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UTERINE INVOLUTION AND REPRODUCTIVE PERFORMANCE OF LACTATING FRIESIAN COWS TREATED WITH OXYTOCIN AND PROSTAGLANDIN ($PGF_{2\alpha}$) AT CALVING

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ABSTRACT

This study was carried out at Sakha Experimental Station, belonging to Animal Production Research Institute to evaluate the effects of oxytocin (OT) and prostaglandin (PG) administration within 6-12 h of calving on uterine involution and reproductive efficiency of lactating Friesian cows. Total of 15 multiparous Friesian cows with normal parturition averaging 400-650 kg live body weight, 2-7 parities and 2.5-3.5 body condition score were used in this study. Animals were divided into three groups, 5 animals in each. Animals in the 1st group were i.m. injected with saline solution (control). Animals in the 2nd and 3rd groups were administrated with an i.m. injection of 50 IU OT and 3 ml PG (Estromate). Animals in all groups were administrated during the same injection schedule (6-12 h of calving). Routine examination of the genitalia per rectum was conducted once weekly to judge the uterine involution by ultrasonography to determine diameter of uterine horns (gravid and non-gravid), uterine body, length and diameter of cervix and vaginal length. Pregnancy was diagnosed by rectal palpation on day 45 post-insemination, days open (DO) and number of services per conception (NSC) were recorded. Results showed that diameter of non-gravid horns showed insignificantly slight reduction during post-partum period in each group. Diameter of gravid horns decreased ($P<0.05$) up to day 35 in control group, versus days 21 and 28 of post-partum in OT and PG groups, respectively. Diameter of the uterine body reduced ($P<0.05$) in OT and PG up to day 21 of post- partum as compared to day 28 in the control group, thereafter uterine horn diameter showed insignificant reduction in each group. Cervical length and diameter reduced ($P<0.05$) up to day 28 in the control group versus day 21 in OT and PG groups. The changes in vaginal length were not significant during post-partum in each group. Period elapsed from parturition to detectable symmetrical uterine horns was shorter in OT and PG groups (29.9 and 28.4 d) than in the control group (33.7 d), respectively. However, nearly complete cervical closure occurred earlier in treatment groups (26.8 d for OT and 25.5 d for PG groups) than in the control one (28.6 d), but the differences were not significant. It is of interest to note that resumption of vaginal length had the same duration, being on day 14 of post-partum period in all groups. Conception rate (CR) within 120 days of post-partum period was 66.7, 80 and 40% in OT, PG and control groups, respectively. Increasing CR of cows in PG group was associated with greater NSC (1.5 services) and longer DO (79.8 d) than those in the control group (1.0 service and 47.5 d, respectively). However, cows in OT group showed greater NSC and longer days open (2.5 services and 80.5 d., respectively).

In conclusion, prostaglandin treatment within 6-12 h of calving (i.m. injection of 3 ml Estromate) as a purpose of stimulating involution had pronounced effect on the duration of uterine involution and improving reproductive performance of Friesian cows in term of conception rate.

Keywords: Cows, uterine involution, oxytocin, prostaglandin, reproduction.

INTRODUCTION

During the bovine puerperal stage, involution of the uterus has an important role in a cow to becoming pregnant again. During involution, the size of the uterus markedly decreases beside morphological changes of the endometrium. The greatest reduction in the uterine size in normal cows occurs during the first few days after parturition (Gier and Marion, 1968). According to some authors, uterine regression processes accelerate between days 10 and 14, reaching its final size and diameter by day 25 post-partum (Morrow *et al*., 1966). However, the time of complete involution can vary within wide ranges; 25 to 50 days after parturition in cows (Gier and Marion, 1968; Morrow *et al*., 1969).

Uterine muscle activity is important in the process of involution. A contractile uterus is advantageous in removing excessive fluid and debris from the uterine lumen early post-partum. There was a high variability among individual animals (Bajcsy *et al*., 2005). Treatment protocols, in which uterotonic drugs are applied during the puerperal phase, in order to increase uterine contractility, aim to accelerate the process of involution. The uterotonic drugs, used in bovine practice during the post-partum period, include natural prostaglandin F2α (PG) or its synthetic analogues (Eulenberger *et al*., 1986; Kündig *et al*., 1990; Sobiraj *et al*., 1998), parasympathomimetics (e.g. carbachol) (Eulenberger *et al*., 1986), calcium borogluconate (Sobiraj *et al*., 1998), β-sympatholytics (e.g. carazolol) (Sobiraj *et al*., 1998), or ergot alkaloids (e.g. ergometrin) (Eulenberger *et al*., 1986; Kündig *et al*., 1990).

Uterine involution and diameter of uterine horns can be monitored directly using transrectal ultrasonography (Kamimura *et al*., 1993; Sheldon *et al*., 2003), palpation per rectum (Kindahl *et al*., 1999), or indirectly by estimating the concentration of PGF2*α* metabolite or acute phase proteins in serum (Sheldon *et al*., 2001).

The therapeutic use of prostaglandins, in order to evacuate the puerperal uterus, is questionable. Use of PGF2*α* is common during the early post-partum period to improve uterine involution (Lindell and Kindahl, 1983; Nakao *et al*., 1997) and fertility in dairy cattle (Archbald *et al*., 1993 and 1994). Although some results suggested a beneficial effect from using endogenous uterine PG synthesis (Lindell *et al*., 1982) or exogenous PG treatment (Lindell and Kindhal, 1983) for shortening the puerperal period by promoting uterine contractility, but some studies failed to show an effect of PG on myometrial activity (Bosu *et al*., 1984; Thompson *et al*., 1987). Early post-partum application of PGF2*α* increased myoelectrical activity and contraction of the uterus (Patil *et al*., 1980; Gajewski *et al*., 1999).

Also, OT preparations can be used as a single treatment or as repeated applications to induce an uterotonic activity increase during the early puerperal phase in cows. They are mainly administered as intramuscular injections, but intravenous, subcutaneous, epidural, intravaginal treatment forms have also been reported (Kündig *et al*., 1990; Sobiraj *et al*., 1998; Starke *et al*., 1998).

In general,, no contradictory results have been reported for oxytocin (OT) preparations as compared to PG. Few studies have quantified their uterotonic effects when given shortly (within 12 h) after calving (Burton *et al*., 1990). The effectiveness of any of these drugs depends on the existence and receptivity of membrane receptors, which are more or less specific for each drug. The presence of a disulphide bridge was shown not to be a prerequisite for the interaction of OT, with its specific receptors, to occur (Barth *et al*., 1973).

To realize the optimum economic return of Friesian cows, the number of calves produced per dam life time must be maximized. As pregnancy in the Friesian cow lasts an average of 285 days, the goal of producing one calf/ cow/year is achievable only if cows conceive by 60 days post-partum. No further data are available on the effect of PG or OT administration immediately post-parturition to reduce uterine involution period on Friesian cows in Egypt. Therefore, the aim of the present study was to evaluate to what extent a single treatment with either PG or OT, 6 to 12 h after normal parturition, influences uterine involution and conception rate of Friesian cows.

MATERIALS AND METHODS

This study was carried out at Sakha Experimental Station, belonging to Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt, during the period from January 2012 to May 2012.

Animals and management:

This study was conducted on 15 multiparous cows with normal parturition having 400-650 kg live body weight (LBW), 2-7 parities and 2.5-3.5 body condition score (BCS). All experimental animals had normal parturition with placental drop duration from 8 to 12 hours and did not develop any reproductive disorders after calving.

During the experimental period, animals were submitted to the ordinary system applied at the station, being indoors all over the year and were fed on diet that met both maintenance and production requirements. The type of offered feed differed according to the season was green feeding system including concentrate feed mixture (CFM) plus fresh Egyptian berseem (*Trifolium alixandrinum,* 2^{nd}-4^{th} cut) and rice straw (RS).

Experimental design and treatments:

The experimental animals (n=15) were divided into three similar groups, according to their LBW and milk production, 5 animals in each. Animals in the 1^{st} group were intramuscularly (i.m) injected with saline solution (0.9% NaCl) and served as a control group (G1). Animals in the 2^{nd} group (G2) were administrated an i.m. injection of 50 IU oxytocin (OT), while those in the 3^{rd} group (G3) were administrated an i.m. injection of 3 ml prostaglandin ($PGF_{2\alpha}$-Estromate). All injections were within 6-12 hours after calving.

Estromate (Novartis Pharma, S.A.E. Cairo, under licence from Novartis Pharma, AG., Basle, Switzerland) was supplied in ampoules, each one (1 ml) contained 0.2 mg methylergometrine hydrogen maleate. However, OT (ADWIA Co. S.A.E. 10^{th} of Ramadan City, Egypt) was in vials containing 100 ml, each ml contained 10 IU of OT.

Milking and suckling system:

During the 1^{st} week post-partum, calves in all groups were left with their dams for 3-4 days to receive the colostrums, and then it was artificial suckled until weaning. Thereafter, all cows were milked twice daily at 7:00 h and 17:00 h by milking machine.

Experimental procedures:

Routine examination of the genitalia per rectum was conducted once weekly to judge the uterine involution. Diameter of uterine horns (gravid and non-gravid), body and cervix as well as length of cervix were determined using ultrasonography examination. However, vaginal length was measured manually throw the rectum. Uterine involution was considered complete when both gravid and non-gravid horns were nearly in symmetrical measure and no further change took place between two consecutive examinations in diameter of horns or cervix (Miettinen, 1990 and Hussain-Shah *et al*., 1990).

Real time ultrasonography equipment (Aquila, pie medical company) with a 8.0 MHz linear rectal transducer was used to determine diameter of uterine horns and cervix by placing the transducer in a transversal position in relation to the horns and cervix at its middle section; distance between the outer surfaces was obtained.

Artificial service was used as a method of breeding in the farm under the current study for all cows in heat 50 days post-partum. For each cow, the date of service was recorded and thereafter followed up for estrus return 21 days later. The non-return animals were rectally examined 45 days after the first breeding for pregnancy diagnosis and in any doubtful case, the examination was repeated 2 weeks later.

Conception rate (CR) was determined by dividing the total number of conceived cows by the number of served ones without considering the number services required for each cow to conceive.

Statistical analysis:

The obtained data were statistically analyzed according to Snedecor and Cochran (1982) using computer programme of SAS (2004) to test the significant changes in measurements of uterine horns, cervix and vagina by advancing pos-partum period within each group. The differences in duration of symmetrical horns (gravid and non-gravid), cervical closer and resumption of vaginal length were tested among the experimental groups. The statistical model was: $Y_{ij} = \mu + A_i + e_{ij}$. Where: Y_{ij} = observed values, μ = Mean, A_i = post-partum day or group and e_{ij} = random error. Duncan multiple range test was used to test the differences among means (Duncan, 1955).

The differences in diameter of uterine horn for all groups between gravid and non-gravid horns were tested using T-test.

RESULTS AND DISCUSSION

Post-partum changes in uterus:

Uterine horns:

Data in Table (1) showed that diameter of uterine gravid horns significantly (P<0.05) reduced in all experimental groups during post-partum period, with different trends in each group. However, diameter of non-gravid horns showed insignificantly slight reduction in each group during post-partum period. Diameter of gravid horns showed significant (P<0.05) decrease up to day 35 of post-partum period in control group, versus day 21 and 28 in OT and PG groups, respectively (Table 1). Such observation may indicate earlier uterine horn symmetry with OT than PG treatment, and both treatments showed earlier uterine horn symmetry than the control group.

Table (1): Changes in diameter (cm) of gravid and non-gravid uterine horns of Friesian cows in the experimental groups at successive post-partum days.

PP-day	Control group		Treatment group			
			OT		PG	
	Gravid	Non-gravid	Gravid	Non-gravid	Gravid	Non-gravid
7	3.66±0.36[a]	3.04±0.16	3.66±0.23[a]	2.66±0.12	3.30±0.32[a]	2.54±0.27
14	3.42±0.31[ab]	2.82±0.21	3.08±0.14[a]	2.48±0.18	2.92±0.24[ab]	2.44±0.25
21	3.00±0.24[ab]	2.66±0.24	2.56±0.12[b]	2.36±0.19	2.66±0.23[ab]	2.18±0.13
28	2.82±0.20[ab]	2.64±0.24	2.40±0.14[b]	2.25±0.18	2.44±0.13[b]	2.16±0.12
35	2.62±0.22[b]	2.58±0.27	2.26±0.07[b]	2.23±0.18	2.38±0.10[b]	2.12±0.14

a and b:: Means denoted within the same column with different superscripts are significantly different at P<0.05. PP: Post-partum

When overall diameter in all groups was compared in gravid with non-gravid horns, it is of interest to note that the differences in diameter between both horns were significant up to day 21 of post-partum period, thereafter the differences were not significant and both horns showed symmetric case (Fig. 1).

The present study evaluated the morphological changes in mean diameter to indicate the interval to be involuted in term of constant measures at successive days or nearly symmetry in diameter of gravid and non-gravid horns. The detected higher measurements of gravid horns within the 7-days of post-partum period was mainly due to the gravid uterus is a large flabby sac lying in the abdominal cavity during the first 24–48 h after calving (Chauhan *et al*., 1977) and the uterus was considered completely involuted when it returns to its pre-conception size, tone and location in the pelvic cavity (Hussain-Shah *et al*., 1990).

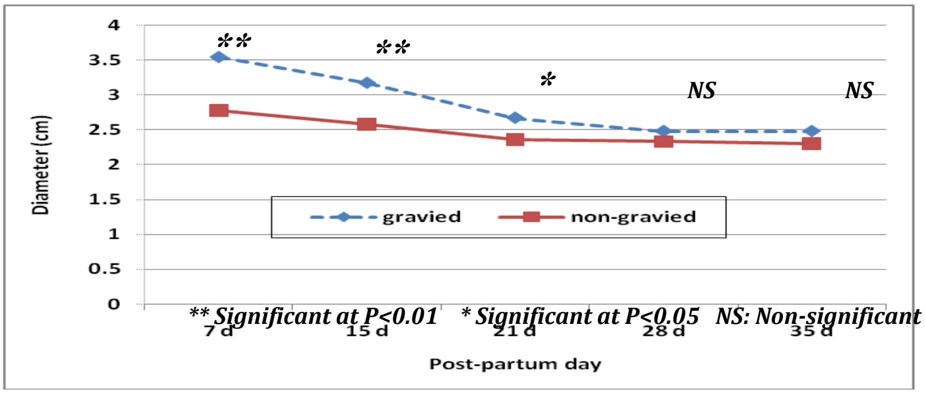

Fig. (1): Changes in overall diameter (mm) of gravid and non-gravid horns in all groups during post-partum period (day).

Also, the gravid horn becomes located on the pelvic brim by day 14 (Usmani and Lewis, 1984), then in the pelvic cavity by days 21–25 (Roy and Luktuke, 1962). However, (El-Azab *et al*., 1984) recorded that the mean intervals necessary for complete uterine involution of buffaloes were 35.3 and 27.8 days for gravid and non-gravid horns, respectively.

Uterine body:

Results presented in Table (2) showed that mean diameter of the uterine body significantly (P<0.05) decreased in all groups during post-partum period, with different rates of reduction among groups. Diameter of the uterine body significantly (P<0.05) reduced in OT and PG up to day 21 of post-partum as compared to day 28 in the control group, thereafter uterine horn diameter showed insignificant reduction in each group.

Table (2): Changes in diameter (cm) of uterine body of Friesian cows in the experimental groups at successive post-partum days.

PP-day	Control group	Treatment group	
		OT	PG
7	4.66±0.23^{a}	4.94±0.25^{a}	4.88±0.27^{a}
14	4.10±0.18^{ab}	4.34±0.29^{a}	4.18±0.25^{a}
21	3.92±0.29^{ab}	3.22±0.29^{b}	3.04±0.22^{b}
28	3.76±0.22^{b}	3.06±0.24^{b}	2.82±0.19^{b}
35	3.22±0.23^{b}	2.96±0.16^{b}	2.80±0.18^{b}

a and b:: Means denoted within the same column with different superscripts are significantly different at P<0.05. PP: Post-partum

In accordance with the present results, (Morrow, 1969) found during involution in post-partum dairy cows that, the size of the uterus markedly decreases. This reduction in size was relatively slow during the first 10 days, but was followed by a period of markedly increased uterine tone and reduction in its size during the next 10-14 days post-partum.

Uterine size is a key indicator of uterine involution (Zemjanis, 1970). In this respect, (Aboul-Fadle, 2000) reported that the diameter of the uterus is halved by day 5 post-partum and its length is halved by day 15 post-partum and the uterus regains its normal size on day 19 to 21 if there is no pathological affection.

Cervix:

Data in Table (3) showed that length and diameter of the cervix showed significant (P<0.05) reduction by advancing post-partum period in all experimental groups. Both cervical length and diameter significantly (P<0.05) reduced up to day 28 in the control group versus day 21 in both OT and PG groups. (El-Azab *et al*., 1984) recorded that the mean intervals necessary for complete cervical involution was 26.1 days in buffaloes.

Table (3): Changes in cervical measures (cm) of Friesian cows in the experimental groups at successive post-partum days.

PP-day	Control group		OT		PG	
	Length	Diameter	Length	Diameter	Length	Diameter
7	$8.4{\pm}0.40^{a}$	$4.00{\pm}0.26^{a}$	$8.5{\pm}0.24^{a}$	$4.06{\pm}0.15^{a}$	$8.0{\pm}0.45^{a}$	$3.74{\pm}0.26^{a}$
14	$8.2{\pm}0.49^{ab}$	$3.62{\pm}0.35^{ab}$	$8.1{\pm}0.58^{a}$	$3.64{\pm}0.18^{ab}$	$7.2{\pm}0.37^{ab}$	$3.18{\pm}0.17^{ab}$
21	$7.5{\pm}0.37^{ab}$	$3.18{\pm}0.38^{ab}$	$6.9{\pm}0.40^{b}$	$3.04{\pm}0.21^{b}$	$6.4{\pm}0.40^{b}$	$2.84{\pm}0.13^{b}$
28	$7.0{\pm}0.32^{b}$	$3.00{\pm}0.30^{b}$	$6.6{\pm}0.24^{b}$	$2.74{\pm}0.15^{b}$	$6.2{\pm}0.37^{b}$	$2.60{\pm}0.21^{b}$
35	$7.0{\pm}0.32^{b}$	$2.90{\pm}0.30^{b}$	$6.6{\pm}0.24^{b}$	$2.70{\pm}0.13^{b}$	$6.2{\pm}0.37^{b}$	$2.60{\pm}0.21^{b}$

a and b:: Means denoted within the same column with different superscripts are significantly different at P<0.05. PP: Post-partum

Vagina:

Results of changes in vaginal length during post-partum period (Table 5) revealed insignificant changes in this measure within each group, although there was marked decrease in vaginal length by advancing post-partum period within each group. This trend was mainly attributed to wide variation in vaginal length between animals within each group at each post-partum day.

It is of interest to note that vaginal length in each group showed pronounced reduction between day 7 and 14 of post-partum period, while slight changes were observed between 21 and 35 days, indicating resumption of vaginal length on day 14 of post-partum period in treatment and control groups.

Table (5): Changes in vaginal length (cm) of Friesian cows in the experimental groups at successive post-partum days.

PP-day	Control group	Treatment group	
		OT	PG
7	18.4±1.89	20.8±1.20	20.8±2.29
14	17.0±1.76	19.2±1.02	18.6±1.57
21	15.8±1.20	18.0±1.67	17.6±1.44
28	15.6±1.21	16.8±1.16	17.0±1.52
35	15.6±1.21	16.8±1.16	17.0±1.52

The differences within each group due to post-partum day are not significant.

Complete uterine involution:

Results presented in Table (6) revealed that the period elapsed from parturition to detectable symmetrical uterine horns was affected significantly (P<0.05) by treatment, being shorter in OT and PG groups (29.9 and 28.4 d) than in the control group (33.7 d), respectively. However, nearly complete cervical closure occurred earlier in treatment groups (26.8 d for OT and 25.5 d for PG groups, respectively) than in the control one (28.6 d), but the differences were not significant. It is of interest to note that resumption of vaginal length had the same duration, being on day 14 of post-partum period in all groups.

Table (6): Effect of treatment on symmetrical horns and cervical closure of Friesian cows at successive post-partum days.

Item	Control group	Treatment group	
		OT	PG
Duration (day) of:			
Symmetric horns	33.7±1.34[a]	29.9±1.22[ab]	28.4±0.98[b]
Cervical closure	28.6±2.62	26.8±1.71	25.5±3.13
Resumption of vaginal length	14.0±0.00	14.0±0.00	14.0±0.00

a and b:: Means denoted within the same column with different superscripts are significantly different at P<0.05. PP: Post-partum.

Based on anatomical features used in this study, the complete uterine involution occurred at an interval averaging 33.7 day-post-partum in the control group. In dairy cows, the combined data showed that involution of the uterus occurred on the average 37.7 days following parturition with a standard deviation of 14.5 days (Perkins and Kidder, 1963). This period was considerably longer than the 26.2 days reported by Casida and Venzke (1936) and 29.4 days as reported by Casida and Wisnicky (1950) and shorter than the 47 days as reported by (Buch *et al*., 1955).

In buffaloes, uterine and cervical involution was completed at an average of 28.5 days post-partum in Egyptian buffaloes (Abdel-Khalek *et al*., 2012) or 26.4 days post-partum in Mehsani buffaloes (Suthar *et al.*, 2004), which is lower than that occurred in Friesian cows in this study. Harbac (2006) suggested marked variation in uterine involution according to breed, age and parity.

Based on the present results, cows treated with OT or PG showed nearly similar earlier uterine involution than that occurred in the control cows in terms of symmetric horns (gravid and non-gravid), cervical closure and resumption of vaginal length. The nearly similarity in the effect of both treatment is possibly due to a similarity in the membrane receptors' affinity towards either OT or PG. Data available in the literature indicate a rapid decline in OT receptor concentrations during the first day after parturition (Fuchs *et al*., 1992). However, there is no information available on the early post-partum changes in uterine prostaglandin receptor concentrations. (Bajcsy *et al*., 2006) found that a single i.m. injection of 50 IU OT, administered between 13 and 15 h after parturition, did not significantly alter FG-metabolite concentrations in the peripheral plasma in early post-partum cows.

The main effect of OT treatment appeared to increase the frequency of myometrial contractions (Bajcsy *et al*., 2006). OT acts directly on the myometrium and also indirectly, through the local endometrial release of $PGF_{2\alpha}$ (Guay and Lamothe, 1980). Increased OT release together with an increase in OT receptor concentrations, cause the release of PG from the endometrium (Schams, 1987). Indeed, $PGF_{2\alpha}$ given twice daily for 10 d starting on d 3 post-partum decreased the time of uterine involution by about 1 wk (Lindell and Kindahl, 1983).

Uterine contractility is necessary for the clearance of intrauterine fluid after bacterial infusion in cows. Few studies have quantified the uterotonic effects of oxytocin if administered shortly (within 12 h) after calving (Burton *et al*., 1990). In buffaloes, (Abdel-Khalek *et al*., 2012) reported that administration of OT following parturition slightly decreased the mean interval to complete uterine involution. However, (Bajcsy *et al*., 2006) indicated that administration of 50 IU OT i.m. elicited similar uterotonic effects in healthy, early post-partum cows (Between 14 and 16 h after parturition). It turned out that OT significantly increased the uterine contractility, mainly during the first post-treatment hour. Also, Eulenberger *et al*. (1986) reported that while the effect of OT, administered either intravenously or intramuscularly, ceased within 2 h.

In the same way, Bajcsy *et al*. (2006) evaluated the myometrial effects of OT showing a fast response to OT, which suggested that at the time of treatment (between 14 and 16 h after calving), the uterus was still sensitive to OT. The uterotonic effect of OT started within approximately ten minutes after treatment, and lasted over the next two hours. During the third hour, uterine activity returned to its initial levels, and by the twelfth hour, had dropped to the level of the control group, at around 50% of the own initial levels.

Generally, the biological effect of uterotonic drugs depends on several factors. The molecular structure of a drug, its dosage and the method of administration determine, amongst others, the intensity, the rapidity of onset, and the duration of a specific, uteromotoric response. However, for the manifestation of such a response, the availability of sufficient specific, drug sensitive receptors in the myometrium and the endometrium, as well as a sufficient number of gap junctions between the myometrial cells, are crucial (Bajcsy *et al*., 2006).

Reproductive performance:

The pregnancy diagnosis revealed that 4 out of 5 cows in PG group conceived, representing the highest conception rate (80%) versus 66.7 and 40% in OT and control groups, respectively. Increasing conception rate of cows in PG group was associated with greater number of services per conception (1.5 services) and longer days open (79.8 d) than those in the control group (1.0 service and 47.5 d, respectively. However, cows in OT group showed greater number of services per conception and insignificantly longer days open (Table 7).

Table (7): Effect of treatment on reproductive performance parameters of Friesian cows within 120 days post-partum.

Item	Control group	Treatment group	
		OT	PG
No. of treated animals	5	5	5
Served cows (n)	5	3	5
Conceived cows (n)	2	2	4
Conception rate (%)	40	66.7	80
NSC/cow	1.0±0.0	2.5±1.5	1.5±0.3
Days open (d)	47.50±9.50	80.50±31.50	79.75±9.47

Uterine involution that has to be grossly completed between 28.4 and 33.7 days post-partum in all cow groups is the most factor of those are limiting restoration of ovarian function after calving (Van De Plassch, 1981). The uterus plays an important role in the resumption of ovarian functions during the post-partum period and re-initiation of normal cyclic activity post-partum depends on the return of the uterus to non-gravid size and function (Schirar and Martinet, 1982). Therefore, (Chauhan *et al*., 1977) indicated that the uterine involution has an important role in a cow to becoming pregnant again.

Inspite the observed similarity of OT and PG on uterine involution in this study, the noticed higher reproductive performance in PG than in OT group may be associated with estrogen level during treatment time. Some authors suggested that the decreased plasma estrogen levels in the cow around calving could impair the effect of oxytocin in a very early post-partum uterus, because estrogen may stimulate the synthesis of endometrial oxytocin receptors (Eulenberger *et al*., 1986; Kündig *et al*., 1990).

CONCLUSION

Based on the foregoing results, it was found that the prostaglandin ($PGF_{2\alpha}$) treatment showed beneficial effects similar to oxytocin treatment on uterine involution, meanwhile prostaglandin treatment had superiority on conception rate and number of services per conception within 90 days-post-partum than oxytocin treatment. Therefore, the present study could conclude that prostaglandin treatment within 6-12 h of calving (i.m. injection of 3 ml Estromate) as a purpose of stimulating involution had pronounced effect on the duration of uterine involution and reproductive performance of Friesian cows

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عودة الرحم لوضعه الطبيعى والكفاءه التناسليه لأبقار الفريزيان الحلابه المعامله بهرمون الأوكسيتوسين أو البروستاجلاندين عند الولاده

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أجريت هذه الدراسة بمحطة بحوث الانتاج الحيوانى بسخا التابعة لمعهد بحوث الانتاج الحيوانى لتقييم تاثير الحقن بكل من هرمونى الاوكستوسين والبروستاجلاندين خلال 6–12 ساعه بعد الولادة على عودة الرحم الى وضعه الطبيعى والكفاءة التناسلية لابقار الفريزيان الحلابة. استخدم فى هذه التجربة 15 بقرة فريزيان حلابة بعد الولادة مباشرة تتراوح اوزانها من 400-650 كجم وعدد ولادات من 2-7 مواسم. تم تقسيم الحيوانات الى ثلاث مجموعات (5 حيوانات لكل مجموعه) وكانت المعاملات كالاتى:

المجموعة الاولى: تم حقنها بمحلول ملح فسيولوجى عند الولادة كمجموعه ضابطة (كنترول)، وتم حقن حيوانات المجموعة الثانية والثالثة بهرمون الاوكستوسين (50 وحدة دولية/رأس) و3 مل/رأس من هرمون البروستاجلاندين (الاستروميت) خلال من 6-12 ساعة بعد الولادة. تم إجراء الفحص الروتينى للجهاز التناسلى عن طريق الجس الشرجى باليد مرة أسبوعيا لتتبع عودة الرحم لوضعه الطبيعى. كما تم إجراء الفحص باستخدام جهاز الموجات فوق الصوتية مباشرة لقياس قطر قرنى وجسم الرحم وعنق الرحم وطول المهبل وعنق الرحم. تم إعتبار الرحم فى وضعه الطبيعى مكتملا عند تقارب قرنى الرحم (الذى حدث به حمل والذى لم يحدث به حمل) فى القطر. كما تم تشخيص الحمل با ستخدام الجس الشرجى عند اليوم 45 بعد التلقيح, تم تسجيل وحساب كل من فترة الايام المفتوحة وعدد التلقيحات اللازمة للاخصاب خلال فترة 120 يوم بعد الولاده.

اوضحت النتائج ان التقلص فى قطر القرن الذى لم يحدث به حمل كان بسيطا وغير معنوى داخل كل مجموعه. زاد التقلص فى قطر قرن الرحم الذى حدث به الحمل معنويا فى مجموعة الكنترول حتى اليوم 35 مقابل يومى 21 و28 بعد الولادة فى مجموعتى الاوكستوسين والبروستاجلاندين. زاد التقلص فى قطر جسم الرحم معنويا فى مجموعتى الاوكستوسين والبروستاجلاندين حتى اليوم 21 بعد الولادة مقابل اليوم 28 فى مجموعة الكنترول. زاد التقلص فى طول وقطر عنق الرحم فى مجموعة الكنترول حت اليوم 28 يوم مقابل اليوم 21 فى مجموعتى الاوكستوسين والبروستاجلاندين. كان التقلص فى طول المهبل غير معنوي فى كل المجموعات. كان وقت عودة التماثل بين قرنى الرحم بعد الولادة أقل فى مجموعتى الاوكستوسين (29.9 يوم) و البروستاجلاندين (28.4 يوم) مقابل 33.7 يوم فى مجموعة الكنترول. حدث قفل عنق الرحم مبكرا وبدون فروق معنويه فى اليوم 26.8 فى مجموعة الاوكستوسين وفى اليوم 25.5 فى مجموعة البروستاجلاندين مقابل 28.6 يوم بعد الولاده فى مجموعة الكنترول. تم رجوع المهبل لوضعه الطبيعى فى توقيت واحد فى كل المجموعات (14 يوم من الولادة). خلال 120 يوم بعد الولادة زادت نسبة الخصوبة فى مجموعة البروستاجلاندين (80%) صاحبها زيادة فى عدد التلقيحات اللازمة للاخصاب (1.5 تلقيحة) و الايام المفتوحة (79.75 يوم) عنه فى مجموعة الكنترول (40%، تلقيحة واحده و47.5 يوم، على التوالى)، بينما أظهرت مجموعة الاوكستوسين أعلى عدد للتلقيحات اللازمة للاخصاب (2.5) و عدد الايام المفتوحة (80.5 يوم) و نسبة اخصاب متوسطه (66.7%).

فى ضوء النتائج السابقة نستنتج ان المعاملة بالبروستاجلاندين فى خلال 6-12 ساعة بعد الولادة (3 مل استروميت/رأس) تؤدى الى التحفيز على عودة الرحم لوضعه الطبيعى مع تحسين الكفاءة التناسلية لابقار الفريزيان الحلابة وخصوصا نسبة الخصوبه.

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