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Farm Building Studies in Northwest Missouri

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INTRODUCTION

Modern conditions make necessary a reduction in the cost of production in every enterprise of the farmer's business. To meet this situation farmers are using one or the other of two methods; they are increasing their efficiency by use of the best known methods and equipment, or they are reducing overhead, resulting, in most cases, in the use of inferior equipment at least. In the adoption of this plan many farmers have abandoned everything in their schedule of crop management except those crops that can be planted with least expense and turned into cash in the shortest time. They have stopped their program of painting and repairing buildings and in many instances they have failed to replace buildings once thought necessary in the operation of their farms. There is no question about the fallacy of the neglect of the soil because it can be replaced, if at all, only through a long and somewhat costly process of management. In the case of buildings it could be possible that the American farmer has learned to carry on his enterprises with a decreased investment in building equipment.

At the present time there are two schools of thought on the question of investment in buildings. One group is of the opinion that the farmer is burdened unnecessarily with his investment in building and with the overhead expense resulting. The other group is equally positive that the farmer receives good returns from this expenditure and would be justified in an even greater investment in efficient, well planned, buildings.

REVIEW OF LITERATURE

Some studies covering various phases of the problem have already been made.

Effect of Investment on Real Estate Value.—G. C. Haas, University of Minnesota, reports in Bulletin 9, A Study to Determine the Influence of Building Improvements on Sale Price of Land. A multiple correlation problem of five factors was set up to determine the influence of each on the sales value of the farm. The factors that would have an influence on the value of the farm were considered to be (1) the location factor in relation to school, church and market, (2) present worth of building, (3) land classification index, (4) productivity of the soil, and (5) distance to market. The forecasting equation resulting

from the solution shows that $1.07 was added to the sales value for each additional $1.00 invested in buildings. This study was based on sales records of 160 farms in Blue Earth County, Minnesota.

Mordecai Ezekiel reports in U. S. D. A. Bulletin 1400, Studies to Determine the Factors Affecting Farmers' Earnings in Southeast Pennsylvania. After the special farms were eliminated the study shows that the following factors have the given percentage influence on the variation in the per acre value of real estate. The values given below shows the influence as determined by the coefficients of net determination.

Dwelling 11. 5%	Dairy Buildings 12.45%
Other Buildings 19.21%	Crop Index 4.55%
Percentage Tillable Land 2.81%	Percentage Level Land .. 6.15%
Distance of Town 2-8/100%	Type of Road 44/100%

Summarizing, we find buildings accounted for 43.16%, other factors listed 16.04%, and unaccounted influences 40.8%.

The proper procedure to follow in the development of building equipment is of increasing importance at this time when repair, remodeling, and new construction must soon be undertaken on many farms. The present worth of farm building equipment on Missouri farms, according to the 1930 census, is $490,297,223. Assuming an average life of 40 years, and assuming that the census value is one-half the replacement cost, then new buildings alone in normal times would require an annual expenditure of $24,500,000. As soon as conditions justify a return to the building program the annual expenditure of Missouri farmers will probably exceed $50,000,000 for a few years at least. The problem of deciding upon the proper investment would be much easier if it were not for the difficulty in securing a measure for the benefits derived from the use of farm buildings. These returns or benefits may come, in part, through the satisfaction derived from using good buildings to aid in carrying out the farm enterprises. Benefits may come through greater net returns from enterprises influenced, or, in case of sale of the farm, in an increase in real estate value. Good buildings may bring benefit through an increase in credit facilities, usually extended to the farmer who has equipment to work with in his business.

One of the safest points to begin a study of the problem is in present practice on the farm. What is the answer of a representative group of farmers to the question, or, in other words, what is present practice? A knowledge of present practice on a large number of farms

permits the study of the effect of variation in investment on the returns from enterprises, or on the real estate value of the land.

Study on Investment.—Warren, in his text on Farm Management, reports a study of 578 farms in Livingston County, New York. This study is concerned with the amount of investment in different enterprises as affected by size of farm. On the small farms 43 per cent of the capital is invested in the dwelling, while the large farms with somewhat better dwellings have only 9 per cent of their capital invested in the home. The small farms have 19 per cent of their capital invested in barns, with 11 per cent of the capital so invested on the large farms. The small farms have an investment of $164 per animal unit in barns compared to $50 per animal unit on the larger farms. The annual cost per animal unit on these farms varied from $16 on the small farms to $5 on the large farms. He concludes that capital invested in farm buildings is not only unproductive, but is a constant source of expense.

INVESTIGATIONAL PROCEDURE

The study was cooperative between the departments of agricultural economics and agricultural engineering. The plan provided for a study of the buildings, field layout, equipment and financial records

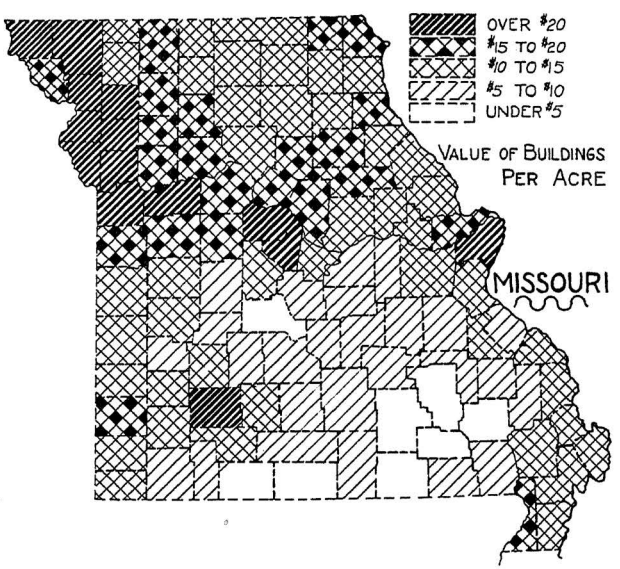

Fig. 1.—Distribution of buildings by counties.

on 100 farms on each of three soil areas. Studies on two soil areas have been completed and are included in this bulletin. One hundred farms on the Marshall silt loam in Nodaway County were surveyed in 1929 and 110 on the Grundy area in Linn County in 1930.

The Selection of Areas for Work.—The map shown in Figure 1, gives the value of buildings per acre in each county in the state and shows Nodaway County as having over $20 per acre invested in buildings and Linn County in the group having between $10 and $15 per acre in buildings. A third area having a lower valuation of buildings will be studied at a later date.

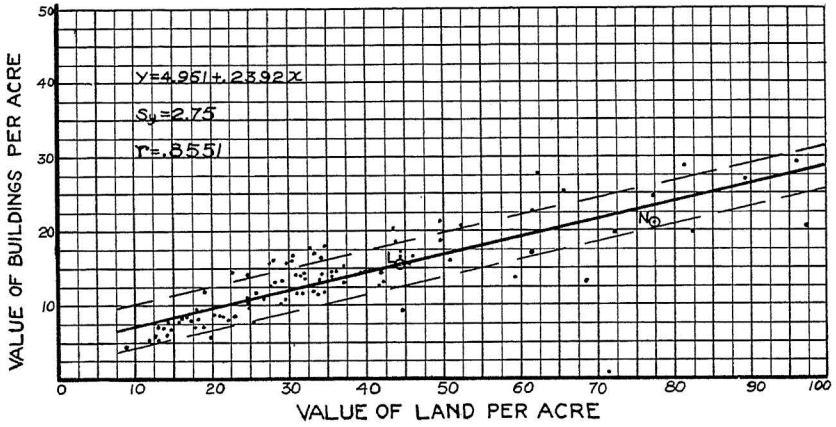

Fig. 2.—Nodaway and Linn counties are representative of high and medium investment in farm buildings.

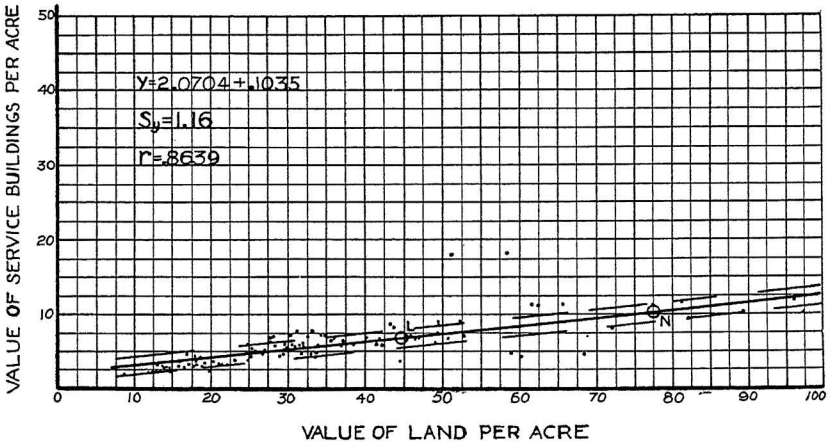

Fig. 3.—Curve used in selecting areas for study of service buildings.

An estimate of the reliability of the selection of the two counties studied is shown on the scatter diagrams in Figures 2 and 3 made up from data secured from the 1925 census. These data are county averages and the dot representing each of the counties studied is circled, showing a close relationship to the regression line for the state, indicating that Nodaway County is representative of the more valuable and Linn County of the medium farm land in the state. These figures also show a high correlation between the value of the land and the value of the farm buildings.

This study is concerned principally with service buildings and Figure 3 shows Nodaway and Linn Counties to be representative of the two areas from the standpoint of service buildings.

Selection of Cooperators in the Area.—As has been indicated, the survey method was used in securing data for the study. In the selection of cooperators it was necessary, of course, to find farmers willing to give their financial record and to permit the study to be made of their farms. Due to the help of the county agents and their organizations no difficulty was encountered in securing sufficient cooperators. Since our records were taken for the previous season it was necessary that the man had lived on this farm during that time. An attempt was made to take all the farms along one highway as nearly as possible to avoid the error which comes from selection. Attention was given to securing a satisfactory sample as to size of farms. Figure No. 4 shows graphically the size of farms used and indicates a sufficiently satisfactory distribution to be representative. Overflow land along streams was avoided due to the uncertainty and irregularity of crops produced. With the exception of a few specialized dairy farms the group could well be classified as general farms.

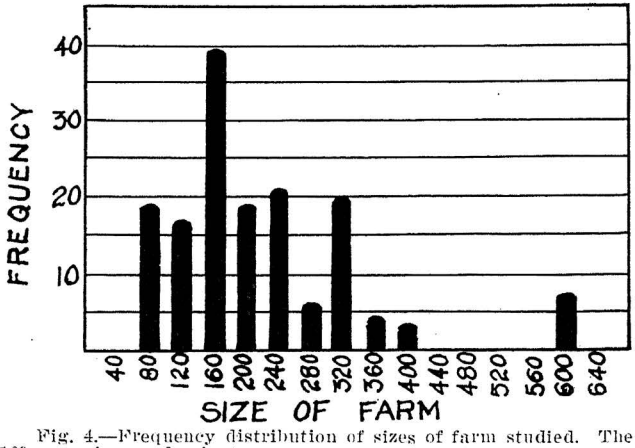

Fig. 4.—Frequency distribution of sizes of farm studied. The 160-acre size predominates.

From one-half to one day's time was spent by the economist and the engineer on each of these farms. A detailed map of the farm and of the building layout was made, the financial record secured, and a special study of each building made. Schedule sheets used in securing data on buildings are included in the appendix. Historical data, cost when constructed, criticisms of the building, and an estimate of its future service was secured from the farmer.

The remaining data were secured by inspection and measurement. For purposes of study and comparison it was necessary to develop some method for computing the present worth of the buildings. The method of depreciated replacement cost was selected as being the better one to use. On the farms studied there were about 100 new buildings on which cost data were secured. These data were used in

TABLE 1.—UNIT COSTS OF FARM BUILDINGS.

Description of Building	Unit Cost (Cents per Cu. Foot)	
	Range	Mode
Hay and feeding barns. Post frame. No foundation	2½- 4	3½
Hay and feeding barns. Timber frame. Rock or concrete foundation	2½- 5½	4
Beef cattle barn. Balloon or timber frame. Rock or concrete foundation	2 - 5	3½
Dairy barns. Balloon or timber frame. Concrete floor and foundation	4 - 6½	5¼
Cattle or machine sheds. No foundation	2½- 4½	3½
Cattle or machine sheds. Balloon or timber frame. Concrete foundation	3 - 7	5
Garages. Post frame. No foundation	3 - 7	5
Garages. Balloon frame. Concrete floor and foundation	3 -10	6½
Poultry houses. Post frame. No foundation. Dirt floor	3 - 6	4½
Poultry houses. Balloon frame. Concrete floor and foundation	4 - 7	5½
Corn cribs. Post frame. Wood floor	3 - 6	4½
Corn cribs. Balloon frame. Concrete floor and foundation	5 - 9	7
Brooder houses. Movable	5 -15	10
Individual hog houses	5 -15	10
Centralized hog houses. Balloon frame. Concrete floor and foundation	6 -10	8
Granaries. Balloon frame. Concrete foundation. Wood floor	6 -16	11
General storage houses. Concrete foundation and floor	4 -12	8
Farm houses, not modern, one story	12 -18	15
Farm houses, semi-modern, two-story	18 -30	25
Farm houses, modern	30 -40	35

connection with costs computed from bill of materials and customary labor charges to arrive at a unit cost for the structure studied. Cost data on farm houses reported by Prof. D. G. Carter from his studies were used and found to check closely with data secured on new structures in this area. The replacement cost was computed by first determining the cubic feet in the building and multiplying by the previously determined unit costs. The range in cost takes care of most of the variation found in materials and workmanship. By use of good judgment in applying these units a very satisfactory appraisal of replacement cost can be made.

Annual Depreciation Rates.—The date of construction and the farmers' and surveyors' estimate on future service provides data for total years of service. In many cases the farmer had plans for wrecking older buildings and replacing them. In such cases the data on total service is accurate. On newer structures the estimates are of less value, although a two months' period of field work, having constant contact with similar structures of varying ages enables the surveyor to predict the life of a building with considerable accuracy. A straight line depreciation was used because the service rendered by buildings during their life does not vary greatly with age. They are not built in most cases with a view to having a resale value, but are constructed for the service they will render in increasing production, saving feed, protecting health or improving the quality of products.

Depreciation rates can be and are influenced very materially by the proper procedure in care and repair. Table 2 gives the range, the average and the modal depreciation rates on the buildings in this study.

TABLE 2.—ANNUAL DEPRECIATION RATES FOR DIFFERENT STRUCTURES.

Description of Building	Range	Average	Mode
Hay and feeding barns. Post frame. No foundation	2.0-12.5	4.04	3.44
Hay and feeding barns. Timber frame. Rock or concrete foundation	2.0- 2.5	2.20	2.07
Beef cattle barn. Balloon or timber frame. Rock or concrete foundation	1.5- 5.0	2.44	2.43
Dairy barns. Balloon or timber frame. Concrete floor and foundation	1.4- 3.4	2.53	1.60
Cattle or machine sheds. No foundation	1.4- 5.6	3.20	2.58
Cattle or machine sheds. Balloon or timber frame. Concrete foundation	1.1- 5.0	2.75	2.44
Garages. Post frame. No foundation	2.0- 5.9	3.26	2.60
Garages. Balloon frame. Concrete floor and foundation	1.4- 4.6	2.66	2.46
Poultry houses. Post frame. No foundation. Dirt floor	1.3-11.0	4.05	3.50
Poultry houses. Balloon frame. Concrete floor and foundation	1.3- 6.6	3.09	2.54
Corn cribs. Post frame. Wood floor and foundation	1.3-16.7	3.93	3.48
Brooder houses. Movable	2.1-25.0	5.49	5.56
Individual hog houses	2.3-25.0	7.86	7.50
Centralized hog houses. Balloon frame. Concrete floor and foundation	1.6- 6.6	3.15	2.51
Granaries. Balloon frame. Concrete foundation. Wood floor	1.9- 3.7	2.56	2.43
General storage houses. Concrete foundation and floor	1.3- 6.6	2.63	2.40
Farm houses, not modern, 1-story	0.9- 3.5	1.57	1.28
Farm houses, semi-modern, 2-story	1.0- 2.0	1.55	1.30
Farm houses, modern	1.1- 2.0	1.53	1.71

REPORT OF FINDINGS

Point of Occurrence and Causes of Excessive Depreciation

In the study of each of the buildings an attempt was made to locate the points showing the most rapid deterioration and, if possible, to determine the cause. Not knowing the history of the structures it was not possible to fix the cause on any one definite condition, but in the summation of these studies the apparent causes are listed in the order of the frequency of their occurrence.

TABLE 3.—RELATIVE IMPORTANCE OF CAUSES CONTRIBUTING TO FAILURE.

Points of Failure	Apparent Contributing Causes
I. Sills and connected framing	1. Lack of care of roof and yard drainage
	2. Foundations too low.
	3. Footings inadequate (size or depth.)
	4. Inferior or damaged siding.
II. Foundations	1. Lack of drainage
	2. Erosion from roof or yard drainage
	3. Inferior design
	4. Poor equality of materials.
III. Siding and Doors	1. Lack of care of roof drainage
	2. Failure of sills and framing
	3. Lack of paint
	4. Splice joints not waterproof
	5. Injury by stock or equipment
	6. Inferior workmanship
IV. Roof Covering	1. Inferior quality
	2. Poor selection
	3. Inferior application
V. Roof Trusses	1. Inferior design
	2. Failure of joints
VI. Joists and Girders	1. Overloading
	2. Failure of nailed joints

One of the causes which was apparent in the greatest number of cases was the lack of care of roof drainage. The damage resulting was evident in rotted sills, framework and siding. A large amount of water drains from roofs and in dripping onto the ground splashes up onto the siding, carrying some soil with it.

If wind is blowing, the water from the roof is blown against the siding and in most cases finds its way through to rot sills and girts. The water from the roof may erode the soil, leaving footings exposed or it may result in a softening of the soil and uneven settling of the foundation. Two hundred and fifteen barns were divided into two groups. One group was spouted and the other group was not spouted. Data from this study are given in Table 4.

TABLE 4.—THE ADVANTAGE OF SPOUTING ON BARNS.

	No. cases studied	Annual depreciation rate	Percentage increase in life of spouted bldgs.
Bldgs. not spouted	186	2.32%	
Bldgs. spouted	29	1.64%	41%

This would mean an increase of 17.8 years in the serviceable life due to spouting, providing all of the barns were of the same general quality.

Many foundations were found to be the contributing cause to rapid deterioration.They were often built too low. Some were built too shallow to be safe from damage by erosion or from lack of drainage. Many foundations had been built without reinforcement, resulting in cracks and failure. Table 5 reports a study on foundations of the larger service buildings.

TABLE 5.—IMPORTANCE OF HEIGHT OF FOUNDATIONS.

	No. cases	Annual depreciation of bldg.	Per cent increase in life of bldgs. with high foundations
Foundations under 8" high	176	3.26	----
Foundations 8" high or over measured from ground	251	2.28	43%

Buildings with higher foundations gave 14 years more service than those with low foundations. Good foundations were often ruined, however, through lack of drainage or through erosion where water had not been properly taken care of. It was not possible to evaluate these damages and, therefore, no statistical studies were made.

Another important cause of rapid depreciation in farm buildings was the lack of paint. Many buildings had been painted several times but had secured but little protection from the paint due to the quality of siding used and the failure to cover resin spots before applying the prime coat. Table 6 reports a comparison of painted with unpainted service buildings on the farms studied.

TABLE 6.—EFFECT OF PAINTING ON DEPRECIATION.

Treatment	No. cases studied	Years of service	Increase in life due to use of paint	
			Years	Per Cent
Not painted	115	37.06	-----	-----
Painted when built but not after	66	45.86	8.80	21 %
Painted as needed	92	53.19	16.13	43.5%

This study indicates that the first cost of paint after the barn is constructed is very effective, adding 21% to the serviceable life, and the buildings receiving paint as needed had been given a 43-5% increase in life due to the paint.

A study was made to determine the returns on money invested in paint. To determine the benefits derived from painting, the investment in paint was credited with the annual depreciation charge and the interest charge on the building for the years of extended life due to painting. Using the formula for compound interest, the rate of interest on the investment in paint, compounded annually, was computed.

The cost of paint was computed on the basis of 500 square feet per gallon for first coat and 700 square feet of surface for second and third coats. Paint was computed at $7.00 per gallon applied. Three coats were allowed for new structures and one coat each ten years thereafter on buildings kept painted. Buildings of uniform quality were selected from each of the groups so as to eliminate differences in construction. The first painting is of more importance than any other, yielding 3-73/100% interest on the investment compounded annually. Where the building was given one coat each ten years following, the rate on the whole investment in paint was 3-22/100% compounded annually from the time each investment was made to the middle of the period of extended life due to the painting. This is not a high rate of interest but since there are other benefits secured from paint it will appeal to most people as a good investment.

Poorly designed splice joints in siding was a very evident cause of failure. A common butt joint, unless waterproofed in some manner, is very ineffective and results in rapid depreciation.

Lack of mechanical repair was evident in many cases. Siding had been split and broken by animals. Inadequate repairs were made resulting in a cold barn, rotted sills and framework, and a much more rapid depreciation rate. Careless nailing, resulting in bruised spots around the nail, is another cause for rapid depreciation of siding.

A great variation was shown in serviceable life of roofing materials due, in some cases, to poor quality materials, in others to poor workmanship in application, and in others to improper selection of materials for the type of roof. Some cattle feeding barns with shed additions had exceptionally long roof slopes. On these the shingles were damaged by the large amount of water passing over them. Intercepting spouts to divide the drainage were used effectively on some of these buildings.

Faulty design of roof supports was evident in a large number of barns. The center joint in each rafter of the gambrel roof in many of these barns was supported by a purline which was carried on posts in the mow. The weight of the roof and the pressure of the hay between posts had caused a spread in the frame and a consequent sagging of the roof. There were few cases of failure of girders or joists. In some instances extra posts had been set in to shorten spans and prevent failure.

General Condition of Buildings

The relationship between present worth and replacement cost of service building is shown in Figure 5.

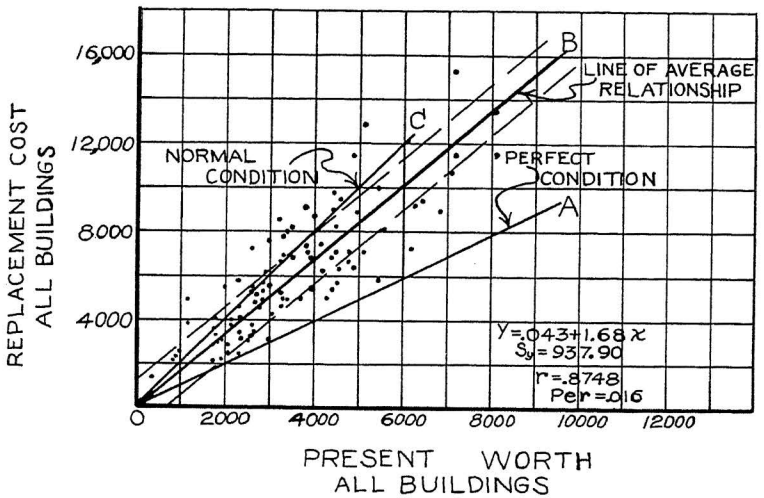

Fig. 5.—Buildings were in better than average state of repair in 1929 and 1930.

If the buildings were midway between their value at the time of construction and completely depreciated, the line of average relationship would fall on the line ob or y = 2x. (If they were all in perfect condition as when constructed, the line would fall on oa or y = x.) The average value of the buildings, however, is better than (y = 2x) one-half replacement cost. This average relationship is shown by the line of, regression y=1.68x. The same relationship applied to buildings for living gives a regression equation of y = 1.65x.

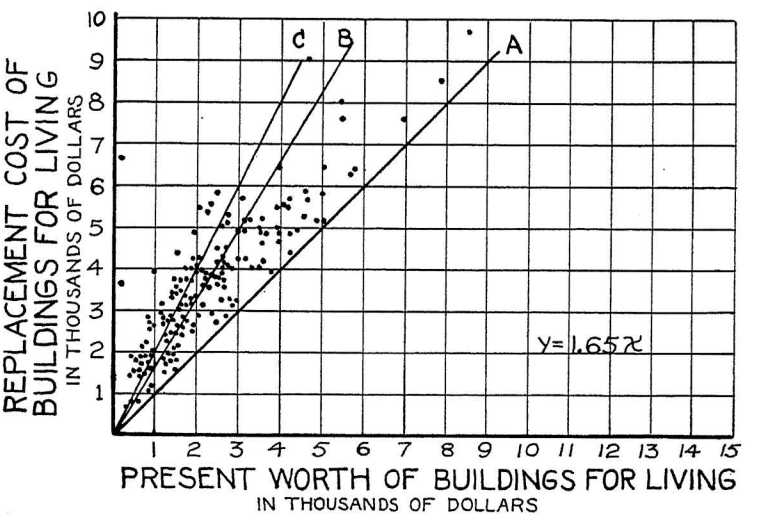

Fig. 6.—Dwellings were in better repair than service buildings.

Here again we find a similar condition to that of service buildings. The dwellings averaged a little better than one-half the replacement cost as shown by line $y = 1.65x$, compared with $y = 2x$ or one-half depreciated.

These studies were made in 1929 and 1930 following a period of prosperous times when money was available for making needed repairs on buildings.

Investment Studies

This study gives present practice in investment in buildings on different sized farms in Northwest Missouri and can no doubt be applied to many other similar areas. When curves were plotted between investment in farm buildings and acres per farm, a curvilinear relationship was anticipated but a straight line gave a higher correlation and less scatter about the line. Figure 6 shows the scatter diagram with curve fitted. This shows that on the average 160-acre farm in this area that the replacement of the buildings would require an investment of $6040. Normal replacement cost for buildings on other sizes of farms can be read from the curve.

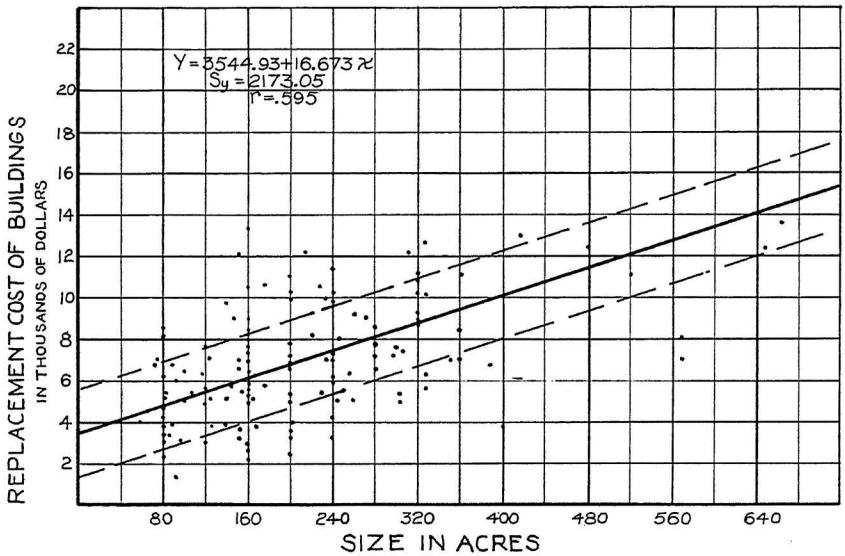

Fig. 7.—Size of farm influences investment in buildings.

Buildings for Living

In this class we have placed the dwelling, summer kitchens, fuel and wash houses. Most of the modern homes having full basements do not require these extra buildings. This group is used essentially

for living and has little direct connection with the business. In studying a factory or a banking business the home of the president would have nothing to do with the problem and for the same reason it would seem that the farm home should be omitted from a study of the buildings used in the business. However, some studies were made of the homes on the farms surveyed and are reported here. Tenant houses, being used in the business, are included as service buildings.

Time of Construction of Homes

From the figures given in Table 7, it can be seen that the greatest number of homes were built on these farms in the periods 1880 to 1885, 1900 to 1905, and 1915 to 1920. Also, it is readily seen that the percentage of modern homes has increased and that farm homes are being made better since the present day replacement cost is greater in the latter periods.

TABLE 7.—PERIODS OF HOME CONSTRUCTION.

Five year periods	Number of homes built	Number modern	Per cent modern	Average 1928-29 replacement cost
1870-1875	7	1	9%	$3176.00
1875-1880	2	1		
1880-1885	18	0		
1885-1890	6	1		
1890-1895	14	0		
1895-1900	10	0		
1900-1905	26	3	10%	$3302.50
1905-1910	18	4		
1910-1915	16	4		
1915-1920	20	6		
1920-1925	19	10	39%	$4194.50
1925-1930	6	4		

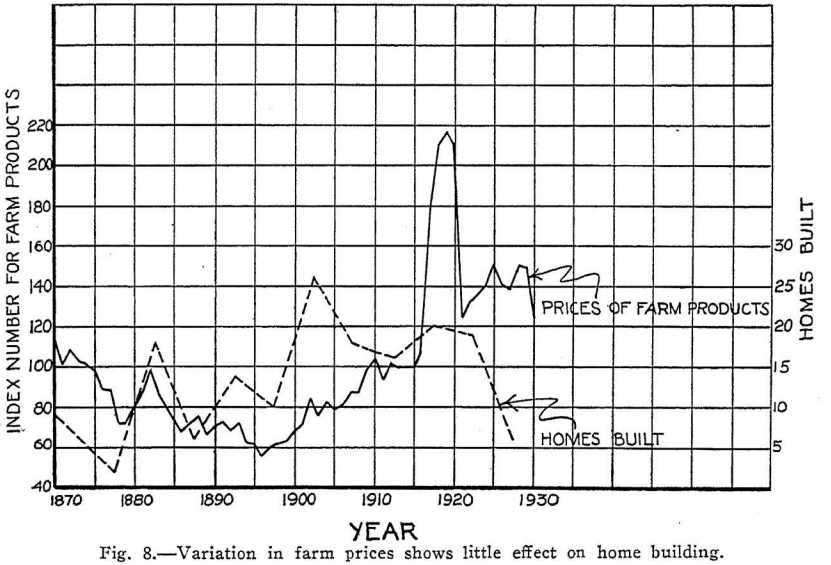

Fig. 8.—Variation in farm prices shows little effect on home building.

Effects of Farm Prices on Amount of Building

Figure 7 shows the trend of farm prices and the amount of home building over a period of sixty years on these farms. There seems to be little relationship between the two curves although a period of steadily increasing farm prices is often accompanied by an increase in building.

In designing dwellings to meet the needs and demands on the farm it is desirable to know the range within which the farmer is accustomed to keep his dwelling investment. Figure 8 shows the range in investment in the dwelling found on these farms, also the average, the mode and frequency of cases in each division. The mode or most common replacement cost is of most importance to the designer as it represents the customary investment made by the farmer.

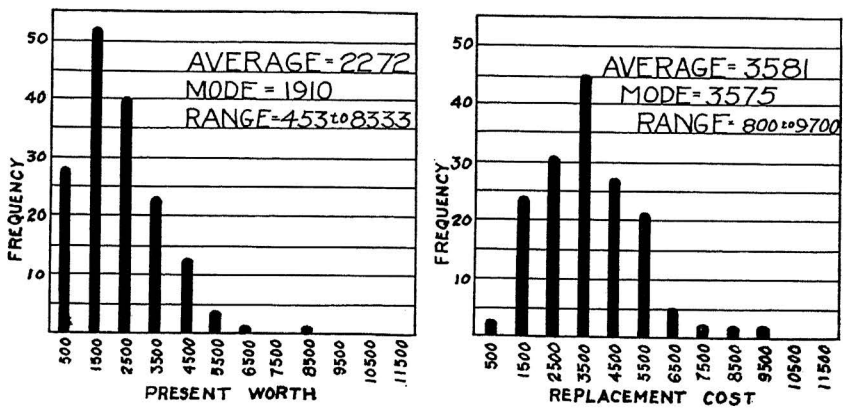

Fig. 9.—Frequency distribution applying to farm homes.

Factors Influencing the Investment in the Home Modernization

There are several factors that have an influence on the investment made in the buildings for living. One of these is the degree of modernization of the home. The following study shows the replacement cost of two classes of homes.

TABLE 8.—EFFECT OF MODERNIZATION ON COST OF HOMES.

Kind of Home	Number	Average replacement cost	Range	Mode
Not modern	74	$3350.00	$ 806-$6624	$2700
Modern	27	5314.00	1008- 9792	5400
All	101	3581.00	----------	3575

A modern home is considered to be one having a heating plant for the whole house, running water, inside toilet, bath, and a unit lighting system. The homes rated as not modern had only a part or none of this equipment.

A definite tendency toward smaller houses, planned to serve the everyday needs of the family was noticeable in the newer houses. Houses of the earlier periods were built large and little thought was given to the service that should be expected from the building.

Effect of Size of Farm on Investment in the Home

The replacement cost of dwellings varies directly with the size of farm. This relationship is expressed by the equation $Y=\$1493.33+9.06x$, where Y = the replacement cost of dwellings and x = the size of farm in acres. The standard error of estimate is $1236.00 and the coefficient of correlation is $.665 \pm .0299$.

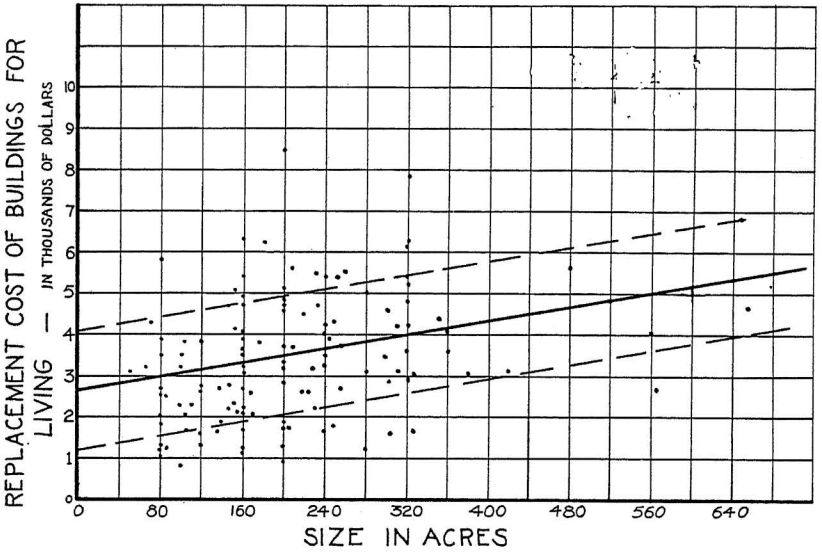

Fig. 10.—The larger farms show an increased investment in homes.

Effect of Distance from Town on Investment in the Home

At one time this was considered to be quite a factor in the investment in the home but with modern roads and transportation, equipment and improvement in communication it seems to have a decreasing effect. The distance from town was weighted by the relative fuel consumption for the type of road involved. The fuel consumption

on a concrete road was taken as 1, gravel road 1.33 and dirt road 1.44*. Practically no relationship is shown between investment in the home and distance from town.

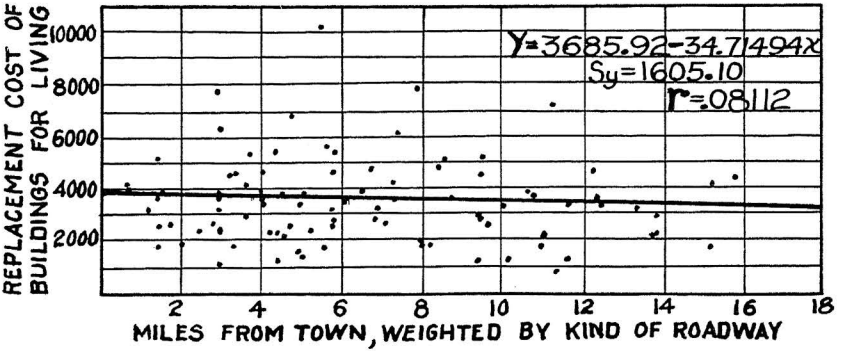

Fig. 11.—Distance to market has little effect on investment.

Importance of Productivity of Land on Investment in the Home

A scatter diagram using the replacement cost of the home and crop index as variables, shows a rather definite increase in investment in homes on the more productive land.

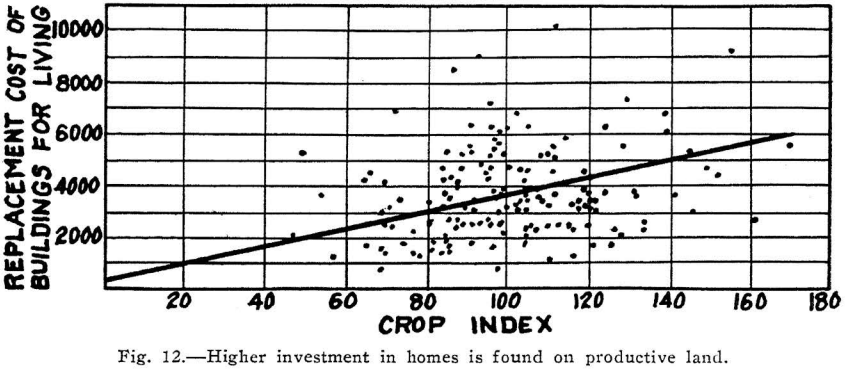

Fig. 12.—Higher investment in homes is found on productive land.

Effects of Possible Selling Value of the Farm on Investment in the Home

On 93 Linn County farms studied the regression equation was Y=$1706.07+.1249x with a standard error of estimate of $1275.15 and a coefficient of correlation of .6384 = .041. This shows that the relationship between real estate value of the farm and the replacement

*Agg, F. R. and Carter, H. S., Highway Transportation Costs, "Engineering Experiment Station Bulletin No. 69." Iowa State College.

value of the home is significant. On a farm having a real estate value of $10,000, the replacement value of the home would fall between $1680 and $4230, while on a farm that would sell for $20,000 the replacement cost of the home would be between $2929 and $5479. Doubling the real estate value of the farm shows only a 17 per cent increase in the replacement value of the dwelling.

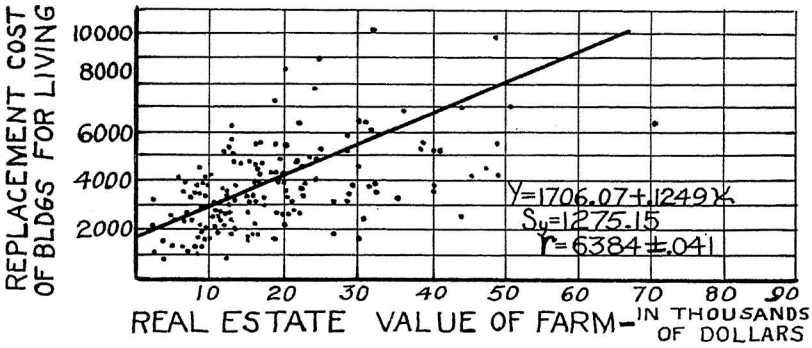

Fig. 13.—There is a direct relationship between real estate value and quality of homes.

Division of Building Investment

The farmer is often criticized for spending too great a proportion of his building budget for service buildings, leaving too small an amount to build an adequate home. Figure 14 shows graphically the relationship between the investment in building for living and for service on 200 Missouri farms. It would be reasonable to expect the farmer with a large investment in service buildings to have a large investment in buildings for living. We find this to be true but the change in investment in buildings advances at a decreasing rate as compared to service buildings until the value of $5000 is reached. After $5000 there is practically no tendency for increase of buildings for business to be accompanied by an increase in the value of dwellings. This relationship is shown by the curve in Figure 13 which shows a tendency to rise rapidly at first and then rise very little, for increases in value of service buildings after $5000 has been reached. For making the curve the means of the values of dwellings for O—$999, $1000—$1999, etc., invested in service buildings was used with the following results.

TABLE 9.—THE MAJORITY OF FARMS STUDIED SHOW A GREATER INVESTMENT IN BUILDINGS FOR LIVING THAN FOR BUSINESS.

$1000	Average Value of Service Bldgs.	No. Cases	Average Value of Bldgs. for Living
0- 1	$ 500	6	$2000
1- 2	1500	22	2320
2- 3	2500	45	3760
3- 4	3500	28	3350
4- 5	4500	25	4400
5- 6	5500	7	5110
6- 7	6500	4	4620
7- 8	7500	5	4680
8- 9	8500	5	4690
9-10	9500	3	4400
10-11	10500	2	6300

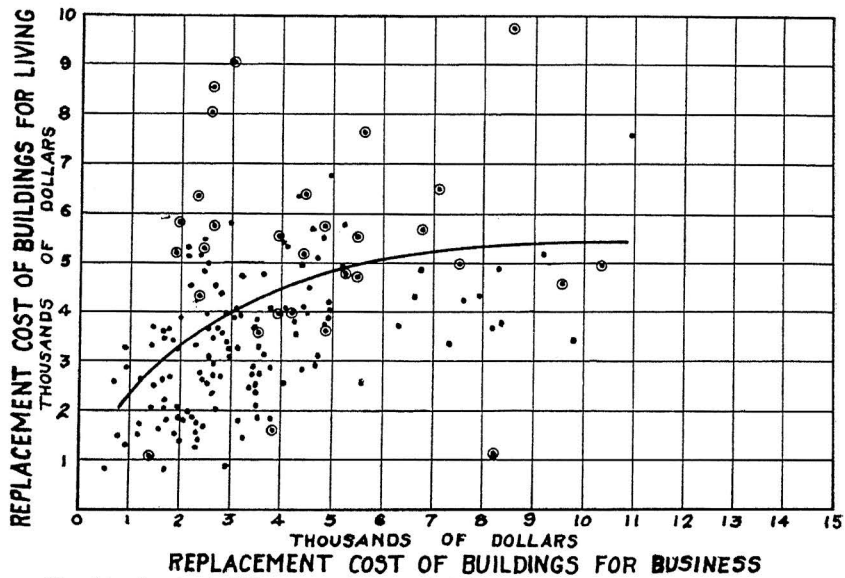

Fig. 14.—Service buildings may increase indefinitely. Dwellings reach a limit at slightly over $5000.

The Investment in Service Buildings

The following data covering 161 farms gives the farmer's opinion as to the proper investment in service buildings. (Most of the buildings have been built since 1900 in a period when the farmer could have put more into his buildings if he had seen the necessity.) There is no question that the need for earlier sale of hogs and beef cattle and higher efficiency in production in general will cause the farmer to demand higher service from buildings. This may or may not increase his investment.

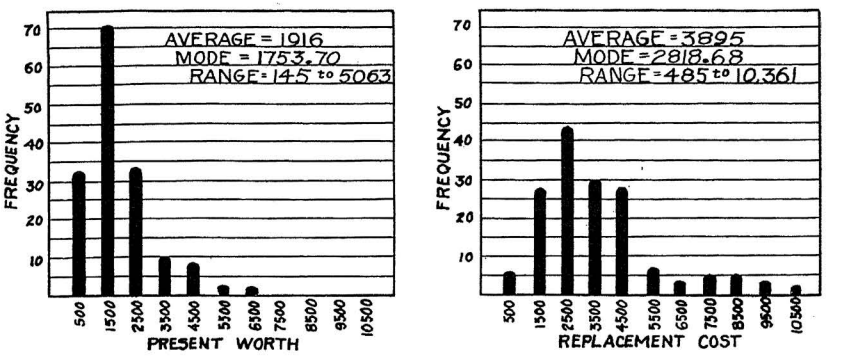

Fig. 15.—Frequency distribution of present worth and replacement cost of service buildings.

Investment in Service Buildings in Nodaway and Linn Counties

TABLE 10.—NODAWAY HAS A GREATER INVESTMENT IN BUILDINGS BUT SHOWS A MORE EFFICIENT USE OF THEM.

	Nodaway County		Linn County	
	Present Worth	Replacement Cost	Present Worth	Replacement Cost
Service bldgs. per farm	$2405.07	$3694.86	$1784.00	$3351.00
Service bldgs. per acre	11.31	22.38	9.19	16.19
Service bldgs. per animal unit	46.77	84.51	85.85	150.21

Factors Causing Variation in Investment in Service Buildings

There are a large number of factors which have an influence upon the investment in service buildings. Some of these factors cannot be evaluated and, therefore, must be left out of the study. For example, the appreciation of the farmer for good buildings cannot be given a value but it may be one of the most important factors influencing the extent of his investments. This factor, however, is probably much less important in service buildings than in the home.

The type of farming is a factor that has an important influence on investment. The farms studied were in a few instances highly specialized most of them securing their income from a rather wide variety of sources. The farms in the Nodaway County study were combined, according to the importance of income from various enterprises, into the following groups.

TABLE 11.—EFFECT OF TYPE OF FARMING ON INVESTMENT IN SERVICE BUILDINGS.

Type of Farming	Replacement Cost Service Buildings	
	Per Farm	Per Acre
General	$3260.00	$17.37
Dairy & Hog	4420.00	24.00
Hog	2475.00	16.30
Beef & Hog	5270.00	21.20

Since there is not a high degree of specialization on the farms in this study, they were grouped together for further study of factors influencing investment.

The factors capable of evaluation which influence the investment in service buildings are: (1) Size of farm, (2) distance from market, (3) productivity of the land, (4) number of crop acres, (5) number of animals kept, (6) the quality of these animals, and (7) the real estate value of the farm.

Size of Farm

The tendency for increase in size of farms to be accompanied by an increase in cost of service buildings is quite definite, especially for farms below 360 acres.

Nodaway County shows a higher correlation than Linn County and a much higher slope for the regression line. This may be due to the more uniform and richer soil of Nodaway County.

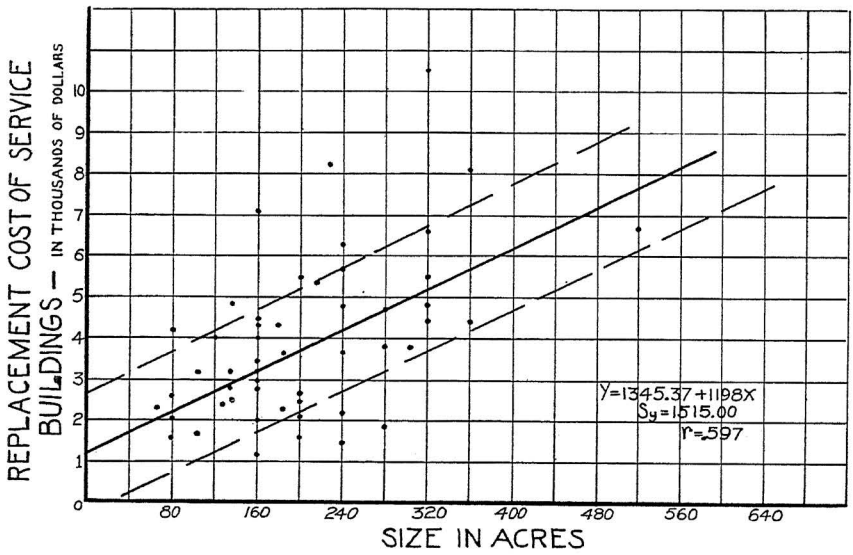

Fig. 16.—The influence of size of farm on investment in service buildings. Highly productive land.

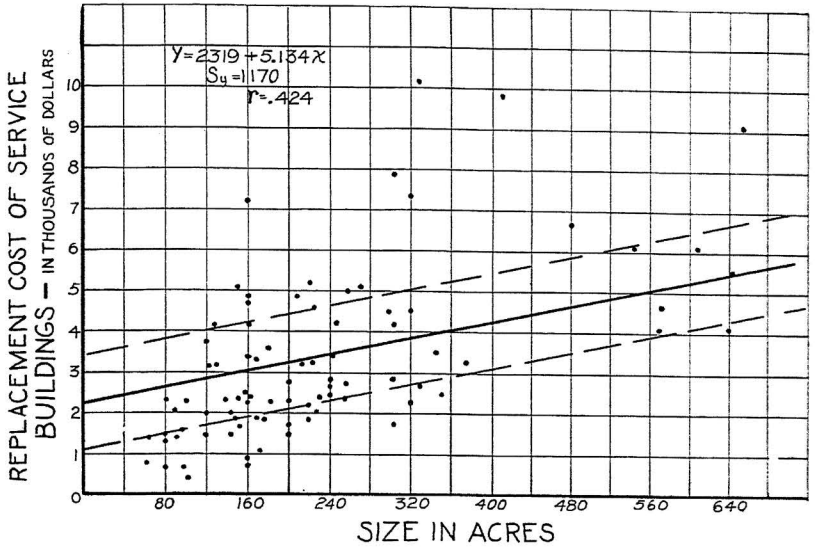

Fig. 17.—Influence of size of farm on investment in service buildings. Medium land.

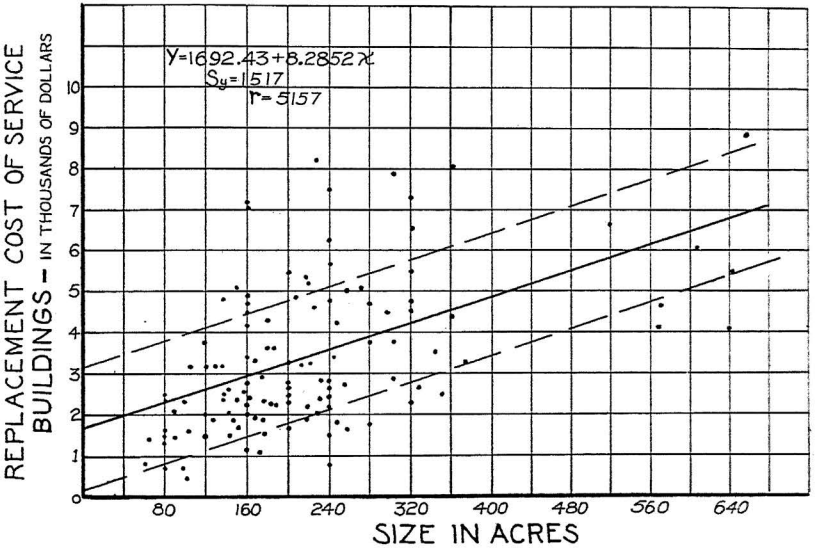

Fig. 18.—Influence of size of farm on investment in service buildings. Average for Northwest Missouri.

The regression line shows a greater slope on the more valuable land as farms increase in size. Increased yields and livestock carrying capacity requires a greater investment in service buildings. Small farms on high producing land show low investment in service buildings due in most of these cases to the type of farming followed. Most of these farmers sold grain and did not keep much livestock.

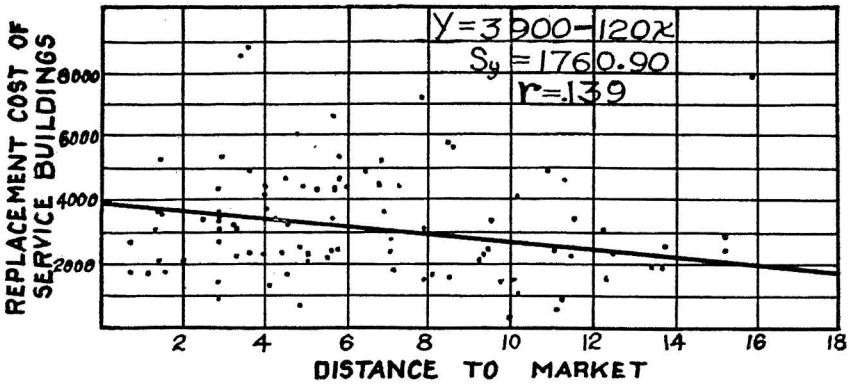

Fig. 19.—The relation between service building investment and distance to market.

Distance to market does not seem to be an important factor in the amount of investment in buildings, although it does show a higher correlation than in the case of the farm home. The improvement in

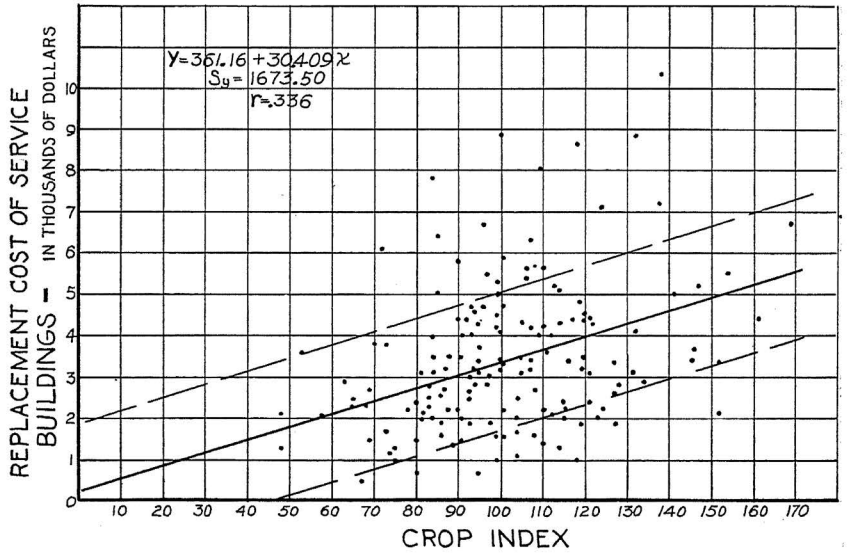

Fig. 20.—Higher crop yields are reflected in a larger investment in service buildings.

transportation facilities will probably result in decreasing the effect of distance from market on the amount of money invested in permanent improvements.

The crop index which is a measure of the productivity of the land under the particular farmers' management shows a large amount of scatter away from the regression line and a rather low correlation between the two variables, however where it is used with the number of crop acres it should give a measure of the quantity of crops produced, and thus have an influence on the amount of service buildings required.*

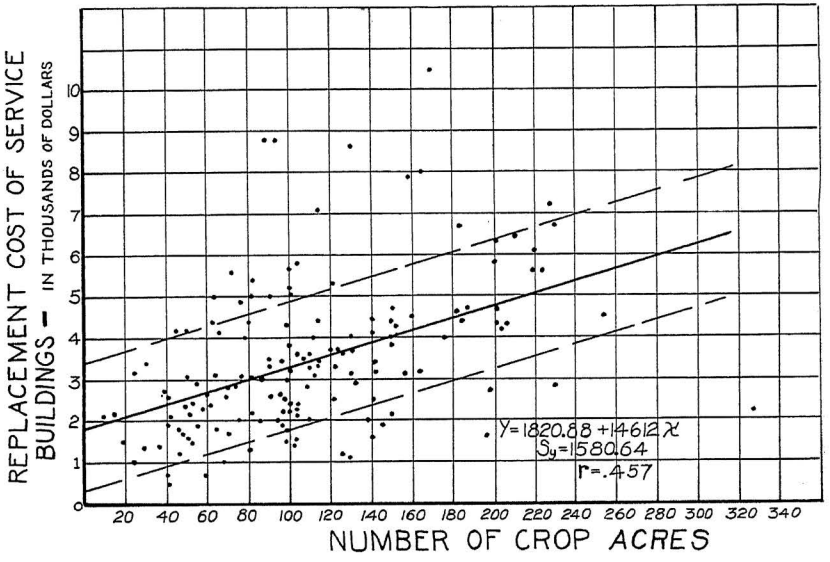

Fig. 21.—The number of crop acres is a good indicator of building investment required.

Crop acres included all land except permanent pasture and waste. The coefficient of correlation, .457, is significant but it does not have the influence on the amount of investment that might be expected.

The correlation between replacement cost of service buildings and animal units is significant although the scatter about the regression line is large. It seems that this factor should have an important influence on service buildings.

One practice that may contribute to a lack of correlation in these two variables is the rather common plan of purchasing feeder cattle and hogs in the spring and selling them off pasture in the fall. This

*The average production for all crops in the area studied is taken as 100. A crop index of 120 would mean that the crops on this farm yielded 20% more than the average.

indicates a large number of animal units per farm but requires a small investment in service buildings.

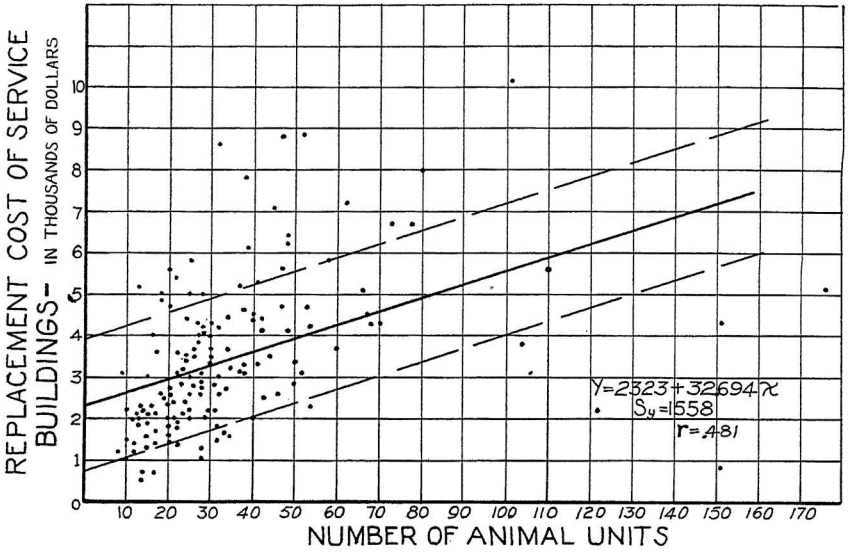

Fig. 22.—The number of animals is a significant factor in predicting building investment.

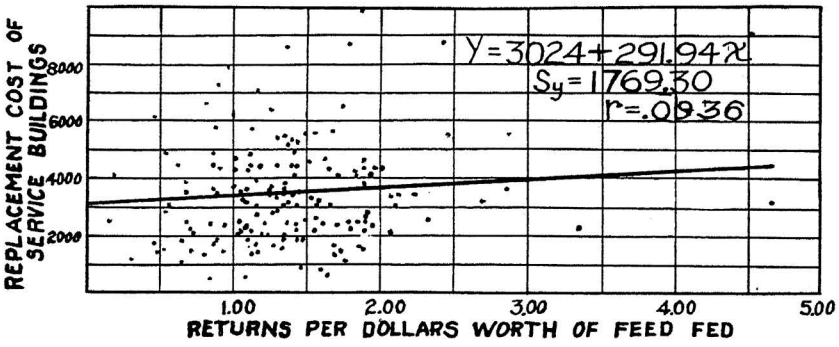

Fig. 23.—The relation between investment in service buildings and quality of livestock as measured by returns from each dollar's worth of feed fed.

The return per dollar's worth of feed fed was used because it was felt that it would be a measure of the quality of livestock on the farm and would thus have an influence on the building standards. The low coefficient of correlation and the wide scatter about the regression line shows very little relationship. This may be due in part to the fact that there is very little difference in the quality of livestock from one farm to another.

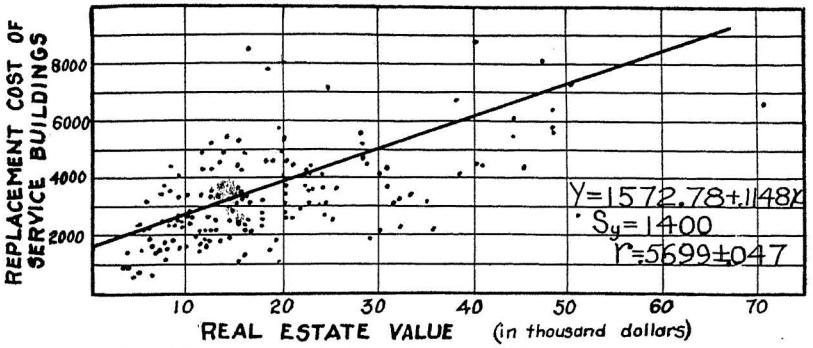

Fig. 24.—Value of service buildings increases with the value of the farm.

There is a high correlation and a relatively small amount of scatter about the regression line of service buildings on real estate value per farm. The probable error in the correlation coefficient is small proving a marked relationship between the two variables.

The Relative Contribution of All Factors

The following factors were selected for a multiple correlation. Some of those previously mentioned as having an influence were omitted because of close relationship to other independent variables or because of the difficulty of evaluating them on farms where the predicting equation might be used.

The following variables were used in the first multiple correlation.

Dependent variable	X_1 = replacement cost of service building
Independent variable	X_2 = crop acres, including pasture in rotation
	X_3 = crop index
	X_4 = number animal units
	X_5 = returns for $1 worth of feed fed

The interrelationship of all the variables is shown by the coefficients of correlation.

*r12 = .457	r23 = .055	r35 = −.427
r13 = .336	r24 = .457	r35 = .008
r14 = .481	r25 = .137	r45 = .096
r15 = .0938		

*r12 indicates a simple correlation with X1 as dependent and X2 as independent variable.

Multiple correlations were run with the following results:

I. R1-234=.772, S1-234=1129.30, accounting for 59.6% of the variation in X_1

II. R1-23 =.551, S1-23 =1483.00, accounting for 30.4% of the variation

III. R1-24 =.550, S1-24 =1484.00, accounting for 30.3% of the variation

The percentage influence is decreased about 30% by omitting one variable, showing that each has a direct influence on building requirements.

To determine the relative importance of each of the independent variables Beta coefficients were run, indicating the influence of each factor as follows:

Crop acres accounts for 4.1% of the variation in service buildings
Crop index accounts for 26.2% of the variation in service buildings and
Animal units accounts for 29.3% of the variation in service buildings leaving 40.4% of the variation unaccounted for.

Predicting equations were derived as follows:

I. Using crop acres, crop index and animal units as independent variables, $X_1=4272.00+3.17X_2+57.02X_3+47.94X_4$

II. Using crop acres, and crop index as independent variables, $X_1=-948.62+14.06X_2+28.13X_3$

III. Using crop acres and animal units

$$X_1=\$1586.78+9.58X_2+23.41X_4$$

By substituting the values of X_2, X_3, and X_4 for any farm the common practice for investment in service buildings for that farm may be secured.

By substituting values from a number of farms in these three predicting equations we find that slightly more than two-thirds of the cases fall within the limit of error, giving a fair check on the size of the sample.

Percentage of the Real Estate Value of Farms in Buildings

The real estate value of the farms is based on the farmer's estimate of what the farm would sell for at private sale Present worth of buildings was used in figuring per cent of real estate value in buildings because the present worth would be the influential factor changing the selling price.

The per cent of real estate value in buildings is considerably larger on the smaller farms, especially in the less productive land.

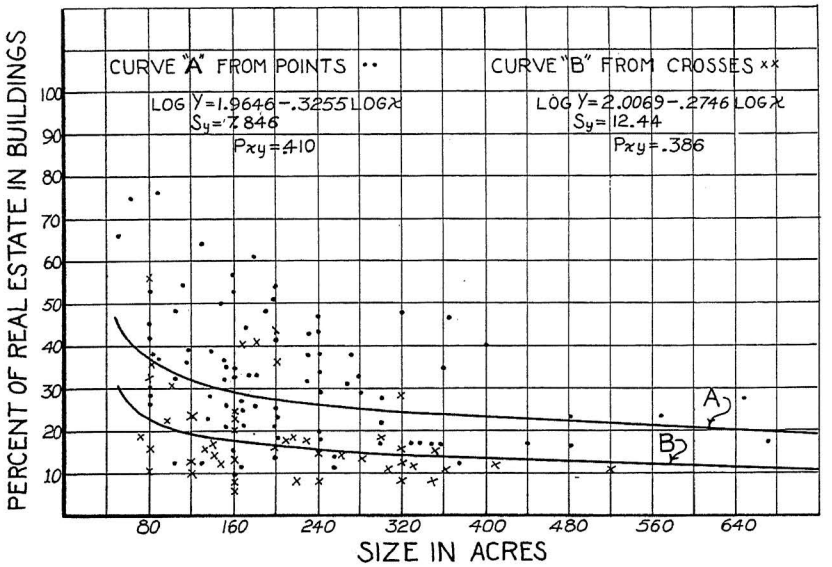

Fig. 25.—Scatter diagram showing percentage of real estate value in the buildings for different sizes of farms in the two counties studied.

Investment per Head of Livestock

The average investment in buildings for each of the different kinds of livestock was found by taking the actual value of buildings for work animals, dairy cattle, brood sows, hens, etc., and dividing by the number of animals to get the actual average value per animal. In some cases it was difficult to portion out this value as several types of livestock were kept in one building. However, this gives us a fair idea of what the farmers of Linn and Nodaway Counties have invested in their buildings for the various classes of livestock. These figures are based on replacement cost.

TABLE 12.—INVESTMENT IN SERVICE BUILDINGS PER ANIMAL.

Kind of Livestock	Average	Mode	Range
Work stock	$95.00	$64.29	$14.47-$291.65
Dairy cows	108.13	45.31	11.08- 315.96
Stock cattle	39.90	24.40	3.54- 158.75
Brood sows	24.47	15.95	1.00- 96.80
Stock hogs	7.25	3.06	.35- 26.80
Poultry (hens)	1.68	1.15	.28- 5.73
Sheep	10.87	8.00	.54- 31.38

Adequacy of Service Buildings

The adequacy of buildings was figured for the livestock owned by the farmer at the time the survey was made. This would vary some from year to year but in most cases it would be a fair average. For animals, kept in stalls there was no difficulty in figuring adequacy and for loose stock the adequacy of any structure was based on floor area. Standard practice of 3 square feet per hen, 50 square feet per head loose cattle, etc., was used. Figure 25 shows that a little more than two farms out of three were underimproved in service buildings. There are 108 cases with buildings, less than 100 per cent adequate and 47 cases where the adequacy was more than 100 per cent. Some of the high percentages result from the farms being under-stocked and tend to raise the average. The mode is a more reliable figure to use in this case. Approximately 40 per cent of the cases fall below the mode which shows 85 per cent adequacy.

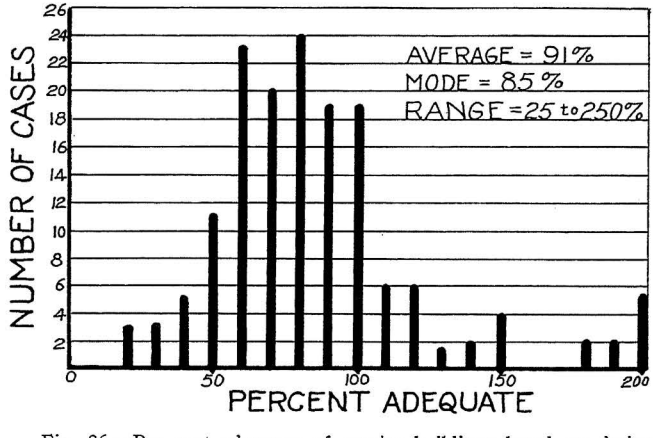

Fig. 26.—Per cent adequacy of service buildings based on design standards in common use.

The Annual Cost of Buildings

There is a tendency on the part of farmers to remember the first cost of buildings in their thinking on the subject and to ignore the more important item, the annual cost. This is due in some cases to a lack of plans or methods of computing these yearly costs. When the annual cost of buildings is analyzed it is found to be made up of five items: Interest on the investment, depreciation, repairs, insurance and taxes.

Interest. The average value of the building from the time it is built to the time of its failure is one-half of the first cost. Money

can usually be secured for making permanent improvements at 6 per cent. This, times the average value, gives the annual interest charge that should be made to equalize this interest charge over the whole period.

Depreciation. The annual depreciation charge depends upon the years of service rendered by the structure and is computed in per cent of the replacement cost.

Repairs. To arrive at a figure for repairs, the total amount of money spent for repairs during the year, on the 200 farms was divided by the total replacement cost of service buildings on these same farms. On some farms no money had been spent on repairs during the year, while on others considerable sums had been spent. Under repairs was considered such items as reroofing, replacement of siding, repair of doors, replacement of sills and foundations, repainting, etc. This gave us an annual repair charge of 1-3/100% of the replacement cost.

Insurance and Taxes. These items are based on the present worth of the structures and were found to be 4/10% and 1/10% of the present worth respectively.

TABLE 13.—ANNUAL COST OF BUILDINGS ON 200 NORTHWEST MISSOURI FARMS

	Nodaway County	Linn County	Average of all
All buildings per farm	491.74	395.48	438.09
All buildings per acre	2.54	2.02	2.24
Service bldgs. per farm	277.83	205.41	237.50
Service bldgs. per acre	1.54	1.01	1.23
Service bldgs. per animal unit	7.99	10.92	9.70
Buildings for living	219.91	189.83	202.00

The annual cost for buildings was higher in every division in Nodaway County except in cost per animal unit. This low cost per animal unit was due to the fact that larger herds were maintained in Nodaway County and better untilization of buildings resulted.

Division of Annual Costs

When annual costs were divided up among the various items each made up the following percentage of the total.

Interest	39.8%	Depreciation	46.2%
Repairs	10.0%	Taxes	.8%
Insurance	3.2%	Total	100.0%

In making up annual charges to different enterprises on the farm it is often desirable to know the amount to charge each

enterprise for housing. The following table gives the average annual charge for housing on the farms studied.

TABLE 14.—ANNUAL BUILDING COST PER ANIMAL.

Work stock	$7.16
Cows	8.14
Stock cattle	3.01
Brood sows	1.84
Stock hogs	.55
Hens	.13
Sheep	.81

The Place of Farm Building Costs in the Total Cost of Production

In the production of salable products on the farm there are certain expenses which must be charged against each enterprise. It was found to be impractical to separate these expenditures for the different projects for study due to their close relationship and due to the lack of itemized records.

In making this study the farm has been considered as a whole and all costs computed together for the operation of the farm. These items were grouped as follows: (1) Feed fed, (farm prices), (2) interest on investment in animals @ 7%, (3) chore labor @ 20c per hour average, (4) fences, (5) service buildings, (annual cost), insurance on livestock and veterinary fees.

TABLE 15.—ITEMS IN FARM OPERATING COST ON 200 NORTHWEST MISSOURI FARMS.

		Per Cent of Total
Feed fed	$3166.00	73.7%
Interest on investment in animals	223.00	5.2%
Labor	583.40	13.5%
Fences	60.00	1.4%
Service buildings	245.00	5.7%
Insurance and veterinary	17.00	.5%
Farm operating cost	4294.00	100.0%

The activities on a number of farms were being curtailed owing to the uncertainity of the future. The following data were taken from 57 of the more profitable farms. This study was made because it was felt that these farmers who were making a profit would be normal in their expenditures for buildings as well as other items in the cost of production.

It may be seen from Tables 15 and 16 that feed is the major item of cost in carrying on the common farm enterprises, making up from 60% to 75% of the total. Figure 27 shows the relationship of feed cost to the total expenses. Each dot representing a farm shows a definite trend and very little scatter about the line of regression and a very high coefficient of correlation, r=.965.

TABLE 16.—PLACE OF BUILDINGS IN THE COST OF PRODUCTION ON PROFITABLE FARMS.

	Interest on Investment in Animals	Insurance and Veterinary	Pasture	Roughage	Concentrates	Annual Cost Service Bldgs.	Profits and Wages of Mgr.
20 most profitable farms	$404.21	$27.38	585.65	644.90	4072.25	333.18	3808.10
Per Cent of Total	6.66%	0.45%	9.65%	10.62%	67.11%	5.49%	-------
20 least profitable farms	193.02	51.24	365.35	343.55	2793.75	224.60	337.50
Per Cent of Total Cost	4.86%	1.29%	9.20%	8.65%	70.34%	5.65%	-------
Average of 57 farms	265.80	31.39	424.96	511.94	3173.66	271.01	1895.05
Per Cent of Total Cost	5.64%	0.67%	9.08%	10.94%	67.86%	5.79%	-------

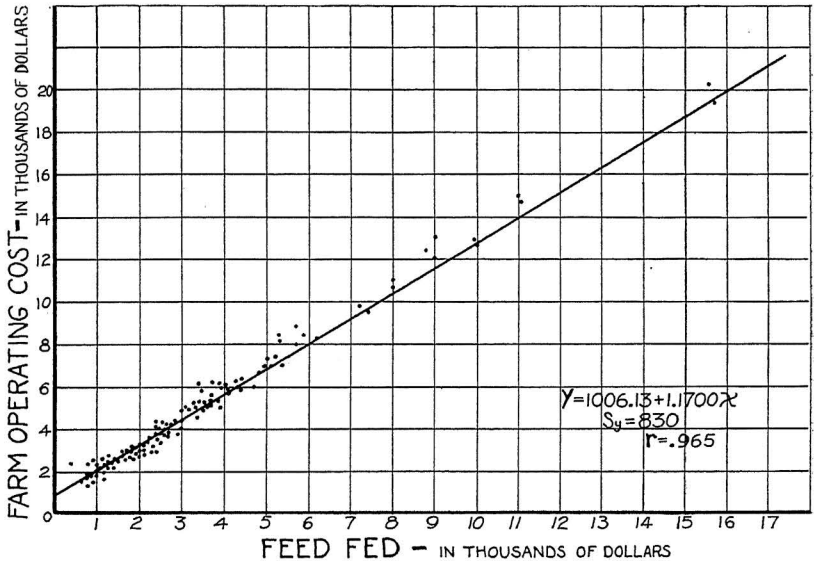

Fig. 27.—Relationship of feed costs to total expenses. This is a casual relation but is given to show the close relationship existing between the two.

The Returns from an Investment in Farm Buildings

Since buildings are but one of the factors contributing to the returns from farm enterprises, it is very difficult to set an exact figure for the extent of their contribution. Other contributing factors, such as the quality of livestock, the farmer's ability as a feeder and as a manager are difficult to evaluate for use in statistical studies, however some trends may be studied and possible conclusions drawn. The measures used are, first, labor income from the farm; second, returns per dollar's worth of feed fed in the different enterprises; third, real estate values, and fourth, saving of feed.

Labor income for one year is not the best measure but it may be taken as indicating a trend. Figure 28 shows that there is a slight relationship between building investment and labor income. An increase of $100.00 in labor income was accompanied by an increase of $1000 in the replacement cost of service buildings.

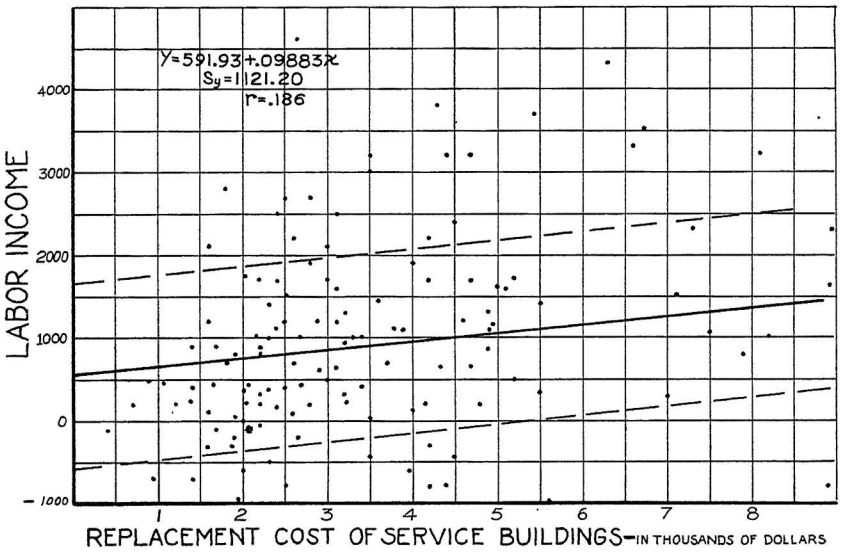

Fig. 28.—The relation of labor income to building investment.

The farms in each county were divided into two groups according to their labor income. First, the twenty farms having the highest labor income, and second the twenty farms having the lowest labor income. A comparison of building investment in these groups is given in Table 17, and illustrated graphically in Figure 28.

Using labor income as the dependent variable, (2) value of buildings per acre, (3) total annual receipts, (4) animal units, and (5) adjusted crop acres as independent variables, a correlation was run. After taking out the effect of 3, 4, and 5, a partial correlation between labor income and value of service buildings gave an r of +.124. Although this r is small the fact that it is plus shows the tendency for high labor income to be associated with high investment in service buildings.

TABLE 17.—BUILDING INVESTMENT ON FARMS GROUPED ACCORDING TO LABOR INCOME.

	20 most profitable from each county	20 least profitable from each county
Present Worth of Buildings		
All bldgs. per farm	$5096.50	$3884.36
Service buildings	2338.33	1742.08
All bldgs. per acre	22.41	23.94
Service bldgs. per acre	10.25	10.85
Service bldgs. per animal unit	49.66	73.86
Replacement Cost of Buildings		
All bldgs. per farm	8391.00	6947.00
Service buildings	4190.50	2370.57
All bldgs. per acre	36.62	32.08
Service bldgs. per acre	18.27	20.77
Service bldgs. per animal unit	88.15	127.79

Returns on Investment in Buildings Measured in the Returns Secured from Feed Fed

Most of the farm enterprises are housed together in the buildings and it is very difficult to allocate the resulting housing charge that should be made to each. The poultry enterprise is kept more to itself and studies could be more readily made. A correlation was run between X_1 the value of poultry buildings and X_2 the returns per $1.00 worth of feed fed. The coefficient of correlation was found to be r=.3686. If we can credit buildings with all the variation in returns from feed fed, then the building would return 37% annually on the investment. It may be that the farmers with better houses had higher quality flocks or provided more suitable feed for them. We have no measure of these factors and therefore give the result with this explanation.

One of the means by which buildings may bring returns is in the saving of feed. A correlation was run between value of feed fed per $100 annual cost of service buildings and the total annual cost of service buildings on 80 farms, forty with a high and forty with a low annual cost for service buildings. This gives a measure of the efficiency in using feed. This curve shows that an increase from $120 annual cost to $420, caused a reduction of $200 in feed cost for each $100 annual cost of buildings. Those farmers with $300 higher annual cost for service buildings saved $600.00 in feed cost.

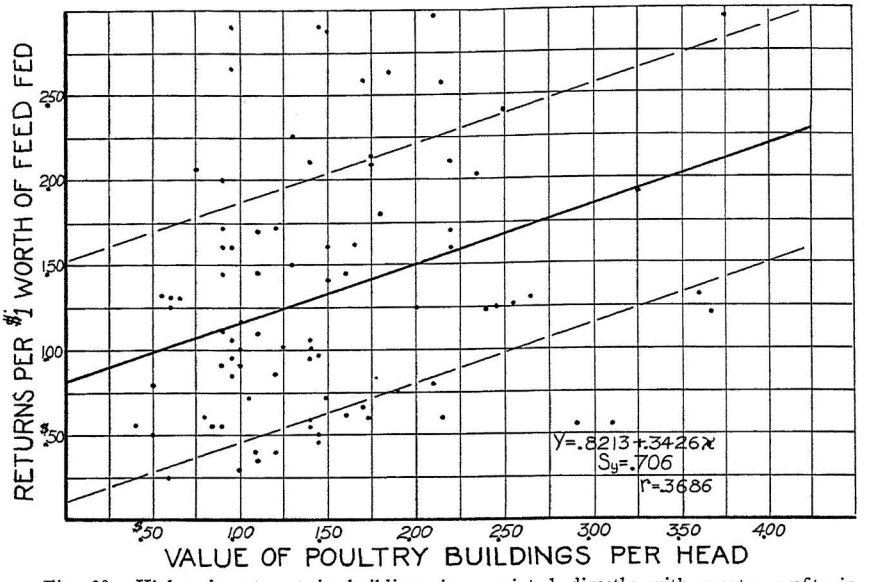

Fig. 29.—Higher investment in buildings is associated directly with greater profits in poultry.

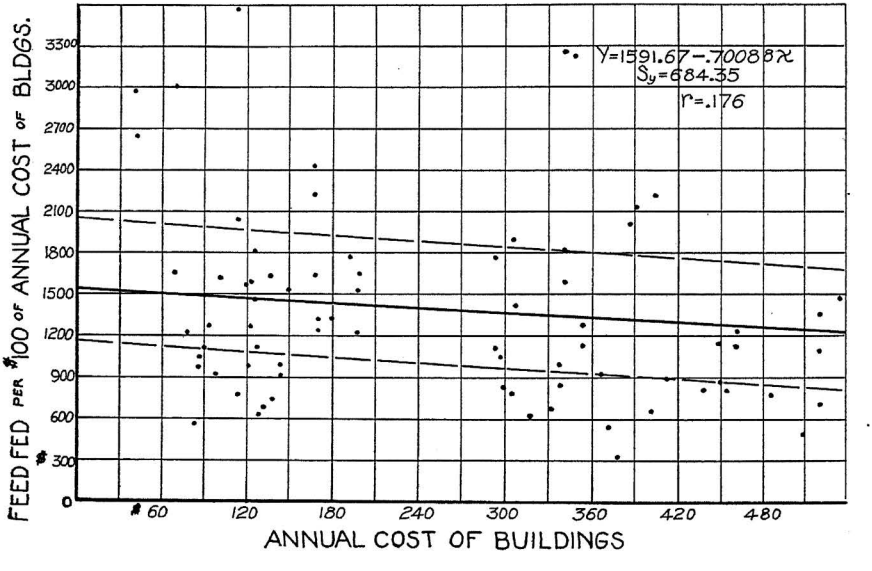

Fig. 30.—Saving in feed from better buildings.

Another way in which buildings may bring returns is by increasing the selling price of the farm. There are many factors

that will exert an influence on real estate value in addition to buildings and therefore the following factors were evaluated and used in the multiple correlation followed by a partial correlation to secure their influence independent of other variables.

X_1=value of real estate per acre—dependent variable

X_2=size in acres—independent variable

X_3=land index—independent variable

X_4=crop index—independent variable

X_5=distance to market—(weighted with kind of road)

X_6=present worth of buildings per acre—independent variable

The resulting predicting equation was as follows:

$X_1=43.26+.011186_2+.026135X_3+.138279X_4$
$-1.07078X_5+.572446X_6$

After getting the values of X_2, X_3, etc., their contribution to the total real estate value was worked out for each farm and deducted from the real estate value. This eliminated the influence of these factors and gave a correlation between present worth of buildings per acre and real estate value per acre, uninterfered with by these factors.

$X_1=36.62+.88056X_6$. Here we have the present worth of buildings contributing 88 cents for each $1.00 of their actual value. Real estate values being abnormally low may have had an influence.

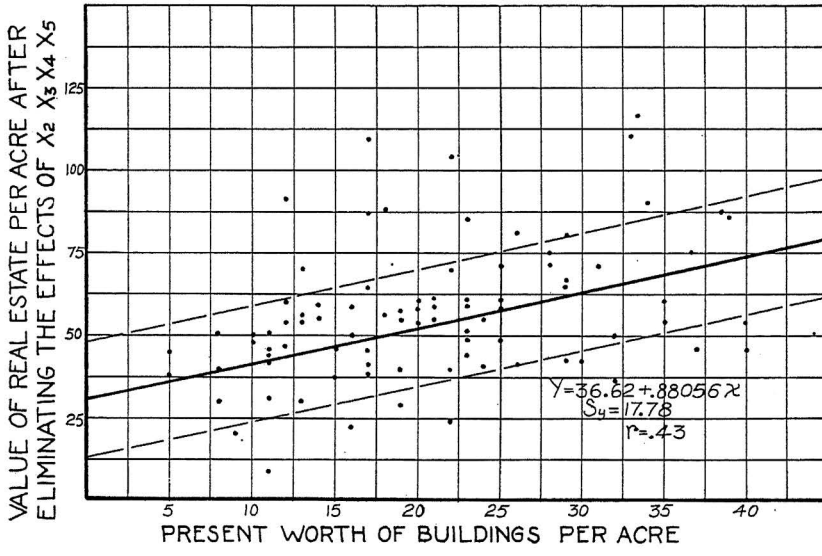

Fig. 31.—Contribution of buildings to real estate values.

Efficiency of Layout and Utilization of Labor

A map of each farm showing fences, gates, waste land and timber was drawn to scale. Among other things this map was used in computing the efficiency of field layout. Distance of field from farmstead and size of field were the two factors used in measuring efficiency of field layout. Each farmstead was scored for efficiency. (See score card in appendix). The farmstead score and the field layout score were used as independent variables to determine their effect upon efficiency in the use of labor. The relationship was not significant due to other factors which were not evaluated in the study.

Summary of Facts Established by This Study

Foundations, sills and connected framing are the most frequent locations of failure in buildings.

Lack of care of roof drainage is one of the most frequent causes of failure.

Foundations 20 inches high and over seem to give sufficient protection to sills and siding.

The first paint, three coats, on a barn yields 3-73/100% on the investment compounded annually.

Barns painted as needed yield 3-22/100% interest on the investment. Their value in sanitation and improved appearance not included.

Farm buildings were found to be slightly above normal condition in 1929 and 1930.

The most common replacement cost for farm homes in the area studied was $3575. Present worth $1910.

The most common replacement cost for service buildings in the area was $2819. Present worth $1754.

26-7/10% of the homes studied were found to be modern.

Distance from market had little, if any, effect on the amount of money the farmer invests in buildings.

Crop acres, crop index and number of animals kept are the most important factors in determining the normal investment in service buildings.

The average investment in buildings for different kinds of livestock was as follows: Work stock $95; dairy cows $108..13; stock cattle $39.90; brood sows $24.47; hens $1.68; and sheep $10.87.

The percentage of real estate value in buildings increases rapidly on farms under 160 acres.

On a majority of the farms the service buildings were less than 85% adequate for livestock owned.

The annual cost of buildings was found to be $2.24 per acre. Service buildings were $1.23 per acre.

Depreciation makes up 46.2% of the cost of service buildings.

Average annual cost of service buildings per horse was $7.16; per cow $8.14; per brood sow $1.84; per hen 13c.

Feed makes up 73.7% of the cost of producing animals and animal products on these farms.

Service buildings make up 5.7% of the cost of producing animals and animal products.

An investment in service buildings yielded 88c on the dollar, present worth in real estate value. (Real estate value abnormally low in 1929 and 1930.)

Efficiency in layout of buildings and fields did not seem to influence efficiency in use of labor. Other factors were more important.

Adequate service buildings require, on the average, an investment of $18.27 per acre.

APPENDIX

ANIMAL UNITS

The animal unit is the figure used to reduce all animals on the farm to a common unit for comparison. The relative value of feed consumed is the basis for reduction to this common unit. Since most of the farms were stocked in a somewhat similar manner the comparison of one farm to another by animal units is feasible.

The table on page 40 gives the number of animals of each kind to make an animal unit. In computing the efficiency of each farmstead, the normal chore time per unit of different kinds of livestock was needed. Column 2 gives the average hours per year per animal unit as found on a large number of farms where records are being kept for the Farm Management Department.

In developing this Schedule Sheet it was necessary to take into account the different groups of animals to be taken care of as well as to consider the different operations involved in the care of each group. Also it was necessary to weight each different group according to the number of animals, or the number of animal units to be taken care of. The score card gives a list of

TABLE 18.—ANIMALS AND CHORE TIME PER ANIMAL UNIT.

	Animal Units	Chore Time per Year per A. U.
Dairy cows	1	150
Farm milk cows	2	100
Calves, heifers and colts	3-1/3	75
Cattle fattened on grass	2	20
Horses and mules	2	100
Brood sows	3-1/3	100
Stock hogs	10	50
Cattle fed thru the winter	1	30
Sheep (stock)	12-1/2	250
Sheep fattened or wintered	20	250
Poultry	40	80

the different operations in caring for each group of animals with a perfect score for each operation. Under care of work animals feeding concentrates was given a value of 10% of the total chore operations. If all the feed was stored conveniently in the barn, the building was scored 10 on this item. If the grain was stored in another building then the score was lowered accordingly. If the building was conveniently arranged to pasture and if check lots are supplied, the farmstead would be graded 100%. The next step would be to determine the number of animal units of work stock on the farm.

By multiplying the number of animal units by the chore hours per year per animal unit we have the total chore hours per year. After the total chore hours per year have been found the percent of chore time devoted to work stock, etc., can be computed. This percent times the percent score for the lay-out gives the final figure, for each division. The sum of these gives the total score for the farmstead. If nothing but work stock is kept and the barn and surroundings rated 100, then 100% of the chores would be on work stock and therefore the final score would be 100. This method of scoring rates the farmstead on the basis of the work that is to be done there. If the layout for the care of poultry is very inconvenient but only a small amount of poultry is kept, then this will have but little effect in reducing the final score.

SCHEDULE SHEET FOR EFFICIENCY OF FARMSTEAD

Farm No.....

The rating for care of each division of livestock is weighted by a number representing the percent of chore time devoted to this division of the farmstead enterprises.

	Perfect Score	*This Farmstead*	
I. Care of Work Animals			
Feeding concentrates	10		Animal units
Feeding hay	15		Chore time
Cleaning barns	25		
Watering horses	25		% total
To and from pasture	25		Weight
Total		x	
II. Care of Dairy Cows			
Feeding concentrates	10		Animal units
Feeding hay	15		Chore time
Feeding silage	10		
Cleaning barns	15		% total
Miking	25		
Watering cows	15		
To and from pasture	10		Weight
Total		x	
III. Care of Stock and Fat Cattle			
Feeding concentrates	10		Animal units
Feeding hay	15		Chore time
Feeding silage	15		
Cleaning barns	5		% total
Watering	35		
To and from pasture	20		Weight
Total			
IV. Hogs			
Feeding concentrates	30	x	Animal units
Bedding	5	x	
Cleaning	15		
Watering	25		% total
To and from pasture	15		
To scales, loading, shutes, etc.	10		Weight
Total		x	
V. Sheep			
Feeding concentrates	15		Animal units
Feeding hay	15		Chore time
Watering	30		% total
Cleaning	10		Weight
Herding	30		
Total		x	
VI. Poultry			
Feeding	25		Animal units
Cleaning	20		Chore time
Watering	35		
To yards and runs	20		

SCHEDULE SHEET FARM HOUSES.....

Type of House.....No. on Farmstead Plan.....Farm No.....

I. HISTORICAL DATA (to be secured from farm operator)

Year constructed..... Cost when built.....

Repairs—Foundations..... Year..... Cost.....

Framing..... Year..... Cost.....

Siding..... Year..... Cost.....

Doors..... Year..... Cost.....

Roof..... Year..... Cost.....

Paint (1st year).....Cost.....(2nd year).....Cost.....

(3rd year).....Cost.....(4th year).....Cost.....

II. CONSTRUCTION AND DEPRECIATION (to be secured by inspection)

.....Foundation. Material.....Height low side.....Defects if any

.....Cause.....

.....Frame.....Material.....Defects if any.....

Cause.....

.....Siding.....Material.....Defects if any.....

Cause.....

.....Roof covering Material.....Defects if any.....

Cause.....

.....Doors. Small Service. How hung.....Defects if any

.....Cause.....

Number each part according to seriousness of defects.

III. CAPACITY

Modern.....Number rooms.....	Semi-modern.....	Not modern.....
No. bed rooms.....	No. rooms.....	No. rooms.....
Kind heating system.....	No. bed rooms.....	No. bed rooms.....
Kind water system.....	Kind heating.....	Kind heating.....
Sources water.....	Kind water sys.....	Source water.....
Power.....	Source.....	Kind lights.....
Kind lights.....	Power.....	Power equip.....
Disposal sewage.....	Kind lights.....	.....
Power Equip. in house.....	Kitchen sink.....	.....
.....	Bath tub.....	.....
.....	Inside toilet.....	.....
.....	Power Equip.....	.....
.....	.....	.....

IV. COST AND SERVICE DATA

Main bldg. Lt.....Wd.....Ht. to sq.....to ridge.....Av.....Cu. Ft.....

.....Shed Lt.....Wd.....Ht. to sq.....to ridge.....Av.....Cu. Ft.....

.....Shed Lt.....Wd.....Ht. to sq.....to ridge.....Av.....Cu. Ft.....

.....Shed Lt.....Wd.....Ht. to sq.....to ridge.....Av.....Cu. Ft.....

Replacement cost cu. ft.....Total $.....Total cu. ft.....

Dep. rate.....% Annual Dep. $..... Age of building to date.....

Present worth..... Future service estimate.....

Cost per cu. ft. when built..... Total service from bldg.....

Use opposite side of sheet for computations and sketches.

SCHEDULE SHEET SERVICE BUILDINGS.....

Number on farmstead plan.....County..... Farm No.....

I. HISTORICAL DATA (to be secured from farm operator)

Year constructed..... Cost when built.....

Repairs—Foundations..... Year..... Cost.....

Framing..... Year..... Cost.....

Siding..... Year..... Cost.....

Doors..... Year..... Cost.....

Roof..... Year..... Cost.....

Paint (1st year).....Cost.....(2nd year).....Cost.....

(3rd year).....Cost.....(4th year).....Cost.....

II. CONSTRUCTION AND DEPRECIATION (to be secured by inspection)

.....Foundation. Material.....Height low side.....Defects if any

.....Cause.....

.....Frame.....Material.....Defects if any

.....Cause.....

.....Siding.....Material.....Defects if any

.....Cause.....

.....Roof Covering Material.....Defects if any

.....Cause.....

.....Doors. Small Service. How hung.....Defects if any

.....Cause.....

Driveway doors. How hung.....Defects if any

.....Cause.....

Hay door. How hung.....Defects if any

.....

Number each part according to seriousness of defects.

III. CAPACITY

Hay. Lt.....Wd.....Depth.....Cu. Ft.....Tons.....Amt. hay needed.....

Hay Lt.....Wd.....Depth.....Cu. Ft.....Tons.....Amt. bedding needed.....

Bedding.....Wd.....Depth.....Cu. Ft.....Tons.....

Corn Lt.....Wd.....Depth.....Cu. Ft.....Bu.....Amt. corn needed.....

Corn Lt.....Wd.....Depth.....Cu. Ft.....Bu.....

Small grain Lt.....Wd.....Depth.....Cu. Ft.....Bu..... Amt. Needed.....

Small grain Lt.....Wd.....Depth.....Cu. Ft.....Bu.....

Machinery Lt.....Wd.....Sq. Ft.....

Ventilation.....No. outlets.....Size.....No. Inlets.....Size.....

Kind of Livestock	Single Stalls No.	Single Stalls Size	Double Stalls No.	Double Stalls Size	Loose Stock Manger Space	Loose Stock Floor Space	Glass area total

IV. COST AND SERVICE DATA

Main bldg. Lt.....Wd.....Ht. to sq.....to ridge.....Av.....Cu. Ft.....

.....Shed Lt.....Wd.....Ht. to sq.....to ridge.....Av.....Cu. Ft.....

.....Shed Lt.....Wd.....Ht. to sq.....to ridge.....Av.....Cu. Ft.....

.....Shed Lt.....Wd.....Ht. to sq.....to ridge.....Av.....Cu. Ft.....

Replacement cost cu. ft..... Total $..... Total cu. ft.....

Dep. rate.....%. Annual Dep. $..... Age of building to date.....

Present worth..... Future service estimate.....

Cost per cu. ft. when built..... Total service from bldg.....

Use opposite side of sheet for computations and sketches.