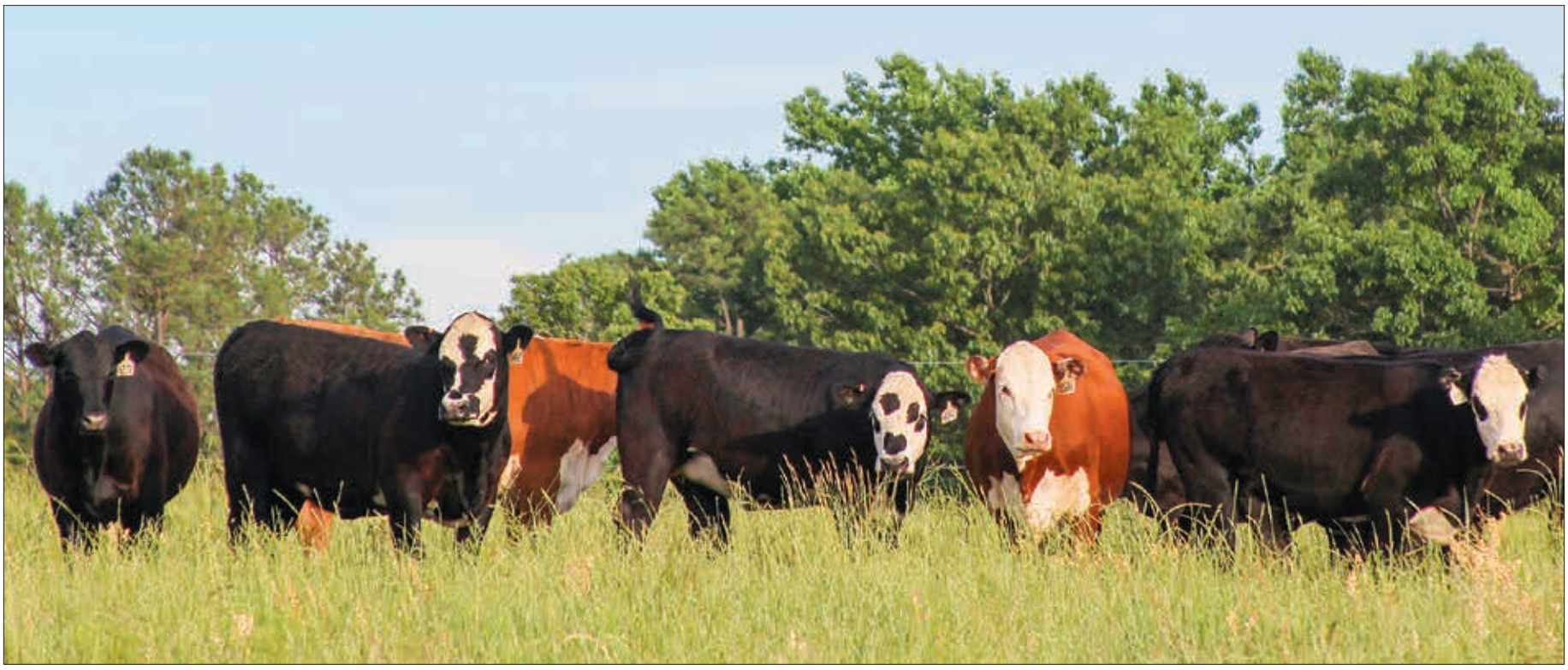

Does AI Pay in a Commercial Herd?

Artificial insemination can be profitable in commercial operations with a plan for capturing added value and a successful breeding program.

*by **Troy Smith***

Is artificial insemination (AI) practical for commercial cow-calf operations? Can it be profitable? A lot of commercial cow folk cling to the notion that AI is too time-consuming, complicated and costly to seriously consider — a likely explanation as to why fewer than 10% of U.S. beef females are bred by AI, with a majority of those belonging to seedstock operations.

Promoter's perspective

Advocates for AI often talk about how the technology offers opportunity for more rapid genetic improvement. Even commercial producers can access semen from proven AI sires representing superior genetics. University of Idaho Extension Beef Cattle Specialist John Hall agrees genetic advancement through AI can improve the quality of feeder cattle and replacement females produced by a commercial operation.

"It allows for the use of bulls that are high accuracy for calving ease while still having above average growth genetics. These 'curve bender' bulls are often too expensive to buy as natural service sires but can easily be accessed by AI," Hall says, adding that bred-in performance and carcass merit represent added value to producers able to market those attributes.

However, Hall says accessibility to top-end genetics is just one potential advantage. There are more opportunities to capture added value from calves resulting from a well-managed program for synchronized AI. Hall says implementation of such a program is less formidable than many producers assume. Advancements in estrus synchronization protocols for fixed-time AI (FTAI) have reduced or eliminated the need for estrus detection, thus reducing time and labor requirements. That does not make implementation of AI cheap — but then neither are bulls used for natural service.

By the numbers

So, what does natural service cost? Producers can plug in their own numbers, but Hall says commercial operations spend $4,000 to $5,000 for breeding bulls, on average, and maintenance cost for each bull used will likely be around $700 per year. On average a bull is used for three years, with a bull-to-cow ratio of 1:25 and a salvage value of $1,600. Risk of loss due to breeding failure, injury or death is about 20% or 0.20 times (purchase + maintenance costs). Based on these assumptions, the cost of natural service will range from $74 to $91 per pregnancy (see Table 1).

Table 1: Annual bull cost and cost per natural service pregnancy* based on bull cost and risk.

Purchase price	$3,000	$4,000	$5,000	$7,000	$10,000
Maintenance cost (3 years)	$2,100	$2,100	$2,100	$2,100	$2,100
Risk of loss	$460	$560	$660	$860	$1,160
Salvage value	-$1,600	-$1,600	-$1,600	-$1,600	-$1,600
Total cost (3 years)	$3,960	$5,060	$6,160	$8,360	$11,660
Annual cost	$1,320	$1,687	$2,053	$2,787	$3,887
Cost per pregnancy	$58	$74	$91	$123	$171

**based on bull to cow ratio of 1:25 and herd pregnancy rate of 90%*

According to Hall, the cost of implementing FTAI in a 300-cow herd would cost $14,268 including extra labor needed for handling the cattle (see Table 2). That means the cost of an AI pregnancy would be about $95 if a 50% pregnancy rate were achieved, about $86 for a 55% pregnancy rate or about $73 for a 65% pregnancy rate.

Table 2: Cost of FTAI for a 300-cow herd

Item	Per cow	300-cow herd
Drug costs	$20	$6,000
Semen cost	$18	$5,400
Technician fee	$7	$2,100
*Additional labor**		$768
Total		$14,268

**labor is based on 4 people at $8/hr for 8 hr for 3 working days.*

The cost per pregnancy is similar, whether a female is AI or bull bred. However, to fairly compare costs of natural service to a program combining FTAI and cleanup bulls, the cost of those bulls must be included in the calculation of total breeding costs. At the University of Idaho Nancy M. Cummings Research, Extension and Education Center, where Hall is superintendent, a bull-to-cow ratio of 1:40 to 1:50 is routinely used. The table comparing costs of natural service with those of FTAI plus cleanup bulls applies a cost of $4,000 per bull used for cleanup in a 300-cow herd (see Table 3).

Hall says the figures suggest there may be some potential for commercial cow-calf producers to reduce breeding costs through implementation of synchronized AI, but not much. In most cases increased profitability will hinge on the ability to increase revenue.

"The greatest opportunity for most cow-calf operations to capitalize on incorporation of estrus synchronization and AI is by increasing the value of the feeder calf," he says.

Table 3: Comparison of cost of natural service to fixed time AI (FTAI) plus clean-up bulls

	Bulls only	FTAI + clean-up	Bulls only	FTAI + clean-up
Average cost of bull used	$4,000	$4,000	$5,000	$4,000
Number of bulls used	12	6	12	7
AI cost	$0	$14,268	$0	$14,268
Bull cost	$20,240	$10,120	$24,640	$11,807
Total breeding cost	$20,240	$24,388	$24,640	26,075
Pregnancy rate	90%	95%	90%	95%
Cost per pregnancy	$75	$86	$91	$91

Synchronization and selection

Worth mentioning is how the synchronization process can "jump start" anestrous (noncycling) cows, giving them more opportunities to become pregnant during the breeding season. According to research, synchronization can boost final pregnancy rates by 3 to 5%. But synchronized AI also results in more females becoming pregnant early in the breeding season and more calves being born early in the first 21 to 30 days of the subsequent calving season. More calves are older at weaning time, affording the opportunity to market larger, more uniform groups of heavier calves. Hall emphasizes synchronization really can make a significant difference.

"Researchers at the University of Florida examined the economic benefit of using fixed-time AI to reduce the length of the calving season and alter the distribution of calves born early in the calving season. They compared two years of a 120-day natural service breeding season to transition to a 70-day breeding season including fixed-time AI in their 300-cow herd," Hall explains. "Over the five years of transition, they increased returns to the herd by over $40,000 per year."

Another opportunity AI affords is the selection of sires which can help producers achieve certain marketing targets. A portion of the cow herd could be bred to terminal-type sires, with the goal of selling all resulting calves as feeders or retaining ownership through the finishing period. Arguably, notes Hall, owning calves all the way to harvest may be the best way to realize return on the AI investment. However, sire selection with more emphasis on maternal traits might generate replacement-quality females worthy of premium prices.

Synchronized AI also can enhance the genetic merit and longevity of females retained in the herd. Evidence shows heifers which calve earlier in their first calving season will, on average, rebreed earlier thereafter, stay in the herd longer and produce more pounds of calf during their lifetimes than will heifers which delivered their first calves later in the season. Hall says AI can also serve as a way to generate crossbred females offering improved calving rate, calf survival to weaning, weaning weight and longevity owed to maternal heterosis.

"At our research station we use AI in an elite group of cows to continue our two-breed rotational cross with Hereford and Angus while breeding the remaining cows to terminal type sires," Hall explains. "This allows us to choose bulls that meet the maternal and frame size characteristics we want in our herd."

For producers pondering implementation of AI, Hall recommends careful comparison of the costs and benefits to their individual operations. Decision aids worth consideration include the University of Nebraska's Breeding Cost Cow-Q-Lator, which can be downloaded at no cost to the user, and an iPad/iPhone app called AI Cowculator, which was developed by the University of Florida and Zoetis.

Hall emphasizes acceptable pregnancy rates to AI are dependent on the management of herd health and nutrition, adherence to estrus synchronization protocols, and application of correct insemination technique. AI can be profitable in commercial operations when the breeding program is successful and the producer has a plan for capturing the added value AI offers. HW