

INDUCTION OF RABBIT PARTURITION BY ADMINISTRATION OF A NATURAL PROSTAGLANDIN F_{2α}

PIMENTA A.¹, REBOLLAR P.G.², ALVARIÑO J.M.R.¹, ALONSO R.¹

¹ Granja Cunícola "Raúl Alonso" C/ Travesía del Manantial, 8, Nambroca, 45790 Toledo - Spain

² Departamento de Producción Animal, E.T.S.I. Agrónomos, Cdad. Universitaria s/n, 28040 Madrid.- Spain

Abstract - The effects of two different doses of a natural Prostaglandin F_{2α} (PgF) administered to 240 multiparous pregnant does of the California x New Zealand White Breed, were studied. Animals were allocated to receive either a single intramuscular injection of 800 µg or 1200 µg of PgF on day 29 of pregnancy at 16.00h. or were untreated. The injection-parturition interval was reduced significantly when comparing treated animals and control groups on day 31 post-coitum. Evidence of a dose-dependent effect was found. Litter size at birth, remating rate and conception rate were not affected by PgF treatment.

INTRODUCTION

Induction of parturition using prostaglandins is a valuable aid in rabbit management. It allows immediate cross fostering from large to small litters and facilitates supervision of does during parturition. Routine birth induction with synthetic analogues of PgF has been studied (PARTRIDGE *et al.*, 1986 ; UBILLA and RODRIGUEZ, 1989) and the results of this treatments administered on day 29 of pregnancy are a good method to control parturition with no effect on prolificacy, litter size at weaning and reduces neonatal mortality by almost 50%. UBILLA and RODRIGUEZ (1989a), have also found that the systematic induction of parturition improve sexual receptivity and conception rate of does mated 6 to 9 days post-partum.

ALVARIÑO *et al.* (1995), suggest that the threshold dose for the induction of parturition with a natural prostaglandin is equal or higher to 700 µg administered on day 29 of pregnancy at 16.00 h. In the present study two doses of this natural prostaglandin were employed to induce parturition in the rabbit and to observe the effect on grouping of parturitions, prolificacy and the posterior acceptance of mating and conception rate.

MATERIAL AND METHODS

This study was carried in commercial rabbitry with 600 does (California x New Zealand White breed) reared with a photoperiod of 16 HL/8 HD and fed with a commercial feed (Purina).

Two hundred and forty births of multiparous rabbits were studied. Two groups of eighty does were injected intramuscularly on day 29 post-coitum at 16.00 h. with 800 µg or 1200 µg of a natural prostaglandin (Inducel Pg, Lab. Ovejero) and another group of eighty does was not injected (control group). To determine the interval between injection and parturition all animals were observed at 9.00 h, 14.00 h., 18.00 h and 22.00 h until parturition occurred and litter size was recorded at birth.

In a second fase, the animals were placed with bucks for mating. This was done to determine whether there were any effects of prostaglandin administration on subsequent ability to conceive when mated on post-partum period (p.p.). Each group was subdivided into two groups of forty does. The subgroups A were presented to the buck on day 3 p.p. and when refused another presentation was made on day 7 p.p. The subgroups B were placed with a buck for mating 7 days after parturition and the does that rejected were again presented to the buck on day 10 p.p.. After mating all animals were treated intramuscularly with 20 µg of GnRh (Inducel GnRH, Lab. Ovejero) and abdominal palpation to determine pregnancy was carried out on day 11 post-coitum.

Statistical analysis of the effect of the prostaglandin treatment on the variables that did not approximate to a normal distribution (proportion of births, acceptance of mating and conception rate) was carried out using a non parametric procedure (Categorical Data Modeling), and means were compared using the contrast procedure. Prolificacy was analyzed with the ANOVA procedure and means were compared using the Duncan test (SAS/STAT, 1985).

RESULTS

Results are shown in tables 1 and 2 and figure 1.

Litter size at birth was not affected by the prostaglandin treatment (Table 1).

Table 1 : Prolificacy (Litter Size and Born Dead \pm s.e.m.) and percentage of parturitions occurred on days 30, 31, 32 and 33 of pregnancy at 9.00 h, 14.00 h, 18.00 h and 22.00 h. respectively in rabbit does treated with 0 - 800 μ g and 1200 μ g of natural Pg F₂ α on day 29 of pregnancy. The means followed by different letters within each column are significantly different (a, b: P<0.05; a, c: P<0.001; b, c: P<0.001)

PG DOSE	PROLIFICACY		PARTURITIONS (%)												
	LS \pm sem	BD \pm sem	30 (9h)	30 (14h)	30 (18h)	30 (22h)	31 (9h)	31 (14h)	31 (18h)	31 (22h)	32 (9h)	32 (14h)	32 (18h)	32 (22h)	33 (9h)
0	7.1 \pm 0.4	0.6 \pm 0.3	2.5	7.5	8.7	8.7	26.2 a	46.2 a	55 a	66.2 a	87.5	91.2	91.2	95	100
800	7.6 \pm 0.4	0.5 \pm 0.1	0	2.5	6.2	10	42.5 b	62.5 b	71.2 b	82.5 b	91.2	91.2	92.5	92.5	100
1200	7.4 \pm 0.4	0.8 \pm 0.2	0	2.5	8.7	18.7	71.2 c	86.2 c	95 c	97.5 c	97.5	100	100	100	100

Doses of 800 and 1200 μ g of natural PgF significantly reduced the injection-parturition interval when compared with the control group (P<0.05 and P<0.001). Significant differences were seen when comparing these two doses on day 31 (table 1) and there was some evidence of a dose-dependent effect (P<0.001).

Percentage of does that accepted mating and conception rate of rabbit does mated in post-partum period were not affected by treatment. Most of does were mated on the first presentation to the buck (subgroup A on day 3 and subgroup B on day 7 p.p.) (Table 2).

Table 2 : Acceptance of mating (AM) and Conception Rate in rabbit does presented to buck on day 3 or 7 post-partum (subgroup A) and on day 7 or 10 post-partum (subgroup B) treated with 0 - 800 or 1200 μ g of PgF₂ α on day 29 of pregnancy and 20 μ g of GnRH after natural mating. The means are not significantly different.

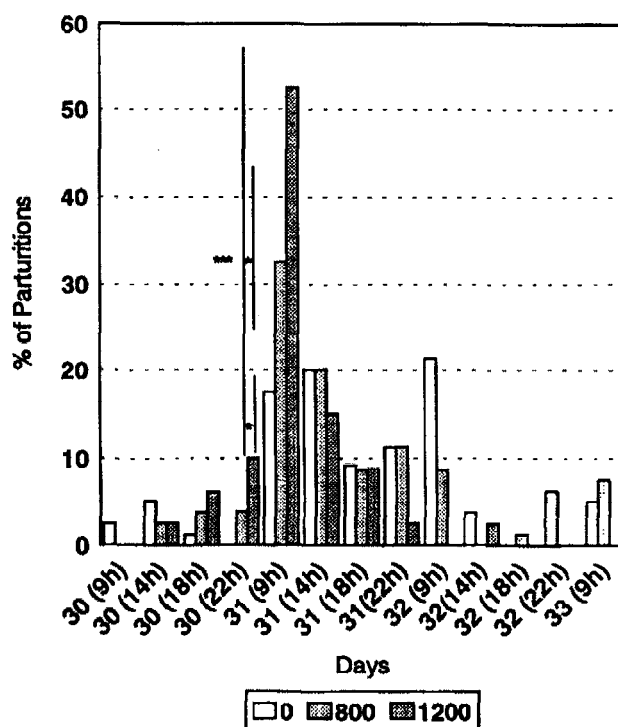
		AM (%) day 3 pp	AM (%) day 7 pp	CONCEPTION RATE
0 μ g PgF	Subgroup A	65 %	2 %	62.9 %
800 μ g PgF	"	75 %	5 %	59.4 %
1200 μ g PgF	"	72.5 %	2.5 %	66.6 %
		AM (%) day 7 pp	AM (%) day 10 pp	CONCEPTION RATE
0 μ g PgF	Subgroup B	57.5 %	10 %	59.3 %
800 μ g PgF	"	85 %	2 %	71.4 %
1200 μ g PgF	"	72.5 %	10 %	63.6 %

DISCUSSION

A significant decrease of dispersion in parturition time in does treated with natural prostaglandin vs. control was observed. The two doses of natural prostaglandin routinely administered on day 29 of pregnancy at 16.00 h., reduces the injection-parturition interval permitting a grouping of parturitions on day 31. This effect agrees with the data of UBILLA and RODRIGUEZ (1989) and ALVARIÑO *et al.* (1995).

52.5% of births of does treated with 1200 µg of PgF occurred between 36 and 42 h. after treatment vs 32.5% and 17.5 % of does treated with 800 µg and control does ($P < 0.05$ and $P < 0.00$; figure 1). There was evidence of a dose-dependent effect which coincides with the results of UBILLA and RODRIGUEZ (1989) who obtain a reduction of pregnancy with 100, 75, 50 and 25 than with 12.5 µg of etiproston doses administered on day 29 of pregnancy. This decrease in dispersion of parturition time and the concentration of a high proportion of does kindling between 22.00 h. on day 30 post-coitum and 9.00 h on day 31 post-coitum, permits a greater control over the birth process.

Figure 1 : Percentage of parturitions occurred at diffents intervals in rabbit does treated with 0, 800 µg and 1200 µg of natural Pg F2α on day 29 of pregnancy (*: $P < 0.05$;*: $P < 0.001$)**



Several studies have showed the utility of synthetics analogues of PgF for induction of parturition in the rabbit does (UBILLA and RODRIGUEZ 1989a; PARTRIDGE *et al.*, 1986). According to those authors the litter size at birth was not affected by treatment with natural prostaglandin, which could be explained by the frequent observation of nests in the control groups, not usual in a rabbit farm. However, the reduction in the individual weight of pups and the neonatal mortality was affected by treatment with analogues synthetics of PgF administered on day 28 or 29 of pregnancy.

Not evidence was found in the present study indicating that the sexual receptivity and acceptance of mating was affected by natural prostaglandin treatment. Nevertheless, a tendency to an increased mating acceptance was detected when females where treated with PgF ($P = 0.0615$). Studies with synthetic analogues of prostaglandin have shown a increase of sexual receptivity and conception rate in does mated 6 to 9 days post-partum. The possible improvement of follicular growth suggested by UBILLA and RODRIGUEZ, (1989 a) is probably not triggered by natural prostaglandin which is metabolized much quicker then the synthetic ones, although, the luteolytic effect of this synthetic prostaglandin should be similar to described by UBILLA *et al.* (1988).

Notwithstanding an effect on ovarian stimulation was described by ALVARIÑO *et al.* (1995a), when 2000 µg of PgF was injected 48 hours before A.I. on day 11 p.p.. Further research is necessary to determine if factors like animal health or nutritional factors are masking this stimulus on ovarian activity.

REFERENCES

- ALVARIÑO J.M.R., REBOLLAR P.G., DEL ARCO J.A., DELGADO F., 1995. Inducción de parto en la coneja mediante una prostaglandina natural F_{2a}. *Inf. Tec. Eco. Agr.*, vol. extra, n° 16, tomo I, 464-466.
- ALVARIÑO J.M.R., REBOLLAR P.G., DEL ARCO J.A., TORRES R., 1995a. Estimulación ovárica en la coneja mediante prostaglandina F_{2a} y PMSG. *Inf. Tec. Eco. Agr. Vol. extra*, n° 16 tomo I, 461-463.
- PARTRIDGE G.G., LAMB I.C., FINDLAY M., 1986. The use of a synthetic prostaglandin analogue (Cloprostenol) to control parturition in the commercial rabbit. *Anim Prod.*, 42, 282-286.
- STATISTICAL ANALYSIS SYSTEM INSTITUTE INC. (1985). *SAS user's Guide: Statistics*. SAS institute Inc., Cary, NC, 956 p.p.
- UBILLA E., RODRIGUEZ J.M.R., DIAZ P., GOSALVEZ L.F., 1988. Luteolytic effect of a new synthetic analogue of prostaglandin F_{2a} administered in rabbits on day 28 of pregnancy. *Invest. Agr.: Prod. Sanid, Anim.* 3, 2-3.
- UBILLA E., RODRIGUEZ J.M.R., 1989. Routine grouping of parturitions when using a new synthetic analogue of prostaglandin F_{2a} (Etiproston), administered in rabbit on day of pregnancy. *Anim. Rep. Sc.*, 19, 299-307.
- UBILLA E., RODRIGUEZ J.M.R., 1989a. A note on the influence of routine induction of parturition by administration of a synthetic prostaglandin analogue on productivity in the rabbit. *Anim. Prod.*, 49, 129-133.