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ROLE OF OXYTOCIN AND/OR PGF$_{2\alpha}$ ON BREEDING EFFICIENCY IN BUFFALOES

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SUMMARY

A study was conducted on 40 buffalo-cows, assigned randomly, immediately after calving into three groups: group I (n=10) injected with saline and taken as control; group II (n=15) received 25 mg PGF$_{2\alpha}$/animal (Lutalyse); group III (n=15) received 25 mg PGF$_{2\alpha}$+25 i.u. oxytocin/animal (Syntocinon), single i.m. dose.

Oxytocin and/or PGF$_{2\alpha}$ significantly (P<0.01) shortened the interval from calving to first service (38.33 and 31.53 days for groups II and III respectively, versus 91.60 days for controls). The treatment reduced the service period (38.29 and 35.87 days for groups II and III respectively, versus 45.40 days for controls). Concomitantly a significant (P<0.01) decrease in the open-days *post partum* was achieved (76.62 and 67.40 days for groups II and III respectively, versus 137.00 days for controls). In addition, the treated buffaloes needed significantly (P<0.01) fewer services per conception (1.67 and 1.20 S/C for groups II and III respectively) than the untreated ones (2.70 S/C), besides a substantial improvement (P<0.01) in their conception rate either at 60 or 85 days *post partum*.

Significantly improved (P<0.05) results were obtained in the oxytocin and PGF$_{2\alpha}$ treated animals, than in those receiving PGF$_{2\alpha}$ alone for all the previous parameters, except for the service period.

Buffaloes therefore seemed to respond better to such treatment than dairy cows.

INTRODUCTION

The impact of calving interval with its components on breeding efficiency are of considerable importance on the lifetime production of the animal. Since gestation period is fairly constant for every breed, improvement in the open-days *post partum* can be considered.

Buffaloes are renowned for their increased age at first calving (Singh & Tomar, 1981) coupled with a protracted calving interval (Jainudeen *et al.*, 1983).

Despite extensive studies on the influence of exogenous prostaglandins on the time needed for restoration of utero-ovarian optimum cyclicity after birth in dairy cows

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(Charles & Gibson, 1983; McIntosh *et al.*, 1984; Peters & Lamming, 1986; Young & Anderson, 1986), little has been done in the buffalo. The present study was done to provide information on the effect of oxytocin and/or $PGF_{2\alpha}$ administration immediately after calving on the breeding performance of buffaloes.

MATERIALS AND METHODS

Forty 5-7-year-old clinically healthy pregnant buffaloes, in their third to fifth pregnancy, bred in a governmental farm close to Cairo, were selected. All animals were offered Egyptian clover during the green season (November–May), while concentrate ration and hay were given during the other months (dry season). They had free access to water.

A free-mating system was adopted where bulls of proven fertility were assigned to females in groups of 15–20 in paddocks. Therefore, three different bulls were allotted to the three groups. The newborn calves were allowed to suckle their mothers for 10 weeks followed by twice daily hand milking.

All buffaloes which calved normally between March and September 1988, inclusive, were allocated 2 h after calving on the basis of chronological order of calving dates to three groups. Group I ($n=10$) was injected with saline and taken as control; group II ($n=15$) received 25 mg $PGF_{2\alpha}$/animal (Lutalyse, Upjohn Co., Kalamazoo MI, USA) single i.m. dose; group III ($n=15$) received 25 mg $PGF_{2\alpha}$+25 i.u. oxytocin/animal (Syntocinon, Sandoz Ltd, Basle, Switzerland) single i.m. dose from each drug.

The onset of first post-partum oestrus was detected through daily teasing carried out morning and evening, together with an intimate observation during the day for appearance of oestrous symptoms. The stockmen were unaware of the identity of the treatment groups. Moreover, rectal palpation was conducted to confirm or exclude the observations. Natural mating was adopted and the animals were observed 3–4 weeks after that for reappearance of oestrus and were remated. Animals were rectally examined after 60 days from the first or last mating conducted for pregnancy detection.

The time from calving to first oestrus, time interval between successive returns to oestrus, number of matings per conception (S/C) and the period from calving to the fertile service (open-days), as well as the conception rate at 60 and 85 days *post partum* were calculated.

The recorded data were analysed by one-way analysis of variance, while the differences between the treated groups were tested by the Student's *t*-test (Snedecor & Cochran, 1976).

RESULTS

Buffaloes administered oxytocin and $PGF_{2\alpha}$ alone exhibited a significant ($P<0.01$) reduction in the interval from calving to first service (38.33 ± 3.42 and 31.53 ± 3.29 days for groups II and III respectively, versus 91.60 ± 7.43 days for controls). Although the average service to conception period was 7.11 and 9.53 days shorter for groups II and III respectively, compared with controls (Table I), these variations were statistically non-significant. Concomitantly, a significant ($P<0.01$) decrease in the open-days *post partum* was achieved (76.62 ± 7.41 and 67.40 ± 3.04 days for groups II and III respectively, versus

137.00 ± 7.02 days for controls). The highest number of services/conception (2.70 ± 0.26) was recorded for the untreated animals, while it was 1.67 ± 0.20 and 1.20 ± 0.10 S/C for injected groups II and III respectively. This trend achieved high statistical significance ($P < 0.01$). Thereafter, the conception rate was improved ($P < 0.01$) in the treated animals either at 60 or 85 days *post partum.*

Significantly improved ($P < 0.05$) results were obtained in the oxytocin and $PGF_{2\alpha}$ treated animals, compared with those injected with $PGF_{2\alpha}$ alone for all the previous entities, except for the service period.

Table I
Effect of oxytocin and/or $PGF_{2\alpha}$ on fertility in buffaloes (mean ± SE)

Fertility measures	*Groups*		
	I	*II*	*III*
Calving to first service (days)	91.60 ± 7.43 (65–150)	38.33 ± 3.42 (19–63)	31.53 ± 3.29 (18–63)
Days from first service to conception	45.40 ± 6.57 (21–93)	38.29 ± 6.84 (0–101)	35.87 ± 5.37 (0–70)
Days from calving to conception (open-days)	137.00 ± 7.02 (94–175)	76.62 ± 7.41 (25–132)	67.40 ± 3.04 (25–90)
Services/conception	2.70 ± 0.26 (2–4)	1.67 ± 0.20 (1–4)	1.20 ± 0.10 (1–2)
Conception rate (%)			
at 60 days PP	0.00	26.66	40.00
at 85 days PP	10.00	73.33	93.33

Figures in parenthesis represent the range.
PP, *post partum.*

DISCUSSION

The complex endocrine changes involved in the post-partum return to cyclic activity in cattle have been reviewed (Leslie, 1983).

The current study revealed that the trend of fertility measures displayed in $PGF_{2\alpha}$ treated buffaloes have some specific peculiarities. The statistically significant reduction in the interval from calving to first service figured in the $PGF_{2\alpha}$ treated group, conflicted with a non-significant effect on the same trait in dinoprost treated cows (Young & Anderson, 1986). Moreover, the influence on the service period, and the open-days *post partum* following $PGF_{2\alpha}$ injection, represented other conflicting observations; the former was reduced and the latter was significantly decreased in the treated buffaloes, while their trend in cloprostenol injected cows at early *post partum* did not achieve statistical significance (Peters & Lamming, 1986). The treated buffaloes exhibited an improvement in conception rate either at 60 or 85 days *post partum* (26.66 and 73.33% respectively). Young *et al.* (1984) reported a conception rate of 68% in $PGF_{2\alpha}$ treated cows.

In view of these observations, it is evident that buffaloes are more likely to respond to prostaglandin $F_{2\alpha}$ treatment at early *post partum* compared with cows.

Uterine involution is an integral part of the process of return to ovarian cyclicity (Kindahl *et al.*, 1982). Therefore, a higher concentration of $PGF_{2\alpha}$ has been associated with both a faster rate of uterine restoration and a stimulatory effect on follicular and luteal components of the ovary (Thatcher *et al.*, 1982; Charles & Gibson, 1983; Madej *et al.*, 1984).

Hence, the rapid improvement in fertility performance in $PGF_{2\alpha}$ treated buffaloes compared with cows, may be referred, in part, to its powerful influence on buffalo's myometrium promoting the involutionary processes. In support, the role of $PGF_{2\alpha}$ in the biochemical events exerting its uterotonic effect has been shown both *in vivo* (Rexroad & Barb, 1975; Eiler *et al.*, 1981) and *in vitro* (Patil *et al.*, 1980; Hopkins, 1983). Moreover, the improved fertility in buffaloes treated with $PGF_{2\alpha}$, compared to dinoprost or cloprostenol injected cattle, could be due to faster ovarian rebound. Bygdeman (1981) reported that prostaglandins appear to be deeply involved in the ovulatory process including ovum maturation, vasoconstriction and follicular rupture. Prostaglandins also mediate LH effects on granulosa and luteal cells (Channing, 1972).

The improved results for the previous entities obtained in the oxytocin and $PGF_{2\alpha}$ treated buffaloes (group III), can be referred to, since, in the presence of prostaglandin $F_{2\alpha}$, ordinarily subthreshold doses of oxytocin will evoke substantial myometrial contractions (Brummir, 1972). In confirmation, early administration of a combined dose of both drugs after normal or difficult birth in cows has been recommended (Kummer *et al.*, 1984).

The marked reduction in number of services per conception, with an improvement in the conception rate in oxytocin and/or $PGF_{2\alpha}$ treated buffaloes compared with the control ones, could be attributed to the induction of efficient self-cleansing of the uterus exerted by the injected drugs (Tindall, 1984). Prostaglandins are currently used in treating uterine infection in cows (Ott & Gustafsson, 1981). Administration of cloprostenol to early post-parturient cows would reduce the incidence of subclinical uterine infections, and hasten the return to a suitable uterine environment for fertilization and pregnancy initiation (McIntosh *et al.*, 1984).

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ERRATUM

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