Genetic Imperatives

Questions and answers about artificial insemination.

by E.F. Grant

The *Angus Journal* recently asked two leading artificial insemination (AI) experts how producers could achieve more efficient and satisfactory results with AI programs.

Cliff Lamb is an associate professor of reproductive physiology and beef cattle management for the University of Minnesota. He is the author of numerous research papers on AI and estrus synchronization. He received his doctorate from Kansas State University in 1998.

Joel Yelich is an associate professor of reproductive physiology for the University of Florida. His research has focused on the application of advanced technologies to enhance and optimize reproductive efficiency in beef cattle. He has a doctorate from Oklahoma State University.

Q What are the economic advantages and tradeoffs of AI?

Cliff Lamb: The genetic improvement and ability to make numerous mating decisions are the obvious advantages of AI, but using estrus synchronization adds the ability to tighten the breeding season and calving season, plus it allows producers to "kick-start" estrous cycles in cows that are not cycling, which is a major advantage.

The tradeoff is that AI still requires facilities sufficient to handle cattle during treatment and AI, plus there remains a little more time in setting cows up for AI compared to simply inserting a bull into the cow herd. Nonetheless, the economic comparisons have demonstrated that, in most cases, the costs of bull breeding and AI appear to be similar, but the genetic value of the subsequent offspring and future genetic makeup of the cow herd certainly favors an AI herd.

Joel Yelich: One of the biggest advantages is that AI provides producers access to superior genetics that they normally wouldn't be able to purchase in the form of a breeding bull. Using high-accuracy-EPD (expected progeny difference) bulls will also allow producers to make rapid progress in their selection programs, which in turn can increase the economic value of the resulting progeny, as well as the quality of the replacements retained in the breeding herd.

By using estrus synchronization and AI, producers will need to purchase fewer cleanup bulls. Consequently, they can apply this economic savings toward the purchase of even better bulls than previously purchased. This approach should result in not only improved herd genetics, but increase the quality and value of their natural-sired calves when sold.

One of the biggest tradeoffs when using AI is that it requires increased management across all aspects of the operation. Probably the most important and expensive area will be in the producers' nutritional management program. In order to maximize the success of estrus synchronization programs, cattle have to be in the proper body condition and plane of nutrition prior to the start of the breeding season. Whether the increased cost of the nutrition required to obtain excellent AI pregnancy rates is offset by the economic benefit realized from AI will need to be determined by individual producers.

Q AI continues to be used on a fairly limited basis by U.S. beef producers. What must happen for producers to make greater use of it?

Lamb: Producers generally cite time and labor as the two major limiting factors when deciding to utilize AI. However, recent developments with fixed-time AI, which eliminate the use of heat detection and reduce the number of times that animals need to be handled, are available for use today.

The key to enhanced use of AI is to create confidence in producers that timed AI is a viable option. The challenge within the next two years will be to encourage producers through education and teaching that adoption of AI will be a benefit to their cattle operations, especially with the need for improved genetics with genetically superior sires that have a high degree of accuracy.

Yelich: Most producers still consider estrus synchronization and AI to be impractical because of the additional labor and cost associated with it. And, most estrus synchronization systems in use today are still not predictable and/or consistent enough across a wide range of management conditions and cattle genotypes for producers to feel confident about using them.

More literature needs to be available and presented to producers showing the short- and long-term economic benefits of synchronization and AI, as well as the short- and long-term benefits to the reproductive and production efficiency of the cow herd. Continued research and educational programs in these areas are also essential in getting more producers to use estrus synchronization and AI.

Although, this is proving to be a challenge when budgets of land-grant universities continue to be cut and limited dollars are available from the private sector to conduct research and education programs on a nationwide basis.

With that said, Dave Patterson at the University of Missouri and cooperators from several other universities recently organized and conducted several nationwide educational programs on estrus synchronization and reproductive management for producers to address these issues.

Q How do producers go about determining which AI system is best for them?

Lamb: The greatest improvement in estrus synchronization systems has occurred in mature beef cows. However, producers are faced with numerous decisions based on labor and time requirements and a vast array of estrus synchronization systems with various products.

No single system is suitable for every producer. Therefore, producers should consult their AI company representatives, veterinarians or state Extension specialists for advice on specific protocols for their individual needs. Numerous folks from the AI industry, universities, pharmaceutical industry and veterinarians have attempted to unify a message that is more consistent than in previous years. Therefore, producers can expect to receive a more uniform message.

Yelich: Producers really need to take advantage of people from their local universities or AI companies to assist them in

picking the most appropriate synchronization system for their operation. This would include an on-farm visit to evaluate a producer's cattle and handling facilities, to discuss the nutritional programs, to determine if the cattle are ready to be synchronized, and to establish the expectations and goals of the producer. This type of approach would be beneficial to producers using estrus synchronization and AI for the first time.

Q **What new reproductive system or current technology do you believe will affect beef producers the most in the years ahead and why?**

Lamb: Fixed-time AI has the potential to make the largest impact on beef producers, because it has eliminated the need for detection of estrus and allows producers to plan in advance when cows can be inseminated. The systems currently available require a minimum of animal handling and have pregnancy rates that usually exceed any heat detection systems. In addition, using a fixed-time AI protocol allows commercial producers the opportunity to AI every cow on the first day of the breeding season. And, you can expect more than half the cows to become pregnant and due to calve during the first 15 days of the calving season.

Yelich: I think that sexed semen is still the technology that could really benefit the beef cattle industry in the years ahead. It will allow for unlimited flexibility in breeding decisions, type of feeder calves marketed, increased production and marketing of quality replacement heifers, and more practical use of superovulation. However, an improvement in pregnancy rates when using sexed semen, along with lower per unit cost of sexed semen, are necessary to make it more attractive to producers.

With that said, our industry still does not use the existing technologies of estrus synchronization and AI to their fullest potential. Until synchronization systems are perfected across all classes of cattle, management scenarios and cattle genotypes, while yielding consistent and predictable results to a timed-AI, technologies like estrus synchronization, AI, sexed semen and early pregnancy test kits may never be fully adapted by producers. **AJ**

Getting started

For producers who have not used artificial insemination (AI) in the past but would like to do so in the future, here's a checklist of things to consider:

✔ Producers need to fully understand the management, production and economic goals of their enterprise to make sure estrus synchronization and AI really have a place in their program, says Joel Yelich of the University of Florida. "Make sure that AI benefits your operation from a genetic, economic and production basis before incorporating it into your management program."

✔ Determine if you have adequate facilities to accommodate cattle for several days, as well as proper working facilities to artificially inseminate your cattle. "The type of facilities may also dictate whether you can synchronize cow-calf pairs and/or yearling heifers," Yelich says.

✔ Establish the class of animals that you are going to synchronize — such as replacement heifers or lactating cows — and also the genotype of the cattle to be synchronized.

✔ Make sure your cattle are on the proper plane of nutrition to either attain puberty prior to breeding or to have a high percentage of cows cycling at the start of breeding.

✔ Determine if you can afford the total cost required to implement a synchronization program, including labor, AI technician and product cost. "If this is the first time you conduct a synchronization and AI program, you may want to start with a limited number of animals to make sure that everything works properly," Yelich says.

✔ Check with your local Extension educator for information on Web sites or brochures. Your Extension educator may also know when and where helpful workshops are taking place in your area that can provide you with important information on AI and estrus synchronization.

"Many changes have occurred in recent years, and producers should consult with folks who have attended one of the 'Applied Reproductive Strategies for Beef Cattle' short courses, which are coordinated by the North Central Region Bovine Reproduction Task Force," says Cliff Lamb of the University of Minnesota. "These courses are designed for industry personnel and veterinarians to be armed with the information to share with individual producers."