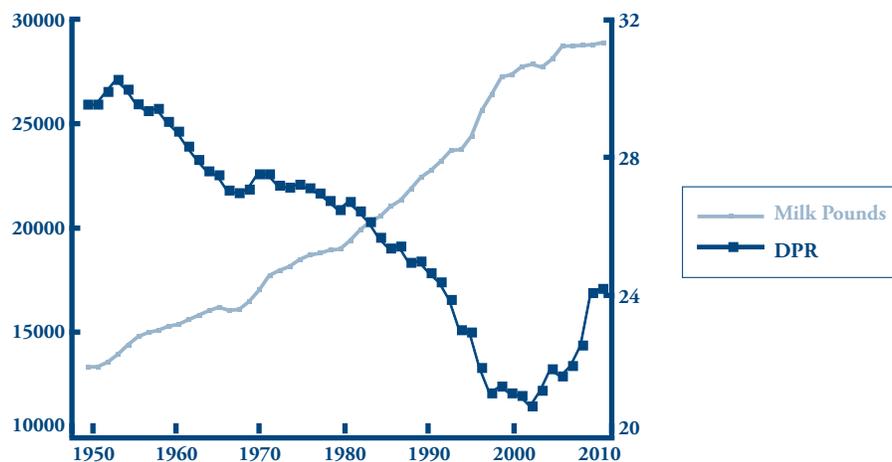


Fertility: The fundamental element of reproduction

Fertility is defined as the capability to produce offspring. For dairy cattle we make adjustments to the environment, the diet and reproductive protocols, all in hopes of improving our chances of producing offspring. Simply put, fertility is the basis of all reproductive challenges.

Research¹ from 1999 notes fertility has declined in U.S. herds about 0.45 percent per year since the 1980s. For years cows have been bred for milk production and dairy character, two traits that work antagonistically to fertility. As shown in Figure 1, milk yield has increased exponentially since the 1950s, while daughter pregnancy rate (DPR) has declined drastically. Rather than accepting low fertility, producers are identifying avenues that can help boost fertility and fundamentally improve herd reproduction.

Figure 1. Improving milk production and declining reproductive performance



Genetics are the foundation for fertility

Genetic selection has been proven to have a positive impact on fertility. Paying close attention to certain traits can help identify the appropriate bulls to capture both milk production and improved reproduction:

- Put less emphasis on dairy form.** While dairy character and dairy form have been highly sought-after traits for many generations in dairy cattle breeding, research shows cows that are under-conditioned are often harder to get bred. Research² in 2008 found that lactating cows with a low body condition score (BCS) were more likely to be anovular at 65 days postpartum. Avoid using bulls known for extreme dairy character that could result in a fertility decline in your mating program.



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- **Consider productive life.** Productive life measures dairy cow survival. For a cow to stay in the herd, it must be able to get bred back. Fertility is, therefore, a significant component of productive life. Herds that select for health, fertility and longevity—all of which are factored into the productive life calculation—have been able to reduce or reverse the negative trends in herd reproductive performance.
- **Include daughter pregnancy rate.** Introduced in 2003, daughter pregnancy rate provides producers with the opportunity to select directly for fertility. DPR is derived from days open records, or the days from calving to conception. DPR is strongly correlated with a number of fertility traits, including days to first service, conception likelihood and 21-day pregnancy rate. There can be quite a difference in fertility—as much as 29 days—between bulls at the top and bottom of the list. Producers should consider using multiple bulls with high DPR to minimize risk.

Breeding and insemination protocols

Identifying cows in heat, breeding them at the proper time and using proven insemination practices all influence the cow’s ability to get pregnant. According to Dr. Richard Pursley of Michigan State University, one of three reproductive parameters is most likely causing the decline in fertility: the sperm, the egg and/or the uterine/oviductal environment. Dr. Pursley recommends a few methods to improve fertility by ensuring high-quality semen reaches the cow at the right time every time:

- **Properly thaw semen.** Most organizations recommend thawing ½ cc straws of semen for approximately 45 seconds in a 95 to 98 degree Fahrenheit water bath. The percentage of motile sperm will decline the longer straws are left in the water bath. Keep the straw in neutral temperatures once removed from the water bath; cold temperatures can reduce the percentage of live sperm delivered to the uterus.
- **Inseminate cows at the proper time.** Timing of A.I. relative to behavioral estrus has been an active area of research because it has such a profound influence on fertility. However, breeding cows at the proper time can be difficult because producers must identify when first standing estrus occurs.³

In the past experts have recommended an a.m./p.m. rule, meaning if a cow is detected in heat in the morning, it should be bred later that day. If an animal is detected in estrus in the evening, she should be bred the following morning. However, the research⁴ outlined in Table 1 shows no difference between the use of the a.m./p.m. rule and once-daily breeding.

Table 1. Once-daily A.I. versus the a.m./p.m. rule on 75-day nonreturn rate

A.I. Method	Number of breedings	75-day nonreturn rate (%)
A.M./P.M. rule	3,659	60.1
Once-daily	3,581	60.6

Take this scenario one step further and research shows that the use of the a.m./p.m. rule plus infrequent estrous detection may actually result in cows receiving insemination too late. Table 2 further outlines that as time to breeding after first estrus is lengthened, the 75-day nonreturn rate declines.⁴

Table 2. Effect of time of A.I. on 75-day nonreturn rate

Interval (h)	Number of A.I.	75-day nonreturn rate (%)
0 – 6	1,126	59.9 ^a
6 – 12	2,352	60.7 ^a
12 – 18	2,455	55.5 ^b
18 – 24	962	53.4 ^{b,c}
24 – 30	99	49.6 ^c

^{a,b,c} Means with superscripts differ ($P < 0.01$).

- **Utilize the proper A.I. technique.** Semen should be deposited into the uterine body or divided between uterine horns for greatest chance of conception. Deposit semen as deep as possible with minimal manipulation. Research shows depositing semen into the cervix can reduce fertility by 20 percent.
- **Train, retrain and refresh employees.** Employees have the most cow contact and are most often responsible for implementing reproductive protocols along each step of the breeding process. Ensure they have the skills necessary to detect cows that are in heat and then use proper A.I. technique to get them bred in a timely fashion. Refresher courses can help your employees avoid picking up bad habits and reinforce the need to maintain breeding protocols as outlined.

Use technological advancements

There are multiple technological advancements in reproduction that improve our ability to get cows bred. The technology helps to boost the cow's natural hormone production to heighten its ability to get pregnant.

- **A progesterone insert** has been helpful to treat anovular cows in the breeding pen prior to a timed A.I. protocol. In anestrous females, many of the functions of the reproductive system are absent, most noticeable being the lack of estrus, ovulation and CL formation. In many breeding programs, a progesterone insert can be used to ensure cows cycle properly and are bred in a timely fashion.
- **Timed-A.I. protocols** take some of the guesswork out of herd reproduction and allow for set herd breeding days. Rather than breeding on heats, protocols allow producers to breed cows based on a set schedule. Protocols have been proven to boost reproductive performance by lowering days to first service, days open and calving interval, and boosting pregnancy rate.

While challenges exist relating to fertility, multiple solutions are available for producers today. Whether it be making changes to bull selection in mating, brushing up on heat detection and breeding, or implementing technology into your breeding program, the varied options will allow you to transform your reproductive program and continue to reverse the negative fertility trends.



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