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INSEMINATION TIME AND PREGNANCY COST IN GRADE ZEBU HEIFERS SYNCHRONIZED WITH PGF2alfa (LUTALYSE^R)

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Thirty grade zebu heifers of between 30 and 36 months of age and average weight of 302 ± 29.9 kg were oestrus synchronized with two intramuscular injections of 30 mg PGF2alfa (Lutalyse^R, Upjohn) at an interval of 10 days. Oestrus was expected at 48 to 52 hours after the second injection. Heifers were inseminated twice, once in the afternoon (3 to 5 pm) of the day of expected estrus, and the second time, in the morning (8 to 10 am) of the following day. Animals were randomly distributed in four groups (G1, G2, G3 and G4) and inseminated with semen from the following breeds: Brahman (G1, n = 10), Brown Swiss (G2, n = 8), Carora (Brown Swiss x zebu) Type (G3, n = 5) and Brahman (1st insemination) plus Carora Type (2nd insemination) (G4, n = 7). Overall conception rate was 63% (19/30). Conception rates per group were: G1 (80%), G2 (75%), G3 (40%) and G4 (43%). Data were analyzed by Chi-square. Conception rate did not differ between G1 and G2, or between G3 and G4 but was highly significantly different (P < .005) when comparing G1 and G2 vs G3 and G4. The low conception rate of G3 was considered a negative effect of the bull. Estimated cost per pregnant x heifer was US$ 43.13 which is comparable to that of natural mating by an average bull used over five years of service.

Key words: oestrus synchronisation, Prostaglandin F_2 alfa, cattle, zebu, conception rate

Prostaglandin F2alfa (Lutalyse^R) is an effective oestrus-synchronizing agent in bovine females bearing an active corpus luteum at the time of treatment (Lauderdale et al., 1974; Louis et al , 1972; Rowson et al., 1972).

At present, artificial insemination is not a routine practice for genetical improvement of bovine herds in Venezuela. In ranches with management practices above normal, the major limitation for artificial insemination as a tool for genetic improvement could be the appropiate detection of oestrus. The use of Prostaglandin F2alfa (PGF2alfa)offers opportunities for artificial insemination and would probably reduce costs involved in the use and replacement of bulls of high genetic potential.

The objetive of this paper was to determine if two inseminations at pre-established times in heifers oestrus - synchronised with two injections of Lutalyse^R would result in a conception rate sufficiently high to justify economically the use of this hormone in artificial insemination programmes in beef herds.

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Materials and Methods

This study was conducted in a farm located in the north eastern plains of Venezuela from which 34 grade zebu heifers originating from cows with a calving period of no more than 5 months, of similar age were weighed, identified and palpated rectally in order to evaluate ovarian function and genital development. The experiment started on June 13th and ended on June 26th and heifers were maintained on native pasture.

Animals were oestrus-synchronized with two intramuscular injections of 30 mg Lutalyse^{R} (PGF_2alfa) at an interval of 10 days. The second PGF_2alfa treatment was given between 0700 and 0900h of the 10th day. Exhibition of oestrus was expected between 1000 and 1200h of the second day after the last treatment. Heifers were inseminated twice. The first insemination was between 1500 and 1700h(56-68 h post-injection) of the day heat was expected, and second insemination was between 0800 and 1000h of the next day(74-76h post-injection). Frozen semen from one Brahman, one Brown Swiss and one Carora (Brown Swiss x Zebu) type bull was used. Semen was obtained from the Instituto de Reproduccion Animal e Inseminacion Artificial, FCV - UCV.

Heifers were distributed randomly in 4 groups according to breed of the bull: Group 1 = Brahman (n = 10); Group 2 = Brown Swiss (n = 8): Group 3 = Carora Type (n = 5); and, Group 4 = First insemination with Brahman semen, and second insemination with Carora Type semen (n = 7). Artificial insemination was performed by one person. Pregnancy diagnosis was determined by rectal palpation at 45 days post-insemination and non-pregnant heifers were allowed to be bred naturally with the rest of the cows from the herd.

Total and pregnant-cow-costs were calculated according to labour and market prices.

Differences in body weight were determined by "t" test and in pregnancy rate by "Chi-square".

Results

The mean body weight of the heifers at the start of the experiment was 302.0 ± 29.9 kg with no significant difference between the four groups (Table 1). At the age of 30 to 36 months, the heifers showed active ovaries and good genital development. At the time of the first insemination, four heifers were eliminated from the experiment because it was impossible to pass the Cassou rod through the cervix.

Conception rate of 30 heifers was 63% (19/30). Table 2 shows results according to insemination groups. Differences in conception rates between heifers bred by Brahman (Group 1) (80%) and Brown Swiss (Group 2) (75 %), were not significant, neither were the differences between Carora (Group 3) (43%) and Brahman/Carora (Group 4) (40%). However, a highly significant difference ($P < .005$) was found when Groups 1 and 2 were compared with Groups 3 and 4.

The items used to estimate the cost per pregnant heifer are presented in Table 3. 25% of the cost per pregnant heifer (US$ 43:13) is represented by the market value of Lutalyse^{R}

Table 1:

Grouping and intramuscular distribution of heifers oestrus-synchronized with two 30 mg of Lutalyse^R (PGF_2alfa) at 10 days interval.

Groups	Nº of heifers (n)	Body weight ($\bar{x}$ ± SD)(kg)
1	10	292 ± 28.7
2	8	321 ± 28.5
3	5	301 ± 19.1
4	7	294 ± 20.3
Total	30	302 ± 29.9

Table 2:

Groups of heifers artificially inseminated with frozen semen of Brahman (Br), Brown Swiss (Bs) and Carora Type (Car) bulls. First insemination was between 3 and 5 pm of the day of oestrus and second insemination was between 8 am 10 am of the following day

Groups	Heifers (n)	Inseminations 1a.	2a.	Pregnancy diagnosis Pregnant	%
1	10	Br	Br	8	80
2	8	Bs	Bs	6	75
3	5	Car	Car	2	40
4	7	Br	Car	3	43
Total	30			19	63

Br = Brahman Car = Carora-type Bs = Brown Swiss

Discussion

Bos taurus cows or heifers bearing a corpus luteum exhibit oestrus 48 to 52 hours post - PGF_2alfa treatment. Brahman cows, on the other hand, have a larger interval of response to the same injection (Moore 1975; Cooper 1978). Plasse et al (1970), Troconiz (1976) and Randell (1980) reported a higher variability in oestrus length and ovulation time in *Bos indicus* compared to *Bos taurus* females.

Regardless of the age and weight, Rodriguez and Troya (1981) reported 25 mg Lutalyse^R to be an effective dose for oestrus synchronization in *Bos taurus*. The 30 mg dose used in this study was slightly greater than the 25 mg recommended by the manufacturer. In the other hand, Aguirre et al

Table 3:
Items considered in estimation of cost per pregnant heifer.

Item	Description	Cost in US $
Labour (2 men)	Movement of the animals to and from the working pen.	46.51
Lutalyse^R	41 50 mg vials. Including 40% discount price = US $ 5.11 per vial. Total dose was 60 mg per treated heifer.	209.51
Semen	Differential price per straw. US$ 2.33 :60 were used.	139.80
Inseminations	It was estimated US $ 2.33 per insemination. Total number of inseminations was 60.	139.80
Rectal palpations and diagnosis	Estimating US $ 6.98 per heifer.	209.40
Depreciation	Estimating 10% of costs.	74.50
Total cost		819.52
Cost per pregnant heifer		43.13

(1981) found cows of 5-6 years of age to have more variability in the response to 30 mg injection of Lutalyse^R than heifers of 3 years of age.

The 63% conception rate reported in this study is greater than that previously found for *Bos indicus* in Venezuela. Falcon et al.(1978) reported a 41% conception rate in non-lactating Brahman cows oestrus synchronized with two injections of prostaglandin F_2alfa and bred at 12 hours post-oestrus detection. Paparella et al (1980) obtained a 44% conception rate in Guzerat cows treated with prostaglandin F_2alfa and two inseminations, one following the AM-PM routine and the second, at 10-12 hours after the first insemination.

Conception rate for Groups 1 (Brahman, 80%) and 2 (Brown Swiss, 75%) could be considered high for Venezuela and especially if we compare these results with those reported by Falcon et al (1978), Paparella et al (1980) and Groups 3 (40%) and 4 (43%), these two being comparable to those for Bos indicus in Venezuela.

Group 3 had the lowest conception rate. This could be a bull effect. Although Brahman and Carora-type bull semen was used in Group 4, the mean conception rate was similar to that of Group 3. Unfortunately, due to the low number of animals and the lack of another group bred first with Carora and then Brahman bull semen, interpretation of this result can not be given at this time. However, considering the results of Group 3, it can be assumed that the semen of Carora-type bull used in the second insemination of Group 4 had no profound effect on its conception rate. It could be also assumed that if the Brahman semen contributed more to the observed conception rate, then this was due to a prolonged survival of the sperm cells in the female tract. This can be confirmed at the time of calving. Foote (1975) reported that the bull is the most important factor affecting fertility rather than the individual ejaculate. Effects due to processing

can be discarded from our study because all the semen used was processed in the same laboratory. Estimated cost per pregnant heifer was US $ 43:13 Of this, 25% is represented by the market price of Lutalyse^{R}. Because of the high component of the total cost represented by the drug, it seems advisable to use only one dose and ensure that cows which are treated have an active corpus luteum. It also seems desirable to study different ways of administering the drug so that costs per cow may be reduced. In any case, the cost per cow is not considered to be high when compared with natural breeding since one bull would be expected to impregnate 100 cows in his lifetime, given an 80% rate of conception rate. Estimating the bull price at US $ 3,489.00, then the cost per pregnant cow will be US $ 34:89, excluding interest , risks, depreciation, feeding, vaccinations and medications.

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