Economics of Production Efficiency

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Introduction

It is obvious that, in order for a herd program to work, the producer and management as well as the consultant must be completely familiar with the economics of production and reproduction. After all, the purpose of a program is to upgrade these two areas at a cost less than the gain resulting from the program. Intelligent decisions can be made if values are available for analysis in the following areas:

1. Total production cost - variable and fixed expenses
2. Production cost per calf
3. Break-even point.
4. Breeding period
5. Pregnancy rate on basis of diagnosis (% conception)
6. Percentage calf crop
7. Individual breeding interval
8. Herd average breeding interval
9. Individual calving interval
10. Herd average calving interval
11. Herd average weaning weights
12. Culling rates with reasons for culling
13. Replacement rates
14. Bull fertility and replacements
15. Winter nutritional needs based on forage analysis
16. Mortality and morbidity rates

Regardless of who compiles the information for the areas mentioned above, they should be available. Once made available, they may be analyzed to determine what areas may need improvement or changes, if any. How these areas are to be improved or changed should be set out in some sort of program to be reevaluated at specified intervals during the course of the year. Whether a producer even needs a program may be determined by a feasibility study based on the information provided for analysis. Using the data mentioned, charts may be prepared and evaluated for progress from year to year. The program may vary in degree from a limited service program to a full service program.

A limited service program may only require pregnancy testing and periodic surveillance of the herd data profile. A full service program may entail setting up record systems, nutritional consultation, marketing service, purchases, inspection, pregnancy testing, etc., or the areas previously covered in Dr. Bitter's paper. With good management, an initial full service program should taper down to an eventual limited service program. The objective of either program is to head off economic difficulties and to remedy already existing deficiencies in a production unit. Goals should be targeted toward improved economic as well as improved production areas. These goals should be pursued relentlessly, utilizing the herd production data profile and herd economic data profile.

I. Background Information on Data for Analysis

A. Total Cost of Production: Regardless of the type of enterprise you may be involved in, each respective enterprise involves a certain amount of expense as weighed against a certain amount of income. Basically, costs are divided into variable and fixed expenses. Income is monies derived from a given enterprise, be it a cow-calf operation or production of ping-pong balls. We must remember that from the time we step from the house until we lie down at night we are either creating costs, generating income, or both concurrently. When we flip on a light switch, flush a toilet, type on a typewriter, repair requipment, work cattle, ride through the pasture, market our calves, supervise our breeding program, or simply sit at our desk and read, we are doing one of two basic things common to any business or enterprise. Ordinarily, there are only three ways to derive income from a cow-calf operation: to sell calves produced from cows, sell cows not producing properly, or both.

Table 1 is an example of the items included in calculating a cost of production for a single cow. The amounts are filled in only as an example and may vary greatly from one operation to another. See formulas for calculation of production cost per calf and break-even point.

As income is relatively simple to calculate, conversely, accurate calculation of expenses may be very complicated. This is so because some expenses aren't direct cash expenses but are, so to speak, "hidden." Such items as depreciation, interest on investment, rental value of owned land, etc., are examples of fixed and "hidden" expenses. Everyone should either be able to determine what his variable and fixed expenses are for his enterprise or should seek the services of an accountant or CPA in order to obtain an accurate total cost of production. If we are seeking a profit, we must generate a maximum amount of income while creating a minimum amount of expense; this being efficiency of operation or production.

Let's apply these basic and simple principles to a beef cattle operation, and restrict our enterprise to a cow-calf operation. The first thing we need to realize is that our total cost of production is going to be separated into fixed and variable costs. On a given acreage, purchased at a given price with a given amount of improvements, the fixed costs are going to

Table 1
Annual Estimated Costs Per Cow, 1974
Red River County, Texas
from Texas Agricultural Extension Service

	Amount Per Cow
Cash Expense	1974
Hired labor	$ 3.00
Feed and mineral	14.60
Fertilizer and lime	54.50
Herbicides - insecticides	2.10
Seed	4.50
Hay	45.00
Machinery and equipment[1]	10.60
Veterinary and medicine	2.50
Repair, buildings and improvements	3.90
Supplies	3.25
Taxes	2.30
Interest on operating capital	10.16
Dues	.20
Other[2]	3.20
Total Cash Expense	$159.81
Fixed Expense	
Depreciation:	
Buildings and improvements	$ 1.24
Machinery and equipment	9.41
Livestock	4.81
Total	$ 15.46
Interest on Investment:	
Buildings and improvements	$ .85
Machinery and equipment	4.25
Livestock[3]	24.75
Total	$ 29.85
Total Fixed Expense	$ 45.31
Total Cash and Fixed Expense	$205.12
Land Costs[3] (rental value of owned land)	$ 24.00
Total Cash, Fixed and Land Costs	$229.12

[1]Cost of machinery operation and repair.
[2]Legal fees, advertising, utilities, etc.
[3]These items are cash expenses in situations where the breeding herd is financed and pastures are leased.
Other Assumptions: Land rental, $8.00/acre with three acres per cow. 180 lbs. of supplement at $10.00 cwt. Cows valued at $275.00 each and land at $300/acre.

Taking these figures, let's do some computation on production cost per calf and break-even points with different calf crop percentage and ownership situations.

#1. 100% calf crop computing with cash expense only
production cost per calf = 160.00
break-even point on 450 lb. calf = 35¢/lb.

#2. 100% calf crop computing cash expense, and depreciation as only fixed expense
production cost per calf = 175.00
break-even point on 450 lb. calf = 39¢/lb.

#3. 100% calf crop computing with cash expense and all fixed expenses and land costs
production cost per calf = 230.00
break-even point on 450 lb. calf = 51¢/lb.

	#1		#2		#3	
	P/C	BEP	P/C	BEP	P/C	BEP
90%	178.00	40¢	194.00	43¢	255.00	57¢
80%	200.00	45¢	218.00	49¢	287.00	64¢
70%	229.00	51¢	250.00	55¢	328.00	73¢
60%	266.00	59¢	292.00	65¢	383.00	85¢

remain the same, excluding interest and depreciation on livestock, regardless of whether we have one or a thousand head of cattle. The variable costs or cash expenses will depend mostly on how many cattle we have in the enterprise. The variable and fixed expenses combined equal the total production cost for the herd.

Cash (variable) expenses
+ Fixed expenses
+ Land costs (rental value of owned land)
=Total production cost

B. Production Cost Per Calf: The income is dependent solely on the number of calves we market each year from the enterprise and the number of cows we cull each year. Therefore, if we allocate our total production costs to our primary source of income (calves), you can see readily when we divide total production cost by the number of marketable calves, we arrive at a figure that equals production cost per calf. Let's look at this in a formula:

$$\frac{\text{Total Production Cost}}{\text{No. of weaned marketable calves}} = \text{Production cost per calf}$$

You can also see that the fastest way to lower production costs per calf is to either decrease total production costs, increase number of calves, or both. However, the denominator will have the greatest effect on lowering the production cost per calf, so we want to have a number of calves as near to the same number of breeding units as possible.

C. Break-even Point: We can use production cost per calf to derive a break even point for our product. This can also be expressed in formula by two methods.

$$\frac{\text{Production cost per calf}}{\text{Avg. weight of calves}} = \text{Break-even point}$$

This can also be calculated by:

$$\frac{\text{Total production cost}}{\text{Total weight of calves}} = \text{Break-even point}$$

The break-even point is simply what we must have to cover all of our expenses, fixed and variable. Hopefully, we can sell for more than our break-even point. Examining this formula, you can also see that the heavier our calves for a given production cost per calf, the lower our break-even point will be.

D. Reproductive Efficiency: Now, putting all of this in terms of efficiency of production, we can see that we want to minimize our total costs and at the same time maximize the number of calves weaned, weight of calves weaned, and market desirability of our product for the most efficient type of operation. How do we accomplish this? An entire volume can be written on how to maximize the total number of calves produced from a given size cow herd. However, in this publication I want to express and calculate the economic effect of reproductive efficiency, or having maximum product from a potential of production. For simplicity's sake we shall say that 100% is our maximum efficiency capability. Perhaps in later years we can show how this can be greater than 100% through ovarian transplant and superovulation technique. This 100% means that given a 100 head cow herd for 365 days, we produce 100 live marketable calves within this 365-day period and keep them alive and marketable until we turn them into cash; which conventionally takes about 16-20 months in a ranching operation. Another way to say it is: the maximum number of marketable calves obtained from a given size cow herd.

In order for a cow to produce a calf, she must first become pregnant. Expressing this statement as a formula, we may say that:

$$\% \text{ pregnant} = \frac{\text{No. diagnosed pregnant}}{\text{No. of cows exposed for conception}} \times 100$$

This can be the first increase in reproductive efficiency. Don't we wish this could always be 100% = $^{100}/_{100}$ X 100. Unfortunately, it is not and there is good reason for it, which we shall discuss later.

After the cow becomes pregnant, she must carry the calf in her uterus for approximately 280 days after which period he exits in the cold, cruel world. In order for him to be expressed as a percent calf crop, *he must survive to be marketed or turned into cash.* This is the second point where efficiency may be increased:

$$\% \text{ calf crop} = \frac{\text{No. calves weaned}}{\text{No. of cows exposed (not number pregnant)}} \times 100$$

This too, would be nice if we could say:

$$100\% \text{ calf crop} = \frac{100}{100} \times 100$$

The weight and desirability of the product is the second point at which efficiency may be increased.

Now let's examine some other terms. Remember we are basing our efficiency on 365 days and 100%. Let's look first at calving interval and say that the maximum interval is to be set at 365 days between successive calves. If a calf is born by at least December 1, 1974, we want the next calf to be born by at least December 1, 1975. The lesser from 365 days the better; unfortunately, it cannot be less than 280 days excepting in the case of embryo transplant and superovulation procedures. Mathematically you can see that if a cow carries a calf 280 days and we are only allowing her 365 days between calves, she has an interval of only 85 days in which to become pregnant again. The less it is from 85 days the better, down to a minimum of less than one day; however, it usually takes a cow nearly 30 to 60 days to mend her uterus sufficiently to conceive again, and many factors will affect this mending and reconception process. Among these factors are nutrition, difficulty in birth process, prepartum and postpartum management, and general overall health of the animal. Every day over 365-day calving interval is an added expense without a return in gross revenue.

Now this brings us to the term "calving period" as applied to a herd of cows. Let's take a 100-head cow herd and say they began calving on February 1. For most efficient reproduction at the lowest cost, one should specify the first and last dates he wants his calves to be born. Since we want as many cows to be bred again as early as possible, we *could* place a bull with them on this same date and allow her 85 days for rebreeding. For simplicity's sake, let's say we allowed her 90 days to become pregnant the previous year because we wanted our calves to be dropped during February, March, and April. Therefore, if we *do* place a bull in the herd earlier than April 25th (May 1) we may have cows dropping calves earlier than desired. If we hold the bulls out for 84 days from when the first calf was born, we must allow that cow or those cows 365 + 21 or less calving interval for the next year as long as they drop within the first 21 days of the next 90-day calving period. Every cow in the herd will have ample time to rebreed within the 90-day breeding period. If the cows don't rebreed, this is their fault or management's fault for not breeding them early in the first place. We must plan on replacing these cows with heifers the next year, allowing the heifers extra breeding time. The first breeding period should be 30 to 60 days ahead of the cow herd and with the cow herd during the next breeding period.

E. Breeding Period: Next, let's examine what we call the "breeding period" or the time spanning the introduction of bulls for breeding until removal. We need to calculate and record the number of days that it takes a cow to rebreed during this period. This is called the "breeding interval." This will give us criteria for selecting replacement heifers. If a cow rebreeds within the first 30 days of the breeding period, her heifers should inherit the potential for early rebreeding provided she is developed properly as a growing heifer. If the same cow is consistently a slow breeder, heifers you select from her may also be slow breeders. Of course, you can see that the calving period will be determined by either the herd's average breeding interval or breeding period, or both. It is possible to shorten the calving period to 45 to 50 days on a 90-day breeding period depending on how rapidly the cattle rebreed.

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In order for us to be able to analyze the information previously mentioned we must have a record system with each breeding animal identified by some means. A card system with each animal's identification must be kept and recorded with a value for the following:

1. Date calved
2. Number and sex of calf
3. Breeding period - dates and number of days
4. Pregnancy test result
5. Breeding interval (from pregnancy test or next calving date) giving: a. Estimated breeding interval from pregnancy test; b. Actual breeding interval from calving date
6. Calving interval
7. Termination of calf with sale weight and dollar value recorded

From the above values, an individual's reproductive efficiency may be evaluated. For instance, let's say a cow calves on March 1; she is reexposed to the bull from May 1 to July 31; she rebreeds on May 15 and will therefore calve again on February 21. These are the values we could obtain:

1. Date calved - March 1, 1975
2. Female calf #35
3. Breeding period May 1 - July 31 - 90 days
4. Pregnancy test result on October 1 - 3½ days
5. Breeding interval - estimated 15 days
6. Calving interval from 1976 calving 375 days, 75 lb. heifer calf kept as a replacement with dam breeding interval index of less than one month, weight 500 lbs. at weaning age of 6 months.

(See Figure 1 for sample cards.)

You can see that this animal is reproductively efficient. She was not able to do this on her own because she is a complex physiological system. Alive in the cold, cruel world she is exposed to a barrage of environmental variables that we as managers of these animals must attempt to control as best we can. From the day a calf is born until she is removed from the productive herd, she has to be fed, handled and generally managed so that she has every possible chance to perform at her peak. Her peak potential is determined by her ancestry, and it is up to us to allow her or him every opportunity to express this potential fully by use of proper management techniques. One of the most important factors influencing the expression of her potential is the type of nutrition we offer her. She must have nutrition that is, at minimum, adequate quantitatively as well as qualitatively. For best results, we need to supply the optimal of both.

On a herd basis we must do the following in order to maintain or increase reproductive efficiency. The chain is only as strong as its weakest link and strict attention must be paid to each item.

1. Strict, simple record system that allows *evaluation* of calving interval, breeding interval, etc.
2. Strict culling of slow breeders, non-producers and poor producers.
3. Fertility testing bulls of unknown fertility.
4. Maintain high immunity levels against endemic reproductive and other infectious diseases.
5. Provide nutrition adequate for development of replacements and continued performance of the herd. Pay strict attention to the requirements and assure that they are fulfilled through forage systems and *any* needed supplement in the form of protein, energy, minerals, vitamins and trace elements.

F. Economics of Reproductive Efficiency: Let's examine the economics of upgrading reproductive efficiency provided that it is less than 95% or so in the first place. What we will be examining is whether a program to upgrade reproductive efficiency will return in gross income more than it costs in cash expense, and possibly increase fixed expense. Looking at Table 2, let's assume that we have a production cost of $275 per calf with a 60% calf crop on a spring calving schedule. You can see that for every 1% increase in calf crop over 60%, we have a given reduction in per-calf production costs and cumulative reduction in production costs per calf giving us a new production cost per calf. Also, at a given weight and market price you can see we would get an increase in gross income with each additional calf and an accumulative increase in gross. Taking any given weight calf at a given production cost per calf, we can calculate a break-even point that will be reduced with each 1% increase in calf crop. (See Table 2.)

If we had a 60% calf crop or 60 450 lb. calves in a 100-cow herd, and the next year we increased the percentage to 70% in a 100-cow herd, you can see that our production cost will be lowered from $275 per calf to $235 per calf, increasing our gross on a 30¢-market for a 450 lb. calf by $1,350 from the calves alone. This is to say that we could afford to pay up to $1,350 for this increase of 10%, $2,700 up by 20%, $4,050 up by 30%, and $5,400 up by 40% in a 100-cow herd. Also, looking at the break-even point you can see that for each increase in 10% of calf crop for a 450 lb. calf, our break-even point will be lowered from 60¢ to 52¢, 45¢, 40¢ and 36¢ respectively. On a 1,000-cow herd our gross could be raised a maximum of $54,000 but, more realistically, around $27,000 if we increase from 60 to 80% calf crop, and decrease our break-even point by the same as if it were a 100-cow herd.

If you are calving in the fall, your reduction in production cost per calf and break-even point would not be as much as with spring calving. This is because each cow that calves and is lactating will consume more feed than if she were dry during the winter months. Just how much difference the two systems make depends on your particular operation and would require a cost-accounting analysis of your system.

You will undoubtedly have to cull some cows and replace them with new stock in a program to increase reproduction. What will you do with those you cull and what will be the economic effect? The most important thing to remember about a slow or non-

Table 2

Assume beginning with 60% calf crop–production cost of $275 per calf–for every 1% increase in calving percent, production cost is reduced by X amount. (One hundred cow herd.)

						Break-even point at different weaning weights				
	Reduction in cost per calf	Cumulative reduction in cost	New production costs	Increase gross @ 30¢/lb. 450 lb. calf	Increase gross @ 20¢/lb. 450 lb. calf	450 lbs. Price per cwt.	475 lbs. Price per cwt.	500 lbs. Price per cwt.	525 lbs. Price per cwt.	550 lbs. Price per cwt.	600 lbs. Price per cwt.
1	$4.50	$ 4.50	$270.50	$ 135.00	$ 90.00	$60.11	$56.95	$54.10	$51.52	$49.18	$45.08
2	4.37	8.87	266.13	270.00	180.00	59.14	56.02	53.23	50.69	48.38	44.35
3	4.23	13.10	261.90	405.00	270.00	58.20	55.13	52.38	49.88	47.61	43.65
4	4.09	17.19	257.81	540.00	360.00	57.29	54.27	51.56	49.10	46.87	42.96
5	3.96	21.15	253.84	675.00	450.00	56.40	53.44	50.77	48.35	46.15	42.30
6	3.85	25.00	250.00	810.00	540.00	55.55	52.63	50.00	47.61	45.45	41.66
7	3.73	28.73	246.27	945.00	630.00	54.72	51.84	49.25	46.90	44.77	41.04
8	3.62	32.35	242.65	1080.00	720.00	53.92	51.08	48.53	46.22	44.11	40.44
9	3.52	35.87	239.13	1215.00	810.00	53.14	50.34	47.82	45.54	43.47	39.85
10	3.42	39.29	235.71	1350.00	900.00	52.38	49.62	47.14	44.89	42.85	39.28
11	3.32	42.61	232.39	1485.00	990.00	51.64	48.92	46.47	44.26	42.25	38.73
12	3.22	45.83	229.17	1620.00	1080.00	50.92	48.24	45.83	43.65	41.66	38.19
13	3.15	48.98	226.02	1755.00	1170.00	50.22	47.58	45.20	43.05	41.09	37.67
14	3.05	52.03	222.97	1890.00	1260.00	49.54	46.94	44.59	42.47	40.50	37.16
15	2.97	55.00	220.00	2025.00	1350.00	48.88	46.31	44.00	41.90	40.00	36.66
16	2.89	57.89	217.11	2160.00	1440.00	48.24	45.70	43.42	41.35	39.47	36.18
17	2.83	60.72	214.28	2295.00	1530.00	47.61	45.11	42.85	40.82	38.96	35.71
18	2.75	63.47	211.53	2430.00	1620.00	47.00	44.53	42.30	40.29	38.46	35.25
19	2.67	66.14	208.86	2565.00	1710.00	46.41	43.97	41.77	39.78	37.97	34.81
20	2.61	68.75	206.25	2700.00	1800.00	45.83	43.42	41.25	39.28	37.50	34.37
21	2.55	71.30	203.70	2835.00	1890.00	45.26	42.88	40.74	38.80	37.03	33.95
22	2.48	73.78	201.22	2970.00	1980.00	44.71	42.36	40.24	38.32	36.58	33.53
23	2.43	76.21	198.79	3105.00	2070.00	44.17	41.83	39.75	37.86	36.14	33.13
24	2.37	78.58	196.42	3240.00	2160.00	43.64	41.35	39.28	37.41	35.71	32.73
25	2.30	80.88	194.12	3375.00	2250.00	43.13	40.86	38.82	36.97	35.29	32.35
26	2.26	83.14	191.86	3510.00	2340.00	42.63	40.39	38.37	36.54	34.88	31.97
27	2.20	85.84	189.66	3645.00	2430.00	42.14	39.90	37.93	36.12	34.48	31.61
28	2.16	87.50	187.50	3780.00	2520.00	41.66	39.47	37.50	35.71	34.09	31.25
29	2.11	89.61	185.39	3195.00	2610.00	41.19	39.02	37.07	35.31	33.70	30.89
30	2.06	91.67	183.33	4050.00	2700.00	40.47	38.59	36.66	34.92	33.33	30.55
31	2.02	93.69	181.31	4185.00	2790.00	40.29	38.17	36.26	34.53	32.96	30.21
32	1.97	95.66	179.34	4320.00	2880.00	39.85	37.75	35.86	34.16	32.60	29.89
33	1.93	97.59	177.41	4455.00	2970.00	39.42	37.34	35.48	33.74	32.25	29.56
34	1.88	99.47	175.53	4590.00	3060.00	39.00	36.95	35.10	33.43	31.91	29.25
35	1.85	101.32	173.68	4725.00	3150.00	38.59	36.56	34.73	33.08	31.57	28.94
36	1.81	103.13	171.87	4860.00	3240.00	38.19	36.18	34.37	32.73	31.24	28.64
37	1.77	104.90	170.10	4995.00	3330.00	37.80	35.81	34.02	32.40	30.92	28.35
38	1.73	106.63	168.37	5130.00	3420.00	37.41	35.44	33.67	32.07	30.61	28.06
39	1.71	108.34	166.66	5265.00	3510.00	37.03	35.08	33.33	31.74	30.30	27.77
40	1.66	110.00	165.00	5400.00	3600.00	36.67	34.73	33.00	31.42	30.00	27.50

$$\text{Break-even Point} = \frac{\text{Production Cost}}{\text{Avg. Wean Weight}}$$

producing cow is that she is doing three things: (1) tying up capital, (2) creating expense, and (3) not generating enough, if any, income. When you cull and sell her, you are freeing up capital, decreasing expenses (she can't eat your feed, take up your time or require medications and vaccinations if she's not there) and generating income by selling her for the calf she didn't produce. For instance, if we cull 20 cows out of a herd of 100 and canner utility cows are bringing 20¢ per pound for an 800 lb. animal, you can easily see the economic effect. You are freeing up $3,-200 capital that is more than likely already depreciated out. You are decreasing your winter feed bill by $1,000 and if you replace her with a bred animal in the spring, you are providing a potential source of opportunity gross income of an additional $2,000 for their calves. If the available money from the sale of the opens and poor producers is reinvested in a "newer model," you still have benefited from their sale. The money may be put into an interest-drawing fund, otherwise invested, or used to decrease your borrowing needs which will also save interest expense. "Money saved is money earned." Let's express this in relation to herds of varying size and observe the short-term effect as a result of 20% cull rate.

	100	200	300	400	500	1000
Free Capital	3200	6400	9600	12800	16000	32000
Decreased Feed Expense	1000	2000	3000	4000	5000	10000
Opportunity Cost	2000	4000	6000	8000	10000	20000
Total	6200	12400	18600	24800	31000	44000

Remembering that a full service program will probably cost you a maximum of $10 per head herd size, and a limited service program probably a minimum of $2 per head, you can now see the returns possible as compared to the cost.

	100	200	300	400	500	1000
Possible Return	6200	12400	18600	24800	31000	44000
Probable Cost	200 to 1000	400 to 2000	600 to 3000	800 to 4000	1000 to 5000	2000 to 10000
Ratio: Gain Depending on Cost	31:1 6.2:1	31:1 6.2:1	31:1 6.2:1	31:1 6.2:1	31:1 6.2:1	22:1 4.4:1

It is obvious that the greater the improvement needed, the greater the return on the investment. By the same token, the less improvement needed, the less investment is required for a corrective program. For example, if you have a 1,000-cow herd and it costs you $2,000 per year to have pregnancy-testing service only provided, and you consistently have 90% conception rates, for $2,000 you have a potential short-term return of $22,000. These figures are only examples but should give you some indication of the potential involved for a nominal cost.

The cost of a program should decrease each year while maintaining an increase in gross each year. If at the same time, your program caused an increase in weaning or market weight of calves, your break-even point would be less and your increase in gross would be even more for the same cost. I really see no way a producer can economically not afford a program. Remember that there are many variations and degrees of programs offered. A producer may only need a program that involves pregnancy testing if he is a top-notch manager, or he may need a full-service program. Many times the need for managerial assistance is merely due to a lack of time available to an owner or absentee owner. It is obviously possible to have a highly qualified veterinary specialist on your management team for much less than the potential for returns. However, you must be certain the person whose services you seek is qualified in the area of management procedures and reproductive efficiency. Challenge him with the same questions I have provided you; if his eyes light up and he can give you intelligent answers, you have found the right man. You'll be surprised how many eyes are waiting to be lighted.

Here is what would be of great benefit to you as a producer. Have an accountant or CPA figure a total production cost for you. Then you or he take this and arrive at a production cost per calf and a break-even point. Now, simply calculate a sheet similar to that on Figure 4 and see if you can economically justify a program for yourself. You decide from the values you reach whether you may benefit from a program financially and what type of program you need. Set goals and start working to attain these goals. They are:

1. Reduce your total production costs.
2. Reduce your production cost per calf by marketing more calves per cow herd at a given total production cost.
3. Reduce your break-even point by increasing your number of calves and increasing your weaning weights, therefore reducing your production cost per calf at the same time.
4. Increase your gross income by increasing the number of calves, weight of calves and market desirability of calves.
5. You can see that it is possible to increase your total cost of production while at the same time decreasing your production cost per calf and break-even point. This is done if you are able to increase the number, weight and market value of the calves for a given herd size. This is, of course, the aim of a programmed enterprise, as long as each increase in expense is at least equalled or surpassed by an increase in gross income.

II. Record System

Now that we have reviewed the basics and importance of production and reproduction efficiency, you can see that you will benefit by setting up some sort of

record system in a business-like fashion. This record system will provide information so that you will be able to answer questions as follows:

1. My total production cost for the fiscal year _____ was $_____ on a herd of _____ cows.
2. My number of calves weaned was _____ therefore giving me a production cost per calf of $ _____ .
3. The average weaning or market weight of my calves was _____ determining my break-even point of $ _____ per hundred weight. I sold _____ calves for $ _____ .
4. My _____ (year) herd's conception rate was _____%.
5. _____ cows were culled (due to no conception _____, previous year breeding performance _____ or other reasons _____) and were sold generating $ _____ income.
6. _____ heifers will be used to replace those cows culled. I will (purchase - raise) the replacements requiring $ _____ if any.
7. My herd's average breeding interval was _____ days.
8. My herd's average calving interval was _____ days.
9. My expected calf crop for _____ (year) will be _____ at a futures market of $ _____ per hundred weight generating a possible $ _____ in revenues.
10. My hay or forage analysis indicated that my supplemental feed cost for winter feeding this year will be $ _____ . I will need to borrow $ _____ .
11. I plan to receive $ _____ from sale of cows to help finance my winter feed costs therefore reducing my borrowing requirement by $ _____ .

Consistently answering these types of questions will enable a producer to keep his finger on the pulse of his enterprise. Periodic checkups will be beneficial, and appropriate corrective measures will help perpetuate the financial health of the enterprise.

Clinical Report

The Treatment and Control of Mastitis: A Summary of a Recent Survey

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A summary of 72 questionnaires returned by bovine veterinary practitioners from all areas of the United States and Canada in 1975 indicates that certain drugs and procedures are preferred by practitioners in the treatment of bovine mastitis.

In the systemic treatment of acute mastitis the tetracyclines are the most commonly used drugs at 5 gm per cow or 5 mg per pound level. Triple sulfas are the second most commonly used drug at 60 gms per cow. The third most often used drug was a combination of tetracyclines and triple sulfa at near the same dosage level as used separately. Most veterinarians recommend systemic treatment for two to three days.

In acute mastitis, penicillin in combination with streptomycin or neomycin were the drugs of choice for prescription preparations. Penicillin was used at 1,000,000 units to 5,000,000 units level and neomycin and streptomycin at ½ to 1 gm level. Of commercial udder preparations used, ampicillin or neomycin were most commonly used. In areas where chloramphenicol may be used it was overwhelmingly the drug of choice.

In the treatment of chronic mastitis, again, tetracyclines and triple sulfas or combinations were still the drug of choice systemically and at about the same dosage level as used in acute mastitis. Again, systemic treatment was recommended for two to three days. In the use of prescription udder treatment for chronic mastitis, there was a definite trend toward using tetracyclines as compared to their use in acute mastitis, otherwise the drugs of choice were penicillin in combination with neomycin or streptomycin and at only slightly lower doses as compared to acute mastitis.

In the treatment of dry cows, veterinarians in general are using the CMT or culture test to determine the status of new herds. Dry cow treatment is being recommended generally for all cows and after last milking before drying. The most recommended prescription for dry treatment is 1,000,000 units penicillin in combination with ½ gm of streptomycin or neomycin. The most often recommended base for dry treatment was 40 cc furacin liquid. In commercial preparations for the udder, penicillin and streptomycin are most often recommended. Retreating the dry cow is recommended when the udder history or clinical symptoms indicate it to be necessary.

Most dairymen are using Bovidine or Chlorhexidine for teat dipping.

Veterinarians are recommending regular milking machine checks to prevent malfunctions but the average dairyman as yet does not usually check machinery except as trouble develops.

Forty-three percent of 65 reporting felt that oxytocin was very important in the treatment of mastitis; 28% considered it to be helpful and 29% of little value. On the East Coast more emphasis was placed on frequent milking of the mastitic cow while more value was placed on the use of oxytocin in the western states. The average practice supplies service for 8,500 dairy cows.