be repaid at the end of 6 months ($\frac{1}{2}$ year) with \$18 interest. Total to be repaid is \$618.

Solution:

$$\frac{\$18}{\$600 \times \frac{1}{2}} = 0.06 \text{ or } 6\%$$

The Authors: J. R. Brake, Assistant Professor of Agricultural Economics, Michigan State University; and M. E. Wirth, Agricultural Economist, Economic Research Service, U.S. Department of Agriculture.

TABLE 7. SUMMARY OF FARM INSURANCE RISKS, COVERAGE, AND COST

Risk	Type Policy	Coverage	Cost
Loss of Property			
1. Buildings	Fire and extended coverage	Pays for loss or damage to buildings from almost any accidental or natural cause. Many policies include a \$50 or \$100 deductible clause.	Fire and extended coverage, \$6.20 per \$1000 insurance. Fire alone \$3.50 per \$1000 insurance. Wind alone \$2.00 per \$1000 insurance. \$100 deductible 25% less. Usually the same rate as for buildings.
2. Livestock, machinery, and crops	Fire and extended coverage	Pays for loss or damage to livestock, machinery, or stored crops from almost any accidental or natural cause.	Varies by crop and area
3. Growing crops	Crop-Hail Insurance	Pays for hail damage to growing crops based on the percent loss.	
	All Risk Crop Insurance	Pays for loss of crop from any natural hazard such as flood or drought, hail, wind, frost, winterkill, fire, snow, hurricane, insects, and plant diseases.	Offered by Federal Crop Insurance Corporation. Cost varies with coverage selected, type of crop and experience in the area. Averages \$7/\$100.
Liability			
1. Person or property of a non-employee	Farmer's Comprehensive Personal Liability	Pays lawsuits resulting from farm or family connected responsibility to persons other than employees.	Basic farm of 160 acres with up to 2 months custom farming and up to 6 months hired labor. 10/20 coverage \$20. Premium increases with acres, months custom farming and months of hired help. Basic 25/50/10 coverage ranges from \$80-\$250. Lower rate applies to a married person over 25 years old with car used for farm and home use only. Rates vary by type of farm - Dec. 1970 rates on dairy, livestock and orchard farms \$5.93 per \$100 of payroll, general farms \$5.16 and truck crop farms \$3.38.
	Auto Liability	Pays lawsuits resulting from motor vehicle accidents involving another person or his property. Additional coverage may be added such as collision, medical payments and death benefits. Required if 3 or more workers are hired for 35 hours per week for 13 weeks of the year. Pays hospital, medical bills and wage benefits for employee injuries arising out of employment.	
2. Employers	Full Workman's Compensation	Required if 1 or more workers are hired for 5 consecutive weeks of the year. Provides hospital and medical insurance as well as general employer liability.	Rates vary by type of farm - Dec. 1970 rates on dairy, livestock, general and orchard farms, \$3.97 per \$100 of payroll, truck crop farms, \$11.72.

Source: Kelsey, M. P. Unpublished Material.

Dept. of Agr. Econ., Michigan State University, January, 1971.

Table 8. COSTS OF DIFFERENT KINDS OF LIFE INSURANCE

Type Policy	Annual Premium for \$1,000 Insurance/ (Age 22)	Annual Premium for \$1,000 Insurance/ (Age 25)	\$100 Annual Premium will Buy this Protection ^{2/} (Age 22)	Cash Value at age 65 Per \$100 Annual Premium (Age 22)	What You Get For Your Dollar Protection	Investment
5-Year Renewable Term	\$ 5.00	5.08	\$20,000	\$0	#####	0
Straight Life	14.00	\$15.20	7,100	4,200	#####	###
Life-Paid-up-at 65	15.90	17.50	6,300	4,475	#####	###
Family Income (20 years) Endowment at 65	—	—	5,800	3,445	#####	H
20-Payment Life	—	—	5,500	5,500	####	####
Retirement Income at 65	23.70	25.20	4,200	2,980	###	±
20-Year Endowment	26.20	29.20	3,800	6,240	##	#####
	45.40	45.55	2,200	Matured (age 42)	±	###

^{1/} Rates shown are approximate premium rates for \$10,000 of life insurance protection for men.

^{2/} Most companies have minimum policy limits of \$1,000, \$3,000 or \$5,000.

Source: Decade of Division. Educational Division, Institute of Life Insurance, New York, 1966.

Table 9.

ESTIMATED TOTAL FAMILY LIVING EXPENDITURES
RELATED TO FAMILY SIZE AND INCOME^{1/}

Family Income	Number in Household							
	2	3	4	5	6	7	8	9
\$ 3,000	\$7006	\$7129	\$7251	\$7374	\$7497	\$7620	\$7743	\$2866
4,000	7109	7231	7354	7477	7600	7723	7846	7969
5,000	7211	7334	7457	7580	7703	7826	7949	8072
6,000	7314	7437	7560	7683	7806	7929	8052	8174
7,000	7417	7540	7663	7786	7909	8032	8155	8277
8,000	7520	7643	7766	7889	8012	8135	8257	8380
9,000	7623	7746	7869	7992	8115	8238	8360	8483
10,000	7726	7849	7972	8095	8218	8340	8463	8586
11,000	7829	7952	8075	8198	8320	8443	8566	8689
12,000	7932	8055	8178	8301	8423	8546	8669	8792
13,000	8035	8158	8281	8403	8526	8649	8772	8895
14,000	8138	8261	8384	8506	8629	8752	8875	8998
15,000	8241	8364	8486	8609	8732	8855	8978	9101
16,000	8344	8466	8589	8712	8835	8958	9081	9204
17,000	8447	8569	8692	8815	8938	9061	9184	9307
18,000	8549	8672	8795	8918	9041	9164	9287	9410
19,000	8652	8775	8898	9021	9144	9267	9390	9512
20,000	8755	8878	9001	9124	9247	9370	9493	9615

^{1/} Estimates are based on linear regression analysis. Approximately 2 out of 3 families spent within \$2,534 of the estimated expenditure for their family size and income. The estimating equation was $Y = \$6,451.14 + 122.87 (X_1) + .10292 (X_2)$ where X_1 is the number of persons in the household and X_2 is the net income from farming plus nonfarm income of the farm operator and his wife.

Total expenditures do not include income taxes, savings, real estate purchases, or miscellaneous (funerals, weddings, legal expense, etc.)

Source: Ferrar, Barbara M. Unpublished Telfarm data for 1969. Department of Agricultural Economics, Michigan State University. January, 1971.

Table 10.

ESTIMATED EXPENDITURES FOR FOOD AS RELATED TO
FAMILY SIZE AND INCOME¹

Family Income	Number in Household							
	2	3	4	5	6	7	8	9
\$ 3,000	\$1402	\$1495	\$1587	\$1680	\$1772	\$1865	\$1957	\$2049
4,000	1410	1502	1595	1687	1780	1872	1964	2057
5,000	1417	1510	1602	1694	1787	1879	1972	2064
6,000	1425	1517	1609	1702	1794	1887	1979	2072
7,000	1432	1524	1617	1709	1802	1894	1987	2079
8,000	1439	1532	1624	1717	1809	1902	1994	2086
9,000	1447	1539	1632	1724	1817	1909	2001	2094
10,000	1454	1547	1639	1732	1824	1916	2009	2101
11,000	1462	1554	1647	1739	1831	1924	2016	2109
12,000	1469	1562	1654	1746	1839	1931	2024	2116
13,000	1477	1569	1661	1754	1846	1939	2031	2124
14,000	1484	1576	1669	1761	1854	1946	2039	2131
15,000	1491	1584	1676	1769	1861	1954	2046	2138
16,000	1499	1591	1684	1776	1869	1961	2053	2146
17,000	1506	1599	1691	1784	1876	1968	2061	2153
18,000	1514	1606	1699	1791	1883	1976	2068	2161
19,000	1521	1614	1706	1798	1891	1983	2076	2168
20,000	1529	1621	1713	1806	1898	1991	2083	2176

¹ Estimates are based on linear regression analysis. Approximately 2 out of 3 families spent within \$476 of the estimated expenditures for their family size and income. The estimating equation is $Y = \$1,195.24 + 92.43 (X_1) + .00742 (X_2)$ where X_1 is the number of persons in the household and X_2 is the net income from farming plus nonfarm income of the farm operator and his wife. Food expenditures do not include the value of home-produced food.

Source: Ferrar, Barbara M. Unpublished Telfarm Data for 1969. Department of Agricultural Economics, Michigan State University. January, 1971.

Table 11.

AVERAGE ANNUAL FAMILY LIVING EXPENDITURES
OF 61 MICHIGAN FARM FAMILIES, 1969

	Number of families	61	
	Average income	\$11,082	
	Average family size	5.2	
	Average expense (dollars)	Percent	Your family's expenses
Housing*	2,321	24.0	
Food	1,755	18.1	
Personal insurance and retirement	1,171	12.1	
Transportation	798	8.3	
Medical care	698	7.2	
Clothing	675	7.0	
Gifts and contributions	578	6.0	
Income taxes	487	5.0	
Recreation	359	3.7	
Education	334	3.5	
Personal care	89	1.0	
Miscellany	405	4.2	
Total family living expenditures	9,670	100.0	

* Includes real estate purchases and betterments.

Percent column does not total correctly, due to rounding.

Source: Ferrar, Barbara M., Costs of Farm Family Living in Michigan During 1969.
Agr. Econ. Rep. No. 178, Dept. of Agr. Econ., Michigan State University.
December, 1970.

Table 12.

WEIGHTS, MEASURES, AND CONVERSION FACTORS

Commodity	Unit	Equivalent
Alfalfa seed	bu.	60 lbs.
Barley	bu.	48 lbs.
Bluegrass seed	bu.	14-30 lbs.
Buckwheat	bu.	48-52 lbs.
Clover seed	bu.	60 lbs.
Corn		
ear, husked	bu.	70-75 lbs.
shelled	bu.	56 lbs.
Corn and cob meal	bu.	45 lbs.
Cream, 40% b. fat	gal.	8.39 lbs.
Dairy products		
butter	1 lb.	20.6 lbs. of
cheese	1 lb.	10.0 milk
condensed milk	1 lb.	2.3 equivalent
ice cream		12-15
Eggs, average size case		
30 dozen	30 doz. case	45 lbs.
Fescue seed	bu.	24 lbs.
Grain sorghums	bu.	50-56 lbs.
Linseed meal	bu.	29 lbs.
Milk	gal.	8.6 lbs.
Milk	cwt.	46.5 qts.
Molasses	bb1.	650 lbs.
Oats, grain	bu.	32 lbs.
ground	bu.	22 lbs.
Orchard grass seed		14 lbs.
Redtop seed	bu.	50-60 lbs.
Rye	bu.	56 lbs.
Sorgo seed	bu.	50 lbs.
Soybeans	bu.	60 lbs.
Spelt	bu.	40 lbs.
Sudan grass seed	bu.	40 lbs.
Timothy seed	bu.	45 lbs.
Water	gal.	8.336 lbs.
	cu. ft.	7.480 gal.
	cu. ft.	62.428 lbs.
Wheat	bu.	60 lbs.
Wheat bran	bu.	16 lbs.
Wood, "full" cord		128 cu. ft.
(4 x 4 x 8 ft.)		
"short" cord		48 cu. ft.
(18 in. x 4 x 8 ft.)		

Table 13.

METHODS OF MEASUREMENT

(Read across for equalities, i.e. in row 2, 1 foot = 12 inches)

Linear (long)...

Miles	Furlongs	Chains	Rods (poles)	Fathoms	Yards	Feet	Links	Inches
--	--	--	--	--	--	--	1	7.92
--	--	--	--	--	--	1	--	12
--	--	--	--	--	1	3	--	36
--	--	--	--	1	2	6	--	72
--	--	--	1	2 1/4	5 1/2	16 1/2	25	198
--	--	1	4	11	22	66	100	792
--	1	10	40	110	220	660	1,000	7,920
1	8	80	320	880	1,760	5,280	--	--

Square (surface) 1.

Township	Sections	Acres	Square Chains	Square Rods	Square Yards	Square Feet	Square Inches
--	--	--	--	--	--	1	144
--	--	--	--	--	1	9	1,296
--	--	--	--	1	30 1/4	272 1/4	--
--	--	--	2 1/2	40	1,210	10,890	--
--	--	1	10	160	4,840	43,560	--
--	1/4	160	1,600	25,600	77,440	--	--
--	1	640	6,400	102,400	--	--	--
1	36	23,040	--	--	--	--	--

Cubic (solid) 2.

Cubic Yard	U.S. Bushels	Cubic Feet	U.S. Gallons	Cubic Inches
--	--	--	1	231
--	--	1.0	--	1,728
--	1	1.244	--	2,150.42
1	21.7	27.0	--	46,656

Circular (round) 3.

Circle	Degrees	Minutes	Seconds	Dry...	Pecks	Qts.	Pints
--	--	1	60	Bushels	--	1	2
--	1	60	--	--	1	8	16
1/4	90	540	--	1	4	32	64
1/2	180	--	--	--	--	--	--
1	360	--	--	--	--	--	--

Liquid 4.

Hogshead	Barrels	Gallons	Quarts	Pints	Cups	Gills	Fluid Ounces
--	--	--	--	--	1	2	8
--	--	--	--	1	2	4	16
--	--	--	1	2	4	8	32
--	--	1	4	8	16	32	128
--	1	31 1/2	126	--	--	--	--
1	2	63	--	--	--	--	--

Table continued on next page.

Table 13 continued

Avoirdupois (weight).⁵

Tons	Pounds	Ounces	Drachms	Grains
--	--	--	1	27 11/32
--	--	1	16	--
--	1	16	256	--
1	2,000	32,000	--	--

- ¹ The usual township is 6 miles square (36 square miles); a section is one square mile.
- ² For an approximation of number of bushels of shelled corn or small grain, use 1 1/4 cubic feet per bushel; for an approximation of the number of bushels of shelled corn, in ear corn form, use 2 1/2 cubic feet per bushel.

Board feet is equal to length in feet x width in feet x thickness in inches. M is the abbreviation for 1,000 board feet.
- ³ The circumference of a circle is equal to its diameter x 3.1416; or, its radius x 2 x 3.1416. The area of a circle is equal to its radius squared x 3.1416.
- ⁴ One tablespoon is equivalent to 1/2 of an ounce; one teaspoon is equivalent to 1/6 of an ounce.
- ⁵ This is the "short" ton; the "long" ton is equivalent to 2,240 lbs., or 35,840 ounces.

Table 14. MICHIGAN ANNUAL AVERAGE INPUT PRICES FOR BUDGETING^{1/}

Item	Source	Unit	1967	1968	1969	1970 ^{2/}
Feed:			(Dollars)			
Soybean oil meal 44% protein	1	cwt.	5.57	5.55	5.47	5.86
Tankage	1	cwt.	6.73	6.43	6.61	7.23 (Nov.)
Mixed hog feed 14-18%	1	cwt.	4.28	4.19	4.16	4.27
Mixed hog feed over 29%	1	cwt.	6.55	6.51	6.64	7.01
Beef cattle concentrate 30% & over	1	cwt.	5.55	5.38	5.34	5.59
Alfalfa hay (baled)	1	ton	24.40	25.20	25.50	22.88
Mixed dairy feed 20%	1	ton	80.00	81.58	80.75	85.41
Chick starter	1	ton	92.41	99.83	90.00	98.29
Stock salt	1	cwt.	2.05	2.08	2.17	2.30 (Nov.)
Corn	1 & 2	bu.	1.00	1.01	1.10	1.47 (Dec.)
Livestock:						
Feeder steers ^{2/} (Choice, Kansas City)						
Yearlings (500-800 lbs.)	3	cwt.	26.68	27.92	31.81	33.52
Calves (300-550 lbs.)	3	cwt.	30.10	31.26	35.40	38.60
Feeder pigs (40 lbs. Illinois)	4	head	17.56	17.35	20.67	20.89
Feeder lambs (Choice, Denver) ^{3/}	3	cwt.	24.98	25.00	28.54	25.86
Seed:						
Corn	1	bu.	13.50	13.90	13.80	14.00 (Apr.)
Oats	1	bu.	1.72	1.65	1.60	1.60 (Apr.)
Wheat	1	bu.	3.05	2.70	2.30	2.50 (Sept.)
Soybeans	1	bu.	4.79	4.50	4.20	4.10 (Apr.)
Field beans:						
Navy	2	cwt.	-----	-----	-----	15.00 (Dec.)
Kidney	2	cwt.	-----	-----	-----	30.00 (Dec.)
Cranberry	2	cwt.	-----	-----	-----	28.00 (Dec.)
Sugar beets	2	lb.	-----	-----	-----	1.00 (Dec.)
Alfalfa (cert.)	1	cwt.	72.20	68.00	63.75	69.50 (Sept.)
Clover-red	1	cwt.	36.50	43.75	52.50	53.00 (Sept.)
Clover-ladino	1	lb.	.93	1.15	1.27	1.25 (Sept.)
Fertilizer:						
Mixed fertilizer 5-20-20	1	ton	71.50	69.50	64.00	65.00 (Sept.)
Mixed fertilizer 6-24-12	1	ton	73.50	71.50	67.00	70.00 (Sept.)
Mixed fertilizer 12-12-12	1	ton	69.00	66.50	61.50	60.00 (Sept.)
Mixed fertilizer 6-24-24	1	ton	82.20	76.50	68.50	70.00 (Sept.)
Ammonium nitrate	1	ton	76.50	68.00	61.50	60.00 (Sept.)
Super phosphate 20%	1	ton	43.50	45.00	46.50	46.00 (Sept.)
Super phosphate 46%	1	ton	83.50	76.00	73.00	73.00 (Sept.)
Murate of potash 60%	1	ton	53.50	49.00	45.50	52.00 (Sept.)
Urea 45%	1	ton	99.00	88.50	77.50	78.00 (Sept.)
Anhydrous ammonia	1	ton	112.80	90.00	66.50	73.00 (Sept.)
Ground limestone	1	ton	7.00	7.20	7.30	7.50 (Sept.)
Fuel and lubricants:						
Gasoline	1	gal.	.285	.297	.300	.310 (Sept.)
Diesel	1 & 2	gal.	.168	.166	.166	.179 (Dec.)
Motor oil	1 & 2	gal.	1.54	1.71	1.86	1.53 (Dec.)
Lubricant	1 & 2	lb.	.249	.250	.247	.260 (Dec.)

Footnotes on next page.

Footnotes for Table 14.

1/ See Table 17 for power and machinery prices, Table 16 for custom rates, Table 39 for chemical prices.

2/ Add about \$2 per cwt. to put these feeders on Michigan farms.

3/ Based on September to December average.

4/ Not all prices in 1970 are annual averages. Month in () indicates period for which price was obtained.

Source: Larzelere, H. E. Unpublished data. Dept. of Agr. Econ., Michigan State University, January, 1971. Data obtained from:

1. Agricultural Prices, U.S.D.A. - SRS, selected years.
2. Local, obtained from various dealers.
3. Livestock, Meat and Wool Market News, U.S.D.A.-C&MS, selected years.
4. Interstate Producers Livestock Assn., Peoria, Ill.

Table 15

MICHIGAN FARM PRODUCT PRICES

Item	Unit	Season Average Prices			
		1966	1967	1968	1969
Crops:			(dollars)		
Corn	bu.	1.22	.97	1.03	1.10
Oats	bu.	.69	.70	.57	.58
Soybeans	bu.	2.72	2.47	2.39	2.30
Wheat	bu.	1.65	1.26	1.07	1.19
Dry beans (field)	cwt.	6.40	8.40	8.00	6.20
All hay (baled)	ton	22.00	22.00	22.50	22.50
Sugar beets	ton	13.40	13.00	10.70	NA
Sugar Act payments	ton	2.20	2.22	2.22	NA
Vegetables:					
Snap beans, fresh	cwt.	11.30	11.00	13.80	12.20
Snap beans, processing	ton	85.60	92.40	89.30	90.50
Cantaloupes, fresh	cwt.	8.10	6.80	7.20	7.70
Cauliflower, fresh	cwt.	11.05	10.36	10.40	12.30
Sweet corn, fresh	cwt.	4.10	4.05	2.75	3.00
Cucumbers, fresh	cwt.	5.80	7.30	7.00	7.60
Cucumbers, processing	ton	91.40	111.00	99.40	101.00
Tomatoes, fresh	cwt.	10.20	9.50	7.40	10.80
Tomatoes, processing	ton	34.00	38.10	37.10	36.80
Potatoes, late summer	cwt.	2.81	2.37	2.28	3.09
Potatoes, fall	cwt.	2.36	1.87	2.20	2.60
Asparagus, fresh	cwt.	21.50	20.20	20.50	21.00
Asparagus, processing	ton	325.00	374.00	412.00	420.00
Fruit:					
Apples, fresh use	cwt.	5.91	7.00	7.30	NA
Apples, all processing	ton	41.50	67.00	69.60	NA
Tart cherries, processing	ton	280.00	360.00	300.00	152.00
Sweet cherries, all	ton	270.00	297.00	340.00	213.00
Sweet cherries, processing	ton	265.00	290.00	335.00	205.00
Peaches, freestone, processing except dried	ton	86.00	131.00	NA	55.00
Pears, fresh	ton	92.00	156.00	138.00	85.00
Pears, all	ton	71.60	135.00	122.00	67.00
Plums, fresh	ton	130.00	142.00	174.00	113.00
Plums, all	ton				
Grapes, all	ton	105.00	114.00	122.00	158.00
Strawberries, fresh	lb.	.212	.208	.244	.236
Strawberries, processing	lb.	.153	.156	.179	.184

Table continued on next page.

Table 15 continued

Item	Unit	1967	1968	1969	1970
(dollars)					
Livestock:					
Slaughter steers, Choice (900-1100 lb., Detroit)	cwt.	26.17	27.56	30.14	30.34 (Nov.)
Slaughter steers, Good (900-1100 lb., Detroit)	cwt.	24.68	25.77	28.10	28.51 (Nov.)
Slaughter steers, Standard (all weights, Detroit)	cwt.	23.06	23.72	26.14	26.76 (Nov.)
Slaughter heifers, Choice (700-900 lb., Detroit)	cwt.	24.75	25.38	27.95	28.59 (Nov.)
Slaughter cows, Utility (Detroit)	cwt.	18.23	18.89	20.79	22.63 (Nov.)
Milk cows, Mich. farm price	head	283.00	307.00	341.00	365.00
Veal calves, Choice (150-250 lb., Detroit)	cwt.	38.09	36.90	39.67	43.00 (Nov.)
Barrows and gilts, US No. 2 & 3 (200-220 lb., Indianapolis)	cwt.	20.40	20.26	23.70	23.53
Sows, US No. 1, 2 & 3 (330-400 lb., Indianapolis)	cwt.	17.06	16.92	21.37	19.43
Lambs, Choice, Detroit (shorn and unshorn)	cwt.	24.78	27.26	29.41	28.87 (Nov.)
Wool	lb.	.38	.35	.37	.33
Poultry & Dairy Products					
Chickens, all	lb.	.10	.09	.10	.08
Eggs, all	doz.	.29	.33	.37	.34
Milk, Detroit, Base	cwt.	5.52	5.74	5.80	6.07
Milk, Detroit, Excess	cwt.	3.92	4.12	4.25	4.60

Source: Larzelere, H. E. Unpublished data. Dept. of Agr. Econ., Michigan State University. January, 1971. Data obtained from:

Crops and Vegetables -- Michigan Agricultural Statistics, Mich. Dept. of Agriculture, and Agricultural Prices, U.S.D.A. - SRS.
 Fruit -- Noncitrus Fruit Prices, -- U.S.D.A.-SRS.
 Livestock -- "Livestock Detailed Quotations" (Detroit Terminal), U.S.D.A.-C&MS, and "Livestock, Meat and Wool Market News," U.S.D.A.-C&MS.
 Wool, Poultry & Eggs -- "Agricultural Prices," U.S.D.A.-SRS.
 Milk -- Administrator, Southern Michigan Marketing Area.

Table 16.

CUSTOM WORK RATES IN MICHIGAN

Job	Unit	Most Frequent Charges
		Per Unit (dollars)
Chopping hay and silage with chopper, blower, 1 man, 1 tractor, 2 wagons	Hour	12.00 - 15.00
Combining		
small grain	Acre	6.00 - 7.00
field beans	Acre	7.00 - 8.00
soybeans	Acre	6.00 - 7.00
seed crops, alfalfa, etc.	Acre	7.00 - 8.00
Picking Corn		
1 or 2 row	Acre	6.00 - 7.00
picker -- sheller	Acre	8.00
Haying		
mowing	Acre	1.50 - 2.00
self propelled swather (12 ft. with conditioner)	Acre	4.00
raking	Acre	1.50
baling (twine)	Bale	.10 - .12
haul bales to barn	Bale	.05
Plowing	Acre	5.00
Disking	Acre	1.50 - 2.00
Dragging		
2-4 section	Acre	1.50 - 2.00
Drilling (small grains & beans)		
with fertilizer	Acre	2.00 - 2.50
without fertilizer	Acre	1.50 - 3.00
Planting Sugar Beets	Acre	5.00 - 6.00
Planting Corn		
with fertilizer & chemicals	Acre	2.00 - 2.50
without fertilizer	Acre	2.00 - 2.50
Cultivating	Acre	2.00
Spraying (no materials)		
row crops (Boom)	Acre	1.50
orchard (Air carrier)	Acre	2.00
Spreading fertilizer (no material)		
bulk dry	Acre	1.00 - 1.50
anhydrous ammonia	Acre	2.00
Machine tiling (no tile)	Rod	1.40
Grinding feed	cwt.	.15
Harvesting Sugar Beets	Acre	22.00
Trucking	Mile	.40
Trucking	Hour	10.00

Source: Tinsley, W. A. Rates for Custom Work in Michigan. Ext. Bul. E-458, Coop. Ext. Ser., Michigan State University. February, 1970.

Table 17

ESTIMATED NEW COST, YEARS AND HOURS OF USE, AND OPERATING AND OWNERSHIP COSTS OF SELECTED FARM EQUIPMENT, 1971

Item	Description	New Cost		Years of Use		Annual Hours of Use		Variable Cost		Fixed Annual	
		(dollars)	(dollars)	(years)	(years)	(hours)	(Operating)per Hour of use ^{1/}	(dollars)	Ownership cost ^{2/}	(dollars)	
Tractor	Gas, 38HP, 2-Plow	4,200		10		650	.73		567		
Tractor	Gas, 53HP, 3-Plow	5,600		10		650	1.04		757		
Tractor	Gas, 70HP, 4-Plow	7,400		10		650	1.38		1000		
Tractor	Diesel, 70HP, 4-Plow	7,900		10		650	1.11		1067		
Tractor	Diesel, 90HP, 5-Plow	10,000		10		650	1.47		1351		
Tractor	Diesel, 115HP, 6-Plow	11,800		10		650	1.76		1500		
Tractor	Diesel, 140HP, 7-Plow	14,100		10		650	2.34		1891		
Combine	SP with 10' grain head	10,300		8		200	3.59		1623		
Combine	SP with 16' grain head	13,500		8		200	4.79		2128		
Combine	SP with 18' grain head	16,500		8		200	5.83		2600		
Corn Head	Two row	2,200		8		200	4.98		2238		
Corn Head	Four row	4,700		8		200	6.38		2916		
Corn Picker	Two row, mounted	4,900		10		200	1.96 ^{3/}		662		
Baler	14 X 18, PTO, with thrower	3,500		8		200	.94		552		
Forage Chopper	One row, PTO	3,000		8		200	1.01		473		
Forage Chopper	Two row, PTO	3,900		8		200	1.31		615		
Beet Harvester	Two row	7,000		8		120	1.53		1103		
Rake	Side delivery, 8 ft.	700		10		120	.21		95		
Plow	3-16", auto-reset	1,600		8		150	1.20		252		
Plow	4-16", auto-reset	2,000		8		150	1.49		310		
Plow	5-16", auto-reset	2,350		8		150	1.76		375		
Plow	6-16", auto-reset	2,850		8		150	2.13		449		
Plow	7-16", auto-reset	3,150		8		150	2.35		496		
Planter	Four row, w. fert. attach.	1,500		8		100	1.07		236		
Planter	Six row, w. fert. attach.	2,100		8		100	1.49		331		
Planter	Eight row, w. fert. attach.	2,600		8		100	1.85		410		
Grain Drill	16-7", w.o. fert. attach.	1,100		12		80	1.15		180		
Cultivator	Four row	1,200		10		150	.35		115		
Cultivator	Six row	1,200		10		150	.49		162		
Cultivator	Eight row	1,300		10		150	.66		216		
Tandem Disk	12 ft.	1,300		10		150	.53		176		
Tandem Disk	16 ft.	1,600		10		150	.66		216		
Tandem Disk	20 ft.	2,100		10		150	.86		284		
Spring, Tooth Harrow	16 ft.	450		15		120	.20		47		

Continued on next page . . .

Table 17 continued

Item	Description	New Cost	Years of Use	Annual Hours Of Use	Variable Cost (Operating) per Hour of use	Fixed Annual Ownership Cost
Windrower	9 ft., PTO	2,700	6	150	1.21	527
Windrower	11 ft., SP	4,800	8	150	1.98	756
Bean Puller	Four Row	600	10	100	.24	93
Silage Wagon	Self-unloading, heavy	1,700	10	200	.62	230
Grain Wagon	Grain box w. tires	575	10	200	.21	78
Manure Loader	Hydraulic	1,100	10	200	.32	149
Manure Spreader	155 Bu.	1,150	10	250	.46	155
Manure Spreader	175 Bu.	1,250	10	250	.50	169
Silage Blower	60 ft. w. elbow & hopper	900	10	150	.29	122

1/ Includes costs of repairs, fuel, lubrication, and oil for tractors and self-propelled items; and repairs and lubrication for other items.

2/ Includes depreciation, interest on investment, housing and insurance.

3/ Does not include cost of baler twine.

Source: Harsh, Stephen B. and Robert A. Milligan. Unpublished data. Dept. of Agr. Econ., Michigan State University. January, 1971.

Table 18. ESTIMATED MACHINE AND LABOR REQUIREMENTS FOR SPECIFIED FIELD OPERATIONS IN MICHIGAN

Operation	Width of Machine (inches)	Operating Speed (mph)	Field Efficiency ¹ /Hour ² (percent)	Acres/Machine Hour ² (acres)	Machine Hrs./acre/Operation (hours)	Man Hours as Percent of Power Hrs. Operation (percent)	Man Hrs./Acre/Operation (hours)
Combine small grain:							
10 ft.	120	3.0	70	2.52	.40	111	.44
14 ft.	168	3.0	70	3.53	.28	111	.31
18 ft.	216	3.0	70	4.54	.22	111	.24
Combine corn (two row):							
38" rows	76	3.0	70	1.60	.63	111	.70
28" rows	56	3.0	70	1.18	.85	111	.94
Combine soybeans & field beans							
Pick corn (two row):	112	2.5	65	1.82	.55	111	.61
38" rows	76	3.0	65	1.48	.68	111	.75
28" rows	56	3.0	65	1.09	.92	111	1.02
Rake hay	96	4.0	80	3.07	.33	100	.33
Chop Silage (two row):							
38" rows	76	3.0	60	1.37	.73	111	.81
28" rows	56	3.0	60	1.01	.99	111	1.10
Spread Fertilizer (30 ft.)	360	5.0	70	12.60	.07	133	.09
Harvest beets (two row)	56	3.0	60	1.01	.99	111	1.10
Plow:							
3-16"	48	4.0	85	1.63	.61	102	.63
4-16"	64	4.0	85	2.18	.46	102	.47
5-16"	80	4.0	85	2.72	.37	102	.38
6-16"	96	4.0	85	3.26	.31	102	.31
Plant and Fertilizer (four row):							
38" rows	152	3.8	60	3.47	.29	124	.36
28" rows	112	3.8	60	2.55	.39	124	.48
Plant, fertilize, and spray (4 row):							
38" rows	152	3.6	55	3.81	.33	132	.44
28" rows	112	3.6	55	2.22	.45	132	.59
Plant (28" rows):							
Two row	56	4.0	70	1.57	.64	116	.74
Four row	112	4.0	65	2.91	.34	116	.40
Six row	168	4.0	62	4.50	.22	116	.26

Table continued on next page.

Table 18 Continued

Operation	Width of Machine (inches)	Operating Speed (mph)	Field Efficiency ¹ (percent)	Acres/ Machine Hour ² (acres)	Machine Hrs./acre/ Operation (hours)	Man Hours as Percent of Power Hrs. Operation (percent)	Man Hrs./ Acre/ Operation (hours)
Drill grain:							
15-7"	105	3.5	70	2.57	.39	111	.43
17-7"	119	3.5	70	2.92	.34	111	.38
Drill grain & fertilize (15-7")	105	3.3	65	2.25	.44	119	.52
Cultivate:							
38" rows:							
Four row	152	3.0	85	3.88	.26	104	.27
28" rows:							
Two row	56	3.0	85	1.43	.70	104	.73
Four row	112	3.0	85	2.86	.35	104	.36
Six row	168	3.0	85	4.28	.23	104	.24
Disc:							
12 ft.	144	4.5	85	5.51	.18	102	.18
16 ft.	192	4.5	85	7.34	.14	102	.14
Rotary Hoe (16 ft.)	192	7.5	85	12.24	.08	100	.08
Spring Tooth:							
12 ft.	144	5.0	80	5.76	.17	108	.19
16 ft.	192	5.0	80	7.68	.13	108	.14
Mow (7 ft.)	84	4.0	80	2.69	.37	100	.41
Windrow (12 ft.)	144	4.0	80	4.61	.22	100	.22
Pull beans (four row)	112	3.0	80	2.69	.37	110	.41
Pull and windrow beans (four row)	112	3.0	75	2.52	.39	110	.43
Spray (six row - 28" rows)	228	5.0	65	7.41	.13	125	.16
Top Beets (three row)	89	5.0	85	3.57	.28	100	.28
Condition Hay	84	5.0	81	3.40	.29	100	.29
Mow-condition Hay	84	3.8	75	2.39	.42	105	.44
Bale (Bales dropped)	168	4.0	75	5.04	.20	111	.22
Bale (with thrower)	168	3.8	65	4.15	.24	113	.27

Footnotes on next page.

Footnotes for Table 18

1/ Refers to the percentage of field time remaining for effective production after "lost time" has been deducted for such items as adjustments, turning, etc.

2/ The capacity of field machines in acres per hour was computed as follows:

(Machine width in inches) (Speed in MPH) (Field efficiency)

100

This formula does not allow for travel time to field and initial mounting or set-up time of equipment.

Source: Connor, Larry J. and Stephen B. Harsh. Unpublished data, Dept. of Agr. Econ., Michigan State University. January, 1971.

Table 19.

STANDARDS FOR CAPACITY OF SERVICE BUILDINGS

Ear Corn	2.5 cubic feet per bushel
Small Grain	1.25 cubic feet per bushel
Chopped Hay	200-250 cubic feet per ton
Baled Hay	200-275 cubic feet per ton
Baled Straw	400-450 cubic feet per ton
Corn Silage	40-55 cubic feet per ton
Hay Silage:	
40% wilted	85-95 cubic feet per ton
55% wilted	70-80 cubic feet per ton
High Moisture Corn	50-55 cubic feet per ton
Shavings	100 cubic feet per ton
Sawdust	200 cubic feet per ton
Dairy:	
free stall (including alleys)	50 square feet per cow
stanchions (including alleys)	75 square feet per cow
young heifer pens	30 square feet per animal
calf pens	15 square feet per animal
bulls	150 square feet per animal
Beef:	
dry lot feeding	2 square feet per 100 pounds
confined in building	3 square feet per 100 pounds
Swine:	
farrowing pen	60 square feet per sow
farrowing stall	35 square feet per sow
slatted floors (weaned pigs; 40-60#)	3 square feet per pig
feeder pigs (confined or with open front shelters with a feeding area, concrete)	
under 100 pounds	8 square feet per animal
100 pounds to market	12 square feet per animal
feeder pigs (confined; slatted floors)	
under 100 pounds	5 square feet per animal
100 pounds to market	8 square feet per animal
Sheep:	
ewes and rams	10-14 square feet per animal
ewes with lambs	12-16 square feet per ewe
feeder lambs	8-12 square feet per animal
Poultry:	
floor system	1.25 square feet per bird
cage system (alleys included)	
8" x 16" cage; 2 birds/cage	.9 square feet per bird

Source: Agricultural Engineering Department, Michigan State University.

Table 20.

FARM BUILDINGS, ANNUAL OWNERSHIP COST ESTIMATES

Item	Percent of Original Cost	
	Range	Average
Depreciation ^{1/}		
10 to 40 years estimated life	2.5-10.0	5.0
Interest		
6.0 to 10.0 percent	3.0-5.0	3.50
Upkeep		
Maintenance	1.0-4.0	2.50
Insurance		
Insured value 60% x \$0.45		0.15
Total Annual Ownership Costs		12.0%

^{1/} Depreciation rates vary depending on one's estimate of the lifetime usefulness of the building.

Source: Suter, R. C. "Farm Planning Props," Purdue University. February, 1967. P. 59. Adjusted for current conditions.

Table 21.

INVESTMENTS IN POULTRY HOUSING, 1964 COSTS

Poultry egg laying houses ^{1/}	Per bird or sq. ft.
5,000 birds (5,000 sq. ft.)	\$2.20 - 2.40
10,000 birds (10,000 sq. ft.)	2.15 - 2.35
25,000 birds (25,000 sq. ft.)	2.00 - 2.20
<u>Growing pullet houses</u>	<u>Per sq. ft.</u>
Housing	\$1.75 - 2.00
Equipment	0.75 - 1.00
Total	\$2.50 - 3.00

^{1/} Includes insulated egg holding room.

Source: Sheppard, C. C. and John Wolford. Unpublished material. Department of Poultry Science. Michigan State University.

Table 22. MATERIAL AND CONSTRUCTION COSTS FOR POLE BUILDINGS
ADJUSTED TO 1970 PRICES^{1/}

Building	Description	Cost/Sq. Ft.
Beef and dairy barn	Open front, outdoor lot	\$1.20 - 1.40
Dairy barn	Open lot, free stalls	1.40 - 2.00
Dairy barn	Cold covered, free stalls	1.60 - 2.50
Dairy barn	Warm enclosed, free stalls	1.75 - 2.75
Swine finishing barn	Completely closed, insulated, slotted floor	4.25 - 6.00
Swine finishing barn	Open one side, concrete floor inside and outside feeding floor	2.75 - 4.50
Swine farrowing barn	Completely closed, insulated, 4" concrete floor	6.50 - 7.00
Machine shed	Closed w/2 or more doors	1.75 - 2.25
Hay barns	Open all sides to 18' eave	1.00 - 1.20
Cold storage	Insulated, concrete floor	6.50 - 8.00

^{1/} Estimates based on galvanized steel siding w/2 oz. zinc coating. Add \$.10/sq. ft. if aluminum siding is desired.

Source: Høglund, C. R. Estimates obtained from Thornton Lumber and Supply Co., Williamston, Michigan. January, 1971.

Table 23. UNIT REQUIREMENTS AND COSTS FOR FREE-STALL DAIRY HOUSING

Item	Unit	Type of Housing	
		Open-Lot	Cold-Covered or Warm-Enclosed
Requirements per free stall			
Free-stall structure	square feet	50	100
Concrete alleys	square feet	20-25	70
Concrete lots	square feet	70-100	---
Feed bunk	linear feet	1/cow + 10 ft.	1
Mechanical feeder	linear feet	1/cow + 10 ft.	1
Free stalls	number	1 per cow	1 per cow
Cost per unit		<u>Dollars</u>	<u>Dollars</u>
Free stall structure (a)	square feet	1.40 - 2.00	1.60 - 2.75
Concrete alleys	square foot	.40	.40
Concrete lots	square foot	.40	---
Feed bunk	linear foot	15.00	10.00
Mechanical feeder	linear foot	15.00	15.00
Free stalls, steel	each	25.00	25.00
Insulation (b)	free-stall	---	45.00
Mechanical ventilation (b)	free-stall	---	38-40

(a) Clear span building with 6" x 6" pressure treated poles, 8' o.c., trusses 4' o.c., 28 GA steel, 2 oz. galvanized coating or 1" T & G lumber for sides, corrugated steel or aluminum roofing, sliding doors in alternative bays both front and back and 3 or 4, 10 foot-12 foot wide sliding doors.

(b) For warm-enclosed housing only.

Source: Hoglund, C. R., J. S. Boyd, and J. A. Speicher. Economics of Open-Lot Versus Covered Free-Stall Dairy Housing Systems. Mich. Agr. Expt. Sta. Res. Rep. 91, Michigan State University. June, 1970.

TABLE 24. SILAGE CAPACITY AND INVESTMENTS FOR MAJOR SIZES AND TYPES OF SILOS AND UNLOADERS USED FOR STORING AND UNLOADING CORN SILAGE AND HAYLAGE, 1970 PRICES, MICHIGAN 1/

Silo Type and Size (feet)	Silo Capacity 2/		Investment 3/						Total/Ton Capacity			
	Corn Silage	50% DM Haylage	Silo		Roof		Total Silo			Per Ton Capacity	Unloader	Total
			Dollars	Tons	Dollars	Dollars	Dollars	Dollars				
Concrete Tower	Tons	Tons	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	
14 x 50	200	130	3,200	300	3,500	17.50	1,350	4,850	24.25			
18 x 50	320	205	4,200	550	4,750	14.84	1,550	6,300	19.69			
20 x 50	394	252	4,850	650	5,500	14.00	1,600	7,100	18.02			
20 x 60	483	310	5,850	650	6,500	13.45	1,600	8,100	16.77			
20 x 70	574	367	6,850	650	7,500	13.07	1,600	9,100	15.85			
24 x 50	570	367	6,100	1,200	7,300	12.81	2,200	9,500	16.66			
24 x 60	697	446	7,300	1,200	8,500	12.20	2,200	10,700	15.35			
24 x 70	827	529	8,500	1,200	9,700	11.73	2,200	11,900	14.38			
26 x 60	818	524	8,800	1,400	10,200	12.47	2,250	12,450	15.22			
26 x 70	970	621	10,400	1,400	11,800	12.16	2,250	14,050	14.58			
30 x 60	1,087	696	11,200	2,400	13,600	12.51	2,400	16,000	14.72			
30 x 70	1,290	826	13,000	2,400	15,400	11.94	2,400	17,800	11.94			
36 x 70	2,000	1,280						22,500	11.25			
Sealed Storage												
20 x 50	375	240			12,400	33.00	2,600	15,000	40.00			
20 x 60	470	300			14,200	30.20	2,600	16,800	35.70			
25 x 65	820	525			22,800	27.80	4,000	26,800	32.70			
Other sizes												
Steel	600-1,000											
Concrete	500- 900											
Bunker 4/												
	500											
	1,000											
	2,000											
	4,000											

1/ Based on information from manufacturers and dairymen buying silos.

2/ Tons based on 32% dry matter corn silage and 50% dry matter haylage.

3/ Includes structure, foundation and roof for concrete and sealed tower silos, and concrete floor and tongue-and-groove treated plank sides and poles for bunker silo, and labor for constructing both types.

4/ Size of bunker should fit quantity of silage fed daily. The deeper the structure, the lower the investment per ton and the lower the storage loss.

Source: Hoglund, C. R. Unpublished Mimeo. Dept. of Agr. Econ., Michigan State University, January 1971.

TABLE 25. INVESTMENTS AND ANNUAL COSTS FOR HARVESTING, STORING AND HANDLING 500 TO 4,000 TONS CORN SILAGE, 1970 PRICES

	Tons Silo Capacity			
	500 (dollars)	1,000 (dollars)	2,000 (dollars)	4,000 (dollars)
<u>Concrete Tower Silos</u>				
<u>Investments</u>				
Harvesting and filling	5,400	6,700	9,500	18,000
Storage and feeding	9,600	17,100	29,800	59,400
Totals	15,000	23,800	39,300	77,400
Per/ton capacity	30.00	23.80	19.65	19.35
<u>Annual Costs</u>				
Harvesting and filling	1,080	1,340	1,900	3,600
Storage and handling				
Silos	715	1,320	2,640	5,280
Unloaders and loading	320	440	660	880
Feed bunks	300	480	720	1,400
Plastic cover	40	80	160	320
Storage loss	280	560	1,120	2,240
Subtotal	1,655	2,880	5,300	10,120
Total Annual Costs	2,735	4,220	7,200	13,720
Per ton preserved				
Harvesting and filling	2.35	1.45	1.03	0.98
Storage and handling	3.60	3.13	2.89	2.75
Total	5.95	4.58	3.92	3.73
<u>Bunker Silos</u>				
<u>Investments</u>				
Harvesting and filling	5,800	7,300	10,300	19,000
Storage and feeding ^{1/}	5,300	9,000	15,400	23,400
Totals	11,100	16,300	25,700	42,400
Per/ton capacity	22.20	16.30	12.85	10.60
<u>Annual Costs</u>				
Harvesting and filling	1,160	1,460	2,060	3,800
Storage and handling				
Silos	525	900	1,500	2,250
Unloaders and loading	240	360	600	720
Feed bunks and drive ^{1/}	110	220	440	880
Plastic cover	200	300	400	700
Storage loss	525	840	1,400	2,520
Subtotal	1,600	2,620	4,340	7,070
Total Annual Costs	2,760	4,080	6,400	10,870
Per ton preserved				
Harvesting and filling	2.73	1.66	1.15	1.04
Storage and handling	3.77	2.98	2.40	1.94
Total	6.50	4.64	3.55	2.98

^{1/} Includes investment of \$0.60 per ton and annual cost of \$0.10 per ton capacity for drive along perimeter of bunk area.

Source: Høglund, C. R. Mimeo. Dept. of Agr. Econ., Michigan State University, January 1971.

TABLE 26. CALCULATED ANNUAL COSTS PER TON PRESERVED TO STORE AND HANDLE
500 TO 4,000 TONS CORN SILAGE,
THREE TYPES OF SILOS, ONE COMPLETE FILL, TWO DEPRECIATION PERIODS

Tons Storage Capacity and Type of Silo	Percent Storage Loss Assumed	Annual Cost/Ton	
		Medium depreciation $\frac{1}{}$ period	Short depreciation $\frac{1}{}$ period
		Dollars	Dollars
<u>500 Tons Capacity</u>			
Sealed storage	4	5.45	6.73
Concrete tower	8	3.60	4.24
Bunker	15	3.77	4.17
<u>1,000 Tons Capacity</u>			
Sealed storage	4	5.32	6.60
Concrete tower	8	3.13	3.72
Bunker	12	2.98	3.32
<u>2,000 Tons Capacity</u>			
Sealed storage	4	4.76	5.99
Concrete tower	8	2.89	3.48
Bunker	10	2.40	2.68
<u>4,000 Tons Capacity</u>			
Sealed storage	4	4.76	5.99
Concrete tower	8	2.75	3.33
Bunker	9	1.94	2.15

$\frac{1}{}$ Medium depreciation period = 20 yrs. for sealed and concrete tower silos and 15 yrs. for bunker silos.

Short depreciation period = 10 yrs. for sealed and concrete tower silos and 8 yrs for bunker silos.

All unloading and loading equipment depreciated over 10 yrs. for both periods.

Source: Hoglund, C. R. Mimeo. Dept. of Agr. Econ., Michigan State University, January 1971.

TABLE 27. CALCULATED ANNUAL COSTS PER TON PRESERVED TO STORE AND HANDLE
HAYLAGE IN SEALED STORAGE AND CONCRETE TOWER SILOS, WHEN FILLED
VARIABLE TIMES, 500 TO 2,000 TONS STORAGE CAPACITY, MEDIUM DEPRECIATION PERIOD

Tons Storage Capacity $\frac{1}{}$ and Type of Silo	Percent Storage Loss Assumed	Annual Cost/Ton		
		Number of times silo filled		
		1	1 $\frac{1}{2}$	2
<u>500 Tons Capacity</u>				
Sealed storage	4	5.45	3.93	3.17
Concrete tower	11	4.00	3.08	
<u>1,000 Tons Capacity</u>				
Sealed storage	4	5.32	3.84	3.09
Concrete tower	11	3.51	2.80	
<u>2,000 Tons Capacity</u>				
Sealed storage	4	4.76	3.40	2.72
Concrete tower	11	3.25	2.60	

$\frac{1}{}$ Based on 32% DM Corn silage.

Source: Hoglund, C. R. Mimeo. Dept. of Agr. Econ., Michigan State University, January 1971.

TABLE 28. ESTIMATED CUBIC FEET OF SPACE NEEDED TO STORE CORN OF DIFFERENT MOISTURE CONTENTS

Kernel moisture content	Shelled Corn		Ear Corn		
	Weight per bushel	Cubic feet per bushel	Weight per bushel	Cubic feet per bushel	
				Whole	Ground
(percent)	(pounds)		(pounds)		
15.5	56.0	1.25	70.0	2.50	1.94
20.0	59.2	1.30	76.5	2.60	2.05
25.0	63.1	1.36	84.4	2.72	2.18
30.0	67.6	1.44	92.0	2.88	2.30

TABLE 29. SILO CAPACITIES PER FOOT OF HEIGHT FOR SPECIFIED MOISTURE CONTENTS OF SHELL CORN AND INSIDE DIAMETERS OF SILOS

Moisture content	Weight to yield standard bushel	Approximate volume to yield standard bushel	Approximate capacity per foot of silo height for inside diameters of:						
			14'	16'	17'	18'	20'	22'	24'
(percent)	(pounds)	(cubic feet)	(bushels dry corn)						
15.5	56.0	1.25	123	161	181	203	251	304	362
20.0	59.2	1.30	118	155	174	196	242	292	348
25.0	63.1	1.36	113	148	167	187	231	279	333
30.0	67.6	1.44	107	140	158	177	218	264	314
35.0	72.8	1.52	101	132	149	167	206	250	291

Source: Høglund, C. R. Unpublished material adapted from data from V. W. Davis, Farm Production Economics Research Division, USDA, January 1971.

TABLE 30. SILO CAPACITIES PER FOOT OF HEIGHT FOR SPECIFIED MOISTURE CONTENTS OF GROUND EAR CORN AND INSIDE DIAMETERS OF SILOS

Moisture content			Approximate volume to yield standard bushel (cubic feet)	Approximate capacity per foot of silo height for inside diameters of 2/						
Kernel (%)	Cob 1/ (%)	Ear corn (%)		14'	16'	17'	18'	20'	22'	24'
15.5	18	16.0	1.94	80	105	117	131	162	196	233
18.0	26	19.7	2.00	77	101	113	127	157	190	226
20.0	34	23.2	2.05	75	98	111	124	153	185	221
22.0	40	26.3	2.10	73	96	108	121	150	181	215
24.0	44	29.0	2.15	71	94	105	118	146	177	210
26.0	48	31.6	2.20	70	92	103	116	143	173	206
28.0	51	34.0	2.25	69	89	101	113	140	169	201
30.0	53	36.1	2.30	67	87	99	110	137	165	197
32.0	54	38.2	2.34	66	85	97	108	134	162	193

1/ Cob moisture rounded to the nearest whole percent.

2/ All capacities are for equivalent standard bushel of 15.5 percent moisture content and 56 pounds.

Source: Hoglund, C. R. Ibid.

TABLE 31. CAPACITIES OF BINS AND CRIBS IN DRY GRAIN AND CONVERSION
OF HIGH MOISTURE FORAGE TO DRY HAY EQUIVALENT

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 x radius x 3.1416 x height.

Then 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 corn.

Converting High Moisture Forage to Dry Hay Equivalent

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

Hay or Forage	Percent Moisture	Dry Hay/Ton
Green chop	88	.25 tons
Grass silage	70	.34
Grass silage	65	.40
Haylage	60	.45
Haylage	50	.57
Haylage	40	.68

TABLE 32. ESTIMATED NEW COST OF SELECTED ITEMS OF FEED HANDLING EQUIPMENT

Item	Description	Unit	New cost per unit (dollars)
<u>Auger conveyor, w/o motor</u>	Flighting, tub, power head	Per foot per inch of diameter	1.20
<u>Auger feeder</u>	9-inch diameter Maximum 100-125 ft., 5 HP	Per foot Each	9.00-11.00 400-700
Auger and tube ^{1/} Drive unit and motor			
<u>Auger unloader</u>	Sweep auger, dry grain slat bottom bin Sweep auger, high- moisture grain	Each Each	175-250 1,200-2,500
<u>Electric motors</u>	From 1/4 to 5.0 HP, use higher price for small and/or highest quality motor	Per HP	80-130
<u>Ensilage loader</u>	For bunker silos tractor mounted	Each	1,800
<u>Feed blower</u>	5 HP motor, fan 4-inch diameter	Each Per foot	450-700 1.20
Blower			
Pipe			
<u>Feed grinder</u>	PTO operated, 200 to 300 bushels ear corn per hour	Each	650-1,000
<u>Feed meter</u>	Trip bucket	Each	150-275
<u>Roller mill</u>	6" x 8" rollers, 3 HP motor, 150 bushels high-moisture shelled corn per hour	Each	900-1,100
<u>Self-unloading wagon</u>	For grain only, tractor drawn For grain or silage, tractor drawn	Each Each	600-900 1,500-2,800
<u>Waterer</u>	Watering unit with heater installed, 75 cattle maximum	Each	175-250

^{1/} Allow minimum of 12 feet of auger in addition to feeding space needed.

Source: Adopted from data by Roy Van Arsdall, Farm Production Economics Division, USDA, 1971.

TABLE 33. SEEDING RATES, COSTS, AND PLANTING DATES
FOR MAJOR CROP ENTERPRISES IN MICHIGAN

Crop	Seeding Rate (lbs.)	lbs./bu.	Cost/Unit	Planting Dates
Corn for grain ^{1/}	10-16	56	\$14.00/bu.	May 1 - June 1
Corn for silage	10-16	56	14.00/bu.	May 1 - June 1
Wheat	90-120	60	2.50/bu.	Sept. 10 - 25
Oats	64-80	32	1.60/bu.	April 1 - May 1
Soybeans ^{2/}	45-60	60	4.10/bu.	May 20 - June 10
Field beans				
navy	30-45	60	15.00/cwt.	May 25 - June 25
kidney	80	60	30.00/cwt.	June 1 - 15
cranberry	60	60	28.00/cwt.	June 1 - 15
Sugar beets	1/2 - 1 1/4	--	1.00/lb.	April 15 - May 30
Rye	56-84	56	2.00/bu.	Sept. 10 - Oct. 1
Alfalfa ^{3/}	6-10	60	69.50/cwt.	June 15 - Aug. 20 or with spring small grains
Ladino clover ^{4/}	1-2	60	125.00/cwt.	with spring small grains
Red clover ^{3/}	6-10	60	53.00/cwt.	with spring small grains
Bromegrass (in legume mixture)	3-5	14	28.00/cwt.	with fall small grains

^{1/} Seeding rate depends on soil productivity.

^{2/} Rate given is for planting in rows. If planted solid, use 90-120 lb. per acre.

^{3/} Rate given is for seeding alone or in a grass mixture.

^{4/} Rate given is for seeding alone. Use 1/2 lb. in alfalfa-brome mixture.

Source: Hildebrand, S. C. Seeding Practices for Michigan Crops. Ext. Bul. 489, Coop. Ext. Ser., Michigan State University, March 1965. Supplemented with cost estimates from unpublished data, Dept. of Agr. Econ., Michigan State University, January 1971.

Table 34.

A GUIDE FOR ESTIMATING TOTAL POUNDS AND COSTS OF NITROGEN (N) FERTILIZER
NEEDED BY FIELD CROPS, AS AFFECTED BY PREVIOUS MANAGEMENT ^{1/2}

Crop and Field Goal Maintenance	Legumes and 10 Tons of Manure per Acre		Good Legumes - No Manure		10 Tons of Manure Per Acre		No Legumes - No Manure					
	Pounds of Nitrogen Required Per Acre	Cost of Application Ammonia Urea Fertilizer 8c/lb. 7c/lb. 9c/lb.	Pounds of Nitrogen Required Per Acre	Cost of Application Ammonia Urea Fertilizer 8c/lb. 7c/lb. 9c/lb.	Pounds of Nitrogen Required Per Acre	Cost of Application Ammonia Urea Fertilizer 8c/lb. 7c/lb. 9c/lb.	Pounds of Nitrogen Required Per Acre	Cost of Application Ammonia Urea Fertilizer 8c/lb. 7c/lb. 9c/lb.				
									Pounds of Nitrogen Required Per Acre	Cost of Application Ammonia Urea Fertilizer 8c/lb. 7c/lb. 9c/lb.		
Corn	0	---	10	.80	30	2.40	2.10	2.70	70	5.60	4.90	6.30
10-89 bu.	0	---	40	3.20	60	4.80	4.20	5.40	100	8.00	7.00	9.00
120-149 bu.	40	3.20	80	6.40	110	8.80	7.70	9.90	150	12.00	10.50	13.50
150-180 bu.	80	6.40	120	9.60	160	12.80	11.20	14.40	200	16.00	14.00	18.00
Sugar Beets	10	.80	10	.80	50	4.00	3.50	4.50	90	7.20	6.30	8.10
Small Grains	10	.80	10	.80	30	2.40	2.10	2.70	50	4.00	3.50	4.50
Late Potatoes	20	1.60	60	4.80	90	7.20	6.30	8.10	130	10.40	9.10	11.70
250-349 Oct. Beans-Soybeans	0	---	10	.80	10	.80	.70	.90	40	3.20	2.80	3.60

^{1/} If the season is cool and wet or the field is poorly drained, it is usually necessary to apply larger quantities of nitrogen than indicated above.

^{2/} Corrections for growing Continuous Corn are on the following page.

Source: Fertilizer Recommendations for Vegetables and Field Crops in Michigan, Ext. Bul. E-550, Coop. Ext. Serv., Michigan State University, February, 1970. Supplemented with cost estimates taken from unpublished data, Dept. of Agr. Econ., Michigan State University, January, 1971.

Table 35.

CORRECTIONS FOR GROWING CONTINUOUS CORN

Credit (subtract figure at right from total N recommended)	Pounds of N per acre
4-8% soil organic matter	20
over 8% soil organic matter	40
150 to 200 pounds of nitrogen applied to previous crop	40
each 5 tons of manure applied	20
crop failure--each 40 lb. N applied	20
 Adverse conditions (add figure at right to total N recommended)	
0-2% organic matter	20
corn removed for silage	50
less than 40 pounds of nitrogen applied to previous crop	20

Source: Fertilizer Recommendations for Vegetable and Field Crops in Michigan.
Ext. Bul. E-550, Coop. Ext. Sec., Michigan State University. February,
1970.

Table 36. PHOSPHATE--PHOSPHORUS RECOMMENDATIONS AND COSTS FOR FIELD CROPS GROWN ON MINERAL SOILS.

	Available soil phosphorus ^{2/} —pounds of P per acre based on a soil test		lbs/acre recommended	Cost P ₂ O ₅ Per Acre ^{1/}
	P ₂ O ₅	P		
0-29	0-19	0-19	250	\$25.00
30 +	20-39	20-39	200	20.00
	40 +	40-69	150	15.00
		70-99	100	10.00
		100 +	75	7.50
		150 +	50	5.00
		250 +	25	2.50
Alfalfa 4 ton (top-dressing)	Alfalfa 6 ton (seeding)	Corn 150 ⁴ bu.	Sugar beets 24-28 ton	Potatoes ^{6/} 250-350 cwt.
Alfalfa 3 ton (seeding)	Alfalfa 4 ton (seeding)	Corn Silage 18-23 ton		
Buckwheat	Barley	Corn 70-100 bu.		
Clover	Corn	Sugar beets 18-23 ton		
Corn	Corn Silage	Wheat 50-70 bu.		
60-89 bu.	80-119 bu.	15-19 ton		
Cover crops	Field beans	Wheat		
Field beans	30-50 bu.			
15-29 bu.	Oats	30-49 bu.		
	80-120 bu.			
50-79 bu.	Sudan Grass			
Pasture				
Eye				
Soybeans				
30-50 bu.				

Footnotes on last page of Table 37.

To use this table look for the crop to be grown showing the nearest yield potential. Then find the position of the soil test range in the overlying column of figures. To determine the phosphate (P₂O₅) needed, follow dotted line to the appropriate column on the right side.

EXAMPLE: Crop to be grown--corn, yield goal of 110 bu. per acre.
Soil test--28 pounds of P per acre
Recommendation--50 pounds of P₂O₅ per acre.

Table 37. POTASH--POTASSIUM RECOMMENDATIONS AND COSTS FOR FIELD CROPS GROWN ON LOAMS - CLAY LOAMS AND CLAYS^{2/}

		Available soil potassium ^{4/} —pounds of K per acre based on a soil test				K ₂ O		K	Cost per acre K ₂ O 7/	
		Less than 60	60-99	100-139	140-179	Less than 60	60-109			
Less than 60	60-99	Less than 60	60-99	100-139	140-179	180-219	220 +	.250	.208	.12.30
60-99	100-149	100-139	140-179	180-219	220-239	---	300 +	.200	.166	10.00
100-179	150-199	140-179	180-219	220-239	---	---	---	.150	.125	7.50
180 +	200 +	220 +	240 +	---	---	---	---	.100	.83	5.00
								.75	.62	3.75
								.50	.42	2.50
								.25	.21	1.25
								.0	.0	0
Barley	Barley	Alfalfa	Corn	Corn	Potatoes ^{6/}					
40-69 bu.	70-100 bu.	3-4 ton	150 + bu.	150 + bu.	250-300 cwt.					
Buckwheat	Clover	Corn	Corn Silage	Corn Silage	Alfalfa					
Corn	Corn	120-149 bu.	20-30 ton	20-30 ton	5-6 ton					
60-89 bu.	90-119 bu.	Corn Silage	Sugar beets	Sugar beets						
Cover crops	Corn Silage	15-19 ton	24-28 ton	24-28 ton						
Field beans	10-14 ton	Sugar beets								
15-29 bu.	Soybeans	18-23 ton								
Oats	50 + bu.	Wheat								
30-79 bu.	Field beans	50-70 bu.								
Pasture	30-50 bu.									
Rye	Oats									
Soybeans	80-120 bu.									
30-50 bu.	Sudan grass									
	Wheat									

1
6
1

To use this table, look for the crop to be grown showing the nearest yield potential. Then find the position of the soil test range in the overlying column of figures. To determine the potassium (K₂O) needed, follow dotted line to the appropriate column on the right side.

Example: To raise 110 bu. corn per acre with a soil test of 120 pounds of K per acre, the recommendation calls for 50 pounds of K₂O per acre, to be added.

Footnotes on last page of Table 37.

Table 38. POTASH POTASSIUM RECOMMENDATIONS AND COSTS FOR FIELD CROPS GROWN ON SANDY LOAMS AND LOAMY SANDS^{1/2}

	Available soil potassium ^{3/} —pounds of K per acre — based on a soil test		Pounds/Acre Recommended		Cost K ₂ O Per ^{1/} Acre ^{2/}
	Less than 60	More than 60	K ₂ O	K	
Less than 60	Less than 60	Less than 60	Less than 60	•	•
60-89	60-89	60-89	60-99	•	•
90-149	90-119	120-159	100-149	•	•
150-199	120-159	160-189	150-199	•	•
200 +	160-189	190-219	200-249	•	•
Barley	200-239	220-259	250-299	•	•
40-69 bu.	240 +	260 +	300-399	•	•
Buckwheat	Alfalfa	Corn	400 +	•	•
60-89 bu.	3-4 ton	Corn silage	Potatoes ^{6/}	•	•
Field beans	Corn	Sugar beets	250-350 cwt.	•	•
15-29 bu.	Corn	24-29 ton	Alfalfa	•	•
Oats	Corn silage	24-29 ton	5-6 ton	•	•
50-79 bu.	15-19 ton	Footnotes			
Pasture	10-14 ton	1/ Available soil phosphorus determined by Bray P. method.			
Rye	18-23 ton	2/ Available soil potassium determined by the 1N ammonium acetate method or 0.13 N hydrochloric acid method.			
Soybeans	Wheat	3/ If no test is made and the soil is probably low in phosphorus, use the recommendations shown for a test of 25 pounds of P per acre.			
30-50 bu.	30-49 bu.	4/ If no test is made and the soil is probably low in potassium, use the recommendation shown for a soil test of 130 pounds of K per acre.			
	Soybeans	5/ If no soil test is made and the soil is probably low in potassium, use the recommendation for a soil test of 80 pounds of K per acre.			
	50 + bu.	6/ For a yield of 400 cwt., increase recommendation 20%.			
		7/ Costs are based on P ₂ O ₅ @ 10c/pound and K ₂ O ₅ @ 5c/pound.			

Source: Fertilizer Recommendations for Michigan Vegetables and Field Crops. Ext. Bul. E-550, Coop. Ext. Ser., Michigan State University. February, 1970.

Table 39. AVERAGE AMOUNTS OF NITROGEN, PHOSPHORUS, AND POTASSIUM,
AND THE COMBINED VALUE OF MANURES FROM DIFFERENT FARM ANIMALS

Kind of Manure	% Water	Pounds Per Ton of Manure					Value ^{1/} Per Ton ^{1/} (dollars)
		N	P	P ₂ O ₅	K	K ₂ O	
Chickens-							
From dropping boards, without litter	54	31	8	18	7	8	5.30
With old floor litter ^{2/}	61	34	12	28	13	15	6.95
Dairy cattle	79	11	2	5	10	12	2.20
Fattening Cattle	80	14	4	9	9	11	2.85
Hogs	75	10	3	7	8	10	2.20
Horses	60	14	2	5	12	14	2.60
Sheep	65	28	4	9	20	24	4.90

Manure Availability

Approximately 8 tons of manure is available per animal unit per year for use on fields.

One Animal Unit Equals

1 cow	7 ewes or bucks
1 horse	20 lambs raised
2 heifers	2.5 brood sows or boars
4 calves	5 hogs raised to 200 lb.
1 bull or steer	100 hens
2 feeding cattle	250 pullets raised

^{1/} Calculated on the assumption that the present retail costs per pound are as follows:
N - 10 cents; P₂O₅ - 10 cents; K₂O₅ - 5 cents.

^{2/} Probably contained some feed residues.

Source: Fertilizer Recommendations for Michigan Vegetables and Field Crops, Ext. Bul. E-550, Coop. Ext. Ser., Michigan State University, February, 1970.

Table 40. CHEMICAL INPUTS AND COSTS PER ACRE FOR MAJOR CROP ENTERPRISES IN SOUTHERN MICHIGAN

Crop	Chemical	Pounds/Acre ^{1/}	Time of Application	Weeds Controlled ^{2/}	Cost/Unit \$	Cost/Acre \$
Corn	2, 4-D (amine)	1/2	Postemergence	3 road-leaved annuals	3.15/gal.	.39
Corn	Atrazine (Aatrex)	2	Preemergence or Pre-plant	Annual grasses except fall Panicum, witch- grass and renbymar, and broad leaved annual weeds	2.50/lb.	6.25
Oats (without seeding)	2, 4-D (amine)	1/4	Fully tillered	Broad leaved annuals	3.15/gal.	.20
Oats	MCPA	3/8	Fully tillered	Broad leaved annuals	7.66/gal.	.72
Soybeans	Amibew	3	Preemergence	Annuals	9.30/gal.	13.95
Field beans	EPTC (Eptam)	3	Before planting	Annuals	13.75/gal.	6.87
Alfalfa (established stand)	MCPA	1/2	Late fall	Yellow rocket Broad leaved winter annuals	7.66/gal.	.96
Sugar beets	Pyrazon (Pyramin) Plus TCA	4 plus 6	At planting	Annuals	5.50/lb. .44/lb.	22.00 2.64

^{1/} Rate given is pounds of active ingredient per acre.

^{2/} There are exceptions and additions to all weeds listed. For further information see listed source.

Source: Meggitt, William F., Weed Control in Field Crops. Ext. Bul. E-434, Coop. Ext. Ser., Michigan State University. May 1, 1970. Costs supplemented from information obtained from local suppliers.

Table 41. ESTIMATED TOTAL LABOR REQUIREMENTS PER ACRE FOR SELECTED CASH-GRAIN CROPS, FOR VARIOUS ACREAGES IN ENTERPRISE

Crop	Total acres of Enterprise			
	160	320	480	640
	(Hours Per Acre)			
Corn	6.50	5.47	4.95	4.61
Oats	4.52	3.56	3.10	2.81
Alfalfa	10.84	9.89	9.37	9.02
Wheat	4.41	3.52	3.09	2.81
Soybeans	5.10	4.01	3.48	3.15

Source: Armstrong, D. Unpublished Data, Dept. of Agr. Econ., Michigan State University, 1971. Estimates are based on a Cobb-Douglas function.

Table 42. ESTIMATED MAN-HOURS PER ACRE FOR PRODUCING VEGETABLES AND FRUITS
UNITED STATES, 1964-68 and 1975

Vegetables and Fruits	Man-hours Per Acre				
	Harvest		Total		1975
	1964-68	1975	1964-68	1975	
	Hours	Hours	Hours	Hours	
Apples	68	64	126		112
Fresh	----	67	----		115
Processing	----	62	----		110
Peaches	67	49	166		134
Cling	----	35	----		120
Others	----	65	----		150
Pears	70	69	198		189
Cherries	260	54	283		77
Tart	----	12	----		35
Sweet	----	135	----		158
Strawberries	598	486	729		606
Potatoes	26	11	45		26
Tomatoes, Total	78	51	118		86
Fresh	103	79	155		----
Processing	65	37	100		----
Corn, Sweet	12	7	22		15
Fresh	30	13	45		----
Processing	4	4	11		----
Lettuce	60	38	105		78
Onions	70	41	120		86
Carrots	70	50	100		77
Cucumbers	70	37	110		73
Beans, Snap	36	5	50		15
Fresh	120	----	132		----
Processing	8	----	23		----
Grapes	50	38	95		76
Table	----	49	----		87
Wine	----	27	----		65

Source: Davis, Velmar W. "Labor or Capital - The Road Ahead," Chapter in Fruit and Vegetable Harvest Mechanization, B. F. Cargill and G. E. Rossmiller, Editors, Rural Manpower Center Report No. 17, Michigan State University, 1969.

Table 43. CLASSIFICATION OF MAJOR SOILS IN SOUTHERN MICHIGAN--
SPECIFICATIONS, EXAMPLES AND LOCATIONS

Soil Group ^{1/}	Major Soil Management Group ^{2/}	Representative Soil Series	Location in State ^{3/}
S ₁	Loams--Clay loams-- 2c	Sims, Brookston	Saginaw Valley, Thumb, & Southeast
S ₂	Loams--Clay loams-- 2a, 2b	Miami, Conover	South Central
S ₃	Sandy loams--3a	Hillsdale, Fox, Warsaw	South Central
S ₄	Loamy sands--4a	Montcalm, Coloma	Central

^{1/} The soil groups are broad, general groupings of soils with similar yield potentials, when inputs and production practices are similar.

^{2/} The soil management groups are explained in more detail in: Fertilizer Recommendations for Michigan Vegetables and Field Crops, Michigan State University, Extension Bulletin E-550, Feb. 1970.

^{3/} For general locations of soils, see Soils of Michigan, Michigan State University Spec. Bulletin 402, December 1959. More detailed County Soil Survey Reports show the distribution of soil series on individual farms. These are published cooperatively by the Michigan Agricultural Experiment Station, and the U.S. Department of Agriculture.

Table 44. ESTIMATED YIELDS PER ACRE FOR MAJOR CASH CROPS, BY SOIL GROUP, SOUTHERN MICHIGAN^{1/}

Crop	Unit	Soil Group ^{2/}			
		S ₁	S ₂	S ₃	S ₄
		(Loam-Clay loam)	(Loam-Clay loam)	(Sandy loam)	(Loamy Sand)
Corn	bu.	110	85	75	65
Wheat	bu.	59	45	38	29
Oats	bu.	90	65	53	45
Soybeans	bu.	36	28	25	22
Field beans	bu.	29	23	20	--
Alfalfa	ton	4.2	3.2	2.8	2.5
Sugar beets	ton	18	--	--	--

^{1/} Yield estimates are expected values based on harvested acreages and non-irrigated land. Above average management is assumed.

^{2/} See Table 43 for specifications of soil groups.

Source: Connor, L.J., Ibid.

Table 45.

SUMMARY OF ESTIMATED ANNUAL COSTS PER ACRE,
BY SOIL GROUPS, FOR MAJOR CASH CROPS IN SOUTHERN MICHIGAN^{1/}

Item	Total Variable Cash Costs ^{2/}	Total Overhead Costs ^{2/}	Total Costs
	(dol.)	(dol.)	(dol.)
S₁ Land (Loam-Clay Loam):			
Corn	37.68	52.92	90.60
Wheat	25.61	48.86	74.47
Oats	22.47	48.62	71.09
Soybeans	23.11	48.98	72.09
Field beans	24.42	51.45	75.87
Alfalfa	22.99	51.22	74.21
Sugar beets	86.16	57.92	144.08
S₂ Land (Loam-Clay Loam):			
Corn	32.30	31.23	63.53
Wheat	23.78	29.58	53.36
Oats	20.66	29.37	50.03
Soybeans	22.06	29.72	51.78
Field beans	23.49	32.20	55.69
Alfalfa	19.99	31.97	51.96
S₃ Land (Sandy Loam):			
Corn	28.06	24.90	52.96
Wheat	22.28	26.27	48.55
Oats	18.22	24.08	42.30
Soybeans	20.04	24.44	44.48
Field beans	21.47	26.92	48.39
Alfalfa	17.04	26.68	43.72
S₄ Land (Loamy Sands):			
Corn	26.37	24.08	50.45
Wheat	21.26	22.44	43.70
Oats	17.25	22.34	39.59
Soybeans	19.30	22.67	41.97
Alfalfa	16.14	24.93	41.07

^{1/} See Table 43 for a more detailed description of the soil groups, and Table 44 for the assumed yields.

^{2/} Includes seed, fertilizer, power and machinery, repairs, and hired labor.

^{3/} Overhead costs include machinery ownership, real estate taxes; and charges for the land investment, operator and family labor, and operating capital.

Source: Connor, Larry J., Ibid.

ESTIMATED ANNUAL PRODUCTION
 COSTS OF SELECTED FRUITS AND VEGETABLES,
 MICHIGAN ^{1/}

Crop	Costs Per Acre		Total
	Variable	Fixed (Dollars)	
Apples	471.56	151.61	623.17
Asparagus-Mach. Cart Harv.	118.37	108.88	227.25
Tart Cherries	181.62	196.01	377.63
Peaches	359.21	212.31	571.52
Pears	401.34	172.76	574.10
Plums	297.17	156.64	453.81
Pickling Cucumber-Hand Harvest	335.03	47.52	382.55
Pickling Cucumber-Machine Harvest	230.72	24.94	255.66
Strawberries-Fresh (w/2 yrs. production)	3548.32	497.60	4045.92
Strawberries-Proc. (w/2 yrs. production)	2933.51	367.41	3200.92
Tomatoes-Fresh	976.12	111.34	1087.46
Tomatoes-Proc.	570.90	81.41	652.31

^{1/} Cost estimates are based on a series of assumptions (eg. yield, acreage, etc.) which are stated in detail in cost studies on these commodities by S. B. Harsh and M. P. Kelsey, Department of Agricultural Economics, Michigan State University.

Table 47.

BUSINESS ANALYSIS SUMMARIES
CASH GRAIN FARMS, MICHIGAN, 1969

Items	Farms with less than 400 tillable acres	Farms with more than 400 tillable acres
Number of Farms	15	17
Investment, Total	\$147,672	\$303,167
Land	102,345	228,172
Improvements	14,386	24,571
Machinery	15,938	32,422
Livestock	220	652
Feed and crops	14,781	17,347
• Tillable Acres	293	668
Number of Men	0.8	1.3
Corn yield, bushels/acre	80	97
• Wheat yield, bushels/acre	47	46
Navy Bean yield, cwt./acre	12.5	12.1
Soybean yield, bushels/acre	30	30
<u>Operator's Income</u>		
Crops	\$ 19,368	\$ 39,079
Livestock	24	-134
Custom Work	497	4,181
Government Payments	2,611	6,433
Other Income	195	745
Less Purchased Feed	-40	-50
Value of Farm Production	<u>\$ 22,655</u>	<u>\$ 50,254</u>
<u>Operator's Cost</u>		
Operator's Labor	\$ 3,744	\$ 4,136
Family Labor	639	2,394
Hired Labor	1,128	2,257
Machinery (Includes custom hire)	7,067	13,199
Improvements	2,088	3,485
• Crop Expense	4,885	11,825
Livestock Expenses	3	11
Taxes	1,176	1,642
• Other Expenses	772	1,519
Cash Rent	907	5,287
Interest Paid	2,976	4,402
Interest on Owned Assets	3,772	7,407
Total Costs	<u>29,157</u>	<u>57,564</u>
Management Income	\$ -6,502	\$ -7,310
Labor Income	-2,758	-3,174
Rate earned on invest.	0.2%	2.2%

Source: Harsh, Stephen B. Telfarm: Business Analysis Summary For Cash Grain Farms, 1969.
Agr. Econ. Rep. No. 171, Dept. of Agr. Econ., Michigan State University, August,
1970.

Table 48.

BUSINESS ANALYSIS SUMMARIES
SAGINAW VALLEY CASH CROP FARMS, MICHIGAN, 1969

Items	Farms with less than 400 tillable acres	Farms with more than 400 tillable acres
Number of Farms	28	22
Investment, Total	\$219,540	\$466,604
Land	164,877	359,969
Improvements	20,388	35,983
Machinery	18,329	35,634
Livestock	-----	295
Feed and crops	15,946	34,723
Tillable Acres	292	666
Number of Men	1.1	2.2
Corn yield, bushels/acre	96	102
Wheat yield, bushels/acre	54	48
Navy Bean yield, cwt./acre	16.3	17.1
Sugar Beet yield, Tons/acre	17.8	17.7
<u>Operator's Income</u>		
Crops	\$ 32,267	\$ 71,109
Livestock	50	166
Custom Work	3,828	4,126
Government Payments	1,227	1,972
Other Income	181	341
Less Purchased Feed	-28	-40
Value of Farm Production	\$ 37,525	\$ 77,674
<u>Operator's Cost</u>		
Operator's Labor	\$ 4,202	\$ 5,245
Family Labor	862	5,100
Hired Labor	1,715	3,562
Machinery (Includes custom hire)	8,766	18,152
Improvements	2,118	4,261
Crop Expense	7,406	16,078
Livestock Expenses	12	4
Taxes	1,485	3,258
Other Expenses	732	1,578
Cash Rent	1,358	4,762
Interest Paid	1,882	5,807
Interest on Owned Assets	6,332	11,522
Total Costs	\$ 36,870	\$ 79,329
Management Income	\$ 655	\$ -1,655
Labor Income	4,857	3,590
Rate earned on invest.	5.8%	5.0%

Source: Harsh, Stephen B. Telfarm: Business Analysis Summary For Saginaw Valley Cash Crop Farms, 1969. Agr. Econ. Rep. No. 170, Dept. of Agr. Econ., Michigan State University, August, 1970.

Table 49.

LABOR NEEDS ON LIVESTOCK

Kind of Livestock	No. of Head	Hours Per Head (In Year)
<u>Dairy cows</u>	30	90
	60	70
	100	60
	200	50
Youngstock		20
<u>Beef cows</u>	Under 50	15
	50-99	10
	100 & over	7
Youngstock		7
<u>Cattle feeding (dry-lot)</u>		
calves (9 mos.)	Under 100	14 (Hours in feeding period)
	100-299	8
	300 & over	6
Yearlings (5 mos.)	Under 100	8 (Hours in feeding period)
	100-299	4
	300 & over	3
<u>Hogs</u>		
Sow and 2 litters until finished	Under 20 sows	45
	20-29 sows	40
	40 & over sows	35
Finishing feeder pigs (40# to 220#)		2
<u>Laying Flock</u>	Under 500 hens	150 per 100 hens
	500-999	100 per 100 hens
	1000-1999	75 per 100 hens
	2000 & over	60 per 100 hens
Raise pullets from baby chicks		60 per 100

Source: Wright, K. T. Unpublished data. Dept. of Agr. Econ. Michigan State University. January, 1971.

Table 50.

ANNUAL LIVESTOCK FEED ESTIMATES^{1/}

Kind of Livestock	My No. of Head	Grain ^{2/}		Protein Supplement		Roughage ^{3/}		Pasture ^{4/}	
		Per Head	My Total	Per Head	My Total	Per Head	My Total	Per Head	My Total
		Lbs.	Lbs.	Lbs.	Lbs.	Tons	Tons	Acres	Acres
Dairy Herd									
Cow (10,000 lb. prod.)		3200		450		5.5		0	
(13,000 lb. prod.)		4000		550		5.5		0	
Youngstock		800		150		3.0		0	
Beef Herd									
Cow (and calf to 8 mos.)		100		25		2.4		2-5	
Bull		320		35		3.0		2-5	
Yearling heifer		670		0		1.5		1-2	
Heifer calf		320		0		1.2		0	
Feeder Cattle^{5/}									
Calf (450 lb. to 1000 lb.)		2250		300		1.5		0	
Yearling (700 lb. to 1100 lb.)		2000		200		1.2		0	
Hogs									
Sow or boar		2800		500		0		0	
Pig (40 lb. to 220 lb.)		650		80		0		0	
Sheep									
Ewe (and lamb to 60 lb.)		140		20		.30		.3	
Poultry									
Layer (210 eggs prod.)		60		20		0		0	
Pullet (chicks to 21 wks.)		15		5		0		0	
TOTAL NEEDED	XXX	XXX		XXX		XXX			
TOTAL PRODUCED	XXX	XXX		XXX		XXX			
TO BE PURCHASED	XXX	XXX		XXX		XXX			

^{1/} Disappearance of grain and roughage would probably be at least 10 percent higher than these figures, due to waste and shrinkage.

^{2/} Corn equivalent (corn-cob meal for dairy, shelled on other livestock). Figure 2 bu. oats, 1 1/2 barley, or 1 bu. wheat equal to 1 bu. corn.

^{3/} Roughage includes both silage and hay, and is in hay equivalent. Three tons of corn or grass silage equal to 1 ton hay.

^{4/} Pasture acres depends on quality of pasture.

^{5/} When on dry-lot feeding.

Source: K. T. Wright. *Ibid.*

Table 51. COSTS OF GROWING, HARVESTING AND STORING CORN SILAGE

Item	Tons Per Acre				
Harvested yield	12.0	14.0	16.0	18.0	20.0
Net available for feeding	11.2	13.0	14.9	16.7	18.6
			(Dollars)		
Fixed Costs per acre					
Land	32.00	32.00	32.00	32.00	32.00
Herbicide material and application	6.00	6.00	6.00	6.00	6.00
Labor and machinery to grow	12.50	12.50	12.50	12.50	12.50
Total fixed costs	50.50	50.50	50.50	50.50	50.50
Variable Costs per acre					
Seed	2.80	3.00	3.20	3.40	3.60
Fertilizer	15.00	17.00	19.00	21.00	23.00
Harvest, haul and fill silos	18.00	21.00	24.00	27.00	30.00
Store	14.40	16.80	19.20	21.60	24.00
Total variable costs	50.20	57.80	65.40	73.00	80.60
Total all costs					
Per acre	100.70	108.30	115.90	123.50	131.10
Per ton fed (32% D.M.)	9.00	8.33	7.77	7.40	7.05

Source: Høglund, C. R. Unnumbered Mimeo Reports. Dept. of Agr. Econ., Michigan State University. January, 1971.

Table 52. COSTS OF GROWING, HARVESTING AND STORING ALFALFA HAY

Item	Tons Per Acre				
Harvested yield	3.0	4.0	5.0	6.0	7.0
Net available for feeding	2.8	3.7	4.6	5.5	6.4
			(Dollars)		
Fixed Costs per acre					
Land	32.00	32.00	32.00	32.00	32.00
Herbicide material and application	10.00	10.00	10.00	10.00	10.00
Labor and machinery to grow	6.50	6.50	6.50	6.50	6.50
Total fixed costs	48.50	48.50	48.50	48.50	48.50
Variable Costs per acre					
Seed and lime (3 year stand)	4.00	4.50	5.00	5.50	6.00
Fertilizer	12.00	13.00	15.00	17.00	19.00
Mow, condition, bale and handle	27.60	35.40	43.00	50.40	57.60
Store	3.90	5.20	6.50	7.80	9.10
Total variable costs	47.20	58.10	69.50	80.70	91.70
Total all costs					
Per acre	95.70	106.60	118.00	128.20	140.20
Per ton fed (90% D.M.)	34.17	28.80	25.65	23.30	21.90

Source: Hoglund, C. R. Ibid.

Table 53. COSTS OF GROWING, HARVESTING AND STORING LOW MOISTURE ALFALFA SILAGE

Item	Tons Per Acre				
Harvested	3.5	4.7	5.9	7.0	8.2
Net available for feeding	3.2	4.3	5.4	6.4	7.5
			(Dollars)		
Total fixed costs per acre	48.50	48.50	48.50	48.50	48.50
Variable costs per acre					
Seed and lime (3 year stand)	4.00	4.50	5.00	5.50	6.00
Fertilizer	12.00	13.00	15.00	17.00	19.00
Mow, condition, harvest and haul	23.55	30.00	36.25	41.75	47.40
Store	9.45	12.70	15.95	18.95	22.20
Total variable costs	49.00	60.20	72.20	83.20	94.60
Total all costs					
Per acre	97.50	108.70	120.70	131.70	143.10
Per ton fed (90% D.M.)	30.50	25.30	22.40	20.60	19.10

Source: Hoglund, C. R. Ibid.

Table 54.

GUIDELINES ON PRICING FEEDER LIVESTOCK^{1/}

A. Steer Calves Bought at 450 Pounds and Sold at 1100 Pounds.

Expected Selling Price Per Cwt.	Price You Can Pay and Recover All Costs.				
	Your Feed Costs Per Pound of Gain.				
	14c	16c	18c	20c	22c
	(\$/cwt.)				
\$26	30.80	27.96	25.13	22.29	19.46
28	35.45	32.61	29.78	26.94	24.11
30	40.09	37.26	34.42	31.59	28.75
32	44.74	41.91	39.07	36.24	33.40
34	49.39	46.55	43.72	40.88	38.05

B. Feeder Pigs Bought at 40 Pounds and Sold at 220 Pounds.

Expected Selling Price Per Cwt.	Price You Can Pay and Recover All Costs.			
	Your Feed Costs Per Pound of Gain.			
	9c	10c	11c	13c
	(\$/cwt.)			
\$18	27.95	23.52	19.10	14.67
20	38.62	34.20	29.77	25.34
22	49.29	44.87	40.44	36.02
24	59.97	55.54	51.11	46.69
26	70.64	66.21	61.79	57.36

^{1/} Break even prices on feeder livestock were calculated from specific feeding operations to cover total costs. The following assumptions were made concerning the two operations described.

Steer calves:

Days on feed	= 300
Death loss	= 2%
Outshrink	= 3%
Interest Rate	= 8%
Veterinary Cost	= \$3.00/head
Variable Labor	= 6.00/head
Transportation & Commission	= 6.20/head
Housing	= 6.40/head
Equipment	= 7.50/head
Fixed labor	= 6.00/head

Feeder pigs:

Number of head fed	= 100
Days on feed	= 110
Death loss	= 2%
Outshrink	= 1%
Interest Rate	= 8%
Veterinary, Power & Utilities, and Bedding	= \$.90/head
Grinding & Mixing	= 1.20/head

Footnotes for Table 54 Continued.

Purchasing & Selling Costs	= \$1.50/head
Housing, Equip., and Facilities	= 3.70/head
Fixed Labor	= 3.60/head

Should the characteristics of your operation vary from those stated, the results possibly would also change. For specific information, consult the source of the above information.

Source: Harsh, Stephen B. Livestock Feeding Model, Number 20. Dept. of Agr. Econ., Michigan State University. January, 1971.

Table 55. INVESTMENTS FOR HARVESTING, STORING AND HANDLING FORAGE CROPS
THREE SIZES OF DAIRY OPERATIONS, TWO ALFALFA ALTERNATIVES

Cost Item	Size of Dairy Herd and Alfalfa Alternative					
	40 Cows		80 Cows		160 Cows	
	Hay	Haylage	Hay	Haylage	Hay	Haylage
Harvesting						
Mower	600	----	----	----	----	----
Mower-Conditioner	----	1,600	2,000	----	2,400	----
Conditioner	----	----	----	----	----	----
Rake	600	700	700	----	800	----
S.P. Windrower	----	----	----	3,600	----	4,200
Baler	1,800	----	2,400	----	3,200	----
Bale thrower	----	----	500	----	500	----
Elevator	----	----	500	----	500	----
Hay wagons	1,200	----	1,600	----	1,800	----
Field chopper and heads	2,500	3,400	4,000	4,900	5,000	12,100
Mechanical wagons	2,400	2,800	3,600	4,200	4,800	5,400
Blower	800	800	900	900	1,000	1,000
Sub-totals	9,900	9,300	16,200	13,600	20,200	22,700
Storage and unloading						
Hay barns	1/	----	3,840	----	7,680	----
Silos	8,500	14,900	17,000	25,000	36,000	50,000
Unloaders	2,250	3,800	4,400	6,600	4,500	9,200
Sub-totals	10,700	18,700	25,240	31,600	48,180	59,200
Total investments	20,600	28,000	41,440	45,200	63,380	81,900
Per cow investments	515	700	518	565	427	512
Difference		+185		+47		+85

1/ Assume hay storage in stanchion barn.

Source: Hoglund, C. R. Unnumbered Mimeo Reports. Dept. of Agr. Econ., Michigan State University. January, 1971.

Table 56. TOTAL ANNUAL COSTS OF GROWING, HARVESTING, STORING AND HANDLING FORAGE CROPS AND BUYING ALL GRAIN. THREE SIZES OF DAIRY HERDS ALFALFA HAY VERSUS ALFALFA HAYLAGE ALTERNATIVES^{1/}

Cost Item	Size of Dairy Herd and Alfalfa Alternative					
	40 Cows		80 Cows		160 Cows	
	Hay	Haylage	Hay	Haylage	Hay	Haylage
Growing	4,988	4,756	9,976	9,512	19,952	19,024
Harvest and storage						
Machinery and equipment	1,524	1,437	2,678	2,270	3,677	3,942
Storage and unloading	1,300	2,250	2,964	3,820	5,268	6,840
Power	533	607	834	879	1,803	1,556
Labor	3,126	2,382	4,818	4,050	8,667	6,656
Purchased grain	4,000	3,760	8,000	7,520	16,000	15,040
Urea	160	160	320	320	640	640
Total costs	15,631	15,352	29,590	28,371	56,007	53,698
Differences in costs						
10% higher yield		-279		-1,219		-2,309
20% higher yield		-908		-2,366		-4,637

^{1/} These costs include all feed fed to both cows and replacements.

^{2/} Cost of tractors used in harvesting forage crops based on hourly custom rates for each specific size of tractor multiplied by the number of hours of use. These figures include cost of electric current in operating bale elevators and silo unloaders.

Source: Høglund, C. R. Ibid.

Table 57.

FEED INPUT-MILK OUTPUT RELATIONSHIPS
THREE BASIC ABILITY COWS AND THREE FORAGE QUALITIES
(HOLSTEIN COWS AND 3.5% TEST MILK)

	Level of Grain Feeding Per Cow Annually				
	2,000	3,000	4,000	5,000	6,000
Tons hay equivalent fed	6.4	6.2	5.8	5.5	5.1
Pounds milk produced					
<u>14,000 lbs. basic ability</u>					
Good forage	12,700	13,500	14,050	14,500	14,900
Medium forage	11,850	12,800	13,600	14,200	14,600
Poor forage	11,100	12,300	13,200	13,800	14,250
<u>12,000 lbs. basic ability</u>					
Good forage	11,000	11,800	12,300	12,650	12,950
Medium forage	10,200	11,100	11,800	12,300	12,650
Poor forage	9,600	10,650	11,450	11,950	12,350
<u>10,000 lbs. basic ability</u>					
Good forage	10,000	10,600	10,850	11,000	11,100
Medium forage	9,400	10,100	10,550	10,750	10,850
Poor forage	9,150	9,950	10,250	10,500	10,700

Source: Hoglund, C. R. Unpublished Data, Dept. of Agr. Econ., Michigan State University, January, 1971.

Table 58.

RELATION OF PRODUCTION PER COW TO COSTS AND
RETURNS ON SPECIALIZED DAIRY FARMS, SOUTHERN MICHIGAN 1969

	Cows Per Farm			
	30 - 49.9		50 - 74.9	
	Production Level ^{1/}			
	Low	High	Low	High
Number of farms	67	68	41	47
Cows per farm	39.3	40.3	61.0	60.1
Pound milk sold per cow	11,477	14,126	11,195	13,660
Hours labor per cow	86	85	68	74
Pounds milk per hour labor	133	166	165	185
Investment per cow ^{2/}	857	987	835	893
Calves born/cow	1.04	1.04	.94	.99
Calf Death loss	12.8	11.2	16.0	13.8
Income per cow				
Milk	\$ 662	\$ 814	\$ 653	\$ 792
Cattle	115	124	97	131
Total	\$ 777	\$ 938	\$ 750	\$ 923
Costs per cow				
Labor	\$ 190	\$ 186	\$ 148	\$ 161
Machinery	46	63	48	55
Building	50	58	51	52
Feed	371	411	347	389
Livestock services	100	117	98	115
Other	26	28	23	28
Total	783	783	710	800
Return to Management	-6	75	40	123
Net cost per cwt. milk sold	\$5.87	\$5.28	\$5.55	\$4.97
Return above feed cost	406	527	403	534

^{1/} The division between high and low production is 12,500 lbs. of milk sold per cow.

^{2/} Includes only those investments directly involved in dairy enterprise. Includes land for building site, buildings, all equipment for handling of feed, milk and manure, and feed supplies.

Source; Høglund, C. R. Compiled from 1970 Telfarm data. Dept. of Agr. Econ., Michigan State University. January, 1971.

Table 59.

RELATIONSHIP OF HERD SIZE TO VARIOUS FACTORS
333 SOUTHERN MICHIGAN DAIRY FARMS, 1969^{1/}

Item	Under				100 and more
	30	30-49	50-74	75-89	
Number of farms	32	135	88	46	32
Cows per farm, number	25	40	61	85	130
Tillable acres/farm	177	222	280	365	466
Investment per cow	\$3,616	\$3,237	\$2,868	\$2,697	\$2,527
Crop yields per acre					
Corn grain, bu.	76	84	84	86	90
Corn silage, ton	12.0	12.8	13.0	13.6	14.3
Hay equivalent, ton	3.3	3.8	4.0	3.8	4.3
Dairy efficiency factors					
Pounds milk sold:					
Per man	341,000	452,000	530,000	600,000	666,000
Per cow	12,585	12,827	12,503	11,612	12,220
Dairy income/\$100 feed	237	220	227	210	213
Net cost per cwt.	\$5.86	\$5.53	\$5.21	\$5.33	\$5.01
Price received/cwt.	5.76	5.76	5.81	5.79	5.76
Earnings to:					
Investment, 90	1.3	4.5	6.4	6.6	9.0
Labor and management	\$3,647	\$6,178	\$8,853	\$8,930	\$16,463

^{1/} Source: Brown, L. H. and J. A. Speicher, 1969 Telfarm Record Summary, Dept. of Agr. Econ., Michigan State University.

Table 60. ESTIMATED COST OF GROWING A REPLACEMENT HEIFER

	<u>Dollars</u>
Value of calf at birth	45.00
Milk and milk-substitute	15.00
1,500 pounds of grain at \$3.30 per cwt.	50.25
3.0 tons of hay at \$24.00 per ton	72.00
5.0 tons of silage at \$8.00 per ton	40.00
Pasture and other feed	25.00
Bedding	2.75
Total feed and bedding	205.00
25 hours of labor at \$2.50 per hour	63.00
Buildings, equipment and power	25.50
Breeding fees	7.00
Veterinarian and medicine	2.50
Interest and insurance	20.00
All other	15.00
Total other than calf, feed and bedding.. . . .	133.00
Total cost of raising heifer to 27.5 months of age	383.00

Source: Høglund, C. R. Data adopted from 1968 New York Farm Cost Accounting Study.
Dept. of Agr. Econ., Michigan State University, January, 1971.

Table 61. INVESTMENT PER COW IN FREE-STALL HOUSING SYSTEMS,
THREE SIZES OF DAIRY HERDS AND 1970 COSTS^{1/}

Investment in:	Open Lot System			Cold Covered System		
	Number of Cows			Number of Cows		
Number of cows	80	120	240	80	120	240
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Free stall barn	145	140	140	260	258	255
Milking parlor	125	115	75	125	115	75
Milking equipment	80	70	50	80	70	50
Bulk tank	80	67	60	80	67	60
Outside yard	60	60	60	---	---	---
Mechanical feed bunk	40	38	35	35	30	30
Totals, per cow	530	490	420	580	540	470
Added cost for:						
Warm enclosed barn				85	85	85
Total for warm encl. barn				665	625	555

^{1/} Investments include a complete housing and milking system for cows, but not feed storage and manure handling or maternity pens, replacement and young stock housing.

Source: Høglund, C. R., J. S. Boyd, and J. A. Speicher. Economics of Open Lot Versus Covered Free- Stall Dairy Housing Systems, Mich. Agr. Expt. Sta. Res. Rep. 91, Michigan State University. June, 1970.

Table 62. ESTIMATED COWS MILKED PER HOUR AND PER MAN HOUR,
THREE TYPES OF PARLORS, EXPECTED MILKING RATES BASED ON GOOD MANAGEMENT
AND MILKING TECHNIQUES

Milking system and number of stalls	Number of:		Systems adapted to herds of: No. of cows	Number of Cows Milked	
	Men Milking	Milker Units		Per hour	Per man hour
Herringbone					
Double 3	1	3	40-100	35	35
Double 4	1	4	60-120	40	40
Double 5 ^{1/}	1	5	80-130	44	44
Double 6	2	6	100-160	54	27
Double 8	2	8	150 & over	76	38
Walk-Through					
Double 3	1	3	40-100	35	35
Side-Opening					
Three in-line	1	3	40-80	26	26
Four in-line	1	4	50-90	28	28
Double 3	2	6	80-150	50	25
Double 4	2	8	100-160	54	27

^{1/} Recommended only for top milkers.

Source: Høglund, C. R., J. A. Speicher, and J. S. Boyd. Milking Efficiency, Investments and Annual Costs for Milking Parlors. Mich. Agr. Expt. Sta., Res. Rep. 93. Michigan State University. June, 1970.

Table 63. INVESTMENTS IN MILKING PARLORS AND EQUIPMENT, 1970 PRICES

Milking System and Number of Stalls	Investments in:					Totals (Dollars)
	(Units)	Buildings ^{2/} (Dollars)	Stalls and Feeders ^{3/} (Dollars)	Milking System ^{4/} (Dollars)	Heat, Hot Water & Other Equip. (Dollars)	
Herringbone						
Double 3	3	10,000	2,700	3,800	2,600	19,100
Double 4	4	11,000	3,600	4,600	3,000	22,200
Double 6	6	13,000	5,400	6,100	3,600	28,100
Double 8	8	14,000	6,600	7,600	4,500	32,700
Double 8	16	14,000	6,600	14,000	4,500	39,100
Walk through						
Double 3	3	10,000	2,600	4,000	2,800	19,400
Side opening						
Three in line	3	10,000	2,100	4,000	2,800	18,900
Three in line	4	11,500	2,700	4,600	3,100	21,900
Double 3	6	13,000	4,100	5,600	4,000	26,700
Double 4	8	14,000	5,200	6,800	4,400	30,400

^{1/} Investment will vary due to differences in costs between brands and equipment and in labor costs and in materials used in parlor building.

^{2/} Includes labor and materials for grading, foundation, concrete inside building, lumber, hardware, electrical installations and fixtures, water and sewage installations but not cost of new wells.

^{3/} Includes stalls, feeders, entrance and exit gates, floor grates and drains. Does not include mechanical feeders.

^{4/} Systems include automatic line washers but not bulk tanks. Investments will be lower or higher depending on degree of automation and equipment included.

Source: Høglund, C. R., Speicher, J. A. and Boyd, J. S. Ibid.

Table 64. INVESTMENTS IN BULK TANKS, INCLUDING AUTOMATIC WASHING EQUIPMENT

Gallon Capacity	1967 Cost
300	3,500
600	5,000
800	6,100
1,000	6,500
1,200	7,200
1,500	8,100

Source: Hogleund, C.R. Cost estimates based on Dealer Prices. Dept. of Agr. Econ., Michigan State University, January, 1971.

Table 65. COWS MILKED PER HOUR AND DAY, AND COST OF MILKING COWS, THREE TYPES OF MILKING PARLORS, 1970 INVESTMENTS AND COSTS

Milking System and Number of Stalls	Number of		Cows Milked		Annual Cost of Milking Cows				Per Cow
	Men	Milker	Per Day	1/ Hour (6 hrs.)	Labor	Parlor ^{2/}	Equip. ^{3/}	Total	
Herringbone					\$	\$	\$	\$	\$
Double 3	1	3	35	105	8,000	1,500	1,184	10,684	102
Double 4	1	4	40	120	8,000	1,840	1,406	11,246	90
Double 6	2	6	54	162	16,000	2,318	1,795	20,113	124
Double 8	2	8	76	228	16,000	2,596	2,238	20,834	91
Double 8	2	16	84	252	16,000	2,596	3,422	22,018	87
Walk-through									
Double 3	1	3	35	105	8,000	1,588	1,258	10,846	103
Side-opening									
Three in line	1	3	26	78	8,000	1,525	1,258	10,783	138
Four in line	1	4	28	84	8,000	1,789	1,336	11,125	132
Double 3	2	6	50	150	16,000	2,155	1,776	19,931	133
Double 4	2	8	52	156	16,000	2,419	2,072	20,491	127

^{1/} Based on 3 hours milking time twice daily and 2 hours daily of preparation for milking and clean up of parlor and equipment after milking.

^{2/} Based on 15 years depreciation of building, stalls and feeders, 2.4% on repairs and 8% interest on 50% of cost.

^{3/} Based on 10 years depreciation on milking and heating system, water heater and other equipment, 5% on repairs and 8% interest on 50% of cost.

Source: Hogleund, C.R., Speicher, J.A., and Boyd, J.S.

Table 66. DETERMINING TOTAL CAPITAL REQUIREMENTS PER BEEF COW UNIT IN MICHIGAN
(EXAMPLE)

Requirements	Total Investment	Investment Per Cow
	(col. 1)	(col. 2)
A. CATTLE		
1. Total Number in the Herd	50	
<u>50</u> cows X \$300 - value per head	<u>\$ 15,000</u>	
<u>8</u> replacements X \$200 value per head	<u>\$ 1,600</u>	
<u>1</u> bulls X \$700 value per head	<u>700</u>	
2. Total Investment in Herd	<u>17,300</u>	\$ 346
B. BUILDINGS AND EQUIPMENT (used by the cow herd)		
1. Value of Sheds, Silos, Etc.	\$ 2,500	
2. Value of Equipment, Bunks, Scales, Etc.	\$ 500	
3. Total Value of Buildings and Equipment.	<u>\$ 3,000</u>	\$ 60
C. LAND VALUE (Acres used by the cow herd)		
1. As Pasture		
Permanent Pasture: <u>75</u> acres X \$125 value.	\$ 9,375	
Rotation pasture: <u> </u> acres X <u> </u> value.	<u> </u>	
Wooded pasture: <u> </u> acres X <u> </u> value.	<u> </u>	
Total acres used for pasture.	<u>75</u>	
Total value of land used for pasture.	<u>\$ 9,375</u>	
2. For Hay and Other Roughage		
Hay: <u>40</u> acres X \$250 value of land	\$ 10,000	
Silage: <u> </u> acres X <u> </u> value of land.	<u> </u>	
Total acres used for roughage	<u>40</u>	
Total value of land used for roughage	<u>\$ 10,000</u>	
3. Total Investment in Land (both Pasture & Hay)	<u>\$ 19,375</u>	\$ 387
D. TOTAL INVESTMENT IN CATTLE, BUILDINGS, EQUIPMENT, LAND FOR PASTURE AND ROUGHAGE (A2 + B3 + C3)		
	<u>\$ 36,675</u>	\$ 793

Source: Kyle, Leonard R. Unpublished data. Dept. of Agr. Econ., Michigan State University, January 1971.

Table 67. ESTIMATING INCOME ABOVE COSTS PER BEEF COW UNIT IN MICHIGAN (EXAMPLE)

Returns and Costs	Average Calf Prices	High Calf Prices
A. ANNUAL RETURNS PER COW UNIT		
1. Percent Calf Crop Expected.	90	Z
2. Estimated Weight at Weaning Time (aver. steers & heifers)	420 lbs.	
3. Expected Price at Weaning	\$ 36.00	\$ 40.00
4. Returns from Calf Sales (420 lbs. X \$36 X 90% calf crop)	\$ 151.20	\$ 168.00
B. ANNUAL COSTS PER COW UNIT		
Variable Costs (Cost of each item ÷ 50 cows in herd)		
1. Grain: Bushels X \$	\$ -	
2. Roughage as Hay Equivalent: 2 Tons X \$20	\$ 40.00	
3. Pasture as Hay Equivalent: Tons X \$	\$ -	1/
4. Protein, Salt and Mineral	\$ 5.00	
5. Breeding Charge, Bull Cost	\$ 7.00	
6. Veterinary and Drugs	\$ 3.00	
7. Marketing: 3% of Total Returns (line A-4 above)	\$ 4.50	
8. Replacement Heifers (annual net cost per cow) . .	\$ 10.00	2/
9. Interest on Investment per cow unit (7% Table 61, Line A-2, col. 2)	\$ 24.22	3/
10. Taxes & Insurance per cow unit (1.5% of Table 61), Line A-2, col. 2)	\$ 5.19	3/
11. Miscellaneous	\$ 1.09	
12. Total Variable Costs per cow unit (Add lines 1 through 11)	\$ 100.00	\$ 100.00
Fixed Costs (Cost of each item ÷ 50 cows in herd)		
13. Buildings & Equipment: Insurance, Depr., Repairs, Taxes 10% X Investment of \$60 (Table 61, Line B-3, col. 2)	\$ 6.00	
14. Interest on Investment in Land, Buildings and Equipment 6% X Investment of \$447 (Table 61, Line B-3, + C-3, col. 2)	\$ 26.85	
15. Labor: 7 Hours X \$2.00	\$ 14.00	
16. Total Fixed Cost Per cow unit (Add lines 13, 14, and 15)	\$ 46.85	\$ 46.85

^{1/} If some of the pasture has an opportunity cost, the total pasture charge should be included.

^{2/} The cost of a replacement heifer less the salvage value of a cow divided by number of years in herd. Average \$8 to \$12 per cow per year.

^{3/} These are variable costs when considering the enterprise. However, once the cows are on the farm, these costs become fixed regardless of production.

Table 67 Con't. ESTIMATING INCOME ABOVE COSTS PER BEEF COW UNIT IN MICHIGAN (EXAMPLE)

Returns and Costs	Average Calf Prices	High Calf Prices
C. TOTAL COST PER COW UNIT (B-12 plus B-16)	\$ 146.85	\$ 146.85
D. NET RETURN ABOVE VARIABLE COST PER COW UNIT (A-4 minus B-12)	\$ 51.20	\$ 68.00
E. NET RETURN ABOVE ALL COST PER COW UNIT (A-8 minus C): This is a return to management.	\$ 4.35	\$ 21.15

Source: Kyle, Leonard R. Ibid.

Table 68. ESTIMATED TOTAL INVESTMENT IN FULL-TIME BEEF-COW FARMS IN MICHIGAN ^{1/}

Investment	Unit	Upper Peninsula		Southern Michigan	
		Good Yields	Excellent Yields	Good Yields	Excellent Yields
Land	(acre)	1,040	883	626	543
Cows	(head)	200	200	200	200
Land	(dol.)	51,536	43,445	82,286	70,785
Improvements ^{2/}	(dol.)	11,538	11,538	10,238	10,238
Machinery and equipment	(dol.)	11,089	11,089	11,089	11,089
Livestock	(dol.)	50,546	50,546	50,546	50,546
Feed and supplies	(dol.)	5,185	5,185	4,668	4,668
Total investments	(dol.)	129,894	121,803	158,827	147,326

^{1/} Based on 1965 values. These are current and not replacement values of improvements, machinery and equipment.

^{2/} Buildings, feed storage, fences, water facilities and corrals.

Source: Maish, L.J. and C.R. Hoglund. The Economics of Beef Cow Herds in Michigan. Mich. Agr. Expt. Sta. Res. Rep. 58 1966.

Table 69.

 CHARACTERISTICS OF HIGH AND LOW INCOME CATTLE
 FEEDING FARMS IN MICHIGAN, 1969

Items	Total Business Investment			
	Under \$250,000		Over \$250,000	
	Management		Income	
	High	Low	High	Low
1. Number of Farms	6	6	11	12
2. Total Farm				
Value of production	\$ 47,485	\$ 42,859	\$121,306	\$ 61,963
Cost of production	39,578	46,714	95,218	68,344
Labor income	13,917	1,414	30,438	460
Rate earned on investment	11.0%	3.0%	12.0%	46.0%
Total investment	\$184,302	\$238,837	\$494,060	\$352,579
Tillable acres	237.0	322.4	560.4	519.7
Number of men	1.4	1.6	2.1	1.8
Steers & heifers sold	216	202	675	355
3. Per Tillable Acre				
Value of production	\$121.68	\$ 96.55	\$110.02	\$ 86.88
Cost of production	123.47	101.44	112.51	96.61
Labor	\$ 27.12	\$ 18.89	\$ 12.21	\$ 11.90
Machinery	38.61	24.89	31.27	25.75
Improvements	6.54	10.53	9.50	8.26
Crop expense	28.25	24.97	32.62	25.38
Interest & other	22.95	22.16	26.91	25.32
Fertilizer expense	13.08	11.73	14.36	13.04
4. Cattle Feeding Enterprise				
Per Head				
Cattle income (minus purchase cost)	\$185.31	\$185.51	\$184.10	\$157.70
Total cost	146.10	179.89	141.82	152.29
Labor	13.27	23.16	11.22	15.04
Machinery	7.12	8.24	5.93	7.29
Improvements	5.91	12.40	7.36	7.65
Feed	97.55	112.53	94.58	102.59
Livestock expense	19.70	17.59	19.88	16.29
Other expense	2.55	5.97	2.85	3.43
Gain in weight	651	576	540	563
Livestock investment	\$ 245	\$ 280	\$ 248	\$ 229
Hours of labor	6.6	6.7	5.7	6.1
5. Per Cwt. of Gain				
Feed cost	\$ 14.73	\$ 19.51	\$ 17.51	\$ 18.22
Non-feed cost	7.66	11.68	8.74	8.83
Total costs	\$ 22.39	\$ 31.19	\$ 26.25	\$ 27.05
Selling price	29.05	29.98	31.18	30.17

Source: Kyle, Leonard R. Telfarm Business Analysis Summary for Cattle Feeding Farms, 1969. Agr. Econ. Rep. No. 173, Dept. of Agr. Econ., Michigan State University, August, 1970.

Table 70. INVESTMENTS FOR FULLY MECHANIZED BEEF FEEDING OPERATIONS
 AUGER AND FENCE-LINE SYSTEMS, FEEDING 400 POUND STEER
 CALVES TO GAIN 600 POUNDS, 1962-63 PRICES

Item	Capacity of Feed Lot, Number of Steers			
	100	250	350	500
	Dollars	Dollars	Dollars	Dollars
Auger feeding system				
Investments				
Housing, fencing, concrete areas	3,950	9,325	12,975	18,350
Feed storage and handling	11,130	20,350	25,300	31,900
Augers, conveyors, motors, electric service and controls, bunks	2,520	5,200	7,200	9,800
Water and manure equipment	910	1,950	2,450	2,850
Total investments	18,510	36,825	47,925	62,900
Investments per head	185	147	137	126
Fence-line feeding system				
Investments				
Housing, fencing, concrete areas	4,300	10,275	14,175	19,550
Feed storage and handling	11,130	20,350	25,300	31,900
Bunks, power wagon ^{1/}	3,000	3,200	4,400	6,100
Water and manure equipment	910	1,950	2,450	2,850
Total investments	19,340	35,775	46,325	60,400
Investment per head	193	143	132	121

^{1/} Additional investment for power wagon for 100 steer unit. Assume 320 tons of corn silage custom harvested. Larger operations already own self-unloading wagons.

Source: Hoglund, C. R. Investments and Annual Costs for Alternative Beef Cattle Feeding Systems. Mich. Agr. Expt. Sta. Res. Rep. 7, Michigan State University, 1964.

Table 71. FEEDING SYSTEMS AND ANNUAL FEED REQUIREMENTS FOR CHOICE 400 POUND STEER CALVES FED TO 1,000 POUND CHOICE SLAUGHTER GRADE

Feeding System	Expt. daily gain (lbs.)	Feeding period (days)	Daily Consumption and Annual Requirement								
			Corn Silage		Alf. Haylage		Gr. Sh. Corn		64% Prot. Supp.		
			daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (bu.)	daily (lbs.)	ann. (lbs.)	
(1) Full feed corn silage, limit ground shelled corn and supplement to 1% of body weight daily.	2.15	280	30	4.2				6.0	30	1	280
(2) Full feed haylage, limit gr. shelled corn to 1 1/2% of body weight daily.	2.15	280			108	1.5	10.5	53			
(3) Full feed 2 parts corn silage and 1 part haylage, limit ground shelled corn and supplement to 1 1/4% of body weight daily.	2.15	280	16.4	2.3	4.5	.6	8.25	41		1/2	140

All rations are computed on the following moisture percentages: Corn Silage 70%; Haylage 45%; Hay 15%; Ground Shelled Corn 15%; Ground Ear Corn 15%; Protein Supplement 15%.

Expected daily gain and length of feeding period based on purchase date to sale date and purchase weight to sale weight.

Source: Kyle, Leonard R. and Henderson, Hugh E. Cattle Feeding Today: What It Costs and What It Pays. Agr. Econ. Rep. No. 23, Dept. of Agr. Econ., Michigan State University. October, 1965.

Table 72. FEEDING SYSTEMS AND ANNUAL FEED REQUIREMENTS FOR CHOICE 400 POUND HEIFERS FED TO 900 POUND CHOICE SLAUGHTER HEIFERS

Feeding System	Expt. daily gain (lbs.)	Feeding period (days)	Daily Consumption and Annual Requirement							
			Corn Silage		Alf. Haylage		Gr. Sh. Corn		64% Prot. Supp.	
			daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (bu.)	daily (lbs.)	ann. (lbs.)
(4) Full feed corn silage, limit ground shelled corn and supplement to 1% of body weight daily.	2.00	250	28	3.5			5.5	25	1	250
(5) Full feed haylage, limit ground shelled corn to 1 1/2% of body weight daily.	2.00	250			10.4	1.3	9.75	44		
(6) Full feed 2 parts corn silage and 1 part haylage, limit ground shelled corn and supplement to 1 1/4% of body weight daily.	2.00	250	16	2.0	4.3	.6	7.6	34	1/2	125

Source: Kyle, L. R. and Henderson, Hugh E. Ibid.

Table 73. FEEDING SYSTEMS AND ANNUAL FEED REQUIREMENTS FOR CHOICE 650 POUND YEARLING STEERS FED TO 1,100 POUND CHOICE SLAUGHTER GRADE

Feeding System	Expt. daily gain (lbs.)	Feeding period (days)	Daily Consumption and				Annual Requirement			
			Corn Silage		Alf. Haylage		Gr. Sh. Corn		64% Prot. Supp.	
			daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (bu.)	daily (lbs.)	ann. (lbs.)
(7) Full feed corn silage, limit ground shelled corn and supplement to 1% of body weight daily.	2.25	200	40	4.0			7.75	28	1	200
(8) Full feed haylage, limit gr. shelled corn to 1 1/2% of body weight daily.	2.25	200			15	1.5	13.0	47		
(9) Full feed 2 parts corn silage to 1 part haylage, limit ground shelled corn and supplement to 1 1/4% of body weight daily.	2.25	200	18	1.8	9	.9	10.5	38	1/2	100

Source: Kyle, L. R. and Henderson, Hugh E. Ibid.

Table 74. FEEDING SYSTEMS AND ANNUAL FEED REQUIREMENTS FOR STANDARD TO GOOD 400 POUND HOLSTEIN AND BEEF TYPE STEER CALVES FED TO 1,000 POUND STANDARD TO GOOD SLAUGHTER GRADE

Feeding System	Expt. daily gain (lbs.)	Feeding period (days)	Daily Consumption and Annual Requirement								
			Corn Silage		Alf. Haylage		Gr. Sh. Corn		64% Prct. Supp.		
			daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (bu.)	daily (lbs.)	ann. (lbs.)	
(10) Full feed corn silage, limit protein supplement to 1 1/4 lbs. per head daily.	1.90	316	42	6.6						1 1/4	395
(11) Full feed haylage, limit gr. sh. corn to 1/2% of body weight daily.	1.90	316			20	3.2	3.5	20			
(12) Full feed 2 parts corn silage to 1 part haylage, limit gr. sh. corn to 1/4% of body weight daily.	1.90	316	22	3.5	11	1.7	1.75	10			

Source: Kyle, L. R. and Henderson, Hugh E. Ibid.

Table 75. FEEDING SYSTEMS AND ANNUAL FEED REQUIREMENTS FOR STANDARD TO GOOD 650 POUND YEARLING HOLSTEIN AND BEEF TYPE STEERS FED TO 1,100 POUND STANDARD TO GOOD SLAUGHTER GRADE

Feeding System	Expt. daily gain (lbs.)	Feeding period (days)	Daily Consumption and Annual Requirement								
			Corn Silage		Alf. Haylage		Gr. Sh. Corn		64% Prot. Supp.		
			daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (tons)	daily (lbs.)	ann. (bu.)	daily (lbs.)	ann. (lbs.)	
(13) Full feed corn silage, limit protein supplement to 1 1/4 lbs. per head daily.	2.00	225	58	6.5						1 1/4	225
(14) Full feed haylage, limit gr. sh. corn to 1/2% of body weight daily.	2.00	225			27	3.0	4.5	18			
(15) Full feed 2 parts corn silage to 1 part haylage, limit gr. sh. corn to 1/4% of body weight daily.	2.00	225	28	3.1	14	1.6	2.5	10			

Source: Kyle, Leonard R. and Henderson, Hugh E. Ibid.

Table 76.

 ANALYSIS FACTOR FOR 10 MICHIGAN HOG FARMS
 WITH OVER 114 LITTERS OF PIGS, 1969

Item	Landlord	Operator	Total Farm	Your Farm
<u>TOTAL INVESTMENT</u>				
Land	\$19,842	\$67,865	\$87,707	\$ _____
Improvements	1,329	35,730	37,059	_____
Machinery	---	26,194	26,194	_____
Livestock	---	48,555	48,555	_____
Feed, crops, and supplies	---	16,668	16,668	_____
Total acres	76	335	411	_____
Tillable acres	76	251	327	_____
Operator's share of investment			77%	_____
Hours of operator labor			2,734	_____
Hours of unpaid family labor			782	_____
Hours of hired labor			1,448	_____
Total hours of labor			4,964	_____
Number of men equivalents			1.65	_____
Labor income per hour of operator labor			\$ 19.30	_____
Value of farm production per \$100 costs			\$ 158	_____
<u>PER TILLABLE ACRE</u>				
Value of farm production			\$ 234	_____
Cost of farm production			148	_____
Operators investment			596	_____
Machinery investment			55	_____
<u>PER MAN</u>				
Total investment			\$131,020	_____
Operators investment			118,129	_____
Value of farm production			46,372	_____
Total tillable acres			198	_____
<u>HOG FACTORS</u>				
Item	Average		Your Farm	
Number of litters	282		_____	
Pigs weaned per litter	6.9		_____	
Feed costs per cwt. pork produced	\$13.53		_____	
Number of hogs sold	1,371		_____	
Average price received per cwt. sold	24.43		_____	
Average weight of hogs sold	232		_____	

Source: Hepp, Ralph E. Telfarm Business Analysis Summary For Swine Farms, 1969. Agr. Econ. Rep. No. 174, Dept. of Agr. Econ., Michigan State University. August, 1970.

Table 77.

ANALYSIS FACTOR FOR 10 MICHIGAN HOG FARMS WITH
UNDER 115 LITERS OF PIGS, 1969

Item	Landlord	Operator	Total Farm	Your Farm
<u>TOTAL INVESTMENT</u>				
Land	\$21,344	\$60,612	\$81,956	\$ _____
Improvements	----	19,165	19,165	_____
Machinery	----	21,580	21,580	_____
Livestock	----	16,071	16,071	_____
Feed, crops, and supplies	----	11,586	11,586	_____
Total acres	79	256	335	_____
Tillable acres	79	204	283	_____
Operator's share of investment			74%	_____
Hours of operator labor			2,210	_____
Hours of unpaid family labor			736	_____
Hours of hired labor			550	_____
Total hours of labor			3,496	_____
Number of men equivalents			1.17	_____
Labor income per hour of operator labor			\$ 10.79	_____
Value of farm production per \$100 costs			\$ 120	_____
<u>PER TILLABLE ACRE</u>				
Value of farm production			\$ 144	_____
Cost of farm production			120	_____
Operator's investment			456	_____
Machinery investment			58	_____
<u>PER MAN</u>				
Total investment			\$128,510	_____
Operator's investment			111,219	_____
Value of farm production			35,168	_____
Total tillable acres			242	_____
<u>HOG FACTORS</u>				
Item	Average		Your Farm	
Number of litters	85		_____	
Pigs weaned per litter	8.24		_____	
Feed cost per cwt. pork produced	\$12.06		_____	
Number of hogs sold	632		_____	
Average price received per cwt. sold	\$24.76		_____	
Average weight of hogs sold	226		_____	

Source: Hepp, Ralph E. Ibid.

Table 78. LAYING FLOCK RECORDS FOR 1967-1970
FLOCKS HOUSED IN 1967 AND 1968 AND 1969

	Year									
	1	2	3	4	5	6	7	8	9	10
1. Number layers housed	6,000	6,900	8,384	4,700	4,411	2,600	10,300	5,040	13,900	6,000
2. Date flock housed	11/67	1/68	1/68	1/68	3/68	4/68	5/68	8/68	8/68	1/69
3. Months production	17	14	14	14	17	14	17	14	17	14
4. Percent mortality	18.12	11.22	122	24.72	10.32	18.82	23.32	27.92	30.02	11.82
5. Eggs per hen housed	255	251	269	182	229	241	208	213	272	282
6. Egg income/dozen	\$.30	\$.28	\$.33	-	\$.37	-	\$.34	\$.38	\$.34	\$.36
7. Egg income/bird	\$ 7.06	\$ 5.86	\$ 7.29	-	\$ 7.04	-	\$ 5.94	\$ 6.81	\$ 7.77	\$ 8.56
8. Pounds feed fed/dozen	4.2	5.0	4.3	5.8	6.6	4.5	5.7	3.9	4.4	4.4
9. Pounds feed fed/bird	92.4	106.00	73.2	88	125.3	90.7	99.4	68.6	98.8	102.6
10. Feed cost per ton	\$ 70.00	\$ 48.65	\$ 87.18	\$ 67.19	\$ 47.32	\$ 69.80	\$ 56.10	\$ 72.30	\$ 67.66	\$ 68.82
11. Feed cost/dozen	\$.147	\$.121	\$.152	\$.130	\$.155	\$.137	\$.160	\$.140	\$.147	\$.150
12. Feed cost/bird	\$ 3.23	\$ 2.58	\$ 3.19	\$ 2.91	\$ 2.96	\$ 2.97	\$ 2.79	\$ 2.48	\$ 3.34	\$ 3.53
13. Purchase cost/bird	\$ 1.70	\$ 1.65	\$ 1.73	\$ 1.88	\$ 1.75	\$ 1.67	\$ 1.53	\$ 1.50	\$ 1.65	\$ 2.08
14. Flock depr./bird	\$ 1.45	\$ 1.40	\$ 1.42	\$ 1.53	\$ 1.35	\$ 1.42	\$ 1.25	\$ 1.24	\$ 1.36	\$ 1.72
15. Flock depr./dozen	\$.077	\$.066	\$.068	\$.068	\$.070	\$.071	\$.072	\$.070	\$.060	\$.073
16. Feed cost and depr./bird	\$ 4.68	\$ 3.98	\$ 4.61	\$ 4.44	\$ 4.46	\$ 4.58	\$ 4.04	\$ 3.72	\$ 4.70	\$ 5.25
17. Feed cost and depr./doz.	\$.244	\$.187	\$.221	\$.198	\$.226	\$.228	\$.234	\$.210	\$.207	\$.223
18. Gain over feed & depr./bird	\$ 1.92	\$ 3.08	\$ 1.25	2.85	\$ 2.72	-	\$ 1.90	\$ 3.09	\$ 3.04	\$ 3.31
19. Gain over feed & depr./doz.	\$.076	\$.145	\$.060	\$.128	\$.142	-	\$.110	\$.175	\$.134	\$.141

Source: Kelsey, M.P. Telfarm Business Analysis Summary for Poultry Farms, 1969. Agr. Econ. Rep. No. 169, Dept. of Agr. Econ., Michigan State University. August, 1970.

Table 79.

POULTRY ENTERPRISE FACTORS,
5 MICHIGAN POULTRY FARMS, 1969

Items	Average	Your farm
Number of hens	10,508	_____
Egg sales	\$ 73,583	_____
Egg sales per hen	\$ 7.00	_____
Eggs sold per hen	232	_____
Average price per dozen eggs	\$.36	_____
Feed disappearance per dozen	\$.17	_____
Flock use cost per bird	\$ 1.13	_____
Flock use cost per dozen	\$.06	_____
Return to management, capital and operator labor	\$ 16,032	_____

Source: Kelsey, M.P. Ibid.

Table 80. FEED COST PER DOZEN EGGS AT VARIOUS FEED PRICES PER TON
AND VARIOUS FEED CONVERSIONS PER DOZEN EGGS

Cost/ton	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00
Cost/lb.	.0275	.03	.0325	.035	.0375	.04	.0425	.045
lbs. feed/ doz. eggs	(cents)							
3.5	09.6	10.5	11.3	12.2	13.1	14.0	14.8	15.7
3.6	09.9	10.8	11.7	12.6	13.5	14.4	15.3	16.2
3.7	10.1	11.1	12.0	12.9	13.8	14.8	15.7	16.6
3.8	10.4	11.4	12.3	13.3	14.2	15.2	16.1	17.1
3.9	10.7	11.7	12.6	13.6	14.6	15.6	16.5	17.5
4.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0
4.1	11.2	12.3	13.3	14.3	15.3	16.4	17.4	18.4
4.2	11.5	12.6	13.6	14.7	15.7	16.8	17.8	18.9
4.3	11.8	12.9	13.9	15.0	16.1	17.2	18.2	19.3
4.4	12.1	13.2	14.3	15.4	16.5	17.6	18.7	19.8
4.5	12.3	13.5	14.6	15.7	16.8	18.0	19.1	20.2
4.6	12.6	13.8	14.9	16.1	17.2	18.4	19.5	20.7
4.7	12.9	14.1	15.2	16.4	17.6	18.8	19.9	21.1
4.8	13.2	14.4	15.6	16.8	18.0	19.2	20.4	21.6
4.9	13.4	14.7	15.9	17.1	18.3	19.6	20.8	22.0
5.0	13.7	15.0	16.2	17.5	18.7	20.0	21.2	22.5

Source: Sheppard, C.C. and John Wolford. Unpublished material. Dept. of Poultry Science, Michigan State University.

Table 81. PULLET COST PER DOZEN EGGS AT VARIOUS RATES OF PRODUCTION
AND VARIOUS PRICES PER STARTED PULLET

Dozens Produced	Started Pullet Cost									
	1.40	1.50	1.60	1.70	1.80	1.90	2.00	2.10	2.20	2.30
	(cents)									
14.0	10.0	10.7	11.4	12.1	12.8	13.5	14.2	15.0	15.7	16.4
14.5	09.6	10.3	11.0	11.7	12.4	13.1	13.7	14.4	15.1	15.8
15.0	09.3	10.0	10.6	11.3	12.0	12.6	13.3	14.0	14.6	15.3
15.5	09.0	09.6	10.3	10.9	11.6	12.2	12.9	13.5	14.1	14.8
16.0	08.7	09.3	10.0	10.6	11.2	11.8	12.5	13.1	13.7	14.3
16.5	08.4	09.0	09.6	10.3	10.9	11.5	12.1	12.7	13.3	13.9
17.0	08.2	08.8	09.4	10.0	10.5	11.1	11.7	12.3	12.9	13.5
17.5	08.0	08.5	09.1	09.7	10.2	10.8	11.4	12.0	12.5	13.1
18.0	07.7	08.3	09.4	09.5	10.0	10.5	11.1	11.6	12.2	12.7
18.5	07.5	08.1	08.6	09.1	09.7	10.2	10.8	11.3	11.8	12.4
19.0	07.3	07.8	08.4	08.9	09.4	10.0	10.5	10.9	11.5	12.1
19.5	07.1	07.6	08.2	08.7	09.2	09.7	10.2	10.7	11.2	11.7
20.0	07.0	07.5	08.0	08.5	09.0	09.5	10.0	10.5	11.0	11.5
20.5	06.8	07.3	07.8	08.2	08.7	09.2	09.7	10.2	10.7	11.2
21.0	06.6	07.1	07.6	08.0	08.5	09.0	09.5	10.0	10.4	10.9

Source: Sheppard, C. C. and John Wolford. Ibid.

Table 82. CAPITAL INVESTMENT EXPENSE FOR A 5,000 BIRD LAYING OPERATION

House & Equip. Cost Per Bird	Total Cost	Interest Rate	Length of Loan	Monthly Payment	Yearly Payment	Cost Per Dozen
\$ 3.00	\$15,000	5% add on	5 yrs.	\$312.50	\$3,750.00	4.29c
4.00	20,000	5% add on	5 yrs.	416.66	4,999.92	5.71c
5.00	25,000	5% add on	5 yrs.	520.83	6,249.96	7.14c
3.00	15,000	6% add on	5 yrs.	325.00	3,900.00	4.50c
4.00	20,000	6% add on	5 yrs.	433.33	5,199.96	5.90c
5.00	25,000	6% add on	5 yrs.	541.66	6,499.92	7.40c
3.00	15,000	7% add on	5 yrs.	337.50	4,050.00	4.60c
4.00	20,000	7% add on	5 yrs.	450.00	5,400.00	6.20c
5.00	25,000	7% add on	5 yrs.	562.50	6,750.00	7.70c
3.00	15,000	5% add on	10 yrs.	187.50	2,250.00	2.57c
4.00	20,000	5% add on	10 yrs.	250.00	3,000.00	3.42c
5.00	25,000	5% add on	10 yrs.	312.50	3,750.00	4.29c
3.00	15,000	6% add on	10 yrs.	200.00	2,400.00	2.74c
4.00	20,000	6% add on	10 yrs.	266.66	3,199.92	3.65c
5.00	25,000	6% add on	10 yrs.	333.33	3,999.96	4.57c
3.00	15,000	7% add on	10 yrs.	212.50	2,550.00	2.91c
4.00	20,000	7% add on	10 yrs.	283.33	3,399.96	3.89c
5.00	25,000	7% add on	10 yrs.	354.16	4,249.92	4.86c
3.00	15,000	6% simple	5 yrs.	290.00	3,480.00	3.90c
4.00	20,000	6% simple	5 yrs.	386.66	4,639.92	5.30c
5.00	25,000	6% simple	5 yrs.	483.33	5,799.96	6.60c
3.00	15,000	6% simple	10 yrs.	166.54	1,998.48	2.28c
4.00	20,000	6% simple	10 yrs.	222.05	2,664.60	3.04c
5.00	25,000	6% simple	10 yrs.	277.56	3,330.72	3.80c

5,000 Birds Produce 105,000 Dozen in 14 Months = 21 doz./bird.
 12 months = 18 doz./bird or 17 1/2 doz./year/bird including cleanout time.

Source: Sheppard, C. C. and John Wolford. Ibid.

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