

Reproductive Performance and Efficiency
AVS 472
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Take home Message

The primary goal of any dairy reproductive management program is to maximize the number pregnancies per lifetime of the cow efficiently and profitably.

Sources of Financial Loss Due to Poor Reproductive Efficiency:

1. Less milk sold as a result of longer days open
2. Fewer calves sold as a result of longer calving intervals
3. Increased number of breedings per conception as a result of poor heat detection, labor, etc.
4. Increased veterinary costs as a result of greater number of problem cows.
5. Increased number of replacement heifers needed for *non-voluntary* reproductive culls and less number of calves born.

The major goal of any dairy herd is to increase the amount milk sold per cow per lactation. In order to achieve this goal one should recognize the factors that influence and contribute to milk sales. These factors include udder health, nutrition, peak milk yield, persistency of milk yield (lactation curve), and **reproductive status** of cows. Herd reproductive performance and efficiency have great impacts on milk yield per lactation, overall lifetime production, number of calves born, and therefore the overall profitability of the farm.

Why should we pay attention to reproductive management?

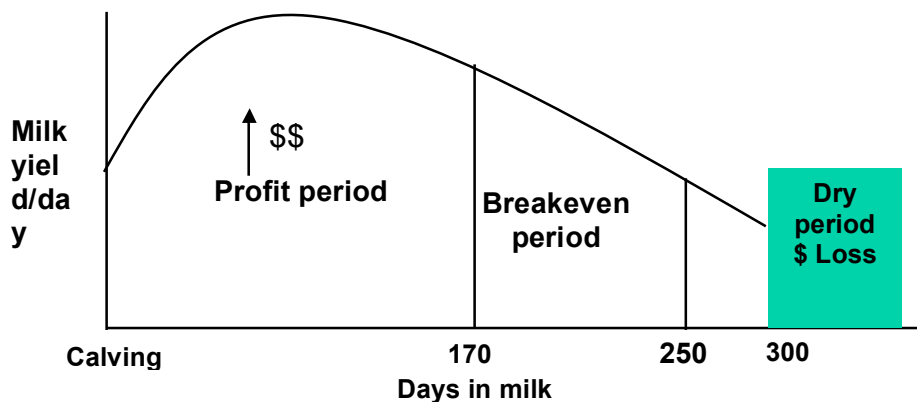
Ovaries secrete both estrogen and progesterone. Further, after pregnancy take place, fetal placenta secrete high amounts of estrogen and some progesterone. These two hormones synergistically stimulate mammary ducts and alveoli development (mammogenesis). Near the parturition other hormones including glucocorticoids, prolactin and growth hormone increase in concentration. These hormones are an integral part of successful lactation because without them, mammary gland protein synthesis cannot occur and lactogenesis cannot take place. Further, milk yield peaks about 2 to 3 months after calving and milk yield declines (mammary function) for the next 7-8 months and eventually milk synthesis decrease drastically at 10 months after calving. To initiate new lactation, the cow must become pregnant during that 10 months and calve again.

It should be clear by now that pregnancy is essential for milk production. In other words, the complete development of the mammary gland and initiation of lactation primarily depends on a successful pregnancy.

How does reproductive efficiency influence farm profitability?

Loss of revenue due to lower milk production Analyzing the lactation curve, one should realize that the peak lactation occurs around 60-90 days after calving and around this period (60-150 days post calving) is the time when the cow generates the most amount of profit. Shortly

thereafter (between 150-250 days), the cow enters a “break even point” phase in which cost of production equals the revenue from milk production. Therefore, the more frequently the cow becomes pregnant (during its productive lifetime), the more profit periods per lifetime cow would have. On the other hand the fewer times the cow becomes pregnant the more time she will spent on the tail end of the lactation curve, resulting in loss of profit (Figure 1)



**Figure 1. Relationship between lactation curve and milk revenue. (adapted from Dr. Senger).
Long average days-in-milk is a characteristic of herds with reproductive problems.**

Lets expand on the issue of why poor reproductive performance leads to economical calamity. Herd reproductive performance, which can be evaluated by calving interval (conception and pregnancy rates, number of days open are other measuring sticks), affects the average milk production (tank average). Calving intervals directly influence the average days-in-milk and the latter affects average daily milk production. In general, as mean calving intervals increase, the average days in milk for the herd increases as well. The question becomes what is bad about having high average days in milk? The answer is that there is an inverse relationship between average days in milk and average daily milk. In other words, the longer the average days in milk is, the lower average daily milk production becomes (Figure 2).

This phenomenon Clearly indicates that poor reproductive efficiency (long calving intervals) negatively affects milk revenue through reducing life time milk production.

Loss of Calf crop and heifer replacement cost

Herds with reproductive problems experience low conception and pregnancy rates. As a result, these herds are faced with long number of day open and long calving intervals. Long calving intervals simply translate to having fewer calves born during the productive lifetime of the cow. For example, cows that conceive at 100 days after calving (12.8 months calving interval), in average will produce about 3 calves throughout their productive life time of 3-3.5 years of (average productive life in commercial herds), whereas cows that conceive at 180 days after calving (15.5 month calving interval), hardly produce 3 calves throughout that time. A 500-

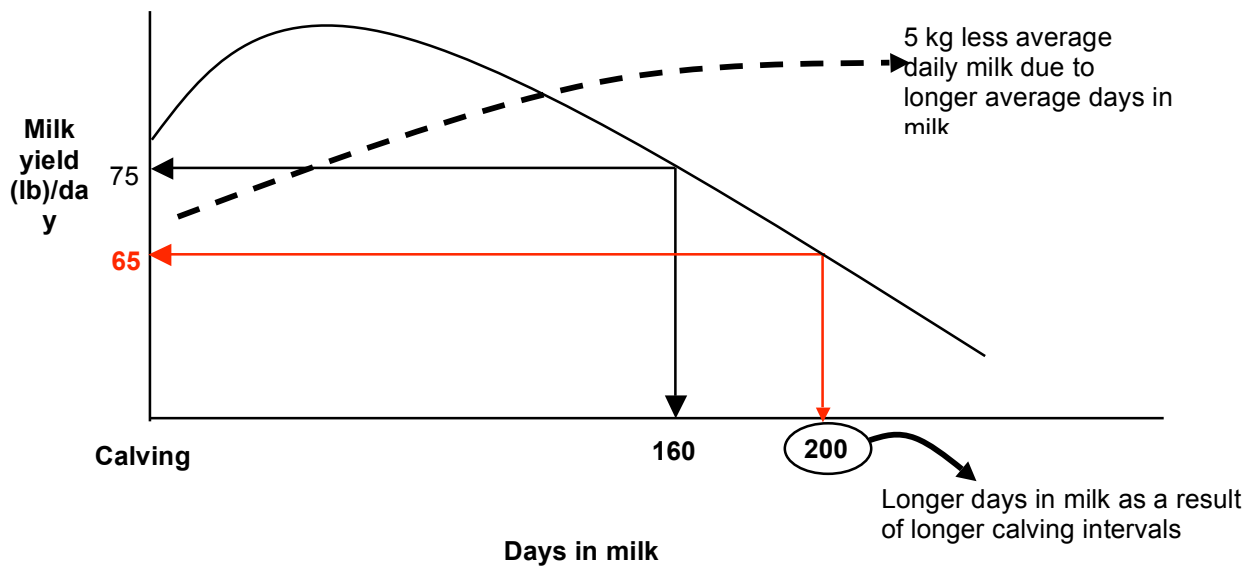


Figure 2. Relationship between long calving interval, average days in milk, and loss of average daily milk production.

cow herd with a 15.5 months calving interval produces approximately 200-250 less calves after 3-3.5 years when compared to the same size herd with 12.8 months calving intervals. This inefficiency in reproduction leads to less calf crop, loss of replacement heifers, and therefore loss of potential income. Furthermore, dairy operations with reproductive in efficiency experience a high involuntary culling rate due to reproductive problems. The involuntary culling increases the need for replacement heifers and sometimes forces producers to lose young cows before they cover their raising expenses.

Increase in veterinary and semen costs

It is needless to say that poor reproductive performance means a high number of problem cows that need more attention by the veterinarian. Furthermore, cows with reproductive problems have low conception rates and ultimately require more insemination before they become pregnant. Collectively reproductive problems lead to increase in semen and veterinarian costs.

What is the bottom line?

Artificial insemination (AI) has become the dominant insemination option among dairy producers because it reduces disease transmission, allows genetic selection, and ultimately increases longevity and milk yield of dairy cows. However, with increasing milk yield the efficient and accurate estrus detection and subsequent timing of AI have become major challenges to improve reproductive and economic efficiencies of many dairy farms.

Approximately 70 to 80% of the dairy farms in the US currently use AI in their breeding program. Senger (1994) estimated an annual loss of > \$300 million to the US dairy industry because of the failure to accurately detect estrus, the misdiagnosis of the estrus, and improper time of insemination. These problems have reduced the economic advantage of artificial insemination. According to the National Dairy Herd Improvement Association (DHIA) heat detection efficiency has decreased from approximately 46% in 1989 to 40% in 1998. Low frequency of estrus in high producing dairy cattle, inefficiency of estrus detection, and low conception rate (40% in US dairy herds), has increased the need for development of new management strategies to improve reproductive efficiency.

Maintaining a high level of reproductive efficiency is required if dairy producers want to maximize the herd profitability. Good managers identify the significance of good reproductive management policies and try to implement them every day and having cows becomes pregnant in a timely manner.

References

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