RESEARCH REGARDING CONCEPTION RATE TO COWS USING HORMONOTHERAPY WITH GnRH AND PROSTAGLANDIN $F_{2\alpha}$

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Abstract

The sexual cycle is neuro-endocrine conditioned, and the smallest disturbances of the system may lead to its blocking. For example, after calving, the resumption of ovarian activity may be delayed, thus prolonging SP and CI respectively, ultimately leading to economic losses. There are often used hormonal blends in order to correct reproductive disorders or to intensify them. In the present paper, we aimed to evaluate two methods of oestrus induction in Holstein Friesian (HF) cows that did not come into heat in 60 days after calving. Batch L1, consisting of 91 cows, was treated with Gonadotropin Releasing Hormone (GnRH, 2.5 ml) and Prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$, 2 ml) according to the Ovsynch protocol. Batch 2, consisting of 27 cows, was treated with 2 doses of Prostaglandin $F_{2\alpha}$ (2 ml) at an interval of 11 days. All cows were artificially inseminated, both those with clinical signs of oestrus during treatment and those without signs (to 18 hours after the end of treatment for the L1 group and to 72 hours for the L2 group, respectively). The average conception rate in cows in the first batch was 45.1%, higher in those showing obvious signs of oestrus (54.2%) and lower in cows without clinical signs of oestrus (42.8%). In cows from group L2, the conception rate was lower than those from group L1 (37.0%). To the cows of group L0 (63 heads), which spontaneously came into heat in the first 60 days post-partum, the conception rate was 57.14%.

Key words: *Gonadotropin Releasing Hormone, Prostaglandin $F_{2\alpha}$, cow, oestrus, conception rate*

INTRODUCTION

A short interval between calving and conception is important from economical point of view in dairy cows' management. This interval is determined by the resumption of the ovary's cyclic activity after calving [1]. The oestrus induction is mainly based on two principles: 1. corpus luteum lysis by using synthetic analogues of prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) and 2. stimulation of follicular development, completed with ovulation by using synthetic analogues of gonadorelin (GnRH) [2]. The administration of PGF2α may be done in a single dose [3,4] with the oestrus appearance after 2-3 days or in two doses, at an interval of 11 days [4,5], heat appearing grouped after 72– 96 hours [4]. For the treatment to be effective, a functional corpus luteum must be present on the ovaries [6]. It involves 60-72% of cases if two injections are given. This scheme is more economically advantageous than using a single dose after corpus luteum palpation because it reduces the service period [7]. The Ovsynch protocol is based on the second principle, which aims to the follicular wave growth, the regression of the corpus luteum and the ovulation induction [4,8]. Artificial insemination may be done at a fixed time, 16-18 hours after GnRH.

Since some studies show that 23%-38% of dairy cows do not show oestrus in the first 60 days post-partum [1], in the present

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research we tested two ways of inducing oestrus using synthetic analogues of GnRH and prostaglandin $F_{2\alpha}$.

MATERIAL AND METHOD

The research aimed to shorten the time interval from calving to the appearance of the first estrous cycles to cows that did not come into heat in the first 60 days postpartum.

The research was carried out on 154 Holstein Friesian (HF) cows between the first and fifth calving. Milk production varied between 6000 and 7500 l of milk. The cows were kept in free-stall housing with an outside paddock. The shelter has a rest area with individual spaces.

The feeding was carried out with diets based on alfalfa hay and grasses, coated alfalfa, corn silage, beer wort, sunflower meal, concentrates and mineral-vitamin supplements, according to the feeding norms.

The feeding and maintenance conditions were in accordance with the requirements of the studied cattle category.

All the cows included in the study had eutocic calvings, and during the puerperal period they had no reproductive disorders (such as, accidents, injuries or infections) that would cause a delay in the onset of oestrus after calving.

The studied herd was grouped into 3 batches. The batch L3 consisted of 63 HF cows that went into heat during the first 60 days after calving and batches L1 and L2 consisted of cows that did not show estrus for 60 days postpartum. To the batches L1 and L2 were applied different hormonal treatment.

Batch L1, consisting of 91 cows, was treated with buserelin acetate with GnRH effect (Receptal) administered IM in a dose of 2.5 ml, on day 61 after calving, the moment being considered day 0. To cows that did not show oestrus, on the 7th day was administered IM luprostiol (Prosolvin 2 ml) with prostaglandin $F_{2\alpha}$ effect. On day 9, the second dose of GnRH (2.5 ml IM) was inoculated, and on day 10 (18 hours after GnRH) the cows were artificially inseminated, regardless of whether they showed signs of oestrus or not (the Ovsynch protocol, tab. 1).

Batch L2, consisting of 27 cows, was treated with prostaglandin $F_{2\alpha}$ according to the protocol presented in table 2. The first dose of prostaglandin $F_{2\alpha}$ (2 ml, IM) was administered on day 61 after calving, the time being considered day 0 of treatment. Cows not in heat were inoculated on day 11 with a second dose of prostaglandin $F_{2\alpha}$ (2 ml, IM). All animals were artificially inseminated 72 hours after the second dose of prostaglandin.

Heat detection was done twice/day (morning and evening) based on the following elements: the alert issued by the reproduction management system based on the motor activity of the cows and the decrease in milk production, external clinical signs (jumping and acceptance of jumping, the mucus of heat presence, agitation), internal clinical signs (vulvo-vaginal congestion, contractility of the uterus on palpation).

Table 1 Schematic presentation of the Ovsynch protocol for the batch 1 (L1)

Days of protocol			
0	7	9	10
The first GnRH administration (IM 2.5 ml)	Administration of prostaglandins $F_{2\alpha}$ (IM 2ml)	Second administration of GnRH (IM 2.5 ml)	Artificial insemination

Table 2 Prostaglandin $F_{2\alpha}$ administration protocol for the second batch (L2)

Specification	Days of protocol		
	0	11	14
No. of cows treated with prostaglandin $F_{2\alpha}$ (IM 2ml – first dose)	27		
No. of cows treated with prostaglandin $F_{2\alpha}$ (IM 2ml – a second dose)		16	Artificial insemination

Artificial insemination was performed in the second part of oestrus to cows with external clinical signs or at a predetermined time (18 hours after GnRH for group L1 and 72 hours after the second dose of prostaglandin $F_{2\alpha}$ for L2 batch). A single straw /oestrus was used.

After insemination, the conception rate was calculated, based on the clinical diagnosis of gestation performed 75-90 days after AI. The conception rate was calculated with the formula:

Rc (%)=Gx100/IA where:

Rc (%) – conception rate;

G – no. diagnosed gestant cows;

IA – no. artificially inseminated cows

RESULTS AND DISCUSSION

To batch L3, from the 63 artificial inseminated cows in the first 2 months after calving, 36 animals went in gestation, which represents a conception rate of 57.14%, with seasonal variations between 63.1% (spring) and 50% (summer). Frequently, the studied literature quotes values between 50% and 70% [9,10].

Results and discussions regarding the coming into oestrus

To the first treatment scheme (group L1), after the first administration of GnRH, 2 cows (2.2%) showed oestrus being identified based on external clinical signs. The low proportion of cows in heat suggests that to most cows the dose of GnRH did not lead to stimulation of the wave of follicular growth and ovulation in the first 6 days after treatment, possibly due to the existence of luteal bodies on the ovaries.

On the 7th day, 97.8% of the herd of cows received a dose of prostaglandin $F_{2\alpha}$ .On the 9th day, a new dose of 2.5 ml of GnRH was administered (tab. 1). On the same day, 8 cows showed oestrus (8.8% of the treated herd). On day 10, the remaining 81 cows (89% of the herd) were inseminated. Of these, 24 (26.4%) showed external clinical signs of oestrus. For 57 cows (62.6%) "blind insemination" was practiced (18 hours after GnRH administration) (tab. 3)

Table 3 Dynamics of artificial insemination in batch L1 (Ovsynch protocol)

Specification	Day of protocol					
	0	4	5	7	9	10
Action	GnRH			PG $F_{2\alpha}$	GnRH	
No./ % cows with evident clinic signs of oestrus		1/1.1	1/1.1		8/8.8	24/26.4
No./ % cows with pale clinical estrus						8/8.8
No./ % cows without clinical signs of oestrus						49/53.8
Total cows						91/100.0

From these, 8 cows (8.8%) presented clinical signs at the time of artificial insemination (slightly hypertonic and hyperkinetic uterus, quantitatively reduced cervical mucus observed at the time of cervix manipulation for the insemination). The fact that some of the treated cows (8.8%) showed only internal clinical signs suggests the need for internal clinical examination cows that do not show external clinical ones.

In conclusion, following the Ovsynch protocol, clinical signs of oestrus were present in 46.2% of the cows.

To the second treatment scheme (L2 batch), after the administration of the first dose of prostaglandin $F_{2\alpha}$, 11 cows (40.7%), grouped as follows: 6 cows (22.2%) on day 3, 4 (14.8%) on day 4 and one (3.7%) on day 7. There was noticed a poor oestrus synchronization after the first dose of prostaglandin $F_{2\alpha}$.

After 11 days from the first administration of prostaglandin $F_{2\alpha}$, the second dose was inoculated, and 72 hours later, the cows were artificially inseminated. In similar studies, hormonal dosing showed that after two doses of prostaglandin $F_{2\alpha}$ corpus luteum lysis can occur in 60% - 72% of cases [6].

Resulus and discussion regarding the conception rate

Following the Ovsynch protocol, 91 cows were artificially inseminated, 34 (37.4%) with obvious clinical signs, 8 (8.8%) with pale clinical signs and 49 (53.8%) without clinical signs. After 3 months, 17 cows (50.0%) from the first group, 3 cows (37.5%) from the second group and 21 animals (42.8%) from the group of cows without clinical signs were diagnosed as gestant (table no. 4).

Table 4 The conception rate to cows from first batch L1 (Ovsynch)

Day of protocol	Eveniment	Artificial inseminated cows (no.)	Gestant cows (no.)	Conception rate Rc (%)
0	GnRH			
4	Cows with evident clinical signs of oestrus	1	-	0
5	Cows with evident clinical signs of oestrus	1	-	0
7	PG $F_{2\alpha}$			
9	Cows with evident clinical signs of oestrus	8	4	50.0
10	Cows with evident clinical signs of oestrus	24	13	54.2
	Cows with pale clinical oestrus signs	8	3	37.5
	Cows without clinical oestrus signs	49	21	42.8
Total		91	41	45.1

To L1 batch, the conception rate in cows with well-expressed oestrus at the end of treatment (54.2%) was close to that of those that spontaneously came into heat (57.1%).

Insemination after treatment with GnRH and PG $F_{2\alpha}$ had an efficacy of 45.1%. The conception rate of 42.8% obtained to cows that were inseminated 18 hours after the end of treatment without showing signs of oestrus demonstrates that signs detection for oestrus is not mandatory with this scheme of treatment. With the same protocol, Britt obtained a conception rate of 47%, with seasonal fluctuations [3], and Stevenson,

30% to cows without clinical signs of oestrus and 55% in those with clinical signs [6].

Following prostaglandin $F_{2\alpha}$ protocol, among the 27 treated and artificially inseminated cows, 10 were in gestation, resulting in a conception rate of 37.0% (table 5).

This low value may be caused by the fact that the treatment was done to cows whose ovaries were not palpated to identify the corpora lutea, as recommended [3]. In similar experimental conditions, LeBlanc obtained a conception rate of 38.1% [7]. After a single dose of prostaglandin $F_{2\alpha}$, Britt recorded a 32% conception rate [3].

Table 5 Conception rate after prostaglandin $F_{2\alpha}$ administration

Specification	No. cows	Cows in oestrus		Artificial inseminated cows	Gestant cows	Conception rate
		No.	%	No.	No.	%
First dose of $PGF_{2\alpha}$	27	11	40.7	11	4	36.4
Second dose of $PGF_{2\alpha}$	16			16	6	37.5
Total				27	10	37.0

Stevenson obtained similar conception rates in the two treatment schemes (GnRH - $PGF_{2\alpha}$ - GnRH, respectively two doses of $PGF_{2\alpha}$) [11], while Aral and Colac calculated higher conception rates when the GnRH treatment was used, although the rate of oestrus discovery was better in the treatment with prostaglandin $F_{2\alpha}$ alone [12]. The results of using the two treatment schemes are highly variable, being influenced by numerous experimental factors.

CONCLUSIONS

Resumption of the reproductive function appreciated by the gestation occurrence was achieved at the end of the 10-day protocol with GnRH and prostaglandin $F_{2\alpha}$, for 45.1% of the cows that did not show oestrus in the first 2 months after calving.

Lower results with 8% were obtained using two doses of prostaglandin $F_{2\alpha}$, to an interval of 11 days.

Both treatment schemes represent possibilities to reduce the service period.

For superior results, we consider it necessary to clinically evaluate the ovaries before starting each treatment scheme.

The analysed treatments made it possible to carry out synchronized inseminations, completed with the gestation occurrence.

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