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College of Agriculture

Analyzing Dairy Farms For Maximum Profit

A Study in Agricultural Adjustment

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Adjustment of agriculture to changing conditions is a never-ending process. Agriculture, as all other business, has always had to adjust itself, and will have to continue to adjust itself, to a progressive, changing world.

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This bulletin developed from a research project, the objective of which was "to determine, from crop and field input-output relationships, the most profitable combination of land, cattle, and equipment for one man operating a Grade-A dairy enterprise."

A selected group of the best-managed one-man operations in northern Idaho was studied. Cultural practices, land-machinery relationships, animal-machinery relationships and animal-crop relationships were analyzed to determine the best combination of factors for the production of milk. From this study a model was constructed that included all the best practices determined by the research; the governing factor of whether or not a practice is included in the model is the amount of work one man can do in a 10½ hour day during his busiest season with a minimum of occasional part-time help.

This bulletin presents the optimum one-man dairy operation in northern Idaho. It was assumed that the dairy farmer knows and has the skills necessary for best herd management practices and is psychologically and physically capable of caring for the herd size that fully uses his labor (10½ hours per day in the busiest season). It presents it in a way to show the costs involved in each step of the dairy enterprise from planting seed for forage to delivering milk to the processor. When it was found that more than one practice, such as chopping or baling hay, could be economically used under differing conditions, the method of calculating both practices is presented. As each step is calculated, blank spaces are provided for an interested farmer to fill in his own costs and make his own analysis.

The cost figures presented here are known to hold true only in northern Idaho; costs will vary in other areas, but the method of analysis is valid everywhere. The dairy farmer in northern Idaho canuse these cost figures as a mark to shoot at when comparing his own practices to those found to be most efficient in his area. The dairy farmer in other areas will have to make allowances for any natural differences that exist between his area and northern Idaho when using these figures as an efficiency guide.

The research from which this material was taken was divided into two parts, 1) the building of the model farm, and 2) the method of cost analysis for this model farm. This bulletin is primarily concerned with the method of cost analysis; it presents the model farm that was developed in the first phase of the work, but does not go deeply into how this model was constructed. The reader who is interested in how the model was developed is referred to the thesis, **An Economic Analysis of Grade A Dairy Farms in Northern Idaho** (1956) by Leonard K. Brooks. The thesis is on file at, or can be had by loan from, the library at the University of Idaho, Moscow.

Analyzing Dairy Farms For Maximum Profit

A Study in Agricultural Adjustment

LEONARD K. BROOKS, SCOTT WALKER, JACK WEBER*

This bulletin is designed to help dairy farmers adjust their operations to changing technology and marketing conditions. Each farmer has a different set of circumstances, resources and markets that will have a great influence on how he adjusts to his situation. To make these adjustments, farmers must have the answers to questions like these:

Can I cut production costs?

Can I cut my investment in equipment or building?

Would I be better off buying all my feed?

If I need more land should I buy or rent it?

How many cows can I handle?

Can I make changes that will make me more money?

The answers lie in the dairy farmer knowing his costs. A simple-to-follow method of cost analysis for a dairy farm is presented here. The dairy farmer who works it out thoroughly will know just what his costs of producing milk, silage, hay and grain are; and he will be in a position to answer questions such as those posed above and adjust his operation to make more money.

A better understanding of costs for a particular area would be gained by a dairy farmer if he worked this through with a group of neighbors, each analyzing his own farm, but working in a group.

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Method Of Analysis Developed In Study Of One-Man Northern Idaho Dairy Farms

IN determing what is the most profitable one-man dairy operation in northern Idaho, a detailed analysis was made of the best current management practices.

Twelve combinations in most common use of operating a one-one farm were studied; they included combinations of three hay harvesting methods, two forage feeding practices and three forage production practices.

The hay harvesting methods analyzed included 1) all-baled hay, 2) all-dry-chopped hay, and 3) grass-silage. The dry-hay methods studied included operations that fed all dry baled hay, all dry chopped hay and ⅓ baled to ⅔ silage, and ⅓ chopped to ⅔ silage.[1]

The production practices studied were 1) all dry land, 2) all sprinkler irrigated and 3) the combination of dry land hay with sprinkler irrigated pasture.

As this study was only of one-man dairy farms the labor of the operator was the limiting factor of how large the operation could become. It was assumed the operator would work a maximum of 10½ hours on any day; but, that at forage harvesting time, he would hire (or trade off with neighbors) a minimum of day labor for about 20 days twice a year, from about June 20 to July 10, and August 15 to September 5.

After data on costs were gathered from the various management practices, they had to be measured against a common yardstick for comparison. It was at this point that the method of analysis, taken up in detail in the next section, was developed. Each farming operation was reduced to its smallest meaningful part and the cost of this part determined from records and job-and-time studies. After the cost of each part was determined, the parts were fitted together statistically; an economic model was constructed of the most profitable one-man dairy farm in northern Idaho.[2] There is probably no actual farm that fits this description exactly, but several of the most profitable ones approximate the model.

The following major conclusions were made:

1) There is a signficant difference in total costs and income between different enterprise combinations. The most efficient and profitable combination of land. labor, and equipment is the enterprise which has sprinkler irrigated pasture and dry-land hay and uses silage-chopped hay forage harvesting method. The least efficient and the poorest profit combination is the all dry-land farm using a baled hay forage harvesting operation.
2) The minimum size operation to cover costs (without any operator labor income) without regard for production practices or machinery combination, ranges between 15 and 17 cows.
3) The most efficient method of harvesting forage is a silage-chopped hay operation. The least efficient is a baled hay operation.

Based on the findings the model one-man dairy farm will have a herd of 52 cows on 171 acres and will have the necessary buildings and equipment (enumerated later) to operate efficiently. Of the 171 acres, 37 are in irrigated pasture (approximately .7 acre per adult cow), 98 acres in dry-land hay, 27 in reseeding and 9 in homestead. A roughage ration of ⅔ silage and ⅓ dry-chopped hay will be fed; all grain will be purchased.

The following limitations and requirements were observed:

Each adult cow in a herd requires a certain replacement stock of calves and heifers coming up. Calculations were based on "adult cow units" which include the young replacement stock necessary to maintain the milking herd size.[1]

Each cow is milked approximately 300 days per year. She is dry 1/6 of the time; therefore, at any time, only 5/6 of the adult cows are milking.

4.71 tons of dry hay equivalents are required per adult cow per year. These are supplied by ⅔ silage and ⅓ dry-chopped hay. It requires **1.43 hours per adult cow of the farm operator's time during the first cutting to harvest forage.** This assumes he has two hired hands during this most critical period. Yield in northern Idaho requires 2.6 acres of hay and forage land per adult cow per year.

2.56 hours per day to set up and clean milking equipment.

.088 hours per day to milk each cow (excluding set-up and cleaning time.)

.5 hours per day for changing irrigation equipment.

[1]This ⅓ - ⅔ ratio is the upper limit of silage intake for dairy cows on full production in this area under current feeding practices.

[2]The complete data and calculations are in the thesis, An Economic Study of Grade A Dairy Farms in Northern Idaho, referred to on page 2.

[1]An "adult cow" unit consists of one cow and approximately ¼ heifer, ⅓ yearling and ⅓ calf.

10.5 hours working day during the busiest season.

Briefly, this is the way in which the model farm was calculated: It takes the operator 2.56 hours per day to set-up and clean up his milking equipment, and another .5 hours per day to change irrigation lines each day. This leaves 7.44 hours for milking time and harvesting during the most critical period.

$$10.50 - 2.56 - .5 = 7.44$$

As it takes 1.43 hours of his own labor per cow to harvest hay during the first cutting, and as the haying season lasts 20 days, it takes the operator .0715 hours per adult cow per day to harvest forage during this period.

$$1.43 / 20 = .0715$$

Forage harvesting is on an "adult cow" basis, while milking time (.088 hours per cow per day) is on a "wet cow" basis. In putting these time requirements on the same basis the milking time is translated into an adult cow basis by multiplying by .833, which gives .0733 hours per day milking time per adult cow.

$$.088 \times .833 = .0733$$

.0715 hours for hay harvesting per adult cow, plus .0733 hours milking time per adult cow, adds up to .145 hours per day per cow. As the operator has 7.44 hours per day to spend in harvesting and milking he can care for 52 cows (7.44 divided by .145) during his critical time period.

$$.0715 + .0733 = .1448 \text{ or } .145$$

7.44/.145 = 51.3 rounded to 52 adult cows units.

At the yield rates in northern Idaho it takes 2.6 acres of hay and forage land for each adult cow, or 135 acres, to feed 52 cows each year. At the yields in northern Idaho this comes to 37 acres of irrigated pasture, enough to pasture the cows for five summer months, and 98 acres of alfalfa to produce hay. In addition, another 27 acres are in the process of being reseeded each year and 9 acres are in the homestead.

SEPARATE DAIRY ENTERPRISE

One of the biggest difficulties in trying to determine costs of production of a single commodity on a farm is that a farming operation is so integrated and covers so many enterprises that it is difficult to separate costs and determine the proportion that applies to each enterprise. (For example, is a new tractor tire to be charged as a cost to wheat, hay, barley or road maintenance?) This analysis has reduced each individual cost item down to its smallest meaningful increment so that it can be divided, where necessary, among several enterprises. On a farm where there is only one enterprise, such as the economic model devised here in which we assume only one commodity, milk, this is not so important as on a farm where several commodities are produced for sale. As this analysis is only concerned with the dairy enterprise, costs will have to be divided as to whether they pertain to the dairy enterprise or not; where it is not a clear-cut case, the farmer working out this analysis for his farm will have to prorate costs between enterprises.

FIXED COSTS: Fixed costs are those that remain more or less the same even with changes in herd size. Taxes, depreciation and insurance are examples of fixed costs.

VARIABLE COSTS: Variable costs are those costs that change with herd size. A larger herd takes more feed, fertilizer, seed, gas and oil, veterinary services and medicine. Costs such as these, that change directly with herd size, are considered variable costs

LABOR INCOME: The farm operator's labor, just as his interest income on invested capital, is not considered as either a fixed or variable cost. It is not considered as a cost at all. His labor income is what remains after all costs have been paid. Cost of hired help, however, is considered as a cost.

In this analysis fixed and variable costs are separated. Fixed costs are determined on a "per-farm" basis while variable costs are calculated on a "per-acre," "per-ton," or "per-cow" basis, whichever is most meaningful; both fixed and variable costs and income are reduced to a per-cow basis in the final analysis.

USE GREEN SHEET

A green sheet that unfolds to the right has been provided in the back of the bulletin in order to make the analysis easier to follow, particularly for those interested in working out their own dairy costs. Each of the items on the green sheet is worked out in detail in the bulletin. Not only are there figures for our model farm, but spaces are provided for anyone to work his costs out along with those of the model farm.

How To Analyze Costs And Profits On Your Dairy Farm

NOTE: Space is provided in each section for a dairy farmer to figure costs on his farm as the analysis of the model dairy farm is presented. THE COST FIGURES PRESENTED FOR THE MODEL FARM ARE KNOWN TO HOLD TRUE ONLY IN NORTHERN IDAHO, COSTS ON FARMS OTHER THAN IN NORTHERN IDAHO WILL PROBABLY VARY. USE COST FIGURES THAT APPLY TO YOUR FARM; IN THE ABSENCE OF ANYTHING TO BASE COST FIGURES ON FOR YOUR AREA USE THE FIGURES FOR NORTHERN IDAHO AS AN APPROXIATION.

Fixed Costs

TAXES

TAXES on the model farm[1] are entered in Table 1. These are property and real estate taxes. As this is a 100% dairy operation all taxes are applied to the dairy operation as costs.

If it were not a 100% dairy operation, taxes would be proportioned according to use of the item taxed. For example, if ⅔ of the land were used to produce feed for the dairy enterprise, and the other ⅓ were used for cash crops or growing feed for another livestock enterprise, then only ⅔ of the land tax would be applied as a cost to dairying. If the irrigation equipment were used for a cash crop as well as pasture and if there were as much irrigating to be done on the cash crop land as on the pasture, then only 50% of the personal property tax on irrigation equipment would be charged to dairy costs. The same holds true for buildings; a building that is used solely for the dairy enterprise is charged to dairying. If it is used for other enterprises as well, such as a machine shed or storage barn, then an approximation of use of the building has to be made according to the enterprises involved.

Total taxes applicable to the dairy enterprise are carried from Table 1 to the green sheet.

[1]Figured at the average current rate for northern Idaho.

Table 1 — Taxes

	Example Farm			Your Farm		
Item	Taxes	Per cent of use in dairying	Taxes charged to dairying	Taxes	Per cent of use in dairying	Taxes charged to dairying
Land	*$ 143.64*	*100%*	*$ 143.64*	$		$
Irrigation equipment	*6.99*	*100%*	*6.99*			
Building not including homestead	*46.10*	*100%*	*46.10*			
Machinery	*45.02*	*100%*	*45.02*			
Cow herd	*49.76*	*100%*	*49.75*			
Total (Carry to green-sheet)			*$ 291.50*			$..................

INSURANCE

OF THE many varieties of insurance, the model farm only carries insurance on the farm buildings; insurance on the house is not included as a dairy cost, but is a personal expense. Insurance cost is entered in Table 2.

Insurance, just as taxes, would be prorated according to the use made of the item insured if it is used on more than one enterprise on the farm.

Table 2 — Insurance

	Example Farm			Your Farm		
Item	**Insurance cost**	**Per cent of use in dairying**	**Insurance charged to dairying**	**Insurance cost**	**Per cent of use in dairying**	**Insurance charged to dairying**
Buildings	*$ 80.00*	*100%*	*$ 80.00*	$		$
Machinery						
Livestock						
Crop						
Liability						
Total (Carry to green sheet)			*$ 80.00*			$ ....

LAND COSTS

FIXED land costs for the model farm consist only of annual fence repair and replacement, depreciation and repairs on irrigation equipment, Table 3. Annual fence costs are 50c per acre in northern Idaho. Depreciation of the irrigation equipment is figured at 5% per year. It costs $3,330 to replace. Repairs to irrigation equipment average 1 per cent or $33.30 per year. This includes repairs to motor, pump, lines and sprinkler heads.

In northern Idaho there is no charge, fixed or otherwise, on irrigation water. If there were, it would have to be included as a land charge. If the model farm rented land, either crop or pasture land, this also would be a land charge, as would any costs of tile or ditch maintenance.

If the land were used for more than the dairy enterprise, land charges would have to be prorated to the various enterprises on the basis of use.

Table 3 — Estimation of Land Costs

	Example Farm			Your Farm		
Item	Costs	Per cent of use in dairying	Charged to dairying	Costs	Per cent of use in dairying	Charged to dairying
Fencing	*$ 85.50*	*100%*	*$ 85.50*	$		$
Land rent						
Tile and ditch maintenance						
Water charges						
Irrigation equip. depreciation	*166.50*	*100%*	*166.50*			
Irrigation Equip. repairs	*33.30*	*100%*	*33.30*			
Other						
Other						
Total (Carry to green sheet)			*$ 285.30*			$...........

BUILDING DEPRECIATION AND REPAIR COSTS

DEPRECIATION of the farm buildings was calculated at 2½% per year on present replacement cost, assuming a life span of 40 years, which is common for the area. Repair costs were estimated from experience at 1% per year. Table 4 carries the estimated costs of depreciation and repair for farm buildings. Note that the homestead is not included; this is a personal expense.

Table 4 — Estimate of Building Depreciation and Repair Costs

Example Farm							
Item	Replacement price	Depreciation Per cent	Depreciation Amount	Repairs	Total depr. and repairs	Per cent of use in dairy	Charge to dairy
Machine shed[1]	*$1500*	*2.5*	*$38.00*	*$15.00*	*$53.00*	*100%*	*$53*
Milking parlor[2]	*5325*	*2.5*	*133.00*	*40.00*	*173.00*	*100%*	*173*
Loading, feeding and hay storage[3]	*7400*	*2.5*	*185.00*	*50.00*	*235.00*	*100%*	*235*
Silo[4]	*4000*	*2.5*	*100.00*	*45.00*	*145.00*	*100%*	*145*
Total (Carry to green sheet)							$606

Your Farm							
Item	Replacement price	Depreciation Per cent	Depreciation Amount	Repairs	Total depr. and repairs	Per cent of use in dairy	Charge to dairy
Machine shed	$		$	$	$		$
Milking parlor							
Loading, feeding and hay storage							
Silo							
Other							
Other							
Total (Carry to green sheet)							$..........

[1]The machine shed is a treated pole structure with sheet metal roof and rough lumber siding. It is 24' x 50', built in 1955 at a cost of $1.25 per sq. ft.

[2]The 30' x 20' milking parlor with milk room and wash room is a four stall, walk-through with overhead grain storage facilities. 1955 construction costs were $6.25 per sq. ft.

[3]The treated pole loafing shed, feed area, hay and bedding storage building has sheet metal roof and rough lumber siding. 1955 construction costs were $1.25 per sq. ft.

[4]The trench silo with concrete floor and wall is incorporated in the same building as the loafing sheds. It's estimated cost of construction is 20 cents per cubic ft. storage.

DAIRY EQUIPMENT DEPRECIATION AND REPAIR COST

THE model farm required milking equipment that would enable the operator to milk at least 35 cows per hour.[1] This was found to be best for any herd over 25 cows because the time saved in milking could be better put to use in the field, especially at the busiest time of the year. The equipment consists of a four-unit combined milker with glass milk line, vacuum wash system, four metal stanchions, four grain-feeding devices and four milk-weighing devices, along with adequate refrigerated space, hot-water heater and washing facilities. If a bulk tank were necessary, it would have required a larger investment.

It was found that maintenance, repairs, and depreciation on milking equipment were about the same whether the equipment was used regularly, little, or not at all. This was true of maintenance repairs because those parts which are most apt to require repairing or replacement deteriorated as much with age as they did with usage. Therefore, both repairs and depreciation were calculated as fixed costs.

Depreciation on milking equipment was found to be 10% a year, while it was only 7% on refrigeration equipment. Present replacement costs for the equipment are used as a base. Repairs were averaged over a large number of farms to arrive at realistic figures. Table 5 is used to estimate dairy equipment fixed costs.

[1]There is milking equipment available now with which one man can milk 60 cows per hour.

Table 5 — Estimate of Dairy Equipment Fixed Costs

Example Farm					
Item	Replacement Price	Depreciation Rate	Depreciation Amount	Repairs	Total charge to dairy
Four unit combined milker, glass milk line, vacuum wash system and four milk weighing devices.	*$2100*	*10%*	*$210.00*	*$56.00*	*$266*
Refrigeration unit	*500*	*7%*	*35.00*	*5.00*	*40*
130 gal. water heater and tank	*250*	*7%*	*17.50*	*7.50*	*25*
Wash vats	*100*	*10%*	*10.00*	*1.00*	*11*
Total (Carry to green sheet)					*$342*

Your Farm					
Item	Replacement Price	Depreciation Rate	Depreciation Amount	Repairs	Total charge to dairy
Your combined milking equipment	$		$	$	$
Refrigeration unit					
Water heater and tank					
Wash vats					
Total (Carry to green sheet)					$

FARM EQUIPMENT DEPRECIATION AND REPAIRS

THE minimum equipment to adequately and economically operate the model farm is listed in Table 6, along with the depreciation schedule that applies to the various pieces of equipment. While it was found that many farms had more equipment, it was also found that the extra equipment was unnecessary from an economic point of view.

Present replacement cost was used as a base for computing depreciation. Even the machinery that was purchased as used equipment was calculated on a present replacement cost basis; present replacement cost was figured on the current cost of a similar piece of equipment in similar condition and at a similar age of the used equipment when purchased. For example, if a five-year old combine had been purchased three years ago for $3,700 and a five-year old combine would cost $4,100 today, $4,100 was used as the base.

Depreciation costs for machinery are calculated in Table 6 on the facing page.

Table 6 — Estimation of Farm Machinery Fixed Costs (Depreciation)[1]

	Example Farm						Your Farm					
Machine	Replacement cost	Total estimated life in years	Annual Depreciation: Per cent rate	Annual Depreciation: Cost	Per cent of use in dairy enterprise	Depreciation charged to dairy enterprise	Replacement cost	Total estimated life in years	Annual Depreciation: Per cent rate	Annual Depreciation: Cost	Per cent of use in dairy enterprise	Depreciation charged to dairy enterprise
Tractor	$2200	14	7%	$154	100%	$154	$			$		$
Field chopper	2500	15	7%	175	100%	175						
Mower	275	14	7%	20	100%	20						
Rake, side delivery	390	24	4%	16	100%	16						
Plow	185	16	6%	11	100%	11						
Disk (tandem)	275	16	6%	17	100%	17						
Harrow (section)	75	25	4%	3	100%	3						
Drill	625	14	7%	44	100%	44						
Packer	275	16	6%	17	100%	17						
Fertilizer spreader	375	14	7%	23	100%	23						
Manure spreader	750	20	5%	38	100%	38						
Loader Attachment	550	14	7%	39	100%	39						
Truck	2000	10	10%	200	100%	200						
Silage wagons (3)	750	14	7%	53	100%	53						
20 h.p. electric motor	750	15	7%	53	100%	53						
Stationary blower	750	20	5%	38	100%	38						
Tools (welder, hoist, power tools, hand tools)	1000	25	4%	40	100%	40						
Other												
Other												
Total Depreciation (Carry to green sheet)						$941						$

[1]For our example we have used average figures for the "Estimated Life in Years." The figures were computed according to the procedure explained in Appendix 1.

OTHER COSTS

OTHER farm costs that were found to remain approximately the same even with changes in herd size included electricity (excluding household), herbicides, insecticides, rodenticides, farm records, shop supplies, odd lumber, and dairy association dues. These are grouped together in Table 7.

Table 7 — Other Fixed Farm Costs

	Example Farm			Your Farm		
Item	Costs	Per cent of use in dairy	Charge to dairy	Costs	Per cent of use in dairy	Charge to dairy
Electricity	*$362*	*100%*	*$362*	$		$
Farm supplies:						
Insecticides	*20*	*100%*	*20*			
Accounting forms	*5*	*100%*	*5*			
Nuts, bolts, nails, shop supplies	*100*	*100%*	*100*			
Herbicides	*45*	*100%*	*45*			
Other						
Other						
Local dairy assoc. dues	*5*	*100%*	*5*			
Subscription to dairy magazine	*5*	*100%*	*5*			
Total (Carry to green sheet)			*$542*			$

Variable Costs

DESCRIPTION OF HERD

VARIABLE costs are also called "herd costs" as they vary with the size of the herd. All herd feed requirements, and therefore, practically all herd costs, are based on an "adult cow" basis. The "adult cow" unit makes allowances for the extra feed and other items needed to care for replacement stock. A well-managed dairy herd of 52 cows in northern Idaho will cull out about 10 cows per year and will lose 3 by disease or accident. To furnish this replacement (and take care of the normal death rate of young stock) there are 14 heifers, 16 yearlings, and 18 calves.[1]

FORAGE FEED REQUIREMENTS

On an "adult cow" basis it requires 4.7 tons of hay or hay equivalents per year per cow; this is a total of 245 tons for a 52 cow herd.

Hay land in northern Idaho yields about 2.5 tons per acre from two cuttings, 1.8 tons the first cutting and .7 ton the second, It will take 98 acres at this yield to produce the roughage necessary. Two-thirds of the roughage is fed as silage and one-third as dry hay, which means that about 163 tons of dry hay equivalent in the form of silage (this is about 500 tons of wet silage as wet silage is three times as heavy as dry hay) and 82 tons of dry hay have to be harvested.

Ninety-one acres of the first cutting ($91 \times 1.8 = 163.8$ tons) will supply the silage. Seven acres of the first cutting ($7 \times 1.8 = 12.6$ tons) plus the second cutting ($98 \times .7 = 68.6$ tons) will furnish the dry hay.

MACHINERY PERFORMANCE RATES

In order to calculate variable costs accurately each field operation was studied to find how much it added to the costs of operating the farm. The performance rate of each piece of machinery and the costs of operating are broken down to unit costs in Table 8 on the next page. The costs of operating some machinery are more closely related to time in use, some, to acres worked on, and some, to yield. In each case the variable cost is stated in the units, "per hour," "per acre," or "per ton," whichever is most appropriate. These performance rates and costs are known to hold true only in northern Idaho. For example, an area that is level may have lower operating costs for the tractor and combine, while one that is more hilly may have higher costs. Any farmer not in northern Idaho can either use these costs as an approximation or figure his own rates and costs.

A minimum of additional labor is hired during the hay harvesting periods to best use the farm equipment. The labor rate is $1.50 per hour.

[1]The cows are valued at $200 each, bred heifers at $125, yearlings at $75, and calves at $20. Total herd investment is $14,000.

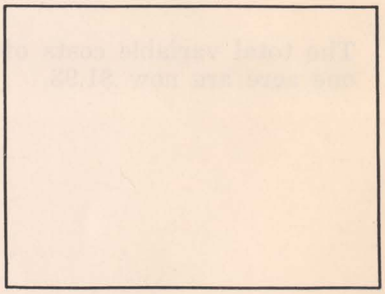
Table 8 — Performance Rates and Costs of Operating Farm Machinery in Northern Idaho

Machine	Performance Rate	Variable Costs			
		Fuel	Repairs	Misc.	Total
Tractor		45¢	5¢	4¢	54¢ per hour
5 ft. field chopper	3 tons dry hay per hour, or, 9 tons wet silage	38¢	7¢	4¢	49¢ per hour
5 ft. baler (twine)	2.5 tons per hour	30¢	7¢	4¢	41¢ per hour
7 ft. mower	3 acres per hour		4¢	1.6¢	5.6¢ per acre
12 ft. side delivery rake	3 acres per hour		2.5¢	.8¢	3.3¢ per acre
5 ft. combine	1.4 acres per hour	30¢	8¢	4¢	42¢ per acre
2-16" plow	.5 acre per hour		2.7¢	1.3¢	4¢ per acre
7 ft. disk (tandem)	1.5 acres per hour		3.2¢	1.3¢	4.5¢ per acre
15 ft. 3 section harrow	4 acres per hour		1.5¢		1.5¢ per acre
10 ft. drill	3 acres per hour		5¢	1.3¢	6.3¢ per acre
10 ft. packer	3 acres per hour		3.2¢	1.6¢	4.8¢ per acre
10 ft. fertilizer spreader	3 acres per hour		5¢	1.6¢	6.6¢ per acre
100 bu. manure spreader	4.5 tons per hour (2 hr. per acre)		3¢	1.6¢	4.6¢ per hour
36 ft. bale elevator	3 tons per hour		5¢	2.5¢	7.5¢ per ton
Stationary blower	3 tons dry hay per hour, or 9 tons wet silage		5¢	2.5¢	7.5¢ per ton
Tractor loader	4.5 tons per hour		3¢	.8¢	3.8¢ per hour
¾ ton truck					10¢ per mile
Silage wagon	3 tons dry hay per hour, or, 9 tons wet silage		1¢	.3¢	1.3¢ per ton
20 h.p. electric motor	3 tons dry hay or, 9 tons wet silage per hr.	21¢	3¢	.8¢	24.8¢ per hour

METHOD OF DETERMINING COST-PER-ACRE OF A FARMING OPERATION

TO arrive at a cost figure for raising any crop it's easiet to visualize it by reducing the crop to an "acre" cost for each operation that goes into raising the crop. As an example, go through the costs involved in reseeding hay and pasture land:

First, visualize an acre of hayland . . .



The first operation in reseeding is plowing the land . . . .

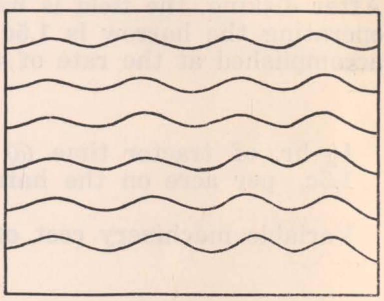
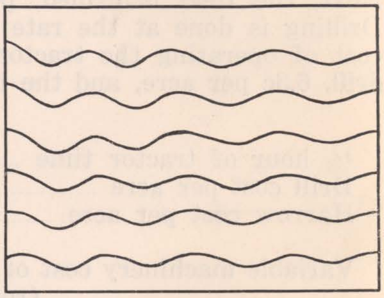


Table 8 shows that land is plowed at the rate of $\frac{1}{2}$ acre per hour, that the tractor costs 54c per hour and the plow 4c per acre. The cost of plowing one acre is then:

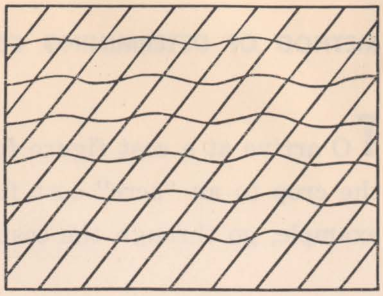


2 hours tractor time	$1.08
1 acre on the plow	.04
Variable machinery cost of plowing one acre	$1.12

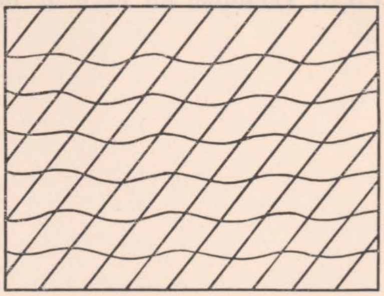
The next operation is disking. The field is disked twice after plowing. Table 8 shows that the variable cost of operating the disk is 4.5c per acre and that disking is performed at the rate of $1\frac{1}{2}$ acres per hour. In one hour he disks the whole acre one-and-a-half times so it takes him $1\frac{1}{3}$ hours to cover the acre twice. The cost of disking is, therefore:

1⅓ hours of tractor time @ 54c per hr. 72c
4.5c per acre on the disk, twice over 9c

Variable machinery cost of disking an acre twice 81c



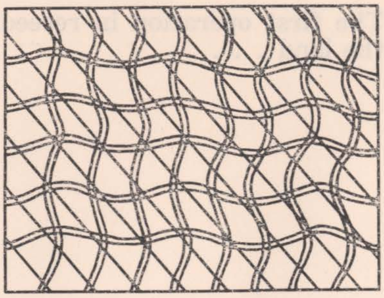
The total variable costs of plowing and disking one acre are now $1.93.



After disking, the field is harrowed twice. The cost of operating the harrow is 1.5c per acre and this can be accomplished at the rate of 4 acres per hour.

½ hr. of tractor time @ 54c per hr. 27c
1.5c per acre on the harrow, twice 3c

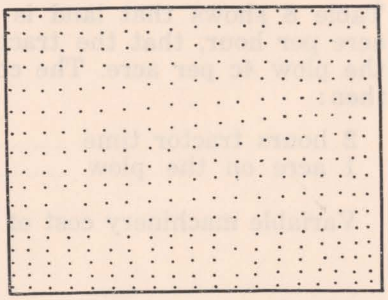
Variable machinery cost of harrowing twice 30c



Next, the field is drilled, pulling the harrow behind. Drilling is done at the rate of 3 acres per hour. The cost of operating the tractor is still 54c per hour, the drill, 6.3c per acre, and the harrow, 1.5c per acre.

⅓ hour of tractor time 18.0c
Drill cost per acre 6.3c
Harrow cost per acre 1.5c

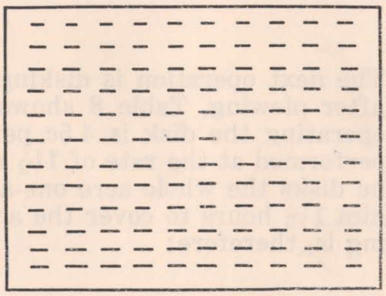
Variable machinery cost of drilling per acre 25.8c
(rounded off to 26c)



The last operation is packing. This is done at 3 acres per hour. Operating cost of the packer is 4.8c per acre.

⅓ hour of tractor time @ 54c per hr. 18.0c
Packer cost per acre 4.8c

Variable machinery cost of packing per acre 22.8c
(rounded off to 23c)



This makes the total variable cost of reseeding one acre; $1.12+.81+.30+26+23=$2.72

USING your own cost figures for operating your equipment, or using the cost figures in Table 8 if you don't have any of your own, figure your variable costs of reseeding an acre of hay land according to your farming practices:

Plow (variable cost per acre)	
Tractor on plow (consider rate per hour)	
Total variable cost of plowing per acre	

Disk (variable cost per acre)	
Tractor on disk (consider rate per hour)	
Total variable cost of disking per acre	

Harrow (variable cost per acre)	
Tractor on harrow (consider rate per hour)	
Total variable cost of harrowing per acre	

Drill (variable cost per acre)	
Tractor on drill (consider rate per hour)	
Total variable cost of drilling per acre	

Packer (variable cost per acre)	
Tractor on packer (consider rate per hour)	
Total variable cost of packing	

(Other operations)	

NOW, with these figures, you are ready to determine your total cost of all operations of reseeding on one acre of hay land:

Plowing (cost per acre times number of times over)	
Disking cost per acre times number of times over)	
Harrowing (cost per acre times number of times over)	
Drilling (cost per acre)	
Packing (cost per acre times number of times over)	
Other operation	
Other operation	
Total variable machinery cost per acre of operations reseeding hay land	

ROUGHAGE FEEDS: RESEEDING HAY AND PASTURE LAND

The model farm reseeds one-sixth of its hay and pasture land every year so that the entire 162 acres of hay and pasture is reseeded once every six years. This is a good management practice in northern Idaho. If the model farmer had chosen to reseed his entire roughage land every six years or half of it every three years, instead of one-sixth every year, he would figure his costs exactly the same way as is done here; he would prorate his costs of reseeding over the years rather than having no reseeding cost some years and a very high cost of reseeding in others.

Table 9 — Estimated Costs of Reseeding Pasture and Hay Land

Example Farm					
Item	**Cost per acre**	**Number of acres**	**Total, cost times number of acres**	**Per cent of use in dairying**	**Total charged to dairying**
Seed	*$6.00*	*27*	*$162.00*	*100%*	*$162.00*
Operating cost of machinery	*2.72*	*27*	*73.44*	*100%*	*73.44*
Total estimated cost of reseeding (Carry to green sheet)					*$235.44*

Your Farm					
Item	**Cost per acre**	**Number of acres**	**Total, cost times number of acres**	**Per cent of use in dairying**	**Total charged to dairying**
Seed					
Operating cost of machinery					
Total estimated cost of reseeding					$

TWO kinds of fertilizer, manure and commercial fertilizer, are used on the model farm. Table 8 shows that the variable costs of spreading commercial fertilizer are 6.6c per acre for the fertilizer spreader and 54c per hour for the tractor to pull it. Three acres per hour can be covered. Therefore, the cost of spreading commercial fertilizer is:

Fertilizer spreader cost	*6.6¢* per acre
Tractor on spreader (1/3 of 54c)	*18.0¢* per acre
Variable machinery cost of spreading fertilizer	*24.6¢* per acre

(figure your cost here)

Fertilizer spreader cost	
Tractor on spreader	
Variable machinery cost of spreading fertilizer	

The cost of spreading the fertilizer, plus the cost of the fertilizer itself, is the total cost of applying commercial fertilizer. The example farm uses borated gypsum, costing $1.50 per hundred, applied 100 pounds to the acre of hay and pasture land, both land in use and land just reseeded. The cost of commercial fertilization is figured in Table 10.

Table 10 — Estimated Costs of Fertilizing with Commercial Fertilizer

Example Farm					
Item	**Cost per acre**	**Number of acres**	**Total, cost times number of acres**	**Per cent of use in dairying**	**Total charged to dairying**
Machinery cost	*$ .246*	*162*	*$ 39.85*	*100%*	*$ 39.85*
Fertilizer cost	*1.50*	*162*	*243.00*	*100%*	*243.00*
Total variable cost of fertilizing (Carry to green sheet)					*$282.85*

Your Farm					
Item	**Cost per acre**	**Number of acres**	**Total, cost times number of acres**	**Per cent of use in dairying**	**Total charged to dairying**
Machinery cost	$		$		$
Fertilizer cost					
Total variable cost of fertilizing					$

SPREADING manure takes more than one man and more than one set of equipment. It is the common practice in northern Idaho for neighbors to trade work for spreading manure, and this is what our model farmer does. He calculates all of the variable costs of all equipment he uses spreading manure on his place and doesn't figure any costs for the time his equipment is working on the neighbor's place. If he had to hire extra labor and/or equipment for this work, he would have to figure the costs involved in that. For spreading manure he needs two spreaders and two tractors, one equipped with a loader. It takes him 115 hours per year to spread the manure from his herd. Table 8 shows that the tractors cost 54c per hour to operate; the spreaders, 4.6c per hour; and the loader, 3.8c per hour. The cost per hour of spreading manure is, then:

2 tractors	*$1.08*
2 spreaders	*.092*
1 loader	*.038*
Total variable machinery cost per hour	*$1.21*

(Figure your costs here)

tractors	$
spreaders	
loader	
labor	
Total variable machinery cost	$

Table 11 — Estimated Cost of Spreading Manure

Example Farm

Item	Cost per hour	Number of hours	Total of cost per hour times hours	Per cent of use in dairying	Total charged to dairying
Manure spreading	*$1.21*	*115*	*$139.15*	*100%*	*$139.15*

Your Farm

Item	Cost per hour	Number of hours	Total of cost per hour times hours	Per cent of use in dairying	Total charged to dairying
Manure spreading	$		$		$

ROUGHAGE FEEDS: SILAGE

COSTS of harvesting forage feeds vary greatly with size of farm. Of the three methods of harvesting forage, silage, baled, and chopped, the model farmer uses only silage and chopped; but the costs of harvesting all three ways will be calculated to demonstrate why it is more efficient for him to use silage and chopped hay, rather than baled, in his operation. The costs of haresting forage have been found to be directly related to yield so all costs have been reduced to a "per ton" basis.

The most efficient method of harvesting silage in northern Idaho on farms of this size consists of one tractor pulling the chopper, a borrowed tractor pulling wagons to and from the fields (3 wagons are needed) and a blower with a 20 h.p. electric motor filling the silo. It's necessary to have two extra hands for this operation; if the operator can exchange labor with neighbors, or have someone in the family help out, all, or part, of this labor can be saved. However, we assume here that all extra labor has to be hired at $1.50 per hour. The model farm requires 500 tons of wet silage. Table 8 presents performance rates and costs of the various pieces of equipment on the model farm, they are:

Chopper (9 tons wet silage per hr. @ 49c)	*05.5¢* per ton
Tractor on chopper @ 54c per hr.	*06.0¢* per ton
3 silage wagons (hauling 9 tons per hr.)	*01.3¢* per ton
Tractor on wagons @ 54c per hr.	*06.0¢* per ton
Stationary blower (9 tons per hr.)	*07.5¢* per ton
20 h.p. electric motor on blower	*02.8¢* per ton
2 hired hands @ $1.50 per hr. (9 tons hr)	*33.2¢* per ton
Total variable cost of putting up silage	*62.3¢* per ton

OTHER combinations of equipment are in common use in northern Idaho for harvesting silage. Even though they are less economical, other considerations, in some instances, make them more desirable. For example, a farmer who cannot exchange the use of a tractor with neighbors will often, if the terrain makes it possible, use a pickup truck for pulling wagons. Another common practice is the use of another borrowed tractor with power-take-off to run the blower instead of an electric motor, but not only are the costs of running the tractor more than twice that of the electric motor, but there are often difficulties in finding the extra tractor to exchange when it is needed. From both the convenience of operation and cost standpoints the combination selected for the model farm is most efficient.

(Calculate your silage harvesting costs here:)

Chopper	
Tractor on chopper	
Silage wagons	
Tractor on silage wagons	
Other	
Other	
Other	
Other	
Total variable machinery costs of harvesting silage	

Table 12 — Estimated Costs of Silage Harvesting

	Example Farm				
Item	**Cost per ton**	**Number of tons needed per year**	**Total, cost per ton times tons needed**	**Per cent of use in dairying**	**Total charged to dairying**
Variable machinery and labor cost	*$.623*	*500*	*$311.50*	*100%*	*$311.50*

	Your Farm				
Item	**Cost per ton**	**Number of tons needed per year**	**Total, cost per ton times tons needed**	**Per cent of use in dairying**	**Total charged to dairying**
Variable machinery and labor cost	$		$		$

ROUGHAGE FEEDS: CHOPPED AND BALED HAY

IN determining whether the model farm should chop or bale hay, it was found that the variable costs of operating the baler or chopper were directly related to the yield, while the costs involved in operating the mower and rake were directly related to the number of acres. With either baled or chopped hay, the costs of mowing and raking were the same. At least one exchange tractor and two extra hands are needed to haul hay. In order to get a better picture of chopping vs. baling costs, chopping and baling costs were seperated from the costs of mowing and raking.

The costs of mowing and raking were calculated from Table 8 and entered in Table 13:

Mower (3 acres per hour)	*5.6¢* per acre
Tractor on mower @ 54c per hour	*18.0¢* per acre
Rake (3 acres per hour)	*3.3¢* per acre
Tractor on rake @ 54c per hr.	*18.0¢* per acre
Total variable machinery cost of mowing and raking	*44.9¢* per acre

(Figure your costs here)

Mower	
Tractor on mower	
Rake	
Tractor on rake	
Total	

One-hundred-five acres are mowed and raked, 7 acres of the first cutting (91 acres of first cutting go into silage) and 98 of the second. The costs of mowing and raking are:

Table 13 — Estimated Costs of Mowing and Raking Hay

Example Farm					
Item	**Cost per acre**	**Number of acres**	**Total, cost times number of acres**	**Per cent of use in dairying**	**Total charged to dairying**
Variable cost of equipment	*$.449*	*105*	*$47.41*	*100%*	*$47.41*

Your Farm					
Item	**Cost per acre**	**Number of acres**	**Total, cost times number of acres**	**Per cent of use in dairying**	**Total charged to dairying**
Variable cost of equipment	$		$		$

IN determining whether to chop or bale hay the variable costs of the various operations that go into chopping and baling were figured from Table 8:

Chopper (3 tons per hr. @ 49c per hr.)	*16.3¢* per ton	Wagons (3 hauling 3 tons per hr.)	*1.3¢* per ton
Tractor on chopper (@ 54c per hr.)	*18.0¢* per ton	Tractor on wagon (@ 54c per hr.)	*18.0¢* per ton
Cost of chopper and tractor	*34.3¢* per ton	Cost of wagon and tractor	*19.3¢* per ton

Blower (3 tons per hr.)	*7.5¢* per ton	Blower (3 tons per hr.)	*7.5¢* per ton
Tractor on blower (@ 54c per hr.)	*18.0¢* per ton	20 h.p. electric motor	*9.3¢* per ton
Cost of blower with tractor power.	*25.5¢* per ton	Cost of blower with electric motor	*16.8¢* per ton

Baler (2.5 tons per hr. @ 41c per hr.)	*16.4¢* per ton
Tractor on baler (@ 54c per hr.)	*21.6¢* per ton
Baler Twine	*64.0¢* per ton
Cost of baler and tractor	*102.0¢* per ton

Bale elevator (3 tons per hr.)	*7.5¢* per ton
Tractor on bale elevator (@ 54c per hr.)	*18.0¢* per ton
Cost of bale elevator with tractor power	*25.5¢* per ton

Bale elevator (3 tons per hr.)	*7.5¢* per ton
Electric motor on elevator	*9.3¢* per ton
Cost of bale elevator with electric power.	*16.8¢* per ton

In all cases, where possible, it is more economical to use electric power rather than tractor power. With these figures for the individual operations the total costs of baling vs. chopping on the model farm are:

Chopper with tractor	*34.3¢* per ton	Baler with tractor	*102.0¢* per ton
Wagons and tractor	*19.3¢* per ton	Wagons and tractor	*19.3¢* per ton
Blower with electric motor	*16.8¢* per ton	Bale elevator with electric motor	*16.8¢* per ton
2 hired hands	*100.0¢* per ton	2 hired hands	*100.0¢* per ton
Variable cost of chopping hay	*170.4¢* per ton	Variable cost of baling hay	*238.1¢* per ton

THE difference in variable cost of chopping and baling hay is mostly because of a savings in baler twine (64c per ton) and partially because of more-tons-per-hour production of chopped hay than baled hay. In addition in a chopped hay operation the investment and depreciation on a baler are saved. In other operations baled hay may be more economical or a truck may be substituted for farm wagon and tractor.

(figure the costs of each of your operations here)

Chopper	
Tractor	
Total	

Wagons	
Tractor	
Total	

Blower	
Tractor	
Total	

Blower	
Electric motor	
Total	

Baler	
Tractor	
Twine cost	
Total	

Bale elevator	
Tractor	
Total	

Bale elevator	
Electric motor	
Total	

(calculate your cost of putting up hay here)

Chopper and tractor	
Baler and tractor	
Blower with tractor	
Blower with electric motor	
Bale elevator with tractor	
Bale elevator with electric motor	
Wagons and tractor	
Truck	
Labor	
Other	
Other	
Total variable cost of putting up hay	

Eighty tons of hay are needed in our model farm. The total cost of hay is calculated in Table 14.

Table 14 — Estimated Cost of Putting Up Hay

Example Farm

Item	Cost per ton	Number of tons	Total, cost times number of tons	Per cent of use in dairying	Total charged to dairying
Variable costs of chopped hay	*$1.704*	*80*	*$136.32*	*100%*	*$136.32*

Your Farm

Item	Cost per ton	Number of tons	Total, cost times number of tons	Per cent of use in dairying	Total charged to dairying
Variable costs of putting up hay	$		$		$

GRAIN AND CONCENTRATES

IN northern Idaho there are one-man dairy farmers who raise all their grain; others raise some, and still others buy all their grain and feed concentrates. It was found in the study that the time required to raise grain could more profitably be spent in caring for a larger herd; the one-man dairy farm operator who raised grain could not care for a 52-cow herd.

Therefore, the model farm purchased all grain and feed concentrates at $3 per hundred. It feeds nine-tenths ton of dairy grain feed per adult cow unit, or 47 tons total per year. The cost is calculated in Table 15.

Table 15 — Estimated Costs of Purchased Grain and Feed Concentrates

Example Farm

Item	Amount purchased	Cost per unit	Total cost	Per cent of use in dairying	Total charged to dairying
Grain	47 tons	*$60*	*$2820*	*100%*	*$2820*

Your Farm

Item	Amount purchased	Cost per unit	Total cost	Per cent of use in dairying	Total charged to dairying
Grain		$	$		$
Other					
Other					
Total					

If, however, our farmer raised all, or part, of his grain, the cost would be calculated for raising grain just as it was for hay and pasture land, visualizing each operation that goes into the crop.

From Table 8, and from the figures calculated for reseeding hay and pasture, we find:

Cost of plowing .... 112.0c per acre
Cost of disking .... 40.5c per acre per time around
Cost of harrowing .... 15.0c per acre per time around
Cost of drilling .... 24.3c per acre
Cost of drilling with harrow behind .... 25.8c per acre
Cost of truck hauling grain .... 10.0c per mile per acre
Cost of combine (1.4 acre per hr.) .... 42.0c per acre
Cost of tractor on combine .... 39.0c per acre
Cost of labor @ $1.50 per hr. ....107.1c per acre per man

Using these figures, as in the reseeding example, the farm operator who raises his own grain can calculate his cost per acre. This is then multiplied by the number of acres to find the total cost of producing grain.

(Put down your cost for each operation in raising grain and calculate how much it costs per acre)

Plowing	Per acre
Disking	Per acre
Harrowing	Per acre
Drilling	Per acre
Truck	Per acre
Combine	Per acre
Tractor on combine	Per acre
Labor	Per acre
Other	Per acre
Other	Per acre
Total variable cost of raising grain	Per acre

By multiplying the total number of acres by the cost per acre will give you your total cost of raising grain. Enter figures in Table 16.

Table 16 — Estimated Costs of Raising Grain

Cost per acre	Number of acres	Total of cost per acre times number of acres	Per cent of use in dairying	Total charged to dairying

Other Miscellaneous Costs

BEDDING

IN northern Idaho the most economical bedding is wood shavings. The model farm uses approximately 1½ tons of bedding per cow per year at a cost of $1.50 per ton, total cost : $117.

VET AND BREEDING SERVICES

The annual veterinary bill averages $104. Breeding service fees, $468.

AMERICAN DAIRY ASSOCIATION CHECK-OFF

Total milk production is 417,560 pounds (8030 pounds per cow). The American Dairy Association check-off @ 2c per cwt. for advertising and promotion is $84.

CAN RENTAL

Can rental is 3c per cwt. or $125.

MILK HAULING

It costs 68c per cwt. to ship milk, or $2,840 per year.

DAIRY ASSOCIATION FEES

Registration and other fees for the model farm's herd run approximately $25 per year.

CAR AND TRUCK EXPENSE

Miscellaneous driving of the family car and farm truck related to the dairy enterprise (picking up shavings at the mill, running to town for parts or supplies, carting cull cows to market, etc.) are estimated to be about 4,000 miles per year @ 10c per mile, or $400.

MILK ROOM SUPPLIES

Filters, cleaners, sponges, brushes and other supplies for the milk room cost about $2 per week or $104 per year.

There may be other miscellaneous expenses in your daily operations. Enter them on the green sheet.

Total Variable Costs and Total Costs

Total variable costs are $8,239.04, or $158.45 per adult cow. (See green sheet)

Total costs are $11,327.20, or $217.83 per adult cow.

Sales From Dairy Enterprise

Sales on the model farm consist of sales of milk and sales of cull cows. The income from veal calves is just about counter balanced by the costs involved in disposing of them.

Four - hundred - seventeen - thousand-five-hundred-sixty pounds of milk at the average blend price (1955) or Grade-A milk in northern Idaho of $4.70 per cwt. brings in $19,625. Cull cows sell for about $125 each, or yearly sales of $1,250. Thus, total income from sales (see green sheet) is $20,875 or $401 per cow.

Sales Minus Costs Equals Income

Total sales less the costs involved bring in an income of $9,547.80 to the dairy enterprise.

Income From Labor and Interest On Investment

The income, $9,547.80, of the model one-man dairy farm is the income to both labor and money invested. If the farm is not paid for, a good share will go to pay the interest on the borrowed money; if it is paid for, the farm operator can distribute it any way he chooses between income from labor and income from money invested.

Let's assume that the entire valuation of the farm, $65,000, is borrowed on a five per cent mortgage. In this case, $3,250 must be substracted from the farm income to pay the interest on the mortgage, leaving the farmer $6,297.80 income from his labor.

If there is only a $30,000 mortgage, interest will take $1,500, leaving the farm operator $8,047.80 income from his labor and $35,000 equity.

If its all paid for, the entire $9,547.80, is the operator's income from labor and investment.

MAKING YOUR OWN ANALYSIS

KNOWING the cost of each operation on your farm gives you the information you need to make decisions for more profitable dairy farming. When you know how much a certain operation or product is costing you at the present, and when you have the information available as to what it would cost you if you changed your farming methods or size of operation, then you know in advance whether or not the change would be profitable. This was the way in which the model dairy farm for northern Idaho was constructed: costs for all possible alternatives were figured and the least-cost combination of different cultural and management practices were included in the model operation.

The following paragraphs give a few ideas of how this analysis of your farm can be used for you to determine on your farm what changes can be made for more profitable operation. As each farm is different each analysis is different.

HAY HARVESTING

The dairy farmer who produces hay for his own use only will usually find it more profitable to use a chopped hay — silage combination of harvesting rather than baled hay. (Hay raised for sale on the market must be baled for convenient transportation.) Chopped hay is less expensive than baled (see pages 24-26) when the costs of a small chopper and small baler are considered for two reasons, (1) mainly, chopping saves the cost of baler twine, which is over 60c per ton, and (2) operating costs of the chopper are slightly less (about 6c per ton) than for the baler because the chopper can be operated at a higher capacity per hour. Other expenses, such as depreciation, are approximately the same for the two machines. (Even the farmer who raises hay for sale may find it profitable to invest in a chopper for the hay used on his own farm if the extra costs of operating the baler, twine, and higher operating costs are more than the added costs of owning a chopper. His added costs would be depreciation—$175 per year—and interest on added investment —about $200 per year—. In northern Idaho, the point at which it would become profitable to own both a baler and chopper is when about 500 tons of hay are needed for the farm operation. In the situation where the farmer needs more than one set of equipment, he may find it profitable to have one chopper with baling equipment.)

In some areas climatic conditions may make chopped hay impractical.

WHETHER TO GROW OR NOT TO GROW GRAIN FOR FEED

The relevant question is whether the value of the grain raised, in terms of what it would cost to buy it on the market, is as much or more than what could be realized from the land used for growing grain it this land were shifted to another enteprise, particularly if it were shifted into pasture and hay land so that the dairy enterprise could be expanded. For example, in a test of this type of analysis in the Gooding, Idaho, area (south-central Idaho, not northern Idaho), it was found that dairy farmers in this area would appreciably increase their income by **not** planting the 15 acres of "free" wheat allowed under present controls and putting this land into pasture and roughage in order to expand the dairy herd, even at the low price for milk for manufacturing purposes.

There is strong evidence to indicate that growing grain on a small scale may not return as much to the farmer as his investing his time in more cows and buying the grain he needs.

DOES IT PAY TO RAISE ANY HAY OR GRAIN?

The question will arise on farms with small acreages whether it is profitable to raise any hay or grain. There is a possibility that it would be considerably more profitable to turn the entire acreage into pasture and purchase all hay and grain in order to double, triple, or quadruple the herd size. The single most important factor in any consideration of this is whether there is an assured, adequate supply of hay readily available at most times.

Each individual farmer has to analyze his own situation in light of the equipment and buildings he has, or can get, financing that is available to him and markets available for additional milk and his own initiative and know-how in caring for a large herd. In northern Idaho, for example, where it takes .7 acre of irrigated pasture per cow, a 40-acre farm could conceivably pasture 50 cows. If the operation were switched to all-pasture, the fixed cost per cow would drop as there would be less invested in machinery and a larger number of animals among which to divide the total fixed cost; the variable cost per cow would increase considerably because of purchasing hay and feed; income per cow would be less because the increase milk would probably have to go as surplus (if it did go at Grade-A prices, the income per cow, of course, would remain about the same). Roughly, in northern Idaho, it would work out that variable costs per cow would increase by about $60 (difference between $15 variable cost per cow for raising hay and $75 per cow when purchasing it), fixed costs would drop and each additional cow would bring in about $240 per year income figuring a surplus price for milk. This would leave an added income of about $30 per additional cow on variable costs, plus an undetermined savings in machinery investment. If the milk could be sold at Grade-A prices, the added income per additional cow would be about $170. In addition, this type of farming would give the farm operator a balanced number of hours of work through the year, about six and one-half hours per day.

HOW MANY COWS CAN A FARM HANDLE?

A drastic change, as that suggested in the above paragraph, assumes that the farm buildings and milking equipment are adequate to handle increased her size. In the event that they are not, other changes are necessary before the herd size can be increased.

If present buildings are adequate for a larger milking palor and more cows, it may be necessary to install modern equipment with a high capacity in order to handle more cows. (However, with the changes suggested in the paragraph above it may be to the advantage of the farmer to get along with older equipment with lower capacity. He has plenty of time to do the work.) Any of the modern types of milking parlors, the walk-through, herringbone, or stalls and pipeline is acceptable; with some of the modern installations, one man can milk up to sixty cows per hour.

If present buildings are not adequate for larger numbers, it may be necessary to build new facilities, such as the new prefabricated milking parlors, or an addition on the barn, before increased herd numbers can be handled.

GENERAL GUIDE TO ANALYSIS

Any farmer contemplating a change in herd size must take into consideration the number of acres of pasture he has available, his hay production potential or the availability and price of hay in the area, and the capacity of his barns, storage and milking facilities; these facilities and the costs of increasing or replacing them, including the possibility of buying or renting additional pasture land, must be considered in respect to the additional income from more cows

In some cases it may be that the facilities of productivity of the farm, the ability of the farmer, the financing available or the market for milk may be such that the farm cannot be expanded to an economic milk-producing unit. In this case the farmer will find it to his financial benefit to discontinue milk production before he has used up his equity capital. A careful analysis of any farm along the lines suggested in this bulletin will give the farmer the answer to whether he should continue at the size he is, increase herd size to a more economic unit or discontinue milk production entirely.

APPENDIX

THE "estimated life" of the machines used in the example farm was computed from present value and new replacement value. Figures from a number of farms were averaged. Individual farmers were asked what present machinery was worth now, what it was worth when bought, and what it would cost to buy a camparable machine today.

The present value of the machine in use was substracted from the present replacement value of a machine like this one purchased, like in age and condition; and this difference was divided by the replacement value. This gave the per cent of total depreciation. Then, the number of years the farmer had the machine was divided by the per cent of total depreciation, giving the estimated life in years based on the depreciation to date. This, of course, presupposes linear depreciation, which may not be true for all types of machines. However, it was found that the figures gained thusly were comparable to other types of depreciation scales.

For example, it was found that the average tractor had a present value of $1,180 and was 6½ years old. A comparable tractor would cost $2,200 new. $1,180 from $2,200 leaves $1,020 total depreciation; $1,020 divided by $2,200 gives 46.3 per cent depreciation in 6½ years. 6.5 divided by 46.3 per cent gives approximately 14 years of expected life.

Another method of estimating machinery depreciation is to estimate the present value of a machine and estimate how many years more use are in it. Dividing the present value by the number of years you will be able to use the machine will give the depreciation per year of the unused life of the machine.

FIXED COSTS

	Example Farm	Your Farm
Taxes (Table 1, page 5)	*$ 291.50*	
Insurance (Table 2, page 6)	*80.00*	
Land Costs (Table 3, page 7)	*285.30*	
Building Depreciation and Repair (Table 4, page 8)	*606.00*	
Dairy Equipment Depreciation and Repair (Table 5, page 9)	*342.00*	
Farm Equipment Depreciation and Repair (Table 6, page 11)	*941.00*	
Other Fixed Costs (Table 7, page 12)	*542.00*	
Other		
Other		
Other		
Other		
Other		
Other		
Other		
Total	*$3,087.80*	
Fixed Cost per Adult Cow: (52 cows total)	*$ 59.38*	

Variable Costs

	Example Farm	Your Farm
Roughage Feeds - Reseeding Pasture (Table 9, page 18)	*$ 235.44*	
Roughage Feeds - Commercial Fertilizing (Table 10, page 19)	*282.85*	
Roughage Feeds - Spreading Manure (Table 11, page 20)	*139.15*	
Roughage Feeds - Silage Harvesting (Table 12, page 22)	*311.50*	
Hay - Mowing & Raking Hay (Table 13, page 23)	*47.14*	
Hay - Putting up Hay (Table 14, page 26)	*136.32*	
Silage Purchased		
Grain and Concentrates Purchased (Table 15, page 27)	*2,820.00*	
Grain and Concentrates		
Miscellaneous		
Vet Fees	*104.00*	
Breeding Fees	*468.00*	
Dairy Supplies	*104.00*	
Advertising	*84.00*	
Can Rental	*125.00*	
Milk Hauling	*2,840.00*	
Dairy Association Fees	*25.00*	
Bedding	*117.00*	
Truck and Car	*400.00*	
Other		
Other		
Total Variable Costs	*$8,239.40*	
Variable Cost per Adult Cow	*$ 158.45*	

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