
Study on luteal tissue treatment in angus cows with natural and synthetic analogue of prostaglandins

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Abstract

The objective of this study was to evaluate the effects of prostaglandins (natural and synthetic analogues) on estrous synchronization in beef cows. The study was carried out between May – August 2019 in a private unit in Timis County, and involved 54 Aberdeen Angus cows diagnosed with ovarian luteal tissue: corpus luteum (n=36 cows), cystic corpus luteum (n= 8 cows) and luteal cysts (n=10 cows). Two products were used for the treatment of this pathology: PGF Veyx Forte (n=27 cows) and Enzaprost (n=27 cows). The interval between hormonal treatment and the onset of estrous was ranging from 48-96 hours. In this trial 83.33% of the animals expressed signs of estrous. In the present experiment the conception rate after the artificial insemination was 71.11%.

Keywords: beef, corpus luteum, prostaglandin

Introduction

In no other species of farm animal is reproductive efficiency more important than in the cow. Gestation length is relatively long in the cow (283 days) and so any loss of production time is amplified many times over. At best, a cow can produce only one calf per year. The use of AI in combination with effective synchronization protocols can reduce the number of days open and accelerate genetic progress [7].

Reproductive management programmes based on strategic use of prostaglandin F₂ alpha (PGF₂ alpha) to induce and synchronize oestrus in cows are widespread. Prostaglandin F_{2α} (PGF_{2α}) and prostaglandin analogues (PGF) are luteolytic in cattle and other domestic species and usually induce oestrus when given during the luteal phase of the oestrous cycle. The interval between administration of the hormone and onset of oestrus ranges from 2 to 6 days [1, 9].

Three important factors regarding PGF as a treatment for estrus synchronization must be considered. Firstly, it is necessary that a functional corpus luteum (CL) be present for PGF to be effective. Early postpartum anestrus cows and prepuberal heifers are not good candidates for PGF protocols because they will not have a functional CL. Secondly, the CL prior to Day 5 after ovulation is nonresponsive to a single injection of PGF [6, 11]. The third factor to take into account when using PGF, is the great variability in the interval from treatment to behavioral estrus and ovulation among treated animals. In the presence of a responsive CL, estrus can be induced by a single administration of PGF; however, the interval to the resulting estrus and ovulation is dependent on the stage of development of the dominant follicle at the time of treatment [4, 5].

Estrous synchronization gives many beef cattle producers the opportunity to capture the economic benefits of artificial insemination (AI). Because AI involves a substantial investment of labor and time, most commercial farms or ranches will not utilize this technology unless this investment can be confined to a period of less than 5 to 7 days. To make the labor requirements of AI compatible with modern beef cattle breeding, the estrous cycle must be synchronized so that a high percentage of treated females show a fertile, closely synchronized estrus.

Compared with rectal palpation, ultrasound examination has been shown to be a more sensitive and specific method: 95% sensitivity and 100% specificity vs 95% and 95.7%, respectively, for rectal palpation [8]; 84% sensitivity and 71% specificity vs 79% and 40%, respectively, for rectal palpation [2].

Material and methods

The study was carried out between May – August 2019 in a private unit in Timis County, and involved 93 Aberdeen Angus older than 24 months.

After performing the rectal palpation (RP) and the ultrasound examination of the bovine female genital tract several ovarian luteal tissue disorders were observed: corpus luteum (n=36 cows), cystic corpus luteum (n= 8 cows) and luteal cysts (n=10 cows).

Luteal cysts formed a thicker wall of luteal tissue around their outer edges. Luteal cysts are often larger than normal corpus luteum.

A major advantage of ultrasound when dealing with these cysts is its ability to distinguish a luteal cyst from that of a very young corpus luteum (day 5 or 6 of the estrous cycle). An early corpus luteum also have a fluid-filled lumen and cobwebs as it continues to luteinize. Using rectal palpation, it is extremely difficult to palpate an early corpus luteum let alone distinguish it from a luteal cyst as they both have similar palpable features, but can be more clearly differentiated with an ultrasound.

Since luteal cysts invariably have luteal tissue and produce progesterone, the best treatment for resolving them is administration of prostaglandin F₂ α to initiate luteolysis.

All animals were divided in 2 equal groups (n=27 cows): 18 cows with CL, 4 cows with cystic corpus luteum and 5 cows diagnosed with luteal cysts.

The treatment in group 1 was performed with an synthetic analogues of prostaglandins – Cloprostenol (PGF VEXX FORTE, Intervet; Netherlands) and for group 2, a natural prostaglandin was chosen – Dinoprost (ENZAPROST). One ml solution of PGF Veyx Forte contains 0.263 mg Cloprostenol. A single intramuscular administration was performed in all cows in group 1 and the dose was 0.5 mg / animal (2 ml / animal). The cows from group 2 received 5 ml Dinoprost/animal (25 mg Dinoprost) in unique dose.

After the treatment the following parameters were investigated: estrous onset, duration and intensity of estrous, pregnancy rate.

Results and discussions

All the investigations in this trial were performed at cows that were more than 60 days after calving. At the ultrasound examination the luteal cyst presented the wall thicker, with a size larger than 4 mm. Regarding the cystic corpus luteum the diagnosis was set when at the ultrasound examination was found that the cavity of the corpus luteum was bigger than 1 cm.

After the hormonal treatment the animals were monitored until first clinical signs of estrus were detected.

The animals in group 1 expressed more intense signs of estrus than those in group 2: most females allowed other animals to mount them, the vulva was swollen and reddish, the area around the tail was wet and dirty, clear mucus from the vulva.

The onset of synchronized estrous was calculated from the time of administration of hormone to the time of first appearance of estrous symptoms. In group 1 the mean interval between cloprostenol treatment and the onset of estrous was 55.72 hours ranging from 48-96 hours. In this group, 5 cows did not express signs of estrous (Table 1). Regarding group 2 the mean interval between dinoprost treatment and the onset of estrous was 56.87 hours ranging from 48-97 hours.

In this group, 4 cows did not express signs of estrus (Table 1). Similar results in beef cattle were recorded (54.2 hours) [10].

The average duration of estrous in group 1 was 22.45 hours with limits between 18-36 hours and in group 1 the mean duration of estrous was 22.21 hours with individual values between 19-35 hours.

In our study the proportions of cows detected in estrus was 81.48% in group 1 and 85.18% in group 2. A study from 2002 reported values of estrous response between 44-100% depending on the dose of Cloprostenol used [3].

The cows detected in estrous were artificially inseminated.

After 32 days the gestation confirmation was performed. A total of 32 pregnant cows (71.11%) were diagnosed after the first gestation examination. In group 1 16 cows were pregnant (72.72%) and in group 2 a number of 16 cows (69.56%) were positives after performing the pregnancy exam (table 1). At the second pregnancy exam 9 cows were diagnosed with 1st degree ovarian hypotrophy and in 4 cows chronic endometritis was found.

Table 1. Fertility parameters recorded

Parameters	Values	
	Group 1	Group 2
Estrus response rate (%)	81.48 (22/27)	85.18 (23/27)
Onset of estrus (hours)	55.72	56.87
Duration of estrus (hours)	18-36	19-35
Conception rate (%)	72.72	69.56

Conclusions

It is possible to conclude that the treatment of ovarian luteal tissue disorders with prostaglandins (natural and synthetic analogue) is an efficient method for estrous synchronization in beef cattle.

The type of corpus luteum or the pathology of luteal tissue did not influence the pregnancy rates of bovine.

The overstimulation of the mammary gland by the calves leads to the transformation of the ovary with a corpus luteum into 1st degree ovarian hypotrophy.

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