

# The Economics of A.I.

## Studies show that A.I. pays

Beef producers know the best beef genetics are most widely available as semen intended for artificial insemination (AI). Yet fewer than 10% of beef producers use the technology each year.

Les Anderson, University of Kentucky Extension Beef Specialist, says there are several reasons why more producers don't choose to use AI and get the benefits of those top-of-the-line genetics.

- In many operations, most cows spend their time ranging in large pastures. Extra labor is needed to gather them repeatedly.
- Producers may lack the facilities necessary for easy and safe cattle handling.
- If inexperienced with AI, some producers may be intimidated by the perceived complexities of estrus synchronization and AI (ESAI).

### Simple Economics

But Anderson says the primary reason for ESAI's limited use is economics. The return investment hasn't been clearly demonstrated to producers.

Not many producers really understand all the costs associated with producing a pregnant female. This includes bull price, bull-to-cow ratio, bull maintenance and pregnancy rate.

A Kansas State University study looked at those costs, comparing natural service and different estrus synchronization protocols. In the study, bull price ranged from \$1,500 to \$3,000, and bull-to-cow ratios used were from 1:15 to 1:50. The study assumed the use of bulls for four seasons, a 10% death loss, a 9% interest rate, and a 94% pregnancy rate. Cost per pregnancy ranged from \$15.98 to \$90.51, depending mostly on the cost of the bull and the bull-to-cow ratio.

If pregnancy rate was held constant, ESAI's cost per pregnancy exceeded natural service, especially for smaller herds. But if the costs were adjusted for the expected increase in calf weaning weight resulting from ESAI, cost of pregnancy was lower to produce a 500-lb. equivalent weaned calf with ESAI.

If the conception rate to AI increased to 60%, then the cost per 500-lb. equivalent calf wasn't different between ESAI and natural service, Anderson says.

There are other factors to consider in comparing costs and returns. The use of ESAI can increase returns by increasing weaning weight (due to both age and genetics), by raising the market price with a more uniform calf crop, and by improving herd productivity with higher quality replacement heifers.

ESAI can also reduce costs because fewer bulls are needed and less labor is required during a more concentrated and predictable calving season.

On the other hand, fewer bulls mean fewer bulls to sell as culls – a reduction in potential income. And, ESAI will increase costs due to the need for synchronization products, labor, technicians and perhaps facilities.

When all these impacts are compiled, however, the costs of pregnancy aren't significantly different between natural service and most ESAI protocols, Anderson says. Of course, if labor is high, if semen costs are excessive, or if conception rate to AI is low, the cost per pregnancy of ESAI can dramatically increase.

### Short-Term Returns

Anderson conducted a study to determine the short-term return on ESAI in which cows were randomly assigned by age and calving date to one of two breeding systems.

- Two-thirds of the cows were synchronized for fixed-time insemination using Co-Synch. Given a gonadotropin-releasing hormone, nine days later they were given a second injection of GnRH and AI'd. These cows were later exposed to natural services for 50 days, with a bull-to-cow ratio of 1:50.
- The second group was only exposed to natural services for 60 days, at a bull-to-cow ratio of 1:25.

Labor cost was calculated by recording the amount of time required to bring the cattle to the corral, work the cows and then return them to pasture. Four laborers were used, three trips through the chute, and at an hourly wage of \$7/hour.

To determine differences in revenue, the calves were weighed at weaning and the differences in weight available to market were determined at a value of \$80/cwt.

The results showed all the benefits going to the ESAI group. Of these, 85% calved in the first 30 days, compared to 62% of the natural service group. The synchronized group also had a 90% calving rate, while the natural group had an 81% calving rate.

The average date of calving was earlier, and the average weaning weight of calves was heavier, in the synchronized group. In fact, the increase in percent calf crop weaned and weaning weight increased the pounds of calf weaned per cow exposed by nearly 110 lbs.

As a result, revenue increased by \$99.62 in the synchronized group, on an investment per cow of just \$29.88/cow. That's a return on investment of \$69.74, a figure that doesn't include the savings associated with reduced bull costs. If those were included, the return on investment rises to \$129/cow.

### Long-Term Returns

Those numbers are attractive for a short-term investment. But what are the implications for long-term returns?

Anderson designed a trial to examine that question. Two years of data collected from a cow-calf operation showed that the use of ESAI increased the percentage of cows that calved, the percent calf crop weaned and the average weaning weight of the steer calves.

In turn, these increases led to a marked improvement in pounds of calf weaned per cow exposed, and those led to increased profitability. The net

profit per cow exposed to the bull doubled in the first year, and increased by another \$20/cow in the second year. Anderson anticipates productivity and profitability to continue to increase as the AI-sired females enter the breeding herd.

As far as the value of using the best genetics, further evidence comes from the American Angus Association (AAA). In its data, carcass value was \$206/head greater for calves sired by the top 10% of sires in carcass value compared to the bottom 10%.

So if the calves produced in the above trials were from sires that were only average, but the bulls used for AI were in the top 10%, the profits shown would increase by another \$100 to \$125/calf.

Of course, such profits would only be realized if the cattle were marketed on a grid. Using alternative marketing systems is an important key to capturing the greatest profit potential of superior genetics.

But, as these results show, even in a commodity market, inclusion of ESAI is profitable for beef cattle operations. The costs of pregnancy are about equal, but both the short- and long-term returns to producers with the use of ESAI are considerable.

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