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**1960**  
**NORTH**  
**DAKOTA**  
**Farm**  
**Planning**  
**Guidebook**

**DEPARTMENT OF AGRICULTURAL ECONOMICS**  
**North Dakota Agricultural Experiment Station**  
**Fargo, North Dakota**

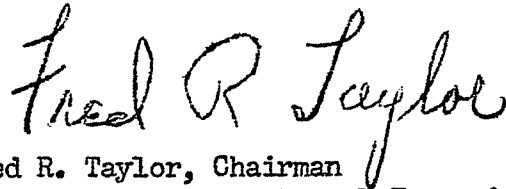
## FOREWORD

Good farm management is essentially the use of good business methods. Good sound management tools are necessary to make sound decisions. Farm management consists of nothing more than planning and directing the operations of the farm so as to obtain maximum returns from the available resources. It is toward this end that the material in this handbook has been assembled.

This handbook has been prepared for use as a guide in farm planning by Laurel D. Loftsgard, Associate Agricultural Economist, Norbert A. Dorow, Assistant Agricultural Economist, and H. W. Herbison, Extension Marketing Economist of the Department of Agricultural Economics. The information in this booklet includes data from both published and unpublished materials, current research projects and resource specialists at the North Dakota Agricultural College.

It is intended for use as a handy reference to guide individual farm planning, extension and vocational agriculture farm management and planning programs, and for generally promoting more efficient agricultural production on North Dakota farms.

The information in this handbook will be supplemented and brought up to date as the need arises.



Fred R. Taylor, Chairman  
Department of Agricultural Economics

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BASIC CONSIDERATIONS

A more profitable farm plan can be developed for nearly every farm. Helping the individual farm family to find a more profitable plan is a lesson in farm management. It requires some knowledge of facts and figures concerning production and resource use. And, equally important, it requires the use of economic principles.

Farm planning is basically concerned with the use of resources. How to use land, capital, labor, management abilities and so on to achieve the kind of living that's desired by the farm family. In most cases, the farm family is interested in higher income but not the highest income possible from the farm. This is true because the desire for making money is closely tied to the desires for minimizing risk, decreasing the amount of time and effort needed in the farm business, and maximizing personal satisfactions of the individuals concerned. To some extent all these desires or goals are attained by increasing income. But, a point is always reached whereby some income must be sacrificed to satisfy non-profit goals.

A. Needs For Change:

Most progressive farms are ones that are constantly changing their operations and type of business to keep up with the changing times. Not recognizing that these continuing changes are needed is a major factor accounting for depressed farm income. Some reasons for dynamic farm planning are:

1. Changes in technology - new seed varieties, livestock feeds, production practices and labor saving equipment allow increased output from the same or less amounts of land and labor. Unless one adopts these changes, inefficiency of production may drive one out of business.

2. Changes in costs and prices - increasing costs of resource inputs mean that inputs have to be used wisely to insure a profit margin. Lower product prices suggest that new or different enterprises should be examined for profitability.
3. Changes in demand and markets - Per capita income in our economy is increasing. As the consumer gets more spendable income, he may spend a smaller percentage on food. Also, he tends toward a less starchy diet. Thus the demand and corresponding price becomes relatively higher for meats, fruits and vegetables. Changes in consumer tastes and demand for agricultural products are reflected in market prices.
4. Government Farm Programs - Relative profitability of various farm enterprises and practices are affected by changes in government farm programs.

B. Two Ways To Increase Income:

There are two main avenues open for increasing farm profits:

1. Expand the farm business by using more resources such as capital and land
2. Reorganize the farm business to do a more profitable job with the resource supplies presently available.

The second alternative is possible for all farms and should be considered even for those farms that can acquire more resources. The first alternative usually means an addition of capital or land to the present farm setup. But many farmers are unable to acquire additional acreage; so, increased profits must come from more intensive use of the land they now have. For a fixed amount of land, the most common ways to increase total profits per acre are:

1. More intensive crop production such as increased use of fertilizer.
2. Including livestock in the farm plan.
3. Specialization of enterprises.

C. Where To Start:

The first phase of farm planning is to determine what there is to work with. This means making an inventory of resource supplies.

Land - present acreage, plus additional acreage that would be rented or purchased.

Capital.- present amounts of operating and investment funds, plus capital that could and would be borrowed.

Labor - the operator's labor, plus family help and outside labor that can be hired.

Buildings - Storage space for crops and housing for livestock.

Machinery and Equipment - the capacity of present machinery, equipment and other facilities for both crop and livestock production.

Livestock Feeds - Supplies of feeds from permanent hay acres; potential use of tillable acres for feed production and/or feed supplies purchased off the farm.

Managerial Ability - Present know-how or skill of the operator, and his willingness to learn and try management practices that are new or different. Likes and dislikes for various enterprises and aversion to risk.

D. Examine The Alternatives:

Knowing all the production alternatives and where they fit most profitably on any one farm is one of the most important parts of farm planning. There may be 50 to 100 different production alternatives for each farm. For example, crops can be rotated in several different ways to make 20 to 30 different crop rotations. Then each rotation can be produced with different rates of fertilizer use.

The livestock program contains the possibility of different livestock enterprises. Also, each livestock enterprise can be fed with different rations to provide several more production alternatives within each enterprise. Each different method of production is a different alternative for using resources. Choosing alternatives that best fit or utilize the resource supplies is a key to increased profits.

E. Budgeting:

The heart of farm planning is sitting down with pencil and paper to actually spell out the farm plan. This process allows one to put all the facts and figures into form where they can be critically appraised and compared to decide on the best farm plan. A suggested guide for budgeting is:

1. Make an inventory of the farm's resources
2. Determine all different production alternatives for both crops and livestock
3. Plan the cropping program
4. Fit a livestock program to the farm.
5. Budget out alternative crop and livestock programs - combinations
6. Select the farm plan that fits best, and
7. Work out the transition from "old" to "new" plan.

F. Farm Records:

The following sections in this manual contain guides and figures for developing farm plans. However, all input-output figures shown are typical only and may not exactly apply to any one farm. Before one can critically plan a farm's operation, facts and figures for that one particular farm and operator are needed. The only systematic and accurate method for obtaining this information is by keeping farm records. A good set of farm records will:

1. Show the financial position and net worth of the farm business
2. Allow one to easily compare year to year changes in operation
3. Expose inefficient enterprises that should be weeded out
4. Provide information for:
  - a.-leasing settlements
  - b.-credit statements
  - c.-government programs
  - d.-tax purposes
5. Provide data and information for budgeting and dynamic farm planning that will increase profits.



THE CROPPING PROGRAM

Planning the cropping program involves not only land use but also the use of capital, labor, and management that's used in the production of crops. The most profitable cropping program is the one that gives the highest return to the whole farm business (rather than to land alone.)

A procedure for determining an economic crop setup for a farm would ordinarily include and/or involve:

1. Selection of high-income per acre crops that can be grown consistently while obtaining required erosion and weed control;
2. Choosing a rotation-sequence well adapted to the land and labor resources of the particular farm;
3. Determining an economic fertilizer program tailored specifically to needs of particular crops and fields;
4. Planned use of any permanent pasture and/or forage crops making up the farm's rotation sequence.

On most farms, returns to land - labor - capital - and management are considerable higher when used for crop production instead of livestock production (within seasonal limitations). This is why the cropping program should be planned first. But, most farms are lacking in sufficient cropland acreage to earn adequate net farm family incomes from crops alone. Hence, the overall farm business operation will usually include livestock; this means that the farm's cropping program cannot always be made without considering the feed needs of livestock to be fitted to the farm.

A. Importance Of Selecting High Income-Expectancy Crops

Fixed cost overhead per acre is substantially the same for all close-grown crops one may elect to grow on a North Dakota farm. In fact, most of those fixed costs per cropland acre (e.g. land use, taxes, operator's family living costs, etc.) stick at about the same level whether you plant crops or go fishing.

Variable costs of producing and harvesting most small grain and oilseed crops (excepting fertilizer) are quite similar also on a per-acre basis in North Dakota.

So, in the selection of crops to grow for maximum profit, rating the several crops one may grow is most practically done on the basis of "expected operator-return per acre" over and above the farmer's usual variable costs of producing a close-grown crop. In pre-judging crops on the basis of "expected operator return per acre", a farmer should use his own sound assumptions as to (1) price-expectancy (2) per-acre yield-expectancy, and (3) probable variable cost outlay per acre under his particular production and marketing conditions.

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B. Remember And Use This Handy Formula:

$$"\$Operator\ Return/A. = "Price/Unit\ X\ Yield/A." - "\$Variable\ Cost/A."$$

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C. Wheat Is Usually Top Dollar Crop To Grow

In all land use areas of North Dakota, wheat gives highest average profits of all the close-grown crops one may elect to grow. Only rarely is there found exceptions to this case. In addition, wheat (of the several close-grown crops) provides the North Dakota farmer with his most economically profitable returns from added increments of fertilizer per acre.

Barley and flax are usually the next highest paying close-grown crops sold on the cash market in North Dakota, particularly in central and eastern land use areas climatically kind to malting-barley and early flax producers. In certain adapted areas of the state, soybeans and grain corn may nearly hold their own with malting-barley and flax in terms of dollar operator-return per acre over time.

Alfalfa and other hay crops may be more profitable than either barley or flax for many North Dakota farmers. If the anticipated cash market price for hay is \$12 per ton or greater (or its cash equivalent provided on the farm through economic feeding of livestock) the profitability of a hay crop should not be overlooked.

D. Thumb-Rules Guiding Selection Of Cropping Program:

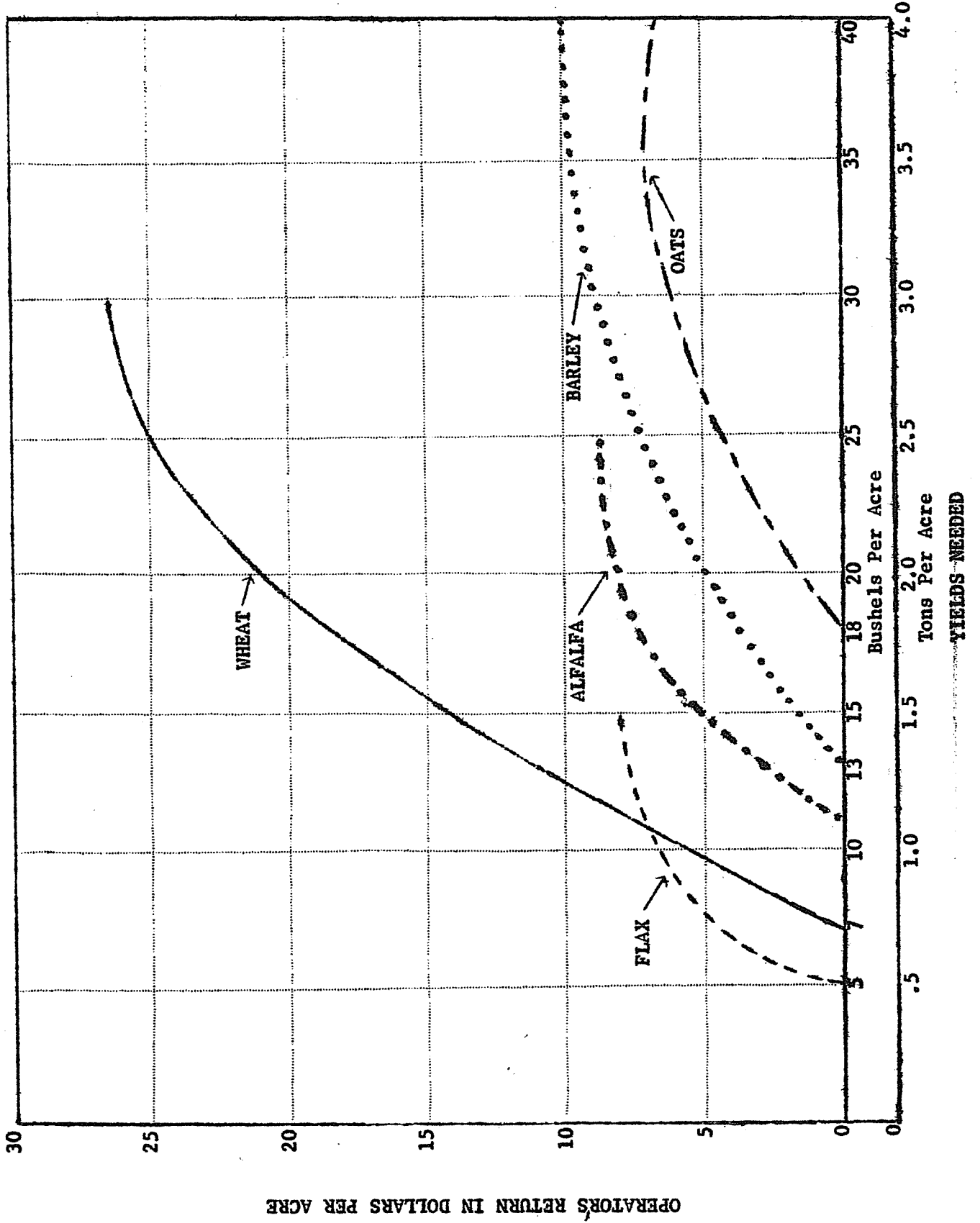
1. Per acre yields are the dominant factor determining profitability of crop production;
2. Total production costs per acre, excepting fertilizer costs, tend to remain "about the same" regardless of harvested yield. Therefore, a 50 percent increase in yield over past-average performance may easily double or triple per-acre profits for most North Dakota close-grown and row crops.
3. In general, production costs per-bushel (hundredweight or ton) decrease as yields per harvested cropland acre are increased.
4. Usually include sufficient hay acreage to utilize its complementary effect upon grain. (See example in Table p.6) Additional hay acreage depends on feed needs of livestock for most farmers (or expected price per ton on the cash market, generally).
5. Use recommended crop varieties for maximum cropping profits.
6. If you use Nitrogen fertilizers, add enough to cash in on near-maximum economic response (using NDAC's useage guides for your particular farm's soils and soil-moisture situations). Applied at fairly heavy rates, Nitrogen fertilizers may give benefits more than one year (not so, however, for Phosphorous applied alone without Nitrogen in North Dakota).
7. Maximize acreage of "high pay crops" for your land-use area in the cropping sequence or rotation selected. (a) Wheat in all land use areas (b) Potatoes & Sugar Beets in established market areas of Red River and Yellowstone Valleys (c) Malting-barley, Soybeans, Flax, Grain Corn in adapted land-use areas.

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(Most Frequent) MODAL PER ACRE CROP COSTS AND RETURNS<sup>1/</sup>

Item	Wheat	Barley	Oats	Flax	Rye	Soybeans	Corn For Grain	Corn For Silage	Alfalfa Hay	Sugar Beets	Potatoes
<u>Preharvest Costs (\$)</u>											
Power <sup>2/</sup>	4.80	4.00	3.20	3.35	3.20	4.00	4.15	4.15	.40	26.00	12.00
Seed	3.00	2.50	2.00	2.30	1.55	4.00	2.00	2.00	3.50	4.50	26.00
Fertilizer	2.50	2.90	2.80	2.15	1.00	1.00	2.00	---	1.80	7.00	12.00
Spray	.35	.35	.35	.35	---	---	---	---	---	3.00	3.00
Insurance	1.60	1.25	.50	1.25	.50	1.00	1.00	1.00	---	---	---
Total	12.25	11.00	8.85	9.40	6.25	10.00	9.15	7.15	5.70	40.50	53.00
<u>Harvest Costs (\$)</u>											
Power <sup>2/</sup>	3.45	3.45	3.45	3.45	3.45	3.45	3.80	5.40	8.25	22.00	10.00
Extra Labor	.25	.25	.20	.15	.20	.20	.75	1.00	.60	15.00	8.50
Other	.25	.25	.30	.15	.20	.20	1.90	.50	.45	4.00	2.50
Total	3.95	3.95	3.95	3.75	3.85	3.85	6.45	6.90	9.30	41.00	21.00
<u>Total Costs (\$)</u>	16.20	14.95	12.80	13.15	10.10	13.85	15.60	14.05	15.00	81.50	74.00
Production	21 bu.	26 bu.	36 bu.	9 bu.	17 bu.	14 bu.	25 bu.	3.7 T	2.3 T	11 T	130 cwt.
Average Price (\$)	1.80	.90	.55	2.35	.90	1.75	1.00	4.00	12.00	13.00	.85
Value of Crop (\$)	37.80	23.40	19.80	21.15	15.30	24.50	25.00	14.80	27.60	143.00	110.50
<u>Operator Return<sup>3/</sup></u>	21.60	8.45	7.00	8.00	5.20	10.65	9.40	.75	12.60	61.50 <sup>4/</sup>	36.50

<sup>1/</sup> Based primarily on central North Dakota except for sugar beets and potatoes which apply to the Valleys.  
<sup>2/</sup> Includes ownership costs of machinery and equipment.  
<sup>3/</sup> Returns to operator's labor, land, capital and management.  
<sup>4/</sup> Two years of land costs should be subtracted from this figure when establishing a net return figure.



OPERATORS' RETURN IN DOLLARS PER ACRE

YIELDS NEEDED

Which Rotation?

Crop rotations usually are built around a main crop, such as wheat. Because of variability in soils on a farm, there will often be two or three rotations used. Planned rotations are used to:

1. control weeds, insects and diseases;
2. prevent soil erosion;
3. lessen risk and uncertainty;
4. even out labor and power requirements;
5. adjust to moisture needs and maintain soil productivity.

Some crops are raised in rotation even though they produce a relatively low direct return. Oats, for example, is typically a low income crop. However, some reasons for including oats in the rotation are:

1. It's an early-in, early-off, ground-mellowing crop;
2. Oats provide straw for bedding on livestock farms, or "emergency-hay";
3. Oats provide a valuable feed grain for livestock, alone or with other grains.

In most parts of North Dakota, barley can replace oats under any of the three reasons given above and at the same time produce a higher direct return.

A very important concept in selecting which crops to include in a rotation is the relationships among different crops. The three basic relationships among both crop and livestock enterprises are:

1. Complementary-when an increase in total output of one crop also increase the total output in another crop, from a fixed amount of acreage or other resource. Example: small grains following a legume.
2. Competitive-when an increase in total output of one crop decreases the total output in another crop, from a fixed amount of acreage or other resource. Example: oats versus barley, cattle versus sheep (this relationship usually exists to some degree among all farm enterprises).
3. Supplementary-when an increase in total output of one enterprise neither decreases or increases the total output in another enterprise, from a fixed amount of resources. Example: A small laying flock of chickens.

COMPLEMENTARY AND COMPETITIVE RELATIONSHIPS BETWEEN SMALL GRAINS AND ALFALFA

Rotation	Yield Per Acre		Total Production Per 100 Crop Acres	
	Wheat	Barley	Wheat	Barley
1. Wheat-Barley-Flax-Fallow	23	26	575	650
2. Wheat-Barley-Flax-Alfalfa*	24	27	600	675
3. Wheat-Barley-Flax-Alfalfa-Alfalfa	24	27	480	540

\*Wheat-Barley-Flax/S. Clover-Fallow "A Popular Sequence" in Eastern North Dakota that is commonly used with comparable output.

Rotation	Relationship of Alfalfa to Small Grains	Gross Return From Small Grains Per 100 Crop Acres	Gross Return From Small Grains Sacrificed To Produce An Additional Ton of Forage
2. Wheat-Barley-Flax-Alfalfa	Complementary	2,216	None
3. Wheat-Barley-Flax-Alfalfa-Alfalfa	Competitive	1,773	\$10.45

Profitable Fertilizer Use

The use of commercial fertilizer is one of the most profitable farm practices that exists. The important question here is how much to use. This depends on the yield response as increasing amounts of fertilizer are applied. There are several ways the individual farmer can guide himself toward profitably using fertilizer.

1. Utilize the soil testing service at the college.
2. Study recommendations from the experiment stations, extension personnel and fertilizer dealers.
3. Check with neighbors who have been using fertilizer on similar soils.
4. Use field check strips.

After one has determined the physical response from fertilizer, there are economic principles to guide him in maximizing profit from fertilizer use.

Applying fertilizer is profitable if:

1. The added cost is less than the added return.
2. The return from dollars spent for fertilizer is greater than the return would be if the same dollars are used elsewhere in the farm business.

One of the best examples of diminishing returns is in fertilizer use. This law or principle determines the amount of fertilizer to use because each added increment of fertilizer gives less return than the preceding increment.

EXAMPLE OF "DIMINSHING RETURNS" AND "ADDED COSTS-  
ADDED RETURNS PRINCIPLE"

Item	0	Pounds of Nitrogen		
		20	40	60
Yield Per Acre (bushels)	20	25	28	29.5
Change in Yield (bushels)	--	5	3	1.5
Added Return	--	\$9.25	\$5.55	\$2.77
Added Cost	--	3.00	2.60	2.60
Return Per Added Dollar Spent on Fertilizer	--	3.08	2.13	1.06



In the above example, a farmer with unlimited capital would get highest profits by using 60# of N because his added cost at this point is still less than the added return. If operating capital is severely limited, he would have to compare the returns per dollar spent on fertilizer with returns per dollar from other investments to determine how much fertilizer to apply.

### Fertilizer Use And Price Changes

Profits in fertilizer depend on both fertilizer costs and product prices. As prices and costs change, the most profitable rate of fertilizer also may change. It's very important to realize that added costs for fertilizer tend to decrease the production costs per bushel or ton. As a result, the use of fertilizer when product prices are low may be very important to insure a plus return from crop production.

#### COSTS AND RETURNS FROM THREE ACRES OF CROPS (AT THREE FERTILITY LEVELS AND THREE PRICE LEVELS) WITH PRODUCTION COSTS OTHER THAN FERTILIZER ASSUMED CONSTANT

Price Level	Item	Levels of Fertilizer Use			
		None	Low	Med.	High
	Fertilization cost \$		\$ 10.80	\$ 20.50	\$ 32.10
	Production Costs (includes rent, & labor)	97.32	108.12	117.82	129.42
<u>Relatively high:</u>					
Wheat at \$2.04 bu.)					
Barley at \$.99 bu.)	Value of crops	105.49	126.12	149.73	163.18
Alfalfa at \$15.40 ton)	Net return	8.17	18.00	31.91	33.76
<u>Near Average:</u>					
Wheat at \$1.85 bu.)					
Barley at \$.90 bu.)	Value of crops	95.80	114.55	135.99	148.20
Alfalfa at \$14.00 ton)	Net return	-1.52	6.43	18.17	18.78
<u>Below Average:</u>					
Wheat at \$1.66 bu.)					
Barley at \$.81 bu.)	Value of crops	86.11	102.96	122.24	133.22
Alfalfa at \$12.60 ton)	Net return	-11.21	-5.16	4.42	3.80

General Facts And Guides

Because of the wide differences in soils and rainfall within North Dakota, fertilizer recommendations must be made for relatively small areas. However, from an economic standpoint it is quite safe to assume for all areas that higher profits result if:

1. Limited amounts of operating funds are used to (1) fertilize all acres at a low rate rather than (2) some acres at a high rate with no fertilizer on the remaining acreage.
2. Funds are invested in fertilizer before livestock, and for a high enough application of fertilizer such that the profit from the last dollar spent for fertilizer is about 50 per cent.

AVERAGE CROP YIELD RESPONSES AND RETURNS TO RECOMMENDED  
FERTILIZER TREATMENTS IN NORTH DAKOTA, 1957-59<sup>1/</sup>

Crop	Acres checked	Cost of fert per acre*	Added return from fert. per acre	Profit from fertilizer per acre	Per cent profit
Wheat fallow	4,019	\$2.62	\$7.68	\$5.06	193
Wheat nonfallow	2,620	5.81	9.14	3.33	57
Barley fallow	369	2.53	6.27	3.74	148
Barley nonfallow	3,319	5.78	7.47	1.69	29
Oats nonfallow	366	6.20	6.79	.59	10
All Crops	10,693	4.50	7.89	3.39	75

\*These cost figures are estimated average costs, including application, of several different kinds of commercial fertilizers.

<sup>1/</sup>Source: North Dakota Farm Research, Vol. 21, No. 5, page 21, May-June 1960.

On the average, a ton of barnyard manure should replace about 10 lbs. of nitrogen, 5 lbs. of phosphate and 10 lbs. of potash.

M A C H I N E R Y   A N D   E Q U I P M E N T

Buying, owning, and operation of machinery and equipment is one of the biggest (if not the biggest) capital expense items in the business of operating the modal North Dakota farm today. Management of this segment of the operator's risk capital composite often holds the key to success or failure in the creation of net spendable farm income.

Basically, use of machinery means use of capital as a substitute for labor. Whether or not one should buy a new piece of machinery depends, economically, upon "benefits of having the machine" versus "cost of owning and operating the machine". A first step in making such an economic decision is to estimate the "annual cost to the farm business". For example:

Item	3-Plow Gas Tractor	Your Machine
A. Original Capital Outlay	\$ 3740	\$ _____
B. Fixed Annual Costs.....	\$ 380	\$ _____
1. Interest/Ave. Investment.....	\$ 135	_____
2. Annual Depreciation, average.....	\$ 200	_____
3. Insurance, Taxes, Miscellaneous.....	\$ 45	_____
C. Annual Variable Costs.....	\$ 520	\$ _____
1. Repairs, including tires.....	\$ 240	_____
2. Fuel, oil, and grease, etc.....	\$ 280	_____
D. TOTAL ANNUAL COSTS.....	\$ 900	\$ _____

Annual costs of owning a new machine must be compared carefully with annual costs of owning the machine to be traded, unless the new machine is to be an addition rather than a replacement. Consequently, only the added costs of owning the new machine should be considered when making this kind of a management decision, generally.

Is It A Sound Investment?

When increased costs are incurred in the farm business, there are several factors one should consider. Whether the expenditure is for machinery or any other factor of production, the one basic principle to use is: Will this expenditure create more profit than the same amount of money invested elsewhere in the farm business?

To help answer this question for a proposed machinery investment, some items to consider are:

1. How many dollars worth of labor can be saved or replaced by this machine?
2. Will this machine make better use of other equipment?
3. Will this machine require other investment in companion equipment?
4. Will this machine add to timeliness of operation that can increase profits?
5. How much can production be increased by owning this machine?

How Big?

Larger machines do the job quicker, but they also require larger expenditures. Buying the right size machine will add most to profits. Overinvestment not only requires a large cash outlay at the outset but means higher maintenance costs. Replacing labor with machinery investment is profitable only if the cost of the labor replaced is greater than the cost of the machinery added.

Compare the last two columns in the next table to see how costs and time per acre change for different sizes of machines:--

USUAL OPTIMUM MACHINERY COSTS AND LABOR<sup>1/</sup>

Kind	Machine Hours	Size	Original Cost <sup>2/</sup>	Average Investment	Annual Fixed Costs <sup>3/</sup>		Annual Variable Costs <sup>4/</sup>		Annual Total Costs	
					Total	Per Hour	Total	Per Hour	Total	Per Hour
Tractor/g	625	2-pLOW	\$ 2680	\$ 1480	\$ 296	\$.47	\$ 468	\$.75	\$ 764	\$ 1.22
Tractor/g	530	3-pLOW	3740	2060	412	.78	592	1.12	1004	1.90
Tractor/g	500	4-pLOW	4450	2440	490	.98	715	1.43	1205	2.41
Tractor/d	520	5-pLOW	5500	3025	604	1.16	718	1.38	1322	2.54

<sup>1/</sup> From Project H-3-17, Dept. of Ag. Econ.; NDAC

<sup>2/</sup> Includes depreciation, insurance, interest on investment and taxes.

<sup>3/</sup> Average cost of different makes of machines.

<sup>4/</sup> Includes repair, fuel, lub., etc.

HOUR AND ACRE ASSUMPTIONS USED FOR COMPUTING OPTIMUM MACHINE COSTS

Size of Machine Combination	Hours of Machine Use	Number of Tillable Acres
2-pLOW combination	625	300
3-pLOW combination	530	380
4-pLOW combination	500	525
5-pLOW combination	520	650

(SEE NEXT PAGE FOR COSTS AND LABOR REQUIREMENTS PER ACRE FOR VARIOUS IMPLEMENTS)

OPTIMUM MACHINERY COSTS AND LABOR (continued)

Machine Kind	Size	Original <sup>12/</sup> Cost	Average Investment	Annual Fixed Costs <sup>3/</sup>		Annual Variable Costs <sup>4/</sup>		Annual Total Costs		Hours Per Acre
				Total	Per Acre	Total	Per Acre	Total	Per Acre	
Plow, Moldboard	2-14"	\$ 510	\$ 280	53	.36	\$ 36	.24	\$ 89	.60	1.11
Plow, Moldboard	3-14"	650	360	69	.33	40	.19	109	.52	.67
Plow, Moldboard	4-14"	800	440	85	.33	44	.17	129	.50	.45
Plow, Moldboard	5-14"	1200	650	125	.41	74	.24	199	.65	.37
Field Cultivator	7 ft.	470	260	41	.20	8	.04	49	.24	.36
Field Cultivator	10 ft.	540	300	48	.14	10	.03	58	.17	.23
Field Cultivator	12 ft.	610	340	54	.14	11	.03	65	.17	.16
Field Cultivator	14 ft.	730	400	65	.14	18	.04	83	.18	.15
Tandem Disk	8 ft.	385	210	41	.34	4	.03	45	.37	.31
Tandem Disk	10 ft.	605	330	64	.40	5	.03	69	.43	.23
Tandem Disk	12 ft.	655	360	69	.32	7	.03	76	.35	.18
Tandem Disk	14 ft.	805	440	85	.31	8	.03	93	.34	.15
Harrow, Boss	15 ft.	340	185	31	.05	6	.01	37	.06	.17
Harrow, Melroe-type	25 ft.	540	300	47	.05	8	.01	55	.06	.09
Harrow, Melroe-type	35 ft.	700	385	62	.06	11	.01	73	.07	.06
Harrow, Melroe-type	45 ft.	830	455	73	.05	13	.01	86	.06	.05
Press Drill & fert. att.	7 ft.	790	440	70	.33	17	.08	87	.41	.38
Press Drill & fert. att.	12 ft.	1300	720	115	.40	23	.08	138	.48	.21
Press Drill & fert. att.	14 ft.	1450	800	128	.34	26	.07	154	.41	.16
Press Drill & fert. att.	21 ft.	2280	1250	202	.45	31	.07	233	.52	.11
Swather, Pull-type	12 ft.	940	515	118	.27	22	.06	140	.33	.21
Swather, Pull-type	16 ft.	1150	630	145	.21	25	.05	170	.26	.13
Combine, Pull-type	6 ft.	3340	1840	476	2.27	206	.98	682	3.25	.56
Combine, W/motor	12 ft.	5130	2820	727	1.94	325	.87	1052	2.81	.28

Mchny-Equip. 4

1/2/3/4/ See previous page for explanation of footnotes.

Alternative To Owning

Many farms aren't large enough to justify owning all modern equipment.

If a machine can't be used efficiently, some possible guides or solutions are:

1. Buy it anyway even if you can't use it efficiently--this is very expensive.
2. Buy used equipment. (Some do very well with it.)
3. Expand the farm business to efficiently utilize the machinery.
4. Buy it in partnership with a neighbor.
5. Buy it and do custom work to make full use of it, in special cases.
6. Hire a custom operator to do the job.

For custom hiring, one has to compare the costs of owning versus the costs of hiring. (See the guide on the next page.) Other considerations here are:

1. Timeliness--being able to hire a machine when you need it.
2. Lack of Capital--even if custom hiring appears to be more expensive than owning, budgeting may show that "scarce funds" will give a higher return elsewhere in the farm business than if used to purchase and use a machine.
3. Labor Savings--carefully analyze the labor situation to determine the benefits of tying up less labor by hiring a custom operator.
4. Work Quality--will a custom rig do the job satisfactorily?

Rules of Thumb for Custom Hiring

Assuming no costs for the farm operator's labor and timeliness of getting the job done:

1. One has to harvest 200 acres of small grains to economically justify owning a 12 ft. pull-type combine.
2. With a hay yield of 1.5 tons per acre, 90 acres of hay must be baled to economically justify owning a baler.

COST GUIDE FOR OWNING VERSUS CUSTOM HIRING

Kind of Machine \_\_\_\_\_

Cost of Owning

Depreciation =  $\frac{\text{Original Cost}}{\text{Years of Life}}$  = \$ \_\_\_\_\_ = \$ \_\_\_\_\_

Interest = Average Investment \$ \_\_\_\_\_ x .06 = \$ \_\_\_\_\_

Annual Costs	{	Taxes	\$ _____
		Fuel	\$ _____
		Repairs	\$ _____
		Labor	\$ _____
		Other	\$ _____

Total cost of owning and operating \$ \_\_\_\_\_

Cost of Custom Hiring

\$ \_\_\_\_\_ charge per { Acre  
Bale  
Hour } x \_\_\_\_\_ total { Acres  
Bales  
Hours } = \$ \_\_\_\_\_

Comparison of Costs

Total cost of cwning and operating \$ \_\_\_\_\_

Total cost of custom hiring (\$ \_\_\_\_\_) minus cost  
(or value) of own labor and power furnished  
( \$ \_\_\_\_\_ ) leaves net cost of custom-hiring at \$ \_\_\_\_\_



## MISCELLANEOUS COSTS

<u>Item</u>	<u>Unit</u>	<u>Approximate Cost of Materials Per Unit</u>
Woven wire fence	rod	\$ 1.00
Barbed wire	rod	.12
Cedar fence posts	4" post	.47
Cedar fence posts	6" post	.95
Steel fence posts	each	.78-.95
Cement blocks (8"x8"x16")	each	.25
Concrete Floors		
4" floor	sq. ft.	.20
6" floor	sq. ft.	.30
Sheds		
Pole shed	sq. ft.	.60-.80
Frame(gable roof)	sq. ft.	.95-1.25
Gothic (homemade rafters)	sq. ft.	1.00-1.25
Prefab. Laminated rafter	sq. ft.	1.20-1.50
Commercial all steel	sq. ft.	1.15-2.00
Grain Storage		
Round steel granary	bu.	.25-.40
Wooden granary	bu.	.40-.50
Feedlot Equipment		
Fence line feed bunk	linear ft.	2.40-3.00
Portable feed bunk	linear ft.	2.00-2.50
Hay self feeder	linear ft.	4.50-6.00
Board fence (8' to 12' high)	linear ft.	2.25-3.50
Rail fence (4-2x6's)	linear ft.	1.10-1.40
Corral fence (6-2x8's)	linear ft.	1.45-2.25
Complete gate (12')	each	20.00-25.00
Water		
Well Drilling (3")	ft.	2.65
Well Drilling (4")	ft.	2.75
Casing	ft.	1.60-2.25
Screen and Fittings	per well	100.00
Pumping and Developing	per well	90.00-100.00
Pressure pumps (shallow well)	each	110.00-130.00
Jet pumps (deep well)	each	225.00-250.00
Galvanized Pipe (1"-1½")	ft.	.35-.55
Plastic Pipe (3/4"-1½")	ft.	.14-.22
Copper Pipe (3/4")	ft.	.70
Fittings	ft.	.10
First Class Distribution System (Including digging & plastic pipeline)	ft.	1.00

(continued next page)

MISCELLANEOUS COSTS-continued<sup>1/</sup>

<u>Item</u>	<u>Unit</u>	<u>Approximate Cost of Materials Per Unit</u>
Wooden Stock Tanks (300 to 1200 gals.) (fir)	each	\$ 56.00-125.00
(redwood)	each	70.00-160.00
Round End Steel Tanks (70 to 240 gals.)	each	25.00-45.00
Windmill - - - - - From \$250 for 22 ft. tower to \$700 for 40 ft. tower.		
Pump Jack (most common one used)	each	65.00
Silage Storage:		(Contract Cost)
Horizontal types, with floor	linear ft.	12.00-15.00
Conventional tower-type, under 300 ton*	ton	12.00-15.00
Tower-type, over 300 ton, glazed*	ton	15.00-20.00
*Allow additional \$1400-1800 for silo top and unloader; You may be able to pick up contract deals a little easier than for the price indicated in some instances, but don't count on it too strongly.		
Feed wagons, multiple use type with augur	each	1600.00-2500.00

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<sup>1/</sup>Add to this list costs of other miscellaneous items you may wish to refer to occasionally. Also, we suggest that you make frequent revisions in cost of items listed in this 1960 handbook as you come in contact with farm suppliers patronized by your county's farm operators.

## LABOR REQUIREMENTS AND USE

On most farms, labor is typically a scarce resource. It contributes more to farm income than either land or capital. Even though family labor doesn't use any out-of-pocket expense, the efficient use of this labor plays a big role in determining the magnitude of farm profits. The value of family labor used on any one job is the profits it would make if used on any other job, on or off the farm.

### Typical Family Labor Supply

Time Period	Man Hours
March } April }      Spring May }      Labor	810
June } July }      Summer }      Labor	780
August } September }      Fall October }      Labor	910
November } December }      Winter January }      Labor February }	1,020

### Factors Affecting Labor Efficiency

Higher output per man usually means higher profits. There are many places in the farm operation to check for higher utilization of labor.

For example:

1. Layout of fields and farmstead
  - a. Avoid small and irregular shaped fields whenever possible;
  - b. Minimize boundary fences and lanes;
  - c. Simplify chore routines and place buildings near work areas;
  - d. Use gravity to move feed and supplies.

2. Supplementary enterprises

- a. Enterprises that utilize "potentially unused labor" do not increase total labor costs -- many livestock enterprises fall in this category;
- b. Do repair work during slack seasons.

3. Managing hired labor

- a. Have a work plan and schedules showing job priority;
- b. Create responsibility and prestige in the hired-labor force by letting them share work planning;
- c. Provide incentives for maximum work effort through bonuses and profit-sharing arrangements, vacation privileges, etc.

4. Substituting capital for labor

- a. Getting higher capacity machinery and equipment can increase output per man but economic efficiency isn't always measured in more product per man hour. A labor-saving device won't increase profits unless the amount of labor freed is worth more than the cost of machinery and equipment needed to replace the labor.
- b. Example of hourly return needed to justify a new barn, economically:

Added annual costs for new barn = \$ 600

Labor savings per cow = 20 hours

Total labor savings for 30-cow herd = 600 hours

Labor return needed to offset higher annual costs =  $\frac{\text{added costs}}{\text{labor savings}} = \frac{\$600}{600 \text{ hrs}} = \$1/\text{hour}$

With this example, costs are increased by building a new barn if labor is valued at less than \$1 per hour. If labor is valued at greater than \$1 per hour, costs would be decreased by investing in the new building. This same principle applies for any capital expenditure used to replace labor.

Direct Labor Requirements Per Acre And Distribution By Monthly Groups

Crop	Total Hrs/Yr.	Unit	Percent and Hourly Distribution By Monthly Groups				
			Nov.-Dec.-Jan.-Feb	March-April-May	June-July	Aug.-Sept.-Oct.	
Wheat	2.80	% Hrs.	---	43.20 1.21	9.60 .27	47.20 1.32	
Barley	2.80	% Hrs.	---	43.20 1.21	9.60 .27	47.20 1.32	
Oats	2.11	% Hrs.	---	43.20 .91	9.60 .20	47.20 1.00	
Flax	2.07	% Hrs.	---	38.73 .80	9.84 .22	50.80 1.05	
Rye	2.65	% Hrs.	---	10.00 .26	35.00 .93	55.00 1.46	
Soybeans	4.32	% Hrs.	2.20 .10	28.70 1.24	36.60 1.58	32.50 1.40	
Corr, grain	5.00	% Hrs.	2.00 .10	28.00 1.40	25.00 1.25	45.00 2.25	
Corn, silage	7.50	% Hrs.	---	17.51 1.31	30.68 2.30	51.81 3.89	
Alfalfa, hay	3.22	% Hrs.	---	1.00 .04	71.90 2.31	27.10 .87	
Sugar Beets	13.00 <sup>1/</sup>	% Hrs.	6.00 .78	8.00 1.04	40.00 5.20	46.00 5.98	
Potatoes	14.52 <sup>2/</sup>	% Hrs.	35.00 5.08	12.00 1.74	13.00 1.89	40.00 5.81	

<sup>1/</sup> Contract labor not included.  
<sup>2/</sup> Operator's labor only.

Direct Labor Requirements For Livestock

Kind	Size-Range of Enterprise	Unit	Labor in Hours Per Year	Your Labor in Hours Per Year
Dairy	5 - 9 cows	Per Head	158	_____
	10 - 14 cows		128	_____
	15 - 29 cows		104	_____
Hogs	2 - 4 litters	Per Litter	47	_____
	5 - 6 litters		45	_____
	7 - 10 litters		30	_____
	11 - 15 litters		25	_____
Ewes	Under 85 ewes	Per Ewe	8.7	_____
	85 - 164 ewes		3.6	_____
	165 - 350 ewes		2.8	_____
Feeder Lambs	Under 100 lambs	Per 100 Lambs	180	_____
	100 - 299 lambs		140	_____
	300 - 600 lambs		104	_____
	600 - 1000 lambs		80	_____
Turkeys	Under 825 poults	Per 100 Turkeys	74	_____
	826 - 1735 poults		67	_____
	1736 - 4480 poults		40	_____
Beef Cows	Under 30 head	Per Head	29	_____
	30 - 49 head		24	_____
	50 - 100 head		13	_____
	Over 100 head		10-11	_____
Feeder Calves (From 400 to 1,000 lbs.)	Under 20 head	Per Head	18	_____
	20 - 39 head		12	_____
	40 - 79 head		9	_____
	80 - 120 head		7.5	_____
Yearling Steers (From 700 to 1,000 lbs.)	Under 20 head	Per Head	11	_____
	20 - 39 head		10	_____
	40 - 79 head		7	_____
	80 - 120 head		5.	_____
2-Year Old Steers (From 850 to 1,100 lbs.)	Under 20 head	Per Head	8	_____
	20 - 39 head		6	_____
	40 - 79 head		4.5	_____
	80 - 120 head		3	_____
Heifer Calves (From 450 to 800 lbs.)	Under 20 head	Per Head	12	_____
	20 - 39 head		10	_____
	40 - 79 head		7.5	_____
	80 - 120 head		6	_____

Usual Labor Distribution on Livestock, By Monthly Groups

Livestock	Percent of Total Labor			
	Nov.-Dec.-Jan.-Feb	March-April-May	June-July	August-Sept.-Oct.
Dairy	41.5	26.8	13.4	18.3
Hogs	22.6	33.4	20.0	24.0
Ewes	28.0	46.0	8.0	18.0
Feeder Lambs	85.0	---	---	15.0
Beef Cows	40.0	28.0	12.0	20.0
Feeder Calves	45.0	30.0	10.0	15.0
Yearling Steers	60.2	25.0	---	14.8
2-Year Old Steers	75.0	25.0	---	---
Heifer Calves	49.0	29.0	12.0	10.0
Turkeys	0.4	38.7	29.0	31.9

DEVELOPING THE LIVESTOCK PROGRAM

I. WHY KEEP LIVESTOCK

A farmer keeps livestock to increase the size of his business and farm profits by utilizing unused labor and available capital together with management ability.

- A. Labor utilization. -- In general, high yielding, high profit crops give higher returns for man labor than do livestock enterprises. However, on most farms the seasonal production of crop uses only a part of the farmer's time, therefore the unused labor may be profitably applied to livestock production.
- B. Capital utilization. -- A farmer may profitably use additional capital of his own or borrowed capital for livestock production. It may be the best alternative for increasing the size of his business.
- C. Management ability. -- A farmer may have particular skills and management ability which can best be capitalized through livestock production.
- D. Marketing feed grains through livestock usually brings higher returns than if sold on the cash market.
- E. Farm produced roughage feeds usually do not have a dependable market except through livestock on the same farm.
- F. Permanent pasture has no market value except through livestock. Other forage crops may be grazed to reduce labor, power and equipment costs.



II. FACTORS AFFECTING THE KIND AND AMOUNT OF LIVESTOCK

- A. Size of farm and labor supply. -- Generally, the problem on small farms is to profitably utilize labor, therefore, livestock with higher labor requirements and high returns per acre (hogs, dairy cattle, and poultry) are usually adapted to these farms. On large farms the available labor for livestock is usually more scarce and the feed supply is larger, therefore, livestock with lower labor requirements per unit of feed (hogs, beef cattle, and sheep) are generally better suited.
- B. Skill of the operator. -- The farmer who has or can acquire the necessary skills to handle livestock can expect a good return from his feed above its market value. Without these skills a crop farmer may lose on livestock.
- C. Feed supply. -- On larger farms, where labor is limited, first the most profitable cropping programs are selected; then the livestock program is adapted to it. On smaller farms the livestock program influences the cropping system.
1. If the optimum cropping system provides significant supplies of forage feed, roughage consuming livestock (beef, dairy cattle, and sheep) usually have first claim to the feed supply.
  2. If there is surplus labor, grain consuming livestock (hogs, poultry, feeder cattle, and feeder lambs) can be expanded. This may involve sale or purchase of grain.

- D. Financial requirements. -- Capital needs and the rate of capital turnover vary among the kinds of livestock. Capital requirements per productive man work unit are lowest for laying flocks and dairy, are moderate for hogs and ewe flocks and high for beef cow herds, cattle feeding, and lamb feeding. Hogs, poultry, cattle feeding and lamb feeding give a rapid turnover of capital; the investment in the feed and livestock is normally returned within a year. Dairy cows require two to three years, and beef cows five to six years in returning investment capital.
- E. Personal preference. -- Except in unusual cases, personal preference is a good guide only as long as it is based on economic principles.

### III. ADVANTAGES AND DISADVANTAGES OF SPECIALIZATION

Specialization tends to increase the risks in farming, but it has some advantages which help increase income. To say it the other way around, general farming tends to stabilize income at a lower level.

Specialization reduces unit costs of production by the more efficient use of labor, buildings and equipment. It also makes possible more advantageous purchasing and marketing.

Specialization makes possible larger enterprise units. As size of enterprise increases, the following changes take place:

- A. Capital requirements per man are increased. At times it is a device for substituting capital for labor.
- B. Managerial requirements for the specialty increase. But it is easier to manage one enterprise than several.

- C. Labor requirements per animal are reduced.
- D. Fixed costs for superior buildings and equipment can be spread over greater numbers so that the cost per animal is no greater.
- E. Cost of purchased items may be reduced by quantity discounts.
- F. Producing high quality products becomes easier and profitable.

#### IV. YARDSTICKS FOR LIVESTOCK EFFICIENCY

Since livestock efficiency is a major factor determining profits from livestock enterprises, the following are some measures of this important factor:

- A. Pigs marketed per litter ( $7\frac{1}{2}$  - 8).
- B. Milk or butterfat per cow (300 - 350 lbs. butterfat).
- C. Percent calf crop saved from beef cows (90 - 95).
- D. Number of lambs saved per ewe (100 - 110).
- E. Daily gains of steers, lambs, and hogs (1.8 - 2.3).
- F. Eggs per hen (200 to 225).
- G. Returns per dollar's worth of feed fed adjusted for type of livestock (\$1.50 - \$1.75).

#### V. ADJUSTING THE LIVESTOCK ENTERPRISES TO CHANGING ECONOMIC AND TECHNOLOGICAL CONDITIONS

In planning a livestock enterprise, it should have enough flexibility to adjust to changing conditions.

- A. Economic conditions. -- Each class of livestock has its particular seasonal and cyclical price movements. As the livestock-feed

price ratios change, the farmer will want to be in a position in which he can expand or contract enterprises.

- B. Technological Conditions. -- Feeding and handling methods and processes are continuously changing and improving. The early adapters of new developments in livestock breeding, feeding, disease control and labor saving methods gain the most benefits. Buildings and equipment which require heavy investments should be planned for flexibility in livestock production.

## VI. SUMMARY OF GUIDING PRINCIPLES

- A. In setting up the livestock program for a farm, the farmer should maximize the use of his available resources -- raised or purchased feed supplies, labor, capital, managerial skill, and markets.

1. Most profitable livestock programs are built around the feed supply produced by a sound land use and cropping system. These livestock programs provide for:
  - a. The use of non-salable pastures, crop residues and byproduct feeds.
  - b. The use of salable feeds.
  - c. The use of purchased feeds.
2. Although crop production usually gives a higher return to labor, livestock production can utilize the labor supply not needed for growing crops. It provides for better

distribution of labor supply and makes possible a larger volume of business on a given acreage.

3. Livestock efficiency is one of the most important single factors influencing livestock profits.
4. Specialization in livestock enterprises is usually more profitable but it increases the risks and requires more capital and management skill.
5. The livestock enterprise should have flexibility for adjustment to economic and technological changes.

B. The Place of the Various Livestock Enterprises

Most farms produce some forages, either as permanent pasture or as a forage crop in the land use program. Roughage consuming livestock (dairy cattle, beef cattle, and sheep) usually have an economic priority on these farms. Grain consuming livestock can be expanded to utilize remaining grain supplies and surplus labor.

1. Beef breeding and sheep breeding enterprises fit best where it is necessary to utilize permanent pasture, which has no other market value. They give relatively low returns for feed and labor, and financial requirements are moderate.
2. Dairying pays a good return for feed but comparatively low returns for labor. Capital requirements are moderate. It fits best where there is an ample supply of labor relative to land and where forage crops are a part of

the crop rotation. The available market for milk may be a determining factor.

3. Beef feeding and lamb feeding enterprises pay high returns for labor over the long run, but are highly speculative in any one year. They pay relatively low returns for feed. Their financial requirements are high. They fit best on farms with surplus roughage and grain, limited labor supplies and strong financing.
4. Poultry enterprises pay good returns for feed but comparatively low returns for labor. They fit best where there is extra labor available.

TABLE 1. CAPITAL REQUIREMENTS FOR VARIOUS KINDS OF LIVESTOCK, WITH AND WITHOUT BUILDINGS INCLUDED

Type of Enterprise	Livestock Inventory	Equip. ment	Grain <sup>11/</sup>		Total Not Incl. Bldg.	Buildings (New)	Total Incl. Bldg.	Ave. Annual Investment (Not Incl. Bldg.)	Ave. Annual Investment (Incl. Bldg.)
			Suppl. Misc. Exp.	Exp.					
Dairy cows <sup>1/</sup>	\$ 345	\$100	\$ 40		\$485	\$400	\$885	\$ 435	\$ 635
350#BF-Grade A	270	80	20		370	350	720	330	505
250#BF-Mfg. Milk	190	5	20		215	40	255	200	220
Beef cow <sup>2/</sup> (calf sold)	255	20	70		345	100	445	300	350
" (calf fed-500# gain)	100	15	60		175	60	235	150	180
Deferred fed steers <sup>3/</sup>	175	15	50		240	60	300	95	125
Short fed yrlg. steers <sup>4/</sup>	112	15	70		197	60	257	150	180
Full fed steer calves <sup>5/</sup>	22	3	5		30	12	42	28	34
Ewe and lamb <sup>6/</sup>	12	2	3		17	4	21	8	10
Feeder lambs <sup>7/</sup>	60	40	140		240	180	420	180	270
Sow and litter <sup>8/</sup>	40	50	200		290	500	790	220	445
Laying flocks (100) <sup>9/</sup>	70	80	250		400	200	600	230	330
Turkeys (100) <sup>10/</sup>									

1/ Includes cow and replacements - 1/2 calf, 1/3 yearling heifer, and 1/6 bred heifer.  
 2/ Includes cow and replacements - 1/6 yearling heifer, 1/6 bred heifer and 1/25 of bull, 90% calf crop.  
 3/ Limited grain through winter and on pasture, ending with full feed on dry lot - 400# to 1000#.  
 4/ Feeding period of 136 days, 700# to 1000#.  
 5/ Full fed approximately 10 months, 400# to 1000#.  
 6/ One ewe, average 100% lamb crop, 90# lambs marketed.  
 7/ Purchased lambs at 65#, marketed at 100#, 4% death loss.  
 8/ Sow with 7 pigs-6 pigs housed after culling. 12% mortality during year.  
 9/ Assumes 100 pullets housed after culling. 12% mortality during year.  
 10/ Purchase poults, 15% mortality, market at 20#.  
 11/ Based on the proportion of total costs that could require financing for the feeding period.  
 12/ Includes livestock inventory for proportion of year held, the proportion of grain, etc. required for operations until production receipts are obtained, and one-half of new value of equipment. (Average value over life).  
 13/ Same as 12/ plus one-half of new building cost (Average value over life).

TABLE 2. USUAL ANNUAL PRODUCTION AND FEED REQUIREMENTS FOR LIVESTOCK ENTERPRISES

Enterprise <sup>1/</sup>	Production or gain	Grain (barley equiv.) <sup>2/</sup> bu.	Protein lbs.	Hay & Silage (hay equiv.) <sup>3/</sup> tons	Pasture (Animal unit Months) <sup>4/</sup>
Dairy cows (incl. repl.)	250# BF + 400# meat	35	200	5	7
	300# BF + 400# meat	44	250	5	7
	350# BF + 400# meat	53	300	5	7
	400# BF + 400# meat	63	350	5	7
Beef cow (incl. repl.)	400# meat	3	100	1.5	7
Calf sold	850# meat	60	300	3.0	7
Calf fed	600# meat	58	200	1.5	1
Deferred fed steers	300# meat	36	150	0.5	-
Short fed long yrkg.	600# meat	75	250	0.8	-
Full fed steer calves	115# meat + 10# wool	3	10	0.4	1
Ewe and lamb	35# meat	3.3	15	0.09	-
Feeder lambs	1750# meat	140	800	-	1
Sow and litter	1566 doz. + 350# meat	125	5000	-	-
Laying flock (100)	1750# meat	155	3000	-	-
Turkeys (100)					

<sup>1/</sup>See Table 1 for description of each livestock enterprise.

<sup>2/</sup>Grain Barley equivalent  
 Oats 1 bu. 0.63  
 Corn 1 bu. 1.25  
 Wheat 1 bu. 1.35

<sup>3/</sup>One ton hay equals 3 tons silage.

<sup>4/</sup>One animal unit month is equivalent to the pasture requirement for a 1000 pound animal for one month.



TABLE 3. PROCEDURE FOR DETERMINING LIVESTOCK INCOME OVER COSTS (LABOR AND CAPITAL NOT INCLUDED)

Enterprise	Dairy Cow (Grade A Market)	Dairy Cow (Manufacturing Milk)	Beef Cow Calf Sold	Beef Cow Calf Fed Out
Source of income.....	350# BF @ \$1.00 \$ 350 Calf and culls 50	250# BF @ \$.80 \$ 200 Calf and culls 50	(90% calf crop 16% saved for repl.) Calf 450# x 22¢ x .90 x .84 \$74.76 Cull cow, 1000# @ 10¢ x 16% 16.00 \$90.76	(90% calf crop 16% saved for repl.) Calf 950# x 23¢ x .90 x .84 \$165.18 Cull cow, 1000# @ 10¢ x 16% 16.00 \$181.18
Gross receipts per enterprise unit .....	\$ 400	\$ 250		
Cost items:				
Purchase cost.....	---	---	---	---
Barley equiv. @ .90.....	53 bu. 47.70	35 bu. 31.50	3 bu. \$ 2.70	50 bu. \$ 45.00
Protein and minerals.....	300# @ 4¢ 12.00	200# @ 4¢ 8.00	100# @ 4¢ 4.00	250# @ 4¢ 10.00
Hay equiv. @ \$14.....	5 T 70.00	5 T 70.00	1.5 T 21.00	2.5 T 35.00
Pasture animal unit mo. @ \$2.....	7 A.U.Mo. 14.00	7 A.U.Mo. 14.00	7 A.U.Mo. 14.00	7 A.U.Mo. 14.00
Total feed cost.....	\$ 143.70	\$ 123.50	\$ 41.70	\$ 104.00
Breeding, Vet. and Med....	20.00	20.00	8.00	10.00
Miscellaneous expense, 1.5% of gross receipts..	6.00	4.35	1.36	2.72
Depr. and repairs on equip. (10% new cost)....	10.00	8.00	.50	2.00
Total enterprise cost (buildings not incl.)....	179.70	155.85	51.56	118.72
Income over costs.....	220.30	94.15	39.20	62.46
Depr. repairs and ins. on bldgs. (7% new cost)..	28.00	24.50	2.80	7.00
Total cost (bldgs. incl.)..	207.70	180.35	54.36	125.72
Return to capital & labor.	192.30	69.65	36.40	55.46

(Continued on next page)

TABLE 3. PROCEDURE FOR DETERMINING LIVESTOCK INCOME OVER COSTS (LABOR AND CAPITAL NOT INCLUDED) -- CONTINUED

Enterprise	Feeder Cattle				Ewe and Lamb Replacements Raised
	Deferred Fed Steers	Short Fed Yearling Steers	Full Fed Steer Calves		
Source of income.....	1,000# @ 23¢ \$230.00	1,000# @ 23¢ \$230.00	1,000# @ 25¢ \$250.00		100% lamb crop saved
Gross receipts per enterprise unit.....	Less 2% death loss 4.80 \$225.20	Less 1% death loss 2.40 \$227.60	Less 2% death loss 5.00 \$215.00		.84 lamb x 90# @ 20¢ \$15.12 16 ewe sold x 125# @ 6¢ 1.20 10# wool @ 55¢ 5.50 \$21.82
Cost items:					
Purchase cost.....	400# @ 25¢ \$100.00	700# @ 22¢ \$154.00	400# @ 27¢ \$108.00		3 bu. \$ 2.70
Barley equiv. @ 90¢.....	58 bu. 52.20	35 bu. 31.50	75 bu. 67.50		10# @ 4¢ .40
Protein & minerals.....	200# @ 4¢ 8.00	100# @ 4¢ 4.00	250# @ 4¢ 10.00		0.4 T 5.60
Hay equiv. @ \$14.....	1.5 T 21.00	0.5 T 7.00	0.8 T 11.20		1 2.00
Pasture animal unit mo. @ \$2.00.....	2.00				\$10.70 1.85
Total Feed Cost.....	\$83.20	\$47.20	\$88.70		
Breeding, Vet. & Med.....	2.00		2.00		
Miscellaneous expense	3.50		3.75		
1.5% of gross receipts...	1.50	1.50	1.50		
Depr. & repairs on equip. (10% of new cost).....	190.20	201.90	195.95		
Total enterprise cost (buildings not included).	35.00	25.70	41.05		
Income over cost.....	4.20	4.20	4.20		
Depr. repairs & insurance on building (7% new cost).	194.40	206.10	200.10		
Total cost (building incl.)	\$30.80	\$21.50	\$36.85		
Return to capital & labor..					13.18 8.64 14.02 \$ 7.80

TABLE 3. PROCEDURE FOR DETERMINING LIVESTOCK INCOME OVER COSTS (LABOR AND CAPITAL NOT INCLUDED) -- CONTINUED

Enterprise	Feeder Lambs	Sow and Litter* (7 Pigs Raised)	Laying Flock -- 100 Hens, 125 sexed chickens	Turkeys (100)
Source of income.....	4% death loss	1 gilt retained	12% death loss	15% mortality
	100 # x 20¢ x .96	6 hogs x 225# x 15¢	200 eggs per hen	85 x 20# x 25¢
Gross receipts per enterprise unit.....	\$19.20	\$202.50	\$ 4.80	\$425.00
		1 sow 400# @ 12¢	Cull pullets 10 x 4# x 12¢	
		\$19.20	88 hens 4# @ 7¢	
			1566 doz. @ 30¢	
		\$250.50	\$199.24	
Cost Items:				
Purchase cost.....	65# @ 18¢	---	125 sexed chicks @ 40¢	100 x 70¢
Barley equiv. @ 90¢.....	3.3 bu.	126.00	125 bu.	137 bu.
Protein and minerals.....	15# @ 4¢	36.00	5000# @ 4.5¢	3000# @ 4.5¢
Hay equiv. @ \$14.....	.09 T	---	---	---
Pasture animal unit mo. @ \$2.....	---	2.00	---	1.6
Total Feed Cost.....	\$4.83	\$164.00	\$337.50	\$261.50
Breeding, Vet. and Med.....	.20	8.00	Inc. fuel & litter 14.00	Inc. ins. 22.00
Miscellaneous expense 1.5% of gross receipts....	.30	3.75	7.50	6.40
Depr. and repairs on equip. (10% of new cost).....	.20	4.00	5.00	8.00
Total enterprise cost (bldgs. not included).....	17.23	179.75	414.00	367.90
Income over cost.....	1.97	70.75	85.24	57.10
Depr. repairs and ins. on buildings (7% new cost)	.28	12.60	35.00	14.00
Total cost (bldgs. incl.)..	17.51	192.35	449.00	381.90
Returns to capital & labor	1.69	58.15	50.24	43.10

\*Re-examine building and equipment costs with multiple litters.

TABLE 4. PROCEDURE FOR DETERMINING RETURNS TO LABOR AND CAPITAL, WITH AND WITHOUT BUILDING COSTS INCLUDED

Item	Dairy		Beef Cow	
	350# BF (Grade A)	250# BF (Mfg. Milk)	Calf Sold	Calf Fed
<b>BUILDING COSTS NOT INCLUDED</b>				
<u>Return for Labor</u>				
Income over cost <sup>1/</sup> .....	\$220.30	\$94.15	\$39.20	\$62.46
Capital cost--6% <sup>2/</sup> .....	26.10	19.80	12.00	18.00
Return to labor.....	194.20	74.35	27.20	44.46
Est. labor req. (hrs.) <sup>3/</sup> ..	110	105	20	30
Return per hour.....	1.76	.71	1.36	1.48
<u>Return for Capital</u>				
Income over cost.....	220.30	94.15	39.20	62.46
Labor @ \$1 per hour.....	110.00	105.00	20.00	30.00
Return to capital.....	110.30	---	19.20	32.46
Average investment.....	435.00	330.00	200.00	300.00
Rate of return.....	25.4%	---	9.6%	10.8%
<b>BUILDING COSTS INCLUDED</b>				
<u>Return for labor</u>				
Return to capital & labor <sup>1/</sup> .....	192.30	69.65	36.40	55.46
Capital cost--6% <sup>2/</sup> .....	38.10	30.30	13.20	21.00
Return to labor.....	154.20	39.35	23.20	34.46
Est. labor requirements (hours) <sup>3/</sup> .....	110	105	20	30
Return per hour.....	1.40	.37	1.16	1.15
<u>Return for Capital</u>				
Return to capital & labor <sup>1/</sup> .....	192.30	69.65	36.40	55.46
Labor @ \$1 per hour.....	110.00	105.00	20.00	30.00
Return to capital.....	82.30	---	16.40	25.46
Average investment.....	635.00	505.00	220.00	350.00
Rate of return.....	13.0%	---	7.5%	7.3%

<sup>1/</sup> Taken from Table 3 (PROCEDURE FOR DETERMINING LIVESTOCK INCOME OVER COSTS).

<sup>2/</sup> Six percent of average annual investment from Table 1.

<sup>3/</sup> Estimated average requirement from the table on labor requirements in the Labor Section.

TABLE 4. PROCEDURE FOR DETERMINING RETURNS TO LABOR AND CAPITAL, WITH AND WITHOUT BUILDING COSTS INCLUDED (CONTINUED)

Item	Sheep		Cattle Feeding		
	Ewe and Lamb	Feeder Lambs	Deferred Fed Steers	Short Fed Yearlings	Full-Fed Steer Calves
<b>BUILDING COSTS NOT INCLUDED</b>					
<u>Return for Labor</u>					
Income over costs <sup>1/</sup> .....	\$8.64	\$ 1.97	\$ 35.00	\$ 25.70	\$ 41.05
Capital cost--6% <sup>2/</sup> .....	1.68	.48	9.00	5.70	9.00
Return to labor.....	<u>6.96</u>	<u>1.49</u>	<u>26.00</u>	<u>20.00</u>	<u>32.05</u>
Est. labor req. (hours) <sup>3/</sup>	3.5	1.2	10	7	10
Return per hour.....	2.00	1.24	2.60	2.85	3.20
<u>Return for Capital</u>					
Income over cost.....	8.64	1.97	35.00	25.70	41.05
Labor @ \$1 per hour.....	3.50	1.20	10.00	7.00	10.00
Return to capital.....	<u>5.14</u>	<u>.77</u>	<u>25.00</u>	<u>18.70</u>	<u>31.05</u>
Average investment.....	28.00	8.00	150.00	95.00	150.00
Rate of return.....	18.4%	9.6%	16.7%	9.2%	20.7%
<b>BUILDING COSTS INCLUDED</b>					
<u>Return for Labor</u>					
Return to cap. & labor <sup>1/</sup> .....	7.80	1.69	30.80	21.50	36.85
Capital cost--6% <sup>2/</sup> .....	2.04	.60	10.80	7.50	10.80
Return to labor.....	<u>5.76</u>	<u>1.09</u>	<u>20.00</u>	<u>14.00</u>	<u>26.05</u>
Est. labor req. (hrs) <sup>3/</sup>	3.5	1.2	10	7	10
Return per hour.....	1.65	.91	2.00	2.00	2.60
<u>Return for Capital</u>					
Ret. to cap. & labor <sup>1/</sup> .....	7.80	1.69	30.80	21.50	36.85
Labor @ \$1 per hour.....	3.50	1.20	10.00	7.00	10.00
Return to capital.....	<u>4.30</u>	<u>.49</u>	<u>20.80</u>	<u>14.50</u>	<u>26.85</u>
Average investment.....	34.00	10.00	180.00	125.00	180.00
Rate of return.....	12.6%	4.9%	11.6%	11.6%	14.9%

<sup>1/</sup> Taken from Table 3 (PROCEDURE FOR DETERMINING LIVESTOCK INCOME OVER COSTS).

<sup>2/</sup> Six percent of average annual investment from Table 1.

<sup>3/</sup> Estimated average requirement from the table on labor requirements in the Labor Section.

TABLE 4. PROCEDURE FOR DETERMINING RETURNS TO LABOR AND TO CAPITAL, WITH AND WITHOUT BUILDING COSTS INCLUDED (CONTINUED)

Item	Sow and Litter	Laying Flock (100)	Turkeys (100)
<b>BUILDING COSTS <u>NOT</u> INCLUDED</b>			
<u>Return for Labor</u>			
Income over cost <sup>1/</sup> .....	\$ 70.75	\$ 85.24	\$ 57.10
Capital cost -- 6% <sup>2/</sup> .....	10.80	13.20	13.80
Return to labor.....	59.95	72.04	43.30
Est. labor required (hrs.) <sup>3/</sup> .....	30	75	60
Return per hour.....	2.00	.96	.72
<u>Return for Capital</u>			
Income over cost.....	70.75	85.24	57.10
Labor @ \$1 per hour.....	30.00	75.00	60.00
Return to capital.....	40.75	10.24	---
Average investment.....	180.00	220.00	230.00
Rate of return.....	22.63%	4.65%	---
<b>BUILDING COSTS INCLUDED</b>			
<u>Return for Labor</u>			
Return to capital & labor <sup>1/</sup> .....	58.15	50.24	43.10
Capital cost -- 6% <sup>2/</sup> .....	16.20	26.70	19.80
Return to labor.....	41.95	23.54	23.30
Est. labor requirements (hrs.) <sup>3/</sup> .....	30	75	60
Return per hour.....	1.40	.31	.39
<u>Return for Capital</u>			
Return to capital & labor <sup>1/</sup> .....	58.15	50.24	43.10
Labor @ \$1 per hour.....	30.00	75.00	60.00
Return to capital.....	28.15	---	---
Average investment.....	270.00	445.00	330.00
Rate of return.....	10.4%	---	---

<sup>1/</sup> Taken from Table 3 (PROCEDURE FOR DETERMINING LIVESTOCK INCOME OVER COSTS)

<sup>2/</sup> Six percent of average annual investment from Table 1.

<sup>3/</sup> Estimated average requirement from the table on labor requirements in the Labor Section.

TABLE 5. PERCENTAGE DISTRIBUTION OF USUAL LIVESTOCK PRODUCTION COSTS<sup>1/</sup>

Enterprise	Feed	Labor <sup>2/</sup>	Buildings	Equip.	Interest <sup>3/</sup>	Other
Dairy herd (grade A)	42	30	8	3	9	8
Beef cow herd	50	20	4	1	14	11
Cattle feeding	72	8	3	1	10	6
Ewe and lamb	54	18	4	2	10	12
Feeder lambs	63	16	4	3	8	6
Sow and litter	70	13	5	2	5	5
Laying flock	69	15	7	1	3	5
Turkeys	67	16	4	2	4	7

<sup>1/</sup>Feed, building, equipment and miscellaneous costs based on livestock budgets.

<sup>2/</sup>Labor computed at \$1.00 per hour.

<sup>3/</sup>Computed at 6 percent on average annual investment.

## GENERAL CHARACTERISTICS OF LIVESTOCK ENTERPRISES

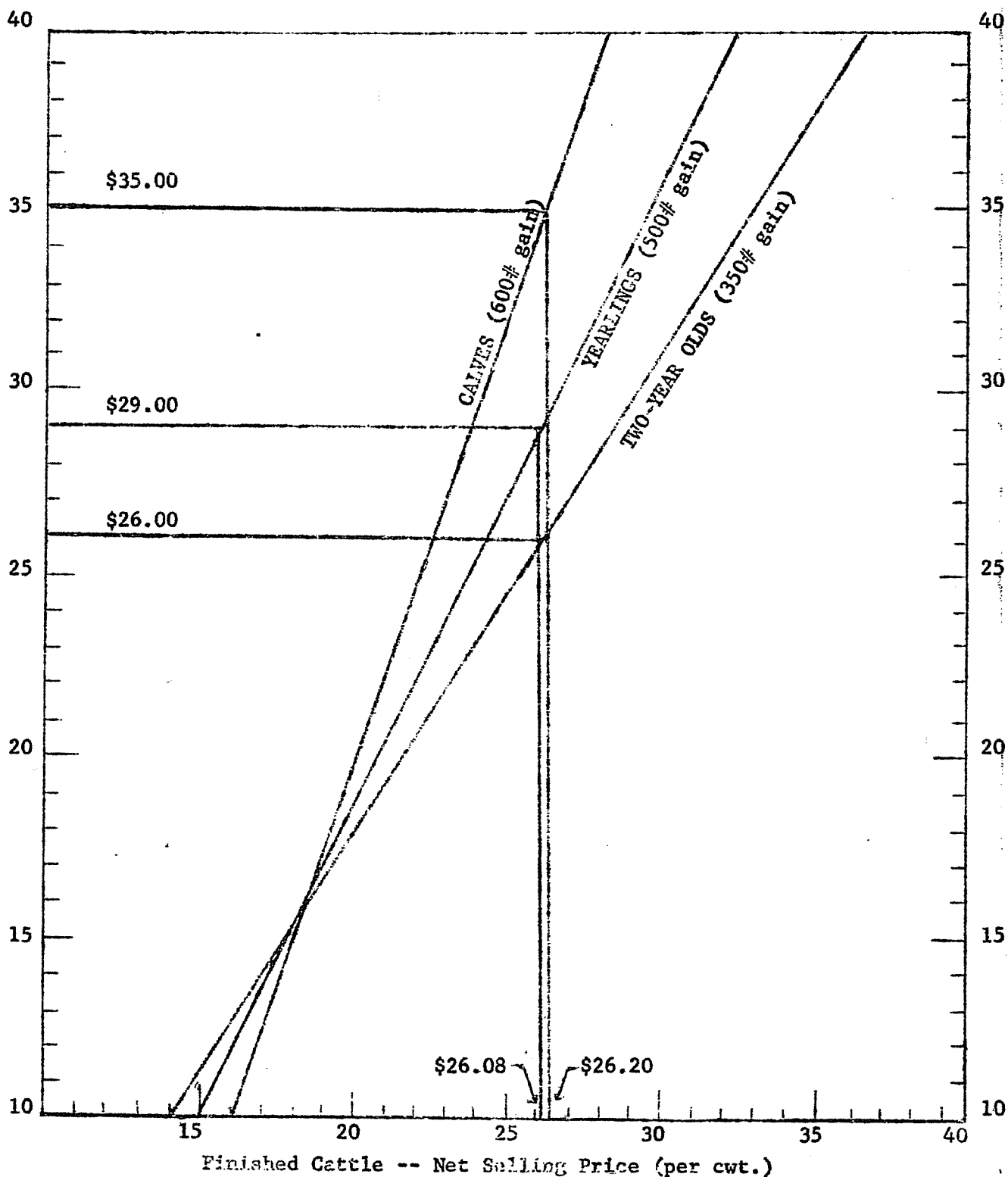
Enterprise	Risk	Managerial Ability Needed For		
		Buying and Selling	Feeding and Breeding	Disease Control
Dairy cows	low	average	high	high
Beef cows	low	average	average	average
Sheep flock	low	average	high	high
Cattle feeding	high	high	high	average
Sheep feeding	high	high	high	high
Hogs	medium	average	average	high
Turkeys	high	high	high	high
Chickens	medium	average	high	high

- General guide for cash rental value of pasture land -

$$\text{Cash rental} = \text{land value} \times 5\frac{1}{2}\% + \text{taxes}$$

**SALES PRICE NEEDED FOR \$1.50 PER HOUR FOR LABOR IN CATTLE FEEDING\***  
 (Over All Costs Other Than Labor, With Average Management)

Feeder Cattle Purchase Price (per cwt.)



\* based on \$0.85 Barley and \$1.05 corn; allow \$0.50 cwt. in break-even price per dime corn price change.

SOURCE: Joint North Dakota and Minnesota Extension Service.



# PLANNING FARM BUILDINGS

## - a guide for determining size

Compiled by  
Arthur H. Schulz  
Extension Agricultural Engineer

### WEIGHTS AND MEASURES

Volume = length x width x height

Volume trench or bunker silo =  $\frac{\text{top width} + \text{bottom width}}{2} \times \text{height} \times \text{length}$

Capacity of grain bin is volume in cubic feet x .8

Capacity of corn crib is volume in cubic feet x .5

1 lineal foot = 1 foot of length

1 bushel =  $1\frac{1}{4}$  cubic feet

1 cubic foot = .8 bushels

1 bushel ear corn = 2 cubic feet

1 cubic foot ear corn = .5 bushels

1 gallon water = 8.3 pounds

1 cubic foot water = 7.5 gallons

1 gallon water = .134 cubic feet

1 gallon water = 231 cubic inches.

1 cubic yard concrete = 81 sq. ft. 4" floor (approx)

1 cubic yard concrete = 54 sq. ft. 6" floor (approx)

Crop	Weight lbs. per bushel	Weight lbs. per cubic foot	Freshly ground	
			Approx. wt. lbs. per cu. ft.	Approx. wt. lbs. per bu. of volume
wheat	60	48.0	38 to 39	47 to 49
barley	48	38.4	24 to 26	30 to 32
oats	32	25.6	20 to 25	25 to 31
flax	56	44.8	-	-
rye	56	44.8	38	48
corn (shelled)	56	44.8	38 to 40	48 to 50
corn (ear)	70	35.0	35	45
soybeans	60	48.0		

### STRAW

Baled = 4 to 5 lbs. per cubic foot (weigh bales and use average)

Loose = 2 to 3 lbs. per cubic foot

### HAY

Weight varies according to type and quality.

Alfalfa (stacked over 30 days) - 4 to 4.5 lbs. per cubic foot  
450 to 485 cubic feet per ton

Wild hay (stacked 30 to 90 days) - 3.3 lbs. per cubic foot  
600 cubic feet per ton  
(stacked over 90 days) - 4.4 lbs. per cubic foot  
450 cubic feet per ton

Chopped alfalfa - 6.5 to 7.0 lbs. per cubic foot  
280 to 300 cubic feet per ton

Baled alfalfa - 8 to 10 lbs. per cubic foot (weigh bales and use average)

Baled wild hay - 6 to 8 lbs. per cubic foot (weigh bales and use average)

## SILAGE

Corn or grass silage in trench or bunker silo (well packed with tractor) 40 to 50 lbs. per cu. ft. (approx.)

**CAPACITIES OF UPRIGHT SILOS OF VARIOUS SIZES**  
Tons (Corn Silage 68 to 72% Moisture Content) \*

Depth of (feet)	Tons of capacity with an Inside diameter of								
	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.	26 ft.	28 ft.	30 ft.
30	102	133							
40	145	189	239	295	357	425	499	579	665
50		246	311	385	466	554	650	755	866
60		308	389	480	581	692	812	942	1082

\* Grass silage as placed in the silo will vary both above and below the figures, depending on whether the grass is wilted or direct cut and on the composition of the forage.

## INSULATION VALUES OF COMMON BUILDING MATERIALS: (R values, High numbers indicate better insulating values)

3/4 inch drop siding, studs	= 1.7
3/4 inch drop siding, paper, 1 inch boards (all on outside of studs)	= 2.7
3/4 inch drop siding, paper on outside of studs, 1 inch matched lumber on inside of studs	= 3.6
Commercial Insulation, fill type per inch of thickness (approx)	= 3.3
Mill shavings per inch of thickness	= 2.0 to 2.5
Chopped wheat straw per inch of thickness	= 1.5 to 2.0
Insulating boards per inch of thickness	= 3.3 to 3.6
8 inch sand cement concrete block = 1.8	Cores filled with granular insulation = 2.6
8 inch lightweight concrete block = 2.7	Cores filled with granular insulation = 4.5
12 inch sand cement concrete block = 2.1	
12 inch lightweight concrete block = 3.1	

## BASIC DESIGN DATA FOR PLANNING LIVESTOCK AND POULTRY HOUSING

### Beef Cattle

#### Space Requirements (Barn):

- Cows - 30 to 40 sq. ft. per cow.
- Calves and yearlings - 15 to 25 sq. ft. per animal.
- Feeders (600 lbs. and above) - 20 to 30 sq. ft. per animal.

#### Feeding and Watering Equipment:

- Not self fed, cattle under 600 lbs. - 18 lineal inches feed bunk per animal.
- Not self fed, cattle over 600 lbs. - 24 lineal inches feed bunk per animal.
- Not self fed, mature cows - 28 lineal inches feed bunk per animal.
- Self fed from portable bunks - 10 to 12 lineal inches feed bunk per animal.
- High rough ration (more than one-half of ration hay-silage or equivalent)- 4 to 6 lineal inches feed bunk per animal.
- High grain or all grain ration - 3 to 4 lineal inches feed bunk per animal.
- Hay bunk - self fed - 3 to 4 lineal inches per animal.
- not self fed - 16 to 24 lineal inches per animal.
- Self feeding silo 4 to 6 lineal inches per animal (minimum silo width of 16 ft. or more)
- Automatic waterer - 60 to 80 animals per unit.

#### Feed Lot Area:

- Good drainage, unsurfaced ----- 200 to 300 sq. ft. per animal
- Average drainage, unsurfaced ----- 300 to 400 sq. ft. per animal
- Concreted ----- 50 to 70 sq. ft. per animal

#### Straw for Bedding: - 3/4 ton per year per animal unit

#### Ventilation: Leave barns open

- Electric fan ventilation: 100 cu. ft. per minute per 1,000 lbs. of animal weight.

### Dairy

STALL BARN DIMENSIONS					Long stalls for use of trainers		Standard stalls	
Outside barn width	Feed alley	Manger	Curb	Gutter	Stall length	Litter Alley	Stall length	Litter Alley
32'	3' - 0"	1' - 10"	4"	1' - 4"	5' - 6"	7' - 0"	5' - 4"	7' - 8"
34'	3' - 6"	2' - 0"	4"	1' - 4"	5' - 10"	7' - 0"	5' - 4"	8' - 0"
34'	3' - 0"	2' - 0"	4"	1' - 4"	5' - 10"	8' - 0"	5' - 8"	8' - 4"
36'	4' - 0"	2' - 0"	4"	1' - 4"	5' - 10"	8' - 0"	5' - 8"	8' - 4"

STALL WIDTHS		
Weight of cow	Girth in inches	Width of stall
1200*	75"	4' - 0"
1400*	79-½"	4' - 4"
1600*	84"	4' - 8"

**Loose Housing:**

- Bedded (loafing) area - 60 sq. ft. per cow (minimum)
- Holding area - 20 sq. ft. per cow to 20 cows, 400 sq. ft. plus 10 sq. ft. per cow for herds over 20 cows.
- Individual calf pen area - 20 to 25 sq. ft. per calf.
- Calves in groups:
  - to 1½ months of age - 15 to 20 sq. ft. per calf.
  - to 10 months of age - 20 to 25 sq. ft. per calf.
  - over 10 months of age 30 to 40 sq. ft. per calf.
- Yearlings and older and dry cows - 35 to 50 sq. ft. per animal.
- Minimum wall height - 9 feet -(wall protected from manure to at least 3 foot height.)
- Feed lot - unsurfaced - 300 to 400 sq. ft. per cow.
- concreted - 100 sq. ft. per cow.

**Milking Room (parlor) Areas**

- 3 stall tandem 12' x 28' to 32' (340 to 400 sq. ft.)
- 4 stall tandem 12' x 36' to 40' (440 to 500 sq. ft.)
- 3 stall U - 16' to 18' x 24' to 28' (380 to 450 sq. ft.)
- 4 stall U - 18' to 24' x 24' to 28' (430 to 575 sq. ft.)
- 4 stall chute - 12' x 20' to 26' (250 to 325 sq. ft.)

Minimum Milk House Floor Areas

Milk production in gallons per day	Whole milk			Cream
	Can coolers	E. D. Bulk	E. O. D. Bulk	
50 or less	168 sq. ft.	168 sq. ft.	168	120 sq. ft.
50 to 100	168	192	216	120 to 180 sq. ft.
100 to 160	192	208	240	180 sq. ft.

**Feeding Equipment:**

- Feed bunks (free self feeding) 6 to 8 lineal inches per cow.
- Feed bunks (not self feeding) 28 to 30 lineal inches per cow.
- Self feeding silo 6 to 8 lineal inches of feed area per cow.  
(minimum silo width of 16 feet)
- Hay self feeders 6 to 8 lineal inches per cow.

**Straw for Bedding:** (Loose housing) one ton per cow per year.  
(Stanchion Housing) ¾ ton per cow per year.

**Ventilation:**

- Stall barns insulated - 100 to 125 cu. ft. per minute per 1000 lbs. of animal weight.
- Stall barns uninsulated - 60 to 80 cu. ft. per minute per 1000 lbs. of animal weight.
- Loose housing - Leave barn partially open.
- Automatic watering: 60 to 100 animals per unit.

**Hogs**

**Barn Space Required:**

**Brood Sows**

- Farrowing pen - 6' x 8' to 8' x 8' pen per sow.
- Farrowing stall - 12" to 18" side space on each side of sow.  
22" to 24" sow stall width.  
6' minimum length.  
Minimum area - 1 sow per 4' x 6' area plus alley.

**Barn Space or Barn Space and Concreted Feeding Floor Per Hog for Growing and Finishing:**

- Weaning to 75 lbs.-8 sq. ft. - 75 lbs. to 125 lbs.-10 sq. ft., - 125 lbs. to market-14 sq. ft.
- Gilts - 12 sq. ft. per gilt.
- Boars and yearling or older sows - 15 to 18 sq. ft. per animal.
- Self feeders: 1 lineal foot or one feeding hole per 4 to 5 pigs.
- Feed trough (feed and water): 12 to 15 inches of trough length per pig.
- Automatic waterers: one waterer or one opening per 30 to 40 pigs.
- Legume pasture: 15 to 20 growing fattening pigs per acre.  
10 mature sows with or without suckling pigs per acre.
- Straw for bedding: 500 to 1,000 lbs. per adult head per year, or for feeder pigs, 100 lbs. per head 100 lbs. of gain.
- Ventilation: Insulated barn - 150 cu. ft. of air per minute per 1,000 lbs. of hogs. (Two or more fans or two-speed fan)  
Uninsulated barn - 60 to 80 cu. ft. of air per minute per 1000 lbs. of hogs. (Two or more fans or two-speed fan; ventilation will be poor in an uninsulated barn.)

## Sheep

### Barn Space Requirements:

Ewes - 10 sq. ft. per ewe (lambing in pasture)  
15 sq. ft. per ewe (lambing in barn)

Feeder lambs - 4 to 6 sq. ft. per lamb.  
All door openings minimum width of 4 ft.

### Feeding and Watering Equipment:

Feed trough - 15 lineal inches per ewe.  
12 lineal inches per feeder lamb.  
Self feeder (feeder lambs) - 2 to 4 lineal inches feed area per lamb.  
Hay bunk (ewes self fed) - 5 to 6 lineal inches per ewe.  
Waterer - 200 head per double opening automatic waterer or per tank opening. (Water all feeder lambs within 100 feet of feeding area)

## Poultry

### Chicks and Pullets:

Brooder space - ½ sq. ft. per chick to 6 weeks.  
- 1 sq. ft. to range age.  
Hover space - 7 to 10 sq. in. per chick (not over 350 chicks per hover)  
- electric brooding - 300 chicks per 4 lamp brooder.  
Range shelter - ¾ to 1 sq. ft. per bird.  
Feed hoppers - 1 lineal inch per chick to 4 weeks.  
- 2 lineal inches per chick to range age.  
- 3 lineal inches per bird on range.  
Waterers - 2 lineal inches per chick to 8 weeks.  
- One 1-gallon waterer per 75 to 100 chicks (under 6 weeks)  
- One automatic waterer per 200 pullets (over 6 weeks old)

### Laying Hens:

Laying house - 2 to 2½ sq. ft. floor area per bird.  
Roosts - 8 to 10 inches per bird - space roosts on 12" centers  
Feeders - 3 lineal inches per bird.  
Individual nests - One individual nest per 4 to 5 birds.  
Community nests - One 2' x 4' community nest per 50 birds.  
Waterer - One 8-gallon waterer per 100 birds.  
- One automatic waterer per 200 birds.

### Ventilation:

3 to 5 cubic feet of air per minute per bird.

## Turkeys

### Poults (Brooding):

Brooder space - 1 sq. ft. of brooder house or brooder house and sunporch per poult to 8 weeks.  
- 1½ sq. ft. per poult to 12 weeks.  
- 2 sq. ft. per poult to 16 weeks.  
Hover space - not over 250 poults per hover.  
Feed hoppers - 1½ inches per poult or  
20 three-foot feeders per 1,000 poults to 5 weeks.  
- 2 inches per poult or  
20 four-foot feeders per 1,000 poults 5 to 8 weeks.  
Waterers - 5 or 6 quart jar type per hover to 2 weeks.  
- 20 one-gallon waterers per 1,000 birds to 4 weeks.  
- 20 three-gallon waterers per 1,000 birds to range age.

### Range Management:

Range shelters - 1½ sq. ft. per bird.  
Range feeders - 4 eight-foot self feeders or 3 ten-foot self feeders per 1,000 birds, minimum feed capacity 700 to 1,000 lbs. per feeder.  
Waterers - Two 8 to 10-foot watering troughs with automatic floats per 1,000 birds or  
Three double automatic hog type waterers per 1,000 birds (provide additional watering as required during extreme hot weather.)  
Roosts - 12 lineal inches per bird. Roosts set 24 inches on center - 12" to 18" off ground.  
Range area - Approximately 125 birds per acre.  
Fence - 4 to 5 feet high.

NORTH DAKOTA  
FARM & HOME DEVELOPMENT PLANNING GUIDE

Inventory of Resources

Years

<u>LAND</u>	<u>Owned</u>	<u>Rented</u>		
	<u>Acres</u>	<u>Value</u>	<u>Acres</u>	<u>Rent.</u>
Cropland	_____	_____	_____	_____
Tillable pasture	_____	_____	_____	_____
Non-tillable hay & pasture	_____	_____	_____	_____
Other	_____	_____	_____	_____
<b>Total</b>	_____	_____	_____	_____

<u>LABOR</u>	<u>Age</u>	<u>Months</u>		
		<u>Available</u>		
Husband	_____	_____	_____	_____
Wife	_____	_____	_____	_____
Children over 14	_____	_____	_____	_____
Hired men	_____	_____	_____	_____
Others	_____	_____	_____	_____
<b>Total</b>	_____	_____	_____	_____

LIVESTOCK & POULTRY

<u>Kind</u>	<u>No.</u>	<u>Prod.</u>	<u>Value</u>
		<u>Capacity</u>	
Dairy cows	_____	_____	_____
Bred Dairy Heifers	_____	_____	_____
Other Dairy Animals	_____	_____	_____
Beef cows	_____	_____	_____
2 yr. Beef Heifers	_____	_____	_____
1 yr. Beef Heifers	_____	_____	_____
Calves, Beef	_____	_____	_____
Feeder Steers	_____	_____	_____
Feeder Heifers	_____	_____	_____
Bulls	_____	_____	_____
Sows	_____	_____	_____
Sows for farrowing	_____	_____	_____
Boar	_____	_____	_____
Feeder pigs	_____	_____	_____
Sheep-Ewes	_____	_____	_____
Rams	_____	_____	_____
Lambs	_____	_____	_____
Poultry	_____	_____	_____
_____	_____	_____	_____
<b>Total</b>	_____	_____	_____

BUILDINGS & IMPROVEMENTS

	<u>Size</u>	<u>Age</u>	<u>Condition</u>	<u>Value</u>
House	_____	_____	_____	_____
_____	_____	_____	_____	_____
Barn	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Poultry House	_____	_____	_____	_____
Granary	_____	_____	_____	_____
_____	_____	_____	_____	_____
Fences	_____	_____	_____	_____
Water Supply	_____	_____	_____	_____
<b>Total</b>	_____	_____	_____	_____

MACHINERY & EQUIPMENT

<u>Kind</u>	<u>No.</u>	<u>Size</u>	<u>Age</u>	<u>Condition</u>	<u>Value</u>
Tractors	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
Plows	_____	_____	_____	_____	_____
Disk	_____	_____	_____	_____	_____
Harrow	_____	_____	_____	_____	_____
Grain Drill	_____	_____	_____	_____	_____
Row Crop	_____	_____	_____	_____	_____
Planters	_____	_____	_____	_____	_____
Row Crop	_____	_____	_____	_____	_____
Cultivators	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
<b>Total</b>	_____	_____	_____	_____	_____

**Grand Total Value** \_\_\_\_\_

Total acres operated \_\_\_\_\_

Acres tillable \_\_\_\_\_

Acres not tillable \_\_\_\_\_

Crops	Acres	Yield per acre	Total Prod.	Operator's Share			(1) Operator's Costs	Income over Costs	Labor		Corn Equiv.	Alf. Hay Equiv.
				Bu.-Ton	Price	Value			per acre	man days		
<b>Total Present Plan</b>		XXX	XXX	XXX	XXX				XXX			
<b>"Alternate Plan"</b>												
<b>Difference</b>												

Crops Block (alternate plan)

Crops	Acres	Yield per acre	Total Prod.	Operator's Share			Operator's Costs	Income over Costs	Labor		Corn Equiv.	Alf. Hay Equiv.
				Bu.-Ton	Price	Value			per acre	man days		
<b>Total Alternate Plan</b>		XXX	XXX	XXX	XXX				XXX			

LIVESTOCK BLOCK

	Requirements Per Unit						Unit In- come over costs	NO. OF UNITS	Present Plan, Total Req <sup>a</sup>					Alternate Plan, Total Req <sup>a</sup>					Total In- come over costs
	CE* BE (d)	Hay Equiv. (d)	Protein Supp. (lbs.) (d)	Man Days (d)	Av. An. Ls. & Eq. Invest. (e)				CE* BE (d)	Hay Equiv. (d)	Protein Supp. (lbs.) (d)	Man Days (d)	Av. An. Ls. & Eq. Invest. (e)		CE* BE (d)	Hay Equiv. (d)	Protein Supp. (lbs.) (d)	Man Days (d)	
1. Dairy Whole Milk (a) 350 B. F. Equiv.	42bu 53	5 T	300	10-13	\$ 435	\$ 220													
2. Dairy-250 lbs. B. F. (b)	28bu 35	5 T	200	10-15	330	.94													
3. Beef Cow-450 lb. calf (c)	2.4bu 3	1.5T	100	1-3	200	39													
4. Beef Cow-Calf fed to 950 lbs.	40bu 50	2.5T	250	2-5	300	62													
5. Calf-400-1000 lbs. deferred fed	46bu 58	1.5T	200	1-2	150	.35													
6. Calf-400-100 lbs. full fed	60bu 75	.8T	250	1-2	150	41													
7. Yrags. 700-1000 lbs.	28bu 35	.5T	100	.5-1	95	26													
8. Ewe and Lamb	2.4bu 3	.4T	10	.3-1	28	16.50													
9. 100 feeder lambs-65- 100 lbs.	264bu 330	.1T	15	8-18	800	2.00													
10. Sow & Litter-7 pigs	112bu 140	-	800	2.5-5	180	70													
11. 100 Laying Hens	100bu 125	-	5000	4-6	220	85													
12. 100 Turkeys	110bu 137	-	3000	4-7	230	57													
13.																			
14.																			
15.																			
16. Total Feed Required																			
17. Raised Feed Available (from crops block)																			
18. Excess or deficit																			
19. Livestock Productive Man Work Units (carry to summary block)																			
20. Average Investment In Livestock & Equipment (carry to summary block)																			
21. Livestock																			

a. Incl. feed for cow and raising replacement plus 1/2 calf, 1/3 yearling heifer, 1/8 bred heifer.  
 b. Incl. feed for cow and raising replacement plus 1/2 calf, 1/3 yearling heifer, 1/8 bred heifer.  
 c. Incl. feed for cow including replacements, .9 calf, 1/6 yearling heifer, 1/10 bred heifer, 1/25 bull.  
 d. Includes feed and labor for replacements.  
 e. Includes cost of replacements but no buildings.

\* CE corn equivalent  
 BE barley equivalent

FARM BUSINESS SUMMARY

LABOR REQUIREMENTS:	PRESENT	I	Plan II
1. Man days on crops (crops block) .....	_____	_____	_____
2. Man days on livestock (livestock block) .....	_____	_____	_____
3. Total many days on farm work .....	_____	_____	_____
4. Man labor months required .....	_____	_____	_____
(25 days equal 1 month)			
5. Operator labor available, months .....	_____	_____	_____
6. Family labor available, months .....	_____	_____	_____
7. Total labor now available (add lines 5 & 6) .....	_____	_____	_____
8. Months of labor to hire .....	_____	_____	_____

CAPITAL REQUIREMENTS:			
9. Crop machinery & equip. owned, value .....	_____	_____	_____
10. Livestock & Ls. equip. owned, value .....	_____	_____	_____
11. Working Capital owned, value (add lines 9 & 10) .....	_____	_____	_____
12. Land value, if owned (current) .....	_____	_____	_____
13. Building value, if owned (current) .....	_____	_____	_____
14. Cost of added improvements needed .....	_____	_____	_____
15. Total value, land & buildings (add lines 12, 13, 14)	_____	_____	_____

ROUGH SUMMARY OF INCOME (UNDISTRIBUTED)			
16. Crops Income over costs (crops blk) .....	_____	_____	_____
17. Livestock Income over costs (ls.blk) .....	_____	_____	_____
18. Total undistributed income .....	_____	_____	_____

UNDISTRIBUTED FARM BUSINESS COSTS:			
19. Hired labor, mo. at \$ per mo. ....	_____	_____	_____
20. Depreciation, repairs, insurance (9% of 1/2 of lines 13 & 14 if owned) .....	_____	_____	_____
21. Real Estate taxes (1 1/2% of line 12 or actual taxes) .....	_____	_____	_____
22. Cash rent paid .....	_____	_____	_____
23. Interest on working capital (6% of line 11) .....	_____	_____	_____
24. Interest on land & buildings (5% of line 15) .....	_____	_____	_____
25. Total undistributed costs (19 to 24) .....	_____	_____	_____
26. INCOME TO MANAGEMENT & FAMILY LABOR (line 18 minus 25) .....	_____	_____	_____



MODAL EFFICIENCY INDICATORS FOR TODAY'S PROFITABLE FARM

<u>(Relating To)</u> <u>Size of Business</u>	<u>Top 30% of</u> <u>N.D. Farms</u>	<u>Your Farm</u> <u>Today</u>	<u>Your Farm</u> <u>Tomorrow</u>
Total Farm Acreage	960	_____	_____
Total Rotated Crop Acres	640	_____	_____
Total Capital Managed	\$ 75,000	\$ _____	\$ _____
Months of Man Labor Used	16	_____	_____
Usual Gross Income	30,000	\$ _____	\$ _____
Expected Net Taxable Income	9,000	\$ _____	\$ _____
<u>Cropland Acres &amp; Yields</u>	<u>Acres Yield</u>	<u>Acres Yield</u>	<u>Acres Yield</u>
Wheat	160 30	_____	_____
Barley-Oats	160 40/60	_____	_____
Flax/Soybeans	160 14/24	_____	_____
Hay-Corn/Corn Silage	80 2/30/6	_____	_____
Fallow/Potatoes	80 /150 cwt.	_____	_____
<u>Livestock Returns</u>	<u>Expected</u>	<u>Expected</u>	<u>Expected</u>
Gross Per \$100 feed fed	\$ 160	\$ _____	\$ _____
Gross Per Dairy Cow Milked	\$ 350	\$ _____	\$ _____
Gross Per Beef Cow & Calf	\$ 100	\$ _____	\$ _____
Gross Per Ewe	\$ 20	\$ _____	\$ _____
Gross Per Hog Litter Raised	\$ 235	\$ _____	\$ _____
Costs/Cwt. of Gain, Calves*	\$ 15-16	\$ _____	\$ _____
Costs/Cwt. of Gain, Yrlings*	\$ 18-19	\$ _____	\$ _____
Costs/Cwt. of hog marketed*	\$ 12-13	\$ _____	\$ _____
*all costs, excepting labor and management.			
Pigs weaned per litter	7½-8	_____	_____
Usual feed: Pork Conversion	4:1	_____	_____
Market Lambs per 100 Ewes	100	_____	_____
Market calves per 100 cows	90	_____	_____
Marketed wool per 100 ewes	1000 lbs.	_____	_____
<u>Labor and Equipment</u>	<u>Usual</u>	<u>Usual</u>	<u>Usual</u>
Rotated Acres Per Man	480	_____	_____
Machine/Power Costs, Crop A.	\$10	\$ _____	\$ _____
Gross Income Per Man	\$24,000	\$ _____	\$ _____

Efficiency Tips 2

<u>Source of Income</u>	<u>Top 30% of N.D. Farms</u>	<u>Your Farm Today</u>	<u>Your Farm Tomorrow</u>
Value of Crops Produced	\$ 20,000	\$ _____	\$ _____
Value of Livestock Produced	10,000	_____	_____
Gross Profits (Sales)	30,000	_____	_____
Expense, Fixed & Variable	21,000	_____	_____
Net Taxable Income, about	9,000	_____	_____
 <u>Miscellaneous Attributes:</u>			
Fertility Needs Mapped in Place	Yes	_____	_____
Farm Records & Accounting	Yes	_____	_____
Broadleaf Weed Spray Program	Yes	_____	_____
Insurance for Cash Costs Outlay	Yes	_____	_____
Crop Improvement Ass'n Member	Yes	_____	_____
Farm Managers Ass'n Member	Yes	_____	_____
Net-Worth Statement and Supporting Progress Records on File at Bank or Production Credit Ass'n Office	Yes	_____	_____
Plans Vacation With Family	Yes	_____	_____
Keeps Up on What's New in Farm Management (reading, meetings, conventions, co.-agent visits)	Yes	_____	_____
Uses Help of Commission Firm in Buying and Selling of Livestock	Yes	_____	_____
Has Estate Planning Setup Worked Out With Wife & Trust Officer To Insure Firm's Business Continuity	Yes	_____	_____
Finds and Takes Time For Church	Yes	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
A Home & Farmstead To Be Proud Of	<u>Yes</u>	_____	_____
Wouldn't Change Jobs With Ike:	<u>No, Sir!</u>	_____	_____

ARE YOU A GOOD CREDIT RISK?

Do lenders seem to shy away from you? Or do they seem eager and willing to lend? Your answers to questions listed below may help you learn how you'd look at yourself through the eyes of money lenders as "a sound credit risk" to play ball with. "No" answers are embarrassing.

A. As A Farm Family (very important):

1. Have you figured out, and can you show, that the proposed loan will earn enough extra profit to meet principal and interest payments? \_\_\_\_\_.
2. Do you adopt new and improved farm practices likely to increase your farm earnings? \_\_\_\_\_.
3. Do you pay your bills promptly? \_\_\_\_\_.
4. When you're not able to pay, do you promptly explain to your lender(s) just what you can or can't do, and why? \_\_\_\_\_.
5. Do you try to obtain most of your credit from one source? \_\_\_\_\_.
6. Do you welcome suggestions from your lender(s) about business and financial affairs? \_\_\_\_\_.
7. Do you maintain a reserve (cash and liquid assets, and/or insurance large enough to meet minor emergencies? \_\_\_\_\_.
8. Have you figured out how the farm business goes on in event of the operator-manager's unexpected death, injury, or serious illness? And how your lender gets paid off in event of such contingencies? \_\_\_\_\_.

B. Your Land-Use and Farming Plan(s): (as bank examiners would view them)

1. Is your farming unit (crops and livestock) really large enough to carry the loan, and still provide income for the level of living you need and want? \_\_\_\_\_.
2. Do you have the power, labor, machinery, and equipment needed to farm for maximum profit today? \_\_\_\_\_.
3. If you're renting, do you have a clear understanding on equitable costs-sharing (e.g. fertilizers, weedicide useage, feeds, seeds, etc.) for both owner and operator on items likely to increase earnings for you and/or your landlord? \_\_\_\_\_.
4. Do you use a maximum high-profit cropping system consistent with weed and soil erosion control now? \_\_\_\_\_.
5. Are you applying fertilizers on the basis of soil tests and yield checks for your individual farm fields, and crops? \_\_\_\_\_.
6. Will you have money for farm and home improvements after meeting your living expenses and loan payments? \_\_\_\_\_.

C. Your Farm Records, Etc.:

1. Do you keep good records now? \_\_\_\_\_.
2. Will your records show how much money you've made or lost on each farming operation? \_\_\_\_\_.
3. Will your records give enough information for a meaningful financial statement for your lender's reference (your assets, liabilities, and net worth today)? \_\_\_\_\_.
4. Can you supply your lender with either financial summaries or "net worth statements" showing your changing financial position over the past three years? \_\_\_\_\_.

D. The Loan(s) In Question:

1. Will the proposed loan increase your net income? \_\_\_\_\_.
2. Have you planned your credit needs over the entire farm business year? \_\_\_\_\_.
3. Are you avoiding use of short-term borrowing when a longer term would be better? \_\_\_\_\_.
4. Are you "leveling" with your lender as to what you owe, where you owe it, and how principal and interest payments are going to be satisfied during the life of your credit contract? \_\_\_\_\_.
5. Will the loan(s) under consideration get the job done? Would more money - and a different repayment contract - work out more advantageously for both you and your lender over time? \_\_\_\_\_.

E. Your Choice of Lender:

1. Can he stick with you in bad times as well as good? \_\_\_\_\_.
2. Can he extend you the line of credit your farm needs today in terms of (a) amounts of money, and (b) repayment terms? \_\_\_\_\_.
3. Does he (or his firm) have a sound practical knowledge of farm management by which lending practice is guided for your mutual benefits (as lender and borrower)? \_\_\_\_\_.
4. Does the lender's firm provide special services in such matters as (a) tax management (b) estate planning (c) farm management (d) trusts (e) risk insurance? \_\_\_\_\_.

Obviously, to get a loan, you must convince some lender that you have a sound basis for credit (and, also, the required security examiners look for in checking your loan file over from time to time). Fundamentally, you must (a) show that your farming program and management ability will increase your income enough to pay interest and principal, and (b) prove that you are a good credit risk. H.W.H.