AS 653 ASL R2238

2007

A Comparison of Intrauterine and Cervical Artificial Insemination Catheters on Farrowing Rate and Litter Size in Artificially Mated Sows

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A.S. Leaflet R2238

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Summary and Implications

The objectives of this study were to determine the effects of artificial insemination (AI) catheter type on litter size and farrowing rate. No performance difference was found between sows artificially inseminated using intrauterine or intracervical methods. Since intrauterine catheters typically are more expensive, there is an economic advantage for the more commonly used intracervical method of artificial insemination in the present study.

Introduction

AI technology has improved over the past two decades primarily attributable to practical implementation on commercial swine operations. Producers have become increasingly proficient in using artificial insemination to achieve desired reproductive performance. Furthermore, producers are willing to adopt any new AI technology if shown to increase profit within their swine operation. Intrauterine AI catheters have been introduced into the marketplace by companies advertising more piglets per litter[1] and increased fertility[1-2]. Yet, very few peer reviewed research projects have been performed to verify an increase in litter size and farrowing rate and to justify the additional expense of the "new" type of AI catheter.

Materials and Methods

Yorkshire x Landrace and Duroc x (Yorkshire x Landrace) sows were allotted into an intrauterine AI catheter group (n=193) and a cervical AI catheter group (n=196). Sows were equally allotted into each group based on parity, body condition score, and sire influence of the sows.

Sows were mated based upon their respective group. The cervical AI catheter (Cerv) was a rounded, foam-tipped catheter that deposited semen directly into the cervix. Industry standard AI procedures were used during matings with the Cerv catheter. Stimulation of the sow with boar presence and/or back pressure occurred in the control group only. Once the Cerv catheter was inserted, semen was deposited by gravitational forces and uterine contractions as a result of stimulation. Once the semen bag was within 5.0 ml of empty, the Cerv catheter was removed and the insemination was defined as successful.

The intrauterine AI catheter (IU) was similar in appearance to the control catheter, both rounded and foam-tipped but differed in function and site of semen deposition. The IU catheter deposited the semen directly into the uterus by a catheter that extended under pressure applied to the semen bottle by the technician. Procedures for a successful insemination differed for the IU catheter as compared to the Cerv catheter. No boar presence or back pressure was allowed when using the IU catheter. The IU catheter was inserted into the cervix of each sow much like that of the control group. After insertion, the sow was allowed sufficient time (usually around one to three minutes) to relax before the semen administered. After this time elapsed and the sow was at least moderately relaxed, forceful squeezing was applied to the bottle, thus increasing fluid pressure inside the catheter expelling the catheter from the interior portion of the IU catheter through the cervix. A mating using the IU catheter was defined as successful if the catheter was extended after removing the catheter from the sow. If the balloon catheter was not capable of extending through the cervix, repeat inseminations occurred until the mating was deemed successful by the inseminator. If the AI did not occur, the sow was not included in the experiment. Both catheters were non-reusable and were discarded after a each single insemination.

The farrowing date, number born alive, mummified piglets, and stillborn piglets were reported at each farrowing. Stillborn and mummified piglets were included only as part of the total number of piglets born. Total number of piglets born alive was calculated for each sow completed farrowing.

For data analysis, farrowing rates were calculated by the FREQ procedure using SAS. A mixed linear model was performed for breed, parity, and BCS on total piglets born, and number piglets born alive. The model included breed and parity as fixed effects and body condition scores of the sow (evaluated at weaning of the litter prior to mating for the experiment) was included as a covariate in the model used to evaluate each dependent variable. A Chi-Squared analysis was performed to calculate differences between the IU and Cerv group

Results and Discussion

Farrowing rates were 67.8% for IU and 66.3% for Cerv (Table 5). No significant ($P = 0.745$) treatment difference was observed for farrowing rate using the Chi-Square analysis. Neither parity, breed of sire influence, or BCS were significant sources of variation for farrowing rate. The intrauterine AI catheter did not increase total piglets born or number piglets born alive when compared to the intracervical AI catheter.

A learning curve was experienced in using the intrauterine catheter as well. After a week of acclimation, employees became proficient using the IU catheters by the beginning of the trial. If this catheter is to be adapted to commercial use, training will be an integral component to becoming confident in using the technique. Furthermore, training on insemination timing and frequency should be included as part of the training session.

For the present study, the intrauterine AI catheter cost $1.10 higher per catheter compared to the cervical catheter. In a swine operation averaging two inseminations per estrus and 100 sows inseminated per month, the intrauterine catheter would cost a total of $220 more per month for the producer. Thus, there appears to be an economic advantage to using the traditional intracervical catheter as compared to the intrauterine catheter when no increase in sow performance is observed.

Any possible increase in farrowing rate or litter size when using the intrauterine AI catheter could be a result of extra attention to detail and management when the “new” tool is being utilized.

Table 1. Distribution of Sows and Farrowing Rates by Treatment

Item	Pregnant	Open	Total	Farrowing Rate (%)
Intrauterine AI Rod	131	62	193	67.8[a]
Cervical AI Rod	130	66	196	66.3[a]
Total	261	128	389	
%	67.1	32.9		

[a] Treatments are not significant (P = 0.75) using Chi-Square Analysis