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Oestrus synchronisation with progestagen injectables in West African Dwarf does.

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Abstract

The efficacy of progestagen injection for synchronising oestrus in West African Dwarf (WAD) does was evaluated. The progestagen injections used were 50mg Progesterone; 100mg Progesterone; 25mg Medroxyprogesterone acetate, MPA; 50mg MPA; 25mg Progesterone plus 0.04mg Ethinyl oestradiol combination and 50mg progesterone plus 10i.u oxytocin. The highest oestrous response of 84.6% was obtained with 100mg of Progesterone injection while the MPA groups did not show oestrus for upward of 50days post injection. A degree of synchrony >50% was obtained only in those treatments containing above 50mg progesterone. Conception rate (Fertility) at first oestrus was above 75% in all the responding groups except the 50mg progesterone where only 20% of the 71.4% does in oestrus and mated conceived. A single intramuscular injection of 100mg progesterone to postpartum does between 21 and 28days post-kidding led to significant ($P<0.05$) reduction of 47 and 27 days in the kidding interval of does under the scavenging and confined management systems respectively. These results indicated that there is good prospect in the use of progestagens injectables for oestrus synchronisation and possibly to shorten the kidding interval of WAD does especially under the predominant smallholder management situation. However further studies are required to establish the mechanism of the effects observed and to determine the appropriate dosage of administration of the progestagens.

Keywords: Oestrus synchronisation, progestagen injectables, WAD does.

Introduction

Oestrus synchronisation is the most important aspect of any livestock breeding programme. Repeated progesterone injections at 2-5day intervals and 10 – 100 mg/female over one oestrous cycle length were used in the past to achieve oestrus synchronisation in livestock (Holst and Moore, 1970; Sefidbakht *et al.* 1971). Convention methods nowadays, which have also been proved to be effective for small ruminants, includes $PGF_2\alpha$ injection, progestagen impregnated sponges, Controlled Internal Drug Release (CIDR) device and oral administration of progestagens (Wildeus, 2000). The use of progestagen treatment to induce oestrus and ovulation in the postpartum dam has also been reported (Brown *et al.*, 1972; Osinowo *et al.*, 1987). The kidding interval of West African Dwarf (WAD) doe under the traditional management system, reportedly in the range of 220 to 300 days (Mack 1983; Egbunike *et al.*, 1993; Odubote *et al.*, 1993) could be significantly reduced with these treatments. However, the relatively high cost and/or technical constraints of the conventional oestrus synchronisation methods make their applicability under the smallholder livestock operation prohibitive. The progestagen injection method, which may not be commercially viable under intensive/large scale operation, may thus be the best option under the smallholder operation. Its applicability under the smallholder operation would be greatly improved if it could be administered as a single dose injection. It was against these backcloths that this study was conducted to determine the efficacy of a single intramuscular injection of some readily available progestagen injectables for oestrus manipulation in WAD doe in southern Nigeria.

Materials and Methods

Animals and management

Thirty (30) completely confined WAD does at the Obafemi Awolowo University Teaching and Research Farm and 14 scavenging WAD does at a village situated 6km away were used between January 2002 and October 2003 to determine the efficacy of some progestagen injectables for oestrus manipulation in pre-conception and postpartum WAD does. At the start of the study the ages and parity of both confined and scavenging does ranged between 2 -8 yr and 0 – 5 respectively. Confined does were housed on concrete-floored open-sided pens in groups of 3 per pen and stall-fed *ad-lib* on a combination of *Panicum maximum, Gliricidia sepium,* and *Leucanea leucocephala* forages plus supplement ration (when available) at the rate of 0.15kg/head/ day. The ration contained 35% corn offal, 40% palm kernel cake, 23% wheat offal, 1% bone meal, 1% oyster shell, 0.25% common salt and 0.1% vitamin/mineral premix. All experimental does were dipped in Makon 50® solution at 6 months intervals (for ectoparasite control) and given Levamisole injection when not pregnant (for endoparasite control) at the manufacturer recommended dosage. While the confined does were monitored daily, the scavenging ones were visited every 2 weeks and given veterinary attention as needed.

Evaluation of progestagen injectables for oestrus synchronisation

Two trials involving only the confined does were conducted to determine the efficacy of progestagen injectables to synchronise oestrus in WAD does. The does weighed 14.56±1.14kg at the start of the trials but were randomised into treatments with respect to parity. The treatments during trial 1 were: 25mg medroxyprogesteroneacetate, MPA (Depo-Provera®, Upjohn, USA) 25MPA; 50mg MPA; 50mg progesterone (Longlife, China), 50PROG and 100mg progesterone, 100PROG. Trial 2 involved 100PROG; 25mg progesterone + 0.04mg ethinyl oestradiol (Menstrogen®, Organon, Pakistan) PROG+EST, and 50mg progesterone + 10i.u Oxytocin PROG+OXY. Injection of 2ml of sterile water served as the control during both trials. All injectables were readily available at very affordable prices and were given as a single dose intramuscular injection on the first day of experiment. Oestrus response, degree of synchrony (% of females in oestrus within 96h of the first one to display oestrus), fertility (conception rate) and kidding performance were determined post injection.

Effect of progestagen injection on postpartum oestrus and conception

After 7 days post-kidding 12 nursing does under confinement were exposed to buck teasing 3 times daily for 15 minutes each session while 14 nursing does under the scavenging system had uncontrolled exposure from day 1 postpartum. At 21-28days postpartum nursing does under both scavenging and confined management systems were divided into 2 groups and one group given once 100mg progesterone injection per animal while the other group received no injection. Thereafter postpartum oestrus was checked daily in all the does under confinement with the aid of aproned bucks introduced at least 2 times per day with at least 5minutes of teasing per doe at each checking. Does in oestrus were removed and hand mated. For the scavenging does, the first fertile postpartum oestrus date was calculated from the next kidding date.

Results and Discussion

Oestrus synchronisation

Table 1 depicts the responses of the does to progestagen injection. The MPA groups (25mg and 50mg injections) were removed from the report because there was no oestrus response until day 77 post-injection (Egbunike and Ola, 2003). Among the remaining groups, 100PROG gave the highest oestrus response of 84.6% while the lowest figure of 57.1% was obtained with PROG+OXY injection. The interval between injection and exhibition of oestrus was shorter ($P<0.05$) in the PROG+OXY (120.50±0.5h) and 50PROG (138.8±10.2h) groups. However in all the groups receiving progestagen injection (except one doe in PROG+EST group) oestrus commenced about 120h (5 days) post-injection. Oestrus duration was significantly ($P<0.05$) shorter in does receiving 50PROG than the PROG+OXY, PROG+EST and the control but not the 100PROG. The percent oestrus responses obtained in this study were lower compared to the response to $PGF_2\alpha$ injection by WAD does (Akusu and Egbunike, 1984) and progestagen-impregnated sponges by WAD (Oyediji *et al*, 1990) and Yankasa (Osinowo, 1982) ewes. However the responses were as good as those of previous works that also employed progestagens injection (Holst and Moore, 1970; Sefidbakht *et al.* 1971), especially with 50PROG, 100PROG and PROG+OXY groups where the degree of synchrony were 100, 54.5 and 100% respectively. Fertility (conception rate) with 100PROG, PROG+OXY and PROG+EST were above 75% (of the does in oestrus and mated) which compared favourably well with several other trials that employed sponges and CIDR devices (Wildeus, 2000). Fertility with 50PROG was only 20% but was better when combined with 10i.u Oxytocin. This may have been due to certain luteal function of oxytocin (Schams *et al.*, 1983; Tallam *et al.*, 2000). Although it is recommended that PMSG or HCG injection shortly before or at the time of progestagen withdrawal will ensure a good fertility (Wildeus, 2000), 100PROG alone as used in this study also gave a good conception rate in the WAD does. It thus appeared that progestagens injections alone could be effective in the synchronisation of oestrus in WAD does. However, further study on the mechanism of action of the progestagen injection in the WAD doe will be required for substantiative conclusion.

Reproduction productivity

The low kidding proportion depicted in table 1 of does given progestagens injection and the control group was due to high abortion rate that occurred during the shortage of concentrate supplemental feed during the study. Gestation length and kid birth weight were however not significantly ($P>0.05$) affected by the progestagen treatment although litter size per doe and incidence of multiple birth were higher for does receiving 100PROG and control. Over 65% of the kids in each treatment group survived till weaning period (5.5kg liveweight or 12 weeks of age), but reproductivity (according to Hofs *et al*, 1985 method) was highest in the 100PROG (0.88) followed by PROG+EST (0.64), control (0.40) and PROG+OXY (0.35). Reproductivity

Table 1: ***Oestrus, fertility and kidding responses of WAD does after intramuscular injection of progestagen***

Parameter	2ml H_2O (Control)	50mg Progesterone	100mg Progesterone	Progesterone + Oxytocin	Progesterone + Ethinyloestradiol
Doe joined	11	7	13	7	9
% in oestrus	75.0	71.4	84.6	57.1	69.2
Response Interval (h)	160.9 ± 56.1^{b} (2-408)	138.8 ± 10.2^{a} (124-176)	261.2 ± 41.7^{b} (120-460)	120.5 ± 0.5^{a} (120-122)	146.5 ± 20.7^{b} (48-216)
Degree of Synchrony(%)	33.3	100	54.5	100	33.3
Oestrus duration (h)	26.1 ± 3.9^{c} (14-48)	13.6 ± 4.0^{a} (6-28)	19.7 ± 1.6^{ab} (12-24)	30.0 ± 6.0^{c} (24-48)	22.2 ± 3.0^{bc} (12-40)
Conception (%)	100	20	81.8	100	77.8
Proportion[k] Kidding	0.25	0	0.54	0.43	0.46
Gestation Length (d)	144.2±0.84	NA	143.8±3.2	146.6±2.2	144.0±1.4
Kidding %	0.50	0	1.08	0.43	0.62
Litter size[l]	1.80	0	1.86	1.20	1.40
Birth weight	1.14±0.15	NA	1.17±0.21	1.18±0.21	1.14±0.10
Multiple birth	0.60	NA	0.75	0.20	0.40
Male: Female	1.67	NA	0.27	1.00	2.50
Kid Survival rate[s]	0.88	NA	0.88	0.67	1.00
Reproductivity[1]	0.40	NA	0.88	0.35	0.64

NA = Not available
[abc] Significant difference at P<0.05

[1]Reproductivity = k.l.s (Hofs et al., 1985)

Table 2: ***Productivity of WAD does after progestagen treatment***

meter	Scavenging does		Confined does	
	UB[1] 9	P+P 5	UB 6	P+P 6
f kids	11	8	.11	10
ıartum :ption (d)	112 ± 10^{c}	65 ± 8^{a}	125 ± 21^{c}	98 ± 4^{b}
ing /al (d)	257 ± 35^{c}	210 ± 12^{a}	270 ± 28^{c}	243 ± 7^{b}
ɔduction (kids/doe/yr)	1.32	1.60	2.03	2.24
ıctivity : (kg weaned doe/yr)	7.42	9.09	8.40	9.34

[1]UB= Unaided breeding; P+P = 100 mg progesterone injection
[abc] Significant difference at $P<0.05$.

of the doe is a function of the proportion of the does kidding, litter size per doe and the proportion of the kids surviving till weaning (Hofs *et al*, 1985). These parameters are in turn determined by parity of the doe, nutrition and management level and not methods of oestrus synchronisation (Odubote *et al.*, 1993;Sodiq *et al.*, 2003).

Postpartum interval to conception

Dams that received progestagen injection under both management systems in this study had shorter postpartum interval to conception, which eventually led to reduced kidding interval and increased productivity index (Table 2). Similar results have been obtained in the cow (Diskin *et al.*, 20 01) and ewe (Osinowo *et al.*, 1987). Diskin *et al.* (2001) had explained that the prolonged postpartum interval to oestrus in the beef cow is not due to failure of ovarian follicle development but rather to the failure of successive dominant follicles to ovulate due to the inadequate frequency of LH pulses. This inhibition of the LH surge necessary for ovulation may be caused by suppression of gonadotrophin secretion by high peripheral levels of cortisol, as is the case in cow (Wagner and Li, 1982) and sow (Cox and Britt, 1982) or prolactin, as is the case in the rat and women (Saito et al., 1970) during lactation and suckling. This inhibition is best removed by a combination of restricted suckling plus progesterone treatment (Diskin et al., 2001). How progestagen injection was able to advance postpartum conception in the present study could not be ascertained since there was no monitoring of the peripheral hormone levels. But, a possible explanation could be a positive feedback effect of the progestagen at the hypothalamus or pituitary axis. However reports had indicated that lactational anoestrus (and postpartum intervals) could also be reduced by adequate nutrition prior to parturition and during lactation (Osinowo and Ekpe, 1985, Diskin et al., 2001).

With every 20 days reduction in the kidding interval Hofs et al. (1985) proved that there would be an 11.6% increase in the meat production of the WAD doe. In the present study the highest reduction of 47days was obtained in the scavenging does (table 2) with a concomitant 27% increase in their productivity when just a single dose of 100mg progesterone was injected.

Conclusion

The present study has been able to show that there is a good prospect in the use of progestagen injectables for oestrus manipulation in WAD does. If well developed the technique would be very beneficial to both on-farm and on-station reproduction researches with small herds. It could also lead to improved efficiency of the smallholder goat production. Further studies are however required to establish the mechanism of progestagens effects and the appropriate dosage of the progestagen injectables for WAD does.

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