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Animal Sciences

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Recombinant Bovine Somatotropin (rBST) and Reproduction in Dairy Cattle:

Reproductive Strategies to Overcome the Loss of rBST in the Dairy Herd

EXPERT REVIEWED

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Overview

Although many years of research and use have proven rBST (Posilac®) safe to the cow and the consumer, as well as effective in increasing the efficiency of milk production (increase milk yield 10-15%), an effort to remove this efficacious biotechnology from the dairy farmer's repertoire is ongoing and gaining traction.

From a reproductive management standpoint, rBST has been demonstrated to *improve* reproductive performance of lactating dairy cows. Research from the University of Florida and the University of California-Davis has demonstrated that administration of rBST as part of a timed artificial insemination (timed-AI) program, or in programs that involve heat detection and AI, increases pregnancy rates and reduces the occurrence of pregnancy loss in lactating dairy cows.

Another benefit of rBST is that in cows with extended days open because of poor reproductive performance, rBST provided a means to overcome the loss in milk yields that would typically occur in cows with extended lactations. However, now that many dairy producers are unable to utilize rBST, producers are concerned about a decrease in reproductive performance in their herds, as well as a reduction in milk yields due to extended days open and extended lactation periods.

Simple cow management is still paramount for reproductive success. Providing adequate nutrition, minimizing numbers of cows that have not reinitiated estrous cycles following calving (anestrous cows), maximizing cow comfort, and maintaining good herd health are essential for optimal reproductive performance. However, other proven reproductive management tools are available that can improve the reproductive efficiency of the dairy herd. These include: submitting all cows for a timed insemination at the end of the voluntary waiting period, and early identification and rapid resynchronization of non-pregnant cows. Implementation of such strategies can improve reproductive performance of the dairy herd.

Timed Insemination

Most dairies incorporate estrous synchronization and AI into their reproductive management practices. However, detection of cows exhibiting estrus (heat) in most modern dairying systems is poor due to several factors including 1) a shorter duration and less intense

expression of behavioral heat in high-producing dairy cows, and 2) poor observation of behavioral estrus signs by farm employees, especially during the nighttime hours when many cows are exhibiting signs of heat. Therefore, many estrous synchronization programs have been developed to circumvent the need for heat detection.

These timed insemination (timed-AI) programs are designed to precisely control ovulation rather than just estrous expression, thus allowing females to be inseminated at a predetermined time in the absence of estrous detection. Programs that herdsman should consider include the following options:

- **Ovsynch:** The Ovsynch program involves the administration of GnRH (commercial product; Cystorelin®, Factrel®, Fertagyl®, OvaCyst®) followed seven days later by prostaglandin $F_{2\alpha}$ (PGF; commercial products; Lutalyse®, Estrumate®, ProstaMate®, estroPLAN™, In-Synch™) to regress the corpus luteum (CL). A second GnRH is given 48 hours following PGF and cows are then timed-AI 12 to 20 hours following the second GnRH. Recent investigations have suggested that conception rates are improved with the Ovsynch program if GnRH is administered 56 hours following PGF (rather than 48 hours) and timed-AI is conducted 16 hour later (72 hours after PGF).
- **Pre-Synch + Ovsynch:** The Ovsynch program by itself does have a few shortcomings, for example not all cows will respond to the first GnRH injection, and it is less effective when initiated after day 12 of the estrous cycle. To overcome these deficiencies with the Ovsynch program, a pre-synchronization program should be implemented prior to initiation of the Ovsynch protocol. PGF 14 days apart with the last PGF given from 14 to 11 days prior to the initiation of the Ovsynch program. Including pre-synchronization programs has been demonstrated to increase pregnancy rates following Ovsynch and timed-AI.
- **Pre-Synch + CO-Synch:** Using a pre-synchronization program (outlined above) in combination with a CO-Synch program can be as effective as the Ovsynch program in some herds. The CO-Synch program is similar to Ovsynch with the exception that cows are given GnRH and timed-AI at the same time, three days following PGF. Hence, unlike the Ovsynch protocol, there is no time between GnRH administration and timed-AI.
- **Ovsynch + CIDR :** Inserting an intravaginal progesterone releasing insert (CIDR) at the initial GnRH injection of the Ovsynch program (Ovsynch + CIDR) and then removing the CIDR at PGF has been demonstrated to improve timed-AI pregnancy rates in lactating dairy cows, especially cows that are anestrus. Inclusion of a CIDR with the Ovsynch program is most beneficial when a pre-synchronization program is not implemented.

With any timed-AI program used, compliance to the protocol is essential for success. To facilitate the implementation of these programs, develop a weekly routine.

Identification and Resynchronization of Non-pregnant Cows

Due to the low first-service conception rates currently being experienced in lactating dairy cows, several strategies, more than can be outlined in this publication, have been developed to quickly identify non-pregnant cows and resynchronize estrus in these females thereby reducing the interval from the initial AI until a second service.

Some of these programs are capable of resynchronizing estrus in cows of unknown pregnancy status while others involve initiation of a hormonal treatment in all cows with further treatment and timed-AI in cows diagnosed non-pregnant with ultrasonography early in gestation.

- **CIDR + Estrous Detection.** A simple option to resynchronize return to estrus in cows of unknown pregnancy status involves administering a CIDR to cows 14 days following AI and then removing the CIDR 7 days later. This approach can condense expression in non-pregnant cows into a shorter time period and does not require cows to be diagnosed for pregnancy early in gestation.

  Moreover, some data suggests that using a CIDR to resynchronize estrus can reduce early embryonic mortality. However with the CIDR program, some non-pregnant cows will fail to exhibit estrus, and this program requires detection of behavioral estrus, which is problematic in many dairying systems.
- **Ultrasonography + Ovsynch.** Many programs have been developed to re-synchronize and time-AI non-pregnant cows shortly after a non-pregnant

diagnosis with ultrasonography. An aggressive option involves initiating the Ovsynch program by administering GnRH to all cows, regardless of pregnancy status, 21 or 23 days after the initial timed-AI. Seven days following GnRH (day 28 or 30 post -AI, respectively) pregnancy is diagnosed via ultrasonography to identify the pregnant and non-pregnant cows. Cows determined to be pregnant receive no further treatment. Cows determined to be non-pregnant receive PGF at pregnancy diagnosis and continue with the Ovsynch protocol.

Alternatively, resynchronization option involves initiating the Ovsynch program 33 days after the initial AI in cows determined to be non-pregnant via ultrasonography on that day (day 33 after AI). These timed-AI resynchronization programs allow for non-pregnant cows to be quickly identified and enrolled in a program to facilitate a rapid second service.

Summary

The potential loss of rBST as a tool for optimizing milk production and reproductive performance is a concern to many dairy producers. With regards to reproductive efficiency, alternative strategies are available to assist in improving the reproductive efficiency of your dairy herd.

Keys to maintaining or improving reproductive efficiency include 1) providing cows proper nutrition, adequate cow comfort, and proper herd health management; 2) implementation of a timed-AI program to ensure that all cows are inseminated; and 3) early detection and resynchronization of non-pregnant cows.

Disclaimer

This fact sheet reflects the best available information on the topic as of the publication date.

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