REPRO TRACKS

by Cliff Lamb, Texas A&M University

The Value of Using Sexed Semen

Factors determining the gain or loss per female exposed.

This issue of the *Angus Journal* is the "Profit Issue." Therefore, I thought it would be good to discuss the value proposition of utilizing sexed semen in an estrous synchronization protocol. It has been well-documented that pregnancy rates with sex-sorted semen tend to be lesser than conventional semen (usually about 8-10% lower).

We recently completed a large field study (23 herds in 11 states) to develop a fixed-time artificial insemination (FTAI) protocol with the use of sexed semen. As a result, we determined pregnancy rates for sexed semen ranged from 73.8-85.6% of pregnancy rates with conventional semen.

This reduction in fertility is largely due to a lower post-thaw motility, a reduced number of sperm cells with intact membranes and acrosomal alterations that can occur during the sorting process.

As a result, the PG-7 seven-day Co-Synch+CIDR® protocol was developed to provide a mechanism to use sexed semen in an FTAI program. This protocol is one of the protocols recommended by the Beef Reproduction Task Force for the use of sexed semen in FTAI.

It has been well-documented that pregnancy rates with sex-sorted semen tend to be lesser than conventional semen (usually about 8-10% lower).

One objective of this large field study was to determine the value required of the offspring of the desired sex to ensure that the use of sexed semen was warranted.

The process

To do this, we utilized a partial budget analysis to convert the results of this experiment into a decision aid tool. This tool can be used to determine the economic feasibility of incorporating sex-sorted semen or a combination of sex-sorted and conventional semen into a heifer production system when compared to conventional semen.

There are a number of inputs that one would be required to enter, such as values that could change if desired or remain as default values. Economic outcomes measured increased returns and decreased costs compared with decreased returns and increased costs attributed to the use of conventional, sex-sorted or a combination of the semen types. The gain/loss per heifer exposed to FTAI, and the gain/loss per herd can be calculated.

To use this tool, inputs include the number of heifers in the herd, number of cleanup bulls that will be utilized for the heifers, desired sex of the semen and expected premium per head by utilizing sex-sorted semen (Table 1).

The changeable values include items such as expected pregnancy rates for conventional semen, mean calf weight gain, expected final pregnancy rates, cost of labor, cost of AI, semen and estrous synchronization products, etc.

After all inputs are accounted for, final gain/loss per female inseminated may be calculated based on increased/decreased returns and increased/decreased costs. Gain/loss per herd can be calculated by multiplying the gain/loss per heifer exposed by the size of the herd.

A sensitivity analysis was performed to determine the differences in gain/loss per female exposed to FTAI according to various scenarios. When looking at the gain/loss per female exposed to sex-sorted semen compared to conventional semen, under our assumptions, positive returns tend to occur when Y-sorted sperm is selected. If X-sorted sperm are used, the value of the female offspring would need to be $154 greater at weaning than male calves within the herd. When a combination of sex-sorted (for those females expressing estrus) and conventional semen (for those females not expressing estrus) is compared to all females receiving sex-sorted semen, the gain/loss per female exposed seems to depend more on herd size and the pregnancy rates than the desired sex.

Financially, the primary factors that influence the gain or loss per female exposed include the expected premium for the desired sex, the cost of sex-sorted semen, the size of the herd, weaning weights and the pregnancy rates to conventional semen. According to our assumptions and values taken from each of the 23 herds included in this study, sex-sorted semen results in the greatest net returns when Y-sorted sperm is utilized.

However, in order for X-sorted sperm to be more profitable, a perceived premium of greater than $154 per head is required. AJ

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

Table 1: ***All inputs to consider when determining the cost of AI with sexed semen***

Inputs	Item to consider
Herd	No. of heifers
	No. of cleanup bulls
	Expected PR/AI with conventional semen
	Expected final pregnancy rate
	Mean calf weight gain per d, kg
Cleanup bulls	Bull maintenance costs
	Mean purchase cost of bull
	Useful life
	Salvage value, per 50.8 kg
	Salvage weight, kg
	Interest rate used
Labor	Cost of labor per d
	No. of employees required
	AI technician required?
	Cost of AI technician per head
Estrous synchronization	Cost of bottle (100 ml) prostaglandin $F_{2\alpha}$
	Doses of prostaglandin $F_{2\alpha}$ per bottle
	Cost of bottle (20 ml) of GnRH
	Doses of GnRH per bottle
	Cost per unit of CIDR inserts
	No. of CIDRs per unit
	Estrous detection patches per pack
	No. of patches
Sex-sorted semen	Cost of conventional semen
	Cost of sexed semen
	Desired sex
	Desired sex premium per head
Financing	Percentage of costs borrowed
	Interest on expenses per year
Weaning weights	Mean expected weaning weight conventional males
	Mean expected weaning weight conventional heifers
	Mean expected weaning weight sexed males
	Mean expected weaning weight sexed heifers
	Expected price of weaned conventional male calf
	Expected price of weaned conventional heifer calf
	Expected price of weaned sexed male calf
	Expected price of weaned sexed heifer calf