Sexed Semen Breeding System Advantage for Beef Cattle

Decision Aid User Guide

The purpose of these decision aids is to facilitate the organization of reproduction, calf price and breeding system cost data to calculate the economic advantage of utilizing **sexed semen** for beef cattle production. This information will assist the evaluation of breeding system alternatives for beef cattle producers and semen marketers to determine profitability of sexed semen technology when compared to conventional artificial insemination or natural service. In order for sexed semen to be successful for beef cattle producers, it must be more cost effective than AI breeding with conventional semen or natural service.

The decision aids calculate added revenue and added cost of using a sexed semen-based AI breeding system compared to conventional semen or natural service. Then, return on investment (ROI) is calculated for the sexed semen breeding system with both higher revenue and higher cost. The income margin above breeding cost is the second indicator of the sexed semen advantage.

The **gender difference in calf value and reproductive success** make sexed semen a profitable alternative to conventional AI or natural service.

These are things to keep in mind when using the decision aids to evaluate alternative breeding systems:

- Reproduction rates for a synchronized breeding system including expected pregnancy and calf losses in the example reflect a consensus of users, but are not based on controlled research or case studies. Efforts are currently underway to measure reproduction in beef cattle, as nearly six million straws have been used in dairy heifer breeding programs. These parameters are variables in the decision aid and should be carefully checked and modified to fit each production situation.

- Based on current information, the sexed semen pregnancy rate is assumed to be 85% of conventional semen. This is a variable controlled by the software user. Accuracy in gender selection is expected to be near 90%, and is also controlled by the user.

- The decision aids have the capability to easily complete "what if" analysis, simply by changing the reproductive values to check their impact on the economic value of alternative breeding systems. Actual producer data on calf prices, reproduction rates and calf loss should be used to fit each situation being evaluated.

Version ST 12-22-2009

Alternative Decision Aids for Beef Cattle Producers

There are two decision aids to accommodate alternative breeding systems:

1. The sexed semen advantage compared to AI using conventional semen.
2. The sexed semen advantage compared to natural service.

Several Examples are set up to demonstrate each decision aid application.

Characteristics of the decision aids are as follows:

- Up to three synchronized breeding system protocols are used for the AI breeding with conventional and sexed semen. Only one is required for the analysis. The protocols are described with the number of input units and associated costs entered.

- Labor costs should be included if extra labor is hired, or ignored if existing labor can accomplish the work.

- Costs reflect a pre-breeding evaluation to eliminate heifers or cows that are not reproductively sound.

- Pregnancy, calving and weaning losses can be varied by the user across breeding systems. This is a data limitation in some cattle operations. One would expect AI systems to have lower death loss rates than natural service, due to selecting lower birth weight sires. For sexed semen, it should also be noted heifer calves have lower birth weights than bull calves. Loss data is entered in the "Summary" sheet.

- The natural service cleanup bull should be priced near what a producer would expect to pay for a bull with similar genetics as sires selected for the sexed semen or conventional semen under consideration.

- Prices of weaned calves should be adjusted for weights and sex using market data and price slides. This is the net payweight and payweight price of the weaned calves. Again, the user can change this input.

- Premiums for the selected gender are also controlled by the user and should reflect the expected value difference over market prices on calves produced. It is always good to think along this line: What market price would the producer pay for the gender and genetics produced from the use of sexed semen compared to natural service?

Methodology Considerations

- The advantage of sexed semen is determined by calculating the **income margin over breeding costs generated by each system,** or value of weaned calves less breeding costs. This margin is a measure of the economic performance of the sexed semen system.

- The income advantage of sexed semen is the result of the difference in gender value of weaned calves, reproduction rate (weaning percentage) and cost differences between breeding systems. **Weaned calf values by gender** are very important in determining sexed semen competitiveness.

- There will be situations where there is a large difference in gender value between heifer and bull calves. The ROI on the added cost of sexed semen will be high, as the difference in added revenue is high relative to the added cost.

- A cow-calf breakeven price for sexed semen-produced calves is not calculated, as it would require a complete cow-calf enterprise cost and return analysis. This is not necessary to evaluate the economics of sexed semen. It is a question of whether the added revenue is greater than the added cost of the sexed semen AI breeding system, compared to conventional semen or natural service. Simply having the most profitable breeding system in place says nothing about overall profitability of cow-calf operations. Selecting the most economically attractive breeding system will either increase overall profitability or reduce losses.

- Breeding costs are reported on the basis of females exposed. Semen cost is reported as a percentage of breeding cost and calf value. In economic terms, sexed semen is a small portion of total breeding and production costs.

- **Synchronization** is a key component in making the use of sexed semen profitable. AI breeding followed by cleanup bulls is especially cost effective and managerially feasible for producing replacement heifers.

- Using sexed semen is simply a "component" of the breeding system. Management, nutrition and implementation of the system are critical to successful reproductive performance. Execution of the breeding system reflected by weaning percentage is the critical determinant of production and financial success.

Interpretation of Analysis Results

The return on investment (ROI) summary and revenue page provides a summary of the major data which determines the advantage of the sexed semen AI breeding system. The spreadsheet rows shaded in green identify areas to focus on in the economic analysis. The first three lines concentrate on reproduction rates, costs and differences in cost of each breeding system. Be sure to check pregnancy and calf loss data on the right side of the sheet. If there is uncertainty in expected losses, vary the rates and note changes in ROI. Users will notice ROI is very sensitive to changes in weaning percentages.

The reproduction and cost sections are followed by the weaned calf market price data, premium (or discount) and gender difference. Calf values, number by gender and gross values are calculated for each breeding system. The cost of semen is calculated relative to calf value to help the user keep semen cost in proper perspective. The final section of the report summarizes the total added revenue above added cost of sexed semen.

The final row is the calculated return on the added cost of sexed semen, or the rate of return on using sexed semen. This figure must be relatively high to warrant the implementation of a sexed semen breeding system in the early adoption period.

Decision Aid Operation

The decision aids use an Excel™ spreadsheet. Multiple sheets are used in the file to enter data and provide summary reports. Review the "User Guide" sheet included for proper operation. The majority of data is entered in the "Summary" sheet, including all calf prices and reproduction data. In the first data sheet, descriptions and costs for breeding protocols are entered, where it is important to keep track of alternative breeding systems being evaluated.

All variables, or data the user can enter, are in **blue**; all other cells are protected. The weights and prices of cattle, along with expected discounts or premiums, are entered and should reflect each production and marketing situation. These are entered to serve as a base on which to compare AI or natural service prices used in the analysis.

The actual costs of the breeding protocol can vary between systems used. If experience is lacking, it would be good to speak with the technician involved. Record as many details as possible on the protocol followed, enter the information in the "Description" sheet, then modify data in the respective sheets.

Once the decision aid is set up, it is recommended to print each sheet and check the data. Unusual results are normally a product of data entry errors, therefore all data should be checked carefully.

"What If" Analysis

The main reason for using a spreadsheet is to facilitate **"what if" analysis.** Key numbers to vary are gender prices, reproduction rates and pregnancy and calf losses. Sexed semen has an advantage where a gender value difference exists.

The summary sheets have these variables to easily estimate the impact of changes on the final return. Because semen cost is a small portion of total breeding costs, the ROI is **very sensitive to changes in gender difference and reproduction rates reflected in weaning percentage.** The best way to observe this sensitivity is to change parameters in the summary sheet and note changes in the resulting ROI.

Users should incorporate their own breeding protocols, semen and bulls costs and cattle prices, as they are highly variable. The cost of sexed and conventional semen varies widely, as it is related to bull demand and production costs. Breeding costs and prices become obsolete very quickly and are highly dependent upon chosen alternatives.