The Influence of Synthetic Analogues of PgF2α on the Evolution of Puerperal Period and the Duration of the Interval from Calving to the First Estrus in Cows

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Abstract

Puerperal period is the most critical period from the productive life of females, at the borderline between physiologic and pathologic. In this stage some reproductive turbulence may appear (uterine subinvolution, uterine infections, ovary inactivity, etc.), which may lead to the increase of the interval between calving and first estrus manifestation. The aim of our paper was to reduce the interval between calving and the firs estrus, also the reduction of the incidence of some impediments of the reproductive function in cows, after calving. For this purpose 500 mcg Cloprostenol were administered at different intervals from calving (12, 24, hours and 7 days). At experimental lots, the interval from calving to first estrus was, on average, 37.57 days, and at control lot it was 45.2 days. Regarding to the impairing of the reproductive function, uterine subinvolution, evaluated at 14 days from calving, it was 26.78% at experimental lots and 33.33% at control lot, and uterine infections were, on average, 14.8% at experimental lots and 16.2% at control lot. In conclusion, administration of synthetic analogues of PgF2α, in the first week after calving, has a negative influence on puerperal period and interval from calving to first estrus manifestation.

Keywords: cow; estrus; puerperal period; synthetic analogues of PgF2α

1. Introduction

Puerperal period is the most critical stage of female reproductive period, at the border line between physiologic and pathologic. In this period some perturbations of the reproductive function may appear (uterine subinvolution, uterine infections, ovarian dysfunctions, etc.) which may lead to extending of the interval between calving and the manifestation of the first oestrus, puerperal period has a decisive role for the cow reproduction. The duration of the puerperal anoestrous has a significant influence over the reproductive performances [1]. The frequency of postpartum anoestrous is higher in cows with high milk productions [2].

During puerperal period the uterine involution occurs, and the hypothalamic - pituitary – ovarian complex is resuming the hormonal production and sexual steroids. The clinical and subclinical uterine infections, from this period, negatively influences the ovarian function [3-5].

Reduced PgF2α uterine secretions during puerperal period extends the duration of the postpartum anoestrus and predispose the animal to uterine infections [3, 4].

The aim of this paper was to use PgF2α synthetic analogues to reduce the duration of the postpartum anoestrous and the incidence of some perturbations of the reproductive function. Also, we aimed to establish the optimal moment for administering PgF2α after calving in order to shorten the postpartum anoestrous.

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2. Materials and methods

The experiments were conducted in 2012-2013 in two familial cattle farms, with Romanian Red Spotted breed, from Ghilad village, Timis County.
As synthetic analogue from PgF2α we used the commercial product Proliz, in 0.500mcg/dose. The product was administered at 3 cow lots: at 12 hours, 24 hours and 7 days after calving. The uterine evolution in puerperal period was monitored at 14 and 21 days from calving, by transrectal examination. In control lot and experimental lot cows with uterine subinvolution were highlighted from the control in 14 and 21 days, also those with puerperal uterine infections at the control in day 21 from calving.
Al the cows from experimental and control lots the manifestation of the first signs of heat were monitored. The cows were inseminated after voluntary waiting period.

3. Results and discussion

In this paper we present the results of experiments through which we monitored the efficiency of synthetic analogues of PgF2α on the evolution of the puerperal period, also the establishment of the optimal moment for administration of the preventive treatment with PgF2α.
In table 1 the influence of synthetic analogues of PgF2α on the evolution of the puerperal period is presented. At 14 and 21 days from calving transrectal exams were performed in order to establish the degree of involution of the reproductive tract and the presence of the uterine infections also.

Table 1. The influence of PgF2α on the evolution of the puerperal period

Lot	N	Uterine subinvolution				Puerperal uterine infections at 21 days	
		14 days		21 days			
		n	%	n	%	n	%
Experimental	56	15	26.78[a]	1	1.78	8	14.28[a]
Control	21	7	33.33[b]	-	-	5	23.8[b]

a-b ($p<0.05$)

The experimental lot was formed of 56 cows which were administered 0,500 mcg Cloprostenol (Proliz) at 12 or 24 hours or 7 days after calving. At clinical transrectal examination at 14 days after calving, 15 cows were identified with uterine subinvolution, which represents 26.78 %, at 21 days examination one cow was identified with uterine involution (1.78%). At control lot, formed from 21 cows, at 14 days from calving 7 cows were identified with uterine subinvolution (33.33%), and at 21 days none of the cows were identified with uterine involution. The differences between the experimental lot and control are significant ($p<0.05$).
Regarding the cows with puerperal uterine infections, at 21 days from calving, from the 56 cows from the experimental lot, 8 cows (14.28%) were identified with puerperal infections. From the 21 cows in the control lot, 5 (23.8%) were with uterine puerperal infections. The differences are significant ($p<0.05$).
From the data presented in this table, it can be noticed that PgF2α hurried the uterine involution at 14 days from calving (26.76% cows with uterine subinvolution), compared with control lot at which the incidence of uterine subinvolution was 33.33%. With respect to the uterine infections, PgF2α contributed to significant reduction of the cows with puerperal uterine infections (14.28%) compared with cows from control lot (23.8%).
In table 2 are presented the influence of synthetic analogues of PgF2α on the manifestation of the first estrus from calving. After three weeks from calving, the cows that manifested signs of heat were monitored.
Al the 16th cows that PgF2α was administered at 12 hours from calving, the average interval from calving until first estrus was 42.04± 0.462 days. At the cows which PgF2αwas administered at 24 hours from calving, the mean interval between calving and first estrus was 38.08±0.321 days. At the 56 cows from the experimental lot which PgF2α was administered at different intervals post calving, the mean interval from calving until first estrus manifestation was 37.57±0.256 days.
At the cows from control (21 cows) lot the mean interval from calving until first estrus manifestation was 45.2±0.642 days. The differences were significant ($p<0.05$).

Table 2. Influence of PgF2α on the manifestation of the first estrus after calving

Interval from calving to administering PgF2α	N	Interval from calving to first estrus (days) $\overline{X \pm S_x}$
12 hours	16	42.04 ± 0.462^{a}
24 hours	18	38.08 ± 0.408^{a}
7 days	22	34.09 ± 0.312^{b}
Experimental lot $\bar{X}$	56	37.57 ± 0.256^{a}
Control lot	21	45.2 ± 0.642^{b}

a-a ($p>0.05$) a-b ($p<0.05$)

From the data presented in this table, it can be noticed that PgF2α administration after calving contributes to the significant reduction of the interval from calving and the manifestation of the first estrus. In reference to PgF2α administration it can be noticed that the best results are obtained when PgF2α is administered at 7 days from calving, compared with administration at 12 or 24 hours from calving ($p<0.05$).

4. Conclusions

Administering of PgF2α (0.500 mcg Cloprostenol) after calving is speeding the uterine involution at 14 days (26.76% cows with 33.33% uterine subinvolution) compared with the control lot ($p<0.05$).

PgF2α contributes to the significant reduction ($p<0.05$) of the uterine puerperal infections (14.28% at experimental lots) compared with control lot (23.8%).

The mean interval from calving until the manifestation of the first estrus from calving is 37.57±0.256 days, at experimental lots and at control lot 45.2± 0.642 days, the differences are significant ($p<0.05$).

The best results are obtained when PgF2α is administered at 7 days from calving. The mean interval from calving until first estrus is 34.09± 0.312 days compared with the administration at 12 or 24 hours (42.04± 0.462; 38.08± 0.408) ($p<0.05$)

References

1. Lucy, M.C. Fertility in high-producing dairy cows: reasons for decline and corrective strategies for sustainable improvement. Soc Reprod Fertil Suppl, 2007, 64:237–54.

2. Opsomer, G, Grohn, Y.T, Hertl, J, Coryn, M, Deluyker, H, de Kruif, A. Risk factors for post partum ovarian dysfunction in high producing dairy cows in Belgium: a field study. Theriogenology, 2000, 53:841–57.

3. Sheldon, I.M, Noakes, D.E, Rycroft, A.N, Pfeiffer, D.U, Dobson, H. Influence of uterine bacterial contamination after parturition onovarian dominant follicle selection and follicle growth and function in cattle. Reproduction, 2002, 123:837–45.

4. Peter, A.T., P.L.A.M. Vos, D.J. Ambrose. Postpartum anestrus in dairy cattle. Theriogenology, 2009, 71, 1333–1342.

5. Mateus, L, da Costa, LL, Bernardo, F, Silva, JR. Influence ofpuerperal uterine infection on uterine involution and postpartum ovarian activity in dairy cows. Reprod Domest Anim, 2002, 37: 31–5.