ANALYSIS OF THE FARM BUSINESS OF EMMANUEL MISSIONARY COLLEGE, 1942-1947

Thesis for the Degree of M. S.

MICHIGAN STATE COLLEGE

James P. Crabtree

1948

ESIS

This is to certify that the

thesis entitled

"Analysis of the Farm Business of
Emmanuel Missionary College, 1942--47"

presented by

James Pemberton Crabtree

has been accepted towards fulfillment
of the requirements for

M.S. degree in Farm Management

Karl T. Wright
Major professor

Date August 3, 1948

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ANALYSIS OF THE FARM BUSINESS OF EMMANUEL MISSIONARY COLLEGE, 1942--1947

By

JAMES P. CRABTREE

A THESIS

Submitted to the Graduate School of Michigan State College of Agriculture and Applied Science in partial fulfilment of the Requirements for the Degree of

MASTER OF SCIENCE

Department of Farm Management

1948

THESIS

VITA

James P. Crabtree

PERSONAL:

Age - 37 years, May 14, 1948	Religion - Protestant
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Nationality - American	Weight - 190 pounds
Marital status - Married	Health - Very good

EDUCATION:

High School - Kenova, West Virginia; graduated 1933. College - Benjamin Franklin University, Washington, D. C. Attended two quarters 1940-41. Emmanuel Missionary College, Berrien Springs, Michigan; graduated 1947, B. S. Degree in Agriculture, minor Biology. Michigan State College 1947-48, M. S. Degree in Farm Management and Education.

PRACTICAL TRAINING AND EXPERIENCE:

Early training and experience gained from grandfather who owned and operated a stock breeding farm in West Virginia. Lived and worked on this farm during childhood and youth.

Two years as a steel-rigger for Youngstown Steel Construction Company.

Seven years with book publishing company, Washington, D. C.

PARTICULAR EXPERIENCE:

Served for six months as assistant herdsman in dairy of sixty purebred cows.

Worked two seasons as wholesale market agent for large truck farm in southwestern Michigan.

Served two years in Emmanuel Missionary College as assistant professor in general science and biology laboratory.

ACKNOWLEDGEMENTS

The writer wishes to express his appreciation to Dr. K. T. Wright and Professor E. B. Hill of the Farm Management Department of Michigan State College for the very helpful suggestions and counsel offered during the preparation of this manuscript.

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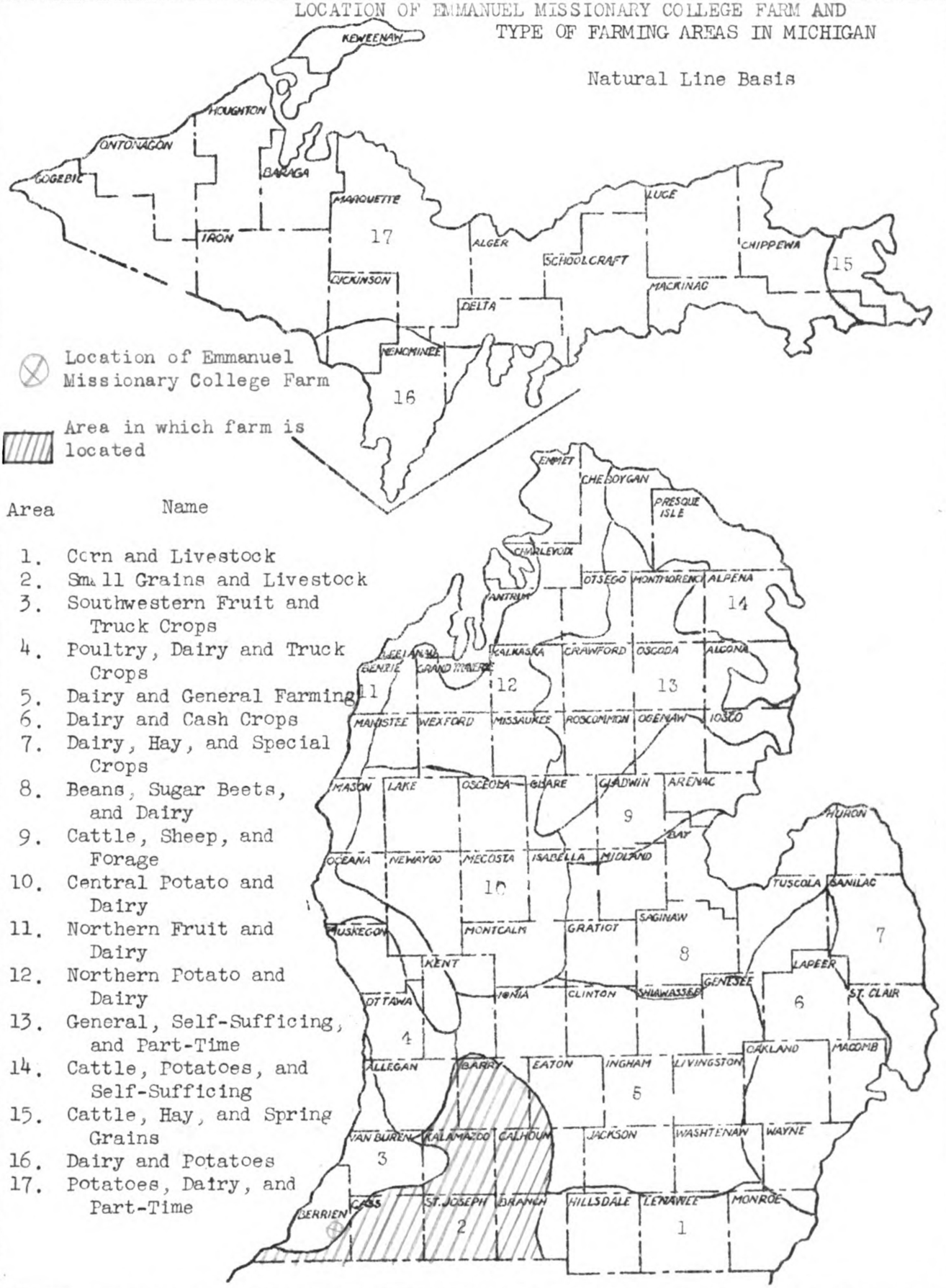
The writer further wishes to express his gratitude to the people of the Farm Management Department of Michigan State College for their courtesy and kindness in checking data used in this manuscript.

LOCATION OF EMMANUEL MISSIONARY COLLEGE FARM AND TYPE OF FARMING AREAS IN MICHIGAN

Natural Line Basis



Area Name

1. Corn and Livestock
2. Small Grains and Livestock
3. Southwestern Fruit and Truck Crops
4. Poultry, Dairy and Truck Crops
5. Dairy and General Farming
6. Dairy and Cash Crops
7. Dairy, Hay, and Special Crops
8. Beans, Sugar Beets, and Dairy
9. Cattle, Sheep, and Forage
10. Central Potato and Dairy
11. Northern Fruit and Dairy
12. Northern Potato and Dairy
13. General, Self-Sufficing, and Part-Time
14. Cattle, Potatoes, and Self-Sufficing
15. Cattle, Hay, and Spring Grains
16. Dairy and Potatoes
17. Potatoes, Dairy, and Part-Time

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ANALYSIS OF THE FARM BUSINESS OF EMMANUEL MISSIONARY COLLEGE, 1942--1947

James P. Crabtree

Introduction

Emmanuel Missionary College farm is one of a large number of farms owned and operated by the educational department of the Seventh-day Adventist denomination. This farm is located in the southwestern corner of Michigan, in Berrien County in the St. Joseph Valley on U.S. Route 31, one mile from the village of Berrien Springs. Similar farms are located in the United States in Massachusetts, Tennessee, Nebraska, California, Washington, Texas, Missouri, Wisconsin; and in foreign countries: Canada, Mexico, Cuba, Argentina, Brazil, South Africa, China, India, and the Islands of the British West Indies. While these farms vary in size both in acres of land and volume of business, the general management and organization is the same for each one.

This study will be confined specifically to the Emmanuel Missionary College farm at Berrien Springs, Michigan. The general plan is to make an analysis of the farm business of this farm to determine, if possible, to what degree the objectives of the farm business organization have been attained, and to make recommendations for the improvement of the farm business factors, using the six-year period from the beginning of 1942 to the end of 1947 as a basis for the study.

The objectives of the farm business, as nearly as could be determined, are:

1. To realize from the farm the greatest financial profit possible, at the same time conserving the value of the land and buildings.
2. To provide the possibility of on-the-job training for those students who are interested in agriculture.
3. To provide illustrations of good methods of agricultural practice.
4. To make available to the school an ample supply of high quality farm products, especially dairy products.

Since the writer plans to be connected with the educational department of the Seventh-day Adventist denomination, he feels that he will benefit directly from this study. It is the purpose also to make a study that will be of some benefit to those who determine the general organizational administrative and accounting policies of the denominational farms. Also it is hoped that all persons interested in farm management may find something of real interest in this study.

History

Emmanuel Missionary College was established in 1901 as the successor of Battle Creek College. The main reason for the move was the necessity for acquiring land for a productive farm. Four hundred and forty-five acres of land were purchased in the beginning. This represented the land in two farms on the present site of this farm. The

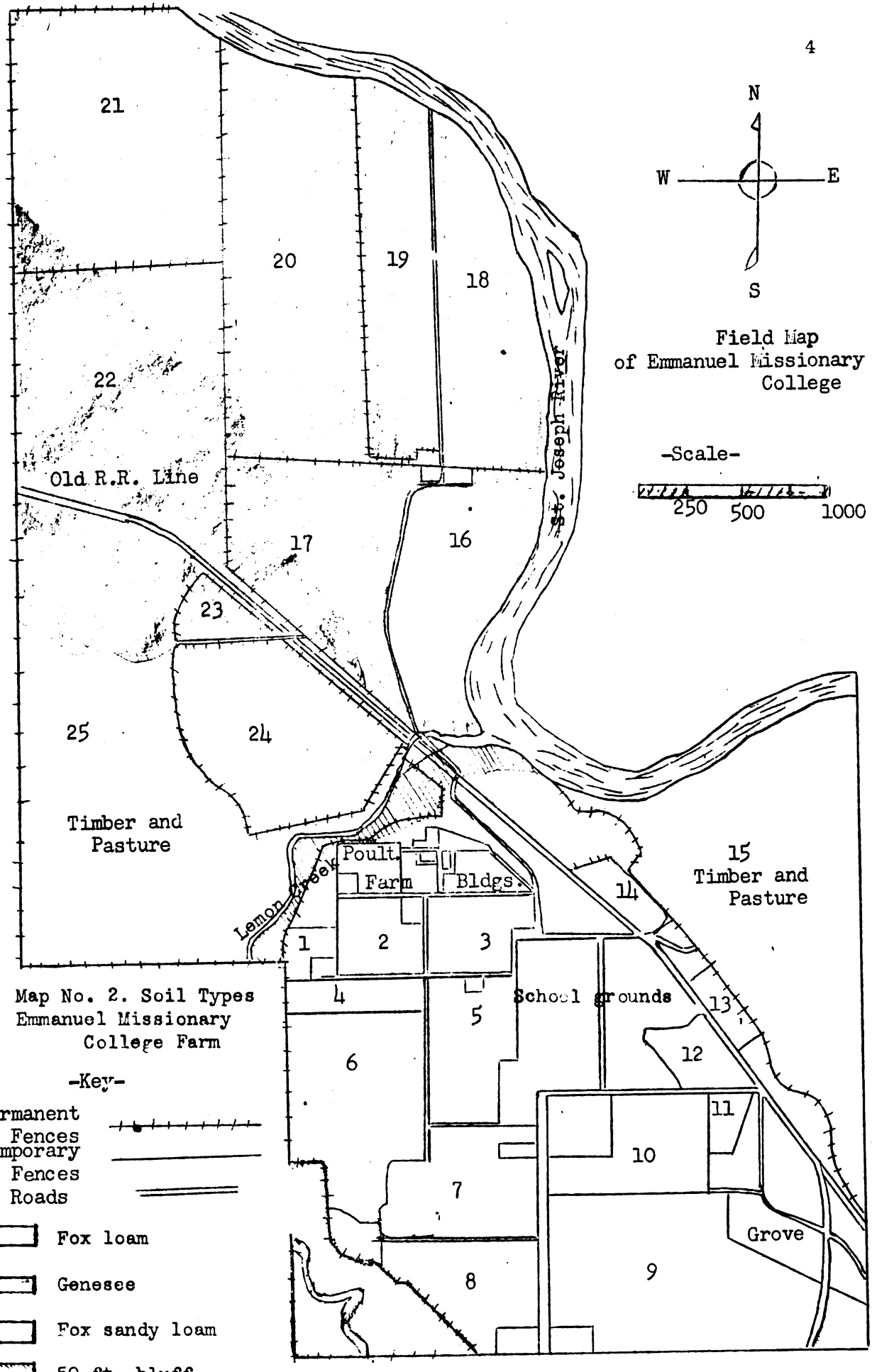
Garland farm contained about 200 acres. The Goodfellow farm consisted of about 245 acres, the latter being all river bottom land.

The farm was managed for several years by different professors of the school. About the year 1920 a regular resident manager was employed. At first the resident manager was no more than a good farmer as far as training and qualifications were concerned. This practice was continued until 1942 when it became necessary to change management, and at the time of this change a manager was secured who qualified as a professional farm manager. It may be stated, therefore, that the farm was under professional farm management with the beginning of the year 1942. The same manager has remained in the same capacity over the period of years covered by this study.

The farm first started out as a general extensive farm with some emphasis on the dairy herd. However, as time passed, truck gardening was found to be profitable and was added to the farm plan. However, the other departments have grown along with these two in such a way as still to remain important in the farm business.

Physical Description of the Land

The present area of land on the Emmanuel Missionary College farm consists of 445 acres. The farm is bounded on the north by the St. Joseph River and on the other sides by adjoining farms. The farm is divided almost in half by a bluff almost fifty feet high. The northern end of the farm was largely formed by overflow from the St. Joseph River; therefore, the soil type of this part of the farm is almost entirely Genesee silt loam. (See map # 2). Near the western end of the


N
W
E
S
Field Map
of Emmanuel Missionary
College
-Scale-
250 500 1000
21
20
19
18
22
Old R.R. Line
17
16
23
24
25
Timber and
Pasture
St. Joseph River
Lemon Creek
Poult.
Farm
Bldgs.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Timber and
Pasture
School grounds
Grove
Map No. 2. Soil Types
Emmanuel Missionary
College Farm
-Key-
Permanent
Fences
Temporary
Fences
Roads
Fox loam
Genesee
Fox sandy loam
50 ft. bluff
Muck

bluff is an area of muckland consisting of about fifteen acres. The low ground on this farm has become known to those connected with the farm as the "lower farm".

The land on the high ground is almost entirely of the type known as fox loam. The top soil on the upland is thin and is underlaid with a sand and gravel sub-soil base. The water table level on the lowland is from three to ten feet below the surface while on the high ground the water table level may go as deep as fifty to one hundred feet. The farm in general is somewhat lower than the surrounding land causing it to receive a small percentage of air drainage from the area. The upland or high ground on the farm is somewhat lower than the adjoining farms on the southeast, yet the high ground on the farm forms a flat table which does not afford a good air drainage; therefore, pockets are formed for air drainage off the higher farms to the southeast. (See map # 3).

Some General Factors Explained

Many factors of farm business are held constant continually. The number of acres tillable remains the same. The general farm layout, because of the physical features of the farm, cannot be changed. The ownership has remained the same and can be said to be permanent for the future. The amount of capital available for operation remains about the same from year to year. The system of accounts and record keeping remains the same year after year. The same type of labor is used consistently.

There are a few problems connected with the operation of this farm with which this study does not concern itself because of the seemingly

physical impossibility of solution. These are merely stated for clarity in the paper.

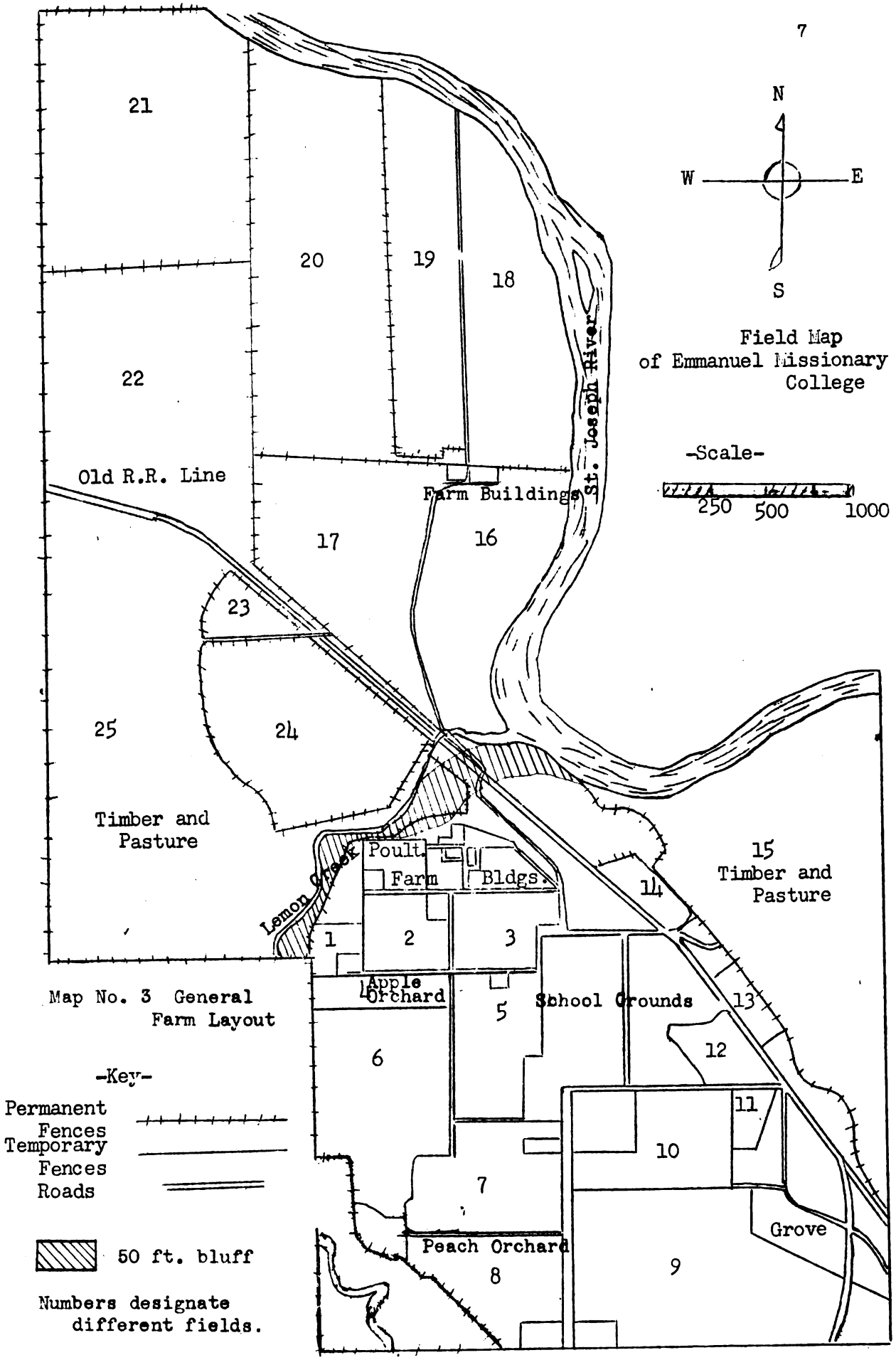
1. The lowland, or lower farm, is flooded each spring, and many times is covered with water well after planting time. The draining of this land would not be possible since much of it is as low as the normal level of the river.
2. The second problem is the fact that the surface of the land is divided into two levels, creating the problem of lifting the weight of crops from the lower level to the higher level. The main set of buildings is located necessarily on the higher level for convenience and easy access to the college buildings.

Farm Business Analysis

The analysis is made in two ways. First, by an over-all picture of the farm business for the six-year period under study in this paper, 1942--1947. Included in this survey of the farm business is a general financial operating statement, and a complete inventory listing of the capital investment for the different years. Included also are schedules showing:

1. Size of the farm business.
2. The crops program.
3. The livestock program.
4. The general farm layout. (Map #3)

The first method of analysis has been made by comparing over-all farm analysis factors: man work units per tillable acre, man work units per man, productive animal units, productive animal units per man, gross



Field Map of Emmanuel Missionary College

Map No. 3 General Farm Layout

income per tillable acre, gross expense per tillable acre, acres per man, crop yield index, crop income per acre; also tillable acres per animal unit, dairy sales per cow, pounds of milk per cow, with the Michigan State College agricultural area standards as they are presented in the "Farm Business Reports" issued by the Farm Management Department of Michigan State College, and with county standards as reported by the county agent's office, also certain standards of measurement used by different state college farm management departments, especially those of Michigan State College, Cornell University, and Minnesota State College.

The second method of analysis of the farm business is a comparison and detailed analysis of the six different departments of the farm and of the different enterprises carried on within the six departments using the accounting records kept on the farm.

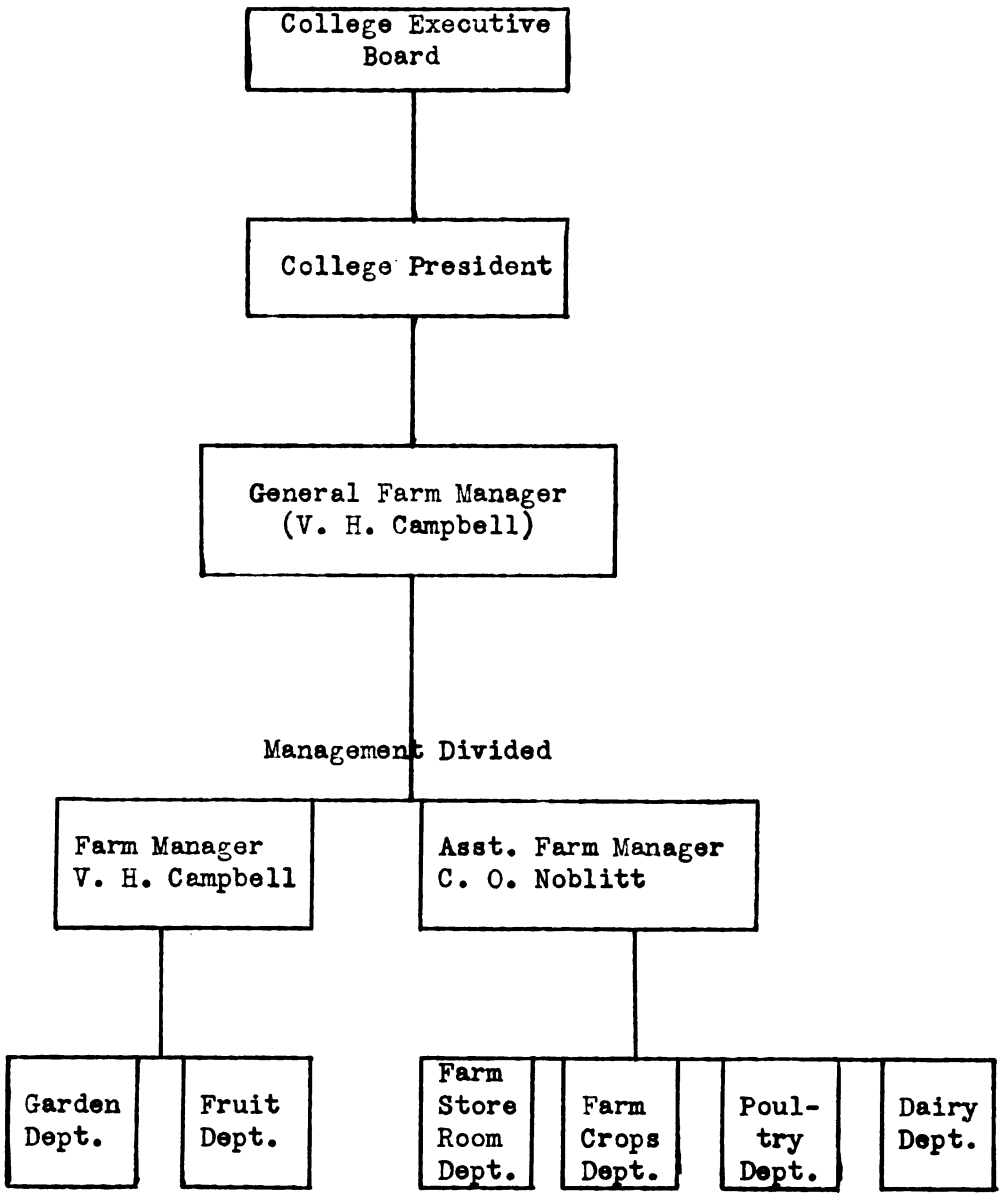
Farm Business Organization

The responsibility of the farm business operation of the farm is vested in the general farm manager. The management further consists of a second, or assistant farm manager. Actually these two men have found it good business to divide the responsibility of the management equally between themselves. (See Chart #1 for a detailed picture of the farm business organization.)

The farm business is divided into six separate departments, as follows:

1. The dairy department.

CHART 1. SHOWING THE ORGANIZATION OF THE FARM BUSINESS OF EMMANUEL MISSIONARY COLLEGE



2. The poultry department.

3. Farm crops department.

4. Farm storeroom department, which consists of the blacksmith shop, the machine shop, the equipment storeroom, and the trucks and farm machinery maintenance.* The farm storeroom department is not considered a production department. However, this department does stand a chance to show a gain because of charges made for outside work.

5. Garden department, which includes the commercial truck garden land and the greenhouse.

6. Fruit department.

Records

All materials, labor, and overhead are charged to the department receiving the benefit. Anything produced by one department and used by another is charged against the department receiving the materials at the prevailing market price. When a department sells a product directly from the department it receives the full benefit in a credit to the sales of that department.

The farm business records are kept in the college accounting office. Each business transaction and item of expense is gathered by the farm manager and reported to the accounting office by a system of schedules and vouchers. At the end of each month an operating statement for each department of the farm is issued by the accounting department, and at the end of each annual period a statement is issued for each department.

*See Glossary

Type of Farming

For the past six years at least the college farm has carried on two distinct types of farming: (1) Small grain and livestock production, which is comparable with that of Michigan farming area #2. (2) Fruit and truck crop production on a part of the high land which is comparable with Michigan area #3.

Economic Conditions

In the consideration of this farm business the writer has taken into consideration the fact that the period 1942-47 was a period of continually rising farm prices and costs. It can be said truly that over this period of time farm incomes were generally high. Weather conditions in general were very favorable. On first thought this might not seem to be a fair period of time to measure the success or failure of a farm business. However, if under favorable conditions the farm business could not reach the objectives of the business, then certainly it would seem only folly to think that under adverse conditions the business could attain any degree of success.

General Financial Statement

First, a general financial statement of the farm business of Emmanuel Missionary College will serve to show the scope of business about to be analyzed.

TABLE 1. OPERATING STATEMENT OF THE EMMANUEL MISSIONARY COLLEGE FARM BUSINESS 1942–47

				SIX YEAR AVERAGE
INCOME				
SALES				
DAIRY DEPT.	$227,709.00			$37,962
FARM CROPS DEPT.	85,404.00			14,237
FRUIT DEPT.	25,160.00			4,193
GARDEN DEPT.	81,205.00			13,534
POULTRY DEPT.	22,539.00			3,756
*STOREROOM DEPT.	52,250.00			8,708
TOTAL SALES			494.267.00	82,378
EXPENSE				
MATERIALS:				
INVENTORY	81,470.13			
PURCHASES	258,020.76			
TOTAL	330,533.84			
LESS CLOSING INVENTORY	42,234.60			
MATERIALS USED	288,299.24			48,049
LABOR & SALARY:				
LABOR	141,497.35			23,583
SALARY	25,803.59			4,301
TOTAL	167,300.94			27,560
INDIRECT EXPENSE:				
ADMINISTRATION	5,892.00			
DEPRECIATION	19,384.57			
ELECTRICITY	2,400.11			
INDIRECT GENERAL	538.87			
INSURANCE	3,821.02			
*RETIREMENT FUND	858.65			
WATER EXPENSE	1,868.00			
INDIRECT EXPENSE, TOTAL	34,763.22			5,793
OTHER EXPENSE, TOTAL		490,363.40		
*LESS FARM CROP INVESTMENT		34,808.69		
NET OPERATING EXPENSE			455,565.00	75,927
NET GAIN FOR SIX YEAR PERIOD			38,702.00	6,460
AVERAGE INVESTMENT FOR SIX YEARS				131,083
PER CENT OF INTEREST EARNED ON INVESTMENT				4.9

*SEE GLOSSARY

TABLE 2. EMMANUEL MISSICNARY COLLEGE
BERRIEN SPRINGS, MICHIGAN

CAPITAL INVESTMENT IN AGRICULTURAL EQUIPMENT AND BUILDINGS
BY DEPARTMENTS

JUNE 15 OF EACH YEAR

	1942	1943	1944	1945	1946	1947
DAIRY DEPT:						
DAIRY CATTLE	4,265.00	4,175.00	4,125.00	3,760.00	5,065.00	8,775.00
DAIRY EQUIPMENT MAJOR AND MINOR	6,484.78	6,637.38	6,645.38	6,731.49	7,043.50	10,485.63
BARNS, DAIRY 4/5	8,325.91	8,325.91	8,325.91	8,325.91	8,547.27	8,608.01
BARN & SILO LOWER FARM	3,369.33	3,369.33	3,369.33	3,369.33	3,369.33	3,369.33
BARN, CATTLE SHEDS	277.24	277.24	277.24	277.24	277.24	277.24
BARN, SIRE SHELTER	—	—	—	1,222.48	1,222.48	1,222.48
DAIRY HOUSE, NEW	13,430.39	13,430.39	13,430.39	13,430.39	13,430.39	13,430.39
DAIRY HOUSE, OLD	1,506.26	1,506.26	1,506.26	1,506.26	1,506.26	1,506.26
SILOS, DAIRY	2,520.05	2,520.05	2,520.05	2,520.05	2,520.05	2,520.05
POULTRY DEPT:						
POULTRY	332.22	332.22	332.22	332.22	332.22	332.22
POULTRY HOUSES	2,520.08	2,520.08	2,520.08	2,520.08	2,520.08	2,520.08
FARM CROPS:						
ALFALFA & OTHER HAY CROPS	363.00	517.10	594.70	467.70	351.00	303.00
FARM EQUIPMENT	7,329.56	8,184.34	8,202.55	8,648.60	8,722.60	9,865.81
FARM HORSES	830.00	425.00	355.00	315.00	50.00	50.00
FARM OFFICE	121.25	121.25	121.25	130.79	130.79	230.79
FENCING	2,905.37	3,018.71	3,018.71	3,068.96	3,068.36	3,087.07
BARN, TOOL SHED	544.02	544.02	544.02	544.02	544.02	544.02
FARM STOREROOM:						
AGRICULTURAL SMALL TOOLS	611.70	636.40	680.15	686.90	691.50	691.50
BLACKSMITH SHOP	1,234.29	1,234.29	1,234.29	1,234.29	1,234.29	1,234.29
FARM STOREROOM	791.91	833.41	880.36	880.36	2,511.39	2,729.73
FRUIT:						
FRUIT EQUIPMENT	1,114.27	1,114.27	1,114.27	1,114.27	1,114.27	1,114.27
FRUIT ORCHARD	1,769.25	1,368.00	1,309.80	1,051.55	1,051.55	1,051.55
½ OF STORAGE	5,456.50	5,456.50	5,456.50	5,456.50	5,456.50	5,456.50
GARDEN:						
ASPARAGUS PATCH	111.64	111.64	111.64	111.64	111.64	111.64
GARDEN	1,108.27	1,186.47	1,186.47	1,227.55	2,151.87	2,803.43
IRRIGATION OVERHEAD	3,059.13	3,059.13	3,059.13	3,083.13	3,083.13	3,083.13
GREENHOUSE	10,129.61	10,129.61	10,485.84	10,485.84	10,485.84	10,485.84
½ OF STORAGE	5,456.49	5,456.49	5,456.49	5,456.49	5,456.49	5,456.49
LAND	39,726.00	39,726.00	39,726.00	39,726.00	39,726.00	39,726.00
TOTAL CAPITAL INVESTMENT	126,938.22	127,461.19	127,833.73	128,929.74	133,019.76	142,316.45

GENERAL FARM ANALYSIS

Size of Business

It is generally believed that a large farm business has greater earnings than a small business. While this statement has been proven to be true,* it is not believed that large institutional farms are very profitable.

The farm under study in this paper is a large institutional farm business. (Table 3, with accompanying schedules 1,2,3,4,5,6, gives the size of this farm business.) In comparing the different factors of size of this farm with those of even the larger farms in the same area it is found that this farm business is comparable with many items and not comparable with other items of the surrounding farms with reference to size and efficiency. Table 4 is presented to illustrate these facts.

Probably one of the best ways to measure the success or failure of any farm business is to compare the factors and the results of the farm with other farms in the same area having the same weather conditions, the same crops or type of farming, and the same markets. The basis of comparison in Table 4 is the six-year average results of seventy-five farms which, in general, have the same type of farming as that of the farm being analyzed.

Although the Emmanuel Missionary College farm is located in Michigan type #3, Farm Business Reports 1942-47, that of southwestern fruit and vegetable type, it will be seen by facts presented later in the

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*Principles of Farm Management, Hill & Brown, 1947. Chapter II, "Size and Volume of Business," pp. 27-40.

TABLE 3. SIZE OF FARM BUSINESS OF EMMANUEL MISSIONARY COLLEGE FARM 1942–47

ITEM	1942	1943	1944	1945	1946	1947	SIX YR. AVERAGE
TOTAL NO. OF ACRES	445	445	445	445	445	445	445
TOTAL NO. TILLABLE ACRES	420	420	420	420	420	420	420
NO. MAN EQUIVALENTS	11	11	11	11	11	11	11
*TOTAL PRODUCTIVE MAN WORK UNITS	3194.5	3057.2	3165.5	3085.5	2994.0	3212.5	3118.2
PRODUCTIVE MAN WORK UNITS PER TILLABLE ACRE	7.6	7.2	7.5	7.3	7.1	7.6	7.4
PRODUCTIVE MAN WORK UNITS PER MAN	290.4	276.9	287.8	280.5	272.0	292.0	283.3
GROSS INCOME PER TILLABLE ACRE	$173.45	180.80	194.64	194.00	185.15	248.60	196.11
GROSS EXPENSE PER TILLABLE ACRE	$165.00	173.70	173.00	175.57	169.90	227.31	130.75
TILLABLE ACRES PER MAN	38.2	38.2	38.2	38.2	38.2	38.2	38.2
CROP YIELD INDEX (FARM CROPS ONLY)	98	141	133	138	124	119	125.5
CROP INCOME PER ACRE (FARM CROPS ONLY)	$35.90	31.90	34.10	35.80	32.00	32.00	33.61
NO. ANIMAL UNITS	95	102	98	100	90.5	95.5	98.3
ANIMAL UNITS PER MAN	8.6	9.2	8.9	9.0	8.2	8.6	8.75
TILLABLE ACRES PER ANIMAL UNIT	4.4	4.1	4.2	4.2	4.6	4.5	4.3
DAIRY SALES PER COW	$207.00	232.77	277.77	296.76	351.40	336.52	287.03
MILK PER COW, POUNDS	7804	8780	9006	9127	9594	7909	8703

*SEE GLOSSARY

SCHEDULE 1. PRODUCTIVE MAN WORK UNITS
EMMANUEL MISSIONARY COLLEGE FARM
BERRIEN SPRINGS, MICHIGAN
1942

Livestock Program

Animal	Number of Head	Productive Animal Units Per Head	Productive Animal Units Total	Productive Man Work Units Per Head	Productive Man Work Units Total
Dairy:					
Cows	55	1.0	55.0	30.0	1650
Beef cows	12	1	12	3	36
Young stock	30	.5	15	3	90
Bulls	3	1	3	10	30
Poultry:					
Hens	1000	.01	10	.18	180
Total			95		1986

Crops Program

Crops	Acres		Productive Man Work Units Per Acre	Productive Man Work Units Total
Grain:				
Corn for silage	25		2.5	62.5
Corn for grain	35		3	105
Oats	57		1	57
Wheat	16		1	16
Hay	50		.07	35
Soybeans	35	218 Acres	3	105
Fruits & Vegetables:				
Tomatoes	23		15	345
Late potatoes	8		5	40
Asparagus	3		20	60
Black raspberries	2		20	40
Peaches	7		15	105
Apples	5		15	75
Strawberries	2		20	40
Greenhouse	2		12	24
Misc. garden	4		6	24
Boysenberries	3	59 Acres	25	75
				1208.5
Total Productive Man Work Units				3194.5

SCHEDULE 2. PRODUCTIVE MAN WORK UNITS
EMMANUEL MISSIONARY COLLEGE FARM
BERRIEN SPRINGS, MICHIGAN
1943

Livestock Program

Animal	Number of Head	Productive Animal Units		Productive Man Work Units	
		Per Head	Total	Per Head	Total
Dairy:					
Cows	60	1	60	30	1800
Beef cows	12	1	12	3	36
Young stock	32	.5	16	3	96
Bulls	4	1	4	10	40
Poultry:					
Hens	1000	.01	10	.18	180
Total			102		2152

Crops Program

Crops	Acres		Productive Man Work Units	
			Per Acre	Total
Grain:				
Corn for silage	25		2.5	62.5
Corn for grain	40		3	120
Oats	29		1.0	29
Rye	4		1	4
Hay (all kinds)	81	179 Acres	.7	56.7
Fruits & Vegetables:				
Tomatoes	13		15	195
Onions	2		30	60
Asparagus	3		20	60
Lettuce	1		10	10
Peaches	7		15	105
Apples	5		15	75
Black raspberries	2		20	40
Strawberries	2		20	40
Misc. garden	4		6	24
Greenhouse	2	41 Acres	12	24
				905.2

Total Productive Man Work Units 3057.2

SCHEDULE 3. PRODUCTIVE MAN WORK UNITS
EMMANUEL MISSIONARY COLLEGE FARM
BERRIEN SPRINGS, MICHIGAN
1944

Livestock Program

Animal	Number of Head	Productive Animal Units Per Head	Productive Animal Units Total	Productive Man Work Units Per Head	Productive Man Work Units Total
Dairy:					
Cows	58	1	58	30	1740
Beef cows	12	1	12	3	36
Young stock	30	.5	15	3	90
Bulls	3	1	3	10	30
Poultry:					
Hens	1000	.01	10	.18	180
Total			98		2076

Crops Program

Crops	Acres		Productive Man Work Units Per Acre	Productive Man Work Units Total
Grain:				
Corn for silage	30		2.5	75
Corn for grain	55		3	165
Oats	65		1	65
Wheat	6		1	6
Hay	35	191 Acres	.7	24.5
Fruits & Vegetables:				
Tomatoes	14		15	210
Onions	2		30	60
Asparagus	3		20	60
Peppers	2		6	12
Melon crops	1		10	10
Eggplant	1		6	6
Lettuce	1		10	10
Soybeans	3		6	18
Black raspberries	2		20	40
Red raspberries	3		20	60
Peaches	7		15	105
Apples	5		15	75
Strawberries	2		20	40
Misc. garden	4		6	24
Greenhouse	2	52 Acres	12	24
				1089.5

Total Productive Man Work Units 3165.5

SCHEDULE 4. PRODUCTIVE MAN WORK UNITS
EMMANUEL MISSIONARY COLLEGE FARM
BERRIEN SPRINGS, MICHIGAN
1945

Livestock Program

Animal	Number of Head	Productive Animal Units		Productive Man Work Units	
		Per Head	Total	Per Head	Total
Dairy:					
Cows	64	1	64	30	1920
Beef cows	10	1	10	3	30
Bulls	3	1	3	10	30
Young stock	26	.5	13	3	78
Poultry:					
Hens	1000	.01	10	.18	180
Total			100		2238

Crops Program

Crops	Acres		Productive Man Work Units	
			Per Acre	Total
Grain:				
Corn for silage	30		2.5	75
Corn for grain	40		3	120
Oats	50		1	50
Hay	45	165 Acres	.7	31.5
Fruit & Vegetables:				
Tomatoes	7		15	105
Sweet corn	2		5	10
Onions	2		30	60
Asparagus	3		20	60
Peppers	3		6	18
Melons	2		10	20
Lettuce	1		10	10
Apples	5		15	75
Peaches	7		15	105
Red raspberries	3	35 Acres	20	60
Misc. garden	4		6	24
Greenhouse	2		12	24
				847.5

Total Productive Man Work Units 3085.5

SCHEDULE 5. PRODUCTIVE MAN WORK UNITS
EMMANUEL MISSIONARY COLLEGE FARM
BERRIEN SPRINGS, MICHIGAN
1946

Livestock Program

Animal	Number of Head	Productive Animal Units		Productive Man Work Units	
		Per Head	Total	Per Head	Total
Dairy:					
Dairy cows	62	1	62	30	1860
Beef cows	4	1	4	3	12
Mature bulls	3	1	3	10	30
Young stock (under 2 yrs.)	33	0.5	16.5	3	99
Poultry:					
Hens	500	0.01	5	0.18	90
Total	602		90.5		2091

Crops Program

Crops	Acres		Productive Man Work Units	
			Per Acre	Total
Grain:				
Corn for silage	25		2.5	62.5
Corn for grain	41		3	123
Oats	45		1	45
Hay (all kinds)	60	171 Acres	0.7	42
Fruits & Vegetables:				
Tomatoes	12		15	180
Sweet corn	$2\frac{1}{2}$		5	12.5
Onions	3		30	90
Asparagus	3		20	60
Misc. garden	4		6	24
Greenhouse	2		12	24
Apples	5		15	75
Peaches	7		15	105
Red raspberries	3	42 Acres	20	60
				903
Total Productive Man Work Units				2994

SCHEDULE 6. PRODUCTIVE MAN WORK UNITS
EMMANUEL MISSIONARY COLLEGE FARM
BERRIEN SPRINGS, MICHIGAN
1947

Livestock Program

Animal	Number of Head	Productive Animal Units		Productive Man Work Units	
		Per Head	Total	Per Head	Total
Dairy:					
Dairy cows	70	1	70	30	2100
Beef cows	2	1	2	3	6
Bulls	3	1	3	10	30
Young stock	35	0.5	17.5	3	105
Poultry:					
Hens	300	.01	3	0.18	54
Total	410		95.5		2295

Crops Program

Crops	Acres		Productive Man Work Units	
			Per Acre	Total
Grain:				
Corn for silage	30		2.5	75
Corn for grain	55		3	165
Oats	25		1	25
Rye	18		1	18
Wheat	30		1	30
Hay	35	198 Acres	0.7	24.5
Straw	30		0.4	12
Fruit & Vegetables:				
Tomatoes	8		15	120
Sweet corn	6		5	30
Onions	3		30	90
Apples	5		15	75
Peaches	7		15	105
Red Raspberries	2		20	40
Asparagus	3		20	60
Misc. garden	4		6	24
Greenhouse	2	40 Acres	12	24
				917.5
Total Productive Man Work Units				3212.5

Table 4.

Comparison of Some Factors of Farm Management of Michigan Area #2 with the Same Factors on the Emmanuel Missionary College Farm. (Average for the Six-Year Period, 1942-47).

	Seventy-five Farms in Cass County	Emmanuel Missionary College Farm
Size:		
Tillable acres	151	420
Productive man work units	438	3118
Animal units	35	98
Gross income per tillable acre	$44	$196
Gross expense per tillable acre	**	$181
Productive man work units per man	290	283
Acres per man	100	38
Crops:		
Crop yield index (farm crops only)	94	126
Crop income per acre (farm crops only)	$9.76	$33.61
Livestock:		
Tillable acres per animal unit	4.3	4.3
Animal units per man	23.4	8.75
Dairy sales per cow	$180	$287
Milk per cow, pounds	5615	8703

**Figures not available

study that this farm is more nearly comparable with that of Michigan area #2, or small grains and livestock. Because of the lack of available data from area #3 type of farming, the factors on this farm which apply directly to fruit and vegetable production will be measured by Michigan averages as presented by the Michigan State crop reporting service.

On this farm the productive man work units per tillable acre average 7.4 for the six years which are being studied, and the average for area #2 was 3.9. The gross income per acre was almost four times as great as that of the average farm in that area. This can be explained partly by the fact that this farm has a much greater intensity as shown by the comparison of the number of acres per man and by the productive man work units per tillable acre.

While these factors are very helpful in the analysis of this farm, they do not give a complete picture of the business. It is, therefore, necessary to compare these items and others with some recognized set of standards. This is the purpose of Table 5, page 24. In this table the standards used are those presented in "Principles of Farm Management," by L. Brown and E. B. Hill of Michigan State College Farm Management Department.

Only those standards measuring the size and volume of business will be presented here. Other standards from the above mentioned source will be used freely throughout the remainder of this paper to measure other factors of this farm business.

Table 5. Comparison of Good Standards of Size and Volume

	Good Standards	Emmanuel Missionary College Farm Six-year Average 1942-47
Land:		
Productive man work units per tillable acre	3-5	7.6
Labor:		
Productive man work units per man	275-350	283.3
Capital:		
Rate of capital turnover*	3-5 yrs.	1.8 yrs.

*See Glossary

Income and Expense

A farm business may consist of adequate size and volume and yet be overloaded with expense. From Schedule 7, page 25, certain measurements may be derived. The expense, income, and net gain per tillable acre are presented graphically for the six years on page 26, Figure 1.

No attempt has been made to compare the income and expense of this farm to that of any other farm or farms in the local area because the items of gross income and expense found on this farm are not included in any average farm business of the local area. For example: in the dairy department the milk is processed and sold retail. Also such items as ice cream and cottage cheese are included in the sales or gross income of the dairy department. These items make it impossible to compare the income and expense with other farms of the same area. Therefore, it is necessary to analyze the income and expense factors from their relation to other factors of the farm business. One way of

Schedule 7. INCOME AND EXPENSE ANALYSIS

EMMANUEL MISSIONARY COLLEGE FARM

(FIGURES ROUNDED TO NEAREST DOLLAR)

DEPARTMENTS	1942	1943	1944	1945	1946	1947	TOTAL GROSS INCOME
INCOME:							
DAIRY	25625	31352	33644	35919	39694	61475	227709
FIELD CROPS	15119	13401	14354	15048	13761	13720	85404
GARDEN	13180	13820	11880	13496	11467	17363	81205
FRUIT	6692	2992	6915	3636	2602	2323	25160
POULTRY	4216	4888	4929	3242	3043	2221	22539
FARM STORE	8018	9485	10029	10210	7198	7310	52250
TOTAL	72850	75938	81751	81551	77765	104412	494267
EXPENSE:							
DAIRY	22746	28363	30420	30959	35819	52668	200975
FIELD CROPS	16614	14580	13148	12742	11467	11168	79719
GARDEN	11238	11881	9365	11231	9543	16380	69638
FRUIT	6268	4085	4811	3906	3150	3373	25593
POULTRY	4535	4689	4714	3355	2898	2722	22913
FARM STORE	7939	9359	10213	11548	8483	9185	56727
TOTAL	69340	72957	72671	73741	71360	95496	455565
NET GAIN	3510	2981	9080	7810	6405	8916	38702
PER TILLABLE ACRE:							
TOTAL INCOME	173	181	195	194	185	249	
TOTAL EXPENSE	165	174	173	176	170	227	
NET GAIN	8	7	22	18	15	22	

Emmanuel Missionary College Farm

Income, Expense, Net Gain Per Tillable Acre, 1942-47

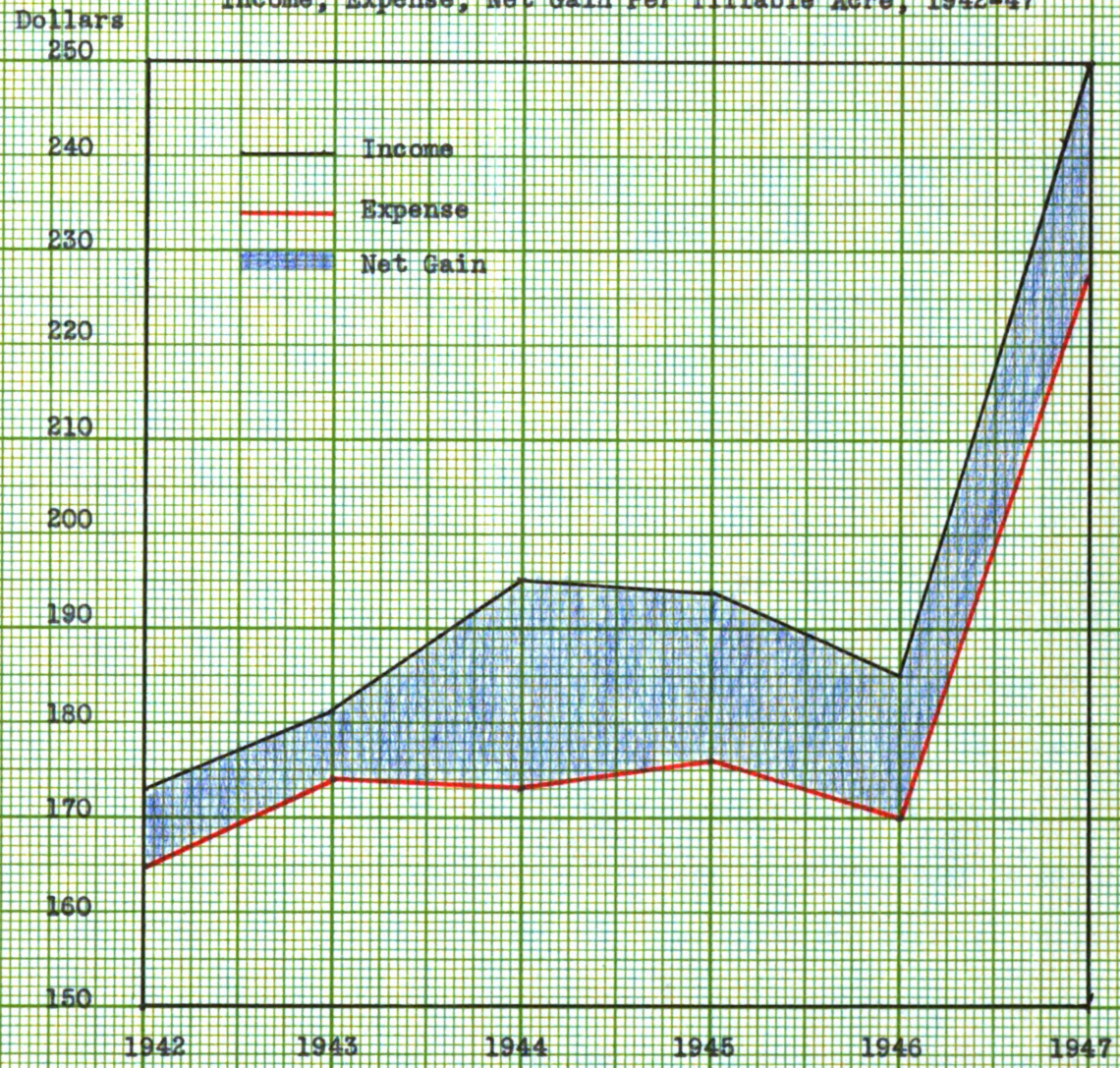

Figure 1

doing this is by showing the income and expense per tillable acre in their relationship to net gain per tillable acre.

From the graph on page 26 it will be seen that the income per tillable acre on this farm was much higher than the area farms. This is due in part to greater intensity of business and in part to the actual management of the farm. The expense per tillable acre is higher than any farm of the area and this is due almost entirely to management of farm business factors. However, any amount of general figures are not enough to determine the success or failure of a farm business. It is necessary, therefore, to go into more detail and break down some of the factors contributing to the final results.

Departmental Analysis

As shown in the organization chart of this farm business on page 9, the farm business is divided into six departments. Each department operates as a separate unit and yet each one is dependent upon the others, and all are under one management. To determine the reason for the final results of a six-year period of operation it is necessary to examine the functions of each of these six departments and their relationship to the whole.

The relationship of cost to the net returns of each department is given as the introduction to the breakdown of the individual enterprises. The graph on page 28, Figure 2, shows the amount of gain for every one hundred dollars of cost. This relationship shows the rate of output* to the rate of input* for the individual departments.

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*See Glossary

Figure 2. GAIN OR LOSS OVER THE COST OF OPERATION
BY DEPARTMENTS 1942-47
EMMANUEL MISSIONARY COLLEGE FARM
BERRIEN SPRINGS, MICHIGAN

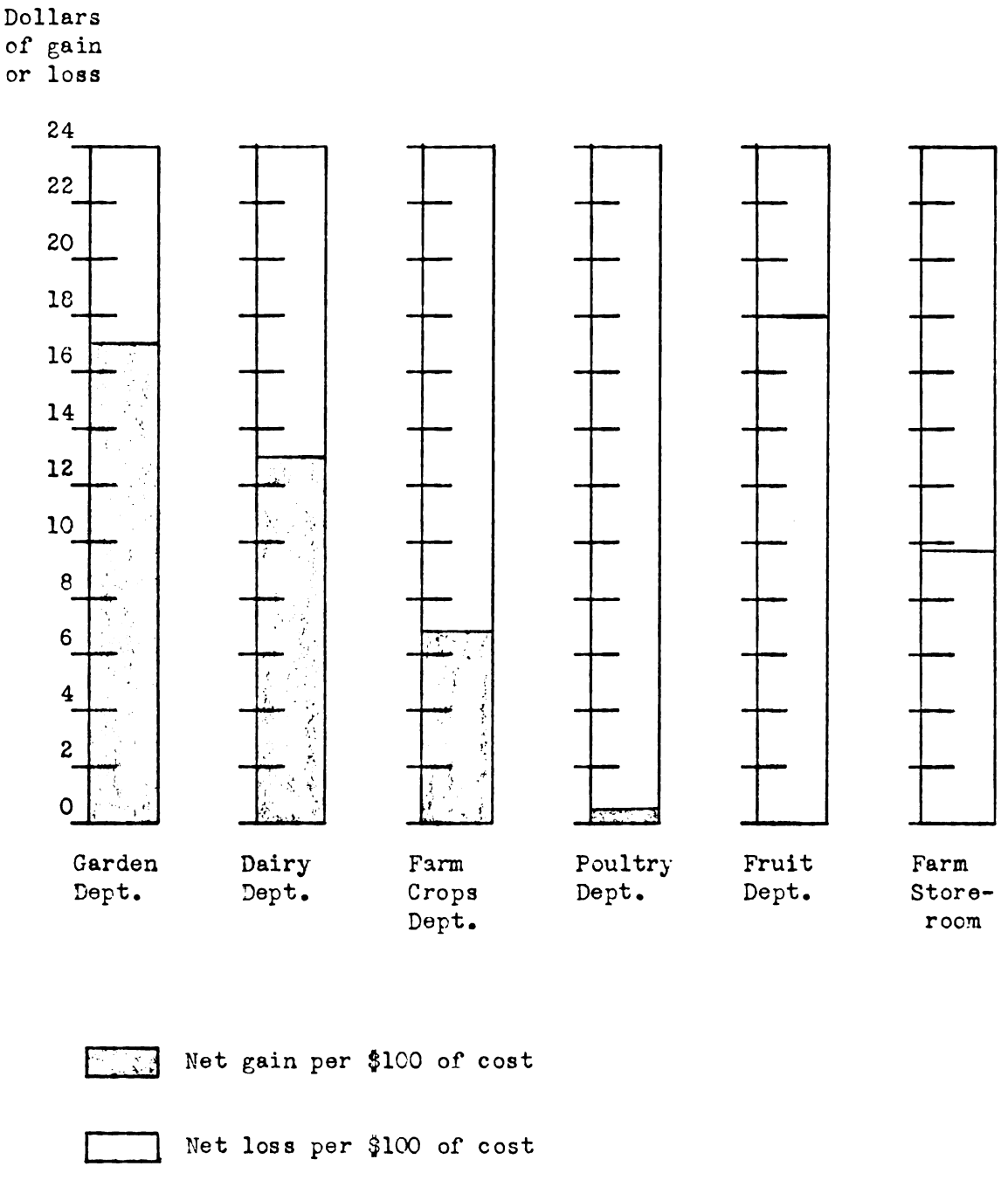


Figure 3. EMMANUEL MISSIONARY COLLEGE
DIVISION OF TOTAL FARM INCOME OVER SIX YEARS, 1942-47

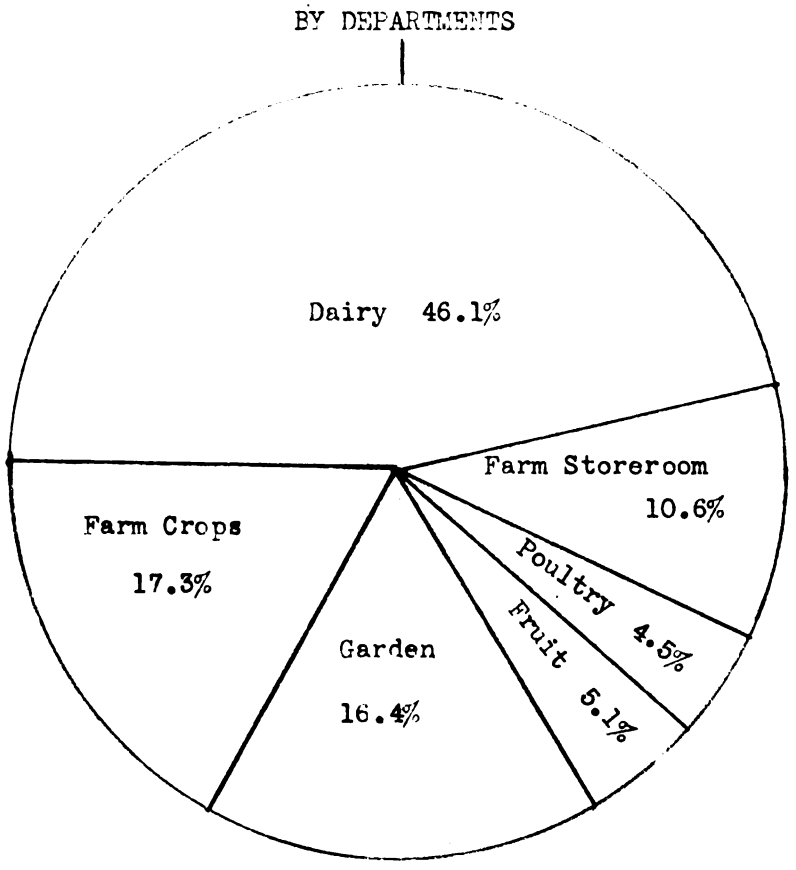
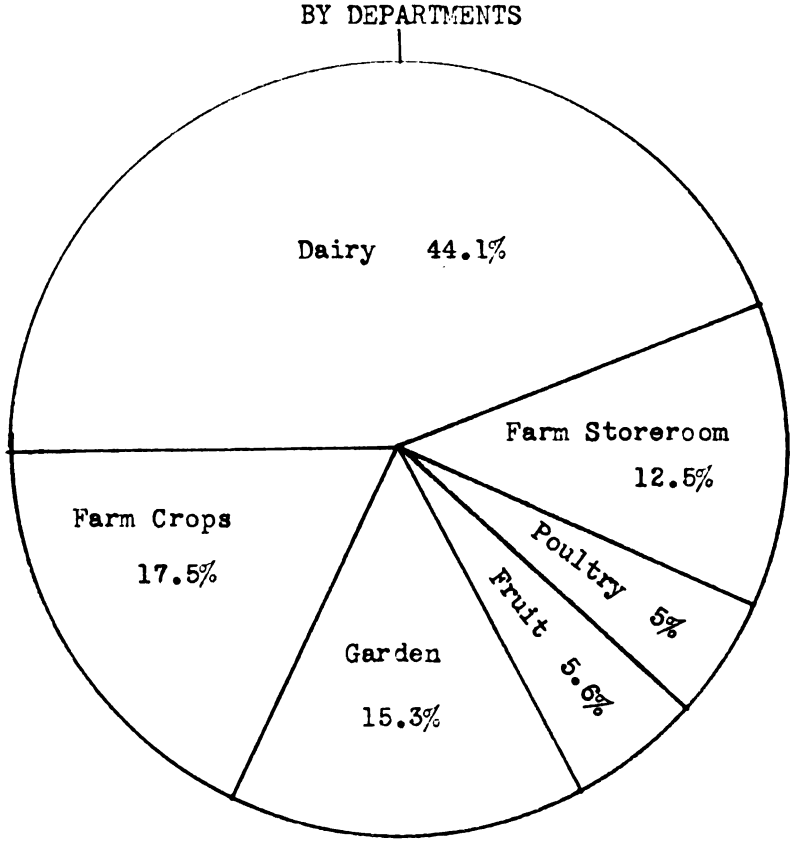


Figure 4. EMMANUEL MISSIONARY COLLEGE
DIVISION OF TOTAL FARM EXPENSE OVER SIX YEARS, 1942-47



Schedule 8. EMMANUEL MISSIONARY COLLEGE

DAIRY DEPARTMENT - ANNUAL OPERATING STATEMENT

INCOME	1942	1943	1944	1945	1946	1947
Sales	25,624.82	31,352.49	33,643.59	35,918.68	39,693.55	61,475.31
EXPENSE						
Materials						
Initial Inventory	1,231.80	2,257.00	1,616.93	1,346.07	976.83	2,437.42
Purchases	13,587.75	16,840.89	17,713.59	18,284.93	22,976.56	34,483.35
Total	14,819.55	19,097.89	19,330.52	19,631.00	23,953.39	36,920.77
Less Closing Inventory	2,257.00	1,616.93	1,346.07	976.83	2,437.42	2,674.07
Materials Used	12,562.55	17,480.96	17,984.45	18,654.17	21,515.97	34,246.70
Labor and Salary						
Labor	7,412.32	7,751.67	8,601.94	9,754.94	11,151.83	14,593.95
Salary	853.14	1,344.35	1,664.00	352.50	764.69	1,115.50
Total	8,265.46	9,096.02	10,265.94	10,107.44	11,916.52	15,709.45
Indirect Expense						
Administration	312.00	384.00	384.00	396.00	475.00	528.00
Depreciation	751.14	670.00	898.99	1,049.18	1,085.18	1,321.86
Electricity	344.32	341.28	327.79	321.26	362.47	357.17
Indirect General	48.00	48.00	48.00	80.00	60.00	68.12
Insurance	269.67	181.67	297.05	224.03	188.41	213.95
Retirement Fund	12.80	21.99	46.04	30.34	80.27	79.23
Water Expense	180.00	139.00	168.00	97.00	144.00	144.00
Total Indirect	1,917.93	1,785.94	2,169.47	2,197.81	2,395.33	2,712. 33
Total Expense	22,745.94	28,362.92	30,419.86	30,959.42	35,818.82	52,668.48
Operating Gain	2,878.88	2,989.57	3,223.73	4,959.26	3,874.73	8,806.83

Those departments showing the greatest amount of gross returns per one hundred dollars cost were consistently the same departments through the six-year history of this study. This fact seems to indicate that the reason lies in the choice and management of the enterprises and is the result of a permanent cause rather than a seasonal fluctuation or physical layout of the farm.

Dairy Department

The dairy department of the Emmanuel Missionary College farm consists of the dairy herd, young stock, and herd sires cared for by a regular herdsman. Also included is the dairy processing plant in which the milk is processed and bottled for sale. The manufacture and sale of ice cream is included in this part of the dairy department.

This department is the largest of the six departments both in capital investment and gross income. The dairy department contributes an average net gain of $4455 for the six years. Although this department contributes a greater amount of income than any other department, the income is due largely to the sale of processed dairy products and in this respect is not comparable to the dairy projects of adjoining farms in that area.

Besides the largest amount of gross income and net profit the dairy department provides the greatest volume of business in the form of man work units. Because of the lack of data the man work efficiency may not be determined separately from the farm operation as a whole. This department accounted for an average of 1997 productive man work units per year.

There are certain practices and methods carried out in the dairy department which clarify the functions of the dairy. The policy of keeping indexed* and progeny-tested* herd sires coupled with the fact that herd sires from this farm have been in demand in good dairy breeding circles is proof that an efficient breeding program has been in operation. The cows are rated by the Dairy Herd Improvement Association of North Berrien County as being much above the average in production and quality in the State of Michigan. The quality of milk produced has been judged by the State Dairy Inspector as Grade A which seems to indicate that good practices have been followed in the drawing and handling of milk.

The rate of production per cow is probably the best measure of the rate of efficiency. The cows in this herd produced as an average for the six-year study 8703 pounds of milk per cow as compared with the area average of 5616 pounds per cow. The average butterfat test was 4.2 as compared with the state average of 3.3 (Michigan Livestock Summary, Michigan Crop Reporting Service).

A further survey of the production rates and efficiency of the herd may be derived from a survey of the records of the Dairy Herd Improvement Association* of North Berrien County. These records are kept by a qualified milk tester servicing the farm at regular monthly intervals. A summary of these records is given in Table 6 for the six-year period, 1942-47.

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*See Glossary

TABLE 6. YEARLY SUMMARY OF DAIRY HERD PRODUCTION OF EMMANUEL MISSIONARY COLLEGE FARM 1942-47

YEAR ENDING OCTOBER 23	AVERAGE NUMBER COWS IN HERD	TOTAL POUNDS OF MILK	AVERAGE MILK PER COW, LBS.	TOTAL POUNDS BUTTERFAT	POUNDS BUTTERFAT PER COW	PER CENT BUTTER FAT	TOTAL VALUE PRODUCT	AVERAGE VALUE PER COW
1942	48.8	381,070	7804	16181	332	4.2	$10,111	$207
1943	44.0	381,993	8780	15546	357	4.08	10,126	233
1944	50.0	450,348	9006	18257	365	4.04	13,889	278
1945	49.4	451,067	9127	17736	359	4.0	14,666	297
1946	49.0	470,133	9594	19806	404	4.2	17,219	351
1947	69.1	546,354	7909	22796	330	4.2	23,221	337

The dairy department furnishes enough manure each year for a four-ton application per acre to all field crops and ten tons per year per acre on forty-five acres of garden land. The excess over this amount is used for compost for the greenhouse. This manure is charged to the garden and crops departments and credited to the dairy department at the rate of two dollars per ton or one spreader load.

The barns are adequate for seventy milking cows and thirty young stock. The herd sire shelters are separate from the main barns and are equipped with safety breeding pens. All barns are equipped with electric lights and running water.

The dairy department used 44.1 per cent of the total expenses for the entire farm from 1942 to 1947 (See Figure 4, page 29), and returned 46.1 per cent of the total income for the same period (See Figure 3, page 29). The department gained seventeen dollars for every one hundred dollars of cost. (See Figure 2, page 28). Forty-two per

cent of the total average labor charge for the entire labor used on the farm was charged to the dairy department. The average expenses for this department for the six-year period 1942-47 were divided in the following manner: Thirty-two per cent for labor and salary, sixty-one per cent for materials used*, and seven per cent for indirect expense. (See Schedule 9, page 35).

Farm Crops Department

Crops grown are corn, oats, wheat, rye, alfalfa and mixed hay. Corn is the major crop and uses about seventy-one acres a year or thirty-eight per cent of the total acres in crops. The production of corn has averaged thirty-five bushels per acre during the six-year period 1942-47. The area average for the same period was thirty-seven bushels per acre. The average production of silage was nine tons per acre as compared to the area average of six and one-half tons per acre.

Oats occupied forty-eight acres each year for the six-year period and represent twenty-six per cent of all land in crops and about sixteen and four-tenths per cent of total tillable acres. For every one hundred dollars of cost this department gained seven dollars. (See Figure 2, page 28). The average production per acre was forty-one bushels as compared to thirty-four bushels per acre for the area.

Hay crops occupy an average of fifty-one acres per year or about twelve per cent of the total tillable acres and twenty-seven per cent of total acres in crops. The production of hay averaged two tons per acre as compared to the area average of one and one-half tons per acre.

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*See Glossary

SCHEDULE 9. DISTRIBUTION OF EXPENSE WITHIN THE DEPARTMENTS OF EMMANUEL MISSIONARY COLLEGE FARM 1942-47
(All figures are six-year averages)

Department	Materials Used	Labor and Salary	Indirect Expense	Total Average Expense	Materials Used. Per Cent of Total	Labor & Salary Per Cent of Total	Indirect Expense Per Cent of Total
Dairy	20,407	10,893	2,196	33,496	61	32	7
Garden	6,961	5,577	1,163	13,701	51	41	8
Farm crops	9,433	5,777	1,376	16,586	57	34	9
Farm Storeroom	6,144	2,369	444	9,457	65	30	5
Fruit	2,390	1,840	454	4,684	51	39	10
Poultry	2,729	927	163	3,819	71	24	5

Wheat was grown only three years out of the six-year period 1942-47 and occupied an average of eight and one-half acres per year for the years grown. The production of wheat averaged twenty-eight bushels per acre as compared to the area average of fourteen bushels per acre.

The choice of crops grown on this farm is determined in part by the soil types and in part by the use to be made of the crop. Since the farm has so much land of the heavy type of Genesee silt loam which is not well drained at all times, alfalfa is grown less than is customary for the location. Corn and oats and hay must be grown in large quantities to supply the large number of animal units.

The crops production on the Emmanuel Missionary College farm uses the practice of a three-year rotation except on land that is seeded to hay crops. The usual rotation on the lowland is corn, oats, sweet clover and then back to corn. When land is seeded to hay crops the practice is to follow corn with oats and seed to clover or alfalfa. However, only fields 9, 10, 11, and 17 (See map No. 3, page 7) can be seeded to alfalfa because of the lack of drainage on the other field-crop areas. All crop lands receive from three to four tons of barnyard fertilizer per acre and from two to three ~~tons~~ cwt of commercial fertilizer per acre each year. The land on this farm does not need lime as indicated by soil tests made by the State Soil Conservation Department in 1942. This test showed a pH range from 5.5 to 6 on the upland and from 6 to 7 on the lowland.

All farm crops are sold directly to the dairy department at the prevailing market price at the time of harvest and appear on the records

SCHEDULE 10. EMMANUEL MISSIONARY COLLEGE

FARM CROPS - ANNUAL OPERATING STATEMENT

INCOME	1942	1943	1944	1945	1946	1947
Sales	15,119.27	13,401.38	14,354.31	15,047.58	13,761.31	13,719.92
EXPENSE						
Materials						
Initial Inventory	8,122.84	6,182.13	6,604.00	7,054.16	5,130.78	4,614.20
Purchases	5,192.10	5,901.92	6,400.78	4,256.08	5,634.16	4,948.77
Total	13,314.94	12,084.05	13,004.78	11,310.24	10,764.94	9,562.97
Less Closing Inventory	2,561.45	2,821.18	2,798.41	2,336.55	1,857.28	1,071.04
Materials used	10,753.49	9,262.87	10,206.37	8,973.69	8,907.66	8,491.93
Labor and Salary						
Labor	5,443.82	6,002.64	4,584.10	4,899.62	3,527.33	3,106.62
Salary	2,418.86	1,805.13	1,235.00	458.50	541.46	637.50
Total	7,862.68	7,807.77	5,819.10	5,358.12	4,068.79	3,744.12
Indirect Expense						
Administration	264.00	276.00	264.00	276.00	330.00	370.00
Depreciation	1,061.57	809.70	839.64	738.51	738.51	977.41
Electricity	9.21	14.78	16.74	20.68	21.43	22.70
Indirect General	12.00	12.00	12.00	20.00	17.00	30.27
Insurance	187.13	97.13	156.75	97.59	80.60	75.59
Retirement Fund	36.28	36.72	40.99	24.46	23.48	16.50
Water Expense	48.00	46.00	48.00	27.00	36.00	24.00
Total Indirect	1,618.19	1,292.33	1,378.12	1,204.24	1,247.02	1,516.47
Total Expense	20,234.36	18,362.97	17,403.59	15,536.05	14,223.47	13,752.52
Less Farm Crop Investment	3,620.68	3,782.82	4,255.75	2,794.23	2,756.92	2,584.84
Net Operating Expense	16,613.68	14,580.15	13,147.84	12,741.82	11,466.55	11,167.68
Gain			1,206.47	2,305.76	2,294.76	2,552.24
Loss	1,494.41	1,178.77				

as a credit to the farm crops department and as a charge to the dairy department.

The farm crops department absorbed seventeen and one-half per cent of the total expense for the six-year period 1942-47 and returned seventeen and three tenths per cent of the total income for the farm. (See Figures 3 and 4, page 29). This department gained seven dollars for every one hundred dollars of cost. (See Figure 2, page 28).

The total six-year average expense for this department is divided in the following manner: Nineteen per cent of the total labor charge of the whole farm for this six-year period was charged to the farm crops department. Thirty-four per cent of the department expense for the six-year period was charged to labor and salary, fifty-one per cent to materials used, and nine per cent to indirect expense.

Garden Department

The garden department includes the greenhouse, one-half of the packing house, the irrigation system, and the garden land. This department has used an average of twenty-seven acres or 6.4 per cent of the total tillable acres each year, and accounted for 15.3 per cent of the total farm expense for the six-year period 1942-47. (See Figure 4, page 29). This department returned 16.4 per cent of the total net income for the period. (See Figure 3, page 29). It had the largest net gain per one hundred dollars of cost of any department in the farm business. (See Figure 2, page 28). This would seem to indicate that if the same amount were invested in the garden department that was invested in the dairy department the income from the garden would be greater than that

SCHEDULE 11. EMMANUEL MISSIONARY COLLEGE
GARDEN DEPARTMENT - ANNUAL OPERATING STATEMENT

INCOME	1942	1943	1944	1945	1946	1947
Sales	13,179.92	13,819.50	11,879.79	13,496.17	11,467.26	17,362.54
EXPENSE						
Materials						
Initial Inventory	2,305.66	2,077.90	3,485.08	3,702.83	3,204.84	4,174.72
Purchases	4,943.75	5,946.26	4,096.11	4,677.49	4,052.62	6,110.33
Total	7,249.41	8,024.16	7,581.19	8,380.32	7,257.46	10,285.05
Less Closing Inventory	449.98	1,415.58	1,154.88	905.01	1,228.43	1,919.94
Materials used	6,799.43	6,608.58	6,426.31	7,475.31	6,029.03	8,365.11
Labor and Salary						
Labor	4,011.29	3,937.61	3,157.46	4,311.84	4,483.76	7,881.43
Salary	1,059.50	1,202.78	1,236.00	567.75	777.37	834.00
Total	5,070.79	5,140.39	4,393.46	4,879.59	5,261.13	8,715.43
Indirect Expense						
Administration	72.00	96.00	96.00	108.00	130.00	198.00
Depreciation	640.21	714.23	681.94	825.44	824.94	940.65
Electricity	9.74	19.20	9.10	9.34	16.92	17.67
Indirect General	12.00	12.00	12.00	20.00	17.00	30.28
Insurance	173.57	141.81	206.95	166.55	133.29	165.28
Retirement Fund	16.13	23.42	23.68	11.64	23.30	14.40
Water Expense	72.00	69.00	63.00	35.00	54.00	72.00
Total Indirect	995.65	1,075.66	1,092.67	1,175.97	1,199.45	1,438.28
Total Expenses	12,865.87	12,824.63	11,912.44	13,530.87	12,489.61	18,518.83
Less Farm Crop Investment	1,627.92	943.50	2,547.95	2,299.83	2,946.30	2,139.26
Net Operating Expense	11,237.95	11,881.13	9,364.49	11,231.04	9,543.31	16,379.57
Gain	1,941.97	1,938.37	2,515.28	2,265.13	1,923.95	982.97

of the dairy. But the amount of land suitable for garden truck crops would not permit such an investment.

The garden department produces tomatoes, sweet Spanish onions, and sweet corn for the market. About four acres are used each year for miscellaneous vegetables for the school kitchen. The rate of crop production has been high as compared to state average figures reported by the [1] "Annual Crop and Livestock Summary," six-year average 1942-47. No comparison can be made of area averages of this department because of lack of available data.

The greenhouse produces one crop of flowers for wholesale at Thanksgiving and Christmas. One crop of vegetable plants are produced each year. The plants are grown to supply the garden department with plants and some excess to be sold locally. Data was not available to make a complete separation of the results of the greenhouse operation from that of the garden department.

The marketing of the garden crops is done through three outlets. A small amount is sold locally. The bulk, however, is sold through the Benton Harbor fruit market or shipped direct to the Chicago market. Good market facilities have contributed to the apparent success of this department. If other garden land could be added to this department it seems possible that the income per dollar spent could be raised even above the present figure.

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(1) Crop Report for Michigan, Annual Crop and Livestock Summary January-February, 1947. United States Department of Agriculture, Bureau of Agricultural Economics in cooperation with Michigan Department of Agriculture, Bureau of Agricultural Industry.

Fruit Department

The fruit department includes the orchards, the berry fields, one-half of the packing house, and land used for growing fruit. An average of sixteen acres per year or 3.8 per cent of the total tillable acres was used for fruit. This department accounted for 5.1 per cent of the total net income of the farm and 5.6 per cent of the total expenses for the six-year period 1942-47. (See Figures 3 and 4, page 29). This department had the largest loss per one hundred dollars of cost of any department on the farm. For every one hundred dollars spent for cost of operation eighteen dollars was net loss. (See Figure 2, page 28). This loss can be accounted for by two years of complete crop failure on peaches and apples, and one year with a very light crop during the six-year period 1942-47. Thus the tree fruits were responsible for the heavy loss. The small fruits (berries) showed a gain over cost of production from the crop records of the college. Over a period of twelve years there was an average of one good crop of tree fruits to three poor crops or failures. This seems very unusual since the Emmanuel Missionary College farm is located in a fruit area, but it may be explained by the physical location of the land. (See page 5).

The land of this farm is somewhat lower than the land to the southeast and this causes an air drainage toward the river across the Emmanuel Missionary College farm. Since the land used for tree fruits is a flat tableland, the cold air does not move into the river and thus causes frost damage both in winter and late spring more often than on higher ground.

SCHEDULE 12. EMMANUEL MISSIONARY COLLEGE
FRUIT DEPARTMENT - ANNUAL OPERATING STATEMENT

INCOME	1942	1943	1944	1945	1946	1947
Sales	6,692.30	2,992.11	6,915.06	3,635.63	2,602.21	2,322.94
EXPENSE						
Materials						
Initial Inventory	1,441.13	696.80	284.77	756.91	534.11	636.42
Purchases	2,493.60	1,542.20	2,755.36	1,704.86	1,568.42	810.61
Total	3,934.73	2,239.00	3,040.13	2,461.77	2,102.53	1,447.03
Less Closing Inventory	135.84	184.15	305.91	63.10	96.75	100.80
Materials used	3,798.89	2,054.85	2,734.22	2,398.67	2,005.78	1,346.23
Labor and Salary						
Labor	2,080.60	809.00	808.38	952.49	813.51	1,453.63
Salary	619.50	852.34	1,236.00	567.75	393.49	451.00
Total	2,700.10	1,661.34	2,044.38	1,520.24	1,207.00	1,904.63
Indirect Expense						
Administration	96.00	96.00	72.00	84.00	100.00	106.00
Depreciation	116.71	256.14	258.34	273.16	273.66	280.15
Electricity	5.51	16.28	20.44	11.76	6.39	20.44
Insurance	30.00	18.00	49.00	45.00	34.20	46.00
Retirement Fund	9.29	14.32	20.64	9.57	8.79	7.42
Water Expense	72.00	69.00	63.00	35.00	54.00	48.00
Total Indirect	329.51	469.74	483.42	458.49	477.04	508.01
Total Expense	6,828.50	4,185.93	5,262.02	4,377.40	3,689.82	3,758.87
Less Farm Crop Investment	560.96	100.62	451.00	471.01	539.67	385.43
Net Operating Expense	6,267.54	4,085.31	4,811.02	3,906.39	3,150.15	3,373.44
Gain	424.76					
Loss		1,093.20	2,104.04	270.76	547.94	1,050.50

Poultry Department

The poultry department consists of the poultry houses, feeding equipment, and the laying hens. No brooder equipment or range equipment is used since only laying hens are kept. This department had a net loss over the six-year period 1942-47 of fifty cents for every one hundred dollars cost of operation. Three years out of the six the department showed a loss (See Schedule 7, page 25), and for the six-year period the average net loss was sixty-two dollars per year.

Over the six-year period the poultry accounted for five per cent of the total expenses of the farm. The loss in this department can be explained by two factors: First, the amount of poultry kept has not been large enough to overcome the expense necessary to keep a small flock. The assumption here is that a larger flock would cut down the cost per hen. The second reason is that the poultry project has been cared for by those not accustomed to caring for poultry, and since the project was small it has received a very minimum of care and management. These last statements are based upon my own observations while being connected with this farm.

Farm Storeroom Department

This department consists of the blacksmith (or machine) shop, the machinery sheds, three motor trucks, road grading equipment, and some other equipment such as the caterpillar tractor, fuel containers, gas pump and tank. This department has shown a loss over the period of this study and has accounted for ten per cent of the total expenses for the

SCHEDULE 13. EMMANUEL MISSIONARY COLLEGE
POULTRY DEPARTMENT - ANNUAL OPERATING STATEMENT

INCOME	1942	1943	1944	1945	1946	1947
Sales	4,215.58	4,888.09	4,928.80	3,241.96	3,043.22	2,220.95
EXPENSE						
Materials						
Initial Inventory	1,004.89	1,289.26	1,094.18	1,122.29	391.53	589.05
Purchases	3,343.62	2,990.93	3,048.77	1,883.73	2,278.73	1,741.03
Total	4,348.51	4,280.19	4,142.95	3,006.02	2,670.26	2,330.08
Less Closing Inventory	1,039.26	844.18	1,122.29	391.53	589.05	417.21
Materials used	3,309.25	3,436.01	3,020.66	2,614.49	2,081.21	1,912.87
Labor and Salary						
Labor	752.26	768.22	1,294.32	535.19	661.25	669.99
Salary	257.79	332.99	212.25	67.00	12.00	--
Total	1,010.05	1,101.21	1,506.57	602.19	673.29	669.99
Indirect Expense						
Administration	24.00	24.00	24.00	24.00	28.00	27.00
Depreciation	130.23	75.00	75.00	75.00	75.00	75.00
Electricity	10.38	10.14	14.70	7.23	9.37	12.17
Insurance	35.50	25.50	45.25	24.25	20.75	16.25
Retirement Fund	3.87	5.00	15.86	1.01	1.68	
Water Expense	12.00	12.00	12.00	7.00	9.00	9.00
Total Indirect	215.98	151.64	186.81	138.49	143.80	139.42
Total Expense	4,535.28	4,688.86	4,714.04	3,355.17	2,898.30	2,722.28
Net Operating Expense	4,285.28	4,438.86				
Gain		449.23	214.76		144.92	
Loss	69.70			113.21		501.33

SCHEDULE 14. EMMANUEL MISSIONARY COLLEGE
FARM STOREROOM - ANNUAL OPERATING STATEMENT

INCOME	1942	1943	1944	1945	1946	1947
Sales	8,018.30	9,485.07	10,029.23	10,210.27	7,198.29	7,310.69
EXPENSES						
Materials						
Initial Inventory	540.14	717.92	1,046.79	1,026.70	866.27	905.78
Purchases	7,382.15	7,097.30	6,342.46	7,529.34	4,159.60	4,343.56
Total	7,922.29	7,815.22	7,389.25	8,556.04	5,025.87	5,249.34
Less Closing Inventory	717.92	1,046.79	1,026.70	866.27	905.78	553.02
Materials used	7,204.37	6,768.43	6,362.55	7,689.77	4,120.09	4,696.32
Labor and Salary						
Labor	274.61	1,296.61	2,737.18	3,339.08	3,936.62	3,700.24
Salary	--	805.53	546.00	40.00	201.72	340.00
Total	274.61	2,102.14	3,283.18	3,379.08	4,138.34	4,040.24
Indirect Expense						
Administration	24.00	24.00	36.00	36.00	42.00	66.00
Depreciation	382.60	400.19	388.44	345.49	61.99	273.37
Insurance	53.00	41.00	102.25	64.25	57.55	56.25
Retirement Fund		23.11	40.46	33.74	60.46	41.76
Electricity					2.62	10.89
Total Indirect	459.60	488.30	567.15	479.48	224.62	448.27
Total Expense	7,938.58	9,358.87	10,212.88	11,548.33	8,483.05	9,184.83
Net Operating Expense	7,938.58	9,358.87				
Gain	79.72	126.20				
Loss			183.65	1,338.06	1,284.76	1,874.14

six years 1942-47. (See Figure 4, page 29). Since this department is not considered as a production department it is expected that it will show some loss. However, in this case the mechanic in charge of the blacksmith shop does some repair work and welding for local farmers and other people in the community. Therefore, this department does have opportunity to show a gain from outside work. Since such outside jobs are not kept as a separate item of income from the farm business of this department it would be impossible to show whether the loss was due to work done for the farm or from outside work.

SUMMARY

The purpose of this study has been to make an analysis of the farm business of Emmanuel Missionary College to determine the degree to which the business is attaining the objectives for the operation of the farm business under the present form of organization. From the study some general conclusions may be stated:

1. The total volume and size of business is adequate for this type of farm.
2. Land use is efficient and meets the needs of the farm.
3. There is a definite functional soil conservation plan in operation
4. Crop yield index is high. (Thirty-four per cent above area average.
5. Income per tillable acre from field crops was $33.61 per acre as compared to $9.76 per acre for the area.
6. Amount of livestock per tillable acre is only average.

7. Animal units per man are below average.

8. Animal production rate is high.

9. Man work efficiency is below area average.

10. Expense per tillable acre is much higher than the area average.

11. The expenses are not economical relative to income on many parts of the farm.

A more detailed survey of strong points and weak points follows:

Operation of Emmanuel Missionary College Farm 1942-47

Strong Points	Weak Points
1. Adequate size of farm business.	1. Man work efficiency low. (Causes labor expense to be high per unit of output).
2. Effective soil conservation program.	2. Expense, other than labor, high.
3. High crop yields.	3. Inefficient use of land in garden and fruit.
4. Good land use with field crops.	4. Low average crop yields on tree fruits.
5. High income per acre.	5. Inadequate farm account records.
6. High grade of livestock.	6. Capital investment overbalanced by expense.
7. Livestock production rate high.	7. Combination of enterprise is weak.
	8. Cleaning of barns and handling of manure done by hand.

Objectives

The all important question of this study may be stated as follows: Is the farm business meeting its objectives?

Objective No. 1: To realize from the farm the greatest financial profit possible, at the same time conserving the value of the land and buildings. The farm business, as shown by the financial statement page 12 for the six-year period 1942-47, has had a net gain on the capital invested of 4.9 per cent. For a large farm this seems to be a fair return but when compared to the farms in the same area for the same period the return is low. The average of all farms in the area over the same six-year period having the highest capital investment was thirteen per cent return on capital invested. Also the Emmanuel Missionary College farm is operated tax free*, coming under the law which exempts educational institutions.

It would appear, therefore, that the farm business is not meeting its first objective as fully as it might. Although the land is being preserved in a high state of fertility the risk involved in an agricultural project of this size will not warrant the operation of the business on a four per cent of investment basis.

Objective No. 2: To provide on-the-job training for those students who are interested in agriculture. Although the farm carries only eleven man equivalents per year, the college records show that these equivalents are divided among from twenty-five to thirty men. Since the students majoring in agriculture at the college number about twenty-two to twenty-five one may conclude that this objective is being accomplished.

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*See Glossary

Objective No. 3: To provide illustrations of good agricultural practices. Since the college does teach agriculture and operate a farm business they feel that the promotion of good methods in agriculture is only in keeping with their purpose. The good points of the farm, such as high crop yields, high livestock production rates, and soil conservation by crop rotation, cover crops, and heavy application of fertilizers are all proof that the farm is meeting the third objective.

Objective No. 4: To make available to the school an ample supply of high quality farm products. All of the dairy products used by the school kitchen and dining hall are supplied by the college farm. About ninety per cent of the vegetables for canning are supplied by the farm and fifty to seventy-five per cent of the school's supply of fruits and vegetables in their seasons are supplied by the farm. About four acres of garden land are devoted each year to the raising of miscellaneous vegetables for the school kitchen. Since the vegetables can be used at their peak of quality and flavor this insures a supply of high quality foods. This objective has been accomplished to a greater degree than the first.

RECOMMENDATIONS

Since it is also desired to make a study that will be of some benefit to those who determine the general organizational, administrative, and accounting policies of the denominational farms, it is therefore necessary that certain recommendations be made. On the basis of the results of research made in this study the writer recommends that the following changes and additions be made:

Physical Changes

1. Items of capital investment, such as the old dairy house and the second dwelling house on the lower farm, and the tree fruit orchards be removed from the capital inventory. Also expensive machinery such as items in the blacksmith shop be removed from the inventory and liquidated. This would cut down some of the heavy capital investment. These items are unnecessary and do not contribute toward income on the farm.

2. Wherever possible, production machinery should be added to bring expensive hand labor to a very minimum.

Changes in Combination of Enterprise

1. The poultry department should be increased in volume and size of business to make it economically possible to employ a full time, qualified poultry man or else drop the poultry department from the farm business and liquidate the assets.

2. The tree fruit orchards--apples and peaches, should be removed from the fruit department and the land now occupied by them be used for small fruits or vegetables. If small fruits are used the writer would recommend strawberries or raspberries. This recommendation is made for the Emmanuel Missionary College farm only. Other farms of the Seventh-day Adventist denomination may find it profitable to grow tree fruits.

Farm Account Records

The analysis of this farm business has been made difficult by the lack of records in certain vital spots of the business. This was found to be the weakest link in the whole construction of farm business. Therefore, I recommend the following:

1. In the case of the dairy department all of the sales and income are included in one main account, and all the expenses are thrown together. There should be some division made in the records of the dairy department. I suggest the dairy herd and young stock be kept as a separate account and a more detailed accounting record be kept that would show separately the cost of feed, the cost of other materials, and the cost of labor. Also these records should show the income from the dairy cattle in separate items such as milk produced and income from sale of calves or other stock.

The processing plant should have separate accounts showing the sale of different products as separate items and the expenses as separate items. All indirect expense and miscellaneous expense should be prorated to the item responsible for the expense. This change would not involve a new organization of accounting records but merely an addition to the old. When this change was made it would then be possible to determine the efficiency of the herd and the efficiency of the dairy processing plant. Under the present system there is no way to reach a conclusion as to just what item is making a profit or loss. It is possible under the present set-up to be keeping the herd and receiving no profit directly from it. If it is necessary to keep individual records on each cow so that she may be culled at any time she fails to produce a profit over cost, then it is also necessary to know which unit or group of units is producing and which is losing money. Management can never reach its maximum efficiency until it has this information.

2. The poultry department is another part of the farm business organization which is in need of more detailed and accurate records.

The writer recommends that if the poultry department is to remain in the business a new system of record keeping be set up which would show the following: The amount of feed, number of birds at all times, cost of the birds, number of eggs received each day, and the amount of live poultry sold. Also the records should contain an accurate account of labor expense and other expense. They should show a detailed record of the price paid for feed, labor, and other expense, and the exact amount received per dozen of eggs or pounds of poultry.

3. In the garden department there should be an addition to the present system of record keeping to show the amount and size of the package of all vegetables sold and the amount received per package. All costs should be prorated to the different crops grown each year.

4. For the fruit department recommendation No. 3 should apply also.

5. Very little can be determined at the present time concerning the amount of expense or condition of farm machinery in general. Therefore, the writer recommends that an account be set up in the farm storeroom department to include only farm machinery and that the use of all machinery be entered as a credit to the machinery account and as a charge against the department or crop receiving the use of it. The overhead and repair expense could then be charged directly against the machinery account.

6. The capital investment inventory as it is now handled on this farm includes the land, buildings, and equipment, and the herd. There is a charge for depreciation made in the indirect expense of each department for the prorated amount of the depreciation rate, but there

is no reserve account for depreciation to balance this charge. As a result of this system, when a piece of equipment has been fully depreciated the only means of replacing it is by appropriation from the operating funds of the institution or from the general treasury of the denomination. Many times this money is not available when repairs should be made or new equipment purchased. This causes the farm manager to change all plans for a crop or maybe a whole season's work. Also if he is worthy of being called a farm manager he should be allowed the opportunity of keeping the inventory of equipment up. Therefore, the writer recommends that the reserve account for depreciation be made available to the farm manager to be used for upkeep and replacement of buildings and equipment upon approval of the college finance committee.

7. The writer further recommends that some suitable system be installed for the filing and preserving of farm records so that they may be available for farm business analysis and for student research.

From the evidence produced by this study the writer believes that if the above recommendations and changes were carried out in the organizational school policies, not only this school farm but all others of the Seventh-day Adventist denomination would more nearly accomplish the objectives used as a basis for this study.

GLOSSARY

Dairy Herd Improvement Association: Local association supported by national organization for the improvement of dairy stock.

Farm Crop Investment: The amount invested in a crop before the crop is harvested.

Farm Storeroom Department: Place where materials and supplies are kept and issued.

Input: Anything put into the business that would increase the net worth.

Materials Used: Includes feed and all other supplies that have been used.

Output: Anything received as the result of labor or capital used.

Productive Man Work Units: The amount of work that may be accomplished by a man working at average speed for ten hours.

Rate of Capital Turnover: The time needed for the gross income to equal the total capital investment.

Retirement Fund: Emmanuel Missionary College carries its own social security and pension plan. The retirement fund takes the place of social security.

Tax Free: No property tax is paid by Emmanuel Missionary College. The farm comes under the Michigan State law that exempts religious educational institutions.

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