Reproduction by the Numbers

The breeding season has started for many Eastern Nebraska spring calving cow herds. This article by Dr. John Comerford, Penn State University Extension Beef Specialist, highlights some of the "numbers" to be considered to be both reproductively efficient and profitable. I would challenge you to calculate the reproductive efficiency of your cow herd.

Beef producers often consider reproductive efficiency as the number of cows that produce a calf each year. The actual calculation is the number of cows that calve each year divided by the number of cows that were turn in with the bull the year before. This value is the exposed cow inventory. We often forget, however, the matrix of events and issues that influence reproduction and its effect on profitability in the cow-calf enterprise.

It is not 100%. When we consider the potential for a cow getting pregnant in a pasture-mating system, there are three factors that have to be considered:

- The percentage of cows in heat
- The percentage of the heats that are fertile
- The percentage of the cows that are serviced by the bull

Even though 100% of the cows may eventually get pregnant during a breeding season, some pregnancies may be lost because of a failure of one of these three issues. For example: if 95% of the herd is in heat in a 21-day period, 95% of these heats are fertile, and 95% of the cows are serviced by the bull when in heat, the result is not a 95% conception rate. The conception rate during that 21-day period is 86% (.95X.95X.95=.86).

If an AI system is in place, several more factors are involved. These include accurate heat detection, the level of semen quality, and the proficiency of the inseminator. Again, the final result is not an average success rate for each factor, but a multiplicative product of the rate for each factor. Table 1 shows the expected percentage of cows in standing heat over a 24-hour period. These data show that if no heat detection is done between 6 pm and 6 am, 55.9% of cows in the herd will not be detected in heat even though they may have had a fertile heat.

Table 1. Time of day when cows exhibit standing estrus

Time of Day	% of Cows in Heat
G.A. Perry, South Dakota State University (unpublished data).	
6 am until noon	26.0%
noon until 6 pm	18.1%
6 pm until midnight	26.9%
Midnight until 6 am	29.0%

It is not 100%. In most cases nature will take control of the breeding in the cow herd. But sometimes managers put too much pressure on Nature and we lose breeding efficiency. For example, we have already shown how 95% of cows being serviced by a bull can significantly influence the pregnancy rate in the herd. The major reason successful mating does not occur (with bulls that are known to be fertile and healthy) is because there are too many cows for each bull. Consider these numbers: in a 21-day period during the breeding season with 25 cows, on average there is more than one cow in heat every day. What happens when you depend on an inexperienced yearling bull to breed these cows? More often than not, a pregnancy will be missed, particularly early in the breeding season. The cost of missing the cow for just one heat cycle is about 40 lbs. of weaning weight in a uniform weaning program. How many times can we lose $80-$100 per cow in this enterprise per 21 days she calves after the initial 21 day calving interval of the cow herd?

It is not 100%. The number of cows in the herd exhibiting a fertile estrus is a function of age, health, and nutritional status. Obviously, not all cows will have a fertile estrus during a breeding season. The combination of animal age, body condition score and nutritional status is the major culprit for this failure. Young, growing females that are also being called on to cycle regularly must also have a nutritional status that gives them the opportunity to be fertile as well. The best method of evaluating this issue is a Body Condition Score.

It is not 100%. The only result in a breeding program that makes a difference is how many calves we get to sell. The reproductive rate in a herd by definition is the number of calves we get to sell compared to the number of cows we exposed to a bull to produce those calves. The summary of standardized performance analysis data from Iowa State University for 2000-2004 is shown in Table 2. It is clear a cow herd will not have 100% reproductive efficiency. For example, the average pregnancy rate during the breeding season was 94.9% instead of 100% for the reasons described above. More importantly, the percentage of calves they got to sell (the weaning percentage) was 87.5%, which includes all of the losses associated with getting cows bred and getting those calves to market. The average pounds that were sold for each cow exposed at breeding were 453 lbs., even though the average weaning weight was 518 lbs. (453/.875). These results show profitability in the cow-calf enterprise depends, not on pounds weaned, but the number of calves weaned from a breeding program.

Table 2. 2000-2004 Summary of SPA Analysis for Iowa

Item	Value
Iowa State University, 2005.	
% cow pregnant	94.9
% live calves born	92.2
% cows weaning a calf	87.5
Avg. lbs. weaned/ Cow exposed for breeding	453
Annual cow cost ($)	345.04

Reproductive efficiency in a cow herd is not going to be 100%, and failures for any number of many factors affecting calf sales will significantly alter profit potential. Small improvements,

however, are possible for many of these issues on the farm, and these changes can add dollars to the enterprise.

Additional resources:

- UNL Beef website: beef.unl.edu
- UNL BeefWatch (monthly e-newsletter that you can subscribe to): http://newsroom.unl.edu/announce/beef
- UNL BeefWatch Podcasts (these are more intimate chats with some of the authors of the BeefWatch articles, you can also subscribe or download them): http://beef.unl.edu/beefwatch-podcast

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