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New Systems on Northwest Missouri Upland Farms

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Current income and future income producing ability represent the most important measures of a successful farming system. The accompanying illustration gives those measures for three different systems as applied to a 160 acre upland farm of above average productivity, in Northwest Missouri.

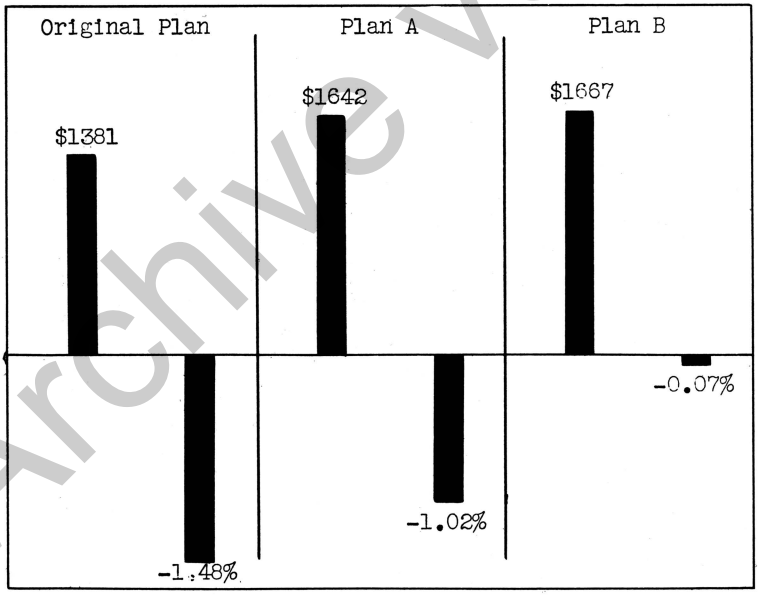

Figure 1.—Annual net cash farm income and annual productivity effect, respectively, of three different systems applied to a typical northwest Missouri upland farm. New systems will increase both annual earnings and check productivity losses on this farm. Annual productivity effects shown are based on factors determined by the department of soils, Missouri College of Agriculture.

THIS CIRCULAR AT A GLANCE

1. The material in this circular can be adapted to apply to Northwest Missouri upland farms. It is based on a survey of a 160 acre general livestock farm in that section.
2. On more productive lands such as are represented by this farm, revised systems will improve long time productivity of the land and at the same time increase annual returns. This statement would hold to even a greater degree, with regard to less productive farm lands.
3. Soil conservation is to be regarded as the maintenance of the "capital"* which resides in the land. Soils and agricultural engineering technicians have provided a basis for figuring the annual depreciation on this form of capital. It's maintenance, like that of any other capital, will be accomplished only when management of the entire business is such that it pays to do so.
4. Three systems are described as they apply to this farm. The percentage of different land uses under each is:

	Row Crop	Small Grain	Hay	Rotation Pasture	Permanent Pasture
	%	%	%	%	%
Original Plan	26.4	13.2	26.4	0.0	34.0
Plan A	26.0	13.0	13.0	14.0	34.0
Plan B	17.0	23.3	7.0	25.7	27.0

5. The number of mature breeding animals under each system is:

	Milk Cows	Beef Cows	Sows	Ewes	Hens
Original Plan	10	0	5	0	200
Plan A	0	20	5	40	200
Plan B	0	20	5	60	50

6. On the basis of conservative yield and price estimates, net cash farm income would be $1381 for the original plan; $1642 for plan A; and $1667 for plan B.
7. On the basis of productivity and slope factors based on soils experimental evidence, the annual depletion of total nitrogen for the farm would be 1.48% with the original plan: 1.02% with plan A; and 0.07% with plan B.
8. Taking the original system as the base, plans A and B would reduce man labor requirements by 4.1% and 9.5%, respectively. Plan A would increase horse labor requirements by 4.8% while Plan B would reduce them by 13.9%.

*"Soil capital" in this instance is measured by total nitrogen content of the surface soil.

THE FARM LAYOUT

The field arrangement illustrated by Figure 1 is logical for the original cropping system which consists of corn; corn, oats; clover; timothy. With the exception of field C, the fields are very uniform in size. The principal weakness of the original field arrangement

is the lack of provision for a secondary rotation to furnish convenient seasonal pasture for livestock. The only small fields for pasture close to the farmstead are the three permanent pasture lots directly below the buildings. These do not afford good pasture for a long enough period throughout the year.

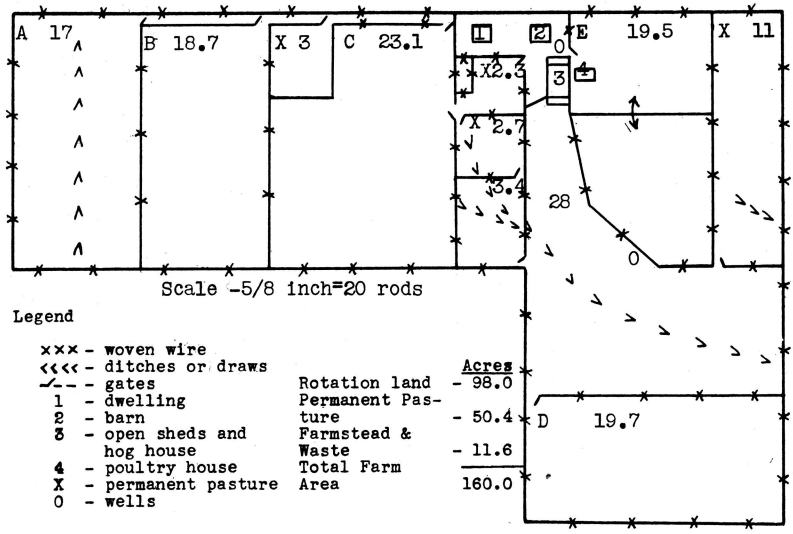

Figure 2.—The Original Farm Layout.

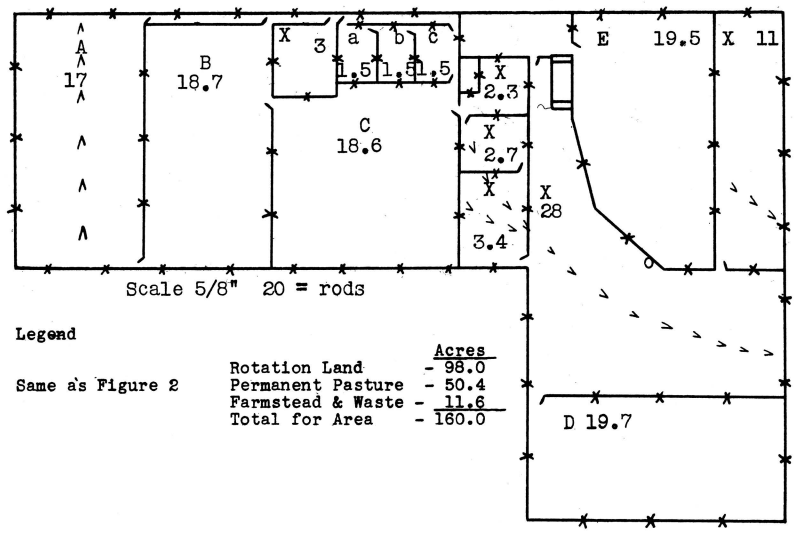

Figure 3.—Layout—Revised Plan A.

Plan A provides for using a part of the original large field C for

a three year rotation hog pasture thus more nearly equalizing the size of the main fields. The net additional amount of fencing required would be about 30 rods.

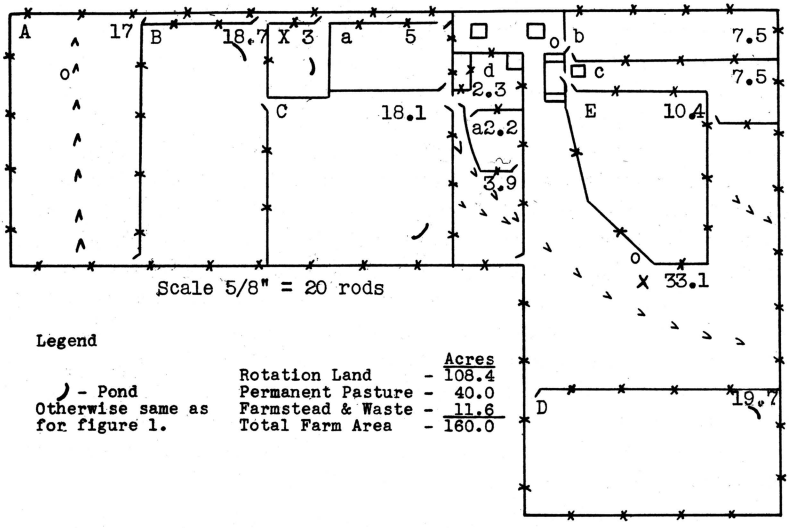

Figure 4.—Layout—Revised Plan B.

Plan B provides for a secondary rotation of fields a, b and c. Note that field *a* consists of two tracts, the smaller one of which was the middle small permanent pasture lot. (See Figure 1.) It has been reduced in size due to changing the location of the fence, to follow the ditch indicated thus permitting the lower permanent pasture lot to extend up to the one adjoining the farmstead. The larger tract comprising field *a*, is 5 acres taken from the original field C, thus reducing the revised field C to a size comparable with the others in the main rotation. The revised field arrangement, thus permits a three year secondary rotation in fields of about 7½ acres each. These are large enough to permit economical handling with equipment ordinarily used on a farm of this size, and yet as arranged, are all conveniently located. Field E will be used for alfalfa for a few years. A number of combinations are possible with fields A, B, C, and D. These will be discussed in the next section.

It will be noted that the revised layout materially changes fence locations in the northeast quarter of the farm, and that in order to develop the secondary rotation, part of the 11 acre permanent pasture is to be shifted into the rotation. The portion thus shifted is similar in topography to the original field E, already in cultivation.

The availability of all fields to water supply, is important in a system of farming devised to permit full utilization by livestock, of crop residues or regular rotation pastures. Fields a, b, c, and E are

all accessible to the farmstead water supply. That is one reason for having fields b and c divided east and west rather than north and south, despite the fact that the latter would require less additional fencing. There is a well in the large 33.1 acre pasture. A pond is to be constructed in either the east or west end of field D. The same is true for fields B, C, and the small 3 acre permanent pasture which is rough land. There is a well in field A.

The Plan B layout requires the construction of 47 rods of new fence, and the moving of 81 rods already constructed. Unnecessary fencing represents waste, but on the other hand fence that serves a useful purpose represents income every day it is used. Except for necessary buildings to protect animals from severe winter weather, adequate fencing is the most essential improvement on a general livestock farm. Possible developments in the use of the electric fence may make adequate fencing of even more value than it now is in relation to its cost of construction and upkeep. On many farms will be found misplaced fences which do not contribute to good land use or efficient livestock management. In such cases, no more profitable use of labor in slack seasons can be found than to rearrange them according to a well thought out plan.

THE LAND USE SYSTEMS

Original Plan (See figure 2)					Revised Plan A (See figure 3)					Revised Plan B (See figure 4)				
Field	Acres	Crop	Acres	Prod.	Field	Acres	Crop	Acres	Prod.	Field	Acres	Crop	Acres	Prod.
A	17	Red Clover	17	22	A	17	Corn	17	595	A	17	Corn	17	680
B	18.7	Timothy	18.7	16	B	18.7	Corn Sorgo	13 5.7	455 68	B	18.7	Wheat Oats	12 6.7	200 254
C	23.1	Corn	23.1	808	C	18.6	Oats - Lesp. Wheat - Lesp.	6.6 12.0	218 174	C	18.1	Sweet Clover	18.1	Past.
D	19.7	Corn	19.7	689	D	19.7	Wheat - Lesp.	19.7	Past.	D	19.7	Oats - Lesp.	19.7	640 Past.
E	19.5	Oats	19.5	642	E	19.5	Rye Soybean Hay Barley	19.5 19.5 19.5	Past. 26 Past.	E	10.4	Alfalfa	10.4	28
					a	1.5	Wheat - Lesp.	1.5	Past.	a	7.2	Corn	7.2	286
					b	1.5	Corn	1.5	52	b	7.5	Rye - Sweet Clover	7.5	Past.
					c	1.5	Wheat - Lesp.	1.5	Past.	c	7.5	Sweet Clover	7.5	Past.
Bushels Grain - Corn Equivalent				1754	Bushels Grain - Corn Equivalent				1394*	Bushels Grain - Corn Equivalent				1562
Tons Hay				40	Tons Hay				26	Tons Hay				28
Tons Straw				15	Tons Straw				13	Tons Straw				27

TABLE I.—ACREAGE AND CROP PRODUCTION OF THE THREE SYSTEMS.

*The 1394 bushels is in addition to the grain contained in the 68 tons of sorgo silage.

The Original Plan

(See Figure 2 and Table I)

The original cropping system was: corn; oats; red clover; timothy. The different crop acreages vary somewhat because of unequal sized fields. The land use system has seldom been exactly as outlined because of "patch" farming in field C, but table I does represent the normal land use and crop sequence.

Permanent pasture land is not included in table I. The original system provides for no rotation pasture except 1st year red clover following the oats, and what grazing would be picked up after cutting the clover and timothy hay crops.

The original system has been considered well adapted to general farms on this kind of land. But with increasing severity of soil losses, together with a need for restoring permanent sod pastures which have been damaged by over grazing, there is need for rotations which will carry the pasture load during the summer months, leaving the bluegrass as a winter pasture to reduce hay and other roughage requirements. Many farms on which the type of rotation represented by the original system, has proved successful in the past, have deteriorated so that soil treatments are necessary for their continuance. Red clover, for example, will no longer grow successfully on many farms similar to this, without lime. Thus even on better lands, it is often a question of treating soils to permit the development of soil maintaining or building systems, or resorting to the use of crops which will grow on lands lower in productivity. Generally speaking, it can be considered good economy to treat the better lands so that cropping systems which will at least maintain fertility, can be established. Cropping Plan A illustrates a land use system, not requiring soil treatments and relying on soybeans for hay and lespedeza for rotation pasture. Plan B is one requiring soil treatments and involves the use of alfalfa for hay, and sweet clover in conjunction with lespedeza for rotation pasture. All three systems are to be compared as to their productivity, initial and normal annual cost.

Revised Plan A

(See Figure 3 and Table I)

There is one main 5-year rotation, and a 3-year rotation, the latter to provide clean ground, hog pasture. In the main rotation, the division of acreage between corn and sorgo in one field was planned to permit maximum gains from participation in the current agricultural conservation program. The small grain which follows corn would be either oats or wheat. The plan in this illustration is 12 acres of wheat since that represents the wheat acreage allotment for this farm. The remainder of the field would be put to oats. Since silage would be used in this system, a part of the crop following lespedeza pasture, would be atlas sorgo, the balance of the field being used to bring the corn acreage up to the allotment. This illustrates certain flexibilities which can be used in developing good farming systems and at the same time permit full participation in the agricultural conservation program. Variation in acreage allotments for certain crops need not interfere with the operation of such a system since it is flexible enough to permit sufficient modification.

Soybeans are used for hay in this system. They would be preceded by rye drilled for pasture and winter cover following the corn and sorgo. The rye would be pastured out in the spring, the ground plowed and prepared for drilling soybeans. After the hay is taken off the ground is drilled to barley for fall pasture after which that field would go to corn the following year, on the assumption that the barley would winter kill in this section of the state. In years when a good stand of barley came through the winter, it could be left for a grain crop instead of putting the field to corn.

The principal advantage of this system over the original plan is that it provides for more pasture and a better distribution of it, thus allowing the bluegrass to rest during the summer months. Furthermore, it can be put into operation without an immediate outlay for lime.

Three plowings would be required in the main rotation, one for each of two corn crops and one just ahead of soybeans. Since lespedeza would occupy the land only two years out of five, it would probably require an annual seeding. A cash outlay for rye, barley, and soybean seed would be necessary, unless a small plat of the latter were allowed to mature for threshing.

Field	A	B	C	D	E	a	b	c
Acres	17	18.7	18.6	19.7	19.5	1.5	1.5	1.5
This year	Corn 8 Oats 9	Corn	Corn 3.1 Hegari 8.0 Soybeans 7.5	Oats - Lesp.	Oats 10.4 Timothy 9.1	Soy-beans	Soy-beans	Soy-beans
1st year	Oats - Korean 5 Wheat - Korean 12	Rye pasture Soybean hay Barley pasture	Rye - Lesp. pasture	Corn 12 Sorgo 7.7	Corn	Corn	Wheat-Lesp.	Wheat-Lesp.
2nd year	Wheat - Lesp. pasture	Barley or Corn	Corn 12.1 Sorgo 6.5	Rye pasture Soybean hay Barley pasture	Oats - Lesp. 7.5 Wheat - Lesp. 12.0	Wheat-Lesp.	Corn	Wheat-Lesp.
3rd year	Corn 10.5 Sorgo 6.5	Oats - Lesp. 6.7 Wheat - Lesp. 12.0	Rye pasture Soybean hay Barley pasture	Barley or Corn	Wheat - Lesp. pasture	Wheat-Lesp.	Wheat-Lesp.	Corn
4th year	Rye pasture Soybean hay Barley pasture	Wheat - Lesp. pasture	Barley or Corn	Oats - Lesp. 7.7 Wheat - Lesp. 12.0	Corn 11.4 Sorgo 8.1	Corn	Wheat-Lesp.	Wheat-Lesp.
5th year	Barley or Corn	Corn 13.0 Sorgo 5.7	Oats - Lesp. 6.6 Wheat - Lesp. 12.0	Wheat - Lesp. pasture	Rye pasture Soybean hay Barley pasture	Wheat - Lesp.	Corn	Wheat-Lesp.

TABLE II.—MAKING THE CHANGE TO REVISED PLAN A.
(See Figure 3 and Table I)

Table II carries the illustration through one five year rotation and shows how the transition could be made from the present actual crop situation, in order to get revised Plan A into operation. Fields a, b, and c of 1.5 acres each, as shown in Figure 3, are taken out of the original field C which as shown in Figure 1 originally consisted of 23.1 acres.

Revised Plan B

(See Figure 4 and Table I)

Plan B consists of a main and a secondary rotation, each of which are corn; small grain; sweet clover pasture. The small grain (rye) in the secondary rotation is pastured out. Field D is in oats-lespedeza continuously for the same period of years in which E is to be occupied by alfalfa. This leaves, for the time being, fields A, B and C to make up a main three year rotation. Either wheat or oats may be used as the small grain crop, the illustration showing some of each. To the extent wheat is used it will be drilled between standing corn rows in years when the corn stands up well. Otherwise the corn will be cut and shocked. In either case the practice is confined to a limited acreage so that the labor problem created by it is not great.

Field	A	B	C	D	E	a	b	c	d
Acres	17	18.7	18.1	19.7	10.4	7.2	7.5	7.5	2.3
This year	Corn 8 Oats 9	Corn	Corn 3.1 Hegari 8.0 Soybeans 7.0	Oats - Lesp.	Oats	Soybeans	Timothy 5.5 Blue-grass 2.0	Timothy 3.6 Blue-grass 3.9	Blue-grass
1st year	Corn	Wheat 12.0 Oats 6.7	Oats 9.0 Rye - Sw. Clo. Past. 9.1	Oats - Lesp.	Alfalfa	Rye-Sw. Clo. Pasture	Corn	Corn	Rye - Lesp. Past.
2nd year	Wheat 12 Oats 5	Sw. Clover pasture	Corn	Oats - Lesp.	Alfalfa	Sw. Clo. pasture	Rye- Sw. Clover pasture	Corn	"
3rd year	Sw. Clover pasture	Corn	Wheat 12.0 Oats 6.1	Oats - Lesp.	Alfalfa	Corn	Sw. Clover pasture	Rye - Sw. Clover pasture	"
4th year	Corn	Wheat 12.0 Oats 6.7	Sw. Clover pasture	Oats - Lesp.	Alfalfa	Rye - Sw. Clo. pasture	Corn	Sw. Clover pasture	"
5th year	Wheat 12 Oats 5	Sw. Clover pasture	Corn	Oats - Lesp.	Alfalfa	Sw. Clo. pasture	Rye - Sw. Clover pasture	Corn	"
6th year	Sw. Clover pasture	Alfalfa 11.2 Corn 7.5 (Replaces field a)	Oats - Lesp.	Wheat 12.0 Oats 7.7	Corn Operated together	Corn	Sw. Clover pasture	Rye - Sw. Clover pasture	"

TABLE III.—MAKING THE CHANGE TO REVISED PLAN B.

Note: A temporary fence to last the life of one alfalfa stand, would divide field B, and likewise fields A, C, and D, when it came their turn for alfalfa.

Table III, outlined to conform to the revised map (Figure 4) shows the revised system as normally in operation over a period of years, and the way in which it is established, beginning with the present crop set up as shown in the horizontal space designated "This year." This space shows what crops occupy the revised fields or parts of them, at the time of beginning to put the revised system into effect.

Table III is carried through six years in order to show how the system operates after it is necessary to shift alfalfa to another field, when it may also be desirable to shift the one year rotation of oats-lespedeza. The second year sweet clover in part of field B would

be plowed early enough to prepare the ground for fall seeding of alfalfa. A temporary fence to last for the life of the alfalfa stand, would be erected between the new alfalfa field and the other crop, which in the sixth year would be corn. Field E, previously in alfalfa, plus the secondary rotation field *a*, would comprise a main field of the three year rotation, while field B would be divided to make up the alfalfa field and the new secondary rotation field *a*. The advantage of having both a main and a secondary rotation system, far outweigh the disadvantage of dividing one of the main fields every five years.

The dividing fence would be moved each time rather than left to interfere with farming operations when the field is thrown back into the main rotation. The farmer can well afford to do such additional fencing when it will contribute so much to productivity of land, convenience in utilization by livestock, and additional current and long time income. If alfalfa is to be grown successfully as a permanent crop, it must be worked into a definite rotation system. To do this there must be different fields on the farm capable of producing this crop economically.

The revised system permits continuous use of lespedeza in one field for a period of years. This is generally more satisfactory since on most lands this crop improves, at least up to a certain point, with the length of time it occupies the land. Table III indicates that each time alfalfa is shifted to a new field, the one year rotation of oats-lespedeza could likewise be shifted. In the 6th year, the 7.5 acre portion of field B, will be thrown into the secondary rotation system and operated that way until alfalfa is again shifted to another field.

LAND USE UNDER THE THREE SYSTEMS

Table I gave the acreage figures for the different crops. Figure 5 is a graphic illustration of the differences in land use under the three systems.

SOIL CONSERVATION EFFECTS

The percentage losses in productivity may be regarded as annual depreciation rates on that part of the farmers capital which resides in the land. *This farm probably contains about 3500 lbs. of total nitrogen per acre. Thus the annual losses per acre would be 52, 36 and 2½ lbs. per acre under the original plan, Plan A and Plan B, respectively. The important thing is that Plan B in itself not only practically eliminates the depreciation on this "soil capital" but increases current income at the same time. Because of the higher

*Total nitrogen content is a fairly good index of land value as is pointed out in Missouri Agricultural Experiment Station Bulletin 229, Factors Affecting Farm Land Values in Missouri."

value placed on present, over future income, any kind of capital replacement will be made only when it pays its way. It is only on such terms that individual farm operators will really accomplish soil conservation. Therefore, the important thing in conserving productivity is quality of management throughout the whole system.

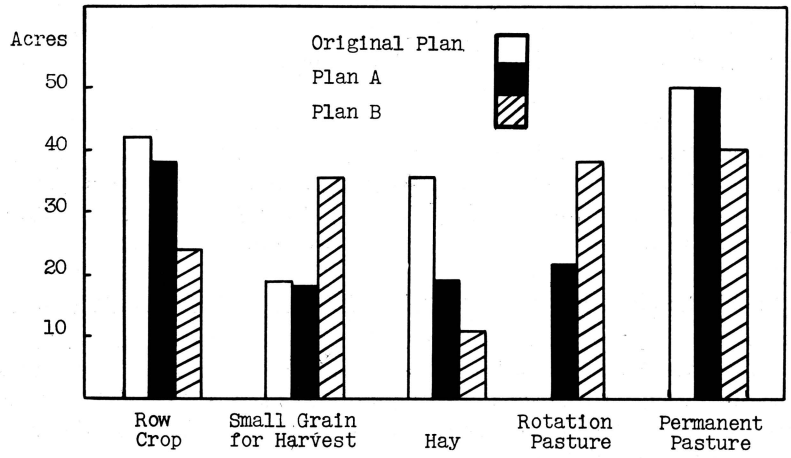

Figure 5.—Acreage Changes Resulting from Use of Different Systems.
Note: The bars representing rotation pasture indicate the acreage devoted to that use only. The original plan included no such land.
Plan B represents the greatest acreage changes from the present system. The large increase in small grain and rotation pasture, and a corresponding decrease in row crops, is in line with the generally needed changes in farming systems on erosive lands of northwest Missouri. The reduced hay acreage of Plan B is offset by the higher annual acre yields of alfalfa.

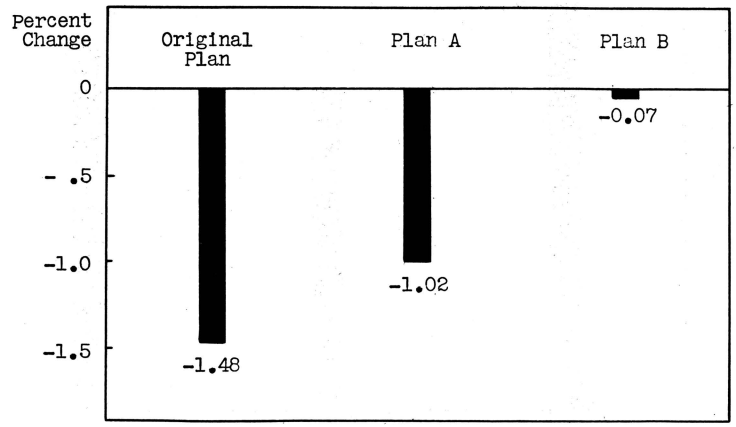

Figure 6.—Annual Effect of Three Systems on Productive Capacity of Farm. (Based on productivity factors supplied by Department of Soils.)

The conclusion indicated by figure 6 is arrived at on the basis of differences in the systems, including fertilizer practices but assuming no mechanical erosion control measures other than contouring in Plans A and B. Terracing would add to the annual productivity effect of each system, but would pay more with the present plan and plan A since plan B in itself would practically maintain productivity. Mechanical erosion preventing practices involve construction which must be maintained and therefore when economic considerations permit, the farming system should be the principal means of soil conservation.

Figure 6 gives a fair measure of the difference in long time productivity effect of the three systems. The important thing is that for soils of the level of productivity represented by this farm, it is practical to use systems like Plan B which practically maintain soil fertility and at the same time improve current incomes.

ANNUAL CROP PRODUCTION UNDER THE THREE SYSTEMS

In measuring grain production, all small grain is reduced to a corn equivalent basis in order to simplify comparisons. Acre yields are assumed equal for the present plan and plan A. Yields for plan B are figured at a 15% higher level, due to the well known effects of the lime and sweet clover.

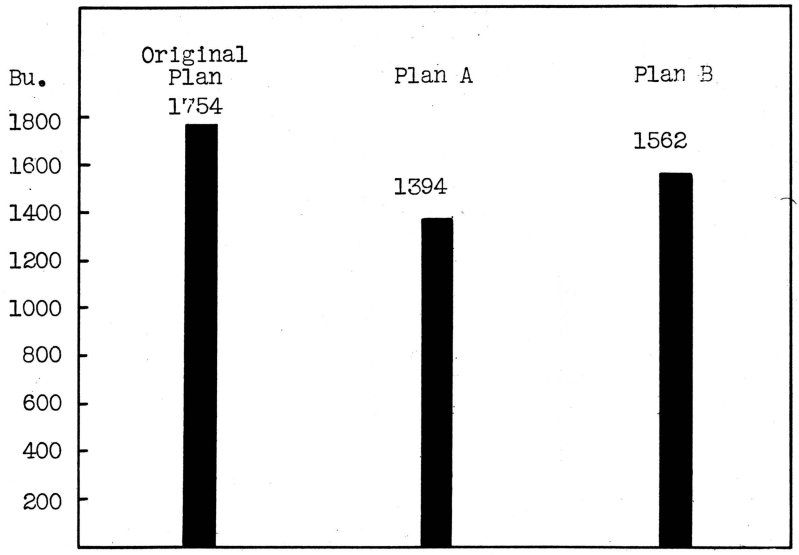

Figure 7.—Bushels Feed Grain Produced Annually.

The smaller amounts of hay produced by plans A and B, are offset by their superior pasture carrying capacity. In comparing Plans A and B, it will be noted that the former includes a silage crop while the latter does not. The beef cattle enterprise under both plan A and B is one of producing spring calves, roughing them through the winter and pasturing the next season, either with or without grain feeding, depending on conditions each year. The use of dry roughage for wintering permits a greater supply of corn for other feeding and avoids the labor and expense of putting up silage. It permits maximum utilization of roughage and together with the use of bluegrass almost exclusively as a winter pasture, assures both sufficient quantity and quality of winter feed.

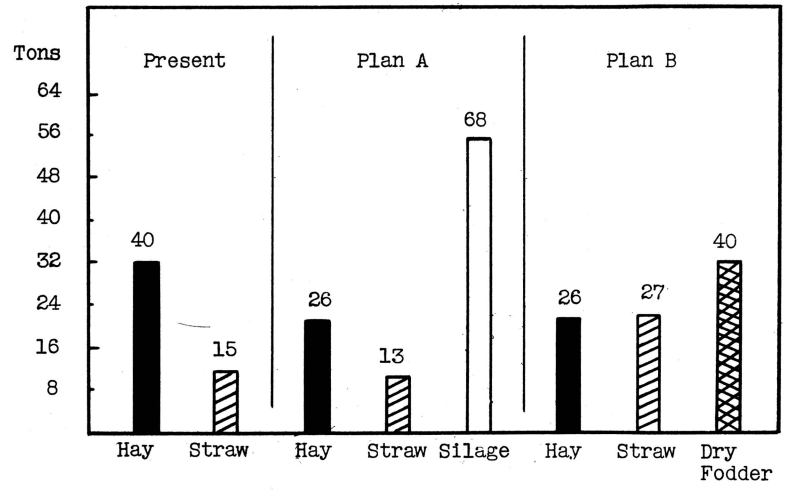

Figure 8.—Tons Roughage Produced Annually. (Based on acreages shown in Table I.)

The silage crop in the case of Plan A, is Atlas Sorgo. This permits full participation in the Agricultural Conservation Program, as otherwise the corn acreage would exceed the allotment for the farm.

PASTURE CARRYING CAPACITY OF THE THREE SYSTEMS

It is here that the advantages of plans A and B appear, particularly the latter. The only way to restore good bluegrass sods is to supply summer pasture from other sources. Plan B is especially advantageous in this respect, since it includes both first and second year sweet clover and lespedeza. In this way the bluegrass can be saved almost exclusively for winter pasture. Plan A uses lespedeza, and while not furnishing as strong a pasture program, it has the

advantage of not requiring lime and is therefore a logical intermediate system to use until the farm can be gradually limed to permit the adoption of plan B.

The following tables show the amount and source of pasture carrying capacity for each system, by months, together with approximate pasturage requirements. Both carrying capacity and requirements are expressed in mature units, one unit being the equivalent of one dairy cow grain fed.

Kind of Pasture	Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Stalk	42.8												22
Timothy	18.7									10	10	5	
1st year Red Clover	19.5									19	19		
Bluegrass	50.4	25	25			50	50	25	25			20	
Units Capacity		25	25	-	-	50	50	25	25	29	29	25	22
Pasture Units Livestock Carried		22	20	20	22	20	19	19	19	19	19	19	22
Difference		+3	+5	-20	-22	+30	+31	+6	+6	+10	+10	+6	0

TABLE IV.—PASTURE CARRYING CAPACITY OF ORIGINAL SYSTEM.

With clover and timothy being needed for hay, practically all of the pasture load is thrown on the bluegrass. This results in overgrazing which injures stands even under normal weather conditions. Furthermore, some of the most severe erosion takes place on overgrazed permanent sod pastures. Tables V and VI show how an improved pasture system increases livestock carrying capacity.

Kind of Pasture	Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Stalk	17												8
Lesp. after Wheat & Oats	18.7							10	27	27	9		
Small grain Lesp. All Past.	21			10	21	21	18	41	32	31	8		
Rye-(S.B.) Barley	19.7			10	20	20					20	30	15
Bluegrass	50.4	50	50			25	50				25	35	40
Units Capacity		50	50	20	41	66	68	51	59	58	62	65	63
Pasture Units Livestock Carried		59	57	57	59	57	56	56	56	63	42	42	45
Difference		-9	-7	-37	-18	+9	+12	-5	+3	-5	+20	+23	+23

TABLE V.—PASTURE CARRYING CAPACITY OF PLAN A.

The effect of lespedeza in strengthening the pasture program is clearly shown. It follows small grain harvested in one field, and in another the small grain and lespedeza are both pastured out. Barley is drilled in one field for fall pasture, after a soybean hay crop is removed. This takes part of the load and prevents too heavy pasturing of the bluegrass during October and November.

Kind of Pasture	Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Stalk	17												10
1st year Sweet Clover	18.7								27	36	12		
2nd year Sweet Clover	18.1				18	45	45	36					
Rye - Sweet Clover	7.5				7	7	7		10	15	5		
2nd year Sweet Clover	7.5				7	18	18	15					
Barley	7.5										10	15	
Lesp. after Oats	19.7							10	30	30	10		
Bluegrass	40	40	40	40	30						25	40	40
Units Supplied		40	40	40	62	70	70	61	67	81	62	55	50
Pasture Units Livestock Carried		63	61	60	62	61	60	60	60	67	46	46	49
Difference		-23	-21	-20	0	⁄9	⁄10	⁄1	⁄7	⁄14	⁄16	⁄9	⁄1

TABLE VI.—PASTURE CARRYING CAPACITY OF PLAN B.

The deficit in pasture supply is greater for the first three months of the year than is the case with Plan A. However, stock can be carried wholly on harvested roughage during this period, if necessary. Plan B carries 20 more ewes than does plan A.

In Table VI, note how the lespedeza strengthens the summer pasture program. On this farm, first year sweet clover will make pasture by August, and the second year crop will pasture through July, in a normal season. The lespedeza fills any gap which might occur in the pasture supply due to failure or partial failure of the sweet clover. Both sweet clover and lespedeza must be pastured to full capacity in their seasons, or much of their value is lost. This is not the case with bluegrass, which can be "saved" for winter pasture. Note in Table VI, that in a normal season it will not be necessary to use the bluegrass even in May or June so that it becomes almost altogether a winter pasture. This is highly important from the standpoint of preserving good stands of bluegrass through adverse conditions, and also from the standpoint of economy in livestock production. To the extent that the livestock harvest their own

roughage, crop labor is saved, feeding labor is saved and manure hauling is reduced. With certain kinds of livestock the opportunity of making these savings is available to a considerable extent, even during the winter.

Effect of New Cropping Systems on Labor Requirements.—Some average labor requirement data for the section of the state in which this farm is located, were applied to the original and revised cropping systems, in order to afford a comparison of the amounts of man and horse labor for each. Tables VII, VIII and IX show the total monthly man labor requirements for all crops, and the total annual requirements for each crop. The figure in the lower right hand corner of each table represents the total ten hour days of man labor required annually for all crops.

Crop	Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
* Corn	16.7 7.5	.1	.2	1.2	4.3	5.3	8.3	3.8	.6	.5 3.3	2.8 2.8	5.9 1.4	2.7 1.4	11.9 23.8 8.9
Oats	23.2		.1	2.4	3.0	.3	.6	9.7	1.7					17.8
Wheat	12.0						1.0	4.2	2.5	1.7	.1			9.5
Alfalfa	10.4					4.8	3.7	.6	2.5	.3				11.9
Total		.1	.3	3.6	7.3	10.4	13.6	18.3	7.3	5.8	5.7	7.3	4.1	83.8

TABLE VII.—MAN LABOR REQUIREMENTS ON CROPS—ORIGINAL PLAN.
(10-hour days.)

Crop	Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Corn	31.5	.1	.3	1.6	5.6	6.9	10.8	5.0	.7	1.0	5.3	11.2	5.1	53.6
Sorgo	5.7			.3	1.0	1.3	2.0	.9	.1	2.9	5.1			13.6
Oats	6.6			.7	.9	.1	.1	2.7	.5					5.0
Wheat	12.0						1.0	4.2	2.5	1.7	.1			9.5
Soybean	19.5					.8	4.1	2.9	.5	11.8	3.5			23.6
Total		.1	.3	2.6	7.5	9.1	18.0	15.7	4.3	17.4	14.0	11.2	5.1	105.3

TABLE VIII.—MAN LABOR REQUIREMENTS ON CROPS—PLAN A.
(10-hour days.)

Plan B requires the least amount of man labor although it is the most profitable from the standpoint of current income and soil maintenance. The labor requirement for hay production is almost halved

by Plan B and this is in line with the general thought that livestock should be made to harvest as much of their own roughage as is consistent with greatest net income. It is true that cutting and shocking the 7.5 acres of corn in order to have shock fodder for winter

Crop	Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Corn	42.8	.1	.4	2.2	7.6	9.4	14.7	6.8	1.0	1.3	7.1	15.2	7.0	72.8
Oats	19.5		.1	2.0	2.5	.2	.5	8.0	1.4					14.7
Clover	17					.1	3.7	2.4	3.9	.6				10.7
Timothy	18.7						3.6	6.7	1.7					12.0
Total		.1	.5	4.2	10.1	9.7	22.5	23.9	8.0	1.9	7.1	15.2	7.0	110.2

TABLE IX.—MAN LABOR REQUIREMENTS ON CROPS—PLAN B.
(10-hour days.)

*24.2 acres of corn in all, 7.5 acres of which are cut, shocked, hauled from shock and fodder hauled for feeding. The bottom row of labor figures from September on, apply to the 7.5 acres only, and the top row to the 16.7 acres husked from standing stalk.

feeding adds to the labor requirement of the corn crop, but this extra labor comes at a time of year when it can well be handled, and it reduces the amount of higher cost roughage needed on farms where beef cattle are to be wintered and where therefore such cheap roughage can be very economically utilized.

Plan B also requires materially less horse labor than does the original plan or Plan A. See Tables X, XI and XII.

Crop	Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Corn	31.5	.3	.7	4.9	18.2	20.9	25.5	10.5	.5	.8	8.4	17.9	8.1	116.7
Sorgo	5.7	-	.1	.9	3.3	3.8	4.6	1.9	.1	3.4	6.1			24.2
Oats	6.6		.1	2.5	2.5	.3	.2	3.0	.6					9.2
Wheat	12.0						1.2	6.3	8.6	6.5	.4			23.0
Soybeans	19.5					2.9	12.0	9.9	1.8	12.5	3.9			43.0
Total		.3	.9	8.3	24.0	27.9	43.5	31.6	11.6	23.2	18.8	17.9	8.1	216.1

TABLE X.—HORSE LABOR REQUIREMENTS ON CROPS—ORIGINAL PLAN.
(10-hour days.)

*See note under Table IX.

Crop	Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Corn	42.8	.5	.9	6.6	24.7	28.4	34.7	14.3	.7	1.2	11.4	24.3	10.9	158.6
Oats	19.5	-	.2	7.4	7.4	.9	.6	9.0	1.9					27.4
Clover	17.0					.1	4.8	2.4	4.3	.8				12.4
Timothy	18.7						4.3	8.6	2.5					15.4
Total		.5	1.1	14.0	32.1	29.4	44.4	34.3	9.4	2.0	11.4	24.3	10.9	213.8

TABLE XI.—HORSE LABOR REQUIREMENTS ON CROPS—PLAN A.
(10-hour days.)

Crop	Acres	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
* Corn	16.7 7.5	.3	.6	3.7	13.9	16.0	19.6	8.1	.4	.7	4.4 .2	9.5 .4	4.3 1.6	18.2 63.3 2.2
Oats	23.5		.3	8.9	9.0	1.0	.8	10.8	2.3					33.1
Wheat	12						1.2	6.3	8.6	6.5	.4			23.0
Alfalfa	10.4						5.8	4.7	.6	3.1	.3			14.5
Total		.3	.9	12.6	22.9	17.0	27.4	29.9	11.9	10.3	5.3	9.9	5.9	154.3

TABLE XII.—HORSE LABOR REQUIREMENTS ON CROPS—PLAN B.
(10-hour days.)

As in the case of man labor, horse labor requirements on crops are materially reduced by Plan B, and the distribution improved.

THE LIVESTOCK SYSTEM AND GROSS RETURNS

Maintenance livestock under the original system (Table XIII) consists of 5 head of work stock, 10 milk cows, 5 sows and 200 hens. Feed requirements of home produced and purchased feeds are shown to the right, in the bottom half of this table. The normal annual production of various items for sale, together with estimated prices and gross cash receipts, is shown in the upper left hand corner of the table. Production per cow, sow and hen, can be secured by dividing the amount of product by the number of breeding animals devoted to its production. Thus 2300 lbs. of butterfat represents 230 lbs. per cow in this case. Total gross cash sales are $2233, of which hogs contribute $1063, dairy cattle $710, and poultry $400.

Est. Income - Original Plan				Feed Req. for Stock Fed for Sale						
To Be Sold	No. Wt. or Amt.	Unit Price	Total Farm Sales	Produced on Farm				To Be Purchased		
Items			$	Corn Equiv. bu.	Hay T	Sil-age T	Straw	Kind of Feed	Amt.	Cost
Butterfat	2300	25	575							
Calves 7	1050	9	95							
Cull Cows	1	40	40							
Spring Pigs 30	6750	7½	506	390				Tankage*	1	60
Fall Pigs 33	7425	7½	557	528						
Cull Hens 100	350	8	28							
Cockerels 100	200	12	24							
Eggs	2320	15	348							
Horse	1	40	40							
Total Value			2233	Feed Req. for Maintenance Stock						
Kind of Stock	No.	Value								
Work Stock	5			200	7					
2 yr. Old	1			20	1					
1 yr. Old	1			16	1					
Milk Cows and Bull	11			236	19			C. S. M. Bran B.M.&Salt	1½T. 2½T.	45 50 9
Heifers 1-2 yrs.	2			20	2					
Heifers under 1 yr.	2			20	1					
Sows & Boar	6			110				Tankage	300#	7
Butcher Hogs	2			30				Tankage	100#	3
Hens	200			174				Mash	3.2T.	112
Chicks to 10 wks.	270							Mash	1134#	25
Pullets to Maturity	135			17				Mash	675#	12
Total	XX			1751	31		0	Total Value of Feed to be Purchased		
Est. Feed Prod. this plan	XX	XXX		1754	40		15			
Difference	XX	XXX		⁄3	⁄9		⁄15			323

TABLE XIII.—THE LIVESTOCK SYSTEM—ORIGINAL PLAN.

*One ton of tankage otherwise needed would be replaced by skim milk.

Est. Income - Plan "A"				Feed Req. for Stock Fed for Sale						
To Be Sold	No. Wt. or Amt.	Unit Price	Total Farm Sales $	Produced on Farm				To Be Purchased		
Items				Corn Equiv. bu.	Hay T	Silage T		Kind of Feed	Amt.	Cost
Yearlings 14	9800#	7	686		5	16				
Cull Cows	3	40	120							
Spring Pigs 30	6750	7½	506	390				Tankage	1.8T.	45
Fall Pigs 33	7425	7½	557	528						
Lambs 40	3000	9	270	40	2			SBM	.1	4
Ewes	6	5	30							
Wool	367	20	73							
Broilers 100	200	12	24							
Hens 100	350	8	28							
Eggs	2320	15	348							
Horse	1	60	60							
Total Value			2702	Feed Req. for Maintenance Stock						
Kind of Stock	No.	Value								
Work Stock	5			200	8					
2 yr.old	1			20	1					
1 yr.old	1			16	1					
Cows & Bull	21				3	21		CSM	.8T	24
Heifers	4				2½	5				
Ewes & Ram	41			73	1½	2				
Lambs	8									
Hens	200			174				Mash	3.2T.	112
Chicks to 10 Wks.	270							Mash	.6T.	27
Pullets to Maturity	135			17				Mash	.3T.	10
Sows & Boar	6			110				Tankage	330#	8
Butcher Hogs	2			30				Corn	204	102
Total	XX			1598		44		Total Value of Feed to be Purchased		332
Est. Feed Prod. this plan	XX	XXX		1394		68				
Difference	XX	XXX		-204		+24				

TABLE XIV.—THE LIVESTOCK SYSTEM; PLAN A.

Est. Income - Plan "B"				Feed Req. for Stock Fed for Sale						
To Be Sold	No. Wt. or Amt.	Unit Price	Total Farm Sales	Produced on Farm				To be Purchased		
Items				Corn Equiv.	Hay	Dry Fodder	Straw	Kind of Feed	Amt.	Cost
			$	Bu.	T	T				
Yearlings 14	9800	7	686		6	9	5			
Cull Cows	3	40	120							
Lambs 60	4500	9	405	60						
Cull Ewes	10	5	50							
Wool	465	20	93							
Spring Pigs 30	6750	7½	506	390				Tankage	1600#	40
Fall Pigs 33	7425	7½	557	528				Tankage	1T.	50
Cull Hens 25	150	8	12							
Eggs	400	15	60							
Horse	1	60	60							
			2549							

Total Value			Feed Req. for Maintenance Stock						
Kind of Stock	No.	Value							
Work Stock	5		200	5		5			
2 yr. old	1		20	1					
1 yr. old	1		16	1					
Beef Cows & Bull	21				26	14	C.S.M.	2000	30
Heifers 1-2 yrs.	4			2	3				
Heifers under 1 yr.	4			1	2				
Ewes & Ram	62		110	6		3			
Yearling Ewes	12								
Sows & Boar	6		110				Tankage	300	8
Butcher Hogs	2		30				Tankage	100	3
Hens Chicks to 10 wks.	50 100		50				Mash Mash	.8 760	24 17
Pullets to Maturity	50		9				Mash	380	6
Total	XX		1523	22	40	27	Total value of feed to be purchased		178
Est. Feed Produced this plan	XX	XXX	1566	26	40	27			
Difference	X	X	✓ 43	✓ 4					

TABLE XV.—THE LIVESTOCK SYSTEM; PLAN B.

Of the $323 estimated feed purchases, $70 is chargeable to hogs, $104 to dairy cows, and $149 to the 200 hens and young birds. Total grain consumption in equal to total production, so that in short crop years, livestock numbers and feeding practices would be changed, or grain purchased, according to the prospective outcome of feeding operations. Of the 1751 bushels of grain consumed, 1048 bushels are by hogs, 276 by cattle, 236 by work stock, and 191 by poultry.

Roughage production is well in excess of normal annual requirements, there being 15 tons of straw available for use in years when the hay supply is short. Reference to Table I discloses however, that only a little more than half of the hay supply is legume.

On farms of this type which are not accessible to a favorable market for dairy products and where there is little family labor other than that of the operator, the question of the profitableness of dairying relative to beef or sheep production, can well be raised. An important point for consideration is the ability of different kinds of livestock to consume cheap roughage which have little value except when utilized to winter beef cow herds or other cattle to be roughed through the winter.

Plan A

In Plan A, 20 beef cows replace the 10 milk cows carried in the original plan, and 40 ewes are added. There is no change in the hog and poultry enterprises. Table XIV lists all livestock, estimated receipts, feed requirements and feed purchases.

The additional grazing capacity of the pasture system makes these changes possible. Of the total cash receipts of $2702, $1063 is from hogs, $806 from cattle, $373 from sheep and $400 from poultry. The system of beef cattle production is to carry spring calves through the winter on hay and silage, start them on rye pasture in the spring, later to bluegrass and then to lespedeza. Table XIV is made up on the assumption that the calves would be sold without grain, weighing 700 lbs. by October. There would of course be the option of purchasing corn with which to finish them, depending on prospects for a profitable return from feeding.

Plan B

The maintenance livestock set up under Plan B consists of 5 head of work stock, 20 beef cows, 60 ewes, 5 sows and 50 hens, plus of course, the necessary young stock for normal replacement purposes. The principal differences are the changing from dairy to beef cattle, the addition of a flock of ewes and the reduction of the poultry enterprise to a family sized flock.

Of the total gross cash sales of $2549, $1063 is from hogs; $806 from cattle; $548 from sheep; and $72 from poultry. The system of beef cattle production is to rough spring calves through the winter

and pasture them on sweet clover and lespedeza the following spring and summer. There would be the option of selling them directly off of pasture in the fall without grain, or of purchasing corn with which to finish them in order to secure a higher price. The method of disposal would depend on prospects in the summer for profit from feeding such cattle to be sold that fall. Table XV is made up on the basis of the yearlings being sold directly from pasture without grain, assuming that with the kind of pasture afforded by the revised cropping system, they should weigh 700 lbs. by October. The advantage of this system, is in the complete utilization of cheap roughage such as dry fodder and straw, which represents extremely low cost wintering, and the further advantage is that pasture is fully utilized, thus saving in labor on both crops and livestock.

The other alternative which would likely be chosen more often than not, would be to purchase grain for finishing the yearlings. Assuming corn at 50c per bushel, they could be fed out by the purchase of 354 bushels of corn and 3200 lbs. of cottonseed meal, at a total additional feed cost of $225. Then by selling the heifers at 700 lbs. for $8.50 per cwt., and the steers at 900 lbs. for $9.50 per cwt., the additional gross income would be $481. Under the foregoing assumptions the additional net total cash farm income would be $256.

Gross Cash Sales per Acre.—On the basis of production and price estimates used in Tables XIII, XIV, and XV, figure 9 illustrates graphically, the differences between the original and revised farming systems as to livestock set up and gross cash returns.

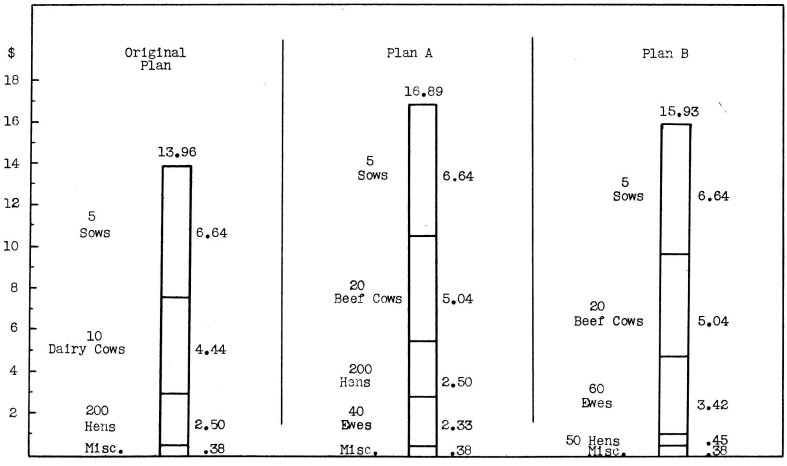

Figure 9.—Gross Cash Receipts per Acre.

Shifting from dairy and poultry, to beef cattle and sheep, permits utilization of more cheap roughage and pasture which are produced coincident with the adoption of soil conserving farming systems. For conditions of this farm, and under production and price levels assumed, such changes in livestock enterprises increase gross cash returns.

Labor Requirements on Livestock and General Maintenance.—The comparison in livestock and general maintenance man labor requirements for the three systems is shown in tables XVI to XVIII.

Enterprise	*Size	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Work Stock	5	1.7	1.7	2.1	2.7	2.7	2.6	2.0	1.7	1.5	1.7	1.7	1.8	23.9
Dairy Stock	10	7.7	6.8	7.1	6.7	6.4	5.9	5.8	5.7	5.8	6.1	6.2	7.2	77.4
Hogs	5	2.2	2.6	4.3	2.5	1.9	1.7	1.6	1.8	3.1	2.4	2.1	2.1	28.3
Poultry	200	2.4	2.8	3.6	13.6	12.4	9.6	5.6	5.2	4.0	2.4	2.4	2.4	66.4
General Main. and Misc.		14.7	14.3	15.6	14.0	10.3	8.3	9.0	12.0	11.5	12.0	8.9	9.6	140.7
Total		28.7	28.2	32.7	39.5	33.7	28.6	24.0	26.4	25.9	24.6	21.3	23.1	336.7
Crop labor (from Table VII)		.1	.5	4.2	10.1	9.7	22.5	23.9	8.0	1.9	7.1	15.2	7.0	110.2
Total 10 hour days all labor		28.8	28.7	36.9	49.6	43.4	51.1	47.9	34.4	27.8	31.7	36.5	30.1	446.9

TABLE XVI.—MAN LABOR REQUIREMENTS ON LIVESTOCK—ORIGINAL SYSTEM.
(10-hour days.)

*Figures in this column refer to number of mature breeding stock carried, but labor requirements shown are for *all* livestock.

Enterprise	Size	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Work Stock	5	1.7	1.7	2.1	2.7	2.7	2.6	2.0	1.7	1.5	1.7	1.7	1.8	23.9
Beef Cows	20	5.4	4.3	5.1	4.9	4.1	3.2	2.9	3.0	3.7	2.8	3.4	5.1	47.9
Sows	5	2.2	2.6	4.3	2.5	1.9	1.7	1.6	1.8	3.1	2.4	2.1	2.1	28.3
Ewes	40	1.7	2.6	2.4	1.6	2.4	1.0	.8	.9	.6	.5	.6	1.0	16.1
Hens	200	2.4	2.8	3.6	13.6	12.4	9.6	5.6	5.2	4.0	2.4	2.4	2.4	66.4
Gen. Main. and Misc.		14.7	14.3	15.6	14.0	10.3	8.8	9.0	12.0	11.5	12.0	8.9	9.6	140.7
Total		28.1	28.3	33.1	39.3	33.8	26.9	21.9	24.6	24.4	21.8	19.1	22.0	323.3
Crop Labor (Table VIII)		.1	.3	2.6	7.5	9.1	18.0	15.7	4.3	17.4	14.0	11.3	5.1	105.3
Total 10 hour Days all labor		28.2	28.6	35.7	46.8	42.9	44.9	37.6	28.9	41.8	35.8	30.3	27.1	428.6

TABLE XVII.—MAN LABOR REQUIREMENTS ON LIVESTOCK—PLAN A.
(10-hour days.)

Enterprise	Size	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Work Stock	5	1.7	1.7	2.1	2.7	2.7	2.6	2.0	1.7	1.5	1.7	1.7	1.8	23.9
Beef Cows	20	5.4	4.3	5.1	4.9	4.1	3.2	2.9	3.0	3.7	2.8	3.4	5.1	47.9
Hogs	5	2.2	2.6	4.3	2.5	1.9	1.7	1.6	1.8	3.1	2.4	2.1	2.1	28.3
Sheep	60	3.2	9.6	8.8	5.8	8.6	3.9	1.5	1.7	1.1	.9	1.0	1.8	47.9
Poultry	50	.6	.7	.9	3.4	3.1	2.4	1.4	1.3	1.0	.6	.6	.6	16.6
Milk Cows	2	1.5	1.4	1.4	1.3	1.3	1.2	1.2	1.1	1.2	1.2	1.2	1.4	15.4
Gen. Main. and Miscellaneous		14.7	14.3	15.6	14.0	10.3	8.8	9.0	12.0	11.5	12.0	8.9	9.6	140.7
Total		29.3	34.6	38.2	34.6	32.0	23.8	19.6	22.6	23.1	21.6	18.9	22.4	320.7
Crop Labor (From Table IX)		.1	.3	3.6	7.3	10.4	13.6	18.3	7.3	5.8	5.7	7.3	4.1	83.8
Total 10 hour Days all labor		29.4	34.9	41.8	41.9	42.4	37.4	37.9	29.9	28.9	27.3	26.2	26.5	404.5

TABLE XVIII.—MAN LABOR REQUIREMENTS ON LIVESTOCK—PLAN B. (10-hour days.)

The extreme right hand column in Tables XVI, XVII and XVIII show the number of ten hour days of man labor used by each enterprise. Note for example, that handling 20 beef cows, together with the calf crop which in this instance is roughed through the winter and sold off pasture the following summer or fall, requires about one month less man labor than handling 10 dairy cows. Sixty ewes require the same amount of labor as 20 beef cows. These tables bring out the fact that the dairy and poultry enterprises are the heavy users of labor. Crop labor for each system has been added to the above tables so that the bottom row of figures represents the total number of 10-hour days of man labor required by months, in each case. Note that the total labor requirement of Plan B is about 42 days less than for the original system. Another important comparison is in the total crop labor and its seasonal distribution.

Horse labor requirements for livestock are increased slightly by the revised systems. Plan B however would materially reduce the requirements for crop production. Total horse labor requirements for plan B are 46 days less than for the original plan and 61 days less than for plan A.

Table XIX to XXI show similar comparisons for horse labor.

Enterprise	Size	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total 10 hr. days
Work Stock	5	2	3	3	5	5	3	2	2	1	2	1	1	3.0
Dairy Cows	10	9	11	10	7	3	2	1	2	2	2	3	5	5.7
Hogs	5	6	7	12	7	4	4	4	4	9	7	5	5	7.4
Poultry	200	4	4	4	12	12	8	4	4	4	-	-	4	6.0
Gen. Main. and Misc.		90	100	131	121	67	46	55	71	65	71	52	54	92.3
Total 10 hour Days		11.1	12.5	16.0	15.2	9.1	6.3	6.6	8.3	8.1	8.2	61	6.9	114.4
Crop Labor from Table X		.5	1.1	14.0	32.1	29.4	44.4	34.3	9.4	2.0	11.4	24.3	10.9	213.8
Total Hours all horse labor		11.6	13.6	30.0	47.3	38.5	50.7	40.9	17.7	10.1	19.8	30.4	17.8	328.2

TABLE XIX.—HORSE LABOR REQUIREMENTS ON LIVESTOCK AND MISCELLANEOUS—ORIGINAL PLAN.
(Hours.)

Enterprise	Size	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total 10 hr. days
Work Stock	5	2	3	3	5	5	3	2	2	1	2	1	1	3.0
Beef Cows	20	25	19	26	25	13	9	8	7	7	6	10	16	17.1
Sows	5	6	7	12	7	4	4	4	4	9	7	5	5	7.4
Ewes	40	4	4	3	2	1	2	1	1	1	-	-	1	2.0
Hens	200	4	4	4	12	12	8	4	4	4	-	-	4	6.0
Gen. Main. and Misc.		90	100	131	121	67	46	55	71	65	71	52	54	92.3
Total 10 Hour Days		13.1	13.7	17.9	17.2	10.2	7.2	7.4	8.9	8.7	8.6	6.3	8.1	127.3
Crop Labor (Table XI)		.3	.9	8.3	24.0	27.9	43.5	31.6	11.3	23.2	18.3	17.9	8.1	216.1
Total 10 hour Days all labor		13.4	14.6	26.2	41.2	38.1	50.7	39.0	20.5	31.9	27.4	24.7	16.2	343.9

TABLE XX.—HORSE LABOR REQUIREMENTS ON LIVESTOCK AND MISCELLANEOUS—PLAN A.
(Hours.)

Enterprise	Size	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total 10 Hr. Days
Work Stock	5	5	3	3	5	5	3	2	2	1	2	1	1	3.0
Beef Cows	20	25	19	26	25	13	9	8	7	7	6	10	16	17.1
Hogs	5	6	7	12	7	4	4	4	4	9	7	5	5	7.4
Sheep	60	7	13	12	9	4	7	1	2	1	1	1	2	6.0
Poultry	50	1	1	1	3	3	2	1	1	1	-	-	1	1.5
Milk Cows	2	2	2	2	1	1	-	-	-	-	-	1	1	1.0
General Main. and Misc.		90	100	131	121	67	46	55	71	65	71	52	54	92.3
Total 10 hour Days		13.3	14.5	18.7	17.1	9.7	7.1	7.1	8.7	8.4	8.7	7.0	8.0	128.3
Crop Labor (From Table XII)		.3	.9	12.6	22.9	17.0	27.4	29.9	11.9	10.3	5.3	9.9	5.9	154.3
Total hours all Horse Labor		13.6	15.4	31.3	40.0	26.7	34.5	37.0	20.6	18.7	14.0	16.9	13.9	282.6

TABLE XXI.—HORSE LABOR REQUIREMENTS ON LIVESTOCK AND MISCELLANEOUS—PLAN B.
(Hours.)

CASH COSTS AND NET INCOME

Total cash outlays are higher for plan A than for either the original plan or Plan B. Feed expenses are not reduced because of the lowered feed grain production of this plan. Crop expenses are increased because of the use of fertilizer and the outlay for seed incident to the use of soybeans for hay and rye and barley for pasture. Because of the type of rotation of plan A (see Table II) it is estimated that some lespedeza seed will be needed each year.

Total cash outlays are about the same for the original plan and for Plan B but the individual items vary greatly.

The changed distribution of expenses is important. The greater crop expenses of Plan B permit following a crop and pasture program which will practically maintain the long time income of the farm, as compared with a lowered productivity level resulting from continuation of the original system. (See Figure 6.) The additional crop expense is largely made up in a lower cash outlay for feed. This means that a larger percent of the feed consumed is home grown, under Plan B. The reason for this is that the live-Stock carried under Plan B are capable of utilizing roughage and pasture to a greater degree, than is the case with the original system. It will be recalled that there is a shift from dairy and poultry, to beef cattle and sheep.

Table XXII. Estimated Cash Farm Expenses									
	Original Plan			Plan A			Plan B		
Item	Amt.	Price	Cost	Amt.	Price	Cost	Amt.	Price	Cost
Crop									
Threshing Oats	682	4	27	231	4	9	940	4	38
Threshing Wheat				192	8	15	216	8	17
Twine	40	9	4	70	9	6	70	9	6
Red clover seed	2	14	28						
Soybean seed				39	1.50	59			
Rye seed				39	.75	30	15	.75	4
Barley seed				39	1.25	49	15	1.25	19
Sorgo seed				40	.05	2			
Sweet Clover seed									20
Alfalfa seed									6
Lespedeza seed				400	.04	16			
Annual Fertilizer cost				2½	27	67	3½	27	95
Annual Lime charge									70
Livestock									
Veterinary			20			30			35
Bull and Ram charge			30			40			40
Chicks	300	8	24	300	8	24	100	8	8
Upkeep on Bldgs.			94			94			94
Upkeep on Equip.			70			70			70
*Car Expense			36			36			36
Feed			323			332			178
Labor			90			75			40
Taxes			80			80			80
Miscellaneous			26			26			26
1. Total	xxx	xxx	852	xxx	xxx	1060	xxx	xxx	882
2. Net cash:Sales less Item 1	xxx	xxx	1381	xxx	xxx	1642	xxx	xxx	1667

TABLE XXII.—ESTIMATED CASH FARM EXPENSES

*Only that part of car expense estimated as a charge against the farm business.

Class of Expense	Original plan	Plan A	Plan B	Change from Original to plan A	Change from Original to plan B	Change from Plan A to Plan B
Crop	59	253	275	↑ 194	↑ 216	↑ 22
Livestock	74	94	83	↑ 20	↑ 9	- 11
Feed	323	332	178	↑ 9	- 145	- 154
Upkeep of Bldgs. & Equip.	200	200	200	--	--	--
Labor	90	75	40	- 15	- 50	- 35
Taxes and Miscellaneous	106	106	106	--	--	--
Total	852	1060	882	↑ 208	↑ 30	- 178

TABLE XXIII.—DISTRIBUTION OF EXPENSES UNDER THE THREE SYSTEMS.

MAKING THE CHANGES TO THE REVISED SYSTEMS

In making the transition from the original to either of the revised plans, there would be certain additional expenses not included in Table XXII, which represents the normal annual outlays for each system assumed fully established. It will be noted in Table XXIV, that there is very little difference in the additional outlays required as between Plan A or Plan B.

The additional expenses during transition years would vary according to the rapidity with which the change is made. Both Plan A and Plan B involve a change from dairy cattle to beef cattle and sheep. This change would be made by buying a few beef cows or heifers, and likewise a few ewes. By holding back the best breeding stock each year, it would not take long to accumulate a herd of 20 cows. The 10 milk cows would be retained until the income from sheep could compensate for the loss of income due to reduction or elimination of the dairy herd.

Changing to Plan B would take longer since under this plan 60 ewes would be carried. The poultry enterprise would be reduced to only 50 hens, or just enough to supply the family needs, with a small surplus of produce to sell at certain seasons. The present poultry house which is 20 by 48 feet, could be converted into a sheep shed since a much cheaper structure would be sufficient for the 50 hens.

It can be assumed that the gross cash income of $2233 (See Table XIII) which would result from operation of the original plan, would continue through the second year of either of the revised plans, by which time any reduction in the dairy income would be offset by

returns from the sheep enterprise. Thus by adding the extra expenses (Table XXIV) to the normal annual expenses (Table XXII) the total expense and net cash income can be estimated for the transition years.

This year				1st year				2nd year			
Plan A		Plan B		Plan A		Plan B		Plan A		Plan B	
Item	Cost	Item	Cost	Item	Cost	Item	Cost	Item	Cost	Item	Cost
Construct 30 rods of new fence	45	Construct 47 rods of new fence	70								
Buy 20 ewes and ram	250	Buy 20 ewes and ram	250	Buy 10 beef cows or heifers	400	Buy 10 beef cows or heifers	400				
		Lime fields "a" and "E" 17.9 acres	*			Lime fields "b" and "B" 26.2 acres				Lime fields "c" and "A" 24.5 acres	22
Total	295	Total	320	Total	400	Total	428	--	--	Total	22

TABLE XXIV.—EXTRA CASH OUTLAYS IN CHANGING TO REVISED PLANS.

*Lime cost less than the $70 allowed as a normal annual charge in Table XXII. This table includes only those costs which are in addition to those shown in Table XXII.

	This year		1st year		2nd year	
	Plan A	Plan B	Plan A	Plan B	Plan A	Plan B
Cash Income - Table XIII	2233	2233	2233	2233	2233	2233
Cash Expense - Tables XXII and XXIV	1355	1202	1460	1310	1060	904
Net Cash	878	1031	773	923	1173	1329

TABLE XXV.—NET CASH INCOME DURING TRANSITION.

Table XXV shows that plan B can be put in operation at an annual expense of about $150 less than that required for Plan A. Once in operation, the net cash returns are slightly in favor of Plan B. In addition to this fact is the great advantage of Plan B with regard to soil maintenance.

THE PLACE OF CREDIT IN NEW FARMING SYSTEMS

Out of the net cash returns must be paid the cash expenses for family living. Then any interest due on borrowings, as well as retirement of any principal due, must be met. Should these items take more than the net cash returns during the transition, there would be a place for the use of production credit. This would be true only if the normal annual net returns to be expected in the future, are large enough to cover family living costs and retire debts already contracted, plus any production loan which might be secured to aid in financing development of the improved system. Only if such is the case is a production loan advisable for any purpose. The de-

velopment of careful farm plans based on conservative production and price estimates provides a means of testing the soundness of either a production or farm mortgage loan.

For purposes of illustration the following table assumes a family living and mortgage installment load to be met, as compared with the net farm income for the original plan and Plan B, and for the transition years while working toward the latter.

	Original Plan (Normal)	Plan B			
		This Year	1st Year	2nd Year	Normal
Net cash farm income	$1381	$1031	$923	$1329	$1667
Family living and mortgage installment assumed	$1050	$1050	$1050	$1050	$1050
Remainder	$331	$-19	$-127	$279	$617

TABLE XXVI.—MEETING FAMILY LIVING COSTS AND MORTGAGE INSTALLMENTS.

During two years of the transition, the net cash income would be inadequate to cover the normal family living costs and the mortgage payments assumed in Table XXVI. But once plan B is in operation, the excess of the net farm income above these items, would be nearly double that of the original plan. Thus under these circumstances, use of production credit during the transition, would be profitable. On many farms the negative balances would be greater and would be more prolonged, than in the illustration shown here.

Farm plans are equally valuable when considering the purchase of a farm. Land value, in the long run, is determined by capitalizing its anticipated future net returns. Complete farm plans worked out conservatively will indicate very closely the probable returns that can be anticipated with safety. It is of course necessary that such plans be carefully developed and considered before making the investment, if they are to be of maximum service for both the borrower and the lender.

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