Sexed semen: does timing of AI matter?

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Summary

- A large sexed semen field trial conducted on dairy cows in 2018:
  - » Conception rates were 60% for conventional semen versus 45% for sexed semen.
  - » The average conception rate achieved with sexed semen was 76% of the average conception rate achieved with conventional semen.
  - » A quarter of the herds achieved better conception rates with sexed semen compared with conventional semen, suggesting that heat detection and timing of AI may impact conception rates with sexed semen.
- A 2019 field trial was undertaken to investigate if timing of AI relative to time of expected ovulation affected conception rates achieved with sexed semen.

Introduction

Sexed semen reliably produces a 90% sex bias. Despite recent improvements in the technology, sexed semen generally achieves poorer conception rates compared with conventional semen. Nevertheless, sexed semen is potentially a revolutionary technology for dairy farmers. In Irish pasture-based systems, fertility is a key driver of efficiency and profitability. To-date, compromised conception rates with sexed semen have reduced its attractiveness and utilisation by dairy farmers. Nevertheless, with low (or zero) value dairy bull calves, the need for a reliable sexed semen product has never been greater.

Timed AI Sexed Semen Study 2019

Sexed semen has a shorter duration of viability in the female reproductive tract (12–16 h) compared with conventional semen (>24 h), which is largely attributed to damage sustained during the sorting process. In the 2018 field trial, 25% of the farms achieved fertility performance with sexed semen that was equal to or greater than that of conventional semen. One possible explanation for this observation was that those particular farms had decision rules for the timing of AI that was particularly suited to sexed semen (i.e., delayed AI relative to heat onset).

In spring 2019, a trial to examine the importance of timing of AI on fertility performance in lactating cows was carried out. Fixed-time AI protocols synchronise the timing of ovulation, and represent a useful tool to test the effect of altering the timing of AI. Approximately 2,250 cows on 24 farms were synchronized with a Progesterone-Ovsynch fixed-time AI protocol (Figure 1). All enrolled cows were younger cows (parity 1–4 only) and early-calving (>50 days calved on day of AI). Three semen treatments were evaluated:

- Conventional semen 16 h after second GnRH injection (CONTROL).
- Sexed semen 16 h after second GnRH injection (SEXED_16).
- Sexed semen 22 h after second GnRH injection (SEXED_22).

All cows were inseminated by an AI Technician, and all cows were scanned for pregnancy diagnosis 35 to 40 days after fixed-time AI.

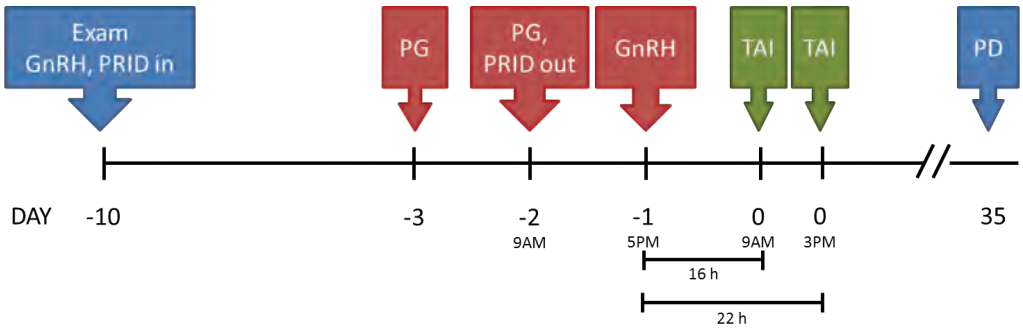

Figure 1. *Synchronisation protocol and semen treatments. Cows assigned to CONTROL and SEXED-16 treatments were inseminated 16 h after the second GnRH, and AI was delayed until 22 h after second GnRH for the SEXED-22 treatment.*

The final dataset had records from 2164 cows available for analysis. Overall, the conception rate to first service was 61.1%, 49.0% and 51.3% for CONTROL, SEXED-16 and SEXED-22, respectively. This corresponds to relative conception rates of 80% and 84% for SEXED-16 and SEXED-22, respectively (i.e., relative to the conception rate achieved in the CONTROL treatment).

The 24 study herds were ranked based on the relative conception rate for sexed semen versus conventional semen. For the 18 herds with the best performance, the mean relative conception rate was 90% (range 75% to 121%), but was much poorer in the remaining six herds (mean relative conception rate = 64%, range 48% to 73%). Of note, these six herds had numerically better mean conception rates with conventional semen (66.1%) than the remaining 18 herds (60.2%). Hence, the cows were fertile, the semen was fertile, and inseminations were conducted at the optimum window of time. More research is needed to identify the reasons for poor performance with sexed semen in a subset of herds that achieve excellent performance with conventional semen.

If the six herds with the poorest relative conception rates are omitted from the analysis, the conception rate was 59.9%, 52.6% and 54.7% for CONTROL, SEXED-16 and SEXED-22, respectively. This corresponds to relative conception rates of 88% and 91% for SEXED-16 and SEXED-22, respectively.

Conclusions

In a timed AI programme, acceptable fertility with sexed semen can be achieved by delaying the timing of AI to between 16 and 22 h after the second GnRH injection. At the levels of fertility performance obtained in this study, sexed semen is a viable strategy for generating replacement heifers.