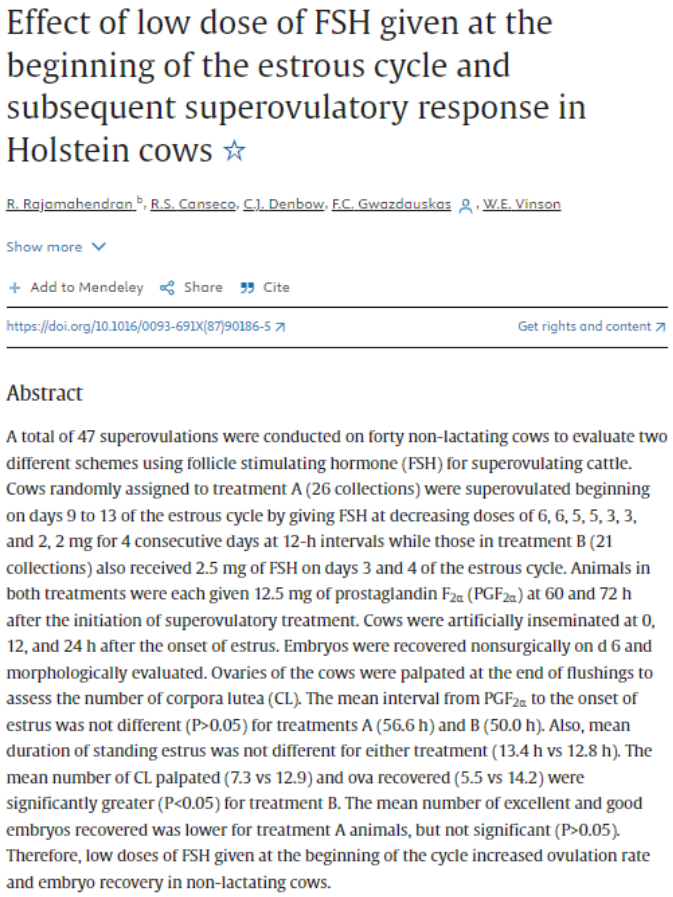
Improving the superovulation response in cows when treated with FSH (Stimufol) can be done through different approaches based on dosage adjustments, cycle synchronization, and combination with other hormones. Here are some conclusions from the relevant research:

1. Administration of a low dose of FSH early in the estrous cycle can increase ovulation rate and embryo recovery in non- lactating cows. (Rajamahendran et al., 1987) .



Effect of low dose of FSH given at the beginning of the estrous cycle and subsequent superovulatory response in Holstein cows ☆

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Abstract

A total of 47 superovulations were conducted on forty non-lactating cows to evaluate two different schemes using follicle stimulating hormone (FSH) for superovulating cattle. Cows randomly assigned to treatment A (26 collections) were superovulated beginning on days 9 to 13 of the estrous cycle by giving FSH at decreasing doses of 6, 6, 5, 5, 3, 3, and 2, 2 mg for 4 consecutive days at 12-h intervals while those in treatment B (21 collections) also received 2.5 mg of FSH on days 3 and 4 of the estrous cycle. Animals in both treatments were each given 12.5 mg of prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) at 60 and 72 h after the initiation of superovulatory treatment. Cows were artificially inseminated at 0, 12, and 24 h after the onset of estrus. Embryos were recovered nonsurgically on d 6 and morphologically evaluated. Ovaries of the cows were palpated at the end of flushings to assess the number of corpora lutea (CL). The mean interval from $PGF_{2\alpha}$ to the onset of estrus was not different ($P>0.05$) for treatments A (56.6 h) and B (50.0 h). Also, mean duration of standing estrus was not different for either treatment (13.4 h vs 12.8 h). The mean number of CL palpated (7.3 vs 12.9) and ova recovered (5.5 vs 14.2) were significantly greater ($P<0.05$) for treatment B. The mean number of excellent and good embryos recovered was lower for treatment A animals, but not significant ($P>0.05$). Therefore, low doses of FSH given at the beginning of the cycle increased ovulation rate and embryo recovery in non-lactating cows.

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2. Reducing the frequency of injections of pituitary extracts (Stimufol®) during superovulation showed similar results to a standard protocol, with a slight improvement in embryo quality (Adel et al., 2018) .

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Research Articles

Effect of the Reduction in the Frequency of Injections of Pituitary Extracts During a Superovulation on the Embryo Collection Results in Cows in Algeria

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Keywords: cattle, embryo production, pituitary extracts, superovulation.

Abstract

The aim of this study is to verify the efficacy of a superovulation treatment with 3 injections of pituitary extracts (Stimufol®) 24 hours apart and compare the results to a standard protocol (8 injections 12 hours apart), with a total dose of 500 µg. Twenty-three embryos collections were conducted after two superovulation protocols, the first with 8 injections 12 hours apart and decreasing doses (n = 11, group 1) and the second 3 injections at constant doses 24 hours of interval (n = 12, group 2). The average number of lutea corpora obtained is 9.1 per cow for group 1 and 10.4 in group 2. A total number of 140 embryos were collected with an average of 6.08 per cow. Among the embryos collected, 46 and 56 per cent were transferable respectively in group 1 and 2. A little quality gain was recorded in group 2 with an average transferable embryo of 3.8 against 2.2 for group1. In our study we observed the same efficacy for both treatments with a little quality improvement (almost one transferable embryo) when reducing the number of injections at the time of superovulation treatment, the same gain minimal in elite cows can have a significant economic impact.

3. Polymorphisms in the upstream region of the FSH receptor gene may be associated with superovulation traits in Chinese Holstein cows, indicating that FSH receptor is a potential marker for superovulation response (Yang et al., 2010) .

Polymorphisms in the 5′ upstream region of the FSH receptor gene, and their association with superovulation traits in Chinese Holstein cows

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Abstract

To identify a predictor to forecast superovulation response on the basis of associations between superovulation performance and gene polymorphism, variation in the bovine follicle stimulating hormone receptor (*FSHR*) gene was investigated using PCR-single-strand conformational (PCR-SSCP) and DNA sequencing. One single nucleotide polymorphism (SNP) of G-278A located in the 5′ upstream region of bovine *FSHR* gene was found in 118 Chinese Holstein cows treated for superovulation. Two SNPs of G-278A (GU253337) and A-320T (rs43676359) were analyzed. In polymorphic locus −278, all cows without superovulation response were mutations with genotypes of CD and DD. Cows with CC genotype had a significant increase in the total number of ova (TNO) ($P<0.01$), and produced more transferable embryos (NTE) than those of the CD and DD genotypes ($P<0.01$). At this locus, the additive effects seemed to be highly significant ($P<0.01$) and allele C was associated with an increase in the TNO and NTE. These results indicated that the FSHR is a potential marker for superovulation response and can be used as a predictor for superovulation in Chinese Holstein cows.

4. Plasma FSH levels of superovulated cows with daily FSH injections show the need to use two daily injections due to the relatively short half-life of FSH (Demoustier et al., 1988) .

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Determination of porcine plasma follitropin levels during superovulation treatment in cows

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Abstract

Porcine follicle stimulating hormone (pFSH) and porcine luteinizing hormone (pLH), are widely used to induce superovulation in cows. An advantage of this treatment is that the LH:FSH ratio can be varied to optimize the growth of the ovarian follicles. However, due to the relatively short half-life of FSH, the superovulatory treatment requires numerous injections.

A performant radioimmunoassay system (sensitivity–0.2 ng/ml plasma) was used to determine plasma pFSH levels in cows that were superovulated with 2 daily injections of 4 Armour Units (A.U.) of pFSH for 4 d. From plasma profiles, the half-life and the disappearance of pFSH were estimated at 5 h and at 10 to 12 h, respectively, confirming the necessity of using two daily injections.

5. Follicular dynamics and superovulatory response in cows treated with FSH-P in different endocrine states show that the endocrine environment can affect the superovulation response (Savio et al., 1991) .

Follicular dynamics and superovulatory response in Holstein cows treated with FSH-P in different endocrine states

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Abstract

The effect of follicular and/or endocrine environments on superovulatory response was tested. Eighteen nonlactating Holstein cows were superovulated with 32 mg FSH-P given in decreasing doses at 12-h intervals plus two injections of prostaglandin F2-alpha (25 mg each) on the third day of treatment. Cows were assigned randomly to treatments: T1, superovulatory treatment initiated on estrous cycle Day 10.5; T2, CIDR (intravaginal device containing 1.9 g of progesterone) inserted from Days 3 to 9 and superovulation initiated on Day 6.5; T3, identical to T2 but Buserelin (GnRH agonist) was injected (8 µg, i.m.) on Day 3 at the time of CIDR insertion. Embryos were recovered on Day 7 after the superovulatory estrus. Cows were examined daily by ultrasonography and blood was collected for progesterone and estradiol determinations. Mean diameter of the dominant follicle (frequency of first-wave dominant follicle) at the beginning of FSH injections was 13.7 mm (46), 11.2 mm (66) and 8.7 mm (66) ($P<0.01$) for T1, T2 and T3, respectively. Following initiation of superovulation, follicles moved into larger follicle classes (Class I, <3 mm; Class II, 3 to 4 mm; Class III, 5 to 9 mm; Class IV >9 mm) earliest in T1 ($P<0.01$). Cumulative follicular diameter and plasma concentrations of estradiol at Day 4 of superovulation were higher ($P<0.01$) in T1 (200 mm, 82 pg/ml) compared with T2 (123 mm, 24 pg/ml) and T3 (130 mm, 18 pg/ml). Proportion of cows in estrus prior to 12 h vs 12 to 24 h differed ($P<0.05$) between groups (T1: 5 vs 1; T2: 2 vs 4; T3: 1 vs 5). Mean number of follicles on the last day of superovulation treatment, number of CL and number of embryos plus unfertilized ova recovered were 17.5, 12.2 and 13.3; 13.8, 10 and 8.2 ($P<0.1$) and 8.7, 4.5 and 2.3 ($P<0.05$) for T1, T2 and T3, respectively. The developmental stage of the dominant follicle was associated with not only the number of ovulations, but also the size and periestrous concentrations of plasma estradiol associated with the recruited follicles.

6. A negative correlation was observed between the increase in progesterone concentration after the start of FSH treatment and the percentage of transferable embryos collected, suggesting an impact of progesterone on embryo quality (Tamboura et al., 1985) .

Superovulation in cows: A relationship between progesterone secretion before ovulation and the quality of embryos

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Abstract

Superovulation was induced in 28 cyclic cows by treatment with FSH and milk progesterone concentrations were studied from the initiation of treatment to oestrus. A negative correlation ($r = -0.66$; $P < 0.001$) was observed between the increase in progesterone concentration observed 2 days after the beginning of treatment and the percentage of transferable embryos collected. During this sampling period progesterone secretion was not related to ovulation rate and number of embryos.

These studies suggest several approaches to improve the superovulation response in cows treated with Stimufol, including adjustment of doses and treatment schedule, as well as consideration of individual genetic and endocrine factors.

7. **Ultrasonographic Monitoring** : Use ultrasound to monitor follicular development and adjust treatment accordingly.
8. **Stress Management** : Minimize animal stress during treatment, as stress can negatively affect the superovulation response.