

REPRO TRACKS

by Cliff Lamb, Texas A&M University

Increasing Fertility after AI

Can hormonal interventions improve fertility?

In recent years, I have had multiple requests regarding what can be done after artificial insemination (AI) to enhance fertility to fixed-time AI (TAI) systems. However, many of the proposed hormonal interventions do not seem to provide the necessary improvements in fertility. Producers should be cautious when implementing these interventions.

One hormone, progesterone, is important for embryonic survival, growth and pregnancy recognition. Increased concentrations of progesterone have been associated with increased conceptus growth rates. Thus, aims of post-TAI interventions are to increase concentrations of progesterone either through inducing accessory luteal tissue, enhancing function of an original corpus luteum (CL) and/or supplementing with additional progesterone. Furthermore, females carrying unfertilized or degenerate embryos tend to have reduced concentrations of progesterone after AI compared to females with normally developing embryos.

Providing progesterone may increase development of a growing conceptus and may increase embryonic survival. However, supplementation of progesterone within 4 days after an estrus may

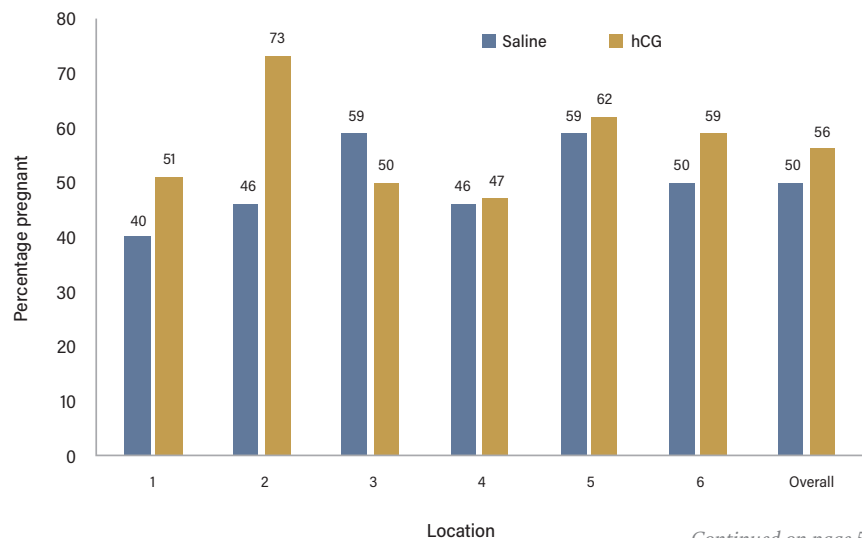
increase the percentage of females that have short estrous cycles. These short cycles result in females coming into estrus early and thus expelling pregnancies. As a result, producers should avoid providing progesterone during the first four days after estrus.

We have also extensively studied the use of supplementation of progesterone using a CIDR® insert from Day 5 to Day 21 after TAI. Some producers wrongfully believe that inserting a CIDR will increase progesterone in females and ultimately increase pregnancy rates. However, cow or heifer physiology is quite dynamic and insertion of

a CIDR simply causes the female to secrete less progesterone from the CL on the ovary. Therefore this autoregulation of progesterone fails to increase concentrations of progesterone, and does not increase pregnancy rates.

Similarly, several producers have asked whether injecting gonadotropin-releasing hormone (GnRH) one week after AI would increase pregnancy rates. The belief behind this strategy is that the GnRH will ovulate a follicle and cause a secondary CL to form, thereby increasing the concentrations of progesterone that are secreted.

Figure 1: Pregnancy rates to fixed time AI (TAI) in beef cows that received saline or 1,000 IU hCG one week after TAI.



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Alas, this strategy does not increase progesterone or pregnancy rates as desired.

One strategy that may have positive effects on pregnancy rates after TAI is the use of human chorionic gonadotropin (hCG).

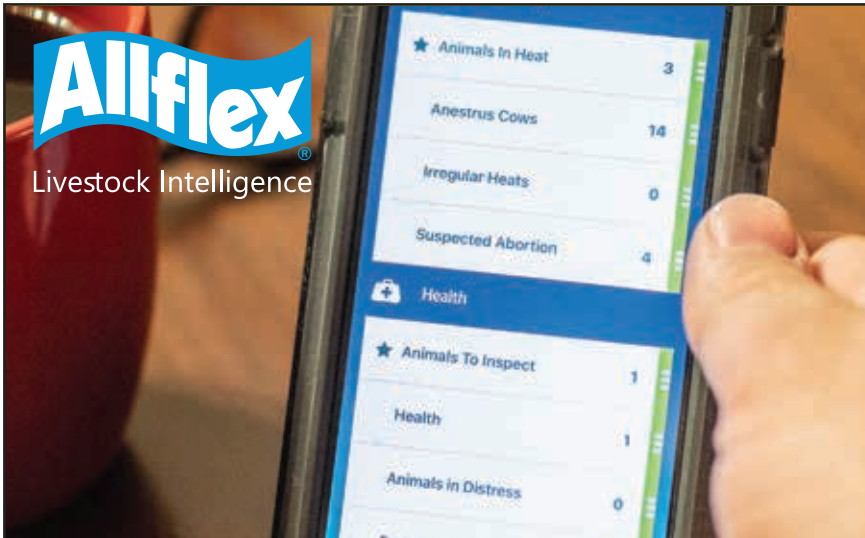
The ability of hCG to induce one or more accessory CL and increase concentrations of progesterone when administered one week after TAI has been demonstrated in cows and heifers. Concentrations of progesterone after TAI were

increased in pregnant cows after treatment with hCG and increased pregnancy rates.

In one study, treatment with hCG one week after TAI using 1,000 IU of hCG resulted in an increase in the volume of luteal tissue on Day 14. Concentrations of progesterone on Day 14 and 33 after TAI and treatment with hCG tended to increase pregnancy rates at five of six locations from 1.1 to 27 percentage points (Figure 1 on page 50). It does appear that the benefit of the use of hCG tends to be more effective in high-risk females, such as those that are in poor body condition, late-calving cows or young cows.

The technology now exists to successfully achieve acceptable fertility in replacement beef heifers and postpartum beef cows after applying a TAI protocol, especially considering that in many cases a high percentage of females may not be cycling at the onset of treatment. Initiation of fertile ovulation in noncycling cows is likely the primary manner in which beef producers may improve fertility in response to estrous synchronization and TAI protocols. Supplementation of a progestin after TAI fails to improve fertility in beef cows, administration of GnRH after TAI also fails to enhance pregnancy rates. However administration of hCG to induce an accessory CL and increase concentrations of progesterone may effectively enhance pregnancy rates in beef cattle. **AJ**

Editor's note: Cliff Lamb is the animal science department head and a professor at Texas A&M University in College Station, Texas.



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