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Prevention of Retention of Placenta in Lactating Friesian Cows with Dystocia and its Relation with their Productive and Reproductive Efficiency and Blood Constituents

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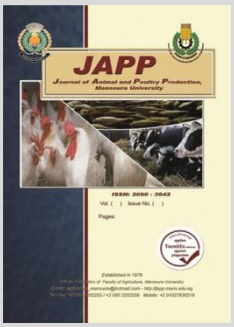

ABSTRACT

Twenty-eight of lactating Friesian cows about 5 – 10 years and 575 – 725 kg weight had dystocia and single-calf parturition were used in the present study. The experimental animal were divided into four groups (7 animals /group). Cows in the first group were administrated with 10 ml of saline solution (0.9 NaCl) intramuscularly injection and kept as a control. The second, third, and fourth groups were treated with oxytocin (OX) at a level of 50 I.U., prostaglandin F_2 alpha (PG) at a level of 500µg and methargin (MT) at a level of 20 mg, with 10 ml of saline solution, intramuscularly injection, respectively. The results showed that, cows administrated with OX, PG or MT recorded decrease ($P<0.05$) in the period from parturition to complete fetal membranes drop and uterine involution, ovarian structure, first estrus postpartum, days open and service period as well as number of services per conception and calving interval, and increase ($P<0.05$) the heat period length as compared to in the untreated cows, moreover cows that had received PG or MT had better values than cows that had received OX. Also, OX, PG and MT treatments increased ($P<0.05$) the actual milk yield compared with untreated. Values of total leukocytic count, immunoglobulins IgG and IgM, total protein and albumin and thyroid hormones T_3 and T_4 as well as glucose were increased ($P<0.05$) in all treated groups, while values of cortisol were decreased ($P<0.05$) as compared to in the untreated group, moreover the best values were recorded with cows that were treated with PG or MT compared with cows that were administrated with OX. The highest percentages of the incidence of postpartum reproductive disorders were recorded for untreated cows, which can be decreased by administration of cows with OX, or avoided by PG or MT treatments within ½ hour postcalving. In conclusion, it can be recommended to administer lactating Friesian cows with dystocia with prostaglandin F_2 alpha at a level of 500 µg, or methergin at a level of 20 mg, with 10 ml of saline solution (0.9% NaCl) intramuscularly injection, respectively, within ½ hour after expulsion of the fetus to avoid retention of fetal membranes, postpartum complications and improve subsequent reproductive performance and blood constituents as well as milk yield and its economic efficiency under the Egyptian conditions.

Keywords: Dairy cows, oxytocin, $PGF_{2\alpha}$, Methergin, reproductive, milk yield, blood constituents.

INTRODUCTION

Postcalving time (pureperium) is of a paramount value in the reproductive and productive performance of cows (Waheeb-Reham *et al.*, 2010). Aberration of the postpartum period include retained placenta, cystic ovaries, metritis/ endometritis, uterine prolapase, and pyometra are major causes of infertility in the postpartum period (Alharoon, 2018). The fetal membranes (RFM) are normally expelled within 3-8 hours after calving in dairy cows (Beagley *et al.*, 2010), and its retention for more than 12 – 24 hours is considered retained placenta (Mohamed and Amer, 2009 and Abou-Aiana *et al.*, 2019). There are many factors influencing the incidence of retained fetal membranes like abortion, dystocia, multiple birth, poor body condition scores, age, nutritional deficiencies, and hormonal imbalance (Grunert, 1986). Abnormal parturition or puerperal complications leads to retention of placenta and its negative sequel on reproductive performance of cows (Ahmed *et al.*, 2004; Kumari *et al.*, 2014 and Solanki *et al.*, 2019), further associated with enhanced risk for endometritis and metritis (Mc Dougall, 2001). High levels of prostaglandin $F_{2\alpha}$ or PG E_2 are released from the uterus during the early postcalving time in cows, may play an important role in both placental separation and uterine involution (Slama *et al.* 1994).

For the prevention or treatment of retention of placenta, injections of ecbolic drugs as oxytocin, prostaglandin F_2 alpha ($PGF_{2\alpha}$) or methylergometrine have been administrated within 24 hours of parturition (Nosier *et al.*, 2012 and Solanki *et al.* 2019). Time elapsed from parturition to complete fetal membranes drop was shorter in cows received oxytocin or methylergometrine maleate/ intramuscularly injection than in untreated cows (Azad *et al.*, 2016 and Madhwal *et al.*, 2019). Also, the usage of methylergometrine or $PGF_{2\alpha}$ immediately postpartum reduced ($P<0.05$) the incidence of retained fetal membranes and improved reproductive performance in cows (Hussein and Metwally, 2004 and Solanki *et al.*, 2019). Additionally, administration of 500 µg $PGF_{2\alpha}$ or 50 I.U. oxytocin via umbilical artery or intramuscular injection immediately after expulsion of the fetus induce early expulsion of placenta and improving the reproductive and productive efficiency of cows experienced retention of fetal membranes (Alharoon, 2018 and Abou-Aiana *et al.*, 2019).

Kudlac *et al.* (1995) estimated the blood biochemical parameters in cows with or without retained placenta and found that values of (total protein, calcium, alkaline phosphates and asparate aminotransferase) mostly ranged within the interval of reference values. On contrast, levels of AST and ALP enzymes were enhanced in cows with dystocia in comparison with cows experiencing normal calving (Hussein and Abd Ellah, 2008). From clinical and economical point of view, prevention rather than therapy of this complication (retention of fetal membranes) is

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very important with regard to general health status and subsequent reproductive and productive performance of the herds.

The objective of this work was to clarify the impact of treating lactating Friesian cows with dystocia with exogenous oxytocin, prostaglandin F_2 alpha or methergin (methy lergometrine maleate) within ½ hour after parturition on the time of placental separation, and subsequent reproductive and productive performance, blood constituents and economic efficiency under the Egyptian conditions.

MATERIALS AND METHODS

The present experiment was performed at El-Gemmizah Experimental Station, El-Gharbiya Governorate, belonging to the Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt, during the period from June 2019 to August 2020.

Cows and treatments:

Twenty-eight of lactating Friesian cows showed apparently general health conditions and clinically free of internal, external and blood parasites, with an average live body weight of 650 ± 75 kg and aged 5 – 10 years with dystocia in the current parturition were randomly divided into four groups (7 animals /group). Cows in the first group were injected intramuscularly (i. m.) with 10 ml of saline solution (NaCl 0.9%) once at ½ hour postcalving, and considered untreated group. The 2nd, 3rd and 4th groups were injected intramuscularly with oxytocin (produced by Novartis Pharma- Switzerland) at a level of 50 i.u. with 10 ml of saline solution, prostaglandin $F_{2\alpha}$ (produced by Pfizer Egypt, S.A.E. Cairo, under license from Pfizer, Italy) at a level of 500 µg with 10 ml of a saline solution and methylergometrine maleate (Methergin, produced by Novartis pharma- Switzerland) at a level of 20 mg with 10 ml of saline solution, respectively, once at ½ hour postcalving.

Previous complete breeding history of each cow was obtained from the farm records. Cows were fed individually on a concentrate feed mixture (CFM), which included [wheat bran (30%), yellow corn (25%), undecorticated cotton seed meal (28%), rice bran (10%), molasses (3.5%), limestone (2%), sodium chloride (1%) and minerals mixture (0.5%)], rice straw (RS) and berseem hay (BH), in order to meet the nutritional allowance of lactating Friesian cows (NRC, 2001), whereas minerals blocks and fresh and clean water were available during the day. The experimental cows were maintained in a common exercise area with open housing and given individual feeds twice daily at 8.00 a.m. and 4 p.m. Chemical composition of feedstuff (Table 1) was analyzed according to A.O.A.C. (1995).

Postpartum reproductive performance:

Once delivery was completed, each cow was put under continual observation to record the interval from parturition until complete drop of the fetal membranes. The duration of postcalving uterine secretion (Lochia discharge) from calving to complete cessation was estimated. Complete uterine involution was recorded by rectal examination at regular interval (twice weekly) until complete involution of the internal genital organs. Also, ovarian structures were calculated as the first appearance of corpus luteum (CL) on the ovary after parturition. All experimental cows were visually observed for detection of estrus behavior, by using teaser bull introduced for 3 times/day at 7 a.m., 12 p.m. and 5 p.m. Each cow came in estrus was artificially inseminated twice a day within 10 – 12 h interval with straw of the thawed-frozen semen, by recto-vaginal insemination technique (Salisbury *et al.*, 1978). Pregnancy diagnosis was performed by rectal palpation on day 60 after insemination. Interval from parturition to first estrus and conception (days open) were measured. Thereafter, service period length, number of service per conception, gestation period length, calving interval and conception rate were calculated.

Table 1. Chemical compositions and feeding values of various feedstuffs used in the experimental rations

Item	Ingredients diet		
	BH	RS	CFM
Chemical composition (% on DM basis)			
DM	91.27	92.11	91.38
OM	89.37	85.94	90.43
CP	11.69	3.10	16.81
EE	1.31	1.61	2.90
CF	33.48	38.89	16.22
NFE	42.89	41.22	54.50
Ash	10.63	15.18	9.57
Feeding values % of DM basis			
TDN%	57.46	53.93	62.78
DCP%	7.67	-0.58	12.58
DE (MCal/Kg DM)	2.53	2.38	2.77
ME (MCal/Kg DM)	2.11	1.95	2.35
NE (MCal/Kg DM)	1.29	1.20	1.42

Total Digestible Nutrients (TDN) = 129.39- 0.9419 (CF+ NFE);
Digestible Crude Protein DCP= 0.9596 CP- 3.55;
Digestible Energy (DE) = 0.04409 (TDN %);
Metabolizable Energy (ME) =1.01(DE) - 0.45;
Net Energy (NE) = 0.0245 (TDN %) - 0.12 (based on NRC, 2001)

Postpartum reproductive disorders:

Cows with partial or complete retained placenta more than 12 hours were considered cases with retention of placenta according to (Grunert, 1986). Also, abnormal discharged lochia (color, odor and consistency) diagnosed by inspection and vaginal examination (Arthur *et al.*, 1992). In addition, cows were considered to have puerperal endometritis when there was white or yellowish white discharge which may or may not malodor, by rectal examination, the uterus was poorly involuted with doughy feel and thickened uterine wall (Lowder, 1993).

Milk samples and analysis:

Just after delivery, all animals were allowed to nurse their offspring for a week postcalving; thereafter, the cows transferred to the milking unit and artificially milked twice daily at 6 a.m. and 6 p.m. Milk yield was recorded daily for each cow. Milk samples (2 milking/day) were well mixed and analyzed biweekly using Milkoscan apparatus.

Blood samples and analysis:

Samples were taken from the jugular vein from each cow in heparinized test tube just before and immediately after parturition, and once weekly up to conception. Samples were divided into two equal parts. The first part was taken for estimating total and differential leukocytic count according to Schalm *et al.* (1975). The second part was immediately centrifuged at 1500 g for 10 minutes to separate plasma and stored at -20ºC until biochemically analysis.

Protein fractions and hormonal profile:

Levels of total proteins and albumin in plasma were estimated according to Peters (1968) and Doumas *et al.* (1971). Levels of thyroid hormones (T3 and T4) and cortisol hormone were estimated by the radioimmunoassay (RIA) procedure using the coated tubes kits purchased from (Diagnostic Products Corporation, Los Angeles, CA, USA) according to the procedure outlined by manufacturer.

Immunoglobulins and glucose:

Blood plasma immunoglobulins (IgM or IgG) were determined according to Killingsworth and Savory (1972). Glucose was estimated according to Trinder (1969).

Statistical analysis:

Statistical analysis of data was done by ANOVA using SAS (2004). Comparisons among means were made using Duncan's multiple rang test (Duncan, 1955).

RESULTS AND DISCUSSION

Fetal membranes drops and uterine involution:

Fetal membranes drop (FMD) and its frequency distribution, and uterine involution (UI) are presented in Table 2. Time required from parturition to complete placenta drop was affected (P<0.05) by OX, PG or MT treatments of cows. Among administrated groups, it was insignificantly the shortest in cows administrated with MT as compared to those treated with OX or PG (3.14 vs. 4.29 and 4.14 days), respectively. The marked reduction of time elapse from calving to complete fetal membranes drop for cows treated with OX, PG and MT was associated with about 85.71, 100% and 100% of treated cows, respectively, recorded FMD within 5 hours following parturition as compared to about 14.28% of untreated cows. While, about 14.29% and 42.86% of cows treated with OX and untreated cows showed FMD within 13 – 24 hours after parturition. Generally, the highest value of retention of fetal membranes was recorded for untreated cows, which can be prevented by injecting some ecbolic drugs as OX, PG or MT of cows within ½ hour after parturition, especially with MT or PG, which showed the highest prevention (100%) compared with OX administration (85.71%) under the Egyptian condition.

Our results came in agreement with those of (Waheeb-Reham *et al.*, 2010; El-Roos *et al.*, 2012 and Alharoon, 2018). Nosier *et al* (2012) found that dairy cows treated with oxytocin or methylergomterine maleate (Methergin) had significantly reduced retention of placenta and enhanced reproductive parameters compared with untreated cows. These finding is in harmony with those reported by (Alharoon, 2018 and Abou-Aiana *et al.* 2019) who found that treatment of $PGF_{2\alpha}$ or oxytocin via umbilical artery or intramuscular injection immediately after expulsion of the fetus induce early expulsion of the placenta and improving the reproductive and productive performance of Friesian cattle experienced retention of fetal membrane. Roberts (1986); Husseian and Metwally (2004) and Nosier *et al.* (2012) reported that administration of methylergomterine maleate or similar drugs developed from the ergot, may be had beneficial effect than oxytocin in cases of atonic myometrium because of its prolonged oxytocin effect. In contrast, Miller and Lodge (1984) found no difference in the time and rate of placenta removed in animals that received oxytocin (OX) at level of 100 I.U. intramuscularly within 3-6 hours following parturition compared with that in the untreated cows.

Table 2 reflecting that, the time required from parturition to complete cervical closure (CC) normal position of the uterus (PU) and uterine horns symmetricity (UHS) were earlier (P<0.05) in all administrated cows compared with that in the control cows. Generally, the cows treated with PG or MT recorded the shortest values of time required from parturition to complete CC,UP and UHS as compared to oxytocin-treated cows, while untreated cows recorded the longest (P<0.05) values. This observation clearly indicated that $PGF_{2\alpha}$ or methergin (Methylergometrine) were accelerated that postpartum uterine involution in Friesian cow. In same trend was observed with (Khatri *et al.* 2013; Hanan, 2015 and Abou-Aiana *et al.*, 2019) who demonstrated that time required from calving to complete uterine involution was significantly shorter in $PGF_{2\alpha}$-treated cows than that recorded for either oxytocin-treated and control cows. Also, (Solanki *et al.*, 2019) found that administration of methylergometrine or $PGF_{2\alpha}$ immediately after parturition in Gir cows hastened (P<0.05) the uterine involution.

Table 2. Fetal membranes drop and its frequency distribution and uterine involution of lactating Friesian cows treated with various drugs during the early post calving.

Item		Control (C)	Treated groups		
			Oxytocin (OX)	$PGF_{2\alpha}$ (PG)	Methergin (MT)
Fetal membranes drop (hours)		13.14 ± 2.56[a]	4.29 ± 1.40[b]	4.14 ± 0.21[b]	3.14 ± 0.40[b]
Within 5 hours	Frequency	14.28	85.71	100	100
Within 6-12 hours	distribution	42.86	-	-	-
Within 13-24 hours	(%)	42.86	14.29	-	-
Overall		100 %	100 %	100 %	100 %
Uterine involution (day):					
Closure of the cervix/day		34.86 ± 3.83[a]	15.00 ± 1.02[b]	10.28 ± 0.87[b]	11.71 ± 1.11[b]
Position of the uterus/day		65.14 ± 6.91[a]	30.50 ± 2.51[b]	19.57 ± 1.38[b]	23.43 ± 1.46[b]
Uterine horns symmetricity/day		84.29 ± 9.34[a]	39.00 ± 2.39[b]	25.43 ± 1.76[b]	28.14 ± 1.83[b]

a-b: Values with different superscripts within, a row are significantly different (P<0.05).

Rapid and earlier fetal membranes drop and uterine involution after administration of PG or MT may be due to immunepotentiating effect of prostaglandin F_2 alpha or methylergometrine maleate. Additionally, administration of exogenous uterotonic products as $PGF_{2\alpha}$ or methylergometine have been shown to decrease plasma progesterone and increase plasma estrogen concentrations which resulted in enhancement of immunity or uterine contractions to help the uterus to resolve infections (Salasel and Mokhtari, 2011 and Nosier *et al.*, 2012). These results attributed to the higher T_3 and T_4 hormones, and glucose levels in plasma of cows that were treated with OX, $PGF_{2\alpha}$ and MT (Table 7), which resulted in enhancement of uterine contractions and function, being more efficient of cows that were received $PGF_{2\alpha}$ or MT. These findings are in agreement with those of former studies (Waheeb-Reham *et al.* 2010; Abdel-Khalek *et al.*, 2013 and Alharoon, 2018).

Reproductive measurements:

As shown in Table 3, cows that had received OX, PG or MT recorded decrease (P<0.05) in the time required from parturition to occurrence ovarian structure (OS), first estrus postpartum (FE), days open (DO) and service period (SP), and significantly (P<0.05) increased the heat period length (HP) as compared to that untreated cows. Although, the differences among treated groups were insignificant, cows administrated with PG had recorded the shortest values of OS, FS, DO and SP and the longest value of HP, while the control cows had recorded the longest (P<0.05) values of OS, FS, DO and SP and shortest (P<0.05) value of HP. These findings reflecting that treatment of exogenous OX,PG or MT to lactating Friesian cows within ½ hour postpartum is able to improve the reproductive efficiency, especially with PG or MT, which had recorded the highest improvement compared with that recorded for either oxytocin-treated or control cows. Our results came in agreement with those of Ramoun *et al.* (2006) and Nosier *et al.* (2012) who demonstrated that cows treated with oxytocin and methylergometrin or $PGF_{2\alpha}$ had improved in reproductive parameters when compared to untreated ones. Prostaglandin $F_{2\alpha}$ administrated animals showed the highest improved productive and reproductive performance with economical return when compared with cows treated with other protocols (manual remove,

oxytocin or carazolol), (Waheeb-Reham *et al*., 2010). Our findings were supported by (Abou-Aiana *et al.,* 2019), who demonstrated that there were decrease in the time from parturition till the first estrus postpartum and days open in cows administrated with $PGF_{2\alpha}$ or oxytocin intramuscularly injection as compared to that in the control cows. Also, (Solanki *et al.,* 2019) found that administration of methylergometrine or $PGF_{2\alpha}$ immediately after parturition in Gir cows reduced postpartum estrus and service period. In contrary, (Hendricks *et al.* 2006 and Hanan, 2015) who indicated that repeated administration of $PGF_{2\alpha}$ to cows following postcalving had no impact on interval from calving to first service or days open. Administration of exogenous oxytocin (OX) after calving enhanced productive and reproductive performance of postpartum cows (Mustafa *et al.*, 2008). This may be due to the time and dose of injection and number of treated cows.

Galvão *et al.* (2010) indicated that early ovarian activity after calving increased conception rate in dairy cows. Changes in hormonal concentrations during postpartum period including pituitary gonadotrophins (FSH and LH), oxytocin, steroid hormones (E_2 and P_4), and prostaglandin ($PGF_{2\alpha}$) are vital to initiation of cyclic ovarian activity after calving (Gautam *et al.* 2010). These changes have effect on postpartum reproductive activity (Abdel-Khalek *et al.,* 2013).

Table 3. Some reproductive measurements of lactating Friesian cows treated with various drugs during the early post calving.

Item	Control (C)	Treated groups		
		Oxytocin (OX)	$PGF_{2\alpha}$ (PG)	Methergin (MT)
Ovarian structure/day	107.29 ± 10.42[a]	50.00 ± 2.60[b]	37.43 ± 2.27[b]	40.57 ± 2.06[b]
Heat period length/hours	16.71 ± 2.59[b]	19.29 ± 1.06[a]	23.57 ± 1.27[a]	20.86 ± 1.39[a]
Estrus cycle length/day	19.14 ± 2.80	20.00 ± 0.62	22.14 ± 0.51	21.00 ± 0.82
First estrus postpartum /day	146.14 ± 10.56[a]	69.29 ± 3.04[b]	53.14 ± 2.30[b]	57.00 ± 2.21[b]
Days open/day	207.29 ± 13.36[a]	75.00 ± 6.28[b]	53.14 ± 2.30[b]	57.00 ± 2.21[b]
Service period/day	61.14 ± 4.42[a]	5.71 ± 5.71[b]	0.00 ± 0.00[b]	0.00 ± 0.00[b]
Gestation period/day	276.57 ± 2.03	278.43 ± 2.46	277.14 ± 1.28	277.71 ± 2.68

a-b: Values with different superscripts within, a row are significantly different (P<0.05).

Number of service per conception and calving interval:

Table 4 indicated that, number of service per conception were affected (P<0.05) by OX, PG or MT treatments of cows, being insignificantly the lowest in cows treated with PG or MT compared with cows that treated with OX. The marked variation among the experimental treatments were related to that about all cows (100%) that administrated with PG or MT were conceived from 1st service, followed by about 85.71% for cows treated with OX, while 0.00% for untreated cows. Also, about 14.29% versus 28.57% were conceived from the 2nd service for cows that received OX and the control cows, respectively. On the other hand, about 42.86% and 28.57% in the control cows required 3rd and 4th service to be conceived (Table 4). Our results came in agreement with those of (Hanan, 2015 and Abou-Aiana *et al.,* 2019) who found that number of service per conception was (P<0.05) lesser in cows that received oxytocin and $PGF_{2\alpha}$ than in the control cows. Also, the injection of oxytocin or methylergometrine immediately postcalving in dairy cows reduced number of service per conception and enhanced reproductive efficiency, in which methylergometrine being more beneficial than oxytocin (Hussien and Metwaly, 2004). Additionally, reproductive performance of cattle was significantly enhanced by administration of $PGF_{2\alpha}$ intramuscularly injection (Waheeb-Reham *et al.*, 2010 and Salasel and Mokhtari, 2011), oxytocin or methylergometrine (Nosier *et al.*, 2012), and $PGF_{2\alpha}$ or methylergometrine in Gir cows (Solanki *et al.*, 2019). In contrast, administration of $PGF_{2\alpha}$ in the early postpartum period no effect on days to first service and the probability of pregnancy at first insemination (Morton *et al.*, 1992; Hendricks *et al.,* 2006 and Mustafa *et al.*, 2008).

Table 4. Number of service / conception, calving interval and their frequency distribution (%) of lactating Friesian cows treated with various drugs during the early post calving.

Item		Control (C)	Treated groups		
			Oxytocin (OX)	$PGF_{2\alpha}$ (PG)	Methergin (MT)
Number of service/ conception		3.00 ± 0.31[a]	1.14 ± 0.14[b]	1.00 ± 0.00[b]	1.00 ± 0.00[b]
1st service	Frequency distribution (%)	-	85.71	100	100
2nd service		28.57	14.29	-	-
3rd service		42.86	-	-	-
4th service		28.57	-	-	-
Overall		100 %	100 %	100 %	100 %
Calving interval (day)		483.86 ± 14.17[a]	353.43 ± 7.56[b]	330.28 ± 2.97[b]	334.71 ± 4.52[b]
318 - 420	Frequency distribution (%)	-	100	100	100
421 - 480		57.14	-	-	-
481 - 540		42.86	-	-	-
Overall		100 %	100 %	100 %	100 %

a-b: Values with different superscripts within, a row are significantly different (P<0.05).

Concerning the calving interval (CI) of cows are presented in Table 4, administration of OX, PG or MT to cows induced reduced (P<0.05) CI compared with untreated cows, being insignificantly shorter in cows received PG or MT than cows that received OX (330.28 and 334.71 vs. 353.43 days), respectively. It is interested to note that the marked reduction of calving interval for cows treated with OX, PG or MT was associated with all cows (100%) in these groups recorded CI from 318 to 420 days as compared to 0.00% for control cows, while about 57.14% and 42.86% of cows in the control showed CI from 421 to 480 days and 481 to 540 days, respectively.

The decreasing of calving interval of administrated groups was mainly related to decrease first estrus postpartum, service period and days open length as compared to untreated group (Table 3). Our results came in accordance with those of former studies (Ramoun *et al.*, 2006, and Ayman, 2013). $PGF_{2\alpha}$ or oxytocin treated cows recorded the shortest calving interval compared to other treated or untreated cows (Waheeb-Reham *et al.*, 2010). Also, the usage of methergin or oxytocin injection immediately postpartum reduced the retention of fetal membranes, period for uterine involution and calving interval in dairy cattle (Nosier *et al.*, 2012). Generally, administration of

OX, PG or MT to lactating Friesian cows within ½ hour after calving reduced number of service per conception and calving interval, especially with PG or MT, which recorded the highest reduction in NS/C and CI compared with those administrated with OX or the control cows under the Egyptian condition.

Actual and cumulative conception rate (CR%):

Actual and cumulative conception rate of cows are presented in Table 5, revealed that with 60 days postcalving, cows treated with PG or MT recorded the highest values of conception rate 85.71%, followed by about 14.29% for cows treated with OX were conceived, while 0.00% for untreated cows. Within 61 – 103 days, the corresponding rates were 14.29%, 71.42% and 0.00%, respectively. Within 104 – 146 days, postcalving about 14.29% of cows administrated with OX were conceived, meanwhile, about 100% for untreated cows required more than 146 days postcalving to be conceived. With regard to cumulative values of conception rate all cows that treated with PG and MT or OX were conceived within 103 and 146 days postcalving, respectively. However, all cows in the control required more than 147 days after parturition to be conceived (Table 5).

The current results come in the same line with finding with (Abdel-Khalek *et al.*, 2013 and Alharoon, 2018) who demonstrated that multiparous cows treated with oxytocin or $PGF_{2\alpha}$ following calving showed a good uterine involution status at the time of insemination with the highest conception rate as compared to the control cows. Also, the injection of eclobic drugs as oxytocin or methylergometrine and $PGF_{2\alpha}$ to cows immediately postpartum caused significant reduced the incidence of retention of fetal membranes and increased the conception rate and reproductive performance (Nosier *et al.*, 2012; Patel *et al.*, 2014 and Solanki *et al.*, 2019). The increase of conception rate in different treatments, especially with PG or MT may be due to the increase in T_3 or T_4 hormones and glucose levels (Table 7), which stimulates development of ovarian luteal cells. In this respect, (Abd El-Kariem *et al.*, 2004) reported that negative energy balance involves mechanisms that inhibit GnRH release, delays ovarian activity and decreasing follicular population, which almost associated with reduce of conception rate%. Also, it may be attributed to increase of progesterone hormone level from steridogenic cells that is associated with inhibit production of prostaglandin $F_{2\alpha}$ from the uterine tissue and estradiol-17β in order to increase the lifespan of corpus luteum (CL), potentially improving survival of embryo LHRH-LH releasing hormone. This findings are accordance with those obtained by (Thatcher and Staples, 2000) who indicated that glucose level has direct impact on the hypothalamus-pituitary-ovary axis. Also, glucose is necessary for progesterone production by steroidgenic cells (Zakar and Hertelendy, 1980). In contrast, administration of $PGF_{2\alpha}$ during the early postpartum period had no effect on days to first service and the probability of pregnancy at first insemination (Hendricks *et al.*, 2006 and Iman *et al.*, 2017).

Table 5. Impact of experimental treatments on actual and cumulative conception rate (CR%) of lactating Friesian cows at successive post calving days.

Item	Control (C)	Treated groups		
		Oxytocin (OX)	$PGF_{2\alpha}$ (PG)	Methergin (MT)
Actual conception rate (CR %):				
Within 60 days	-	14.29	85.71	85.71
Within 61 - 103 days	-	71.42	14.29	14.29
Within 104 - 146 days	-	14.29	-	-
After 147 days	100	-	-	-
Overall	100 %	100 %	100 %	100 %
Cumulative conception rate (CR %):				
Within 60 days	-	14.29	85.71	85.71
Within 103 days	-	85.71	100	100
Within 146 days	-	100	-	-
After 147 days	100	-	-	-
Overall	100 %	100 %	100 %	100 %

Milk yield and composition:

Table 6, showed that actual milk yield (AMY) was improved ($P<0.05$) for all administrated cows than for the control cows. However, the differences effect among treated groups on AMY were insignificant, cows that had received PG or MT recorded increase of AMY compared with that had received OX treatment. With regard to the percentages of milk composition%, including (TS%, fat%, SNF%, protein% and ash%) were insignificantly enhanced, while the percentage of milk lactose was ($P<0.05$) increased for cows that received OX, PG or MT compared with the control cows. Also, cows that supplemented with PG or MT achieved the greatest ($P<0.05$) values of milk lactose% as compared to either supplemented with OX or unsupplemented cows (Table 6). Additionally, milk yield was affected significantly ($P<0.05$) by OX, PG or MT treatment of cows. The highest ($P<0.05$) values of protein and lactose yield were observed in cows that supplemented with PG or MT compared with that supplemented with OX, while the lowest values were recorded in unsupplemented cows.

Table 6. Impact of experimental treatments on milk yield and composition of lactating Friesian cows treated with various drugs during the early post calving.

Item	Control (C)	Treated groups		
		Oxytocin (OX)	$PGF_{2\alpha}$ (PG)	Methergin (MT)
Milk yield:				
Actual milk yield (kg/day)	8.29 ± 1.11^{b}	10.86 ± 0.83^{a}	13.82 ± 0.89^{a}	13.29 ± 0.87^{a}
Milk composition:				
Total solid (TS, %)	11.26 ± 0.72	11.53 ± 0.65	12.38 ± 0.51	12.04 ± 0.76
Total solid yield (Kg/day)	0.98 ± 0.22^{b}	1.28 ± 0.16^{a}	1.72 ± 0.14^{a}	1.62 ± 0.18^{a}
Fat (%)	3.17 ± 0.17	3.20 ± 0.14	3.26 ± 0.16	3.35 ± 0.12
Fat yield (kg/day)	0.27 ± 0.05^{b}	0.35 ± 0.04^{a}	0.45 ± 0.03^{a}	0.45 ± 0.04^{a}
Solid non fat (SNF, %)	7.10 ± 0.68	7.58 ± 0.59	7.98 ± 0.56	7.96 ± 0.60
Solid non fat yield (kg/day)	0.62 ± 0.16^{b}	0.84 ± 0.11^{a}	1.10 ± 0.11^{a}	1.05 ± 0.10^{a}
Protein (%)	3.01 ± 0.15	3.10 ± 0.16	3.30 ± 0.13	3.37 ± 0.21
Protein yield (kg/day)	0.24 ± 0.04^{c}	0.33 ± 0.02^{b}	0.45 ± 0.01^{a}	0.44 ± 0.03^{a}
Lactose (%)	3.34 ± 0.35^{c}	4.45 ± 0.29^{b}	5.54 ± 0.18^{a}	5.27 ± 0.24^{a}
Lactose yield (kg/day)	0.27 ± 0.04^{c}	0.48 ± 0.04^{b}	0.77 ± 0.06^{a}	0.70 ± 0.05^{a}
Ash (%)	0.96 ± 0.17	1.02 ± 0.18	1.11 ± 0.20	1.05 ± 0.18

a-c: Values with different superscripts within, a row are significantly different (P<0.05).

Our findings are in agreement with those of former studies (Rajala and Grohan, 1998; Wafa, 2004 and Alharoon, 2018), who showed that cows treated with oxytocin or $PGF_{2\alpha}$ during early postpartum recorded enhance in milk yield and composition compared with untreated ones. The highest and lowest values of milk yield were recorded for cows administrated

with $PGF_{2\alpha}$ and untreated cows, respectively (Steven and Dinsmore, 1997 and Abou-Aiana *et al*., 2019). In contrary, the differences effect between oxytocin-treated and control groups on both milk yield and milk fat % of buffaloes and cattle were insignificant (Mustafa *et al*. 2008). The observed increase in milk yield in treated groups, particularly with $PGF_{2\alpha}$ or MT may be due to the increase in glucose or T_3 and T_4 concentrations as shown in (Table 7), which stimulates the protein synthesis by reduce of the proteolytic action of glucocorticoids or an increase of glucose transport to provide energy required for peptide synthesis and milk production by mammary gland. Also, this may be due to activity improvement of mammary immune system related to the decrease in cortisol levels and increase plasma immuneglobulins (IgG and IgM) in different treatments, especially with $PGF_{2\alpha}$ or MT administration as shown in Table 7. Thyroid hormones (T_3 and T_4) plays a vital role in the control of several metabolic processes including protein, fat, carbohydrates, vitamin and mineral metabolism (Guyot *et al*., 2011).

Blood constituents:

Humoral immune response of cows are presented in Table 7, administration of OX, PG or MT induced significantly ($P<0.05$) increased total leukocytic count and level of immunoglobulins IgG and IgM , and decreased level of cortisol in blood plasma of cows as compared to the control cows. Generally, cows received PG or MT had the greatest ($p<0.05$) values of total leukocytic count, IgG and IgM and the least values of cortisol when compared with cows that had received OX or control cows, in accordance with (Mamdouh, 2000 and Wafa, 2017).

Table 7. Blood constituents of lactating Friesian cows treated with various drugs during the early post calving.

Item	Control (C)	Treated groups		
		Oxytocin (OX)	$PGF_{2\alpha}$ (PG)	Methergin (MT)
Total leukocytic count/µI	8230.71 ± 717.02^{c}	9617.14 ± 349.97^{b}	11877.14 ± 449.99^{a}	11355.43 ± 335.21^{a}
Immunoglobulins (Ig) :				
IgG (mg/ml)	15.29 ± 1.48^{c}	18.71 ± 0.42^{b}	23.57 ± 0.78^{a}	21.00 ± 0.75^{a}
IgM (mg/ml)	1.79 ± 0.25^{c}	2.57 ± 0.17^{b}	3.86 ± 0.34^{a}	3.57 ± 0.23^{a}
Protein fractions:				
Total protein (g/dl)	4.47± 0.60^{b}	6.43 ± 0.57^{a}	7.71 ± 0.60^{a}	6.79 ± 0.72^{a}
Albumin (g/dl)	2.26 ± 0.32^{b}	4.00 ± 0.31^{a}	5.14 ± 0.46^{a}	4.57 ± 0.48^{a}
Globulin (g/dl)	2.21 ± 0.34	2.43 ± 0.34	2.57 ± 0.36	2.22 ± 0.34
Hormonal profile:				
T3 (ng/ml)	3.19 ± 0.64^{b}	5.14 ± 0.34^{a}	5.29 ± 0.42^{a}	5.57 ± 0.14^{a}
T4 (ng/ml)	63.57 ± 7.21^{b}	103.43 ± 7.67^{a}	112.86 ± 8.30^{a}	105.71 ± 7.90^{a}
Cortisol (ng/ml)	7.86 ± 0.91^{a}	4.57 ± 0.36^{b}	3.14 ± 0.26^{b}	3.71 ± 0.28^{b}
Other measurements:				
Glucose (mg/dl)	59.28 ± 6.09^{b}	79.71 ± 4.16^{a}	85.57 ± 5.24^{a}	83.29 ± 3.70^{a}

a-c: Values with different superscripts within, a row are significantly different ($P<0.05$).

The higher enhancement of immunoglobulins concentrations of blood plasma in different administrations, particularly with PG or MT may be due to absolute increased in number of immunogloblins antibodies producing cell in the germinal center of the spleen and other lymphoid organs (Lewis, 2003). Such finding may be attributed to activity improvement of immune response of lymphoid cells in response to decrease in cortisol levels in different treatments, particularly with PG or MT (Table 7) in accordance with (El-Desouky, 2014). Also, it may be due to enhance in levels of total leukocytic count, total protein, albumin and globulin or increase in thyroid hormone concentrations in cows that received OX, PG or MT, which resulted in improvement of the functions of the immune system, especially with cows that received PG or MT. Guyot *et al*. (2011) reported that T_3 and T_4 hormones play very important role in the control of several metabolic processes of fat, protein and carbohydrates as well as vitamin and minerals.

As show in Table 7, blood plasma levels of total protein (TP) and albumin (AL) were significantly ($P<0.05$) increased and globulin (GLO) level tended to by significantly higher in all treated groups as compared to in the control group. This finding evidently suggested that administration of some ecbolic drugs as OX, PG or MT to cows had a valuable effect on liver functions, particularly with PG or MT, which achieved the highest improvement of liver functions without any harmful effect on hepatic cells. These findings go in hand with findings of (Seifi *et al*., 2007 and Hanan, 2015). Also, (Akar *et al.* 2012) found that the values of total protein and albumin were significantly higher, and aspartate aminotransferase, creatine kinase and alkaline phosphatase enzymes were lower for cows that received $PGF_{2\alpha}$ than that received oxytocin or control cows. The positive effects of treatments on blood protein and its fractions may be due to enhance of glucose, T_3 and T_4 hormones concentrations in blood of treated cows (Table 7), which stimulates the protein synthesis by reducing the proteolytic action of glucocorticoids, or activity enhancement of hepatic immune system related to the reduced cortisol concentrations in plasma of administrated cows, especially with PG or MT as shown in (Table 7). Thyroid hormones influence the function of most organs and stimulate the basic metabolic rate through regulation of the metabolism of proteins, lipids and carbohydrates (Guyot *et al*., 2011). On the other hand (Castillo *et al*., 2005 and Wafa, 2004) who evaluated some biochemical parameters including (glucose, total protein, albumin, AST and ALP) in cows before or after parturition with no significant differences.

Table 7, cleared that cows had received OX, PG or MT showed ($P<0.05$) improved of T_3, T_4 and glucose levels as compared to that untreated cows. Although, the differences effects among treated groups on the values of pervious measurements were insignificant. Cows that had received PG or MT showed the higher values of T_3, T_4 and glucose than that received OX treatment. Our results came in agreement with those of (Seifi *et al*., 2007 and Hussein and Abd Ellah, 2008). Also, (El-Nemer *et al*., 2000) who demonstrated that cows that suffering from retention of fetal membranes recorded the lowest levels of thyroid hormones (T_3 and T_4). Our findings were supported by those obtained by (Gabr, 2005) who reported that T_3 and glucose levels in plasma were ($P<0.05$) greater for cows that received $PGF_{2\alpha}$ or methylergometrin intramuscularly injection following expulsion of the fetus than the control cows under hot summer condition of Egypt.

Postpartum disorders:

Data in Table 8 reflecting that the prevalence of retained placenta, abnormal discharged lochia, uterine prolapse and puerperal endometritis syndromes in the control cows were reduced by OX treatment, or can be avoided by PG or MT

administration within ½ hour following parturition. Generally, the highest percentages of the incidence of pervious disorders were recorded for untreated cows, which can be decreased by injection of exogenous OX , PG or MT of cows , especially with PG or MT administration , which showed the hundred percent (100%) efficacy when compared with OX or control treatments under the Egyptian condition. Same results observed with (Kasimanicham *et al*., 2005 and Nosier *et al*., 2012). Decreased the incidence of retained fetal membranes, abnormal lochia and endometritis in cows that were injected with OX, PG or MT during the early postpartum may be attributed to the increase of T_3 and T_4 hormones and glucose concentrations in plasma of injected cows (Table 7), which improve uterine muscular contractions that exert mechanical removal of placenta and uterine contaminant through the cervix (Waheeb-Reham *et al.*, 2010, Salasel and Mokhtari, 2011 and Azad *et al*., 2016). Administration of MT or similar drugs developed from the ergot alkaloids, may be more beneficial than oxytocin in cases of atonic myometrium because of its prolonged oxytocin effect (Roberts, 1986 and Hussien and Metwaly, 2004). Also, may be due to stimulate the humoral mechanism of immune system via increase the total and differential leukocytic count and immunoglobulins IgG and IgM levels related to reduce level of cortisol in treated groups, particularly with PG or MT as shown in Table 7, thus the body resistance to microbial infection would be raised and hence the rate of pathological affection of genitalia seems to be declined. Treatment with $PGF_{2\alpha}$ and methylergometrine following parturition helped in reducing the postpartum disorders of cows under hot summer condition in Egypt (Gabr, 2005). On the other hand, treatment of prostaglandin $F_{2\alpha}$ immediately postcalving had no effect on metritis in lactation dairy cows (Hendrickes *et al*., 2006 and Imani *et al*., 2017).

Table 8. Postpartum disorders of lactating Friesian cows treated with various drugs during the early post calving.

Item	Control (C)	Treated groups		
		Oxytocin (OX)	$PGF_{2\alpha}$ (PG)	Methergin (MT)
Retained placenta	3/7 (42.86%)	1/7 (14.29%)	0 %	0 %
Uterine prolapase	2/7 (28.57%)	1/7 (14.29%)	0 %	0 %
Abnormal lochia	3/7 (42.86%)	1/7 (14.29%)	0 %	0 %
Endometritis	2/7 (28.57%)	0 %	0 %	0 %

Economic efficiency of milk production:

Results presented in Table 9 illustrated that cows administrated with OX, PG and MT improved milk yield and economic efficiency compared with control cows. Generally, the highest improvement of milk yield and economic efficiency were observed for cows received PG or MT, especially with PG. The lowest values of milk yield and economic efficiency were detected with control cows. Same results were observed with findings by (Waheeb-Reham *et al.*, 2010) who found that cows were received prostaglandin $F_{2\alpha}$ had enhanced reproductive efficiency and economical return compared with cows received other protocols.

In conclusion, administration of exogenous oxytocin, prostaglandin F_2 alpha and methergin (methylergometrine maleate) within ½ hour following parturition reduced retention of placenta and postpartum complications, and improved subsequent reproductive performance, blood constituents, milk yield and its economic efficiency of lactating Friesian cows with dystocia. Therefore, it can be recommended to administer lactating Friesian cows with dystocia with prostaglandin F_2 alpha at a level of 500 µg, or methargin at a level of 20 mg, with 10 ml of saline solution (0.9 NaCl) intramuscularly injection, respectively, within ½ hour after expulsion of the fetus to avoid retention of fetal membranes and postpartum complications and improve subsequent reproductive performance and blood constituents as well as milk yield and its economic efficiency under the Egyptian conditions.

Table 9. Economic efficiency of milk production of lactating Friesian cows treated with various drugs during the early post calving.

Item	Control (C)	Treated groups		
		Oxytocin (OX)	$PGF_{2\alpha}$ (PG)	Methergin (MT)
Average daily feed cost (LE):				
CFM	24	24	24	24
BH	0.68	0.68	0.68	0.68
RS	5.10	5.10	5.10	5.10
OX, PG or MT	-	0.80	1.00	0.60
Total daily feed cost (LE)	29.78	30.58	30.78	30.38
Actual milk yield (kg/day)	8.29	10.86	13.82	13.29
Price of actual milk yield (LE)	39.38	51.59	65.65	63.13
Economic feed efficiency (%)	132.24	168.71	213.29	207.80

*** Average daily feed intake of CFM, RS and BH were 8, 4 and 3 (kg/h/day)**
*** price of feedstuffs (LE/ton) for 2019: CFM 3000, BH 1700 and RS 170.**
*** price of kg of milk of cows was 4.75 LE.**
*** Economic Efficiency = (price of actual milk (LE)/Total feed cost) X 100**

REFERENCES

AOAC., Association of Official Analytical Chemists (1995). Official methods of analysis. 16th ed., published by the A.O.A.C., Washington, D. C., U.S.A.

Abd El-Kariem, M.A.; El-Neanaey, M.H. and Mohamed, M.M. (2004). Post-partum blood composition and reproductive performance of high and low milk producing Friesian cows, under Egyptian condition. Proc. 3rd Intern. Conf. on Anim. Prod. And Helath Semi-Arid Arears, El-Arish, North Sinai, Egypt, pp. 137 – 149.

Abdel-khalek, A. E.; El-Harairy, M. A.; Mehrez, A. F. and Foad, W.F. (2013). Uterine involution and reproductive performance of lactating Friesian cows at calving J. Anim. and poult. Prod., Mansoura University, 6: 350-362.

Abou-Aiana; R.M. Mohamed, M.E.R.; Gabr, Sh.A.; Amer, A.M.; Ahmadi; E.A.A. and Alharoon, A. H. A. (2019). Effect of the method of postpartum administration of oxytocin or $PGF_{2\alpha}$ on the drop of retained placenta in cows and subsequent reproductive and productive performance. Kafrelsheikh Vet. Med. J., 1: 18 -35.

Ahmed, W.M.; El-Ekhnawy, K.l.; El-Nattat, W.S.; Desouky, H.M.; Abd El-Razik, K.A. and El-Khadrawy, H.H. (2004). Investigation on calving associated problems in a Friesian herd in Egypt with special reference to some prophylactic trials. Egyptian journal of basic and applied physiology, 3: 65-87.

Akar, O.; Kizil, O.; Saat, N. and Yuksel, M. (2012) . The effect of Oxytocin and cloprostenol application via umbilical artery immediately after dystocia on time and rate of fetal membrane removal in cows. Turk. J. Vet. Anim. Sci., 36 (3): 275-281.

Alharoon, A. H. A. (2018). Comparison between application of injection via umbilical artery and intra-muscular injection of oxytocin and prostaglandin $F_{2\alpha}$ on time and rate of placenta separation after parturition. M.Sc. Agri. Sci. Thesis, Animal Production Department, Faculty of Agriculture, Tanta University, Egypt.

Arthur, L.O.; Bess, J.W.; Sowder, R.C.; Benveniste, R.E.; Mann, D.L.; Chermann, J.C. and Henderson, L.E. (1992): Cellular proteins bound to immunodeficiency viruses: implications for pathogenesis and vaccines. Science. 258: 1935–1938.

Ayman, A.A. M. (2013). Some studies to improve fertility in buffaloes. M.V.Sc., Thesis, Fac. Vet. Med., Zagazig Univ., Egypt.

Azad , M.A.A.; Rahman, M.M.; Sinha, B.; Shamsuddin, M.M. and Bari, F.Y. (2016). Prevention of retained fetal membrane by using various drugs immediately after parturition in cows. Bangladesh Journal of Veterinary Medicine, 14 (1): 79 – 84.

Beagley, J.C.; Witman, K.J.K.; Baptiste, E. and Scherzer, J. (2010). Physiology and treatment of retained fetal membranes in cattle. Journal of Veterinary Internal Medicine, 24: 261 – 268.

Castillo, C.; Hernandez, J.; Bravo, A.; Lopez-Alonso, M.; Pereira, V. and Benedito, J.L. (2005). Oxidative status during late pregnancy and early lactation in dairy cows. Vet. J., 169: 286-292.

Doumas, B.; Watson, W. and Biggs, H. (1971). Albumin standards and measurements of serum with bromocresol green. Clin. Chem. Acta., 31: 87 - 96.

Duncan, D.B. (1955). Multiple Ranges and Multiple F-test. Biometrics, 11: 1 – 42.

El-Desouky, A.M. (2014). Improvement of the reproductive performance of dairy cows during the transition period. Alexandria Journal of Veterinary Science, 41: 62 – 67.

El-Nemer, I.; Hazza, N. and Emara, S. (2000). Changes in thyroid and sex hormones in serum of cattle with retention of placenta. J. Dairy Sci., 57: 725 – 728.

El-Roos, M.E.A.; Soliman, M.F.; Zaghlol,A.H. and Ghoniem, E.M. (2012). Introduction of some therapies to improve the reproductive performance of postpartum Egyptian buffaloes. Lucran Stiintifice- Medicina Veterinara. Universitatea de Stiinte Agricole si Medicina Veterinara "Lon Lonescu de La Brad" Lasi., 55 (1/2): 342-348.

Gabr, A.A. (2005). Effect of different drags during puerperal period on reproductive performance and blood metabolies in cattle. M.Sc. Thesis, Fac. of Agric., Al-Azhar University, Egypt.

Galvão, K.N.; Fraiblat, M.; Butler, W.R.; Brittin, S.B.; Guard, C.L. and Gilbert, R.O. (2010). Effect of early postpartum ovulation on fertility in dairy cows. Reproduction in Domestic Animal, 45: 207–211.

Gautam, G.; Nakao, T.; Yamada, K. and Yoshida, C. (2010). Defining delayed resumption of ovarian activity postpartum and its impact on subsequent reproductive performance in Holstein cows. Theriogenology, 73: 180–189.

Grunert, E. (1986). Etiology and pathogenesis of bovine retained placenta in: Current therapy in theriogenology Edt. Morrow DA. 2nd ed. WB Saunders Co. Philadelphia, London, Toronto, Mexico City. Pp. 237 – 242.

Guyot, H.L.; De Oliveira, A.; Ramery, E.; Beckers, J.F. and Rollin, F. (2011). Effect of a combined iodine and selenium supplementation on I and Se status of cows and their calves. J. Trace Elem. Med. Bio., 25: 118 – 124.

Hanan, I. E. I. (2015). Some hormonal treatments affecting uterine involution of primiparous cows. M.Sc. Agri. Sc. Thesis, Fac. Agric., Tanta Univ., Egypt.

Hendricks, K.E.; Bartolome, J.A.; Melendez, P.; Risco, C. and Archbald, L.F. (2006). Effect of repeated administration of PGF2alpha in the early post partum period on the prevalence of clinical endometritis and probability of pregnancy at first insemination in lactating dairy cows. Theriogenology, 65: 1454–1464.

Hussein, H. and Abd Ellah, M.R. (2008). Effects of dystocia, fetotomy and caesarian sections on the liver enzymes activities and concentrations of some serum biochemical parameters in dairy cattle. Anim. Reprod. Sci., 105: 384-391.

Hussein, F.M. and Metwelly, K.K. (2004). Effects of Methylergometrine or oxytocin after birth on fetal membranes drop and reproductive performance of dairy cattle. Alex. Vet. Sci., 21: 676-685.

Imani, M.; Seifi, H.A.; Koolabadi, G. and Farzaneh, N. (2017). Effect of early administration of equine chorionic gonadotropin and prostaglandin $F_{2\alpha}$ on reproductive performance of postpartum dairy cows. IJVST, 81: 8 – 17.

Kasimanickam, R.; Duffield, T.F.; Foster, R.A.; Gartley, C.J.; Leslie, K.E.; Walton, J.S. and Johnson, W.H. (2005). The effect of a single administration of cephapirin or cloprostenol on the reproductive performance of dairy cows with subclinical endometritis. Theriogenology, 63: 818–830.

Khatri, P.; Tunio, S. A.; Kaka, I.; Samo, M. U.; Bhutto, B. and Memon, M. R. (2013) . Effect of Exogenous PGF2α and Oxytocin on Postpartum Anestrus and Uterine Involution in Kundhi Buffaloes .J. Anim. Prod. Adv., 3 (4): 158-163.

Killingsworth, L.M. and Savory, J. (1972). Manual Nephelometric methods for immunochemical determination of immunoglobulins IgG, IgA and IgM. Clin. Chem., 18 (4): 335 – 339.

Kudlac, E.; Sakour, M. and Canderle, J. (1995). Metabolic profile in the peripartal period in cows with after birth retention and without it. Veterinarni Medicina, 40: 201-207.

Kumari, S.; prasad, S.; Kumaresan, A.; Manimaran, A.; Patbandha, T.K.; Pathak, R.; Boro, P.; Mohanty, T.K. and Ravi, S. K., (2014). Risk factors and impact of retained fetal membranes on performance of dairy bovines reared under subtropical conditions. Trop. Anim. Health Prod., 11 (7): 65-70.

Lewis, G.S. (2003): Steroidal regulation of uterine immune defenses. Animal Reproduction Science, 82–83: 281–294.

Lowder, Q. (1993). Diagnosis and treatment bovine postpartum endometritis. A review. Vet. Med., 88 (5): 474 – 479.

Madhwal, D.; Sharma, M.; Painuly, B.; Revathy. and Kumar, H. (2019). Effect of methyl ergometrine maleate on expulsion of fetal membrane in cross bred cows. Res. J. Chem. Env. Sci., 7 (4): 53 – 55.

Mamdouh, M.S.M. (2000). Studies on some factors affecting reproductive performance of bovine. Ph.D. Thesis, Fac. Vet. Med., Zagazig Univ., Cairo, Egypt.

McDougall, S. (2001). Effects of periparturient diseases and conditions on the reproductive performance of New Zealand dairy cows. *New Zealand Veterinary Journal*, 49:60–68.

Miller, B.J. and Lodge, J.R. (1984). Postpartum oxytocin treatment for prevention of retained placentas. Theriogenology, 22: 385-388.

Mohamed, A. and Amer, A. (2009). Hormonal and biochemical anomalies in dairy cows affected by retained fetal membranes. http://priory.com/vet/cow_fetal_nembrane.htm.

Morton, J.M.; Allen, J.D.; Harris, D.J. and Miller, G.T. (1992). Failure of a single postpartum prostaglandin treatment to improve the reproductive performance of dairy cows. Australian Vet. J., 69 (7): 158-160.

Mustafa, M.Y.; Saleem, K.; Munir, R. and Butt, T.M. (2008). Effect of oxytocin on the productive and reproductive performance of buffalo and cattle in Sheikhupura-Pakistan (a field study). Livestock Research for Rural Development, 20 (12): 193.

Nosier, M.B.; Metwelly,K. and Bakr, M.M. (2012). Prophylaxis of retained fetal membranes in dairy cattle. Alexandria Journal of Veterinary Sciences, 35 (1): 23 – 31.

NRC (2001). Nutrient Requirment in Dairy Cattle. 7th Ed., Nat. Acd. Press, Washington, D.C.

Patel, R.V.; Khasatiya, C.T.; Chaudhary, J.H.; Parmar, S.C. and Chaudhary, J.K. (2014). Therapeutic Efficacy of Methylergometrine maleate during Puerperal period in Cows. Intas. Polivet., 15 (II): 373-375.

Peters, A.R. (1968). Determination of total protein. Clim. Chem., 114: 1147.

Rajala, P.J. and Grohan, Y.T. (1998). Effects of dystocia, retained placenta, and metritis on milk yield in dairy cows. Journal of Dairy Science, 81: 3172–3181.

Ramoun,A. A.; Darweish, S.A.; El-Ghait, H.A.A and Fattouh E. M. (2006). Effect of enhancement of uterine involution and earlier initiation of post-partum cyclicity on the reproductive performance of buffalo. Reproduction, Fertility and Development, 18 (5): 545 – 550.

Roberts, S.J. (1986). Retention of placenta. In: Veterinary Obstetrics and Genital Diseases (Theriogenology), Woodstock, Vermont, USA. pp. 373-388.

Salasel, B. and Mokhtari, A. (2011). Effect of early postpartum PGF2α treatment on reproductive performance in dairy cows with calving and puerperal traits. Theriogenology, 76: 1723–1729.

Salisbury, G.W.; Van Demark, N.L. and Lodge, J.R. (1978). Physiology of Reproduction and Artificial Insemination of Cattle. W.H. Freeman and Company, San Francisco, USA.

SAS (2004). Statistical Analysis System, SAS User's Guide Statistics, SAS Institute Inc., Editions Cary NC, USA.

Schalm, O.W.; Jain, N.C. and Carroll, E.J. (1975). Veterinary haematology. 3rd Ed., Lea and Febigar, Philadelphia, USA, PP. 602-627.

Seifi, H.A.; Dalir-Naghadeh, B.; Farzaneh, N.; Mohri, M. and Gorji-Dooz, M.(2007). Metabolic changes in cows with or without retained fetal membranes in transition period. J. Vet. Med. A, 54: 92-97.

Slama, H.; Vaillancourt, D. and Goff, A.K. (1994). Control of in vitro prostaglandin F2 alpha and E2 synthesis by caruncular and all antochorionic tissues from cows that calved normally and those with retained fetal membranes. Dom. Anim. Endocr., 11: 175-185.

Solanki, G.B.; Chaudhary, J.K.; Vijeta, H.P.; Gamit, P.M. and Parikh, S.S. (2019). Effect of PGF2α and Methyl ergometrine during Puerperium in Gir Cows. Ind. J. of Vet. Sci. and Biotec., 14 (4): 9-12.

Stevens, R.D. and Dinsmore R.P. (1997). Treatment of dairy cows at parturition with prostaglandin F2 alpha or oxytocin for prevention of retained fetal membranes. J. Am. Vet. Med. Assoc., 21: 1280 – 1284.

Thatcher, W.W. and Staples, C.R. (2000). Effect of dietary fat supplementation on reproductive in lactating dairy cows. Page 213 in Adv. In Dairy Tech., Vol. 12, Alberta Univ., Depart. Agric., Food and Nutr.

Trinder, P. (1969). Determination of glucose in blood using glucose oxidase with an alternative oxygen acceptor. Annals of Clinical Biochemistry, 6: 24 – 27.

Wafa, W. M. (2004). Improving the fertility in Friesian cattle. M.SC. Thesis, Fac. of Agricultural, Al-Azhar University., Egypt.

Wafa, W.M. (2017). Immune response and some blood constituents of calves produced from primi- and multi-parous Friesian cows fed yeast culture. J. Anim. and Poultry Prod., Mansoura Univ., 8 (8): 213- 219.

Waheeb, R. S.; Hussein, F. M.; El-Amrawi, G. A. and El-Hammady, E. A. (2010). Retained Fetal Membranes In Holstein Cows: Economical evaluation of different therapeutic protocols under Egyptian conditions" International Scientific Publications: Agriculture and Food, Volume 2, ISSN 1314-8591.

Zakar, T. and Hertelendy, F. (1980). Effects of mammalian LH, cyclic AMP and phosphodiesterase inhibitors on steroidogenesis, lactate production, glucose uptake and utilization by avian granulosa cells. Boil. Reprod., 22: 810 – 816.

الوقاية من إحتباس المشيمة فى أبقار الفريزيان الحلابة المتعسرة فى الولادة وعلاقة ذلك بكفاءتها التناسلية والإنتاجية ومكونات الدم

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هذه الدراسة تم إجرائها على 28 بقرة فريزيان متعسرة فى الولادة مختلفة المواسم الإنتاجية، تتراوح أعمارهما بين 5 – 10 سنوات، وذات متوسط وزن 575 – 725 كجم ضمن قطيع الأبقار بمحطة بحوث الإنتاج الحيوانى بالجميزة ، معهد بحوث الإنتاج الحيوانى، مركز البحوث الزراعية، وزارة الزراعة، مصر. وذلك بغرض دراسة تأثير معاملة أبقار الفريزيان الحلابة المتعسرة فى الولادة بالأوكسيتوسين والبروستاجلاندين إف2 ألفا أو الميثرجين بعد الولادة بنصف ساعة على زمن انفصال الأغشية الجنينية (المشيمة)، وكذا الأداء التناسلى والإنتاجى، وصورة ومكونات الدم، والكفاءة الإقتصادية فيما بعد. قُسمت الحيوانات إلى أربعة مجاميع بكل منها 7 بقرات، المجموعة الأولى تم معاملتها بـ 10سم من محلول كلوريد الصوديوم 0.9% حقناً فى العضل (مجموعة ضابطة)، المجموعة الثانية تم معاملتها بـ 50 وحدة دولية من الأوكسيتوسين مع 10 سم من محلول كلوريد الصوديوم 0.9% حقناً فى العضل، المجموعة الثالثة تم معاملتها بـ 500 ميكروجرام من البروستاجلاندين إف2ألفا مع 10 سم من محلول كلوريد الصوديوم 0.9% حقنا فى العضل، والمجموعة الرابعة تم معاملتها بـ 20 ملليجرام من الميثرجين مع 10سم من محلول كلوريد الصوديوم 0.9% حقناً فى العضل، وقد تم إعطاء المعاملات بعد الولادة بنصف ساعة. وبتحليل النتائج احصائياً أسفرت الدراسة على أن معاملة الأبقار بالأوكسيتوسين والبروستاجلاندين إف2ألفا أو الميثرجين قد سجلت انخفاضاً معنوياً على مستوى 5% فى الزمن اللازم لاكتمال نزول المشيمة وعودة الرحم كلياً إلى وضعه الطبيعى، والفترة من الولادة حتى وجود تراكيب مبيضية، حتى أول شياع، وحتى التلقيحة المخصبة (الفترة المفتوحة)، والفترة من أول شياع حتى التلقيحة المخصبة، بالإضافة إلى عدد التلقيحات اللازمة للإخصاب، والفترة بين ولادتين، وارتفاعاً معنوياً على مستوى 5% فى طول فترة الشياع مقارنة بالمجموعة الضابطة، وكان تأثير كلا من البروستاجلاندين أو الميثرجين أفضل من تأثير الأوكسيتوسين على تلك القياسات. أظهر البحث أيضا زيادة معنوية على مستوى 5% فى إنتاج اللبن فى المجموعات التى أعطيت الأوكسيتوسين والبروستاجلاندين والميثرجين مقارنة بالمجموعة الضابطة. إعطاء كلا من الأوكسيتوسين والبروستاجلاندين والميثرجين للإبقار أحدث إرتفاعاً معنوياً على مستوى 5% فى العدد الكلى لكرات الدم البيضاء، وتركيزات كل من الجلوبيوليينات المناعية (IgG, IgM) والبروتين الكلى والألبيومين وهرمونات الغدة الدرقية والجلوكوز، وانخفاضاً معنوياً على مستوى 5% فى تركيز هرمون الكوريتزول مقارنة بالمجموعة الضابطة، فكان لتأثير البروستاجلاندين أو الميثرجين المفاضلة عن تأثير الأوكسيتوسين. أيضا أدت معاملة الأبقار بالأوكسيتوسين إلى انخفاضاً واضحاً فى نسبة حدوث المشاكل التناسلية بعد الولادة بينما لم تظهر أى من هذه المشاكل بين الأبقار المعاملة بالبروستاجلاندين أو المثيرجين مقارنة بالأبقار غير المعاملة. وبناء عليه ومن الناحية الاقتصادية والتطبيقية، خلصت الدراسة إلى أهمية معاملة أبقار الفريزيان الحلابة المتعسرة فى الولادة بالبروستاجلاندين إف2ألفا بمعدل (500 ميكروجرام مع 10 سم من محلول كلوريد الصوديوم 0.9% حقناً فى العضل) أو الميثرجين بمعدل (20 ميلليجرام مع 10 سم من محلول كلوريد الصوديوم 0.9% حقناً فى العضل) بعد الولادة بنصف ساعة لتجنب احتباس المشيمة والمشاكل الصحية بعد الولادة ولتحسين كلاً من الأداء التناسلى ومكونات الدم وإنتاج اللبن والكفاءة الإقتصادية للأبقار تحت الظروف المصرية.