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EFFECT OF CLOPROTENOL AND BIO STIMULATION ON ESTRUS SYNCHRONY, ONSET AND DURATION IN UDA EWE

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ABSTRACT

The influence of biostimulation in combination with cloprostenol administration on estrus synchronization was studied. Twelve matured pre-partum ewes, weighing between 21 and 31 kg and 1 – 2 years of age were used for this study. The animals were assigned to four treatment groups (A, B, C and D) each consisting of three (n = 3) animals. Estrus manifestations were seen in group A, B, C and D as 100, 66.7, 66.7 and 0% respectively. The time to onset of estrus for groups A, B, C and D were 36.33 ± 8.32, 26.23 ± 2.81, 23.14 ± 0.14 and 0.00 ± 0.00 h respectively. The duration of estrus was 33.30 ± 12.60, 15.67 ± 13.58 and 0.00 ± 0.00 h respectively. Percentage synchrony was highest in group A, with all the animals being synchronized after the second dose of cloprostenol were administered. In groups B (single dose of cloprostenol with introduction of a ram) and C (double doses of cloprostenol without introduction of ram) percentage synchrony were same. Bio stimulation had a synergistic effect on cloprostenol and their combination will reduce cost of synchronization and is therefore recommended for synchronization programs.

Key words: Biostimulation, synchronization, estrus detection

INTRODUCTION

Small ruminants are integral to the cultural and livelihood systems of rural Nigerian communities (Ajala, 2004). Shaib *et al*. (1997) emphasized the critical need to enhance domestic food animal production, particularly conventional sources of animal protein, to address acute shortages in developing nations like Nigeria.

Reproductive performance in indigenous tropical sheep and goats is generally suboptimal, attributed to insufficient data, poor nutrition, and inadequate management practices. Key factors contributing to this low efficiency include irregular estrous cycles, subtle estrus signs, and reduced fertility rates (Adamu & Sidi, 2024). Uda and Balami, two widespread breeds in Northern Nigeria, lack sufficient research on estrus synchronization efficacy and fertility outcomes. This study aims to evaluate the effectiveness of cloprostenol for estrus synchronization in Uda ewes.

Intravaginal sponges impregnated with fluorogestone acetate (FGA) or progesterone-releasing devices (CIDR®) administered for 10–16 days, combined with intramuscular eCG at device removal, have proven effective in enhancing ewe reproductive performance (Haresign, 1992; Kohno *et al*., 2005). Synchronization enables farmers to schedule natural breeding or artificial insemination without relying on estrus detection.

MATERIALS AND METHODS

Experimental animals and treatment groups

Twelve matured cycling ewes between 12 and 24 months and two matured rams between 18 and 24 months aged using their dental eruption pattern as described by Dereje *et al*. (2013) were used for this experiment. The animals were purchased from available animal markets in Sokoto and its environs. The ewes after purchase were scanned using ultrasound machine to rule out pregnancy and animals found pregnant were replaced with some others and ascertained not pregnant before the commencement of the experiment. The rams were examined for their breeding soundness. The ewes were separated from the rams and conditioned for 2 months. During the period, feed and water were provided *adlibitum*.

Group A Consists of three Uda ewes separated from rams for 2 months. Animals were administered two doses of cloprostenol at 125µg/animal 11 days apart, with a ram introduced at the beginning of experimentation.

Group B Consists of three Uda ewes separated from rams for 2 months and were administered a single dose of cloprostenol at 125µg/animal, with a ram introduced at the beginning of experimentation.

Group C Consist of three Uda ewes separated from rams for 2 months and were given two doses of cloprostenol at 125µg/animal 11 days. The group had no ram introduced.

Group D Consist of three Uda ewes separated from rams for 2 months. Animals in this group were given placebo (0.5ml of normal saline i.m) with no introduction of ram.

Estrus synchronization.

Intramuscular administration of cloprostenol at a dose rate of 125µg was given as described for the groupings above.

Estrus detection

The treated ewes were visually observed for behavioral estrus manifestations three times daily, 08:00am, 12:00pm and 06:00pm (Akusu, 2003) for five days. Two intact rams (n=2) were used to aid estrus detection. Standing to be mounted by other female and mounting by the males (homo and heterosexual mounting) were taken to be the primary and sole criteria to judge evidence of estrus. Other secondary signs of estrus such as clear mucus discharge, restlessness, tail wagging, frequent bleating, reddened and swollen vulva, frequent

adoption of urination posture were also noted and taken into account (Díaz *et al*., 2018).

Estrus Behavior and Synchronization Efficacy.

The following estrus behaviors were evaluated:

- Estrus Response (%): Calculated as the percentage of ewes in each treatment group that displayed standing estrus and were subsequently mated, relative to the total number of ewes.
- Time to Onset of Estrus: Defined as the interval (hours) between cloprostenol administration and the first observed standing estrus, expressed as mean ± standard error of the mean (SEM).
- Duration of Estrus: Measured in hours as the period from the first standing estrus to the final acceptance of mounting by the ram, reported as mean ± SEM.

RESULTS

Three criteria were used in detecting the animals on heat, they include swelling of the vulva, vaginal discharge and standing heat.

Percentage synchrony

In group A, there was 100% synchrony and 66.7% synchrony in group B. In group C a synchrony of 66.7% was achieved. The control group (group) recorded no estrus.

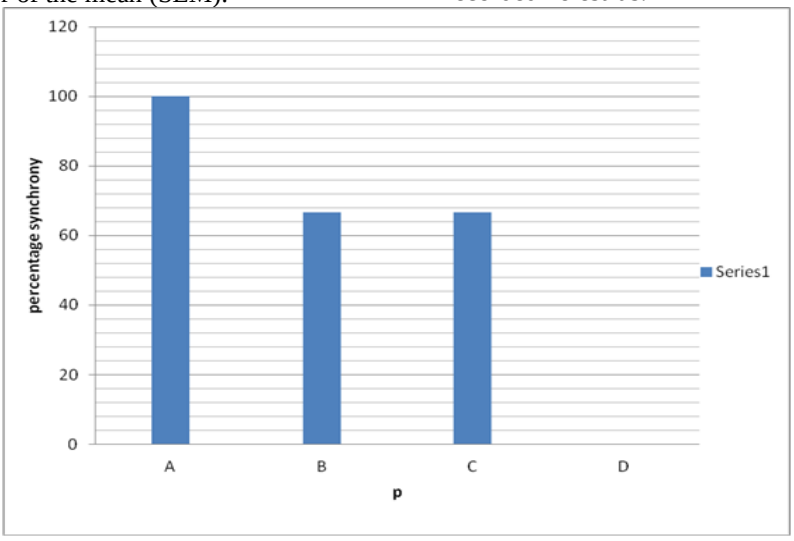

Figure 1: Showing percentage synchrony following different treatments in Ewes

Time to onset of estrus

The time from treatment to onset of estrus in group A, B, C and D was 36.33h ±8.32, 26.23h ±2.81, 23.14h±0.14 and 0.00h±0.00 respectively

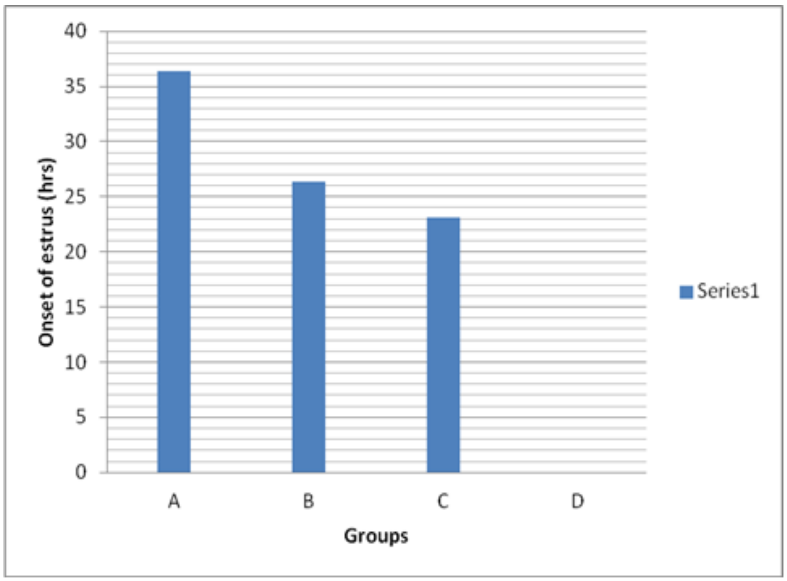

Figure 2: Showing time to onset of estrus (hrs) mean± SD following different treatments in Ewes.

Duration of estrus

The duration of estrus in groups A, B, C and D are respectively 33.33hrs ±12.6, 15.67hrs ±13.58, 18.00hrs ±16.09 and 0.00hr ±0.00.

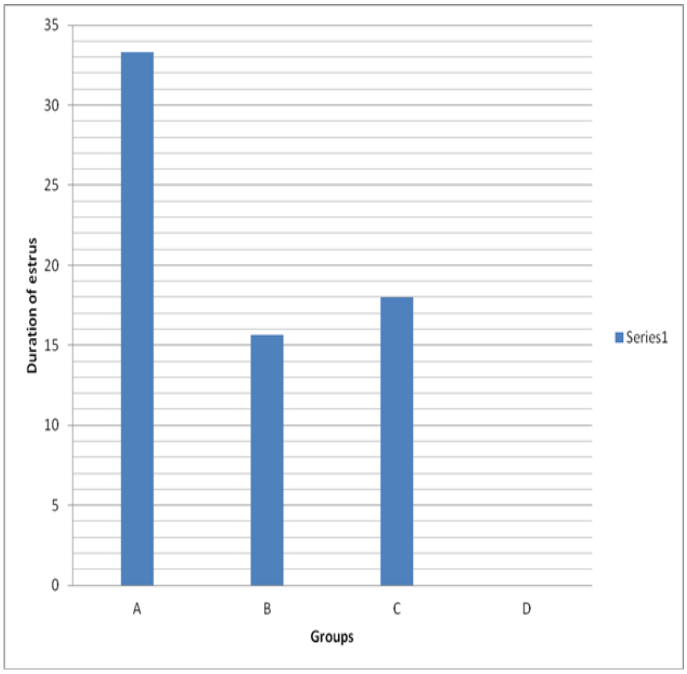

Figure 3: Showing duration of estrus (hrs) mean ±SD following treatments in Ewes

DISCUSSION

Percentage synchrony

In this study, synchrony rates were 100%, 66.7%, and 66.7% for groups A, B, and C, respectively. Group A, treated with a combination of biostimulation and two cloprostenol doses administered 11 days apart, exhibited a higher estrus response compared to groups B and C. Group B received ram introduction alongside a single cloprostenol dose, while group C was administered two cloprostenol doses 11 days apart without ram exposure. These results contrast with findings by Omontese *et al*. (2010) in Yankasa sheep, which reported 70% and 80% synchrony using Eazi-Breed™ CIDR and FGA, respectively, as well as with study by Dogan *et al*. (2005). However, they align with the 62.5–100% range observed in treatments using FGA/MAP intravaginal sponges (Romano, 2002) or combined with PGF2α (Leboeuf *et al*., 2003). Discrepancies may stem from variations in synchronizing agents, animal species, and environmental factors. Notably, groups B and C achieved equivalent synchrony despite differing cloprostenol regimens (one vs. two doses). This similarity in group B may reflect the combined effect of biostimulation and cloprostenol, consistent with Pearce and Oldham's (1994) observation that ram exposure enhances luteinizing hormone secretion, inducing ovulation. Earlier studies corroborate that ram introduction accelerates puberty in ewe lambs across breeds such as Merino, Romney, Dorset, Southdown, Awassi, Corriedale, Préalpes, and Berrichon. The inclusion of intact males in groups A and B likely contributed to the high synchronization rates (100% and 66.7%) observed here.

Time to onset of estrus

Mean time to estrus onset (interval from cloprostenol administration to first estrus signs) was 36.33 ± 8.32, 26.33 ± 22.81, and 23.14 ± 0.14 hours for groups A, B, and C, respectively. Group A exhibited a longer interval compared to groups B and C. Prior studies report estrus onset within 6–120 hours post-intravaginal device removal (Romano, 1998; Greyling & Van der Nest, 2000), with Dogan *et al*. (2005) documenting a mean of 20.6 ± 0.8 hours. The shorter onset times in this study contrast with Omontese *et al*. (2010) in Sokoto Red goats and Umaru (2006), but align with higher onset rates reported by Romano (2002), Romano and Benech (1996), Greyling and Van Niekerk (2002). These variations may arise from breed, species, male presence, or nutritional factors (Greyling & Van Niekerk, 2002; Mani *et al*., 1992; Ahmed *et al*., 1998).

Duration of estrus

In the present study, the duration of estrus was recorded as 33.33±12.60, 15.67±13.58, and 18.00±16.00 for groups A, B, and C, respectively. Group A demonstrated a longer estrus duration compared to groups B and C, which contrasts with the earlier findings on estrus duration reported by Omontese *et al*. (2010); Dogan *et al.* (2005); Umaru (2006). The reason for such duration of estrus may be attributed to the combined effect of cloprostenol and biostimulation.

CONCLUSION

Ram effect (Biostimulation) in this study was shown to have a synergistic influence on cloprostenol in inducing estrus in Uda ewes and hence, can reduce the quantity and cost of synchronizing agents. The physical manifestations of signs of estrus e.g standing heat, vaginal discharge and swelling of the vulva were all demonstrated. There were serious indications that, the use of cloprostenol in conjunction with biostimulation can be used for synchronization as it produces good synchrony, short onset to estrus and a longet duration of estrus.

RECOMMENDATIONS

It is recommended that a single injection of cloprostenol, when combined with biostimulation, be used for synchronizing estrus in ewes, as this approach can reduce both the quantity and cost of the synchronizing agent. Additionally, varying doses of cloprostenol could be explored in combination with biostimulation to assess its effects on synchronization. The use of this combination in pre-pubertal and postpartum animals should also be investigated to determine its effectiveness. Furthermore, this combination should be considered for estrus synchronization in large animals.

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