

Expected Returns
from
Selected Specialized Farming Systems
in the
Northern Highland Rim Area
of
Tennessee

by
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Summary

THE cost-price squeeze of recent years is making farming an occupation with low returns.

- Operators of large farms are able to have lower unit costs than most farmers on small farms. But even on the very large farms most farming systems show low net returns. Also, it is not certain what proportion of the operators on small farms have the capacity to operate large farms efficiently.

- Only on large farms with a grade-A dairy system and with high average production per cow and per acre of land is it possible to obtain net revenues sufficient to give a fair return to investment, and wages to management comparable to opportunities in other occupations. The number of grade-A dairy farms needed is only a small percentage of the total number of farms in the area covered by this study.

- On farms with tobacco allotments, the tobacco enterprise tends to raise the net returns, but not enough to yield adequate incomes from the whole farm business for all of the livestock systems.

- Only highly-specialized farming systems were analyzed for this report. Specialization is a means of using equipment to best advantage. With diversification a farmer loses some of the advantages gained from increased size of each enterprise. Sometimes, however, diversification facilitates making supplementary use of some resources.

- Livestock waste some feed when grazing pastures, but save some labor that would be needed if all feed was harvested and fed at the barnyard. One phase of this study indicated that harvesting all feed rather than pasturing part of it would increase size of business on a certain acreage and raise net returns considerably.

- There is wide variation among the farms in the area studied in the productivity of the soil resource. There are many different soils of varying acreages and productivity on each farm, and numerous kinds of crops and pastures of varying adaptability to each soil.

- The labor resources vary greatly among these farms. The plans in this report are primarily for farms on which all labor is hired, or the operator can be said definitely to have opportunities for off-farm occupations at the specified wages. Among other farms there are varying numbers of family workers who have little opportunity or prefer not to enter other occupations. Satisfactory hired labor may or may not be available on these farms. The present study shows that there are wide variations among farms and farming systems in acres of land needed for a full-time worker.

- Several of the analyses in this report show the amount of reduction in net returns if production per cow is arbitrarily reduced, or if prices of products are reduced.

Acknowledgments

Appreciation is expressed to all who have assisted in this study: the farmers who supplied information concerning their farms; personnel in the Agricultural Experiment Station, Agricultural Extension Service and the Computing Center of the University of Tennessee, and the Soil Conservation Service and Agricultural Stabilization and Conservation Service of the United States Department of Agriculture.

The sample of farms studied was obtained through the cooperation of the Agricultural Stabilization and Conservation Service, and soil maps for these farms were supplied by the Soil Conservation Service.

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EXPECTED RETURNS FROM SELECTED SPECIALIZED SYSTEMS OF FARMING IN THE NORTHERN HIGHLAND RIM AREA OF TENNESSEE

by
W. P. Ranney*

Introduction

FARMERS are faced with the necessity of adjusting to continuous technological and economic changes, to frequent changes in government programs and to changes in their own resource situations. Increases in the production of livestock and livestock products and in the demand for high quality products with definite specifications call for increased skills in livestock and feed production.

Total capital investment per farm is several times the requirements of two decades ago. Compared with 10 years ago, costs of production are higher relative to prices of products sold. The trend toward a smaller margin of profit does not appear to have ended.

This study¹ was directed primarily toward the dark-fired tobacco type-of-farming section of the Highland Rim Area of Tennessee, which covers all or parts of seven counties in the northern and northwestern part of the Highland Rim. Not all farms in this area have tobacco allotments. Hence the study was made for farms both with and without tobacco allotments. The part of the study covering farms without tobacco allotments is fairly applicable to many farms without specialty crop allotments (tobacco or cotton) in the entire Highland Rim region, which is the largest physiographic region in the State (Fig. 1). However, there is a larger proportion of large farms in the dark-fired tobacco area of this region than in the other areas.

The physical and economic characteristics of the region and sub-areas are described in Tennessee Agricultural Experiment Station Bulletin 311.²

Objectives of the Study

This study was directed toward evaluating alternative systems

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¹ The study was started in 1957 as a contributing project to regional project S-27 entitled "Economics of Forage Production and Use on Beef and Dairy Farms in the Southeastern States."

² Martin, Joe A. and Luebke, B. H., *Types of Farming in Tennessee*, Tennessee Agricultural Experiment Station Bulletin 311, March 1960.

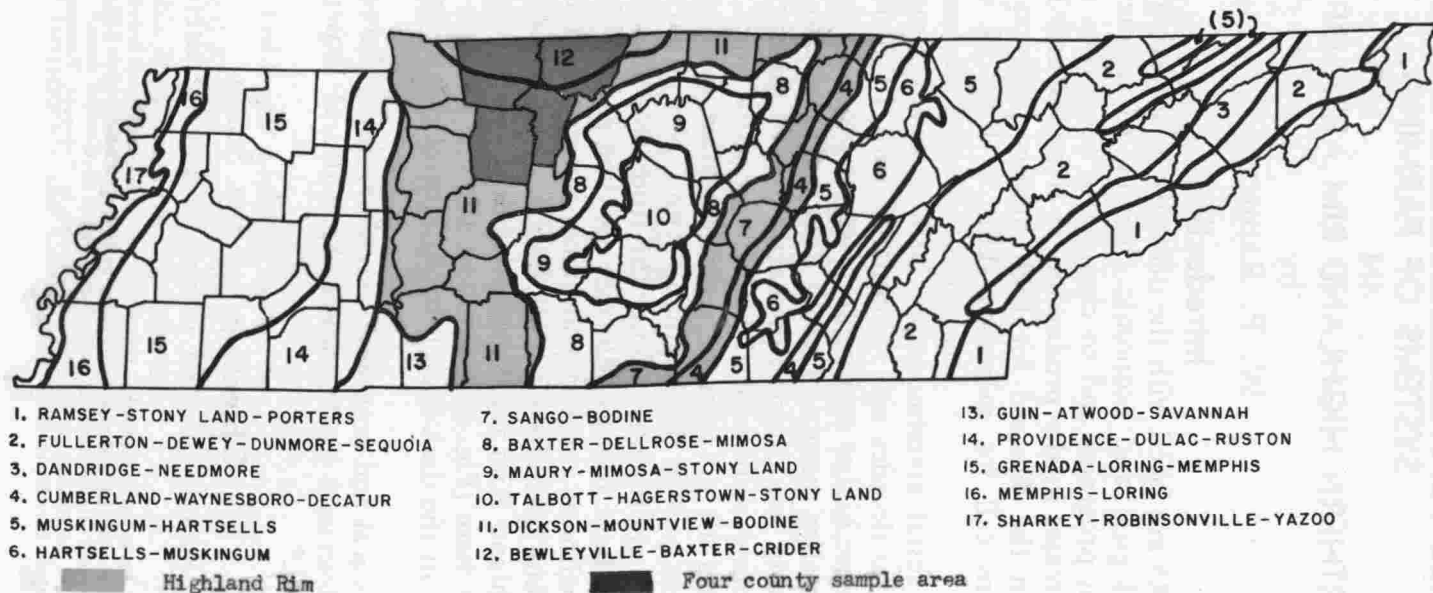


Figure 1. Map of Tennessee showing Highland Rim Region, Soil Associations and four county sample study areas.

of farming for particular resource situations. Specific objectives were:

1. To compute optimum combinations of land use from the standpoint of maximum net income to management and capital investment for selected specialized livestock systems (with and without a tobacco enterprise) for assumed situations.
2. To estimate the returns, capital investments, and total labor and power requirements for the optimum-income plans.

Procedure

To carry out the first of these objectives, linear programming was chosen as a tool for arriving at the optimum-income plans for selected situations.³

Farms in Area Studied

A stratified random sample of 327 farms in Cheatham, Dickson, Montgomery, and Robertson Counties⁴ was used as a basis for classifying the farms for this study. Because of the small number of large farms (Fig. 2) a larger proportion of them than of the small farms was included in the sample.

Information obtained for the farms in the sample included: numbers, ages, and schooling of the members of the operators' and regular hired laborers' families, and amount of off-farm work done;⁵ soil maps, land use by acres, numbers and kinds of livestock, and kinds of buildings and machinery; and fertilizer inputs and crop yields by fields if this information was available. Some farmers reported all inputs used in crop production by fields. Information on amount of capital investment and the farmer's equity was not requested.

The information obtained from the sample farms showed that there were wide differences in systems of farming and in land, labor, building, and machinery resources among the farms. The information served as a basis for delineation of farming systems and of situations that were used in the analyses.

³ The linear programming method of analysis is described in numerous publications, including: E. O. Heady and Wilfred Candler, *Linear Programming Methods*, (Ames, Iowa: Iowa State College Press, 1958). R. Dorfman, P. A. Samuelson, and R. M. Solow, *Linear Programming and Economic Analysis*, (New York: McGraw-Hill Book Company, Inc., 1958). A. Charnes, W. W. Cooper, and A. Henderson, *An Introduction to Linear Programming*, (New York: John Wiley and Sons, Inc., 1953).

⁴ See Figure 1 for location of these counties in the State, and their position in reference to the Highland Rim region and soil-association areas.

⁵ A summary of the operators' ages and amount of off-farm work, by size of farm, was reported in Tennessee Farm and Home Science, Progress Report No. 24, December, 1957.

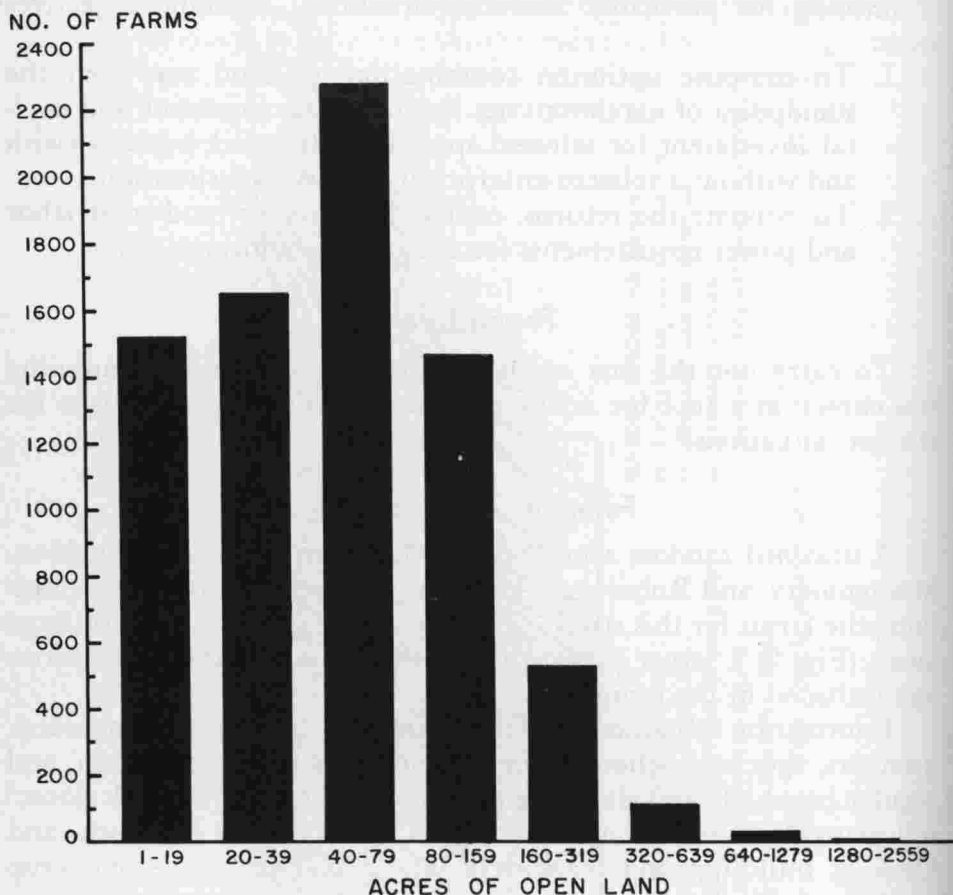


Figure 2. Estimated number of farms in farm-size groups in Cheatham, Dickson, Montgomery, and Robertson counties in 1957.

Cattle made up the principal kind of livestock. There were some highly specialized grade-A and manufacturing-milk dairy farms and cow-calf beef farms, both with and without a tobacco enterprise. There were many diversified farms with various combinations of these kinds of cattle enterprises, and others that included one or more other enterprises such as sheep, hogs, or poultry, and a few cases of specialty crops other than tobacco.

There were 80 different soils⁶ found on the soil maps for the 327 sample farms; and as many as 50 on a single farm. Most of the

⁶ A soil in this report pertains to a mapping unit, which is a certain combination of series, type, slope phase, and accelerated erosion phase. See maps in Appendix B.

farms had from 10 to 25 different soils, which were usually distributed over each farm in numerous tracts of different sizes and shapes. On many farms some of the most productive land was found in very small tracts and/or locations that would handicap optimum usage of these soils. However, on account of the shortage of these better soils on some farms, they often need to be used for the most intensive crops in spite of the small fields. For classification of the farms in this study the soils were first arranged in six groups. A list of the soils included in each group is presented in Appendix A. The six groups are as follows:

Group I—level to undulating, high in water-supplying capacity, well-drained.

Group II—level to undulating, medium to high in water-supplying capacity; not well-drained and/or subject to overflow.

Group III—level to undulating, medium in water-supplying capacity.

Group IV—level to undulating, low to medium in water-supplying capacity.

Group V—rolling to hilly, low to medium in water-supplying capacity.

Group VI—level land, if very poorly drained, and rolling to steep land, very low in water-supplying capacity.

On some farms part of the land in Group VI was cleared, and a small amount of pasturage was obtained in favorable years. Also, some productive work and income were obtained from woodland on a few farms. However, this study was limited to acres of "open land," which was assumed to exclude Group VI.

The farms were classified into three patterns on the basis of relative proportions of open land in Soil Groups I to V, as follows:

Soil pattern A—total acres in Soil Groups I, II, and III amounted to 50% or more of total open land on the farm.

Soil pattern B—a rather high percentage of the open land was in Group IV or the farms had fairly equal proportions in Group V and one or more of Groups I, II, and III.

Soil pattern C—acres in Soil Group V amounted to 60% or more of total open land on the farm.

The farms in the sample were classified into farm-size groups on the basis of acres of open land. The classification was made on

the basis of the following ranges in acres: 1 to 19, 20 to 39, 40 to 79, 80 to 159, 160 to 319, 320 to 639, 640 to 1,279, and 1,280 to 2,559.

The farms were not classified on the basis of family labor or capital. Assumptions were set up for these items in each analysis made in the study. The needs for buildings and machinery were then estimated for the optimum-income system determined by each analysis.

On the basis of the distribution of the sample farms among the groups, an estimate was made of the number of farms in the four counties studied that were in the different soil-pattern and farm-size groups in 1957. The estimates are presented in Table 1, and show that the proportion of farms in the four largest farm-size groups was greatest for Soil-pattern A and lowest for Soil-pattern C.

Data in the United States Census show that there has been a trend toward an increasing proportion of farms in the larger farm-size groups.

Case-Study Farms

Three actual farms in the sample studied, one for each of the three soil-pattern groups, were selected for determining the effect

Table 1. Estimated Numbers and Percentages of Farms in Cheatham, Dickson, Montgomery and Robertson Counties in 1957, by Soil-Pattern and Farm-Size Groups

Ranges in acres of open land	Soil Patterns			Totals
	A	B	C	
	— Number —			
1- 19	207	613	702	1,522
20- 39	354	530	766	1,650
40- 79	590	1,051	632	2,273
80- 159	424	500	540	1,464
160- 319	158	248	124	530
320- 639	50	32	26	108
640-1279	16	5	5	26
1280-2559	1	3	0	4
— Percent —				
1- 19	11.5	20.5	25.1	20.1
20- 39	19.6	17.8	27.4	21.8
40- 79	32.8	35.2	22.6	30.0
80- 159	23.5	16.8	19.3	19.3
160- 319	8.8	8.3	4.5	7.0
320- 639	2.8	1.1	.9	1.4
640-1279	.9	.2	.2	.3
1280-2559	.1	.1	.0	.1

of soil resources on land use and optimum net income for different farming systems. Maps showing the soil-mapping units on each farm and proposed delineated areas for soil groups I to V are presented in Appendix B.

Figure 3 illustrates the relative proportions of the five soil groups for each of the three soil patterns.

To study the effect of farm size (acres of open land) on land use and optimum net revenue for different farming systems, five sizes were assumed for each of the three case-study soil patterns, as follows: 60, 120, 240, 480, and 960 acres of open land.⁷ These represent the five farm-size groups shown in Table 1 falling between 40 and 1,279 acres of open land.⁸ These five farm-size groups represented only 58% of all farms, but included about 87% of the open land in all farms in the four counties in 1957.

Assumptions and Resource Restrictions

An arbitrary level of management, estimated to be considerably above the average, but below that shown by the best farm operators in the area, was assumed in this study. No assumption was made in regard to the probability that managers on small farms would be able to maintain the same level of management if they moved to larger farms. Operators with required capacities for management were assumed for the various farm-sizes.

The input-output data used in the analyses are presented in the Appendix. Rates of fertilization and yields of certain crops by soils on selected farms in the sample studied were used to determine marginal fertilizer inputs and yields presented in the Appendix. These estimates were then extended to other crops and soils, checking with experiment station data where available.

The planned performances for livestock are not as high as some few farmers are getting. The planned average production of milk per cow in this study is about 10,000 pounds; some herds are averaging over 12,000 pounds.⁹ The planned average gain per beef calf

⁷ Throughout this manuscript farms of the selected sizes with Soil-pattern A are designated as "A" Farms, those with Soil-pattern B as "B" Farms, and those with Soil-pattern C as "C" Farms.

⁸ A large proportion of the farms with less than 40 acres of open land were designated in the United States Census as residential, part-time or miscellaneous. Many of the operators on these farms were elderly or retired people, persons of poor health, or women. Most of the younger men on these farms had full-time off-farm occupations, and had little time for farm operations. The four farms with over 1,280 acres of open land were operated by hired managers.

⁹ Marginal rates for feeding concentrates to dairy cows at assumed prices for concentrates and milk were estimated from data for good cows in Table 2, Michigan Special Bulletin 376, May 1952, (by C. R. Hoglund and K. T. Wright), Agricultural Experiment Station, Michigan State University.

PCT. OF OPEN LAND

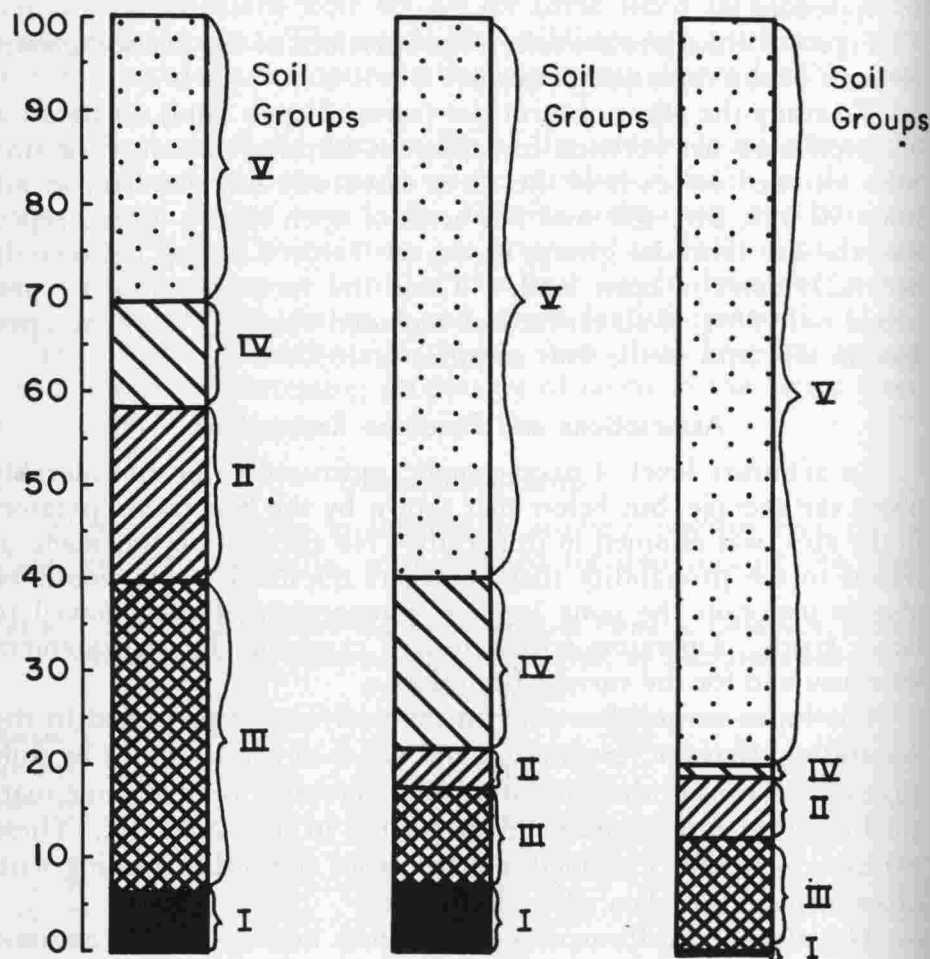


Figure 3. Proportions of open land in various soil groups on case-study farms, by soil-pattern groups.

is 1.75 pounds per day; some few farmers are getting over 2 pounds average.

The needs of livestock for total digestible nutrients and digestible protein by months and ages of animals and the nutrients expected from crops and pastures were computed in detail from data

in Morrison's *Feeds and Feeding*¹⁰ (Appendix D). The data were computed for three seasons: October to March, April to June, and July to September. It was assumed that for the October to March season pasture would be used 2 months, partly at the beginning of this season and partly at the end.

In most of the analyses for this report an assumption was made that all labor would be hired at \$1.25 per hour, including perquisites if furnished, or would be family labor with readily available opportunities to work at other occupations at that rate. Hence the charge for labor was included as a variable expense. Assuming that there may be opportunities in some instances to hire labor at lower wages without lowering quality of performance, analyses were made for a few situations using a labor charge of 75 cents per hour in order to note the effect of this difference in wages on the optimum-income plans.

In this study it was assumed that sufficient capital was available for the optimum-income plans, either as owned or borrowed capital.

The only resource limitations used in the analyses for this report were acres of land in the different soil groups, and the tobacco allotments.

An assumption was made that for all land over 1% slope, all farming operations involving land preparation and cultivation would be done on the contour, that strip cropping would be used for the longer slopes, and terraces would be used where practicable. In fact, visitations to the three case-study farms showed that these and many other farms in the area already had terraces.

Enterprises Considered

In the analyses, the different kinds of livestock were not given a chance to compete against each other. The objective was to determine optimum-income plans for each kind of livestock as a highly-specialized organization, with tobacco included on the farms with tobacco allotments. Grade-A dairy, manufacturing-milk dairy, and cow-calf beef were the three major livestock systems studied.

Sheep and feeder pigs were analyzed for a few situations to give some indication of possibilities for these systems when highly specialized.

¹⁰ F. B. Morrison and Associates, *Feeds and Feeding*, 22nd edition, third printing, Morrison Publishing Co., (Clinton, Iowa: 1959).

Table 2. Land Uses by Soil Groups That Were Included in This Study

Land uses	Soil groups
Dark tobacco	I, III ₁ , IV ₁ , V ₁
Dark tobacco (fall and spring pasture) ¹	I
Burley tobacco	I, III ₁ , IV ₁ , V ₁
Burley tobacco (fall and spring pasture)	I
Corn	I, II, III ₁ , IV ₁ , V ₁
Corn silage	I, II, III ₁ , IV ₁
Corn silage (fall and spring pasture)	I
Corn silage (fall and spring grass silage)	I
Barley	V ₁
Barley (straw) (lesp. hay)	I, III ₂ , IV ₂
Barley (straw) (lesp. pasture)	I, III ₂ , III ₁₋₂ , IV ₂ , IV ₁₋₂
Barley (straw) (oats and crim. cl. past.)	I, III ₂ , IV ₂
Alfalfa hay	I, III ₁₋₂
Alfalfa silage and hay ²	I, III ₁₋₂
Lad. cl. and orch. grass hay	I, III ₁₋₂ , IV ₁₋₂ , V ₂ , V ₁₋₂
Lad. cl. and orch. grass silage and hay ²	I, III ₁₋₂ , IV ₁₋₂ , V ₂ , V ₁₋₂
Lad. cl. and orch. grass silage	V ₁
Lad. cl. and grass pasture	I, III ₁₋₂ , IV ₁₋₂ , V ₂ , V ₁₋₂
Lad. cl. and fescue hay	II
Lad. cl. and fescue silage and hay	II
Lad. cl. and fescue pasture	II
Fescue pasture, lesp. hay	II, V ₂ , V ₁₋₂
Fescue pasture, lesp. pasture	II, III ₁₋₂ , IV ₁₋₂ , V ₂ , V ₁₋₂
Lepedeza hay	II, III ₂ , III ₁₋₂ , IV ₂ , IV ₁₋₂
Lepedeza pasture	II, III ₂ , IV ₂
Millet hay	I, II, III ₁ , IV ₁ , V ₁
Millet silage	I, II, III ₁ , IV ₁ , V ₁
Millet pasture	I, II, III ₁ , IV ₁ , V ₁
Crim. cl., past., lesp. past.	III ₂ , IV ₂
Crim. cl., past., lesp. hay	III ₂ , IV ₂
Fescue to harvest for bedding	II

¹ The land use in parentheses represents the second crop in a "double cropping" system.

² Silage was assumed for the first two crops.

Note: 1-2 means 1 & 2.

In selecting crop and pasture uses to be included for the different soil groups, consideration was given to the following: crop adaptability to these soils; crop sequence; and soil loss tolerances permissible under the assumptions that were made in regard to farming on the contour, strip-cropping, and terracing.¹¹

¹¹ Bell, F. F., and Springer, M. F., University of Tennessee, and Breinig, C. B., Roark, C. L. and Springer, D. K., Soil Conservation Service, *Soil Loss Estimation in Tennessee*, Mimeographed Report, November 1959 (with revisions in 1962).

If a certain soil group, Group III for instance, was available for a 2-year rotation, 1 year in row crop and 1 year in small grain or meadow, then the total acreage in Group III was divided by two, with half of the acreage denoted for Soil Group III₁ and half for Group III₂. Likewise, if only one-eighth of a soil group was considered suitable for more intensive use occasionally, then the group, such as Group V, would have one-eighth of the acreage denoted as V₁ and seven-eighths as V₂.

The land use possibilities considered in the analyses for this report are shown in Table 2. Opportunities for buying bedding, concentrates, and protein supplements were also included.

For two situations, analyses were made for systems that excluded grazing pasture. All feed was assumed to be harvested and fed throughout the year in the barn or barnyard. These analyses were made because a few farmers are using this system and it seemed desirable to evaluate it.

Optimum-Income Plans for Case-Study Farms with Different Soil Patterns, By Size of Farm and Farming System

In the following sections for each case-study farm there are shown, in addition to net income above variable costs, the capital investment needed, the percent return on this investment, the land-use enterprises for each soil group, the amount of livestock in the plan, hours of labor required, and hours of tractor use.

Certain results of the analyses are illustrated in Figures 4 to 16 inclusive. The results of each analysis applies only to the point directly above the specified acres of open land. The points for the

Table 3. Acres Available in Each Soil Group, and Tobacco Allotments, "A" Farms, by Acres of Open Land

Soil groups	Acres of open land				
	60	120	240	480	960
I	3.7	7.4	14.8	29.6	59.2
II	11.1	22.2	44.4	88.8	177.6
III ₁	10.0	20.0	40.0	80.0	160.0
III ₂	10.0	20.0	40.0	80.0	160.0
IV ₁	3.4	6.8	13.6	27.2	54.4
IV ₂	3.4	6.8	13.6	27.2	54.4
V ₁	2.3	4.6	9.2	18.4	36.8
V ₂	16.1	32.2	64.4	128.8	257.6
Tobacco allotments					
Dark-fired	3.3	6.6	8.8	11.6	15.6
Burley	.7	1.1	1.3	1.5	1.7

various farm sizes studied are connected in the figures by straight lines. Actually, no attempt was made to determine whether these connecting lines should be drawn straight, curved, or irregular.

"A" Farms (With Soil-pattern A)

Acres by Soil Groups

The acres available in each soil group and the tobacco allotments for each farm size are shown in Table 3. The tobacco allotments were based on the average acreages of tobacco grown in 1957 on farms with tobacco in the sample studied.¹² The acreages of land

¹² Not all of the farmers with tobacco had both dark-fired and burley types. But most of them had both types. A few farmers had another type, called one-sucker, but the acreage was so small that it was not included in this study.

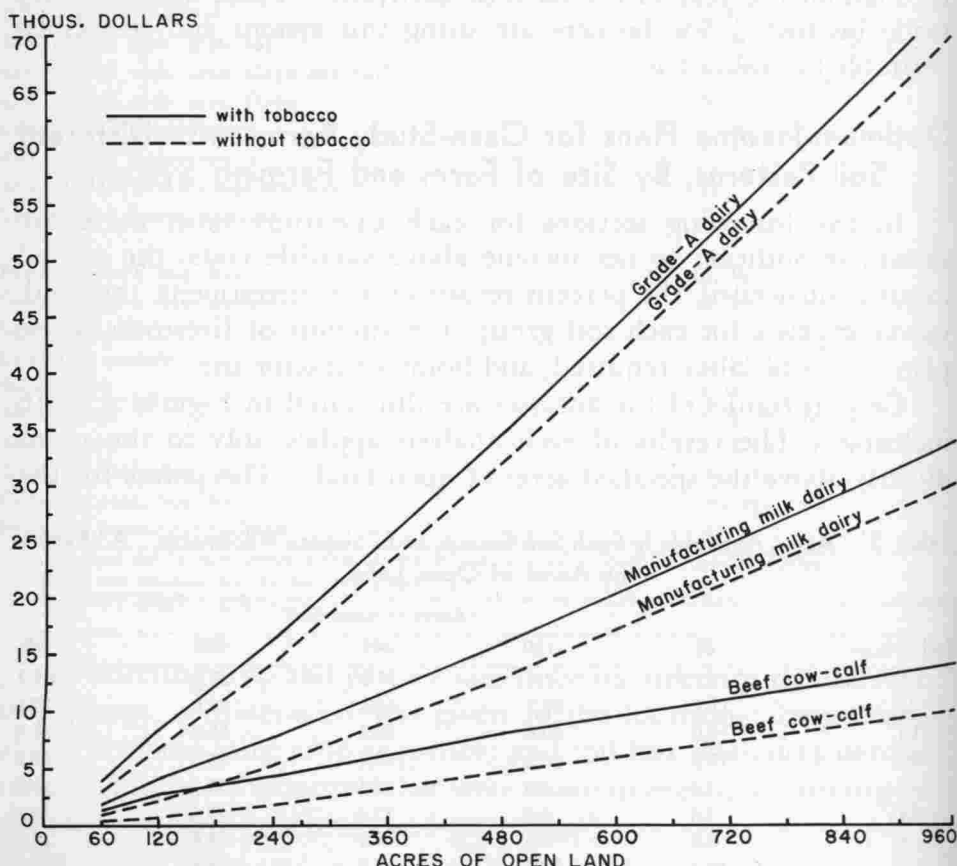


Figure 4. Net revenue above variable costs in the optimum-income plans, "A" Farms, by acres of open land and farming system.

for each soil group were arbitrarily kept in the same proportions for each farm size analyzed. But the tobacco allotments did not increase proportionately with the size of farms.

Net Revenue

Figure 4 shows that the net revenue in the optimum-income plans is a little more than twice as great for grade-A dairy as for manufacturing-milk dairy farms (with tobacco allotments). The ratio changes only slightly with size of farm.

The net revenue for the grade-A dairy system is 3 times that for the beef system on the smallest farms and 5 times as great on the largest farms, for farms with tobacco. But for farms without tobacco the net revenue for the grade-A dairy system is 12 times that for the

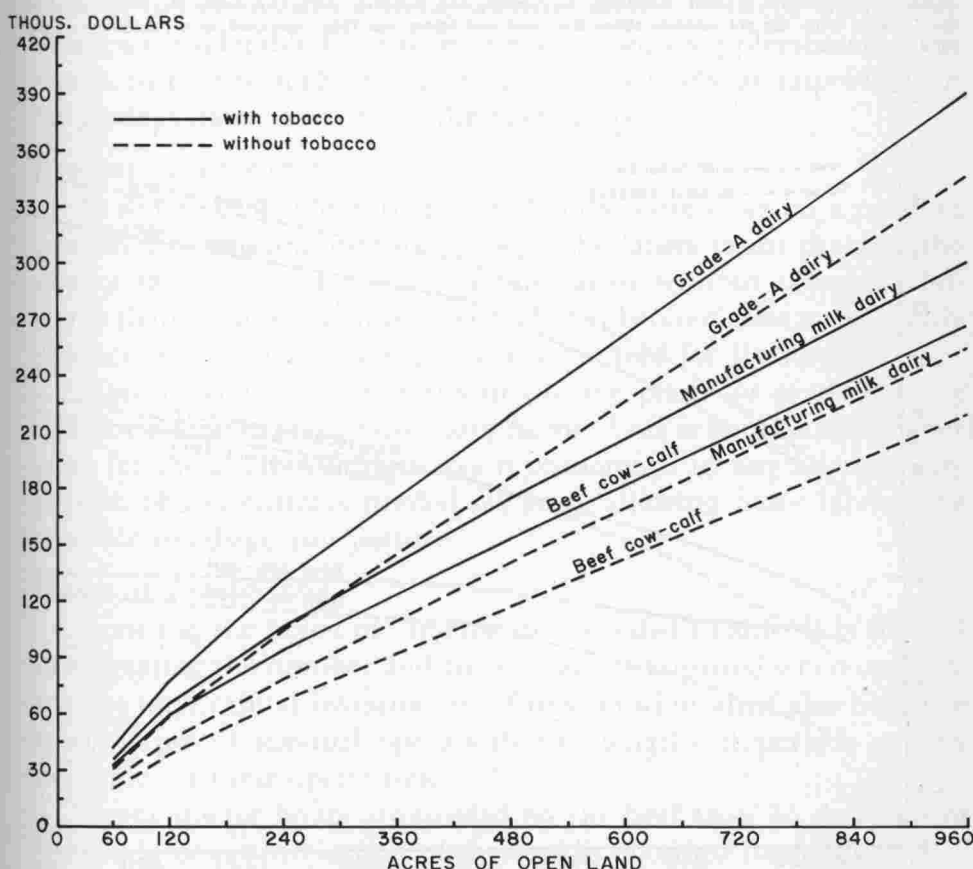


Figure 5. Total capital investment in the optimum-income plans, "A" Farms, by acres of open land and farming system.

beef system on the smallest farms and 7 times as great on the largest farms.

Capital Investment and Rates of Returns¹³

There are not as great differences among the livestock systems in total capital investment as in net revenues (Figs. 4 and 5). Also, variable costs are considerably higher than fixed costs other than interest. Hence, the differences among the livestock systems in rate of returns on investment are large (Fig. 6). The differences in rate of returns among farm sizes are considerable.

¹³ The investments include machinery, buildings, and fencing at cost when new. If it is assumed that about half of them are new and half worth about scrap value, the total capital investment would be about one-fifth to one-fourth lower, and the positive rates of return would be increased accordingly, and the negative rates of return would be greater negative rates. This would result in greater differences among farming systems and farm sizes than shown by the differences in rates in Figure 6. Fixed costs, based on investments in land, buildings, equipment, and breeding stock (Appendix H), were added to the variable costs; the net revenue above this total cost figure was then computed as a percentage of the total investment.

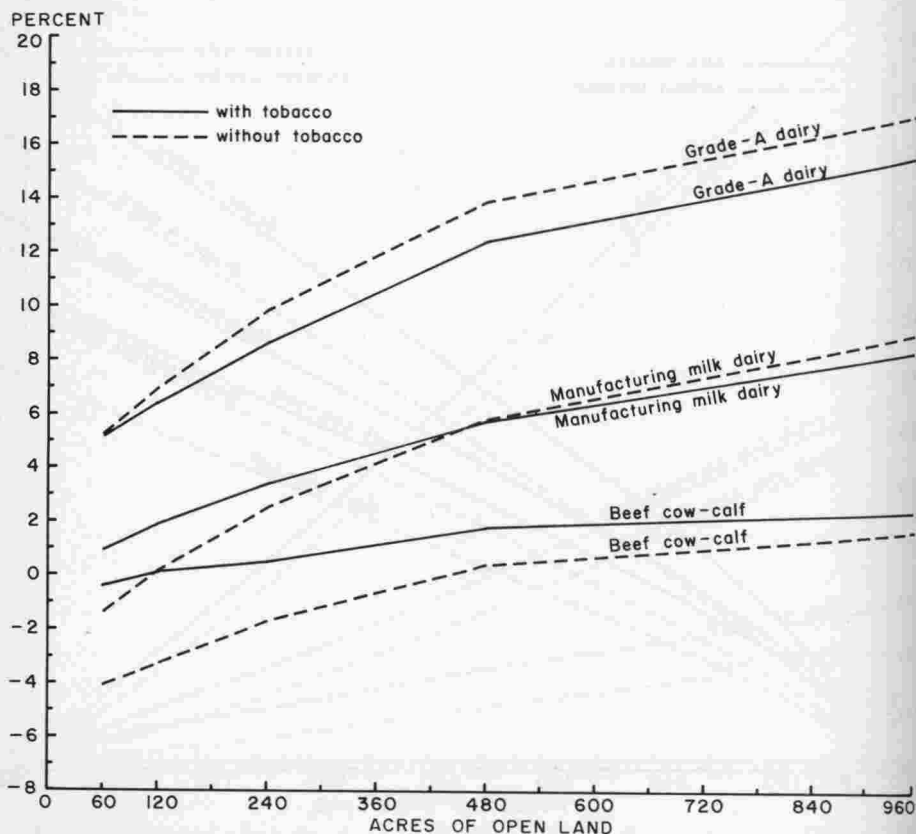


Figure 6. Percent returns on capital investment in the optimum-income plans, "A" Farms, by acres of open land and farming system.

Although the rates of return were computed as percentages of capital investment, they cannot be interpreted to signify solely *interest earned on investment*. They include returns to management. It undoubtedly requires more managerial capacity to hire laborers to do dairy chores throughout the year than to hire workers for chores on a beef farm, and there are more laborers to hire and manage on the large dairy farms. The farm managers with higher capacities for managing farms are undoubtedly men who could command higher salaries in other occupations or in business. Hence an *opportunity cost charge* for management would make differences in "interest on capital investment" smaller than the differences in rates of return shown in Figure 6.

Rates of return on investment are higher on grade-A dairy farms without tobacco than on those with tobacco. Tobacco barns constitute a considerable fixed investment. Also, a supplementary high return enterprise such as tobacco is not relatively as important on the grade-A dairy farms as on the beef farms.

Amount of Livestock

As shown in Table 4, there are slightly more cows on a per-acre basis in the optimum-income plans on the larger farms than on the smaller farms, and also more on the farms without tobacco allotments than on those with tobacco. The tobacco claims some highly productive land that would produce some feed for livestock.

More cows are in the optimum-income plans for grade-A dairy than for manufacturing-milk dairy farms. This is because the higher price for the grade-A milk makes it economical to buy a larger proportion of concentrates needed for feed, allowing more land to be used for roughage and pasture.

Hours of Tractor Use

Knowing the hours of "tractor use" needed (Table 4) is helpful in estimating the number and size of tractors required when computing the total capital investments. Consideration must also be given to the types of seasonal operations and lengths of periods usually available for these operations.

Fewer tractor hours are needed on the beef than on dairy farms because a larger proportion of the feed is obtained from pastures.

Labor Requirements

The hours of labor required are shown in Figure 7. There are

Table 4. Number of Cows and Hours of Tractor Use in Optimum-Income Plans, "A" Farms, by Acres of Open Land and Farming System

	Acres of open land				
	60	120	240	480	960
Numbers					
Number of cows					
With tobacco					
Grade-A dairy	18	41	88	174	356
Mfg.-milk dairy	15	30	62	125	253
Cow-calf beef	18	36	74	152	328
Without tobacco					
Grade-A dairy	20	45	90	180	366
Mfg.-milk dairy	16	32	65	130	259
Cow-calf beef	20	39	78	159	336
Hours					
Hours of tractor use					
With tobacco					
Grade-A dairy	400	770	1350	2110	3790
Mfg.-milk dairy	390	710	1200	1960	3360
Cow-calf beef	320	580	1000	1530	2900
Without tobacco					
Grade-A dairy	380	700	1240	1970	3640
Mfg.-milk dairy	360	610	1090	1830	3200
Cow-calf beef	280	480	860	1400	2730

relatively greater differences among the livestock systems and among the farm-size groups in hours of labor required when tobacco is grown than when it is not grown.

The distribution of labor requirements by months on "A" Farms for several situations is shown in Figure 8.¹⁴ The distribution is very irregular on farms with tobacco enterprises and quite irregular on the beef farms without tobacco. The distribution is slightly more regular by months for manufacturing-milk farms than for grade-A dairy farms, mainly because part of the hay is lespedeza rather than alfalfa.

An irregular distribution of labor by months and low labor requirements per acre make it necessary to have larger farms in order to provide the laborers with more nearly full-time employment. This is illustrated in Figure 7. The demand on dairy farms for considerable chore time every day, including Sundays, is another factor affecting size of farm needed for full-time employment throughout the year.

An attempt was made to show in Table 5 and Figure 8 the ap-

¹⁴ The distribution of labor by months is based on data in Tennessee Agricultural Experiment Station Bulletin No. 316, *Labor Requirements on Tennessee Farms*, by W. P. Ranney, September 1960.

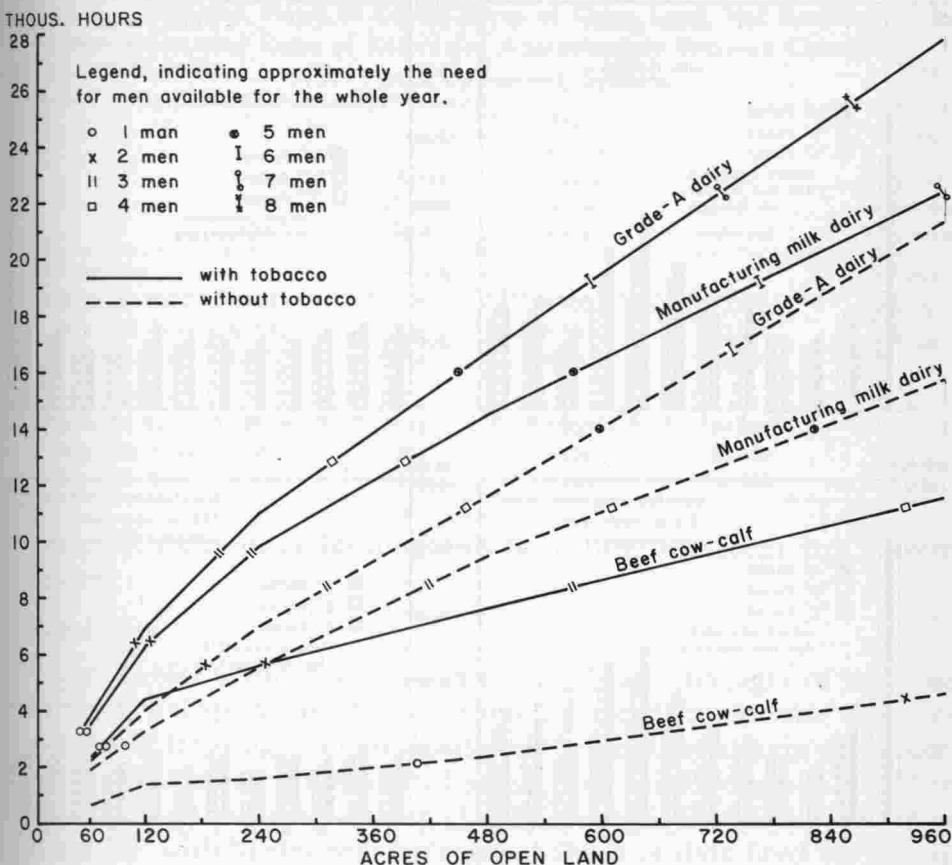


Figure 7. Hours of labor used in the optimum-income plans, "A" Farms, by acres of open land and farming system.

proximate acreages of open land needed to keep two laborers fully employed throughout the year, yet not relying too much on seasonal labor. By interpolating in Figures 4, 5, and 6, estimates were made to provide the data in Table 5 in regard to acres, income, and investment.

It takes more acreage for a two-man operation without tobacco than with tobacco and, also, more total capital investment in spite of the lower values assumed for the land and the elimination of tobacco barns. But the rate of return is higher on the farms without tobacco.

Capital requirements are high for the beef farms, and rate of return low. If a farmer owns this capital without debts he may

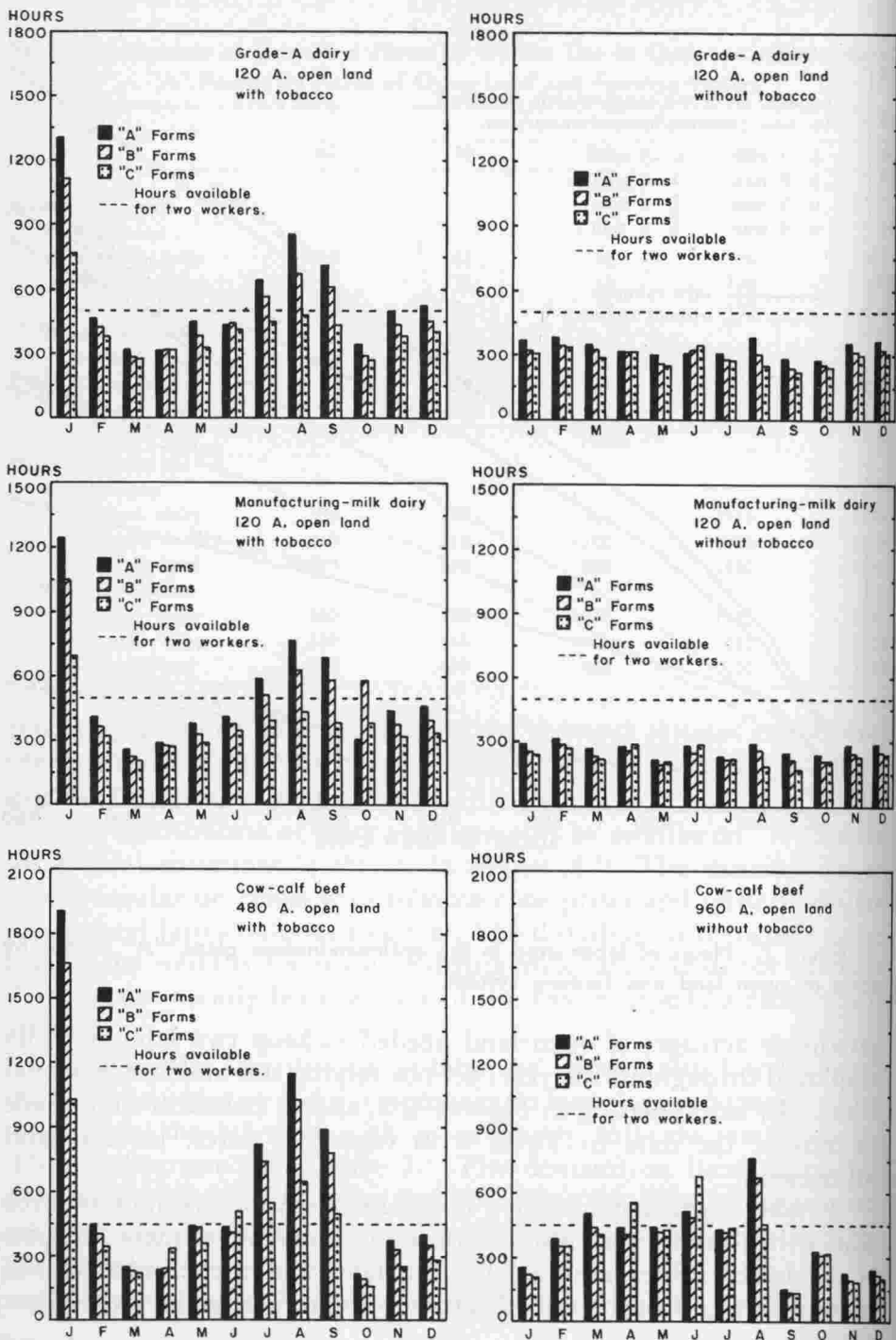


Figure 8. Monthly labor distribution on "A" Farms needing approximately two full-time laborers with extra help used seasonally.

Table 5. Estimated Hours of Labor, Acres of Open Land, Net Revenues, Total Investments, and Rates of Return for Approximately Two-man Operations, "A" Farms, by Farming Systems

	Hours of labor	Acres of open land	Net revenue above variable costs	Total capital in- vestment	Rate of return on investment
With tobacco					
Grade-A dairy	6,400	110	\$7,600	\$72,000	6.2%
Mfg.-milk dairy	6,400	126	4,500	67,000	2.0%
Cow-calf beef	5,600	246	4,500	96,000	.5%
Without tobacco					
Grade-A dairy	5,600	186	11,000	84,000	8.5%
Mfg.-milk dairy	5,600	246	5,500	80,000	2.6%
Cow-calf beef	4,400	920	9,800	210,000	1.6%

prefer this system of farming and be willing to accept this rate of return.

Land Use

In Tables 6 and 7 are shown the kinds and acreages of land use for each soil group in the optimum-income plans for the different systems of farming. There is strong competition among the different possible uses for the limited acreages of Soil Groups I and III in particular, and next for Group II. Tobacco has first claim to Groups I and III, with burley tobacco coming ahead of dark-fired for Group I. Alfalfa has a high priority on Group III.

Because of the high price of bedding and need for rotations, the combination of barley, straw, and a little lespedeza pasture permits barley acreage to exceed corn acreage in the production of needed concentrates.

The higher-valued products permit the acquisition of some concentrates and bedding through purchases. Most of the concentrates are bought in the grade-A dairy system, but none are bought in the other systems.

None of the optimum-income plans call for any purchase of cottonseed meal. This is because of the protein content assumed in high quality leguminous hay and pasture. It is quite likely that in drouth periods when pasture plants become very dry some protein supplements may be needed.

The higher-valued products permit more productive and higher-cost "land uses." Alfalfa comes in only on the grade-A dairy farms.

Table 6. Land Use and Feed and Bedding Purchases in Optimum-Income Plans, "A" Farms, With Tobacco, by Acres of Open Land and Livestock System

Land use	Soil group	Grade-A dairy Acres of open land					Mfg.-milk dairy Acres of open land					Cow-calf beef Acres of open land				
		60	120	240	480	960	60	120	240	480	960	60	120	240	480	960
		Acres					Acres					Acres				
Corn	I	—	—	—	—	—	—	—	—	—	—	—	—	1.9	3.9	8.6
	III ₁	—	—	—	—	—	3.3	7.4	14.2	27.9	56.3	.5	1.0	—	—	—
Corn sil. (w.p.) ¹	I	—	—	4.7	16.5	42.0	—	—	—	—	—	—	—	—	—	—
Corn sil.	III ₁	5.0	11.3	16.8	18.1	29.5	4.4	8.9	18.3	37.3	75.5	3.6	7.3	14.9	30.6	66.3
Grass sil.	V ₁	—	—	2.8	18.4	36.8	—	—	—	—	—	—	—	—	—	—
Barley (l.p.) ²	I	—	—	—	—	—	1.3	—	4.7	15.3	35.5	—	—	2.8	12.6	—
Barley (l.p.) ²	III ₂	8.8	12.5	21.2	18.1	18.1	9.3	17.5	33.6	65.4	147.8	3.0	6.0	2.0	6.2	42.8
Barley (l.p.) ²	IV ₂	.8	—	—	26.8	49.6	1.8	6.8	13.6	27.2	32.4	—	—	—	8.0	13.1
Barley (l.p.) ²	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	—	—	8.6	—	—
Barley (w.p.)	III ₂	—	—	—	—	11.4	—	—	—	—	—	—	—	—	—	—
Alfalfa hay	III ₁₋₂	2.4	5.2	11.0	22.2	45.4	—	—	—	—	—	—	—	—	—	—
La. c., or. g. hay ³	III ₁₋₂	—	—	—	—	—	1.4	4.6	9.6	19.3	—	—	—	—	—	—
La. c., or. g. hay ³	IV ₁₋₂	—	—	—	—	—	1.0	—	—	—	44.0	4.6	9.0	18.6	38.4	82.6
La. c., or. g. past.	III ₁₋₂	—	9.8	26.6	101.6	215.6	—	.4	3.2	9.8	24.4	—	—	—	—	—
La. c., or. g. past.	IV ₁₋₂	5.2	13.6	27.2	.8	9.6	2.2	—	—	—	—	—	—	—	—	—
La. c., or. g. past.	V ₁₋₂	—	5.6	—	—	—	—	12.8	24.0	44.2	83.2	—	—	—	—	—
Fes., l. past. ⁴	II	10.1	—	—	12.7	—	11.1	22.2	44.4	88.8	177.6	3.1	5.9	18.0	44.9	132.7
Fes., l. past. ⁴	III ₁₋₂	—	—	—	—	—	—	—	—	—	—	11.2	22.8	50.2	98.8	187.4
Fes., l. past. ⁴	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	2.2	4.6	—	—	—
Fes., l. past. ⁴	V ₂	—	—	19.6	128.8	257.6	—	—	—	—	—	—	—	—	—	—
Fes., l. past. ⁴	V ₁₋₂	18.4	31.2	51.2	—	—	18.4	24.0	49.6	103.0	211.2	18.4	36.8	73.6	147.2	294.4
Lesp. past.	II	—	—	—	—	—	—	—	—	—	—	8.0	16.3	26.4	43.9	—
Lesp. past.	III ₂	—	—	—	—	—	—	—	—	—	—	1.4	2.6	12.9	24.4	23.5
Millet past.	I	—	—	—	—	—	—	—	—	1.2	6.4	—	—	—	—	33.3
Millet past.	II	1.0	22.2	44.4	76.1	177.6	—	—	—	—	—	—	—	—	—	44.9
Millet past.	III ₁	3.5	.9	4.4	—	—	—	.9	1.1	.3	16.0	—	—	—	—	—
Millet past.	IV ₁	.8	—	—	26.8	49.6	1.8	6.8	13.6	27.2	32.4	—	—	—	8.0	13.1
D. tob. (w.p.)	I	—	6.3	8.8	11.6	15.5	—	—	—	—	—	—	—	—	—	—
D. tob.	I	3.0	—	—	—	—	1.7	6.3	8.8	11.6	15.6	3.0	6.3	8.8	11.6	15.6
D. tob.	III ₁	.3	.3	—	—	—	1.6	.3	—	—	—	.3	.3	—	—	—
B. tob. (w.p.)	I	—	1.1	1.3	1.5	1.7	—	—	—	—	—	—	—	—	—	—
B. tob.	I	.7	—	—	—	—	.7	1.1	1.3	1.5	1.7	.7	1.1	1.3	1.5	1.7
Buy corn (100 bu.)		8.0	21.8	47.5	97.4	204.8	—	—	—	—	—	—	—	—	—	—
Buy bedding (tons)		6.7	25.9	59.6	123.1	267.1	—	1.8	1.2	—	—	—	—	—	—	—

¹ Late fall and early spring pasture, ² lespedeza pasture, ³ ladino clover and orchardgrass hay, ⁴ fescue and lespedeza pasture.

Note: 1-2 means 1 & 2.

Table 7. Land Use and Feed and Bedding Purchases in Optimum-Income Plans, "A" Farms, Without Tobacco, by Acres of Open Land and Livestock System

Land use	Soil group	Grade-A dairy Acres of open land					Mfg.-milk dairy Acres of open land					Cow-calf beef Acres of open land						
		60	120	240	480	960	60	120	240	480	960	60	120	240	480	960		
				Acres							Acres							
Corn	I	—	—	—	—	—	—	—	—	—	—	.5	1.0	2.0	4.1	8.7		
Corn	III ₁	—	—	—	—	—	3.5	7.1	14.4	28.8	57.6	—	—	—	—	—		
Corn sil. (w.p.)	I	.5	7.4	14.8	29.6	59.2	—	—	—	—	—	—	—	—	—	—		
Corn sil.	III ₁	5.1	4.8	9.5	6.2	14.2	4.7	9.5	19.2	38.5	77.2	3.9	7.9	15.7	31.9	67.9		
Grass sil.	V ₁	—	—	—	18.4	36.8	—	—	—	—	—	—	—	—	—	—		
Barley (l.p.)	I	—	—	—	—	—	3.3	6.6	11.4	22.8	45.4	—	—	12.8	20.9	—		
Barley (l.p.)	III ₂	8.7	10.3	20.6	17.0	5.7	8.7	16.6	33.6	67.3	143.5	3.2	6.5	—	—	45.0		
Barley (l.p.)	IV ₂	—	—	—	27.2	54.4	1.5	4.1	10.4	21.0	31.9	—	—	—	7.3	12.2		
Barley (l.p.)	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	—	—	.8	—	—		
Barley (w.p.)	III ₂	—	—	—	—	15.2	—	—	—	—	—	—	—	—	—	—		
Alfalfa hay	III ₁₋₂	2.6	5.8	11.6	23.0	45.6	—	—	—	—	—	—	—	—	—	—		
La. c., or. g. hay	I	—	—	—	—	—	—	—	—	—	—	3.2	6.4	—	—	—		
La. c., or. g. hay	III ₁₋₂	—	—	—	—	—	2.6	5.0	10.0	8.9	—	—	—	—	—	—		
La. c., or. g. hay	IV ₁₋₂	—	—	—	—	—	—	—	—	12.4	45.0	1.0	2.0	19.6	39.8	84.4		
La. c., or. g. past.	III ₁₋₂	—	13.6	27.2	103.0	231.6	—	1.8	2.8	16.5	33.0	—	—	—	—	—		
La. c., or. g. past.	IV ₁₋₂	6.8	13.6	27.2	—	—	3.8	5.4	6.4	—	—	—	—	—	—	—		
La. c., or. g. past.	V ₁₋₂	—	—	—	—	—	—	—	18.4	36.8	73.6	—	—	—	—	—		
Fes. l. past.	II	11.1	2.0	4.2	20.5	—	11.1	22.2	44.4	88.8	177.6	1.8	3.5	20.6	57.0	147.1		
Fes. l. past.	III ₁₋₂	—	—	—	—	—	—	—	—	—	—	12.2	24.2	48.6	96.2	184.2		
Fes. l. past.	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	5.8	11.6	6.8	—	—		
Fes. l. past.	V ₂	—	—	—	128.8	257.6	—	—	—	—	—	—	—	—	—	—		
Fes. l. past.	V ₁₋₂	18.4	36.8	73.6	—	—	18.4	36.8	55.2	110.4	220.8	18.4	36.8	73.6	147.2	294.4		
Lesp. past.	II	—	—	—	—	—	—	—	—	—	—	9.3	18.7	23.8	31.8	—		
Lesp. past.	III ₂	—	—	—	—	—	—	—	—	—	—	.7	1.4	15.7	31.9	22.9		
Millet past.	I	3.2	—	—	—	—	.4	.8	3.4	6.8	13.8	—	—	—	4.6	50.5		
Millet past.	II	—	20.2	40.2	68.3	177.6	—	—	—	—	—	—	—	—	—	30.5		
Millet past.	III ₁	3.6	5.5	11.1	10.8	6.7	.5	—	—	—	8.7	—	—	—	—	—		
Millet past.	IV ₁	—	—	—	27.2	54.4	1.5	4.1	10.4	21.0	31.9	—	—	—	7.3	12.2		
Buy corn (100 bu.)		9.8	25.3	50.7	101.6	212.8	—	—	—	—	—	—	—	—	—	—		
Buy bedding (tons)		9.9	32.4	64.8	129.9	281.6	—	—	—	—	—	—	—	—	—	—		

Note: 1-2 means 1 & 2.

This is probably because the higher-valued product permits purchases of all concentrates needed; hence, alfalfa does not have to compete with corn for the land suited to alfalfa. The establishment of pasture after corn silage, tobacco, and/or barley for late fall and spring pasture comes in only on the grade-A dairy farms, with the exception of a couple of instances on the 960-acre farm. This was an example of how lower unit costs on a larger farm influence the solution.

The higher-valued products permit millet and "ladino clover and orchardgrass" pastures to come in to a greater extent on dairy farms, especially grade-A dairy, than on beef farms. The pastures costing less to produce (fescue and lespedeza, and lespedeza alone) predominate in the beef system. Even though fescue pasture was discounted heavily in computation of feed nutrients, more acreage of fescue is shown in the plans for the dairy farms than is usually desired.

Miscellaneous Analyses

Optimum-income programs were determined for the grade-A dairy system, with and without tobacco, on farms with 120 acres of open land, with cows being fed concentrates for an average milk production per cow of 9,000 pounds instead of 10,400. Decreasing the output per cow by this much lowers net revenues above variable costs and rate of returns to investment by 15% to 20%.

Optimum-income programs were determined for the manufacturing-milk dairy system, with and without tobacco, on farms with 120 acres of open land, with a cut of 30 cents per hundredweight in price of milk sold. (A price of \$2.90 per cwt. for 3.5% milk rather than \$3.20 was used.) On the farms with tobacco this results in a cut of 23% in net revenue above variable costs, and lowers the rate of returns to investment from 1.9% to .5%. On farms without tobacco the net revenue is cut in half and the rate of returns from 0.1% to a minus 2.2%.

A special study was made for the grade-A dairy system, with and without tobacco, to determine the effect of omitting grazing of pastures in the feed program. All crops, including meadows, were assumed to be harvested and fed at the barn. On the farms with tobacco this change increases number of cows by 73%, net revenue by 39%, total investment by 25%, and rate of returns to investment by 23%. On farms without tobacco this change in practice increases

number of cows by 69%, net revenue by 56%, total investment by 35%, and rate of returns to investment by 32%.

Analyses were made of sheep and hogs (sale of two litters of weanling pigs per sow per year), with and without tobacco, for farms with 120 acres of open land and those with 480 acres of open land. The returns for the sheep system average a little higher than those for the cow-calf beef system. The returns for the hog system average about the same for the 120-acre farm but considerably lower for the 480-acre farm than the averages for the manufacturing-milk dairy system.

A special study was made for the beef and sheep systems, without tobacco, on farms with 120 acres of open land, with labor charged at 75 cents instead of \$1.25 per hour. The net revenues above variable costs are increased about 60%, but this increase is from a very low base. The rates of losses to investment are reduced, but the rates remain *negative* even at the lower wage rates.

"B" Farms (With Soil-pattern B)

Acres by Soil Groups

"B" Farms are medium in productivity in the area studied (see Fig. 3, p. 12; and Figs. B₃ and B₄ in Appendix B). The acres available in each soil group and the selected tobacco allotments for each farm size are shown in Table 8.

Table 8. Acres Available in Each Soil Group, and Tobacco Allotments, "B" Farms, by Acres of Open Land

Soil groups	Acres of Open Land				
	60	120	240	480	960
I	4.5	9	18	36	72
II	2.5	5	10	20	40
III ₁	3.0	6	12	24	48
III ₂	3.0	6	12	24	48
IV ₁	5.5	11	22	44	88
IV ₂	5.5	11	22	44	88
V ₁	4.5	9	18	36	72
V ₂	31.5	63	126	252	504
Tobacco allotments					
Dark-fired	2.7	5.5	7.5	10.0	13.0
Burley	.6	.9	1.1	1.3	1.5

"B" Farms have proportionately twice as much land as "A" Farms in the soil group of lowest productivity, Group V, and almost twice the proportion in Group IV. "B" Farms have, relative to

"A" Farms, a little more land in Group I, but much less in Groups II and III.

The tobacco allotments are lower for each farm-size group on "B" Farms than on "A" Farms.

Returns, Investments, Amount of Livestock, Labor Requirements and Tractor Use

The results of the analyses of "B" Farms for net revenue, capital investment, returns to management and investment, amount of livestock, and labor and tractor requirements are presented in Figures 9 through 12 and in Table 9.

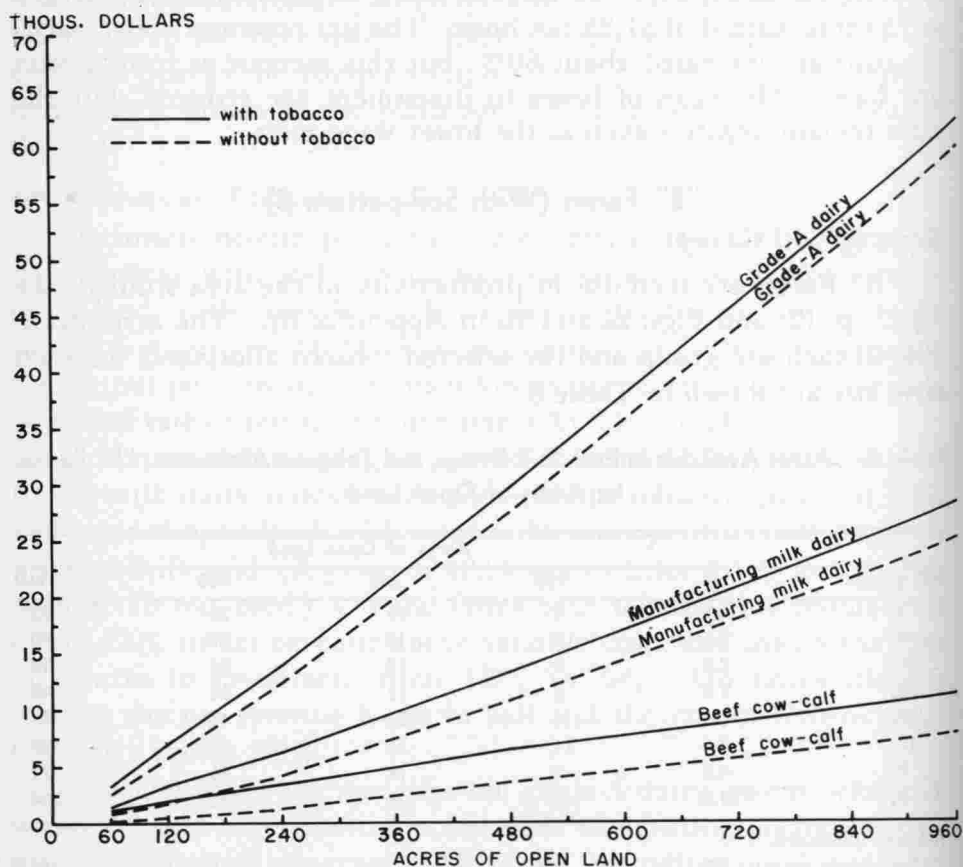


Figure 9. Net revenue above variable costs in the optimum-income plans, "B" Farms, by acres of open land and farming systems.

Production and financial returns are lower for "B" Farms than for "A" Farms. The differences in financial returns between the

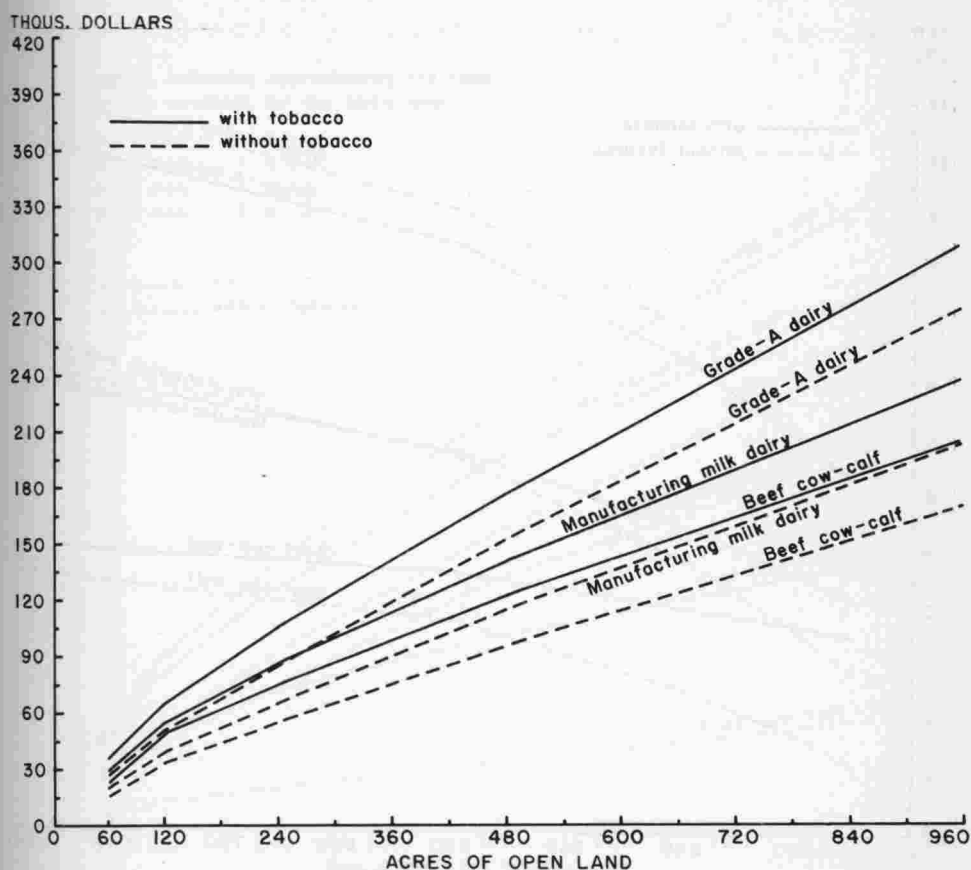


Figure 10. Total capital investment in the optimum-income plans, "B" Farms, by acres of open land and farming system.

two soil patterns are relatively greater than the differences in number of cows and labor requirements, and the differences in net revenues are greater for the lower-valued products than for higher-valued products, and greater for the small farms than for the larger farms. Rate of return on investment is greater for the grade-A dairy system on "B" Farms than on "A" Farms for the three largest farm sizes, and greater for the manufacturing-milk system on "B" Farms than on "A" Farms for the 960-acre size.

The reason for these relations lies in the fact that the difference between lands of high and low productivity in cost per feed nutrient is greater than the difference in total physical production. This is more serious on small farms, where costs per feed nutrient are high, than on large farms.

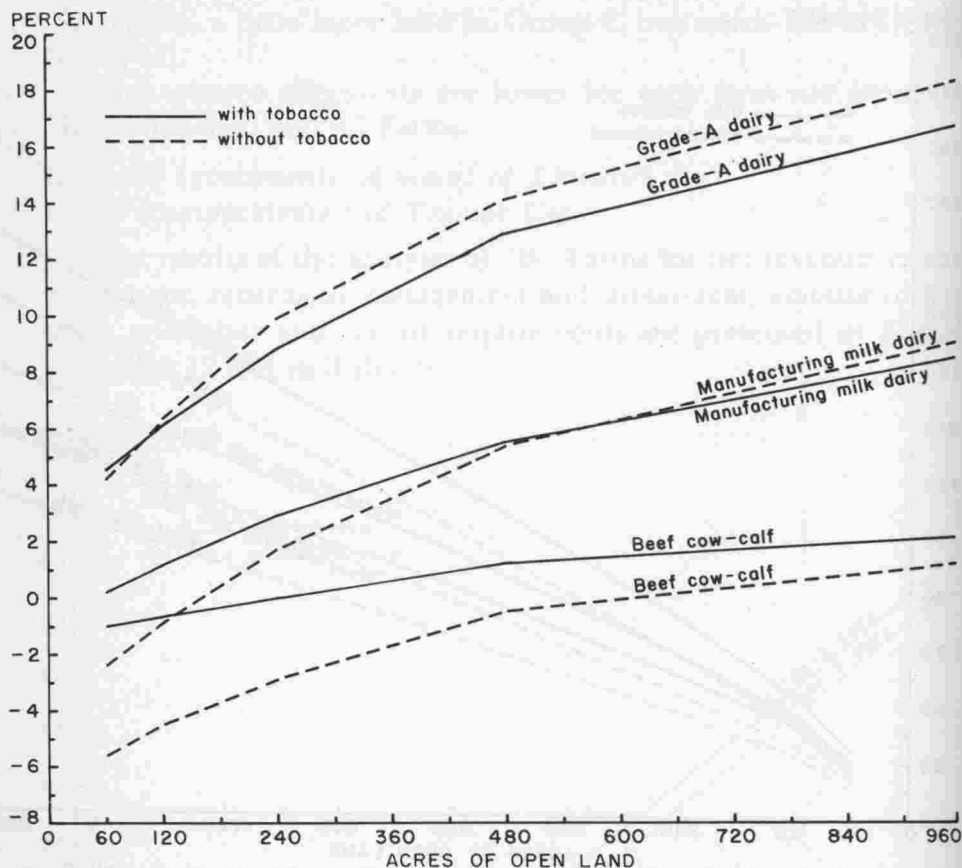


Figure 11. Percent returns on capital investment in the optimum-income plans, "B" Farms, by acres of open land and farming system.

Hours of tractor use are slightly less on "B" Farms than on "A" Farms (Tables 4 and 9).

In Table 10 are presented data interpolated in Figures 9 through 12 to show certain information about approximately two-man operations for the different farming systems on "B" Farms. Compared with similar data in Table 5, it is noticeable that larger acreages are needed for two-man operations on "B" Farms, but the total capital investments are slightly less on "B" Farms. The differences in financial returns are small.

Land Use

Land use by soil groups and farming systems for "B" Farms is presented in Tables 11 and 12 as it was for "A" Farms in Tables 6 and 7.

THOUS. HOURS

Legend, indicating approximately the need
for men available for the whole year.

○ 1 man	● 5 men
x 2 men	1 6 men
3 men	⌋ 7 men
□ 4 men	⌋ 8 men

— with tobacco
- - - without tobacco

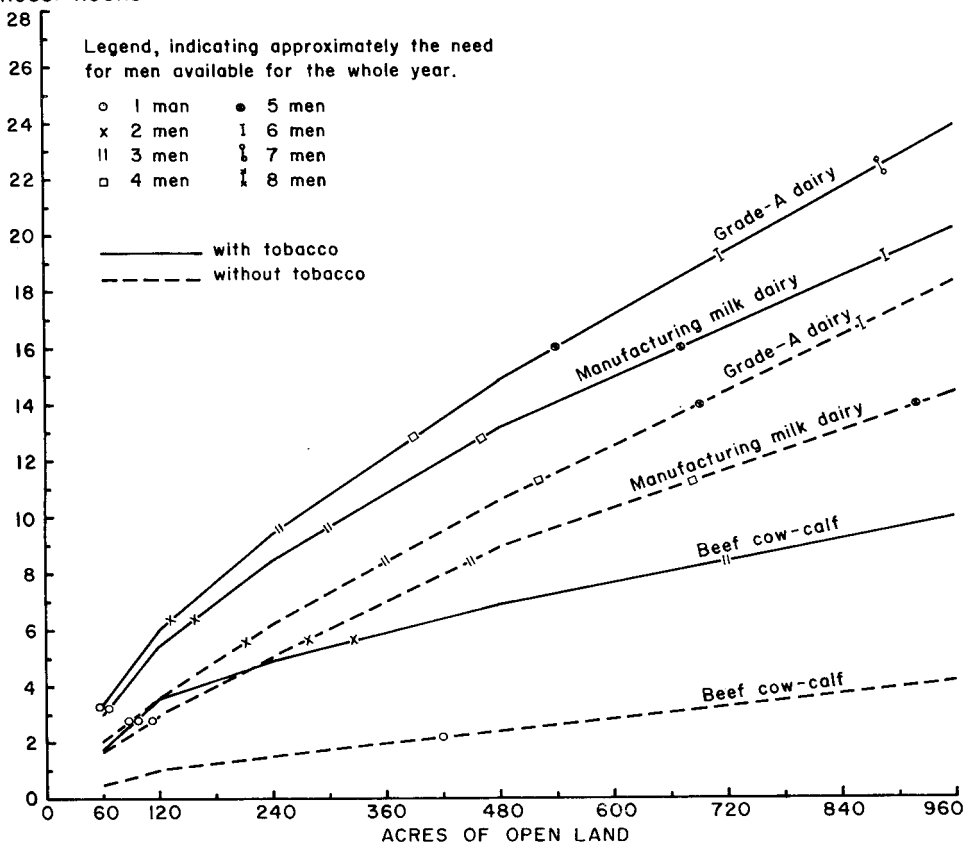


Figure 12. Hours of labor used in the optimum-income plans, "B" Farms, by acres of open land and farming system.

A little larger proportion of Soil Group I on "B" Farms than on "A" Farms permits all of the tobacco to come in on this soil group. A lower proportion of Soil Groups II and III results in shifting some corn silage, barley, millet pasture, ladino clover and orchardgrass hay and pasture to the less-productive soils. More grass silage on Group V is used on the dairy farms, and a little more of the pasture comes in as fescue and lespedeza on "B" Farms than on "A" Farms.

Just as on "A" Farms, alfalfa holds its place on Soil Group III on "B" Farms for the grade-A dairy system.

For the smallest farm size, the combinations of acres of the different groups and the high costs of production result in the cow-calf beef system leaving most of Group V land unused on "B" Farms.¹⁵

¹⁵ "Unused" means that none of the alternative land uses as budgeted in the study would be feasible. However, some grazing might be obtained from this land occasionally.

Table 9. Number of Cows and Hours of Tractor Use in Optimum-Income Plans, "B" Farms, by Acres of Open Land and Farming System

	Acres of open land				
	60	120	240	480	960
Numbers					
Number of cows					
With tobacco					
Grade-A dairy	17	34	72	147	299
Mfg.-milk dairy	12	25	54	109	220
Cow-calf beef	9	32	65	139	282
Without tobacco					
Grade-A dairy	18	38	76	153	306
Mfg.-milk dairy	13	27	56	113	225
Cow-calf beef	11	34	69	145	289
Hours					
Hours of tractor use					
With tobacco					
Grade-A dairy	400	720	1220	2020	3530
Mfg.-milk dairy	350	660	1100	1860	3220
Cow-calf beef	170	590	940	1530	2690
Without tobacco					
Grade-A dairy	370	640	1070	1810	3290
Mfg.-milk dairy	330	570	1040	1750	3090
Cow-calf beef	170	490	830	1420	2560

Table 10. Estimated Hours of Labor, Acres of Open Land, Net Revenues, Total Investments, and Rates of Return for Approximately Two-Man Operations, "B" Farms, by Farming Systems

	Hours of labor	Acres of open land	Net revenue above variable costs	Total capital in- vestment	Rate of return on investment
With tobacco					
Grade-A dairy	6,400	132	\$7,750	\$69,000	6.4%
Mfg.-milk dairy	6,400	159	4,450	65,000	1.8%
Cow-calf beef	5,600	324	4,500	92,000	.4%
Without tobacco					
Grade-A dairy	5,600	210	10,750	75,000	9.0%
Mfg.-milk dairy	5,600	276	5,250	72,000	2.2%
Cow-calf beef	4,400	1000	8,500	177,000	1.4%

Table 11. Land Use and Feed and Bedding Purchases in Optimum-Income Plans, "B" Farms, With Tobacco, by Acres of Open Land and Livestock System

Land use	Soil group	Grade-A dairy					Mfg.-milk dairy					Cow-calf beef				
		60	Acres of open land				60	Acres of open land				60	Acres of open land			
			120	240	480	960		120	240	480	960		120	240	480	960
			Acres					Acres					Acres			
Corn	I	—	—	—	—	—	—	—	—	—	—	—	.8	1.7	3.6	7.3
Corn	III ₁	—	—	—	—	—	3.0	6.0	12.0	24.0	48.0	.2	—	—	—	—
Corn	IV ₁	—	—	—	—	—	.4	1.2	2.5	2.9	2.4	—	—	—	—	—
Corn sil. (w.p.)	I	—	—	—	14.5	31.2	—	—	—	—	—	—	—	—	—	—
Corn sil.	I	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16.8
Corn sil.	III ₁	1.9	3.8	7.3	.5	—	—	—	—	—	—	1.8	6.0	12.0	21.8	39.6
Corn sil.	IV ₁	—	—	—	—	—	4.5	6.4	4.2	11.5	28.6	—	—	—	—	—
Grass sil.	V ₁	3.7	8.1	18.0	36.0	72.0	—	3.3	18.0	33.1	60.6	—	—	—	—	—
Barley (l.p.)	I	—	—	—	—	—	1.2	2.6	9.4	24.7	57.5	1.2	1.4	6.6	—	—
Barley (l.p.)	III ₂	1.9	3.8	7.4	14.6	19.3	3.0	6.0	12.0	24.0	48.0	.3	—	—	—	—
Barley (l.p.)	IV ₂	5.1	7.8	18.5	44.0	88.0	5.5	11.0	22.0	44.0	88.0	—	—	—	26.0	52.6
Barley (l.p.)	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	—	4.4	5.0	—	—
Alfalfa hay	III ₁₋₂	2.2	4.4	9.2	18.8	38.2	—	—	—	—	—	—	—	—	—	—
La. c., or. g. hay	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	2.2	8.0	16.4	35.0	70.8
La. c., or. g. hay	V ₂	—	—	—	—	—	—	—	12.4	1.9	—	—	—	—	—	—
La. c., or. g. hay	V ₁₋₂	—	—	—	—	—	2.4	5.8	—	23.2	50.5	—	—	—	—	—
La. c., or. g. past.	III ₁₋₂	—	—	—	—	19.2	—	—	—	—	—	—	—	—	—	—
La. c., or. g. past.	IV ₁₋₂	.8	6.5	7.0	—	—	—	—	—	—	—	—	—	—	—	—
La. c., or. g. past.	V ₂	—	—	43.2	136.7	222.7	—	—	23.6	51.0	65.5	—	—	—	—	—
La. c., or. g. past.	V ₁₋₂	4.8	7.2	—	—	—	—	—	—	—	40.0	—	—	—	—	—
Fes., l. past.	II	2.5	—	—	—	—	.9	5.0	10.0	20.0	40.0	—	—	—	20.0	40.0
Fes., l. past.	III ₁₋₂	—	—	—	—	—	—	—	—	—	—	2.0	—	—	4.4	16.8
Fes., l. past.	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	8.8	2.0	7.6	1.0	—
Fes., l. past.	V ₂	25.9	56.7	82.8	115.3	281.3	—	22.9	90.0	178.8	359.4	—	—	—	—	—
Fes., l. past.	V ₁₋₂	1.6	—	—	—	—	33.6	40.0	—	—	—	6.5	72.0	144.0	288.0	576.0
Lesp. past.	II	—	—	—	—	—	1.6	—	—	—	—	2.5	5.0	10.0	—	—
Lesp. past.	III ₂	—	—	—	—	—	—	—	—	—	—	1.7	6.0	12.0	21.8	39.6
Lesp. past.	IV ₂	—	—	—	—	—	—	—	—	—	—	—	3.8	7.5	—	—
Millet past.	I	1.2	2.6	9.4	10.2	26.3	—	—	—	—	—	—	—	—	15.2	33.4
Millet past.	II	—	5.0	10.0	20.0	40.0	—	—	—	—	—	—	—	—	—	—
Millet past.	III ₁	—	—	.1	14.1	19.3	—	—	—	—	—	—	—	—	—	—
Millet past.	IV ₁	5.1	7.7	18.5	44.0	88.0	.6	3.4	15.3	29.6	57.0	—	3.8	7.5	26.0	52.6
D. tob. (w.p.)	I	—	.6	7.5	10.0	13.0	—	—	—	—	—	—	—	—	—	—
D. tob.	I	2.7	4.9	—	—	—	2.7	5.5	7.5	10.0	13.0	2.7	5.5	7.5	10.0	13.0
B. tob. (w.p.)	I	—	.9	1.1	1.3	1.5	—	—	—	—	—	—	—	—	—	—
B. tob.	I	.6	—	—	—	—	.6	.9	1.1	1.3	1.5	.6	.9	1.1	1.3	1.5
Not used	V ₁₋₂	—	—	—	—	—	—	—	—	—	—	29.5	—	—	—	—
Buy corn (100 bu.)		8.2	18.1	37.4	74.9	156.7	—	—	—	—	—	—	—	—	—	—
Buy bedding (tons)		8.7	21.3	42.9	82.3	180.7	1.5	3.2	4.9	4.7	2.2	—	—	—	—	—

Table 12. Land Use and Feed and Bedding Purchases in Optimum-Income Plans, "B" Farms, Without Tobacco by Acres of Open Land and Livestock System

Land use	Soil group	Grade-A dairy					Mfg.-milk dairy					Cow-calf beef					
		60	120	240	480	960	60	120	240	480	960	60	120	240	480	960	
				Acres							Acres						
Corn	I	—	—	—	—	—	.2	1.2	1.9	1.0	1.9	.3	.9	1.8	3.7	7.5	
Corn	III ₁	—	—	—	—	—	2.7	4.7	10.5	24.0	48.0	—	—	—	—	—	
Corn sil. (w.p.)	I	—	1.6	3.8	16.6	33.2	—	—	—	—	—	—	.9	—	—	—	
Corn sil.	I	.6	—	—	—	—	—	—	—	—	—	—	—	1.8	11.7	24.0	
Corn sil.	III ₁	1.8	3.6	4.6	—	—	.3	1.3	1.5	—	—	2.2	6.0	12.0	16.9	33.6	
Corn sil.	IV ₁	—	—	—	—	—	4.5	8.3	7.5	12.3	24.4	—	—	—	—	—	
Grass sil.	V ₁	3.8	7.6	18.0	36.0	72.0	—	—	13.1	33.7	67.4	—	—	—	—	—	
Barley (l.p.)	I	—	—	—	—	—	4.3	7.8	16.1	35.0	70.1	1.9	6.0	11.9	1.1	—	
Barley (l.p.)	III ₂	1.8	3.6	7.1	—	—	3.0	6.0	12.0	24.0	48.0	—	—	—	—	2.2	
Barley (l.p.)	IV ₂	3.4	4.8	8.8	44.0	88.0	4.5	10.0	21.7	40.5	80.9	—	—	—	25.8	51.6	
Alfalfa hay	III ₁₋₂	2.4	4.8	9.8	19.6	39.0	—	—	—	—	—	—	—	—	—	—	
La. c., or. g. hay	I	—	—	—	—	—	—	—	—	—	—	2.3	1.2	2.5	—	—	
La. c., or. g. hay	IV ₁₋₂	—	—	—	—	—	2.0	2.0	.6	7.0	14.2	—	7.0	14.0	36.4	72.8	
La. c., or. g. hay	V ₁₋₂	—	—	—	—	—	.4	3.5	12.2	16.8	33.2	—	—	—	—	—	
La. c., or. g. past.	III ₁₋₂	—	—	—	28.4	57.0	—	—	—	—	—	—	—	—	—	—	
La. c., or. g. past.	IV ₁₋₂	4.2	12.4	26.4	—	—	—	—	—	—	—	—	—	—	—	—	
La. c., or. g. past.	V ₂	—	—	—	60.2	120.0	—	—	—	52.6	105.8	—	—	—	—	—	
La. c., or. g. past.	V ₁₋₂	—	—	—	—	—	—	—	27.1	1.7	3.0	—	—	—	—	—	
Fes., l. past.	II	2.5	—	—	—	—	1.4	5.0	10.0	20.0	40.0	—	—	—	20.0	40.0	
Fes., l. past.	III ₁₋₂	—	—	—	—	—	—	—	—	—	—	1.6	—	—	14.2	28.8	
Fes., l. past.	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	8.8	7.2	14.4	—	—	
Fes., l. past.	V ₂	26.3	53.2	126.0	191.8	384.0	—	—	91.6	183.2	366.6	—	—	—	—	—	
Fes., l. past.	V ₁₋₂	5.9	11.2	—	—	—	35.6	68.5	—	—	—	12.9	72.0	144.0	288.0	576.0	
Lesp. past.	II	—	—	—	—	—	1.1	—	—	—	—	2.5	5.0	10.0	—	—	
Lesp. past.	III ₂	—	—	—	—	—	—	—	—	—	—	2.2	6.0	12.0	16.9	31.4	
Lesp. past.	IV ₂	—	—	—	—	—	—	—	—	—	—	1.1	3.9	7.8	—	—	
Millet past.	I	3.9	7.4	14.2	19.4	38.8	—	—	—	—	—	—	—	—	19.5	40.5	
Millet past.	II	—	5.0	10.0	20.0	40.0	—	—	—	—	—	—	—	—	—	—	
Millet past.	III ₁	—	—	2.5	—	—	—	—	—	—	—	—	—	—	—	—	
Millet past.	IV ₁	3.4	4.8	8.8	44.0	88.0	—	1.7	14.2	28.2	56.5	—	3.9	7.8	25.8	51.6	
Not used	IV ₁	—	—	—	—	—	—	—	—	—	—	1.1	—	—	—	—	
Not used	V ₁₋₂	—	—	—	—	—	—	—	—	—	—	23.1	—	—	—	—	
Buy corn (100 bu.)		10.2	21.8	44.1	84.8	169.7	—	—	—	—	—	—	—	—	—	—	
Buy Bedding (tons)		12.6	28.4	58.1	105.6	211.3	—	—	—	—	—	—	—	—	—	—	

Note: 1-2 means 1 & 2.

Miscellaneous Analyses

Analyses were made of sheep and weanling pigs, with and without tobacco, for farms with 120 acres and 480 acres of open land. The relative returns for sheep as compared with the beef system are similar on "B" Farms to those on "A" Farms in that the sheep returns are slightly higher than the beef returns. The hog returns are lower than the returns for the manufacturing-milk system on the larger farms but higher on the 120-acre size.

The effects of considering lower wage rates for labor for the beef and sheep systems on "B" Farms are quite similar to those on "A" Farms.

"C" Farms (With Soil-pattern C)

Acres by Soil Groups

"C" Farms represent farms of lowest productivity in the area studied (see Fig. 3, p. 12; and Figs. B₅ and B₆ in Appendix B). The acres available in each soil group and the selected tobacco allotments for each farm size analyzed are shown in Table 13.

Table 13. Acres Available in Each Soil Group, and Tobacco Allotments, "C" Farms, by Acres of Open Land

Soil groups	Acres of open land				
	60	120	240	480	960
I	.3	.6	1.2	2.4	4.8
II	3.9	7.8	15.6	31.2	62.4
III ₁	3.6	7.2	14.4	28.8	57.6
III ₂	3.6	7.2	14.4	28.8	57.6
IV ₁	.3	.6	1.2	2.4	4.8
IV ₂	.3	.6	1.2	2.4	4.8
V ₁	6.0	12.0	24.0	48.0	96.0
V ₂	42.0	84.0	168.0	336.0	672.0
Tobacco allotments					
Dark-fired	1.7	3.3	4.5	6.0	8.0
Burley	.5	.7	.8	1.0	1.2

Comparing the data in Table 13 with those in Tables 3 and 9, it is clear that "C" Farms are at a big disadvantage in productivity. Tobacco allotments are just slightly more than half those for "A" Farms. The proportion of land in Soil Group V is more than two and one-half times as great as on "A" Farms. There is practically no land in Group I and only about one-third as much in Group II on "C" Farms as on "A" Farms.

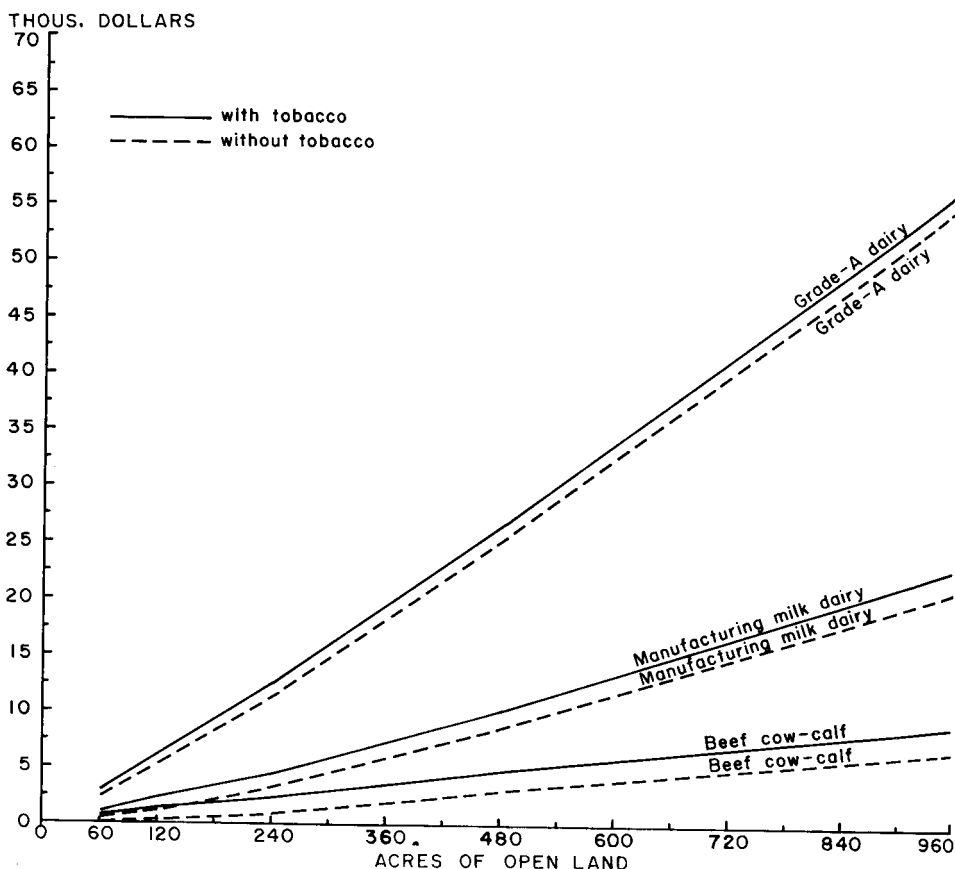


Figure 13. Net revenue above variable costs in the optimum-income plans, "C" Farms, by acres of open land and farming system.

*Returns, Investment, Amount of Livestock,
Labor Requirements and Tractor Use*

The results of the analyses of "C" Farms for net revenue, capital investment, returns to management and investment, amount of livestock, and labor and tractor requirements are presented in Figures 13 through 16 and in Table 14.

The differences in the results are not generally as great between "B" Farms and "C" Farms as between "B" Farms and "A" Farms, especially on the larger farms.

In Table 15 are presented data interpolated in Figures 13 through 16 to show certain information about approximately two-man operations for the different farming systems on "C" Farms. Just as "B" Farms require larger farms than "A" Farms for two-man operations, "C" Farms require larger farms than "B" Farms.

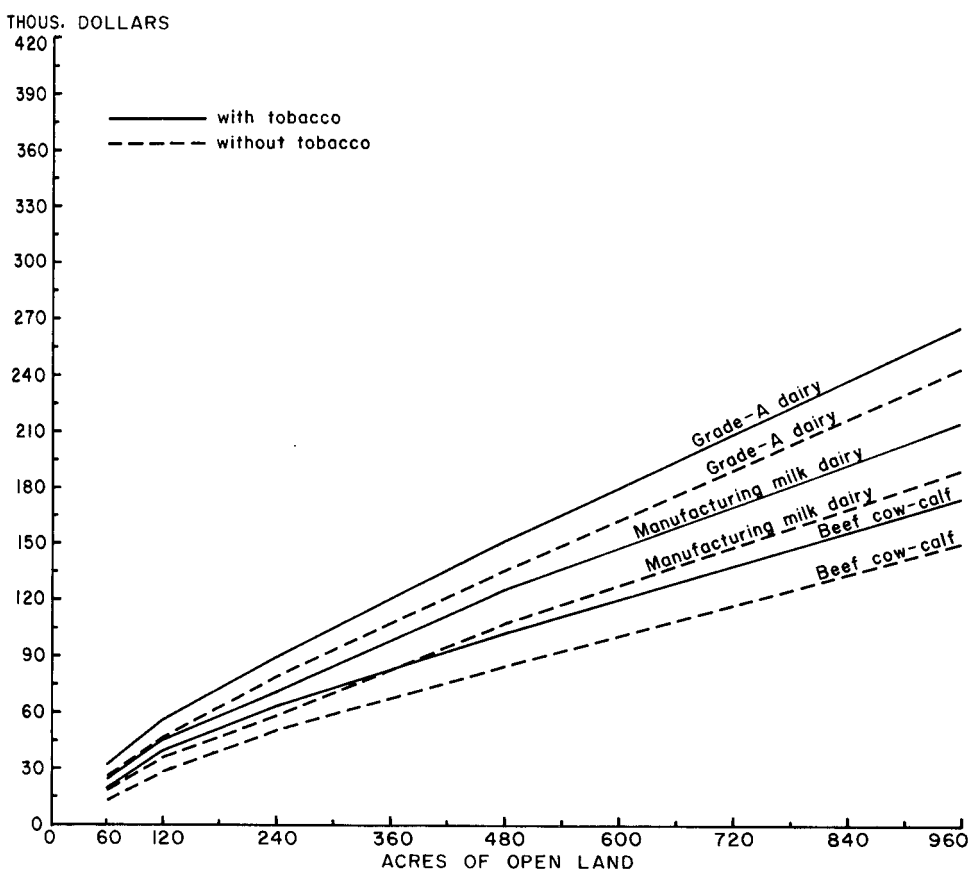


Figure 14. Total capital investment in the optimum-income plans, "C" Farms, by acres of open land and farming system.

Land Use

Land use by soil groups and farming systems for "C" Farms is presented in Tables 16 and 17.

Because of the very small amount of Soil Group I, burley tobacco uses all of this land on the smaller farms. With proportionately smaller tobacco allotments on the larger farms, a little dark-fired tobacco acreage occupies part of Group I; most of the dark-fired tobacco comes in Soil Group III.

Alfalfa is crowded out of the plan even for the grade-A dairy system with tobacco. Most silage is ladino clover and orchardgrass silage on Soil Group V₁. Even a little barley and corn for the manufacturing-milk system is crowded onto Soil Group V₁. Also,

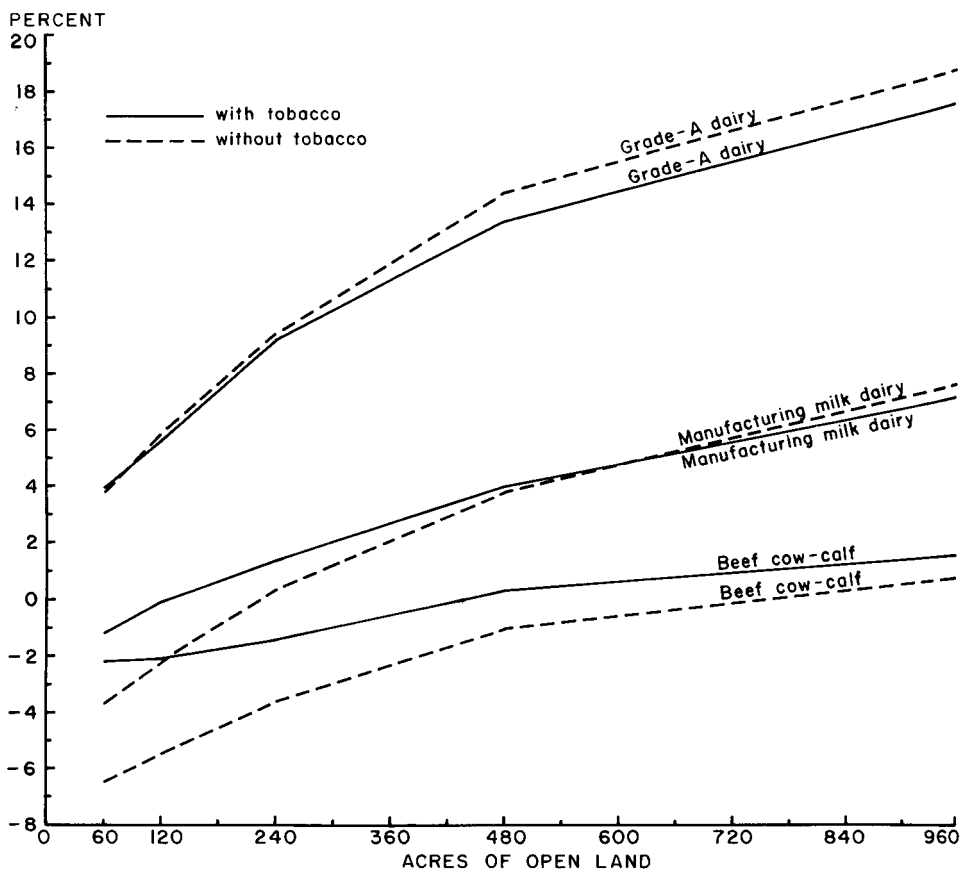


Figure 15. Percent returns on capital investment in the optimum-income plans, "C" Farms, by acres of open land and farming system.

ladino clover and orchardgrass hay and pasture are relegated to Group V. Barley (straw, and lespedeza pasture), a little corn and corn silage, and millet pasture claim the use of the small acreages of more productive soils of Groups II, III, and IV.

Some alfalfa comes in Soil Group III in the grade-A dairy system without tobacco, but not as much as on "A" Farms and "B" Farms. The competition from millet pasture on this soil keeps down the acreage of alfalfa.

On the dairy farms there is a decided shift from ladino clover and orchardgrass and millet pastures to the use of more fescue and lespedeza pastures. There is a question here as to whether the expected production of milk might be lowered more than the rather

THOUS. DOLLARS

Legend, indicating approximately the need
for men available for the whole year.

○ 1 man	● 5 men
x 2 men	I 6 men
3 men	⌋ 7 men
□ 4 men	⌋ 8 men

— with tobacco
- - - without tobacco

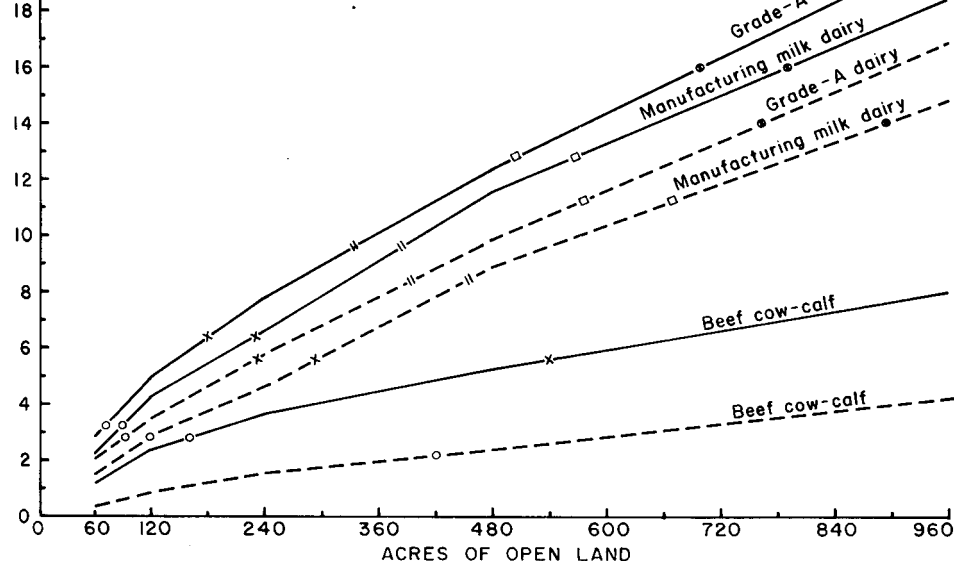


Figure 16. Hours of labor used in the optimum-income plans, "C" Farms, by acres of open land and farming system.

heavy discount that was made in computing feed nutrients from the fescue.

The larger proportion of land in Soil Group V on "C" Farms causes more land to be unused than occurs on "B" Farms. Some of Group V is unused on the smallest farms for both manufacturing-milk and the beef systems, and some on the 120-acre size for the beef system.

Miscellaneous Analyses

The comparisons of sheep returns with those for cow-calf beef are similar on "C" Farms to those on "B" Farms. But the hog returns on "C" Farms are higher than manufacturing-milk dairy returns on both the 120- and 480-acre farms, while on "B" Farms the

Table 14. Number of Cows and Hours of Tractor Use in Optimum-Income Plans, "C" Farms, by Acres of Open Land and Farming System

	Acres of open land				
	60	120	240	480	960
	Numbers				
Number of cows					
With tobacco					
Grade-A dairy	16	33	67	135	273
Mfg.-milk dairy	10	23	47	114	227
Cow-calf beef	6	23	64	134	269
Without tobacco					
Grade-A dairy	17	35	70	140	279
Mfg.-milk dairy	11	25	50	114	228
Cow-calf beef	8	27	65	137	273
Hours					
Hours of tractor use					
With tobacco					
Grade-A dairy	380	670	1,050	1,710	3,100
Mfg.-milk dairy	290	600	910	1,630	2,900
Cow-calf beef	120	450	910	1,510	2,670
Without tobacco					
Grade-A dairy	370	630	990	1,630	3,000
Mfg.-milk dairy	300	560	860	1,560	2,810
Cow-calf beef	120	430	840	1,420	2,570

Table 15. Estimated Hours of Labor, Acres of Open Land, Net Revenues, Total Investments, and Rates of Return for Approximately Two-man Operations, "C" Farms, by Farming Operations

	Hours of labor	Acres of open land	Net revenue above variable costs	Total capital investment	Rate of return on investment
With tobacco					
Grade-A dairy	6,400	180	\$9,300	\$72,000	7.4%
Mfg.-milk dairy	6,400	230	4,250	69,000	1.2%
Cow-calf beef	5,600	540	5,400	93,000	.5%
Without tobacco					
Grade-A dairy	5,600	234	11,000	77,000	9.3%
Mfg.-milk dairy	5,600	294	4,500	69,000	1.1%
Cow-calf beef	4,400	1,020	7,000	158,000	-1.0%

Table 16. Land Use and Feed and Bedding Purchases in Optimum-Income Plans, "C" Farms, With Tobacco, by Acres of Open Land and Livestock System

Land use	Soil group	Grade-A dairy					Mfg.-milk dairy					Cow-calf beef				
		Acres of open land					Acres of open land					Acres of open land				
		60	120	240	480	960	60	120	240	480	960	60	120	240	480	960
Acres																
Corn	II	—	—	—	—	—	1.6	5.7	9.8	—	—	—	—	—	—	—
Corn	III ₁	—	—	—	—	—	1.7	3.8	10.3	24.2	52.7	.1	.6	1.8	3.6	7.4
Corn	IV ₁	—	—	—	—	—	.3	.6	1.2	—	—	—	—	—	—	—
Corn	V ₁	—	—	—	—	—	—	2.2	3.8	—	—	—	—	—	—	—
Corn silage	III ₁	.3	.6	1.7	3.8	8.5	—	—	—	.3	.5	1.2	1.8	—	9.4	22.6
Grass silage	V ₁	6.0	12.0	24.0	48.0	96.0	4.0	9.8	20.2	48.0	96.0	—	4.0	18.3	25.2	45.5
Barley	V ₁	—	—	—	—	—	2.0	—	—	—	—	—	—	—	—	—
Barley (l.p.)	III ₂	3.6	7.2	14.4	28.7	57.6	3.6	7.2	14.4	28.8	57.6	1.0	2.8	9.5	20.2	40.4
Barley (l.p.)	IV ₂	.3	.6	1.2	2.4	4.8	.3	.6	1.2	2.4	4.8	—	—	1.2	2.4	4.8
Barley (l.p.)	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	—	1.2	—	—	—
Alfalfa hay	III ₁₋₂	—	—	—	.2	—	—	—	—	—	—	—	—	—	—	—
La. c., or. g. hay	III ₁₋₂	—	—	—	—	—	—	—	—	—	—	.8	—	—	—	—
La. c., or. g. hay	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	.6	—	—	—	—
La. c., or. g. hay	V ₂	3.6	7.1	14.6	29.4	60.0	2.2	5.3	10.9	26.2	52.6	—	—	—	—	—
La. c., or. g. hay	V ₁₋₂	—	—	—	—	—	—	—	—	—	—	—	8.0	21.4	44.8	90.2
La. c., or. g. past.	V ₂	2.8	6.3	17.1	40.3	89.3	—	—	—	—	—	—	—	—	—	—
Fes., l. past.	II	—	—	—	—	—	—	—	—	—	—	2.8	—	—	—	—
Fes., l. past.	V ₂	35.6	70.6	136.3	266.3	522.7	25.9	78.7	157.1	309.8	619.4	—	—	149.3	176.5	319.3
Fes., l. past.	V ₁₋₂	—	—	—	—	—	—	—	—	—	—	9.3	56.0	—	137.5	313.0
Lesp. past.	II	—	—	—	—	—	—	—	—	—	—	1.1	7.8	15.6	—	—
Lesp. past.	III ₂	—	—	—	—	—	—	—	—	—	—	2.2	4.4	4.9	8.6	17.2
Millet past.	II	3.9	7.8	15.6	31.2	62.4	2.3	2.1	5.8	31.2	62.4	—	—	—	31.2	62.4
Millet past.	III ₁	1.4	3.2	8.6	20.3	44.7	—	—	—	—	—	—	1.4	8.5	11.2	23.2
Millet past.	IV ₁	.3	.6	1.2	2.4	4.8	—	—	—	2.1	4.8	—	—	1.2	2.4	4.8
Millet past.	V ₁	—	—	—	—	—	—	—	—	—	—	—	—	3.0	—	—
D. tob. (w.p.)	I	—	—	—	—	2.4	—	—	—	—	—	—	—	—	—	—
D. tob.	I	—	—	.4	1.4	1.2	—	—	.4	1.4	3.6	—	—	.4	1.4	3.6
D. tob.	III ₁	1.7	3.3	4.1	4.6	4.4	1.7	3.3	4.1	4.6	4.4	1.7	3.3	4.1	4.6	4.4
B. tob. (w.p.)	I	.3	.6	.8	1.0	1.2	.3	.6	.8	1.0	1.2	.3	.6	.8	1.0	1.2
B. tob.	III ₁	.2	.1	—	—	—	.2	.1	—	—	—	.2	.1	—	—	—
Not used	V ₁₋₂	—	—	—	—	—	13.9	—	—	—	—	38.7	28.0	—	—	—
Buy corn (100 bu.)		9.1	18.2	37.6	76.5	154.8	—	—	—	27.3	51.1	—	—	—	—	—
Buy bedding (tons)		11.5	23.2	47.9	97.9	198.4	3.0	13.7	28.9	76.2	152.9	—	—	—	—	—

Note: 1-2 means 1 & 2.

Table 17. Land Use and Feed and Bedding Purchases in Optimum-Income Plans, "C" Farms, Without Tobacco, by Acres of Open Land and Livestock System

Land use	Soil group	Grade-A dairy					Mfg.-milk dairy					Cow-calf beef				
		Acres of open land					Acres of open land					Acres of open land				
		60	120	240	480	960	60	120	240	480	960	60	120	240	480	960
				Acres					Acres					Acres		
Corn	I	—	—	—	—	—	—	—	.3	.8	—	—	—	—	—	—
Corn	II	—	—	—	—	—	1.0	3.6	7.3	—	—	.2	—	—	—	—
Corn	III ₁	—	—	—	—	—	3.6	7.2	14.4	28.8	57.6	—	.7	1.8	3.7	7.6
Corn	IV ₁	—	—	—	—	—	.3	.6	1.2	—	—	—	—	—	—	—
Corn	V ₁	—	—	—	—	—	—	1.3	2.6	—	—	—	—	—	—	—
Corn sil.	III ₁	.6	1.3	2.5	5.0	10.0	—	—	—	—	—	1.5	3.6	2.0	15.2	30.3
Corn sil.	IV ₁	—	—	—	—	—	—	—	.5	1.0	—	—	—	—	—	—
Grass silage	V ₁	6.0	12.0	24.0	48.0	96.0	4.8	10.7	21.4	48.0	96.0	—	2.8	16.0	17.7	35.5
Barley	V ₁	—	—	—	—	—	1.2	—	—	—	—	—	—	—	—	—
Barley (l.p.)	I	—	—	—	—	—	.3	.6	1.2	2.1	4.0	—	.6	1.2	—	—
Barley (l.p.)	III ₂	3.2	6.5	12.8	25.6	51.2	3.6	7.2	14.4	28.8	57.6	1.2	2.9	8.7	20.7	41.1
Barley (l.p.)	IV ₂	.3	.6	1.2	2.4	4.8	.3	.6	1.2	2.4	4.8	—	—	1.2	2.4	4.8
Barley (l.p.)	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	—	1.2	—	—	—
Alfalfa hay	III ₁₋₂	.8	1.4	3.2	6.4	12.8	—	—	—	—	—	—	—	—	—	—
La. c., or. g. hay	I	—	—	—	—	—	—	—	—	—	—	.3	—	—	—	—
La. c., or. g. hay	III ₁₋₂	—	—	—	—	—	—	—	—	—	—	1.0	—	—	—	—
La. c., or. g. hay	IV ₁₋₂	—	—	—	—	—	—	—	—	—	—	.6	—	—	—	—
La. c., or. g. hay	V ₂	2.4	5.1	9.9	19.7	39.4	2.6	5.8	11.6	26.3	52.7	—	—	—	—	—
La. c., or. g. hay	V ₁₋₂	—	—	—	—	—	—	—	—	—	—	—	9.1	21.9	45.8	91.5
La. c., or. g. past.	V ₂	5.1	10.3	20.3	40.4	81.0	—	—	—	—	—	—	—	—	—	—
Fes., l. past.	III ₁₋₂	—	—	—	—	—	—	—	—	—	—	2.8	—	—	—	—
Fes., l. past.	V ₂	34.5	68.6	137.8	275.9	551.6	31.0	78.2	156.4	309.7	619.3	—	—	112.8	123.5	248.8
Fes., l. past.	V ₁₋₂	—	—	—	—	—	—	—	—	—	—	14.1	64.4	41.3	197.0	392.2
Lesp. past.	II	—	—	—	—	—	—	—	—	—	—	3.9	7.8	15.6	—	—
Lesp. past.	III ₂	—	—	—	—	—	—	—	—	—	—	.5	4.3	5.7	8.1	16.5
Millet past.	I	.3	.6	1.2	2.4	4.8	—	—	—	—	—	—	—	—	2.4	4.8
Millet past.	II	3.9	7.8	15.6	31.2	62.4	2.9	4.2	8.3	31.2	62.4	—	—	—	31.2	62.4
Millet past.	III ₁	2.6	5.2	10.3	20.6	41.2	—	—	—	—	—	—	2.9	10.6	9.9	19.7
Millet past.	IV ₁	.3	.6	1.2	2.4	4.8	—	—	—	1.9	3.8	—	—	1.2	2.4	4.8
Not used	V ₂	—	—	—	—	—	8.4	—	—	—	—	33.9	19.7	—	—	—
Buy corn (100 bu.)		10.1	20.1	40.3	80.6	161.2	—	—	—	22.6	44.9	—	—	—	—	—
Buy bedding (tons)		13.3	26.4	52.9	105.9	211.6	5.3	15.1	30.1	74.4	149.1	—	—	—	—	—

Note: 1-2 means 1 & 2.

hog returns are higher than manufacturing-milk dairy returns only on the smaller farms.

The effects of considering lower wage rates for labor for the beef systems on "C" Farms are similar to those on both "A" Farms and "B" Farms. Even with labor charged at 75 cents per hour, large losses are shown for management and investment.

General Appraisal of the Optimum-Income Plans

In appraising the optimum-income plans resulting from the analyses in this study, several facts should be emphasized.

Most farmers in the area are getting very low returns for their investments and managerial services. Only the grade-A dairy system shows possibilities of adequate returns. But only a limited number of farms are needed for production of grade-A milk or have access to this market. Even for this system it may be possible that the high level of managerial ability required to obtain high production on large farms with very large capital investments could command higher remuneration in other occupations.

There is not much opportunity to raise net revenues by increasing gross returns per acre or animal. Barring unforeseen occurrences the sale prices used in the analyses are about as high as can be expected—possibly higher. There may be some prospects for the managers to raise the productivity of the land and livestock above the levels used in the study, but not by any great amount.

Another possibility is to lower costs per unit of product. But equipment prices have been gradually rising. The alternatives, to omit some equipment and/or hire cheaper labor, involve the possibilities of lowering quality of performances and amounts and quality of products.

The advantage of size of enterprise in reducing unit costs is quite apparent. This fact gives an advantage to high specialization, as well as in greater volume of sales. Diversification of enterprises would result in some increased costs due to smaller enterprises, but this disadvantage might be more than offset by gains from supplementary uses of resources. Hogs and sheep might fit in as supplementary enterprises.

The cow-calf beef system shows especially low returns. It also has the disadvantage that the farmer must wait until near the end of the year for any returns. In this study no cost was included for use of operating capital to carry over to the time when sales are made.

Hence the beef system is at even greater disadvantage than shown by the returns in the optimum-income plans.

This study serves to emphasize the importance of having farms with high proportions of the most productive land. The results shown in the optimum-income plans bear out the saying that the less productive farms tend to be over-valued in relation to the more productive farms.

There are many farms in the area studied similar to "C" Farms in general level of productivity. Many of the farmers on these farms, as we would expect, are working part-time off the farm. Some of these farms were already abandoned in 1957, when the survey of sample farms was made. Some are introducing a large, highly-specialized enterprise such as the production of eggs, broilers, or pigs entirely in confinement.

The optimum-income plans for a livestock system on "A" Farms, depending entirely on harvested feed and eliminating grazing of meadows as a type of land use, show promising possibilities for increasing livestock production and net revenues. Investments are increased materially but the returns to these investments are also increased. This affords an opportunity for the farmers with small acreages to increase size of business and incomes without enlarging the farm.

No consideration was given to the alternatives offered by participating in Government Agricultural Programs, other than the production of tobacco on farms with allotments. The optimum-income plans for the grade-A dairy system on "A" Farms with planned lower production per cow show this: that farm returns would be lowered if a farmer attempted to adjust to quotas for reduced marketing by reducing production per cow rather than keeping fewer cows.

Appendixes

Data Used in the Analyses

Appendix A

Classification of Soils Into Soil Groups

- Group I. Level to undulating, high in water-supplying capacity, well-drained: Huntington, Ennis, Greendale and Emory; with Huntington predominating.
- Group II. Level to undulating, medium to high in water-supplying capacity, not well-drained and/or subject to overflow: those named in Group I if subject to overflow; and Lindside, Ooltewah, Lobelville, Melvin, Robertsville, Taft, Lee and a few areas of Guthrie that had good drainage ditches; with Lindside and Ooltewah predominating.
- Group III. Level to undulating, medium in water-supplying capacity: Bewleyville, Mountview, Cookeville, Pembroke, Hermitage, Etowah, Humphreys, Minvale and Pickwick; with Bewleyville and Mountview predominating.
- Group IV. Level to undulating, low to medium in water-supplying capacity: Dickson, Pace, Paden, Wolftever, Captina, Bruno, Brandon and Lax; with Dickson predominating.
- Group V. Rolling to hilly, low to medium in water-supplying capacity: Baxter and any soils listed in Groups III and IV but with 5% to 20% slope; with Baxter predominating.
- Group VI. Level if very poorly drained, and rolling to steep, very low in water-supplying capacity: Guthrie, Bodine, Guinn, Stony land, gullied land, and all land with slopes over 20%; with Bodine predominating.

Appendix B

Maps of Case-Study Farms

Maps B₁, B₃, and B₅ show soil-mapping units. Maps B₂, B₄, and B₆ show suggested delineated boundaries for soil-group areas.

All of these delineated areas would not necessarily have to be fenced out as separate fields. The linear-programming, optimum-income plan may show that two or more adjoining delineated areas should be used for the same crop or pasturage. However, an assumption was made that the pasture usage would be rotated, and considerable distances of either permanent or temporary fences would be needed for this purpose. Many farmers in these counties are using electric fences.

Many of the fence lines on these farms actually coincide with the suggested delineated boundaries for soil groups on the maps. The operators on these farms were actually trying to use even small tracts of highly-productive land for the more productive land uses.

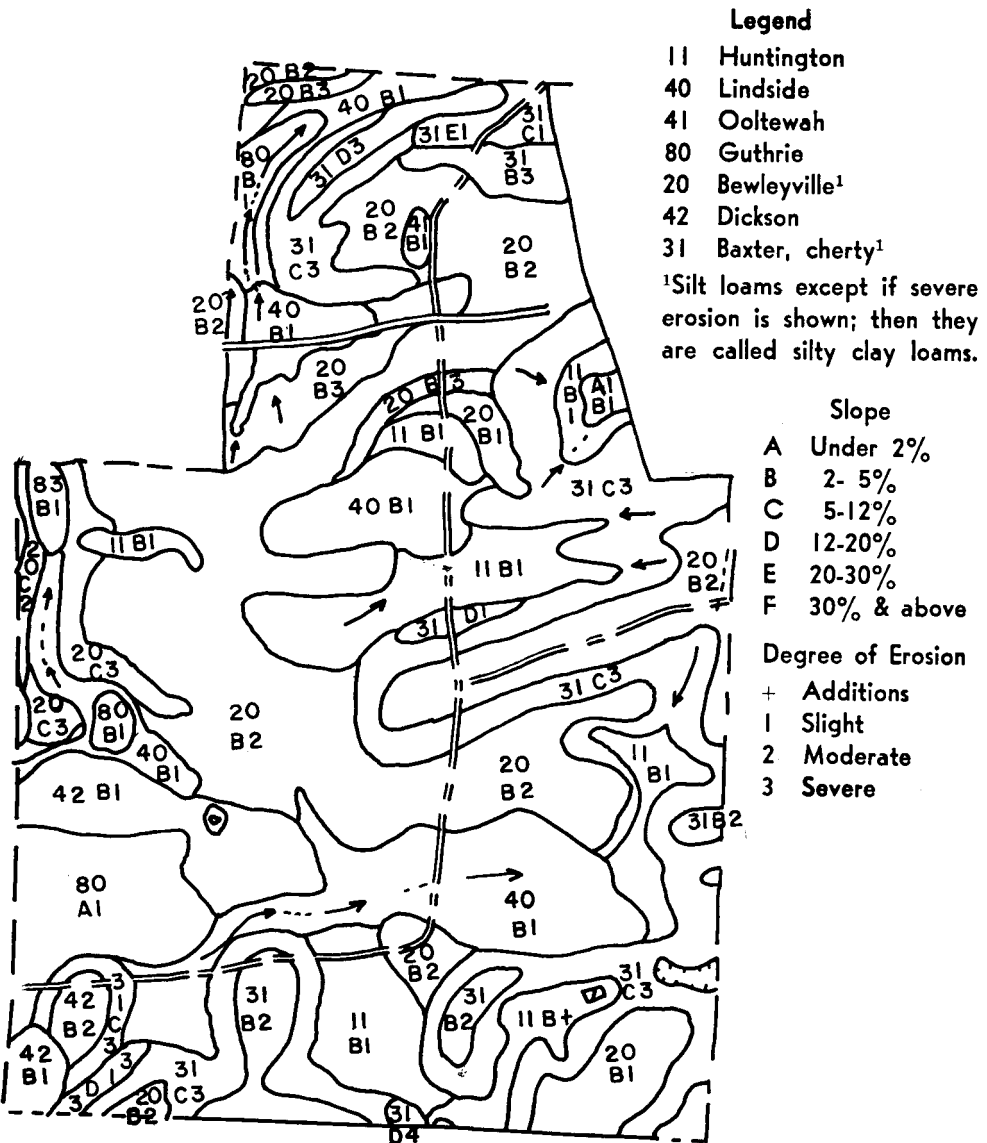


Figure B₁. Map of case-study farm with soil-pattern A, showing soil-mapping areas.

SOIL GROUPS

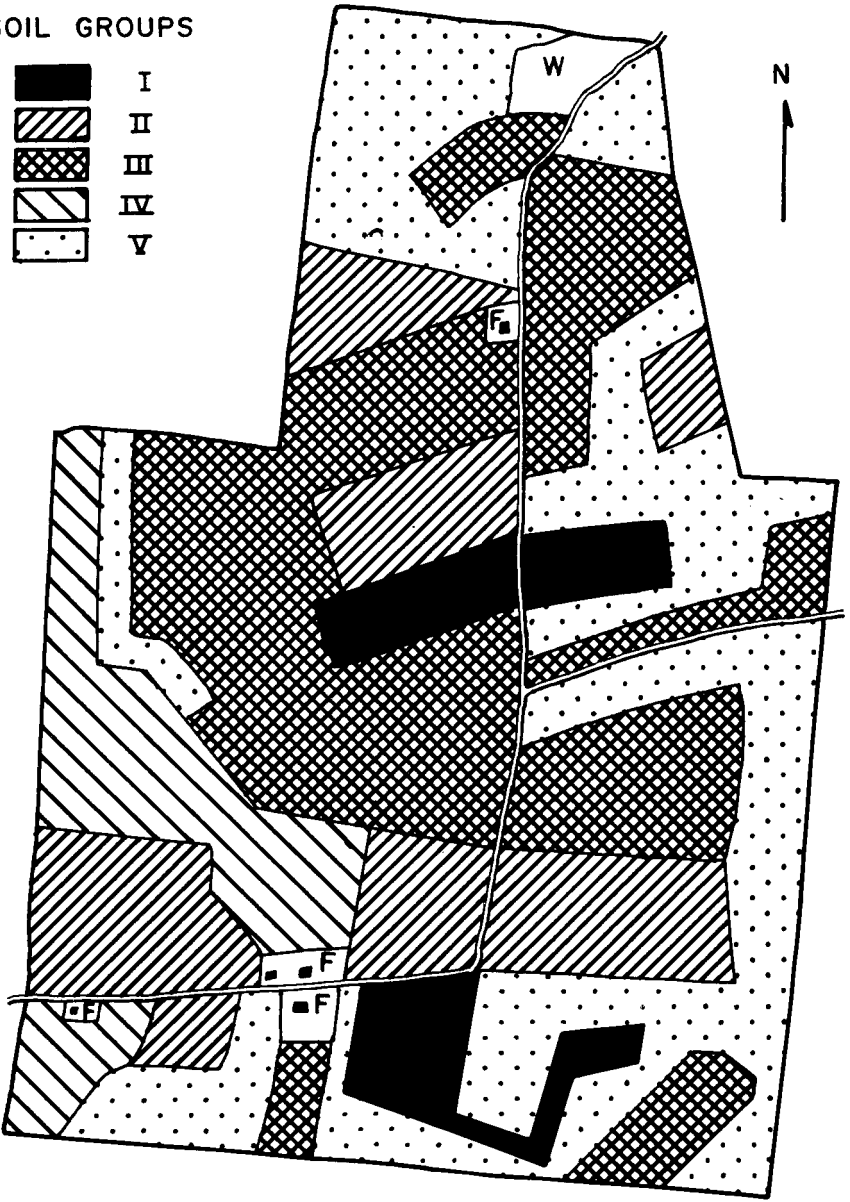
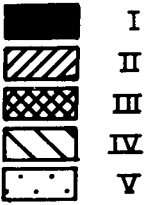


Figure B₂. Map of case-study farm with soil-pattern A, showing suggested field boundaries for soilgroup areas.

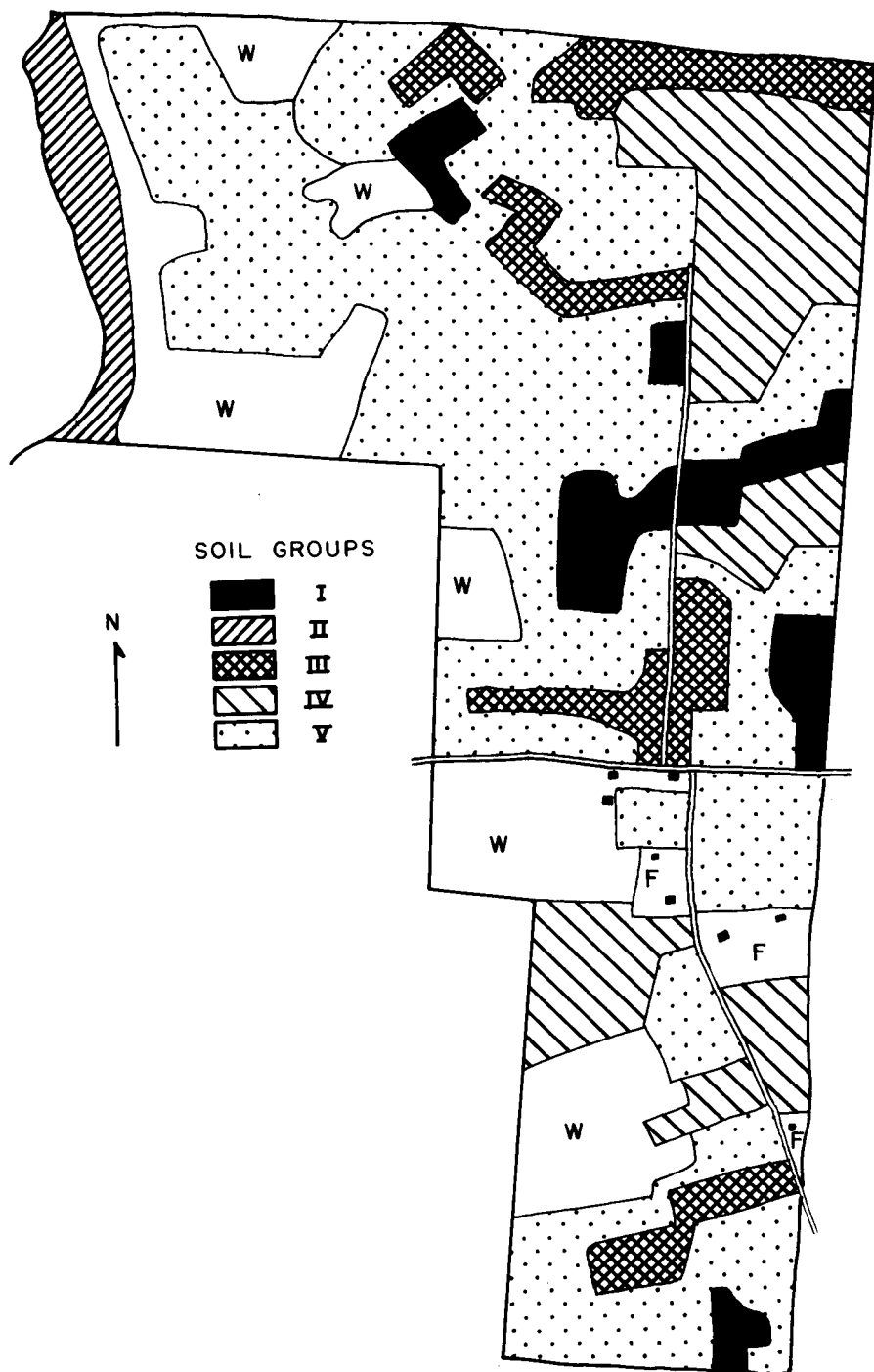


Figure B₄. Map of case-study farm with soil-pattern B, showing suggested field boundaries for soil-group areas.

Legend

- 4 Lobelville
- 6 Greendale
- 18 Ennis
- 19 Ennis, cherty
- 98 Lobelville
- 60 Minvale¹
- 91 Mountview
- 54 Dickson
- 62 Baxter, cherty¹
- 53 Bodine, cherty¹

¹Silt loams except if severe erosion is shown; then they are called silty clay loams.

Slope

- A Under 2%
- B 2- 5%
- C 5-12%
- D 12-20%
- E 20-30%
- F 30% & above

Degree of Erosion

- + Additions
- 1 Slight
- 2 Moderate
- 3 Severe

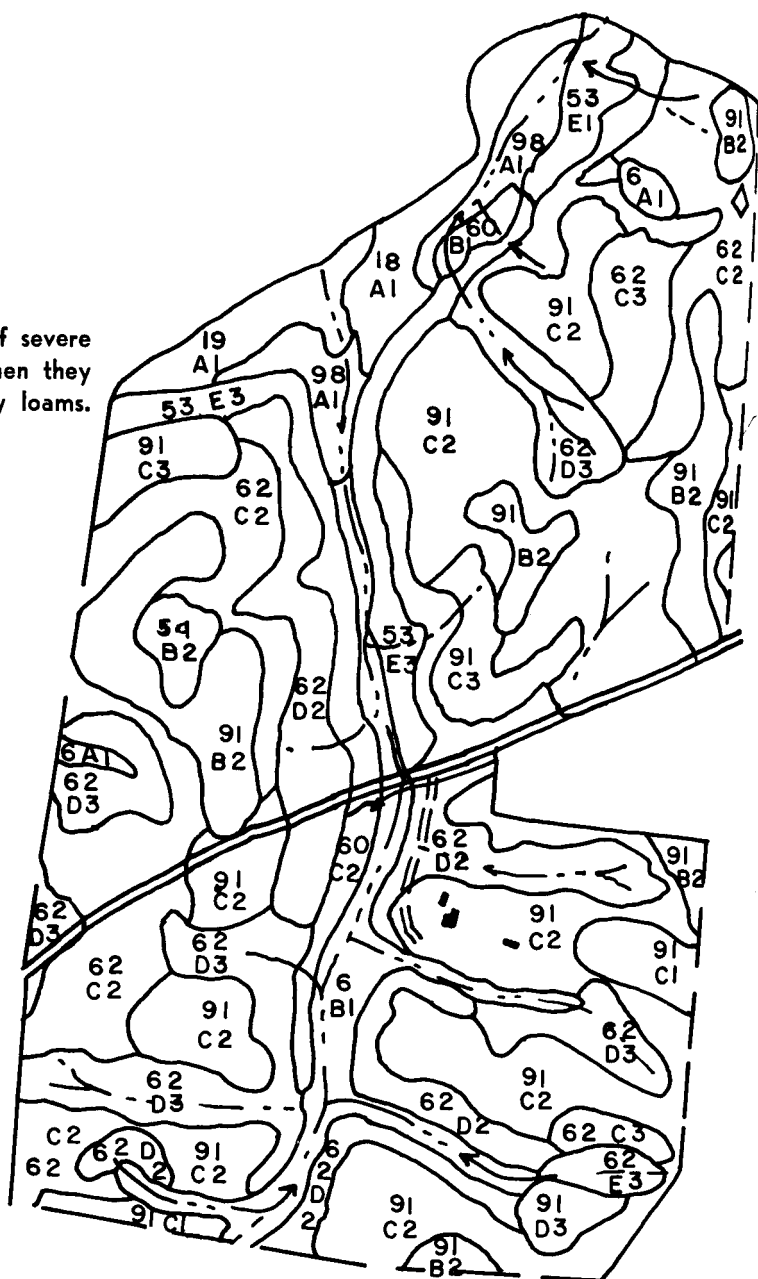


Figure B₅. Map of case-study farm with soil-pattern C, showing soil-mapping areas.

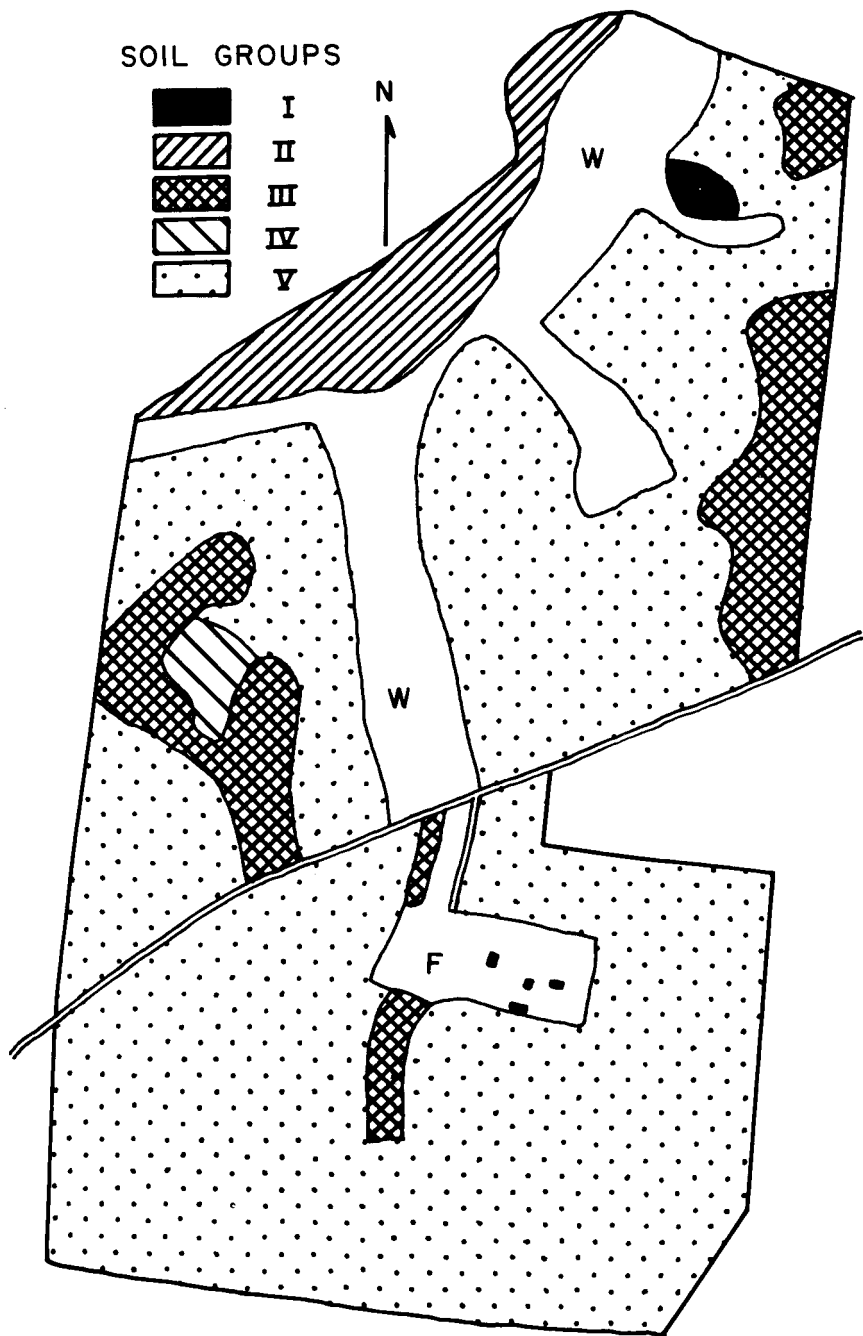


Figure B₆. Map of case-study farm with soil-pattern C, showing suggested field boundaries for soil-group areas.

Appendix C

Prices

Table C-1. Prices of Products Sold and Items Purchased

Products sold	Unit	Price
Grade-A milk (3.5% b.f.)	cwt.	\$ 4.40
Manufacturing milk (3.5% b.f.) ¹	cwt.	3.20
Dairy veal calves	cwt.	16.00
Dairy heifers	cwt.	13.00
6-year-old dairy cows with fairly good records	head	200.00
Cull dairy cows	head	150.00
Beef calves	cwt.	24.00
Cull beef cows	cwt.	15.50
Dark tobacco	lb.	.42
Burley tobacco	lb.	.60
Alfalfa hay	ton	32.00
Ladino clover and orchardgrass hay	ton	32.00
Ladino clover and fescue hay	ton	25.00
Lespedeza hay	ton	25.00
Items purchased		
Barley seed	bu.	2.50
Oats seed	bu.	1.25
Hybrid corn seed	lb.	.18
Alfalfa seed	lb.	.45
Orchardgrass seed	lb.	.35
Fescue seed	lb.	.20
Ladino clover seed	lb.	.65
Crimson clover seed	lb.	.20
Lespedeza seed	lb.	.20
Millet seed	lb.	.18
Inoculation of legume seeds	acre	.50
Limestone	ton	5.00
Nitrogen	lb.	.12
Phosphorous	lb.	.07
Potash	lb.	.05
Fertilizer mixing	cwt.	.50
T.D.E. insecticides	lb.	.60
Salt	cwt.	2.00
Bonemeal	cwt.	6.00
Cottonseed meal	cwt.	3.70
Corn	bu.	1.20
Bedding	ton	20.00
Alfalfa hay	ton	42.00
Lespedeza hay	ton	35.00

¹ This price includes premiums generally paid if coolers and concrete floors in milking area are used.

Table C-2. Labor, Tractor, and Truck Cost Rates Per Hour¹

Items	Unit	Price
Labor	hr.	\$1.25
Tractors, garden	hr.	.40
Tractors, 1-plow-bottom for 60-acre farm	hr.	.52
Tractors, 2-plow-bottom for 120-acre farm	hr.	.69
Tractors, 3-plow-bottom for 240-acre farm	hr.	.85
Tractors, 4-plow-bottom for 480-acre farm	hr.	1.00
Tractors, 5-plow-bottom for 960-acre farm	hr.	1.14
Trucks, 1 T. for 60-acre farm	mile	.11
Trucks, 2 T. for 120-acre farm	mile	.12
Trucks, 3 T. for the three largest farms	mile	.13

¹ The labor rate is assumed to include house rental and perquisites if these are furnished.
The tractor and truck rates are assumed to include fuel, oil, grease, and repairs.

Appendix D

Crop Yields and Livestock Needs

Table D-I. Selected Crop and Pasture Yields Per Acre, by Soil Groups¹

Crop or pasture	Soil groups				
	I	II	III	IV	V
Dark tobacco, lb.	2100	—	2050	1950	1900
Burley tobacco, lb.	2300	—	2200	2000	1950
Corn, bu.	90	75	85	65	54
Corn silage, tons	15.5	13.6	15.0	12.2	—
Crim. cl. and oats silage after corn sil., tons	1.4	—	—	—	—
Legume and orchardgrass silage, tons	—	—	—	—	8.5
Barley, bu.	48.0	—	50.0	44.5	38.5
Straw from barley, tons	1.15	—	1.20	1.07	.92
Lesp. hay or pasture after barley, tons	1.0	—	.8	.7	—
Crim. cl. and oats past., after barley, corn silage, or tobacco, tons	1.4	—	1.2	1.0	—
Alfalfa hay, tons	4.0	—	4.6	—	—
Alfalfa silage, tons	6.5	—	7.5	—	—
and hay, tons	1.4	—	1.6	—	—
Lad. cl. and orchardgrass hay or pasture, tons	3.9	—	3.6	3.2	2.4
Lad. cl. and orchardgrass silage, tons	6.0	—	6.0	5.25	4.0
and hay, tons	1.5	—	1.2	1.1	.8
Lad. cl. and fescue hay or pasture, tons	—	3.8	—	—	—
Lad. cl. and fescue Crop or and hay, tons	—	1.3	—	—	—
Lad. cl. and fescue pasture, tons	—	3.1	2.9	2.5	2.0
and lesp. hay or past., tons	—	1.1	1.0	.9	.6

¹ The same yields were assumed for all of the farm-size groups.

Table D-1 (Continued)

Crop or Pasture	Soil Groups				
	I	II	III	IV	V
Fescue for bedding, tons	—	3.4	—	—	—
Lesp. hay or pasture, tons	—	1.8	1.6	1.4	—
Millet hay or pasture, tons	4.0	3.8	3.6	3.2	2.4
Millet silage, tons	10.0	9.5	9.0	8.0	6.0
Clover and oats past., tons	—	—	1.6	1.4	—
and lesp. hay or past., tons	—	—	1.4	1.2	—

Table D-2. Selected Percentages of Total Pounds of Feed Used to Determine Available Pounds of Total Digestible Nutrients and Digestible Protein for the Livestock Systems¹

Feeds	Total digestible nutrients	Digestible protein
Section 1		
Corn, dent, Grade No. 2	80.1	6.7
Barley, common, not including Pacific Coast States	77.7	10.0
Cottonseed meal, 43% protein grade, solvent process	65.2	33.3
Corn silage, dent, well matured, recent analysis	18.3	1.2
Alfalfa silage, wilted	21.5	4.3
Alfalfa hay, 1/10 to 1/2 bloom	51.4	11.2
Lespedeza hay, annual, before bloom	49.2	7.2
Millet hay, pearl, or cat-tail	49.8	4.2
Section 2		
Ladino clover and orchardgrass silage, wilted	23.0	4.5
Ladino clover and fescue silage, wilted	22.3	4.9
Crimson clover and oats silage, wilted	23.0	4.3
Millet silage, wilted	19.9	1.7
Ladino clover and orchardgrass hay, immature	57.4	12.4
Ladino clover and fescue hay, immature	55.7	12.2
Crimson clover and oats hay, immature	54.0	11.0
Ladino clover and orchardgrass past. (Oct.-June)	61.7	14.2
Ladino clover and orchardgrass past. (July-Sept.)	57.4	12.4
Ladino clover and fescue grass past. (Oct.-June)	60.5	13.5
Ladino clover and fescue grass past. (July-Sept.)	55.7	12.2
Fescue pasture (Oct.-June)	64.1	11.5
Fescue pasture (July-Sept.)	55.0	6.6
Lespedeza pasture (June)	50.6	10.3
Lespedeza pasture (July-Sept.)	49.2	7.2
Crimson clover and oats pasture (Oct.-June)	58.4	13.6
Millet pasture (June)	54.1	5.5
Millet pasture (July-Sept.)	49.8	4.2

¹Section 1, "Taken by permission of the Morrison Publishing Company, Clinton, Iowa, from the 22nd edition, third printing, 1959, of *Feeds and Feeding*, by F. B. Morrison and associates."

The percentages in Section 2 are estimates made by the author of this study. It was assumed that the pastures were well-managed from the standpoint of rotations, rest periods, and clipping as needed. The percentages for pastures are given on a hay-equivalent yield basis.

Table D-3. Selected Percentage Distribution of Pasturage by Seasons¹

Pasture species	Seasons		
	Oct.-Mar.	Apr.-June	July-Sept.
	Percent		
Ladino clover and orchardgrass	28	56	16
Ladino clover and fescue	30	52	18
Fescue	40	50	10
Lespedeza (alone or with fescue)	—	15	85
Lespedeza (after barley for grain)	—	—	100
Crimson clover and oats (plow under Apr. 1)	100	—	—
Crimson clover and oats (followed by lesp.)	50	50	—
Lespedeza (after oats and crimson clover pasture)	—	15	85
Millet pasture	—	15	85

¹ Selected percentage discounts of pasturage nutrients to obtain supply utilized by livestock:

Selected discount for pastures because of trampling and desiccation of plants.....	33.3%
Selected additional discount for fescue pasture because of appetite-depressing effect.....	33.3%

Table D-4. Selected Demands for Livestock Nutrients and Bedding¹

	Grade-A milk	Manufac- turing milk	Beef, cow- calf
	Pounds per cow		
T.D.N. ² in concentrates	2964	2400	415
T.D.N. in silage	1520	1636	1109
T.D.N. in hay	605	638	923
T.D.N. in pasture (Oct.-Mar.)	1063	1136	1052
T.D.N. in pasture (Apr.-June)	1694	1805	1595
T.D.N. in pasture (July-Sept.)	1694	1805	1699
D.P. ³ (Oct.-Mar.)	530	520	259
D.P. (Apr.-June)	265	260	161
D.P. (July-Sept.)	265	260	176
Bedding	2000	2000	400
	Sheep		Sow and 2
	Farms without tobacco	Farms with tobacco	litters, Weanling pigs
	Lbs. per flock ⁴		Lbs. per sow
T.D.N. ² in concentrates	4599	3699	3671
T.D.N. in silage	911	937	—
T.D.N. in hay	7812	8128	177
T.D.N. in pasture (Oct.-Mar.)	5208	5177	170
T.D.N. in pasture (Apr.-June)	10539	10539	189
T.D.N. in pasture (July-Sept.)	6510	7099	163
D.P. ³ (Oct.-Mar.)	1867	1700	346
D.P. (Apr.-June)	1326	1396	199
D.P. (July-Sept.)	679	775	174
Bedding	2400	2400	800

¹ Includes nutrients for replacement stock, and for sire except on dairy farms.

² Total digestible nutrients.

³ Digestible protein.

⁴ Flock includes 30 ewes, 1 ram, and 35 lambs.

Appendix E

Physical Requirements for Crop Production

Table E-1. Selected Hours of Labor Required Per Acre, by Soil Groups, Land Use, and Acres of Open Land

Soil group and land use	Acres of open land				
	60	120	240	480	960
	Hours per acre				
Soil group I					
Dark tobacco	419.9	409.2	405.5	406.2	409.2
Dark tobacco and cr. cl. and oats past.	423.8	412.4	408.1	408.0	410.6
Burley tobacco	455.1	415.8	391.6	378.6	375.6
Burley tobacco and cr. cl. and oats past.	459.0	419.0	394.2	380.4	377.0
Corn	6.8	5.3	4.4	5.0	3.8
Corn silage	17.0	15.2	17.5	12.1	11.6
Corn sil. and cr. cl. and oats past.	20.9	18.4	20.1	13.9	13.0
Corn sil. and cr. cl. and oats silage	34.5	31.0	31.1	24.1	23.2
Barley (straw) and lespedeza hay ¹	10.0	8.5	6.6	6.0	4.9
Barley (straw) and lespedeza past.	7.6	6.4	5.1	4.8	3.7
Barley (straw) and cr. cl. and oats past.	13.7	10.7	8.6	7.2	5.6
Alfalfa hay	12.3	10.5	7.7	6.1	5.7
Alfalfa silage and hay	22.2	20.0	16.8	15.2	14.6
Lad. cl. and orchardgrass hay	11.6	10.0	7.2	5.7	5.4
Lad. cl. and orchardgrass silage and hay	21.4	19.4	16.2	14.5	14.2
Lad. cl. and orchardgrass or fescue past. ²	4.5	3.7	2.9	2.2	2.0
Lesp. hay (year after row crop)	5.2	4.7	3.6	3.1	3.0
Millet hay	14.2	11.6	8.8	6.9	6.5
Millet silage	28.7	25.5	22.1	19.9	19.5
Millet pasture ²	7.7	5.7	4.4	3.1	2.7
Soil group II					
Corn	6.5	5.0	4.1	4.7	3.6
Corn silage	16.1	14.3	16.3	11.2	10.7
Lad. cl. and fescue hay	11.6	10.0	7.2	5.7	5.4
Lad. cl. and fescue silage and hay	21.4	19.4	16.2	14.5	14.0
Fescue pasture, lespedeza hay	5.5	4.7	3.4	2.7	2.5
Fescue pasture, lespedeza pasture ²	3.6	3.0	2.2	1.7	1.5
Lespedeza hay	5.0	4.5	3.4	2.9	2.8
Lespedeza pasture ²	2.3	2.0	1.4	1.1	1.0
Fescue for bedding	7.1	6.3	5.7	4.8	4.6
Millet hay	13.9	11.3	8.5	6.6	6.2
Millet silage	28.4	25.2	21.8	19.6	19.2

¹ Barley harvested for grain, and straw harvested for bedding, with lespedeza harvested later.

Table E-1 (Continued)

Soil group and land use	Acres of open land				
	60	120	240	480	960
	Hours per acre				
Soil group III					
Dark tobacco	414.9	404.2	400.5	401.2	404.2
Burley tobacco	450.0	410.7	386.5	373.5	370.5
Corn	6.7	5.2	4.3	4.9	3.7
Corn silage	16.7	14.9	17.0	11.9	11.4
Barley (straw) and lespedeza hay	9.9	8.4	6.5	5.9	4.8
Barley (straw) and lespedeza pasture	7.7	6.5	5.2	4.9	3.8
Barley (straw) and cr. cl. and oats past.	13.8	10.8	8.7	7.3	5.7
Alfalfa hay	12.9	11.1	8.3	6.7	6.3
Alfalfa silage and hay	22.6	20.4	17.2	15.4	15.0
Lad. cl. and orchardgrass hay	11.5	9.9	7.1	5.6	5.3
Lad. cl. and orchardgrass silage and hay	21.3	19.3	16.1	14.4	14.1
Lepedeza hay	4.7	4.2	3.1	2.6	2.5
Millet hay	13.8	11.2	8.4	6.5	6.1
Millet silage	28.3	25.1	21.7	19.5	19.1
Crim. cl. and oats past., lesp. hay	8.4	7.2	5.5	4.2	3.8
Crim. cl. and oats past., lesp. past. ²	6.2	5.2	4.0	2.9	2.5
Soil group IV					
Dark tobacco	405.9	395.2	391.5	392.2	395.2
Burley tobacco	437.8	398.7	375.1	361.8	359.1
Corn	6.3	4.8	3.9	4.2	3.5
Corn silage	15.6	13.8	15.6	10.5	10.0
Barley (straw) and lespedeza hay	9.6	8.1	6.2	5.6	4.6
Barley (straw) and lespedeza pasture	7.5	6.3	5.0	4.7	3.7
Barley (straw) and oats and cr. cl. past.	13.6	10.6	8.5	7.1	5.6
Lad. cl. and orchardgrass hay	11.1	9.5	6.7	5.2	4.9
Lad. cl. and orchardgrass silage and hay	20.9	18.9	15.7	14.0	13.7
Lepedeza hay	4.5	4.0	2.9	2.4	2.3
Millet hay	13.3	10.7	7.9	6.0	5.6
Millet silage	27.9	24.7	21.3	19.1	18.7
Crim. cl. and oats past., lesp. hay	8.2	7.0	5.3	4.0	3.6
Soil group V					
Dark tobacco	401.4	390.7	387.0	387.7	390.7
Burley tobacco	427.4	388.3	364.4	351.4	348.4
Corn	6.0	4.5	3.6	4.2	3.2
Legume and orchardgrass silage	18.7	17.2	15.1	13.9	13.7
Barley (straw)	6.6	5.4	4.4	4.3	3.2
Lad. cl. and orchardgrass hay	10.5	8.9	6.1	4.6	4.3
Lad. cl. and orchardgrass silage and hay	20.2	18.2	15.0	13.3	13.0
Fescue past. and lespedeza hay	5.0	4.2	2.9	2.2	2.0
Millet hay	12.7	10.1	7.3	5.4	5.0
Millet silage	26.8	23.6	20.2	18.0	17.6

² Amount of labor used was estimated to be the same for other soils where this pasture was considered.

Table E-2. Selected Hours of Tractor Work Required Per Acre, by Soil Group, Land Use, and Acres of Open Land

Soil group and land use	Acres of open land				
	60	120	240	480	960
Soil group I	Hours per acre				
Dark tobacco ¹	14.3	17.8	15.7	14.7	13.1
Dark tobacco and cr. cl. and oats past.	18.2	21.0	18.3	16.5	14.5
Burley tobacco ¹	8.2	13.9	15.3	11.9	11.1
Burley tobacco and cr. cl. and oats past.	12.1	17.1	17.9	13.7	12.5
Corn ¹	5.0	3.5	2.6	3.2	2.5
Corn silage	10.9	9.1	12.1	8.4	7.9
Corn sil. and cr. cl. and oats past.	14.8	12.3	14.7	10.2	9.3
Corn and cr. cl. and oats silage	23.6	21.1	23.5	17.4	16.1
Barley (straw) and lespedeza hay	9.5	8.0	6.6	6.0	4.9
Barley (straw) and lespedeza pasture	7.1	5.9	5.1	4.8	3.7
Barley (straw) and cr. cl. and oats past.	13.7	10.7	8.6	7.2	5.6
Alfalfa hay	12.3	10.5	7.7	6.1	5.7
Alfalfa silage and hay	16.1	13.9	10.7	9.1	8.5
Lad. cl. and orchardgrass hay	11.6	10.0	7.2	5.7	5.4
Lad. cl. and orchardgrass silage and hay	15.5	13.5	10.3	8.6	8.3
Lad. cl. and orchardgrass pasture ¹	4.5	3.7	2.9	2.2	2.0
Lespedeza hay	4.7	4.2	3.6	3.1	3.0
Millet hay	14.2	11.6	8.8	6.9	6.5
Millet silage	19.7	16.5	13.1	10.9	10.5
Millet pasture ¹	7.7	5.7	4.4	3.1	2.7
Soil group II					
Corn silage	10.6	8.8	11.4	7.9	7.4
Soybeans	9.9	7.6	6.1	5.4	4.1
Lad. cl. and fescue hay	11.6	10.0	7.2	5.7	5.4
Lad. cl. and fescue silage and hay	15.5	13.5	10.3	8.6	8.1
Fescue past., lespedeza hay	5.5	4.7	3.4	2.7	2.5
Fescue past., lespedeza past.	3.6	3.0	2.2	1.7	1.5
Lespedeza hay	4.5	4.0	3.4	2.9	2.8
Lespedeza pasture	1.8	1.5	1.4	1.1	1.0
Fescue for bedding	7.1	6.3	5.7	4.8	4.6
Millet hay	13.9	11.3	8.5	6.6	6.2
Millet silage	19.6	16.4	13.0	10.8	10.4
Soil group III					
Corn silage	10.8	9.0	11.8	8.3	7.8
Barley (straw) and lespedeza hay	9.4	7.9	6.5	5.9	4.8
Barley (straw) and lespedeza pasture	7.2	6.0	5.2	4.9	3.8
Barley (straw) and cr. cl. and oats past.	13.8	10.8	8.7	7.3	5.7
Alfalfa hay	12.9	11.1	8.3	6.7	6.3
Alfalfa silage and hay	16.4	14.2	11.0	9.2	8.8
Lad. cl. and orchardgrass hay	11.5	9.9	7.1	5.6	5.3
Lad. cl. and orchardgrass silage and hay	15.4	13.4	10.2	8.5	8.2
Lespedeza hay	4.2	3.7	3.1	2.6	2.5
Millet hay	13.8	11.2	8.4	6.5	6.1
Millet silage	19.5	16.3	12.9	10.7	10.3
Crim. cl. and oats past., lespedeza hay	7.9	6.7	5.5	4.2	3.8
Crim. cl. and oats past., lespedeza past. ¹	5.7	4.7	4.0	2.9	2.5

Table E-2 (Continued)

Soil group and land use	Acres of open land				
	60	120	240	480	960
Soil group IV	Hours per acre				
Corn silage	10.4	8.6	11.0	7.5	7.0
Barley (straw) and lespedeza hay	9.1	7.6	6.2	5.6	4.6
Barley (straw) and lespedeza past.	6.9	5.7	4.9	4.6	3.6
Barley (straw) and cr. cl. and oats past.	13.6	10.6	8.5	7.1	5.6
Lad. cl. and orchardgrass hay	11.1	9.5	6.7	5.2	4.9
Lad. cl. and orchardgrass sil. and hay	15.2	13.2	10.0	8.3	8.0
Lepedeza hay	4.0	3.5	2.9	2.4	2.3
Millet hay	13.3	10.7	7.9	6.0	5.6
Millet silage	19.4	16.2	12.8	10.6	10.2
Crim. cl. and oats past., lespedeza hay	7.7	6.5	5.3	4.0	3.6
Soil group V					
Legume and orchardgrass silage	12.0	10.6	8.5	7.3	7.1
Barley (straw)	6.6	5.4	4.4	4.1	3.2
Lad. cl. and orchardgrass hay	10.5	8.9	6.1	4.6	4.3
Lad. cl. and orchardgrass silage and hay	15.0	13.0	9.8	8.1	7.8
Fescue past. and lespedeza hay	5.0	4.2	2.9	2.2	2.0
Millet hay	12.7	10.1	7.3	5.4	5.0
Millet silage	19.1	15.9	12.5	10.3	9.9
All soil groups (garden tractor)					
Dark tobacco	11.2	8.0	7.2	6.4	6.0
Burley tobacco	2.8	2.0	1.8	1.6	1.5

¹ Hours of tractor use was estimated to be the same for all soil groups.

Table E-3. Selected Miles of Use of Trucks Per Acre, by Soil Group, Land Use, and Acres of Open Land

Soil group and land use	Acres of open land				
	60	120	240	480	960
Soil group I	Miles				
Dark and burley tobacco ¹	25	25	25	25	25
Corn	13	13	13	16	19
Corn silage	21	21	21	26	32
Corn silage and cr. cl. and oats silage	26	26	26	34	42
Barley	3	3	3	4	5
Alfalfa silage and hay	10	10	10	13	15
Lad. cl. and orch. grass silage and hay	12	12	12	14	16
Millet silage	16	16	16	20	24
Selling hay ¹	100	100	100	100	100
Soil group II					
Corn	11	11	11	13	16
Corn silage	18	18	18	23	27
Lad. cl. and fescue sil. and hay	11	11	11	13	15
Millet silage	16	16	16	20	23
Soil group III					
Corn	12	12	12	15	18

Table E-3 (Continued)

Soil group and land use	Acres of open land				
	60	120	240	480	960
Corn silage	20	20	20	25	30
Barley	3	3	3	4	5
Alfalfa silage and hay	12	12	12	15	18
Lad. cl. and orchardgrass silage and hay	10	10	10	12	14
Millet silage	15	15	15	19	22
Soil group IV					
Corn	10	10	10	12	14
Corn silage	16	16	16	20	24
Barley	3	3	3	4	5
Lad. cl. and orchardgrass silage and hay	8	8	8	10	12
Millet silage	13	13	13	16	20
Soil group V					
Corn	8	8	8	10	12
Legume and orchardgrass silage	15	15	15	17	19
Barley	3	3	3	3	4
Lad. cl. and orchardgrass silage and hay	5	5	5	7	9
Millet silage	9	9	9	12	14

¹ Miles of truck use was estimated to be the same for the other soil groups.

Table E-4. Selected Quantities of Seed Used Per Acre, by Soil Group¹

Land use	Soil group				
	I	II	III	IV	V
Corn or corn silage, lb.	13.0	11.0	12.0	10.0	8.0
Barley and lespedeza hay or pasture					
Barley, bu.	2.2	—	2.2	2.1	2.0
Lepedeza, lb.	28.0	—	26.0	25.0	—
Barley, crim. clover and oats pasture					
Barley, bu.	2.2	—	2.2	2.1	2.0
Crimson clover, lb.	24.0	—	23.0	22.0	—
Oats, bu.	4.0	—	3.8	3.6	—
Alfalfa, lb.	20.0	—	20.0	—	—
Lad. clover and orchardgrass or fescue hay or pasture or silage					
Lad. clover, lb.	2.0	—	2.0	2.0	2.0
Orchardgrass, lb.	15.0	—	15.0	15.0	15.0
Fescue and lespedeza					
Fescue, lb.	—	15.0	15.0	15.0	15.0
Lepedeza, lb.	—	27.0	26.0	25.0	23.0
Fescue for bedding, lb.	—	20.0	—	—	—
Lepedeza (year after row crop), lb.	28.0	27.0	26.0	25.0	—
Lepedeza (continuously), lb.	—	—	25.5	24.5	—
Crim. clov. and oats (after row crop or barley) (lespedeza)					
Crimson clover, lb.	—	—	23.0	22.0	—
Oats, bu.	—	—	3.8	3.6	—
Lepedeza, lb.	—	—	26.0	25.0	—

¹ The quantities were the same for all farm-size groups. Establishing alfalfa was assumed to be once in 5 years; orchardgrass or fescue and ladino clover once in 8 years, and other fescue once in 12 years.

Appendix F

Variable Expenses for Crops Per Acre

Table F-1. Expenses for Fertilizers Per Acre, by Land Use and Soil Group¹

Land use	Soil group				
	I	II	III	IV	V
Dark tobacco	\$53.00	\$ —	\$51.00	\$47.00	\$45.00
Burley tobacco	92.00	—	86.00	74.00	65.00
Corn or corn silage	25.40	23.00	24.70	21.00	—
Legume and orchardgrass silage	—	—	—	—	18.50
Barley (straw) and lesp. hay or pasture	15.20	—	16.25	12.20	10.00
Barley (straw) and crim. clover and oats pasture	26.25	—	25.75	20.50	—
Crim. clover and oats after barley, corn silage, or tobacco	16.00	—	—	—	—
Alfalfa ²	19.50	—	22.00	—	—
Lad. cl. and orchardgrass ³	20.50	—	19.00	17.00	13.00
Lad. clover and fescue	—	20.00	—	—	—
Fescue and lespedeza	—	8.50	8.25	8.00	5.00
Fescue for bedding	—	14.25	—	—	—
Lespedeza alone (year after row crop)	6.00	5.50	5.00	4.50	—
Lespedeza (continuously)	—	—	4.75	4.25	—
Millet	23.00	22.00	21.00	19.00	15.00
Clover and oats past. and lespedeza	—	—	15.00	12.50	—

¹ The same fertilization was assumed for all farm-size groups.

² Includes 1/5 of establishment.

³ Includes 1/8 of establishment.

Table F-2. Expenses Per Acre for Special Machines Owned or Custom Hired
(for All Soil Groups)¹

Items	Acres of open land				
	60	120	240	480	960
Corn (picker)	\$6.00 ²	\$6.00 ²	\$6.00 ²	\$2.50	\$2.10
Corn silage (row attach. for chopper)	8.00 ²	8.00 ²	4.03	2.78	2.73
Barley (combine)	6.00 ²	6.00 ²	6.00 ²	5.00	6.25
Lespedeza (hand or trac. cycle seeder)	.10	.05	.25	.18	.15
Tobacco (setter)	— ³	5.86	4.36	3.32	2.59

¹ A charge of \$6 per ton was assumed for custom-hiring baling of hay for sale.

² Custom hired.

³ Tobacco set by hand.

Table F-3. Selected Expenses for Miscellaneous Items Per Acre, by Special Crops

	Crop					
	Dark tobacco	Burley tobacco	Corn	Corn silage	Alfalfa	Soybeans
Plant bed expense	\$27	\$27	\$—	\$—	\$—	\$—
Insecticides	45	45	—	—	3	1
Wood for firing	18	—	—	—	—	—
Herbicides ¹	—	—	7	2	—	—
Airplane dusting ²	3	—	—	—	—	—

¹ Atrazine was used for corn, but was not considered safe for corn silage because the harvest for feed comes too soon after the herbicide application.

² On the farms with 480 and 960 acres of open land.

Table F-4. Total Variable Expenses Per Acre, by Soil Group, Land Use, and Acres of Open Land

Soil group and land use	Acres of open land				
	60	120	240	480	960
Soil group I					
Dark tobacco	\$683	\$679	\$674	\$675	\$678
Dark tobacco (fall and spring pasture)	714	710	704	703	706
Burley tobacco	741	703	675	657	653
Burley tobacco (fall and spring pasture)	773	734	705	686	681
Corn	53	51	50	49	47
Corn silage	67	66	69	59	60
Corn silage (fall and spring pasture)	99	97	99	88	88
Corn silage (fall and spring grass silage)	121	119	121	109	110
Barley (straw) (lespedeza hay)	50	49	47	45	45
Barley (straw) (lesep. pasture)	46	45	44	43	42
Barley (straw) (crim. clover and oats pasture)	73	69	66	64	62
Alfalfa hay	49	48	44	41	41
Alfalfa silage and hay	65	63	59	57	57
Lad. cl. and orchardgrass hay	43	42	38	36	36
Lad. cl. and orchardgrass silage and hay	59	58	53	51	52
Lad. cl. and orchardgrass pasture	31	30	29	28	28
Millet hay	51	48	44	41	41
Millet silage	74	71	67	64	65
Millet pasture	39	37	35	33	32
Soil group II					
Corn	50	48	47	45	44
Corn silage	63	61	63	54	55
Lad. cl. and fescue hay	43	41	37	35	35
Lad. cl. and fescue silage and hay	58	57	52	50	51
Lad. cl. and fescue past.	30	29	28	27	27
Fescue past., lespedeza hay	25	24	22	21	21
Fescue past., lespedeza past.	22	21	20	19	19
Lespedeza hay	20	19	18	18	18
Lespedeza pasture	15	14	14	14	13

Table F-4 (Continued)

Soil group and land use	Acres of open land				
	60	120	240	480	960
Soil group II (Continued)					
Millet hay	\$ 49	\$ 47	\$ 43	\$ 40	\$ 39
Millet silage	72	69	65	63	64
Millet pasture	38	36	34	32	31
Fescue to harvest for bedding	28	28	27	26	26
Soil group III					
Dark tobacco	674	671	665	667	669
Burley tobacco	729	691	662	644	640
Corn	52	50	49	48	46
Corn silage	66	64	67	58	59
Barley (straw) (lesp. hay)	51	49	47	46	45
Barley (straw) (lesp. past.)	47	46	45	44	43
Barley (straw) (crim. clover and oats pasture)	72	68	66	63	62
Alfalfa hay	53	51	47	45	45
Alfalfa silage and hay	68	67	62	60	61
Lad. cl. and orchardgrass hay	42	41	36	34	34
Lad. cl. and orchardgrass silage and hay	57	56	51	49	50
Lad. cl. and orchardgrass past.	29	29	27	26	26
Fescue past., lesp. pasture	21	21	20	19	18
Lespedeza hay	18	18	17	16	16
Lespedeza pasture	14	14	13	13	13
Millet hay	48	45	41	38	38
Millet silage	71	68	64	61	62
Millet pasture	37	35	33	31	30
Crim. clover and oats pasture, lespedeza pasture	41	40	39	37	36
Crim. clover and oats pasture, lespedeza hay	45	44	42	40	39
Soil group IV					
Dark tobacco	659	655	650	651	654
Burley tobacco	701	664	636	617	614
Corn	47	45	44	42	41
Corn silage	59	58	59	50	51
Barley (straw) (lesp. hay)	46	44	42	41	40
Barley (straw) (lesp. past.)	42	41	40	39	39
Barley (straw) (crim. clover and oats pasture)	66	62	59	57	55
Lad. cl. and orchardgrass hay	39	38	33	31	31
Lad. cl. and orchardgrass silage and hay	54	53	49	46	47
Lad. cl. and orchardgrass pasture	27	27	25	24	24
Fescue pasture, lesp. pasture	21	20	19	18	18
Lespedeza hay	17	17	16	15	15
Lespedeza pasture	13	13	13	12	12
Millet hay	45	42	38	35	35
Millet silage	68	65	64	58	59
Millet pasture	35	33	33	29	28
Crim. clover and oats pasture, lespedeza pasture	38	37	36	34	33
Crim. clover and oats pasture, lespedeza hay	41	40	38	36	36

Table F-4 (Continued)

Soil group and land use	Acres of open land				
	60	120	240	480	960
Soil group V ₁					
Dark tobacco	\$651	\$648	\$643	\$643	\$647
Burley tobacco	679	642	614	595	592
Corn	41	39	38	37	35
Barley (straw)	38	36	35	34	34
Soil group V ₂					
Lad. cl. and orchardgrass hay	34	33	29	26	26
Lad. cl. and orchardgrass silage and hay	49	48	44	41	42
Lad. cl. and orchardgrass silage	52	51	49	48	48
Lad. cl. and orchardgrass past.	24	23	22	21	21
Fescue past., lesp. hay	20	19	18	16	16
Fescue past., lesp. pasture	18	17	16	15	15
Millet hay	40	37	33	30	29
Millet silage	62	59	55	52	53
Millet pasture	31	29	27	24	24
Soil group V ₁ and V ₂					
Lad. cl. and orchardgrass hay	34	33	28	26	26
Lad. cl. and orchardgrass silage and hay	49	48	43	41	42
Lad. cl. and orchardgrass past.	23	23	21	20	20
Fescue pasture, lesp. hay	20	19	17	16	16
Fescue pasture, lesp. past.	17	17	16	15	15
Baling and selling hay ¹	25	26	27	27	27

¹ Same for all soil groups.

Appendix G

Livestock Variable Expenses and Net Revenues

Table G-1. Returns, Selected Items of Expense, and Net Revenue Per Cow for Grade-A Dairy Farms, by Acres of Open Land

Returns	
Milk sales, 10,100 lb. @ \$4.40 per cwt.	\$444.40
Veal calf, 175 lb. @ 16¢ x 45%	12.60
Heifers, 14 mo. old, 800 lb. @ 13¢ x 9%	9.36
First-calf cows or 6-yr.-old cows with fairly good records, \$200 x 10%	20.00
Cull cows, mostly 7 yr. old, \$150 x 19%	28.50
Manure, 6 tons @\$2.00	12.00
	\$526.86
Selected items of expense	
Salt, 15 lb. @ 2¢	\$.30
Bone meal, 30 lb. @ 6¢	1.80
Mixing feed, 37 cwt. @ 25¢	9.25
Calf starter, 235 lb. @ 6¢	14.10
Artificial breeding @ \$6.00 per cow plus 10% for extra heifers	6.60
Milk hauling, 10,100 lb. @ 30¢	30.30
Fuel and oil for other hauling	4.00
Miscellaneous (cleaning material, electricity, plastic silo covering, veterinary, insurance, dues)	35.00
Total without labor	\$101.35

Table G-1 (Continued)

With labor for farm having 60 acres of open land, 90 hr., \$112.50	\$213.85
With labor for farm having 120 acres of open land, 80 hr., \$100.00	201.35
With labor for farm having 240 acres of open land, 74 hr., \$92.50	193.85
With labor for farm having 480 acres of open land, 64 hr., \$80.00	181.35
With labor for farm having 960 acres of open land, 52 hr., \$65.00	166.35
Net revenue for farm having 60 acres of open land	\$313.01
Net revenue for farm having 120 acres of open land	325.51
Net revenue for farm having 240 acres of open land	333.01
Net revenue for farm having 480 acres of open land	345.51
Net revenue for farm having 960 acres of open land	360.51

Table G-2. Returns, Selected Items of Expense, and Net Revenue Per Cow for Manufacturing-Milk Dairy Farms, by Acres of Open Land

Returns	
Milk sales, 9,700 lb. @ \$3.20 per cwt.	\$310.40
Veal calf, 175 lb. @ 16¢ x 45%	12.60
Heifers, 14 mo. old, 800 lb. @ 13¢ x 9%	9.36
First-calf cows or 6-yr.-old cows with fairly good records, \$200 x 10%	20.00
Cull cows, mostly 7 yr. old, \$150 x 19%	28.50
Manure, 6 tons @ \$2.00	12.00
	\$392.86
Selected items of expense	
Salt, 15 lb. @ 2¢	\$.30
Bonemeal, 30 lb. @ 6¢	1.80
Mixing feed, 30 cwt. @ 25¢	7.50
Calf starter, 235 lb. @ 6¢	14.10
Artificial breeding @ \$6.00 per cow plus 10% for extra heifers	6.60
Milk hauling, 9,700 lb. @ 40¢	38.80
Fuel and oil for other hauling	4.00
Miscellaneous (cleaning material, electricity, plastic silo covering, veterinary, insurance, dues)	28.00
Total without labor	\$101.10
With labor for farm having 60 acres of open land, 90 hrs., \$112.50	\$213.60
With labor for farm having 120 acres of open land, 80 hrs., \$100	201.10
With labor for farm having 240 acres of open land, 74 hrs., \$92.50	193.60
With labor for farm having 480 acres of open land, 64 hrs., \$80.00	181.10
With labor for farm having 960 acres of open land, 52 hrs., \$65.00	166.10
Net revenue for farm having 60 acres of open land	\$179.26
Net revenue for farm having 120 acres of open land	191.76
Net revenue for farm having 240 acres of open land	199.26
Net revenue for farm having 480 acres of open land	211.76
Net revenue for farm having 960 acres of open land	226.76

Table G-3. Returns, Selected Items of Expense, and Net Revenue Per Cow for Cow-Calf Beef Farms, by Acres of Open Land

Returns		
Calves, 485 lb. @ 24¢ (77½%) ¹		\$ 90.21
Cull cows, 1,100 lb. @ 15.5¢ (11½%) ¹		19.61
Manure, 3.5 tons @ \$2.00		7.00
Hide, \$3.00 x 1%		.03
		\$116.85
Selected items of expense		
Depreciation on bull		\$ 5.00
Salt, 15 lb. @ 2¢		.30
Bonemeal, 30 lb. @ 6¢		1.80
Fuel and oil for hauling		2.00
Miscellaneous (pastic silo covering, sprays, veterinary, insurance)		2.50
Total without labor		\$ 11.60
With labor for farm having 60 acres of open land, 13 hr., \$16.25		\$ 27.85
With labor for farm having 120 acres of open land, 10 hr., \$12.50		24.10
With labor for farm having 240 acres of open land, 8.5 hr., \$10.62		22.22
With labor for farm having 480 acres of open land, 6 hr., \$7.50		19.10
With labor for farm having 960 acres of open land, 5 hr., \$6.25		17.85
Net revenue for farm having 60 acres of open land		\$89.00
Net revenue for farm having 120 acres of open land		92.75
Net revenue for farm having 240 acres of open land		94.63
Net revenue for farm having 480 acres of open land		97.75
Net revenue for farm having 960 acres of open land		99.00

¹ 90% calf crop saved; 12½% of cows replaced and 1% death loss each year.

Table G-4. Returns, Selected Items of Expense, and Net Revenue Per Flock of 30 Ewes, for Sheep Farms With and Without Tobacco Allotments¹

Returns	Farms with tobacco		Farms without tobacco	
Lambs, 35 @ 85 lb., total 2, 975 lb.	@ 18.5¢	\$550.38	@ 19.5¢	\$580.13
Cull ewes, 4	@ \$ 5.40	21.60		21.60
Cull rams, .25	@ 8.00	2.00		2.00
Wool, 7 lb. per fleece, total 217 lb.	@ .60	130.20		130.20
Manure credit, 15.5 tons	@ 4.00	62.00		62.00
		\$766.18		\$795.93
Selected items of expense				
Salt, 2 cwt.	@ \$ 1.50	\$ 3.00		\$ 3.00
Medication		10.00		10.00
Hauling		20.00		20.00
Ewe replacements, 5	@ 25.00	125.00		125.00
Ram replacements, .25	@ 90.00	22.50		22.50
Bags and twine, 31	@ .04	1.24		1.24

Table G-4 (Continued)

Selected items of expense	Farms with tobacco		Farms without tobacco	
Insurance and taxes		\$ 7.50		\$ 7.50
Custom shearing, 31	@ .50	15.50		15.50
Total without labor		\$204.75		\$204.75

Labor charges

Acres of open land	Hr. labor per 30 ewes	Labor cost	Total expense with labor	
60	102.	\$127.50	\$332.25	\$332.25
120	66.	82.50	287.25	287.25
240	61.5	76.88	281.63	281.63
480	52.5	65.63	270.38	270.38
960	52.5	65.63	270.38	270.38

Net Revenue

60	\$433.93	\$463.68
120	478.93	508.68
240	484.55	514.30
480	495.80	525.55
960	495.80	525.55

¹ On account of the competition for labor to prepare dark-fired tobacco for marketing, it seemed advisable to plan the lambing season for a later period on farms with tobacco allotments than on farms where tobacco would not be raised.

Table G-5. Returns, Selected Items of Expense, and Net Revenue Per Sow With Two Litters Per Year, Selling Weanling Pigs

Returns			
Pigs, 15 $\frac{2}{3}$		@ \$9 per pig	\$141.00
Sow	Net 420 lbs. @ 11¢ ¹		14.37
Manure credit		1.8 T. @ \$2	3.60
			\$158.97
Selected items of expense			
Vaccination	16 @ \$.90		\$ 14.40
Wormer	16 @ .20		3.20
Hauling	16 @ 1.00		4.00
Elec. and misc.			2.00
Insurance and taxes			4.50
Depreciation on boar			.90
Total without a labor charge			\$ 29.00
Total with a labor charge		15 hrs., \$18.75	\$ 47.75
Net revenue			111.22

¹ Assumes each sow kept 3 years, with death loss of 1 out of every 15 sows (\$46.20 less 1/15, times $\frac{1}{3}$).

Appendix H

Fixed Investments and Costs

Table H-1. Selected Investment in Machinery for Case-Study Farms, by Farming System, and Acres of Open Land¹

Machinery for all farming systems and case-study farms	Acres of open land									
	60		120		240		480		960	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Truck	0	\$ —	1	\$2,500	1	\$3,000	1	\$3,000	1	\$3,000
Plow	1	200	1	350	1	500	1	630	1	750
Disk	1	275	1	350	1	425	1	500	1	600
Harrow sections	2	60	3	90	3	90	3	90	3	90
Drill	1/3	267	1/2	400	1	1,000	1	1,200	1	1,400
Planter	1/3	83	1	135	1	265	1	375	1	375
Cultipacker	1/3	67	1	300	1	375	1	450	1	525
Cultivator	1/2	125	1	250	1	350	1	350	1	350
Mower	1	365	1	365	1	365	1	650	2	1,300
Crimper	1/3	265	1/2	400	1	800	1	1,400	1	1,400
Rake	1/3	150	1	450	1	450	1	450	1	450
Chopper	1/3	617	1	1,850	1	1,850	1	1,850	1	1,850
Row attachment	0	—	0	—	1	600	1	600	1	600
Herb. distributor	1/3	65	1/2	95	1	185	1	300	1	300
Trailers	1	200	1	200	1	400	2	800	3	1,200
Manure spreader	1/3	300	1/2	450	1	900	1	900	1	900
Manure loader	1/3	150	1/2	225	1	450	1	450	1	450
Cycle seeder	1	5	1	5	1	55	1	80	1	130
Elevator	0	—	1	250	1	675	1	675	1	675
Tractors										
Grade-A dairy farms										
With tobacco										
"A" Farms	1	2,500	1	3,000	2	5,250	2	7,000	3	11,500
"B" Farms	1	2,500	1	3,000	2	5,250	2	7,000	3	11,000
"C" Farms	1	2,500	1	3,000	1	3,500	2	6,500	3	10,500
Without tobacco										
"A" Farms	1	2,500	1	3,000	2	5,250	2	7,000	3	10,500
"B" Farms	1	2,500	1	3,000	1	3,500	2	7,000	3	10,500
"C" Farms	1	2,500	1	3,000	1	3,500	2	6,500	3	10,500
Mfg.-milk dairy farms										
With tobacco										
"A" Farms	1	2,500	1	3,000	1	3,500	2	7,000	3	11,000
"B" Farms	1	2,500	1	3,000	1	3,500	2	7,000	3	10,500
"C" Farms	1	2,500	1	3,000	1	3,500	2	6,500	3	10,000
Without tobacco										
"A" Farms	1	2,500	1	3,500	1	3,500	2	7,000	3	10,500
"B" Farms	1	2,500	1	3,500	1	3,500	2	7,000	3	10,500
"C" Farms	1	2,500	1	3,500	1	3,500	2	6,500	3	10,000

Table H-1 (Continued)

Machinery for all farming systems and case-study farms	Acres of open land									
	60		120		240		480		960	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Tractors										
Cow-calf beef and sheep farms										
With tobacco										
"A" Farms	1	2,500	1	3,000	1	3,500	2	6,500	3	10,000
"B" Farms	1	\$2,500	1	\$3,000	1	\$3,500	2	\$6,500	3	\$10,000
"C" Farms	1	2,500	1	3,000	1	3,500	2	6,500	3	10,000
Without tobacco										
"A" Farms	1	2,500	1	3,000	1	3,500	2	6,500	3	10,000
"B" Farms	1	2,500	1	3,000	1	3,500	2	6,500	3	10,000
"C" Farms	1	2,500	1	3,000	1	3,500	2	6,500	3	10,000
All hog farms ²			1	4,000			3	10,000		
Combines										
All dairy farms	0	—	0	—	0	—	1	2,400	1	5,400
Beef farms	0	—	0	—	0	—	1/2	1,200	1/2	2,700
Sheep farms ²			0	—			0	—		
Hog farms ²			1/2	1,200			1	5,400		
Corn pickers										
Mfg.-milk farms	0	—	0	—	0	—	1/2	725	1/2	1,175
Sheep farms ²			0	—			1/2	725		
Hog farms ²			1	1,450			1	2,350		
Tobacco setters										
All farms with tobacco	0	—	1	245	1	245	1	245	1	245
Garden tractors										
All farms with tobacco										
"A" Farms	1/2	200	1/2	200	1/2	200	1 1/2	600	2	800
"B" Farms	1/2	200	1/2	200	1/2	200	1	400	1 1/2	600
"C" Farms	1/2	200	1/2	200	1/2	200	1/2	200	1	400

¹ Fractions of machines indicate joint ownership with neighbors.² Only two farm sizes analyzed: 120 and 480 acres of open land.

Table H-2. Selected Percentages of Fixed Investments Used to Determine Fixed Costs, Cost of Miscellaneous Overhead, and Shelter for Baled Hay Held for Sale

Items	Percentages
Breeding stock (insurance)	1
Tractors and trucks (depreciation, insurance) ¹	9
Other machinery (depreciation, insurance, and repairs)	12
Buildings and fencing (depreciation, insurance, and repairs)	6
Land (taxes)	1
Miscellaneous overhead	Dollars
60 acres open land	30
120 acres open land	50
240 acres open land	90
480 acres open land	165
960 acres open land	300
Investments in Shelter for Baled Hay Held for Sale	Dollars
Open shed, pole construction; per ton of hay	20

¹ Repairs on tractors and trucks were included in the variable costs.

Table H-3. Selected Values Per Acre of Open Land Without Buildings on Case-Study Farms, With and Without Tobacco Allotments

Type farm		Acres of open land				
		60	120	240	480	960
	Case-study farms					
With tobacco allotments	"A"	\$195	\$175	\$145	\$120	\$105
	"B"	130	113	85	70	61
	"C"	95	80	55	45	40
Without tobacco allotments	"A"	75	75	75	75	75
	"B"	40	40	40	40	40
	"C"	25	25	25	25	25

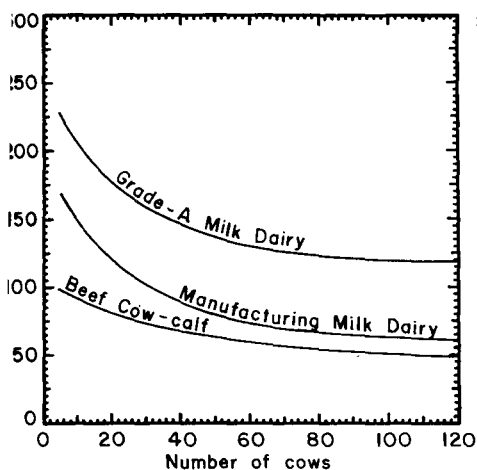


Figure H₁. Investment in loafing barn, hay and grain storage per cow.

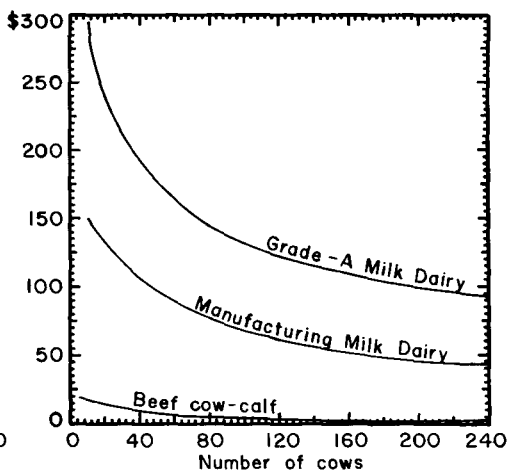


Figure H₂. Investment in dairy or beef equipment per cow.

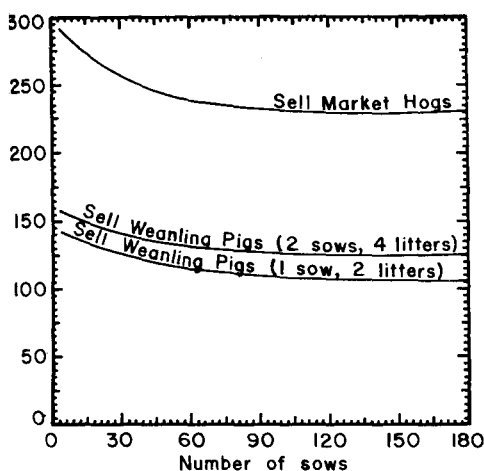


Figure H₃. Investment in shelter and equipment per sow with two litters per year.

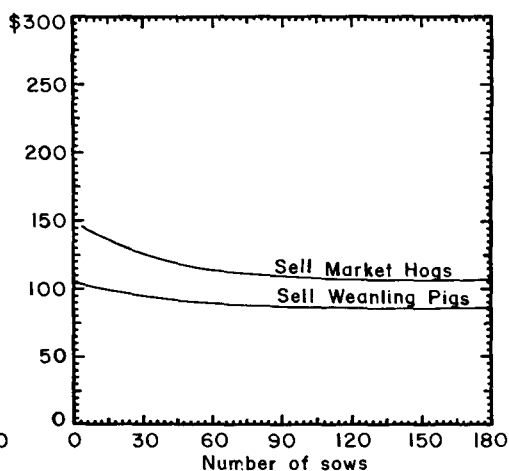


Figure H₄. Investment in shelter and equipment per sow with one litter per year.

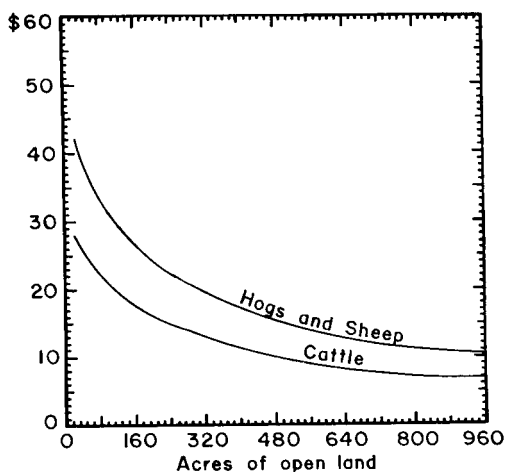


Figure H₅. Investment in fencing per acre.

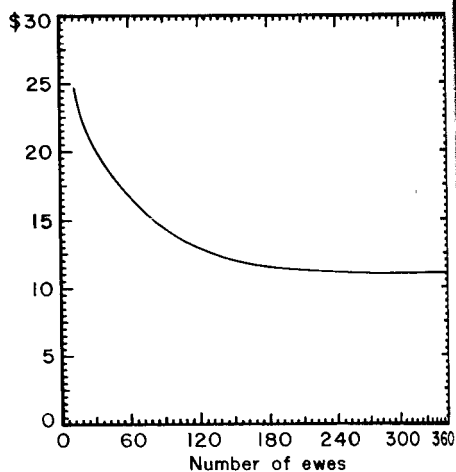


Figure H₆. Investment in shelter and equipment per ewe.

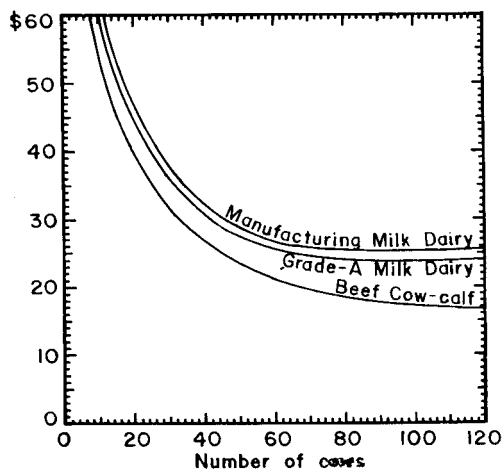


Figure H₇. Investment in bunker silo per cow.

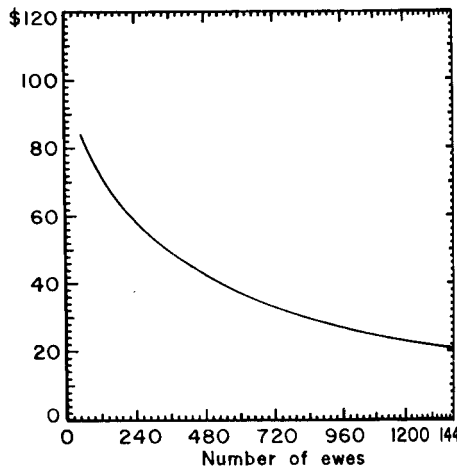


Figure H₈. Investment in bunker silo per 30 ewes.

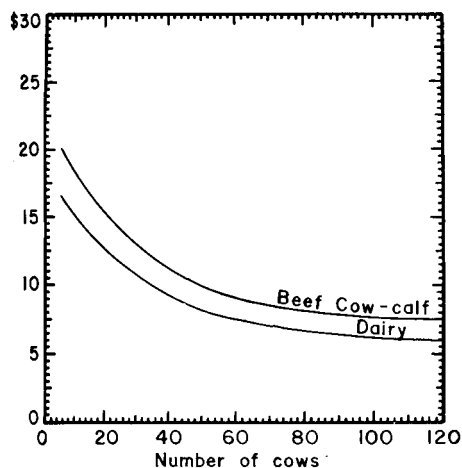


Figure H₉. Investment in hay drying equipment per cow.

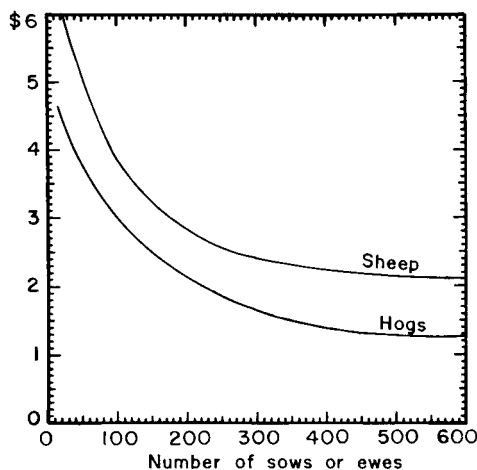


Figure H₁₀. Investment in hay drying equipment per sow or ewe.

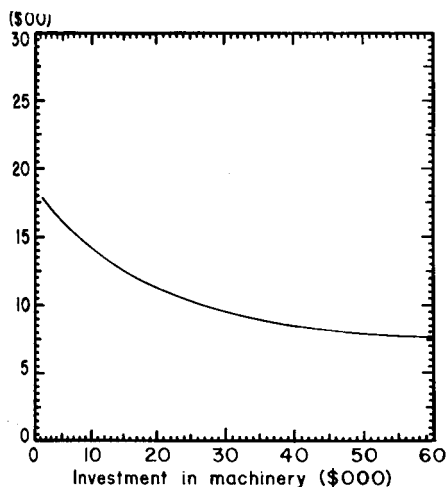


Figure H₁₁. Investment in machine shelter per \$100 investment in machinery.

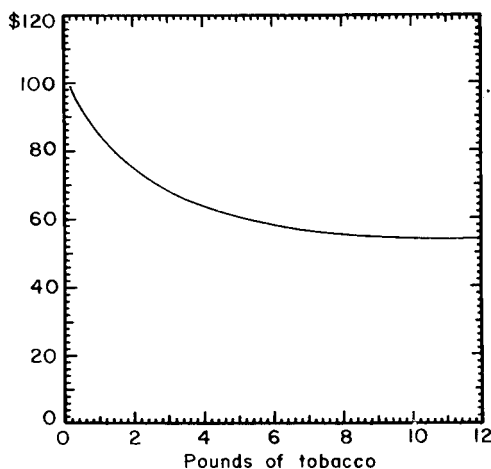


Figure H₁₂. Investment in tobacco barns per 100 pounds of tobacco.

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