



Repro Tracks

► by **Bill Beal**, beef cattle reproductive physiologist, Virginia Tech

Research on AI Pays Off

Richard Saacke has spent more than 50 years researching topics related to bovine semen quality and artificial insemination (AI). Semen evaluation procedures developed by Saacke and others have allowed the majority of low-fertility bulls to be identified and eliminated from use for AI. Research information from many universities and AI organizations allows the marketing of high-quality semen that consistently results in high fertility when combined with good insemination technique, semen storage and semen handling.

Introduction

Saacke is a highly respected scientist who spent a lifetime researching the effects of semen quality and other factors on the fertility associated with AI in cattle. Saacke has trained hundreds of undergraduate and graduate students. He serves as a consultant to AI organizations throughout the world and has a wealth of information related to AI. Therefore, he was asked several questions related to AI. His enlightening responses demonstrate the value of research, like his, performed at land-grant universities across the United States.



Dr. Richard Saacke

Question No. 1:

Beef producers strive to achieve high AI pregnancy rates. After 57 years of experience with AI, what would you say are the keys beef producers should focus on to develop a successful AI program with their herd?

Response: During the past 10 years I've had the privilege of participating with colleagues across the country in a program entitled Applied Reproductive Strategies in Beef Cattle (ARSBC, for more information see www.appliedreprostrategies.com). This program updates producers each year on systems of synchronizing estrus and ovulation.

I am continually amazed at the many schemes and options presented to breeders each year, some labor-intensive, others quite simple.

One point that comes through each year is that one system does not fit all; i.e., choice of a system is highly dependent

upon the breeder's management style and philosophy.

Thus, my answer to the question would be:

- 1) study the options out there by reading and with the help of knowledgeable professionals (extension, veterinary and industry personnel) familiar with your management style and goals;
- 2) assure good insemination technique, semen storage and semen-handling practices; and
- 3) deal with reliable AI organizations where bull fertility and semen quality are high priorities, along with top genetics.

Question No. 2:

You consult with AI studs around the world. They collect semen from hundreds of bulls. Some bulls have semen quality problems that make them unacceptable for AI. What are the most common semen problems you see with bulls at AI studs? Is there a "cure" for poor semen quality?

Response: Perhaps the most serious semen quality problems originate in bulls with disturbances in the testes resulting in production of abnormal sperm. The abnormal sperm may come from a heritable trait, which is usually permanent. Conversely, the abnormalities may be caused by environmental factors, such as high ambient temperatures, those beyond the ability of the bull to cope utilizing his natural testes temperature-regulating mechanisms. Nevertheless, such bulls or semen should not be used since sperm abnormalities are associated with both fertilization failure and early embryonic loss.

Diligent AI stations will not accept bulls with poor semen quality, or they will reject their semen upon recognizing problems at the time of collection. Cures for these problems are difficult to formulate. However, overconditioned bulls can exacerbate the

problem by excessive accumulation of fat in the scrotum, elevating testicular temperature. Therefore, as a protection, breeders submitting bulls for AI should resist the natural tendency to overcondition their bulls.

Question No. 3:

How much difference in first-service conception rates exists between the highest-fertility bulls and the lowest-fertility bulls at AI studs?

Response: In diligent AI laboratories where attention is paid to sperm viability and morphology and thus semen and bull culling is appropriate, differences among bulls used in AI would be quite small or negligible. On the other hand, similar to a natural population of bulls, fertility can range from excellent to seriously subfertile if attention is not given to semen quality.

Unfortunately, prediction of fertility by laboratory semen tests has not been achieved. However, utilizing the available semen tests, one can say that the majority of low-fertility bulls are efficiently recognized and eliminated. Unfortunately, it is more difficult to recognize and select for high-fertility bulls.

Question No. 4:

You have been involved with AI in cattle since 1953. What is the biggest technical change you've seen related to AI in your 57 years of experience?

Response: There have been many changes, but you're going to age me here since my experiences really began in the early 1950s when I started graduate school. At that time we were just feeling the impact of what I would consider the major advancement to fertility by AI, i.e., the addition of antibiotics to the semen dose. Clearly, this resulted in the greatest single improvement in bull fertility utilizing AI.

After antibiotics, I would then place the successful development of frozen semen. Freezing and shipping semen fostered the distribution of superior genetics to farms and ranches over great distances. Finally, I would also consider the hormonal control of heat and ovulation as an important contribution. It is important to remember that each of these advancements represents the contributions of many scientists and their students.

REPRO TRACKS

Question No. 5:

Dozens of graduate students were trained in your research lab and with them you have published more than 90 research papers. When you look back, what is the one accomplishment from your lab that stands out in your mind?

Response: The greatest contribution I would cite is, namely, the students themselves. Many have gone into academic work, teaching, writing and doing research in the field of animal reproduction and

AI. In the process, many have trained their own students. Others have gone into the AI industry as directors of AI labs or in training AI personnel. Still others have chosen extension positions interfacing the university, farm and ranch with AI. I actually look at these young men and women as the most important product of our laboratory at Virginia Tech.

A handwritten signature in black ink that reads "Bill Beal". The signature is written in a cursive, flowing style.

Editor's note: Bill Beal is a beef cattle reproductive physiologist and Professor Emeritus at Virginia Tech. He conducts research involving estrus synchronization, artificial insemination, embryo transfer and the use of ultrasound technology. This column is designed to provide answers to questions about reproductive management commonly posed by commercial and purebred breeders. If you have questions or comments related to the reproductive management of cows or bulls, e-mail them to Dr. Beal at wbeal@vt.edu or mail them to him at the Dept. of Animal & Poultry Sciences, Virginia Tech, Blacksburg, VA 24061-0306.