

# Increase Pregnancy Rate

Steps to get more cows and heifers pregnant.

by T.S. Gatz

There's a certain amount of satisfaction — and a boost to your bottom line — that comes when more heifers and cows become pregnant during a nice, tight breeding season, and fewer cows are culled due to being open. Enter the “Equation of Reproduction” developed by George Perry, South Dakota State University (SDSU) associate professor and beef reproductive management specialist, and Erin Larimore, graduate research assistant in the SDSU Department of Animal Science.

The “equation of reproduction” — which impacts fertility and affects pregnancy rates in both natural service and artificial insemination (AI) programs, whether synchronized or non-synchronized — encompasses four factors: (1) percent of animals detected in standing estrus and inseminated; (2) inseminator efficiency; (3) fertility level of the semen; and (4) fertility level of the herd.

Multiplying those factors provides your pregnancy rate, explains Perry. So, if all four factors are 100%, you'd have a 100% pregnancy rate — not very likely. If each

factor is at 70%, your pregnancy rate drops to 24% ( $70\% \times 70\% \times 70\% \times 70\%$ ) — not very profitable.

Bottom line: Implementing sound management practices to bolster each factor in the equation can increase pregnancy success and longevity, thereby having a positive effect on a herd's profitability and sustainability.

## Percent detected in standing heat

For successful insemination to occur, cows and heifers must be detected in standing estrus. With natural service, this is considered “the bull's job,” says Perry. Whether a bull gets the job done or not hinges on his libido.

Bulls vary in libido, or their desire to mate, says Perry. Libido is not related to scrotal circumference, semen quality or physical conformation. Because there is more variation in libido between sons of different sires than between sons of the same sire, libido is thought to be highly heritable, with heritability estimated at about 0.59.

Producers should evaluate libido by closely watching a bull after introduction into a cow herd and determining his desire to detect cows in estrus, advises Perry.

In an AI program, a person replaces the

herd bull in detecting estrus, says Perry. While accurate detection of estrus can be a difficult and time-consuming activity, the payoff can be big.

Perry shares results of a Colorado State University (CSU) study comparing pregnancy results of animals synchronized and monitored for standing estrus 24 hours a day with a computer-assisted heat-detection system vs. those monitored twice a day for 30 minutes by visual observation. By Day 5 after estrus synchronization, 95% of the animals monitored 24 hours a day were detected in standing heat, while only 56% of animals observed twice a day for 30 minutes were detected in standing heat. A 95% heat detection rate and a 70% conception rate would allow for a 67% pregnancy rate in the computer-monitored group, but only a 39% pregnancy rate with a 55% detection rate in the visually detected group (see Table 1).

Adding additional observation times can improve detection rates with visual observation, as cows may show heats at different times of the day (see Table 2). When cows were visually observed for estrus activity, research shows that estrus detection increased by 10% with the addition of a mid-day observation, and by 19% when observed every six hours when compared to



**Table 1: Effect of estrus-detection rate on increasing pregnancy rate**

Estrus-Detection Rate	55%	60%	65%	70%	75%	80%	85%	90%	95%
Conception Rate	70%	70%	70%	70%	70%	70%	70%	70%	70%
Pregnancy Rate	39%	42%	46%	49%	53%	56%	60%	63%	67%

detecting standing estrus at only 6 a.m. and 6 p.m.

Increased visual observation accompanied by estrus-detection aids could improve fertility by determining the most appropriate time for insemination.

Considering the serving capacity of the bull is critical in natural-service settings where females are synchronized. The recommended bull-to-female ratio with non-synchronized cows ranges from 1:10 to 1:60 depending on the age, experience and semen quality of a bull, as well as the size and terrain of a breeding pasture. Perry cited research by Rupp et al. that indicated no differences in estrus detection or pregnancy rates in the first 21 days of the breeding season were detected between a bull-to-female ratio of 1:25 and 1:60 provided the bulls were highly fertile and had large scrotal circumference.

Among synchronized females, Perry cites research by Healy et al. showing a tendency for higher pregnancy rates to a 28-day synchronized breeding season when a bull-to-female ratio of 1:16 was used vs. 1:50; however, there was no significant difference between using a 1:16 ratio and a 1:25 ratio.

### Inseminator efficiency

With natural service, savvy producers have a breeding soundness evaluation conducted on all of their bulls, plus observation of the bulls as they attempt to breed a cow. A successful mating means all is well, while an unsatisfactory attempt warrants a look at a bull for disease or injuries to the penis or prepuce.

With AI, inseminator efficiency is influenced by two key factors, says Perry: (1) semen handling and (2) the technician's ability to deposit semen in the correct location.

A few tips that can help boost conception rates include:

- ▶ Have a detailed inventory of semen easily accessible to avoid exposure of semen to ambient temperatures.
- ▶ Keep the canister, cane and unused semen straws as low as possible in the neck of the tank, preferably below the frost line.
- ▶ Thaw semen following the AI stud's recommendations.
- ▶ Prevent direct straw-to-straw contact during thawing.
- ▶ Use appropriate hygienic procedures.

- ▶ Maintain thermal protection of straws during AI gun assembly and transport to the cow.
- ▶ Deposit semen in the uterus of the cow within approximately 15 minutes after thawing.
- ▶ Manipulate the reproductive tract until the tip of the AI gun is past the cervix so semen can be deposited into the uterus.

### Fertility level of the herd

"Fertility level of the herd may be the hardest to evaluate," says Perry. "Herd fertility includes cycling status, compliance with protocols, embryonic mortality, body condition (nutrition level), and disease."

Stress — particularly heat and shipping stress — can be detrimental to embryos and decrease pregnancy rates, with pregnancy losses averaging as much as 10% when cows are shipped between Days 5 and 42 after insemination, says Perry.

The best time to ship cows is between Days 1 and 4 after breeding, when the embryo is in the oviduct and not likely subjected to uterine changes. Shipping cows after Day 45 should be OK, as the embryo "is well-established and fully attached," he says, adding the reminder that embryonic loss from shipping has been reported up to 60 days after insemination.

Required shipping practices include gentle and calm handling of cattle and not overcrowding them in the trailer.

Additional research has found the following.

- ▶ Administering the prostaglandin inhibitor flunixin meglumine to cows and heifers 10-13 days after AI (at transport) reduced pregnancy losses by about 9%. However, administration of flunixin meglumine 10-15 days after

breeding did not increase pregnancy establishment in cows.

- ▶ Handling heifers to administer flunixin meglumine, when compared to leaving them in the pasture, reduced pregnancy rates by 6%.
- ▶ Plan ahead for the breeding season as heat stress 42 days prior to and up to 40 days after breeding can affect pregnancy rates.
- ▶ Heat stress can be reduced by shade, fans and misters. However, misters do not benefit animals in humid areas.
- ▶ Timed-AI protocols can increase pregnancy rates during the hot summer months since natural service's required heat detection is more challenging when the weather is too hot.
- ▶ High-quality, fresh embryos have been proven to increase pregnancy rates over AI in heat-stressed cows.
- ▶ Dietary stresses can have a negative impact on pregnancy success. During breeding season, consistency in management and meeting nutritional needs of heifers and cows are highly important.

When it comes to vaccination programs, replacement heifers should be vaccinated before and at weaning. A booster vaccine should be given to both heifers and cows at least 30 days before breeding. If a modified-live virus (MLV) vaccine must be given less than 30 days prior to breeding, the vaccine should be administered as soon as possible and only to animals that were vaccinated both before and at weaning. Naïve animals should not be vaccinated near the time of breeding.

### Fertility level of semen

Bulls differ in their ability to impregnate cows. To ensure a successful breeding season, bulls should have a comprehensive breeding soundness evaluation 60 days prior to the breeding season, advises Perry. Whether natural service or AI is used, two of the most important indicators of bull fertility are sperm motility and morphology.

**Table 2: Time of day when cows exhibit standing estrus**

Time of Day	Cows Exhibiting Standing Estrus
6 a.m. to 12 noon	26%
12 noon to 6 p.m.	18.1%
6 p.m. to 12 midnight	26.9%
12 midnight to 6 a.m.	29.0%

Source: Data adopted from Hurnik and King, 1987; Xu et al., 1998, G.A. Perry unpublished data.

**Editor's Note:** T.S. Gatz is a freelancer from Windsor, Colo. She has been writing about the beef industry for more than 40 years. Information for this article was pulled from Perry's presentation and proceedings, "Factors to Get the Most Cows and Heifers Pregnant," at the 2013 Applied Reproductive Strategies in Beef Cattle in Staunton, Va. The proceedings are available in the Newsroom archive at [www.appliedreprostrategies.com](http://www.appliedreprostrategies.com).