

Reproductive Response of West African Dwarf Does to Prostaglandin Administration

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Abstract: The paper reports on oestrous synchronisation, interval between prostaglandin injection and standing oestrus, fertility, kidding rate and litter size in multiparous West African Dwarf (WAD) does following prostaglandin administration. Thirty four WAD does were stratified by age (young: 3-4 yrs, n=17 versus old: 5-6 yrs, n=17) and synchronised for oestrus with a PGF_{2α} analogue (Cloprostenol, twice i.m. injection, 62.5 µg, 11 days apart). Two each of the young and old does did not come into oestrus four days after the second Cloprostenol injection (SCI), giving a synchronisation rate of 88.2%. The overall mean (±SD) interval between SCI and standing oestrus was 55.7±15.46 h. Young does had a shorter interval between SCI and standing oestrus than old does (53.3±15.40 versus 58.0±15.70 h; P>0.05). All the 30 does mated gave birth and the number of kids given birth to was 49. This resulted in overall means of 100%, 88.2% and 1.6±0.56 for fertility, kidding rate per does exposed to the buck and litter size, respectively. Young does had a higher litter size than old does (1.8±0.56 versus 1.5±0.52, P>0.05). It was concluded that young WAD does (3-4 yrs) in the derived savannah ecological zone may give a better reproductive response to prostaglandin administration than old does (5-6 yrs).

Key words: Age · Cloprostenol · Dwarf goat · Fertility · Litter size · Oestrous synchronisation

INTRODUCTION

Goat meat (chevon) is relished in Ghana, especially in the urban centres [1]. Large numbers of goats may be required to supply the needed quantity of chevon as Ghana's population grows and becomes more sophisticated with time. The potential to export chevon to the international market also exists as there is a growing world wide interest in meat goat production [2]. Goat production is, however, not developed in Ghana. The productivity indicators sometimes show poor reproductive performance, perhaps because virtually no inputs are committed to the rearing of goats in the country. Even though the West African Dwarf goat, which is the predominant goat breed in Ghana, is credited with a high mean litter size of 1.8 [2, 3], it is reported to have a litter size of 1.3 in certain parts of Ghana [4]. An improved feeding and management system may, therefore, be required to bridge the performance gap.

Oestrous synchronisation is a management technique that can be used to enhance the care of pregnant and lactating does and their young. It also enhances the effective use of complementary reproductive technologies such as artificial insemination (IA) and embryo transfer

(ET) [5]. Normally, oestrous synchronisation in goats is achieved by control of the luteal phase of the oestrous cycle either by giving exogenous progesterone or by inducing premature luteolysis. This potential to control is greater during the luteal phase in goats because the phase lasts longer and is more responsive to manipulation. Serious efforts have been made in recent times to establish protocols for oestrous synchronisation in goats. It, however, appears that breed, feeding, season, geographical location and age affect the response of does to treatments [5]. The optimum age band for high reproductive performance in the WAD doe has been reported to be 3-4 yrs by some scientists while others put it at 5-6 yrs [6, 7]. The objective of the present study was, therefore, to assess the reproductive performance of the WAD doe according to age, following oestrous synchronisation with PGF_{2α} analogue, Cloprostenol in the derived savannah zone of Ghana.

MATERIALS AND METHODS

The study was carried out at Kintampo (373 m a.m.s.l.; 08°03'N, 01°43'W), a town located in the derived savannah zone of Ghana. The climate is hot and humid,

with annual means for temperature and precipitation of 27°C and 1300 mm, respectively. The study involved 34 multiparous West African Dwarf does and four bucks. The does were stratified by age (young, n=17 and old, n=17). The mean (\pm SD) ages for the young and old does at the start of the study were 3.8 \pm 0.19 and 5.7 \pm 0.27 yrs, respectively and their overall mean (\pm SD) age was 4.7 \pm 1.02 yrs. The overall mean (\pm SD) body weight was 16.3 \pm 2.62 kg while the body weights for the young and old does were 14.8 \pm 1.70 kg and 17.7 \pm 2.61 kg, respectively. The does grazed mainly local *Panicum maximum* and *Centrosema pubescens* pasture at the time of the study. The study was conducted in May, which is the early part of the wet season in the area.

The does were injected twice intramuscularly with 62.5 μ g Cloprostenol (0.25ml Estrumate; Schering-Plough Animal Health; NJ), a prostaglandin F_{2 α} analogue, 11 days apart. Following the second Cloprostenol injection (SCI), the goats were confined and observed for oestrus and mating for four days. Four pens were used to confine the goats; a pen contained three or four each of young and old does and a servicing buck with proven fertility. Confined does and bucks were supplied with cut forage, water and salt lick ad lib. A doe was observed to be in standing oestrus when it willingly stood still to be mounted by a buck. The does were grazed in paddocks from the fifth day of SCI until parturition.

Kidding rate in this study was defined as percentage of does kidding per number exposed to the buck and litter size was defined as the number of kids born per doe kidding.

The data were analysed by one-way ANOVA for the establishment of significance at the 5% level of significance. The interval between SCI and standing oestrus and litter size were linearly regressed on age of the doe. The SPSS computer statistical package [8] was used for the data analysis.

RESULTS

The overall mean (\pm SD) interval from SCI to standing oestrus was 55.7 \pm 15.46 h. The interval did not differ ($P>0.05$) between the young does (53.3 \pm 15.40 h) and the old does (58.0 \pm 15.70 h). Oestrous synchronisation was similar for the young and old does, 88.2% in each case. Oestrus occurred between 32 and 80 h of SCI. Only 2.5% of does came into oestrus 36 h following SCI. However, 25% of them were in oestrus during the second day of SCI. The percentage increased to 67.5 by the close of the third day and 82.5 at the end of the fourth day (Fig. 1). Thirty out of the 34 does were mated and they all gave birth, resulting in 100% fertility and 88.2% kidding rate per does exposed to the buck. The overall mean (\pm SD) litter size was 1.6 \pm 0.56. Young does (1.8 \pm 0.56) had a higher litter size than old does (1.5 \pm 0.52), but the difference was not statistically significant. The linear regression line for the interval between SCI and standing oestrus on age of doe (x) was 45.1 + 2.2x and that for litter size on age of doe (x) was 2.3 - 0.14x. None of the two equations was statistically significant ($P>0.05$).

DISCUSSION

It is possible that some of the 11.8% does not responding to Cloprostenol treatment within the four days of observation were anoestrus. However, variability in oestrous response following synchronisation in cyclic does have been reported in several previous studies. The individual variability inherent in the events following oestradiol peak, which is beyond the capacity of synchronisation, may be responsible for the differences [9]. It may also have been that some individuals in the present flock were in the early stages of the luteal phase at the time of SCI, resulting in some does possibly responding after the period of observation. It has been previously reported that prostaglandin injection in the late stages of the luteal phase (d 11 to 15 of the oestrous

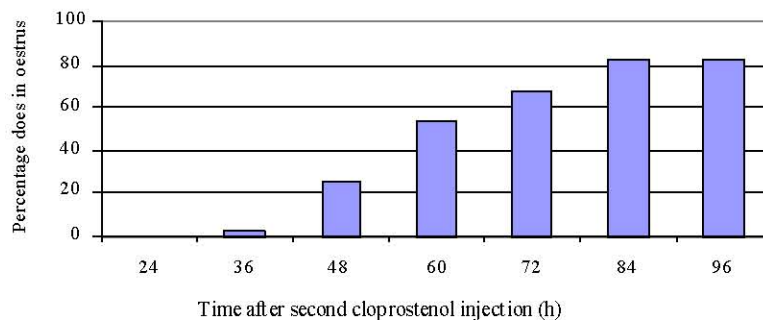


Fig. 1: Cumulative percentage of dwarf does in oestrus 96 h after cloprostenol injection

cycle) of cattle resulted in a higher oestrous response and fertility rate compared to those injected with prostaglandin in the early part (d 6 to 9) of the luteal phase [10]. A similar trend has also been reported in dairy goats [11], but in their case the differences between does injected with Cloprostenol on d 6 and those injected on d 12 of the oestrous cycle did not reach significance in the hours from injection to onset of oestrus and percentage of goats responding to treatment (46 h and 95% versus 48 h and 100%). It was observed that the variances of the duration to oestrus were different. The ranges were 12-88 h and 34-68 h for does injected on d 6 and 12 of the oestrous cycle, respectively. In that study, while only 67% of does injected on d 6 showed signs of oestrus between 36 and 60 h after injection as much as 85% of does injected on d 12 showed signs of oestrus within the same period.

The proportion of does which came into oestrus in the present study cannot compare with the 100% response previously reported for Nubian [12] and East African Shorthorned [13] does. The current oestrous response is also inferior to the 93.8% reported for Boer does [14]. However, it is higher than the 64% recorded for Mashona does [15] and the 66.7% for black Bengal does [16].

The overall mean (\pm SD) interval between SCI and standing oestrus of 55.7 ± 15.46 h also compares favourably with the 60.5 h reported [12] for Nubian does and is better than the 95-137 h reported [16] for black Bengal does. The present fertility rate is higher than the 75% [12, 16] and 64-83% [15] previously reported. The litter size of 1.6 ± 0.56 obtained in this study has similarly been reported [6], but is inferior to the 1.8 reported [3] for the WAD breed. The present litter size is indeed better than the 1.3 reported elsewhere [4]. The positive rate of change in the interval between SCI and standing oestrus per change in age of doe suggests that 3-4 yr old WAD does may come into oestrus more quickly than 5-6 yr old does when treated with prostaglandin. The negative rate of change in litter with change in age of doe also suggests that young (3-4 yrs) does may produce larger litters than old (5-6 yrs) does. The implication is that young does may give a better reproductive response to prostaglandin administration than old does. In a similar oestrous synchronisation study, Melengestrol acetate (MGA) in combination with PMSG caused superovulation only in young goats and not in old does [5].

CONCLUSIONS

The high degree of oestrous synchrony and fertility achieved in this study indicate that fixed time artificial insemination and reduction of breeding season in the WAD goat are possible and feasible and could be used to manage the WAD does more efficiently in the derived savannah ecological zone. The results further indicate that young WAD does may give a better reproductive response to prostaglandin administration than old does.

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