

Comparison of the effect of estradiol benzoate plus progesterone and GnRH on the follicular wave emergence and subsequent follicular development in CIDR-treated, lactating dairy cows with follicular cysts

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Received 28 November 2005; received in revised form 18 March 2006; accepted 22 March 2006

Available online 18 April 2006

Abstract

This study examined the effect of estradiol benzoate (EB) plus progesterone (P4) as compared with GnRH on follicular wave emergence and follicular development, and synchrony of ovulation and pregnancy rates following a second injection of GnRH in a controlled internal drug release (CIDR)-based timed AI (TAI) protocol in lactating dairy cows with follicular cysts. Lactating dairy cows diagnosed with follicular cysts received a CIDR device, with an injection of 2 mg EB plus 50 mg P4 (EB + P4 group) or with an injection of 100 µg GnRH (GnRH group) at the beginning of the experiment (day 0). Thereafter, all received PGF_{2α} at the time of CIDR removal on day 7, GnRH on day 9, and TAI 16 h later. Follicular wave emergence occurred within 7 days in 12/15 EB plus P4-treated and 14/15 GnRH-treated cows ($P > 0.05$). The interval to wave emergence was longer in the EB + P4 group (4.8 ± 0.4 days) than in the GnRH group (2.0 ± 0.2 days). The mean diameters of preovulatory follicles and the proportion of cows with preovulatory follicles greater than 12 mm on day 9 did not differ between groups ($P > 0.05$). The proportion of cows with synchronized ovulations by 40 h after the GnRH injection on day 11 and pregnancy rates to TAI did not differ between the EB + P4 (13/15 and 36.7%) and the GnRH (14/15 and 53.3%) groups, respectively. Results suggest that a single treatment with EB plus P4 as compared with GnRH simultaneously with CIDR insertion in lactating dairy cows with follicular cysts will result in relatively asynchronous emergence of a new follicular

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wave, but subsequently similar sizes of preovulatory follicles and synchronous ovulation, resulting in similar pregnancy rates to TAI.

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Keywords: Dairy cows; Ovarian follicular cysts; CIDR; Estradiol benzoate; Progesterone; GnRH

1. Introduction

Ovarian cystic degeneration in cows is characterized by persistent anovulatory follicular structures in the absence of CL and interrupted or abnormal estrous cycles (Lopez-Diaz and Bosu, 1992). Ovarian cysts are a major reproductive disorder responsible for economic loss in the dairy industry (Bartlett et al., 1986; Borsberry and Dobson, 1989). Lack of release or inappropriate release of GnRH at the time of estrus appears to be an important pathological factor in development of ovarian cysts (Garverick, 1999). This condition may be the result of hypothalamic insensitivity to the estradiol surge caused by inadequate prior exposure to progesterone (P4) (Gümen and Wiltbank, 2002). GnRH, human chorionic gonadotropin (hCG), luteinizing hormone (LH), and P4 are frequently used to treat ovarian follicular cysts (Thatcher et al., 1993; Osawa et al., 1995; Garverick, 1997; Peter, 1998; Calder et al., 1999; Tebble et al., 2001; Todoroki et al., 2001), but treatment outcomes are highly variable.

Administration of GnRH, followed by PGF_{2α}, with or without exogenous P4, in cows with ovarian follicular cysts induced the recruitment of a healthy new ovarian follicle, resulting in timely ovulation in response to a second GnRH treatment or P4-removal (Ambrose et al., 2004). Recently, Kim et al. (2005) reported that insertion of a controlled internal drug release (CIDR) and GnRH injection in lactating dairy cows with ovarian follicular cysts could induce a new synchronous follicular wave emergence, timely follicular development and synchrony of ovulation following the second GnRH injection, resulting in an acceptable conception rate. Treatment with estradiol and P4 in CIDR-treated cycling beef or dairy cattle resulted in synchronous follicular wave emergence and, following CIDR removal, synchronous ovulation (Martinez et al., 2000; Cavalieri et al., 2003). The usefulness of this technique in lactating dairy cows with follicular cysts has not been clearly determined. We hypothesized that treatment with estradiol benzoate (EB) and P4, in addition to CIDR insertion, might reduce the LH level, resulting in atresia of the cysts and other large follicles, followed by a new follicular wave in response to increasing FSH in cows. Therefore, we assumed that administration of EB plus P4 might be used alternatively with GnRH at the time of CIDR insertion in a CIDR-based TAI protocol in lactating dairy cows with ovarian follicular cysts. Our objective was to evaluate the effect of EB plus P4 compared to GnRH in CIDR-treated lactating dairy cows with follicular cysts on follicular wave emergence and follicular development, and synchrony of ovulation and pregnancy rates following a second injection of GnRH.

2. Materials and methods

2.1. Herds and experimental animals

The present study was performed over the period from February to September 2005 on a large dairy herd (approximately 1000 milking cows) in Chungbuk province, central Korea. The herd received reproductive health checkups every week from veterinarians at the College of

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