

# Can GnRH Be Used to Induce Ovulation Early in Lactation and Improve Fertility in Dairy Cows?<sup>1</sup>

Klibs N. Galvão<sup>2</sup>

## Introduction

It is well established that early cyclicity results in increased pregnancy per artificial insemination (PAI) and decreased time to pregnancy (Thatcher and Wilcox 1973; Darwash et al. 1997; Galvão et al. 2010). Treatment with gonadotropin-releasing hormone (GnRH) has long been used to induce ovulation in early postpartum dairy cows (Britt et al. 1974). Earlier studies showed an improvement in ovulation risk from 20%–28% to 75%–90% when GnRH was administered between 10 and 14 days in milk (DIM) (Britt et al. 1974; Benmrad and Stevenson 1986). Effects of GnRH administration early postpartum on fertility, however, have not been consistent. Some studies showed a detrimental effect of GnRH administration early in lactation on uterine health and reproductive performance (Etherington et al. 1984; Stevenson and Call 1988; Padula and Macmillan 2002). Others failed to show an improvement in reproductive performance when GnRH was administered early in lactation (Cavestany and Foote 1985; Foote and Riek 1999). Nonetheless, others have reported increased PAI and reduced time to pregnancy (Nash et al. 1980; Benmrad and Stevenson 1986; Jeong et al. 2013) or reduced culling because of reproductive failure (Britt et al. 1977) when GnRH was administered between 8 and 29 DIM.

Nevertheless, none of the previous studies used synchronization programs such as the Presynch-Ovsynch as part of their reproductive management. Therefore, the objective of

this article is to present the results of a recent paper (Bittar et al. 2014) that evaluated the effects of administration of GnRH at  $17 \pm 3$  and  $20 \pm 3$  DIM in Holstein dairy cows without a corpus luteum (CL) on induction of ovulation, uterine health, and reproductive outcomes.

## Evaluation of the effect of GnRH administration in early lactation on induction of ovulation, uterine health, and reproductive outcomes

Holstein cows without a CL at  $17 \pm 3$  DIM were assigned randomly to receive intramuscular (i.m.) GnRH ( $n = 245$ ) at  $17 \pm 3$  and  $20 \pm 3$  DIM or to remain as controls ( $n = 245$ ). Ovaries were scanned by ultrasonography (US) twice weekly totaling four examinations. Ovulation was characterized by the appearance of a CL  $\geq 20$  mm at any US or by CL  $< 20$  mm in two consecutive examinations. Clinical and cytological endometritis were diagnosed at 35 DIM. Compared with control, GnRH increased ovulation up to 3.5 d after the last treatment (78.7% vs. 45.0%), and did not affect the prevalence of clinical endometritis (23.9% vs. 18.6%) or cytological endometritis (30.9% vs. 32.8%). Treatment with GnRH did not affect pregnancy per AI at 32 d after AI (37.6% vs. 38.6%) or 74 d after AI (35.0% vs. 31.5%), but treatment with GnRH reduced pregnancy

1. This document is VM201, one of a series of the Veterinary Medicine-Large Animal Clinical Sciences Department, UF/IFAS Extension. Original publication date July 2014. Reviewed February 2021. Visit the EDIS website at <https://edis.ifas.ufl.edu>.

2. Klibs N. Galvão, DVM, MPVM, PhD, Dipl. ACT, Department of Large Animal Clinical Sciences, College of Veterinary Medicine; UF/IFAS Extension, Gainesville, FL 32611.

loss (6.8% vs. 18.1%). There was no overall effect of GnRH treatment on hazard of pregnancy (Figure 1).

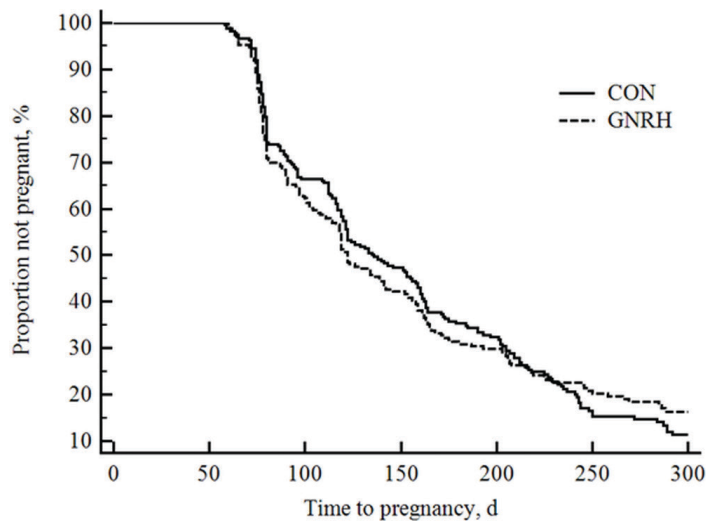


Figure 1. Kaplan-Meier survival curves for time to pregnancy up to 300 DIM for GnRH-treated group (GNRH; dashed line;  $n = 240$ ) and control group (CON; solid line;  $n = 240$ ). GnRH-treated group (cows received 100  $\mu\text{g}$  i.m. injection of gonadorelin hydrochloride at  $17 \pm 3$  and  $20 \pm 3$  DIM) and control group (no hormonal injection) had median days to pregnancy and proportion of cows pregnant by 300 DIM of 122 d/78.8% and 136 d/76.3%, respectively (univariable survival analysis;  $P = 0.93$ ).

Credits: Adapted from Bittar et al. (2014)

## Conclusion

In summary, early postpartum administration of GnRH induced ovulation without affecting uterine health, but failed to improve PAI or time to pregnancy, although it reduced pregnancy loss.

## References

- Benmrad, M., and J. S. Stevenson. 1986. "Gonadotropin-releasing hormone and prostaglandin F<sub>2</sub> $\alpha$  for postpartum dairy cows: estrous, ovulation, and fertility traits." *J Dairy Sci* 69: 800–811.
- Bittar JH, Pinedo PJ, Risco CA, Santos JE, Thatcher WW, Hencken KE, Croyle S, Gobikrushanth M, Barbosa CC, Vieira-Neto A, Galvão KN. 2014. "Inducing ovulation early postpartum influences uterine health and fertility in dairy cows." *J Dairy Sci* 97: 3558–69.
- Britt, J. H., D. S. Harrison, and D. A. Morrow. 1977. "Frequency of ovarian follicular cysts, reasons for culling, and fertility in Holstein-Friesian cows given gonadotropin-releasing hormone at two weeks after parturition." *Am J Vet Res* 38: 749–751.
- Britt, J. H., R. J. Kittok, and D. S. Harrison. 1974. "Ovulation, estrus and endocrine response after GnRH in early postpartum cows." *J Anim Sci* 39: 915–919.
- Cavestany, D. and R. H. Foote. 1985. "Reproductive performance of Holstein cows administered GnRH analog HOE 766 (Buserelin) 26 to 34 d postpartum." *J Anim Sci* 61: 224–233.
- Darwash, A. O., G. E. Lamming, and J. A. Wooliams. 1997. "The phenotypic association between the interval to postpartum ovulation and traditional measures of fertility in dairy cattle." *J Anim Sci* 65: 9–16.
- Etherington, W.G., W. T. K. Bosu, S. W. Martin, J. F. Cote, P. A. Doig, and K. E. Leslie. 1984. "Reproductive performance in dairy cows following postpartum treatment with gonadotrophin releasing hormone and/or prostaglandin: a field trial." *Can J Comp Med* 48: 245–250.
- Foote, R. H., and P. M. Riek. 1999. "Gonadotropin-releasing hormone improves reproductive performance of dairy cows with slow involution of the reproductive tract." *J Anim Sci* 77: 12–16.
- Galvão, K. N., M. Frajblat, W. R. Butler, S. B. Brittin, C. L. Guard, and R. O. Gilbert. 2010. "Effect of early postpartum ovulation on fertility in dairy cows." *Reprod Dom Anim* 45: e207–e211.
- Nash, J. G., L. Ball, and J. D. Olson. 1980. "Effects on reproductive performance of administration of GnRH to early postpartum dairy cows." *J Anim Sci* 50: 1017–1021.
- Padula, A. M., and K. L. Macmillan. 2002. "Reproductive responses of early postpartum dairy cattle to continuous treatment with a GnRH agonist (deslorelin) for 28 d to delay the resumption of ovulation." *Anim Reprod Sci* 70: 23–36.
- Stevenson, J. S., and E. P. Call. 1988. "Fertility of postpartum dairy cows after administration of gonadotropin-releasing hormone and prostaglandin F<sub>2</sub> $\alpha$ : a field trial." *J Dairy Sci* 71: 1926–1933.
- Thatcher, W. W., and C. J. Wilcox. 1973. "Influence of early estrus, ovulation, and insemination on fertility in postpartum Holstein cows." *J Dairy Sci* 56: 608–610.