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Luteolytic Effects of two types of prostaglandin (Lutalyse and Fenprostalene) for synchronization of Estrus in postpartum Buffalo Cows

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Abstract

Thirty cyclic water buffaloes were assigned to two types of PGF_2 alpha (Fenprostalene and lutalyze) for estrus synchronization. All animals were given two injections of the PGF_2 alpha 11 days apart (1mg fenprostalene or 25mg lutalyze per injection).Results indicated that there were no significant difference in the luteolytic potency of the two types of PGF_2 alpha tested (100% response). All animals came on estrus 3 to 4 days after given either of the two types of prostaglandin. Among the ten symptoms of estus monitored, swollen vulva and mucus discharge were found to be expressed by all the buffaloes. The least common symption is licking other buffaloes which was never expressed by any of the animals.

Keywords: Luteolytic, prostaglandin, lutalyse, fenprostalene, synchronization, estrus, postpartum

Introduction

One of the current priorities in the efforts to develop the buffalo industry is the improvement in the reproductive efficiency in buffalo cows. It is within this area that tremendous improvement can be made since the level of productivity particularly with respect to calving rate is alarmingly low. In addition to the well known problem of lack of good breeding bulls (in the Philippines) in the field, the inherent physiological responses of the buffalo to poor nutrition and low level of management has made the over-all situation quite complicated.

Water buffaloes have been shown to have prolonged calving interval extending up to 3years. One of the major reasons for such abnormally long period between calvings is the inability of the farmer to bring the animals into pregnant status at the soonest possible time after delivery. Of course this particular item may be traced from the relatively long period of ovarian inactivity of the buffalo cows postpartum. It would therefore appear that it is very essential for the animal to regain normal ovarian function postpartum so that successful breeding can be made. This would require that after the period of uterine involution, the ovary should initiate follicular development which should result to behavioural estrus and ultimately to successful ovulation.

There are various schemes to initiate resumption of ovarian function postpartum. These would include early weaning, limited nursing, and hormonal manipulation. To date there is enough evidence to indicate that the physiological responses of water buffalo and cattle to PGF_2

alpha treatments are similar (Cruz *et al.*, 1985; Cruz, 1986; Cruz *et al.*, 1987; Rao and Sreemannrayana, 1983; Herschler, 1983; Maffeo *et al.*, 1983). Because these compounds cause luteolysis, they can be used to synchronize estrus in water buffalo.

The interest of this study was to know the luteolytic potency of two types of prostaglandin for the synchronization of estrus in postpartum buffalo cows.

Materials and Methods

Experimental animals and treatments. Thirty cyclic buffalo cows with normal reproductive records and with an average age of 8.0 ± 1.3 years were used for the experiment. The experiment took place at the experimental farm of the Philippine Carabao Center (PCC) Carranglan, Digdig, Philippines (PCC was formerly PCRDC, Philippine Carabao Research and Development Center).

The general physical condition of the cows was satisfactory. The animals were allowed to graze freely and coralled at night. In addition, the animals were given mineral concentrate and molasses as supplements. The cows were grouped randomly into two with 15 animals in each group. They were treated with PGF_2 alpha regardless of the status of their estrous cycle. Each group was given two injections of either 1mg fenprostalene (Synthex Animal Health Inc., West Des Moines, USA) or 25mg Lutalyse (The Upjohn Co., Kalamazoo, MI, USA) 11days apart. The animals were regularly checked for signs of estrus.

Clinical investigation. The clinical investigations comprised detailed observation of the animals. All results were immediately recorded on a form, separate for each individual animal. Daily observations of the external heat symptoms were performed on all buffalo cows in the morning, noon-time and in the evening. Sometimes the animals were observed also at night-time in order to check the behaviour and heat symptoms. Visible symptoms of heat recorded were:

(a) Swollen vulva. Vulva were examined everyday. Emphasis was on the wrinkles of the vulva.

(b) Mucus discharge. Observations were carried out of spontaneous mucus discharge from vulva and discharge at rectal palpation. Presence of mucus discharge on the ground which was left behind by recumbent animals, especially during night-time, was included in the observations.

(c)Raised tail and lowered back either spontaneously or when the animal was pressed with a hand on the lumbar region, were recorded.

(d) Other recorded heat symptoms were frequent urination, bellowing, mounting of other animals, restlessness, loss of appetite and licking of other animals.

Results and Discussion

Out of the thirty water buffaloes synchronized with the two kinds of prostaglandin (lutalyse and fenprostalene) all came into estrus (Table 1) and the symptoms of heat were exhibited by individual water buffaloes.

Table 1 *Luteolytic effect of two kinds of prostaglandin in postpartum buffalo cows*

Type of Prostagnlandin	No. of animals Treated	No. of animals in Estrus	Estrus Rate (%)
Lutalyse	15	15	100
Fenprostalene	15	15	100

The luteolytic properties of prostaglandin and its analogues are well established in cows (Lauderdale, 1972; Louis *et al.*, 1972; Rowson

et al., 1972; Roche, 1974; Hafs and Manns, 1975; Jackson *et al.*, 1979).

In general, PGF_2 alpha and its analogues are ineffective in causing luteolysis in the early stage of the estrous cycle (Battista *et al.*, 1984; Kiracofe *et al.*, 1985). Estrus synchronization systems involving the giving of all animals two injections 11 or 12 days apart was developed to circumvent this problem. Usually the animals are not observed for estrus until after the second injection of prostaglandin. This is because the double-injection scheme takes care of buffaloes that are in the early and late luteal phases.

Therefore, if the buffaloes are distributed equally across the day of the estrous cycle, approximately 70% of the cycling buffaloes should show estrus after the first injection. These buffaloes and the remainder of the cycling buffaloes should be at a stage of the estrous cycle to respond to the second injection. After the second injection, animals are checked for estrus and bred at estrus or given fixed time inseminations at 80 hours also called the single insemination or at 72 and 96 hours (double insemination).

This system also has the advantage of maintaining a fairly high degree of synchrony of estrus for animals that return to heat in the subsequent cycle. In fact, the animals will remain fairly well synchronized for about three estrous cycles after treatments. The result further establish that prostaglandins are effective only in the presence of a CL. This is because the time of estrus is controlled by secretion of progesterone from the CL. Progesterone exerts negative feedback on LH secretion so that the endocrine events that lead to the maturation of preovulatory follicle and their subsequent ovulation are inhibited until progesterone decline at the time of CL regression. Synchronization of estrus really means controlling the life span of the of the corpus luteum.

Burfening *et al.*, (1978) reported that among cattle known to be cycling prior to a two-injection system, only 71% showed estrus following the second injection. This may be due to an effect of stage of estrous cycle. Research with beef heifers has shown that stage of the estrous cycle within the luteal phase when prostaglandin is given affects the proportion of cattle showing estrus and the time interval from prostaglandin injection to the onset of estrus (King *et al*, 1982). Cattle injected during d 10 to 15 of the estrous cycle had a greater estrus response (percentage of females showing estrus following treatment) than cattle injected d5 to 9 of the estrus cycle. Similar results have been reported in lactating dairy cows (Macmillan, 1983; Macmillan and Henderson, 1984) and stage of the estrous cycle at the time of prostaglandin injection influences interval to estrus in dairy heifers (Johnson, 1978; Refsal and Seguin, 1980; Stevenson *et al.* 1984). Furthermore, conception rate may be higher following late luteal phase injections compared with early luteal phase injections (Watts and Fuquay, 1985).

Detection of estrus

The occurrence of different heat symptoms by clinical inspection is presented in Table 2.

Table 2 *The occurrence of different heat symptoms in 30 water buffalo postpartum*

Symptoms	No. of buffaloes	% of total No.
Swollen vulva	30	100.0
Mucus discharge	30	100.0
Raised tail	12	40.0
Frequent urination	8	26.7
Bellowing	7	23.3
Mounting other buffaloes	6	20.0
Allowing mounting	6	20.0
Restlessness	3	10.0
Loss of apetite	1	3.3
Licking other buffaloes	0	0.0

(a) Swelling of vulva was found in all the buffaloes at estrus. This was a reliable symptoms provided the appearance of vulva was compared to the conditions the previous day. There are great individual variations and therefore the size of the vulva cannot be expressed in absolute figures but only relative to other days in the same animal. It is especially important to observe the wrinkles of the vulva.

(b) As with swelling of the vulva, mucus discharge was found in all examined buffaloes at estrus. The animals were checked very carefully for mucous discharge, also at night-time. However, the mucous was not always discharged spontaneously but sometimes only at rectal palpation.

(c) As seen in Table 2, the other visible heat symptoms were seen in comparatively low numbers of animals. The third most frequently seen symptom was raised tail. This symptom was seen when the lumbar region of the buffaloes was pressed by a hand. In the 12 positive cases in the table there was a clear reaction with lifting of the tail and lowering of the back. In a number of additional cases there was a weak positive reaction. In cattle, a positive reaction is obtained when the clitoris is touched but the buffalo react negatively when the vulva lips were touched.

(d) Frequent urination and bellowing were seen in about one buffalo out of four and was therefore less reliable as a heat symptom than the ones mentioned above.

(e) About 20% of the buffaloes in heat would try to mount other buffaloes and an equal number of animals would allow mounting by others. No bulls were present among the experimental animals.

(f) The remaining symptoms that could be observed at inspection were found in only 10% or less of the buffaloes.

References

Battista, P. J., Rexroad, C. E. and Williams, W. F. 1984. Effects of progesterone administered to dairy heifers on sensitivity of corpora lutea to PGF_2 alpha and on plasma LH concentration. Theriogenology 22:47.

Burfening, P. J., Anderson, D.C., Kinkie R. A., WIlliams, J. and R. L. Friedrich. 1978. Synchronization of estrus with PGF_2 alpha in beef cattle. J. Anim. Sci. 47:999.

Cruz, L. C., Valle, E. R and Esarez, J. C., Omarick, G. F., Faulkner, D. B., OTT, R. S. and Kesler, D. J. 1985. Ovulation response and fertility of cyclic beef cows to one injection of PGF_2 alpha followed by GnRH treatment and artificial insemination of pre-determined time. J. Anim. Sci. 61:114 Suppl. (Abstr.).

Cruz, L. C. 1986. Factors that enhance pituitary and ovarian function in postpartum beef cows. Ph.D. Thesis. Illinois University.

Cruz, L. C., Duran, P. G., Venturina, H. V. and Mamuad, F. V. 1987. Occurrence of LH surge and ovulation in buffalo cows treated with PGF_2 alpha or PRID. PCARRD Rev. and Eval. workshop, CLSU, July 7-8, 1987.

Hafs, H. D. and J. G. Manns, J. G. 1975. Onset of estrus and fertility of dairy heifers and suckled beef cows treated with prostaglandin F_2 alpha Anim. Prod. 21:13.

Herschler, R. C. 1983. Estrus synchronization and conception rates in beef heifers using fenprostalene in both single and double-injection programs. Agric - Practice 4:28.

Jackson, P. S., Johnson, C. T, Furr, B. J and Beattle, J. F. 1979. Influence of stage of estrus cycle on time of estrus following cloprostenol treatment in the bovine. Therinogenology 12:153.

Johnson, C. T. 1978. Time in onset of estrus after the injection of heifers with cloprostenol. Vet. Rec. 103-204.

King, M. C., Kiracofe, G. B., Stevenson, J. S. and Schalles, R. R. 1982. Effect of stage of the estrus cycle on interval to estrous after PGF_2 alpha in beef cattle. Theriogenology 18:191.

Kiracofe, G. H., Keay, L. E. and Odde, K. G. 1985. Synchronization of estrus in cyclic beef heifers with the prostaglandin analog alfaprostol. Theriogenology. 24:737.

Lauderdale, J. W. 1972. Effects of PGF_2 alpha on pregnancy and estrous cycle of cattle. J. Anim. Sci. 35:245 (Abstr.)

Louis, T. M, Hafs, H. D. and Morrow, D. A. 1972. Estrus and ovulation after uterine prostaglandin F2 alpha in cows. J. Anim. Sci. 35:247 (Abstr.)

Macmillian, K. L. 1983. Prostaglandin responses in dairy herd breeding programmes. N. Z. Vet. J. 31:110.

Macmillan, K. L. and Henderson, H. V. 1984. Analyses of the variation in the interval from an injection of prostaglandin F_2alpha as a method of studying patterns of the follicle development during diestrus in dairy cows. Anim. Reprod. Sci, 6:245.

Maffeo, G., Ballabi, R. OIgiani V. and Guidobono, F. 1983. Induction of estrus in cows by a new analogue of PGF_2 alpha. Prostaglandins 25:54.

Rao, A. V. and Screemannarayana, O. 1983. Induction of ovulatory estrus and fertility in non-cyclic buffaloes with norgestomet during low breeding season. Therio. 19:305.

Refsal, K. R. and Seguin, B. E. 1980. Effect of stage of diestrus and number of cloprostenol (ICI 80, 996) injection on interval to estrus, LH peak and ovulation in heifers. Theriogenology 14:37.

Roche, J. F. 1974. Synchronization of estrus and fertility following artificial insemination in heifers given prostaglandin F_2 alpha. J. Reprod. Fertil. 37:135.

Rowson, L. E. A, Tervil, R. and Brand, A. 1972. The use of prostaglandin for synchronization of estrus in cattle. J. Reprod. Fertil. 29:145.

Stevenson, J. S., Schmidt, M. K. and Call, E. P. 1984. Stage of estrus cycle, time of insemination, and seasonal effects on estrus and fertility of Holstein heifers after prostaglandin F_2 alpha J. Dairy Science 67:1798.

Watts, T. L. and Fuquay, J. W. 1985. Response and Fertility of dairy heifers following injection with prostaglandin F_2 alpha during early, middle and late diestrus. Theriogenology 23:655.

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