

# The Economics of Improved Reproductive Performance



IRM-17

## Dairy Integrated Reproductive Management

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Controlling cost and increasing efficiency of production without making large capital investments are important factors for dairy producers to consider as they seek to maximize herd profitability. Improving reproductive efficiency is one way to cut costs and increase the efficiency of production and, therefore, profit. In this fact sheet, how suboptimal reproductive performance affects herd profitability is discussed.

### How Does Low Reproductive Efficiency Affect Profitability?

Poor reproductive performance reduces income and profitability through its effects on several areas of herd performance.

- Increased milk produced per day of life is the goal when the cow's lifetime profitability is to be maximized. Long calving intervals result in more milk per lactation, but less milk per day of life because cows spend more days in late lactation when daily milk yield is low and (or) more days dry.
- When calving intervals are long, fewer calves are born each year. The result is fewer heifers for sale or for use as herd replacements. Culling for production is limited and the rate of genetic progress is slowed.
- Culling due to reproductive failure increases. This reduces the amount of culling based on production and may increase the number of replacements needed to maintain herd size. The result is reduced genetic progress, increased cost of replacement rearing and fewer opportunities to market replacement heifers.
- It is advantageous for many producers to maintain a fall calving herd. Cows that calve in the fall produce more milk and there is a price differential that favors fall production over spring production. If calving intervals are greatly extended, fall calving cows soon become spring calving cows with a resultant decrease in production and profit.
- Low conception rates result in higher semen costs because more units of semen must be used to obtain each pregnancy.
- When conception rates are low the use of bulls of lower genetic merit increases because their semen costs less. In some cases clean-up bulls are used extensively. These practices slow the rate of genetic progress, reducing future production potential.
- Low reproductive efficiency often is associated with higher veterinary bills, as examinations and treatments increase in an attempt to get cows to conceive.
- Extended periods of low production and long dry periods often result in an increased incidence of fat cows. Overconditioned cows have more health and reproductive problems during the subsequent lactation.

## Improving Reproductive Efficiency— What Is the Economic Benefit?

The benefits from improving reproductive efficiency obviously cannot be measured directly. It isn't possible to determine the amount of milk a cow fails to produce or the value of a calf that was never conceived. The fact that the economic consequences are not obvious is one reason why herd reproductive efficiency has not received the attention that it should from dairy producers.

Even though it is impossible to precisely determine the dollar cost of poor reproductive performance, a reasonably accurate estimate can be made using some assumptions based on experiences in Northeast dairy herds. Following are some examples that will put dollar values on reproductive efficiency.

To do this, a typical herd situation is established. Then calculations are made on how costs and income change when reproductive performance improves. The first step is to identify the reproductive management factors that are most important in determining the herd's reproductive efficiency. The following are most important.

- **First breeding policy**, defined as the minimum number of days allowed between calving and first service.
- **Estrous detection efficiency**, or the percentage of estrous periods accurately identified.
- **Conception rate**, or percentage of the services that result in pregnancy.
- **Number of cows with reproductive disorders**.
- **Culling policy**, defined as maximum days open or longest calving interval allowed. Cows that exceed the limit are automatically culled.

First, cows that are completely free of reproductive disorders will be considered and average income per cow per year under poor, average and good reproductive management programs will be estimated. A discussion of the effect of reproductive disorders on income will follow. Poor, average and good reproductive management programs to be used in the example are described in Table 1.

To estimate the economic consequences of changing reproductive performance, certain costs and prices must be assumed. For this example milk price is \$12.50/cwt, calves are worth \$70 when sold as bob calves; there is a one time technician service charge of \$5 for each cow; a \$10 semen fee is charged at each breeding and a \$600 charge is made for each replacement. The replacement charge was calculated by subtracting the average price received for cull cows (\$500) from the cost of raising a replacement heifer (\$1100 when all costs are considered). The milk yield potential of the herd is kept the same across the reproductive management programs and is 19,000# ME for 305 days.

The effects of reproductive management changes on reproductive performance and income per cow are shown in Table 2. Milk sold, costs and returns are on a per year basis not on a lactation basis in order to accurately determine the effect of improved reproduction on economic returns. Feed costs were assumed to be 40% of the return for milk.

This example indicates that improving reproductive management from poor to average in a 100 cow herd of healthy cows will increase yearly income by \$5,500. A change from average to good will result in an increase of another \$2,900. So, changing from a poor reproductive management program to a good one would be worth \$8,400! This puts a cost of \$1.50 to \$3.00 on each additional day open beyond 90-100 days.

**Table 1. Characteristics of Poor, Average and Good Reproductive Management Programs**

	Poor	Average	Good
1st breeding policy (days)	60	55	50
Percent of estrous periods detected	45	55	65
Conception rate	45	50	55
Culling policy (days open)	270	245	200

<sup>1</sup>Cows are culled if days open exceed the value shown.

**Table 2. The Effect of Changes in Reproductive Management on Reproductive Performance and Net Income Per Cow**

	Reproduction Management Program		
	Poor	Average	Good
<b>Reproductive Performance</b>			
Milk sold/cow/year (lb)	15,667	15,986	16,275
% of herd culled for repro	20	6	5
Average days to 1st service	96	83	73
Average days open	129	110	92
#Services/Conception	2.2	2.0	1.8
<b>Costs and Returns</b>			
Income over feed cost/cow/year	\$1175	\$1199	\$1220
Return from calves/cow/year	\$56	\$62	\$66
Breeding & Replacement costs/cow/year	\$78	\$53	\$49
Return/cow/year	\$1153	\$1208	\$1237
Difference	\$55	\$29	

These figures account for some of the increased costs that would be associated with improved reproduction such as increased feed costs to produce the extra milk and additional semen as estrous detection improves. They do not account for any costs associated with the management changes that would be necessary to bring about these improvements. These costs would have to be determined for each farm and subtracted from the returns to get a true estimate of the profitability of making these changes. **However, the cost of improving reproductive management is not likely to be high enough under any circumstances to make improving reproductive efficiency an unprofitable activity.**

**What Are the Effects of Reproductive Health Disorders?**

The discussion until now has centered on healthy cows without reproductive disorders. Obviously this neglects an important part of the herd. Research involving 2852 lactations in 33 Holstein herds in New York indicated that potentially harmful reproductive disorders occurred in 25% of the first lactation cows and 30% of the cows in their second and later lactations.

The effects of the reproductive disorders on services per cow, days open and percent culled are shown in Table 3 and 4. (All herds were on reproductive health programs.) In general, effects were greater in older cows. Some reproductive disorders were associated with increased days open, services per cow and culling.

The cost and income figures in the previous example can be used to estimate the cost, in terms of lost income, for each first lactation or older cow that suffered one or more disorders (Table 4). The costs are only those due to lower

reproductive efficiency and increased culling. Charges for veterinary exams and drugs are not included and would increase the costs of some of these disorders by \$10 or more.

All disorders except retained placenta (Fact Sheet IRM-21) and metritis (Fact Sheet IRM-22) in first lactation cows resulted in significant losses compared to cows that did not suffer any reproductive problem. All disorders were most costly in older cows. Losses for older cows that experienced a difficult calving (Fact Sheet IRM-20) or more than one disorder were higher because of the high cull rate.

It is important to note that the herds in which this information was gathered were on regular herd health programs and that all of these disorders received veterinary treatment. Herd health programs may minimize the incidence and effects of these disorders, but treatment apparently does not entirely prevent losses due to reproductive health problems. Performance was impaired and culling increased compared to normal cows in spite of treatment. The average loss per cow per year due to reproductive disorders was \$20.00 plus the cost of drugs and veterinary service in these herds.

The key to increasing herd profitability lies in preventing disorders. Therefore, producers should work closely with their veterinarians, cooperative extension agents and nutritionists to develop nutrition (Fact Sheet IRM-14), herd health (Fact Sheet IRM-18), and herd management programs that will minimize the incidence of potentially harmful reproductive disorders. They must also provide timely, effective treatment for those problems that will always occur even under the best management conditions.

**Table 3. The Effects of Reproductive Disorders on Reproductive Performance and Culling in First Lactation and Older Cows**

	Services per cow <sup>1</sup>		Days Open		% Culled	
	1st Lact.	Later	1st Lact.	Later	1st Lact.	Later
No. Disorders	1.6	1.5	104	105	15	29
Difficult Calving	1.6	1.5	126	105	15	52
Retained Placenta	1.6	1.5	104	114	15	29
Metritis	1.6	1.9	104	119	15	29
Cystic Ovaries	1.6	2.1	133	136	15	29
Two or More Disorders	1.6	1.8	104	131	29	47

Smith, Erb and Oltenacu, Cornell University, 1984.

<sup>1</sup>Note that for the purpose of calculating costs associated with disorders, this figure is services per cow and includes cows culled. It is not services per conception.

**Table 4. Losses Due to Impaired Reproductive Performance and Culling Caused by Reproductive Health Disorders.**

Disorder	Loss/Cow	
	1st lactation	Later
No. Disorders	0	0
Difficult Calving	\$35	\$142
Retained Placenta	0	\$14
Metritis	0	\$26
Cystic Ovaries	\$46	\$56
Two or More Disorders	\$84	\$153

### What Is The Bottom Line?

All evidence collected to date suggests that maintaining a high level of reproductive efficiency is required if dairy herd profitability is to be maximized. Producers are advised to work with their reproductive management team (veterinarian, AI representative, cooperative extension agent, etc.) to identify the weak links in the reproductive management program and institute changes that will result in improved performance and increased profits. Gains of \$1.50-3.00 per cow for every day that calving intervals above 12.5-13.0 months are reduced can be expected. Look for weak links in the following areas:

- **First breeding policy.** Earlier breeding will improve performance in many herds. Aim for an average of 70-75 days to first service.
- **Estrous detection efficiency.** Estrous detection is the number one problem. Improving estrous detection (Fact Sheet IRM-6) is the most effective way to improve reproductive efficiency. Little cost is usually involved so it is the most profitable, too. Cornell research indicates that increasing the percentage of estrous periods detected from 35 to 55% results in an additional \$70 return per cow

per year when conception rate is 50% and cows are culled after 210 days open (16 month calving interval). A further increase to 75% results in an additional \$17 per cow per year.

- **Conception rate.** Aim for conception rates (Fact Sheet IRM-10) higher than 55%. Improvement to this level or above is possible and will be profitable. Because of the many factors that can affect conception rate, making improvements will be more challenging than improving estrous detection in most herds.
- **Reproductive disorders.** Establish management programs (Fact Sheets IRM-18 and IRM-19) and practices that will minimize the incidence of health disorders and ensure effective, timely veterinary treatment for problems that do occur.

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