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The Appraisal of Farm Buildings

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The appraisal of a building is accomplished by determining its structural value and then from this, its place or use value. Structural value depends upon the years the building has been in service, the care it has received, the correctness of the design and the quality of material and workmanship that was used in erecting it. The place value depends upon how effectively the building serves the farm on which it is located.

Determining the Structural Value

Appraisers are generally agree that the most reliable method for determining the structural value of a building is to compute the cost of replacing the building and then depreciate this cost for past use. This brings values up to the present time and gives a better basis for computations.

Replacement cost of buildings.—There are several methods used for determining the cost of erecting buildings. These have been developed and are being used by contractors who make competitive bids on construction work. These methods are accurate but for the appraiser in the field the method known as "cubing" is probably the most satisfactory one to use. This method is carried out by computing the cubic foot figure suited to the type of building. This figure will vary with different buildings and with variations in cost of materials and labor. To take care of variations in types of buildings they have been divided into different classes A to N inclusive. This classification is shown in Table 1, Classification of Buildings.

To secure a cubic foot cost figure that takes in all of the variables a definite plan has been devised. In working out this plan several buildings for which accurate cost data was available were used. The board feet of construction lumber, the board feet of finish lumber, squares of roofing, cubic yards of aggregate, hours of carpenter labor and the value of hardware, equipment, cement and paint per cubic foot of space in the building were determined. By multiplying each of these by local

TABLE 1. – CLASSIFICATION OF BUILDINGS*

A. Two-story general-purpose barns, 55,000 cu. ft. capacity, concrete foundations, concrete floor in stalls, alleys, and bins
B. Hay and feeding barn, 64,000 cu. ft. capacity, post frame, concrete-pillar foundation, practically no steel equipment
C. Hay and feeding barn, 25,200 cu. ft. capacity, pole frame, no foundation
D. Two-story dairy barn, 58,000 cu. ft. capacity, concrete floor, steel stanchions, drop siding, balloon framing
E. Sheep sheds, machine sheds, and open sheds for cattle, 10,000 cu. ft. capacity, concrete foundation, single-wall siding, concrete floors in service alleys
F. Missouri-type poultry house, 30 by 30 ft., 10,000 cu. ft. capacity, concrete foundation, thin-section concrete floor
G. Double corn crib, 2,000 bu. 11,000 cu. ft. capacity, concrete floors and foundations
H. Granary, 2,000 bu. 3,000 cu. ft. capacity, concrete foundation and floor
I. Garage, one car, 2,200 cu. ft. capacity, concrete foundation and floor
J. Milkhouse, two room, 1,500 cu. ft. capacity, concrete foundation and floor
K. One-story frame house, 22,825 cu. ft. capacity, four rooms
L. One-story brick veneer house, 20,960 cu. ft. capacity, four rooms
M. Two-story brick veneer house, 28,800 cu. ft. capacity, nine rooms
N. Two-story frame house, 28,680 cu. ft. capacity, eight rooms

Acknowledgment: Tables 1 to 6 inclusive, and Figure 1, are used by special permission of the publishers, McGraw Hill Company, from the book, "Farm Buildings," by J. C. Wooley.

*For barns in classes A, B, C, and D, adjust cost unit for size as follows: For every 10 per cent increase in the cubical contents, decrease the unit cost by 2 per cent. Increase cost at a similar rate for smaller sizes.

For buildings in classes E to J adjust cost unit for size as follows: For every 10 per cent increase in the cubical contents, decrease the unit cost by 4 per cent, and for every 10 per cent decrease in the cubical content, increase the unit cost by 4 per cent. If a barn is in class A (with the exception that it is a pole frame without foundation), use the constants for poles and for miscellaneous that applies to this type of construction, and omit the constant in class A for sand and gravel.

**Miscellaneous for K to N inclusive includes lath, building paper, moulding, windows, doors, hardware, gutters, plaster, cement and paint.

***Adjust unit cost for size as follows: For each 10 per cent decrease in cubical content increase unit cost 6 per cent. For each 10 per cent increase in cubical content decrease unit cost by 6 per cent.

In dwellings basements are included in cubage.

costs a figure for the particular building involved is secured. The results of this study are shown in Table 2.

TABLE 2. CONSTANTS TO BE MULTIPLIED BY PRICES TO DETERMINE COST PER CUBIC FOOT

Classification of buildings*	Construction lumber, board feet per cubic foot	Finish lumber, board feet per cubic foot	Roofing squares per cubic foot	Sand and gravel, cubic yards per cubic foot	Labor hours per cubic foot	Miscellaneous paint, cement, hardware, equipment, cents per cubic foot	Poles, for pole-frame buildings per cubic foot	Brick Thousand per cubic foot
A	0.4100	0.0630	0.00079	0.0017	0.0190	0.549		
B	0.3900	0.0340	0.00076	0.00082	0.0150	0.265		
C	0.3900	0.0640	0.00087	0.	0.0260	0.0088	0.00071	
D	0.4900	0.0480	0.00066	0.0016	0.0210	0.578		
E	0.4500	0.0260	0.0012	0.0013	0.0210	0.399		
F	0.4400	0.1500	0.0012	0.0024	0.0260	0.784		
G	0.5500	0.0160	0.00098	0.0033	0.0260	1.106		
H	0.9000	0.3800	0.0015	0.0048	0.0500	1.576		
I	0.4600	0.7200	0.0017	0.0038	0.0520	1.271		
J	0.6100	1.0300	0.0019	0.0110	0.0600	4.22		
K	0.713	0.2185	0.00078	0.00253	0.072	4.15		
L	0.5488	0.087	0.0008	0.0027	0.0728	4.8		0.00086
M	0.56	0.075	0.00062	0.00246	0.0795	4.84		0.00085
N	0.728	0.22	0.00066	0.00235	0.0728	5.2		

*From Table 1. The appraiser can secure local prices on the following materials to represent each of the groups. Construction lumber will be represented by the price per board foot of a 2 by 4 in.--16 ft. of the grade used in the building; finish lumber by the price per board foot of a 1 by 8 in.--12 ft., surfaced four sides; roofing by the price per square of the particular kind of roofing used; sand and gravel by the average price of sand and of rock or gravel per cubic yard; labor by the average hourly wage for a carpenter crew; poles for pole frames by the cost of a pole 25 ft. long with a 6-in. top. Since prices of nails, cement, paint and equipment does not vary much from one community to another, the total value of these items per cubic foot of capacity in the barn is found, and this figure is added in to find the, total cost of the building per cubic foot.

**No provision has been made for plumbing, wiring or interior decoration.

Application. In order to become familiar with the plan an appraisal problem will be carried through the different steps. Let us assume that the appraised value of a barn is desired. This barn was built in 1920 on a 120 acre farm located on Shelby soil and is reached daily by a milk, butter, and egg route, making dairy and poultry the desirable enterprises. The farmer does his work with one team and a small general purpose tractor. Twenty-seven acres of the farm is in permanent pasture and the remainder is cultivated land. The barn has stalls for 10 head of horses, 4 cows and the remaining floor space has been used for loose stock and machinery. A 350 bushel corn crib and a 700 bushel oat bin are located on the first floor. There is a concrete foundation and concrete floors in bins and alleys. There is 2000 square feet of usable ground floor space. The mow will hold 40 tons of hay. The total space in the barn is 42,000 cubic feet.

Local prices for construction items of similar quality to that used in the barn are as follows: dimension lumber 3½c per board

foot, finish lumber 4½c per board foot, roofing $4 per square. gravel $2 per yard and carpenter labor 60c per hour.

Referring to Table 1 on Classification of Buildings we find that this barn would be in Class A. Class A in Table 2 gives the constants to use in determining the per cubic foot cost. Listing these in tabular form we have.

Item	Constant	Local Price	Cost per cubic foot
Dimension	.41	3½c	1.435
Finish	.063	4½c	.284
Roofing	.00079	$4.	.316
Gravel	.0017	$2.	.340
Labor	.019	60c	1.140
Miscellaneous			.549
Total cost per cubic foot			4.064

The schedule is made up for a barn containing 55,000 cubic feet and in order to secure the correct figure for the barn which is 23.6% smaller it is necessary to add 2% for each 10% decrease (2% × 2.36 = 4.72%) to secure the proper per cubic foot cost. 4.064 × 104.72 = 4.26c the adjusted per cubic foot cost of replacement. This figure times the total cubic feet of space in the building (4.26 × 42,000) gives 1789.20 the replacement cost of the building.

Depreciation of replacement cost to determine present worth.—Knowing the date of construction we have the number of years the building has served to date. This, times the percentage annual depreciation for a building of this type, (see Table 3) gives the percentage of the normal serviceable life that has already been used.

This table was made up from information secured in studying 200 Northwest Missouri farms. It has been checked by a number of appraisers and seems to be quite reliable. If the building is average construction, use the mode or most common rate. If the construction and design are above average, use a correspondingly lower rate. The range covers both extremes.

Application.—By referring to Table 3 we find that the annual modal depreciation rate for barns of this type is 2.07%. The barn we are considering was built in 1920 and therefore it has been used 21 years. Thus, 21 × 2.07% =43%, the amount of the serviceable life that has been used to date.

Some appraisers use the straight line method for depreciating buildings. This gives equal value for each year of the life of the building. The equal profits ratio method used in engineering appraisal seems to give more nearly accurate results. This curve gives less depreciation for the earlier years of service and a greater rate for years near the end of the serviceable life. At the time of failure both reach the same point, the junk value

TABLE 3. DEPRECIATION RATES FOR FARM BUILDINGS IN PER CENT OF TOTAL LIFE

Description of building	Range, per cent	Mode
Hay and feeding barn, post frame, no foundation	2.0-12.5	3.44
Hay and feeding barns, timber frame, rock or concrete foundation	2.0- 2.5	2.07
Beef cattle barn, balloon or timber frame, rock or concrete foundation	1.5- 5.0	2.43
Dairy barns, balloon or timber frame, concrete floor and foundation	1.4- 3.4	1.60
Cattle or machine sheds, no foundation	1.4- 5.6	2.58
Cattle or machine sheds, balloon or timber frame, concrete foundation	1.1- 5.0	2.44
Garages, post frame, no foundation	2.0- 5.9	2.60
Garages, balloon frame, concrete floor and foundation	1.4- 4.6	2.46
Poultry houses, post frame, no foundation, dirt floor	1.3-11.0	3.50
Poultry houses, balloon frame, concrete floor and foundation	1.3- 6.6	2.54
Corn cribs, post frame, wood floor and foundation	1.3-16.7	3.48
Brooder houses, movable	2.1-25.0	5.56
Individual hog houses	2.3-25.0	7.50
Centralized hog houses, balloon frame, concrete floor and foundation	1.6- 6.6	2.51
Granaries, balloon frame, concrete foundation, wood floor	1.9- 3.7	2.43
General storage houses, concrete foundation and floor	1.3- 6.6	2.40
Farmhouses, not modern, one story	0.9- 3.5	1.28
Farmhouses, semimodern, two story	1.0- 2.0	1.30
Farmhouses, modern	1.1- 2.0	1.71

of the building. Figure 1 gives the two curves and either one may be used.

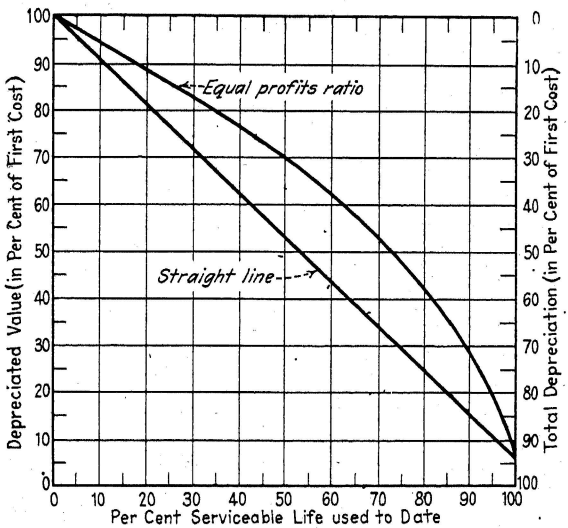

FIG. 1.—Curves for determining depreciated value of farm buildings.

Application.—Referring to Figure 1 and using the equal profits ratio curve we find that the building which is 43% used should be valued at 75% of the replacement cost. Thus $1789.20 × 75% =$1341.90 the structural value.

Determining the Place Value

The building needs of a farm depend upon correct land use for the area and the types of enterprises which will suit the farmer and the markets of the community.

The livestock carrying capacity of both pasture and crop land varies with the fertility of the soil and the climate. The soils of Missouri have been grouped into five classes based on productiveness. Table 4 gives this information for Missouri.

TABLE 4. SOIL-PRODUCTIVITY CLASSIFICATION*

Class	Description	Principal upland series
1	Productive land, all suitable for cultivation. Average corn yields 40 bu. or more per acre	Marshall, Grundy, Summit
2	Above medium productivity, all suitable for cultivation. Average corn yields 30-40 bu. per acre	Edina and Carrington, better grades of Knox, Shelby and Pettis
3	Medium productivity, practically all tillable. Average corn yields 20-30 bu. per acre	Crawford, Decatur, Eldon, Hagerstown, Leslie, Memphis, Oswego, Putnam
4	Below medium productivity. May or may not be tillable, but suitable for pasture. Average corn yields below 20 bu. per acre	Bates, Baxter, Cherokee, Lindley, Tilsit, Union, Gerald
5	Mainly forest or rough pasture, because of low fertility, rough surface, erosion stone content, or wet condition	Ashe, Boone, Clarksville, Hanceville, Marion, Lebanon

*Missouri Extension Circular 375, Replanning Missouri Farms.

The livestock carrying capacity for both pasture and crop land in each of these classes has been determined. This information is given in Table 5.

From the data given in Tables 4 and 5, the farm on which buildings are located can be classified. By consultation with the farmer and a study of the markets, transportation facilities, etc., the most desirable enterprises for the farm can be determined. When these have been selected the livestock carrying capacity can then be secured and by referring to Table 6 the storage and housing space that will be needed can be figured. By comparing the floor, hay, and bin space needed to the storage and housing space in the building being appraised the per-

TABLE 5. ACRES OF PASTURE AND CROPS ON DIFFERENT CLASSES OF LAND REQUIRED TO SUPPORT ONE ANIMAL *

Kind of animals	Class 1		Class 2		Class 3		Class 4		Class 5	
	Pasture	Cultivated	Pasture	Cultivated	Pasture	Cultivated	Pasture	Cultivated	Pasture	Cultivated
Dairy cows, full ration	1.5	2.25	1.75	3.25	2.25	4.50	3.00	6.00	4.00	
Family cows	1.89	1.91	2.20	2.76	2.84	3.83	3.80	5.20	5.10	
Dairy heifers, second year	1.32	1.53	1.52	2.20	1.95	3.06	2.62	4.07	3.46	
Dairy heifers, first year	0.60	0.95	0.70	1.36	0.90	1.89	1.20	2.50	1.60	
Beef cow and fed calf sold in fall	1.90	1.91	2.22	2.76	2.88	3.81	3.81	5.1	5.1	
Beef yearling, full fed, dry lot, no silage, 140 days		1.04		1.50		2.06		2.76		
Ewe with lamb, sold early	0.32	0.20	0.37	0.28	0.47	0.41	0.63	0.54	0.84	
Lambs, Western fed, dry lot		0.37		0.53		0.74		1.00		
Sow, including 13 pigs, sold at 200 lb		5.40		7.80		10.8		14.4		
Hen		0.026		0.038		0.053		0.071		
Work horse	0.86	2.05	1.00	2.95	1.28	4.10	1.71	5.50	2.27	
Colt, first year	1.20	1.64	1.40	2.35	1.80	3.28	2.40	4.36	3.20	
Colt, second year	1.50	2.10	1.75	3.00	2.25	4.20	3.00	5.60	4.00	

~~* If livestock is moved to small grain fields in the spring and again in the fall and onto Lespedeza during the summer months, the acres of pasture per head given may be reduced by 50 per cent.~~ Table compiled from information taken from University of Missouri Extension Circ. 375. Replanning Missouri Farms

TABLE 6. BUILDING-SPACE REQUIREMENTS FOR DIFFERENT ANIMALS

Kind of animal	Number of stalls	Pen space, square feet.	Hay stored, tons.	Corn, bushels	Small grain. bushels	Silage, tons
Dairy cow, full-grain ration	1 or 75		1.2	20 or 24		2.6
Dairy heifers and calves	1 or 40		1.3	10 or 12		1.5
Beef cow	1 or 40-60		1.0	10 or 12		0.5
Beef yearling, full fed, dry lot no silage		28-42	0.36	33 or 38		
Ewe with lamb, sold early		15-20	0.15	1	2	
Lambs. Western, fed in dry lot		15	0.10	2	0.5	
Brood sow		50		10 or 12		
Pig to 200 lb		20		13 or 15		
Hen		3		0.50	0.37	
Work horse	1		1.8	34	59	
Colt, first year		36	1.0	9	17	
Colt, second year		60	1.3	12	21	

centage usefulness of the building can be obtained. To determine a figure that will represent the true percentage of usefulness it is necessary to weight the different parts of the barn according to their economic importance in housing. The following weights have been selected for different parts of a barn. Stall or pen space 5; hay space 3; grain storage space 1. The percentage usefulness of floor space $\times$ 5 plus the percentage usefulness of hay space $\times$ 3 plus the percentage usefulness of crib and bin space $\times$ 1 and the sum divided by a 9 gives the percentage usefulness of the building to the farm.

Application.—The availability of markets for dairy and poultry products make these the desirable enterprises. By referring to Table 4, we find that Shelby soil comes in Class 2 so far as producitivity is concerned. Table 5 gives information on the livestock carrying capacity of the land and enables one to determine the total livestock carrying capacity of the farm. It is usually desirable to use the pasture completely because it cannot otherwise be marketed. This often necessitates the purchase of some grain crops.

Assuming that the poultry enterprise will consist of 500 hens because this is usually considered to be the smallest size flock for economical management, the poultry will require the crops from 19 acres of cultivated land. The two work horses will require 2 acres of pasture and six acres of crop land. Assuming that a four-year rotation will be used and that one year of this will include pasture, this will furnish 23 acres of pasture which together with the remaining 27 acres of permanent pasture can be used for the dairy herd. One-fifth of the calves are kept each year to maintain the herd. For each five cows there would be one two-year old, one yearling and one calf. This unit would require 11 acres of pasture and therefore on the 48 acres it would be safe to plan for 20 cows, 4 two-year olds, 4 yearlings and 4 calves. Setting this out in tabular form we have.

Kind of livestock	Pasture acres	Crop acres
500 hens	0	19
2 work horses	2	6
20 dairy cows	35	65
4 two-year olds	6	9
4 yearlings	3	4
4 calves	1	
Needed	47	103
Available	50	93

With this amount of livestock on the farm it would be necessary to purchase crops from 10 additional acres annually.

Having determined the livestock that should be placed on the farm we can figure the percentage usefulness of the barn in question. Arranging this data in tabular form and assuming that the barn will be used as a loafing place for the dairy herd, we have the following.

Kind of Livestock	Floor Space		Hay Space		Cribs and Bins	
	Available	Needed	Available	Needed	Available	Needed
20 cows		1500		24		
4 2 year olds		160		5		
4 yearlings		160		4		
2 horses		160				
Total	2000	1980	40	33	1760 cu. ft	960
Usefulness	100%		82%		54%	

$$1.00 \times 5 = 500$$
$$.82 \times 3 = 246$$
$$.54 \times 1 = 54$$
$$9 = 800$$

— 89% useful to the farm

$1,341.90 the structural value × 89% = $1,194.29 the appraised value of the barn to the farm.

Steps to Follow in Making an Appraisal of a Building.

1. Measure the building and figure the cubical content.
2. Determine the date of erection.
3. Select the proper classification for the building to be appraised. (Table 1).
4. Secure the local prices for grade of material used in the original construction and compute the proper per cubic foot cost. (Table 2).
5. Using this cubic foot cost determine the replacement cost of the building.
6. Figure the percentage of the serviceable life of the building that has been used to date.
7. Using the straight line or the equal profits ratio curve secure the percent of the replacement cost still remaining in the building.
8. Figure the present worth or structural value.
9. Find the proper classification for the land on the farm. (Table 4).
10. Determine the most suitable enterprise for the farm.

11. Figure the livestock carrying capacity to secure the best land use. (Table 5).
12. Figure the stall or pen space, hay, bin and crib space needed. (Table 6).
13. Check this against the building being appraised and figure the percentage usefulness.
to determine the place or final appraised value.
14. Multiply the structural value times the percent usefulness.