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Incentives for Increasing Pregnancy Rate

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Reproductive efficiency has major impacts on profitability of dairies, primarily through its impact on average milk/ cow/ day, but also due to its impact on culling and the number of calves born. Despite improved understanding of the financial impacts of poor reproductive management, reproductive efficiency has been on the decline within the dairy industry for the last 50 years. Consequently, producers have expressed renewed interest in designing incentive pay programs for their employees to try to improve reproductive performance. However, effective incentive programs for reproductive management are rare and difficult to design and maintain. Before attempting an incentive program, one needs to understand the key influencers of success, the major limitations faced by breeders, and the concepts and metrics of monitoring reproduction. After a more complete understanding of

Good reproduction starts with healthy fresh cows and the cornerstone of fresh cow management is a structured monitoring and treatment program.

the complexities associated with reproductive management, producers who still desire to design and implement an incentive program should proceed cautiously and work together with their veterinary advisor.

Whether in-house or from outside companies, dairy breeders face the same obstacles with improving reproductive efficiency…locating cows in heat and successfully placing semen into these cows.

CRITICAL FACTORS NOT CONTROLLED BY BREEDER

Health problems such as lameness, prolonged anestrus, mastitis, and endometritis are usually beyond the control of the breeders, unless they are also involved with the day-to-day management of transition cows and the herd's nutrition program.

Recent studies have demonstrated that the effect of milk production on

Cycle number	Days in Milk	# of Eligible Cows (cow cycles)	# of Heats Serviced	Breeding Submis-sion Rate	# of Preg-nancies	Conception Rate (CR)	Pregnancy Rate (PR)
1	50-70	100	56	56%	20	36%	20%
2	71-91	80	63	79%	22	35%	28%
3	92-112	58	36	62%	13	36%	22%
4	113-133	45	25	56%	8	32%	18%
5	134-154	37	21	57%	6	29%	16%
6	155-175	31	17	55%	5	29%	16%
7	176-196	26	14	54%	3	21%	12%
8	197-217	23	12	52%	3	25%	13%
9	218-238	20	10	50%	3	30%	15%
10	239-259	17	9	53%	2	22%	12%
11	260-280	15	7	47%	2	29%	13%
12	281-301	17	8	47%	2	25%	12%
		469	**278**	**59.3%**	**89**	**32%**	**19%**

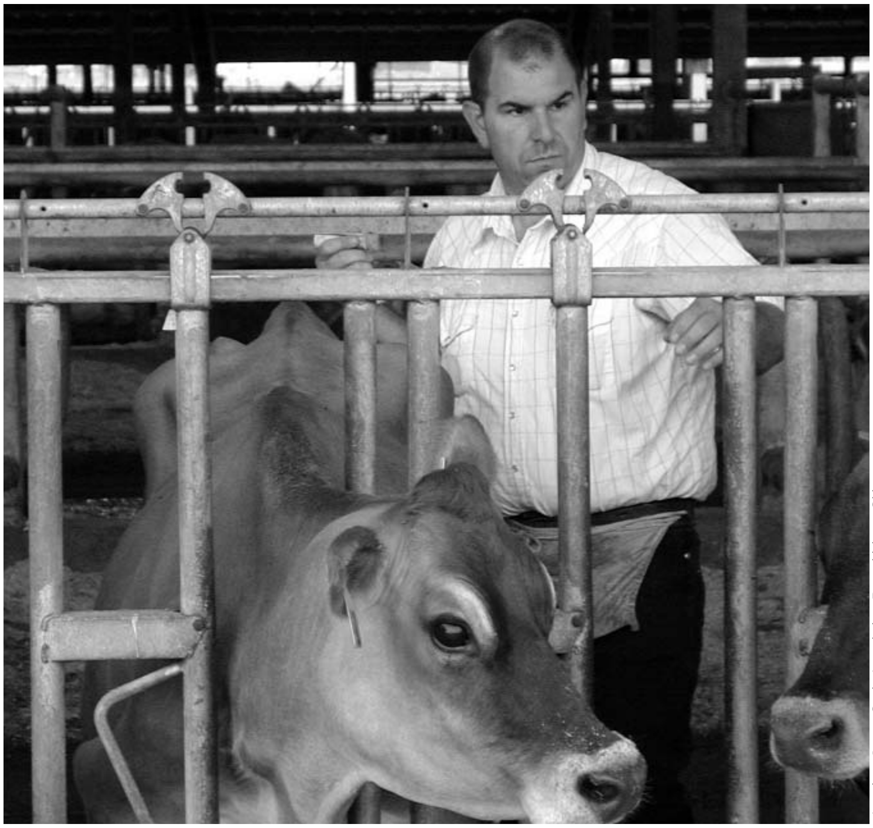
Sample pregnancy rate (PR) calculation for an imaginary 100 cow dairy that continues breeding cows until 301 days in milk and has a voluntary waiting period of 50 days.

fertility within herds is minor compared to other critical factors such as calving difficulty, twins, retained fetal membranes, metritis, and ketosis.[1;2] Excessive weight loss during the early postpartum period, often associated with one of the preceding disease problems, leads to an increased risk for metritis, endometritis, and prolonged anestrus, a condition marked by a delayed return to normal ovulation patterns. Each of these conditions leads to problems with reproduction such as poor heat detection, lower conception rates, and higher risk for early embryonic deaths.

With such a wide variety of problems that may impact reproductive efficiency, there is the potential for a large disparity between the effort of the breeder and the actual success of the reproductive management program. Disease control and prevention strategies, along with nutritional management and cow comfort, interact to impact reproductive efficiency. Unfortunately, these factors are often out of the control of breeders and no amount of financial incentives will allow even the best breeding manager to achieve the targeted goal for reproduction if cow health is the limiting constraint. The net result is mounting frustrations and an ineffective incentive program.

BIASED MEASURES

Historically, dairy managers and consultants have used calving interval (CI) or days open (DOPN) as indices of reproductive performance. Generally, most advisors agree that the optimal lactation length to maximize milk/ cow/



American Jersey Cattle Association, Reynoldsburg, Ohio

A key component to improving pregnancy rates is accurate and intensive heat detection.

day in the herd, without regard to transition management issues or risk of culling, is something less than 11 months. Adding a 40-60 day dry period to the end of an 11-month lactation results in a calving interval of 12-13 months.

Both CI and DOPN are actually biased estimates since they only provide information for positive outcomes (pregnant cows) and exclude all remaining animals. Calving interval only measures the reproductive efficiency of cows that became pregnant, maintained the pregnancy through a normal gestation length, and calved again. It neglects cows that fail to become pregnant or that are culled while pregnant. In addition, there is considerable lag in this metric due to the time it takes a cow to become pregnant and deliver her calf. While DOPN is slightly better, it still does not consider cows that have failed to become pregnant and is very susceptible to the effects of culling.

For example, clinical experience has shown that the calculated average DOPN is almost always going to be higher for high producing cows. However, to interpret this metric as meaning that high producing cows are more difficult to get pregnant is often incorrect. As a group, high producing cows stay on the dairy longer than low producing cows. Consequently, these high producing cows receive more opportunities for additional breedings, which results in longer average days open and higher services per conception. While the fertility may not be different per unit of time, high producers have longer average DOPN because they are retained for their milk production. On the other hand, low producing cows tend to either become pregnant or end up being culled due to their lower milk production, resulting in a shorter average DOPN.

PREGNANCY RATE (PR)

Pregnancy rate, defined as the proportion of eligible cows that become pregnant each 21 day cycle, is the preferred parameter for evaluating reproductive performance. PR is a true rate (considers risk of success or failure per unit of time) and is calculated by dividing the number of pregnancies produced within a 21-day cycle by the number of eligible cows present during that same 21-day period. PR is a less biased parameter than either DOPN or CI since it considers all eligible cows (not just successes) and contains much

less lag than CI. It is more sensitive to detecting recent changes in reproductive performance and provides useful information for most of the lactating cows.[3] Based on database surveys as reported by Steve Stewart, Bruce Clark, Don Niles, and David Galligan (personal communications), PR nationwide appears to average approximately 14-16%. Yet, the ultimate goal for optimum reproductive management is a PR of 25-30%.

Since PR is a function of both heat detection efficiency (HD) and conception rate (CR), attempts to improve reproductive performance must consider both factors. Heat detection efficiency refers to the percent of cows found in heat. In reproductive management, the better term to consider is breeding submission risk (BSR) since only the cows that are found in heat and inseminated affect the ultimate goal of more pregnancies. Previous recommendations have been made to base incentive programs on heat detection and the number of cows presented for breeding. While dairies want to increase the herd's heat detection intensity, paying breeders in this manner promotes overzealous recording of heats. Inaccurate or overzealous heat detection will usually lead to a dramatic decrease in conception rate due to breeding cows that are not truly in heat. Since conception rate is influenced by both the accuracy and intensity of heat detection, as well as handling of semen and cow uterine health, overzealous heat detection may also result in more early embryonic death or abortions due to inseminating cows that are already pregnant.

Another type of reproductive incentive that has sometimes been promoted is to base breeders incentives on conception rate. This approach is also problematic. Within herds, breeders can make their conception rates improve dramatically by hand-selecting cows to inseminate. For example, if breeders only inseminated healthy, well conditioned cows that displayed very strong signs of estrus such as standing for multiple mounts and discharging large amounts of perfectly clear, thick vaginal mucous, their conception rates would rise. However, many other cows that might become pregnant if inseminated, might be skipped. The result would be higher conception rates, but fewer pregnant cows.

While conception rate can be easily decreased by overzealous breeding, it is much more difficult to positively impact compared to heat detection. Breeding submission risk can be positively impacted with the implementation of either estrus synchronization or by using ovulation synchronization protocols. Since estrus synchronization protocols do not control the moment of ovulation, detection of estrus is required. Ovulation synchronization protocols have gained in popularity because of their ability to dramatically improve breeding submission risk or rate. Examples of these programs included Ovsynch and Cosynch. Each of these programs utilizes combinations of

A well organized breeding cart, good record keeping, and attention to semen handling details are important steps to improving conception rates.

GnRH (Cystorelin®, Fertagyl®, OvaCyst®, etc.) injections and prostaglandin (Lutalyse®, Estrumate®, Prostamate®) injections to synchronize ovulation and allow dairymen to deliver a timed AI. These programs have been proven to work well, assuming that cows are able to respond, uterine health is good, and the injections are actually delivered at the appropriate times.

Table 1 demonstrates how PR is calculated for an imaginary dairy milking 100 cows with a voluntary waiting period of 50 days. In this simplistic example, all 100 cows calved together and remained in the herd for the entire 250+ day breeding period. Starting with the first cycle, 50-70 days in milk (DIM), 100 cows were considered eligible for breeding. During this time, 56 cows were inseminated, resulting in a heat detection rate of 56%, assuming that all cows detected were actually inseminated. Of the 56 cows inseminated, 20 pregnancies resulted, yielding a conception rate of 36% (CR is calculated by dividing the number of pregnancies, 20, by the total number of inseminated cows, 56). The pregnancy rate for the first cycle is 20% (PR is calculated by dividing the number of pregnancies, 20, by the total number of eligible cows, 100). The second cycle is much better. During the period of 71-91 DIM, 80 cows were eligible and 63 were inseminated. With a CR of 35%, the resulting PR is 28% or 22/80. The reason that this cycle has a higher PR is because a timed AI program such as Ovsynch was used on all cows not inseminated during the first cycle, resulting in a higher breeding submission rate of 79%. To calculate the total PR after the first 2 cycles, we add the # of pregnancies (20 + 22) and divide by the total # of eligible cow cycles (100 + 80). The result is 24.4%. The goal of a successful reproductive program is to get cows pregnant as quickly as possible, once the voluntary waiting period has ended. [*Editor's note*: In thinking through an incentive pay program, breeders ought to be rewarded according to the difficulty of the task, so in this case, the incentive pay structure would be higher during periods when no synchronization protocols are used. The idea is to pay for effort involved. Otherwise, the dairy farmer will pay twice: a higher bonus obtained by using a synchronization protocol (breeders are more successful) plus the cost of purchasing the synchronization program.]

Utilizing a team approach to reviewing breeding records can help identify problem areas more quickly.

Good cow comfort can help reduce lameness and improve not only milk production, but also reproduction.

If an incentive program for reproductive management is still desired, there are several alternatives that may offer improvements over paying for heats or conception rates. The first is to pay for improvements in PR. Conservative estimates by the author for the value of 1 unit change in PR are approximately $10-20/ cow in the milking herd. The dairyman could choose to give a breeder a bonus for improvements in whole herd PR. For example, in a 1000 cow dairy with a baseline PR of 16% (whole herd, including bulls), moving the herd to 18% could theoretically result in an economic gain for the herd of approximately $20,000 per year. The breeders could be awarded a percent of that gain for the year for improving PR. [*Editor' note*: There are two somewhat opposing incentive pay principles that need to be considered simultaneously: 1) As goals are more difficult to achieve, employees should receive higher pay (so that effort is rewarded evenly); and 2) The greater the amount of incentive earned by an employee, the greater the benefit to the dairy. Because breeders will be better able to achieve increases in the baseline at the lower PR levels (10-11%), greater incentives would need to be provided for achieving the more difficult higher levels (over 20%). On the other hand, dairymen will see proportionately greater economic gains with improvements at the lower than the higher levels. Say a 10% increase at the 10% PR level (moving to 11% PR) will yield substantially greater savings than a 10% increase at the 25% PR level (moving to 27.5% PR). There comes a point where improvements beyond a certain level require too much effort for the return. A dairy farmer needs to be clear as to where that point is.]

In order to use PR change as an incentive, the breeder must understand the concept of PR and the various forces that influence it including cow health, heat detection, conception rate, and movement of cows into bull pens. The author's research shows that keeping cows in AI pens longer results in improved PR's. Records used for evaluation and incentives should reflect the overall risk of becoming pregnant for the entire herd by evaluating the PR of both AI and bull pens. If only AI pens are considered for incentives and breeders have the ability to influence the movement of cows or the classification of breeding eligibility, problems may result due to manipulation of the system just to improve the AI numbers. Cows with fertility issues might be moved to bull pens or classified as "do not breed," thus removing them from the eligible population. To prevent this potential source of abuse, safeguards must be put in place such as using whole herd PR and not just the AI pens and monitoring of the proportion of cows recorded as “do not breed.”

Another possible incentive involves paying for compliance within the breeding system. As previously mentioned, pregnancy rate is determined by both breeding submission rate and conception rate. Paying bonuses for improved compliance within the Ovsynch program should lead to improved PR assuming cows are actually inseminated. For example, cows are started on Ovsynch by receiving an injection of GnRH. In order for the program to be successful, cows must receive all injections and be inseminated as per the protocol unless observed in heat prior to its completion. Incentives could be set up to pay for levels of compliance within the system such as 95% or 98% of cows receiving an insemination within 10 days of receiving the first GnRH.

SUMMARY

Effective incentive programs for reproductive management are very rare and can be difficult to design. Knowledgeable breeders or workers can find ways to manipulate the system to their advantage or may become frustrated over a lack of control within the dairy system. Before attempting an incentive program, dairy producers, breeders, and their veterinary advisors need to understand the key influences of success, the major limitations faced by breeders, and the concepts and metrics of monitoring reproduction. Commonly used incentive programs from the past such as reducing days open, or paying for improved heat detection or conception rates independently, often result in failures within the system. Producers who still desire to design and implement an incentive program should proceed cautiously, work with their veterinary advisor, and consider basing incentives on pregnancy rate changes or improvements in compliance within the reproductive management system.

CHAPTER 3 REFERENCES

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