

## **Proper Timing for Sow Ovulation**

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Artificial insemination (AI) is widely used in the swine industry. For best reproductive performance, there must be adequate quantities of fertile sperm at the site of fertilization when eggs are ovulated from the ovary of the sow. Therefore, timing of insemination is critical to ensuring reproductive success. Optimal sow fertility is achieved by insemination of fresh extended semen during the 24-hour period before ovulation. There is variation in the length of time it takes sows to return to heat after weaning and there is also uncertainty about when ovulation takes place during the period of standing heat. These factors make precise timing of AI more difficult. To overcome the variation and uncertainty producers need to be vigilant in observing for signs of heat and breeding multiple times during estrus. Most weaned sows have a wean-to-estrus interval (WEI) of 4 to 7 days, and are bred at least twice during the period of standing heat. Generally, sows bred later than 7 days after weaning have shorter estrus periods, lower farrowing rates and smaller litter sizes than sows bred within 7 days of weaning. Ideally, sows should be bred before day 7 post-weaning using as few inseminations as possible in order to save time and money.

The use of exogenous pharmaceutical products for the synchronization of estrus and ovulation allow for the application of targeted intensive estrus detection and the determination of the appropriate timing for successful AI. While the use of these products can increase the precision of AI timing, it will not replace or correct other aspects of management required for good reproductive performance.

The most common protocol for the induction of estrus in weaned sows is the injection of 500 to 750 IU of equine chorionic gonadotrophin (eCG) or a combination of 400 IU eCG and 200 IU of human chorionic gonadotrophin (hCG) (PG600). There is a wealth of literature demonstrating the efficacy of this approach for the induction of a fertile estrus after weaning. While efficacious for estrus induction, injection of eCG or PG600 does not permit an accurate timing of ovulation.

Research was conducted at the Ontario Veterinary College to determine the timing of ovulation following a protocol of eCG to induce estrus and porcine luteinizing hormone (pLH) to induce ovulation. In a pilot study sows (n=17) were given 600 IU of eCG on the day of weaning and 5mg pLH 80 hours later. Ultrasound examinations were performed to monitor the ovaries in order to determine the time of ovulation. The time from pLH treatment to ovulation ranged from 34.25 h to 42.5 h, with a mean of  $38.2 \pm 2.8$ h. This information was then used to design a reproduction study involving 567 weaned sows. The results of this large study showed that sows could be reliably bred using a single insemination at a fixed time post-weaning, in our case that was Tuesday morning. There was no advantage in using two inseminations. On the farm where the trial was conducted the usual farrowing rate was about 75%. Farrowing rate for sows that were induced to ovulate at a specific time achieved an 85% farrowing rate indicating that the semen and breeding technique were adequate and that the reason for the suboptimal level of reproductive performance in the control group is related to the timing of the insemination. When the protocol was discontinued, pregnancy and farrowing rates fell to previous levels. In this

case the protocol provided diagnostic evidence that timing of AI was likely a problem in this herd.

In another study done in conjunction with researchers at Michigan State University, the same synchronization protocol was used and ovulation times were determined in 32 sows. All sows ovulated between 34 and 42 hours after pLH treatment, with 84.4% ovulating between 36 and 40 hours. The mean time after pLH treatment was  $38.2 \pm 0.2$ h. In this study, pregnancy rate with fresh semen was 85% compared to 32% with frozen semen. In this study, precise timing produced acceptable results with fresh semen, but the reduced fertility of the frozen semen compromised pregnancy rate. These researchers were able to remove timing as a factor with the synchronization protocol.

In another OVC study, a reduced number of sperm in the insemination dose (1 billion) produced similar pregnancy rate to normal sperm concentration (3 billion) when the synchronization protocol was utilized. Also pregnancy rate from intra-uterine deposition of semen was comparable to the traditional cervical deposition. These results were obtained using a single insemination. If timing of insemination is precise a lower sperm concentration in the insemination dose may be used in the traditional method of insemination to achieve acceptable results.

Low farrowing rate can be caused by many factors including semen quality, estrus detection, insemination technique and inappropriate timing of insemination. The current research results indicate that estrus synchronization and induced ovulation combined with timed insemination can potentially solve problems associated with timing of insemination and estrus detection. In addition, it can be used as a tool in diagnosing other causes of low fertility by removing timing of insemination and estrus detection as possible causes.

### References

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