



BEEF CATTLE RESEARCH UPDATE

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Evaluating Conventional and Sexed Semen in a Commercial Beef Heifer Program

Recent research by the University of Nebraska evaluated the use of sexed semen compared with conventional semen in a commercial beef heifer development program.¹ In this study, 500 heifers were fed melengestrol acetate (MGA) for 14 days. Prostaglandin F_{2α} (Lutalyse) was administered intramuscularly 19 days later and heat detection patches were placed on tail heads. Following prostaglandin injection, heifers were detected for estrus by 1 of 2 methods: visual observation of standing estrus or activated heat detection patches. Heifers were artificial inseminated (AI) approximately 18 to 24 hours following detection of standing estrus. Heifers not detected in estrus by 72 hours (3 days) were time inseminated and injected intramuscularly with gonadotropin-releasing hormone (GnRH) 77 to 78 hours after the prostaglandin injection. All heifers were inseminated with either conventional (unsexed) or semen sorted at 90% purity for heifer calf pregnancies. Twelve days later, clean-up bulls were turned in with the heifers. Fifty-five days after timed insemination, pregnancy was determined by ultrasound. The heifers were identified as pregnant by AI, clean-up bull, or not detectable and sorted accordingly. Non-detected heifers (124 heifers) and heifers pregnant by clean-up bull (247 heifers) were returned with bulls for an additional 18 days and checked for pregnancy by ultrasound approximately 60 days later.

These researchers reported that pregnancy rate was significantly greater ($P < 0.01$) for heifers inseminated with conventional than sexed semen (58.4 vs. 41.0%). These results agree with previous research indicating pregnancy rates using sexed semen are generally 60 to 90% of conventional semen. It is suggested that this reduction in pregnancy rate with sexed semen is likely due to a combination of factors including damage of the sperm during the sorting process resulting in reduced longevity in the female reproductive tract and decreased number of sperm per straw. This study also noted that more ($P < 0.01$) heifers detected in standing estrus were pregnant ($\geq 55.9\%$) than heifers time inseminated (24%). The overall pregnancy rate in this study (including natural service) was 93% and similar ($P > 0.10$) between sexed and conventional semen. The breeding costs per pregnant heifer was about \$43 greater for AI with sexed semen than AI with conventional semen due to lower pregnancy rates and greater semen costs (\$14 for conventional vs. \$45 for sexed). The extra cost of using sexed semen must be compared to any benefit derived from producing mainly heifers in deciding whether to use sexed semen.

These researchers noted that data from this study would not support the utilization of sexed semen for the clean-up time AI breeding due to a greater decrease in AI pregnancy rates. They speculated that a combination of utilizing sexed semen to inseminate heifers exhibiting estrus and less expensive conventional semen for the clean-up AI would decrease the cost difference per pregnant heifer making the utilization of sexed semen a more viable alternative.

Influence of Organic versus Inorganic Trace Mineral Supplementation on Bull Semen Quality

Research has generally shown that organic trace minerals are more bioavailable than inorganic minerals. It is well documented that trace mineral supplementation has an impact on reproductive performance. University of Arkansas researchers evaluated the effect of source of supplemental trace minerals on bull semen quality during the summer, as measured by computer-assisted sperm analysis.² In this trial, bulls were maintained in a dry lot and fed mixed grass hay to maintain body condition over a 123 day study. Three times weekly bulls were individually fed 3 lb of a grain supplement that served as the carrier for treatments containing either inorganic or organic trace mineral treatments (cobalt, copper, manganese, and zinc). The inorganic sources of these trace minerals were cobalt carbonate, copper sulfate, manganese sulfate, and zinc sulfate. For the

organic trace minerals, Zinpro Corporation's Availa-4 was used. Starting on day 60 of the study (July 15), semen was collected by electroejaculation weekly for 9 consecutive weeks. The semen was then evaluated by computer-assisted sperm analysis for percentage motile, progressive, and rapid sperm within 5 minutes of each collection.

Since sperm production requires about 60 days in bulls, the bulls were fed the trace mineral supplements for 60 days (mid-May to mid-July) prior to starting the weekly semen collections to ensure adequate time for treatments to influence sperm production or quality. Semen was collected from mid-July to early September when fertility is more likely to be adversely affected by heat stress.

These researchers reported that bulls supplemented with organic trace minerals had more ($P < 0.03$) motile, progressive, and rapid sperm than those supplemented with inorganic trace minerals (65.5 vs. 56.1%, 47.0 vs. 38.4%, and 62.3 vs. 52.8%, respectively). Comparison of the mean percent motile, progressive, and rapid sperm for bulls in each treatment before and during the trial showed that the organic trace mineral helped to maintain these sperm parameters during the Mid July to early September trail period. Regardless of treatment, these sperm motility parameters declined during the hot weather. These results suggest that organic trace mineral supplementation may improve bull semen quality. It was noted that additional studies are needed to determine if this treatment results in increased pregnancy rates.

¹ Funston, R. N. and T. L. Meyer. 2012. Evaluating conventional and sexed semen in a commercial beef heifer development program. *Prof. Anim. Sci.* 28:560-563.

² Rowe, M. P., J. G. Powell, E. B. Kegley, T. D. Lester, C. L. Williams, R. J. Page and R. W. Rorie. 2011. Influence of organic versus inorganic trace mineral supplementation on bull semen quality. Arkansas Animal Science Department Report Research Series 597:11-13.