

Induction of oestrus in Nigerian Ouda ewes with different oestrus synchrony protocols

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SUMMARY

The objective of this study was to evaluate different protocols of oestrus synchronization in Ouda ewes (OE) using fluorogestone acetate pessaries (FGA-45'), Eazi-Breed™ controlled internal drug release device (CIDR') and prostaglandin (PGF_{2α}). Thirty ewes were equally allocated randomly into 5 groups: ewes treated with FGA-45' (OFG), FGA-45' plus PGF_{2α} (OFGPG), CIDR' (OCD), CIDR' plus PGF_{2α} (OCDPG) and PGF_{2α} (OPG). Ewes were grouped with sexually active rams. There was 100 % synchronization of oestrus in all groups. Time interval to the onset and duration of oestrus did not differ between groups (p<0.05). There was significant effect (P<0.05) in the period of the day (70 %) during which onset of oestrus was observed in the morning (a.m.) in contrast to 30 % observation for the p.m. periods, respectively. A 100 % conception rate was recorded 17-21 days post mating by measurement of non-return rates of oestrus. It was concluded that intravaginal progestagens and/or prostaglandin were equally efficient protocols for induction of oestrus in Nigerian Ouda ewes; however, the choice of either agent or protocol to be used would depend on economic considerations, access to the hormones and individual preference.

Keywords: Oestrus response, progestin, PGF_{2α}, Ouda ewes, conception

RESUME

Induction de l'oestrus chez des brebis Ouda (Niger) par différents protocoles de synchronisation

L'objectif de l'étude était d'évaluer différents protocoles de synchronisation des oestrus chez la brebis Ouda. Trente brebis ont été réparties aléatoirement dans 5 lots : un lot traité au FGA-45' (OFG), un lot traité au FGA-45' et aux PGF_{2α} (OFGPG), un lot traité au CIDR' (OCD), un lot traité au CIDR' et aux PGF_{2α} (OCDPG) et un lot traité aux PGF_{2α} (OPG). Les brebis ont été mises en présence de béliers actifs. Les oestrus ont été synchronisés dans tous les lots. L'intervalle entre le traitement et le début de l'oestrus et sa durée ont varié entre les lots de brebis (p<0.05). La majorité des oestrus (70%) ont été détectés le matin. Un taux de conception de 100 % a été observé 17-21 jours après l'accouplement par l'observation des non retours en oestrus. Il a été conclu que les traitements à base de progestagènes et/ou de prostaglandine sont efficaces pour induire l'oestrus chez les brebis Ouda.

Mots-clés : Oestrus, progestagènes, PGF_{2α}, Brebis Ouda, conception

Introduction

Over the past few decades, several techniques have been developed to induce oestrus in sheep, thus allowing farmers to breed their animals within a short predetermined interval. It has been reported that oestrus can be efficiently synchronized with intravaginal progestins [3, 30, 10, 29, 27, 26], progestins-prostaglandin combination [21-23, 7], progestagen-ram effect combination [18, 34], prostaglandin-ram effect combination [11], prostaglandins [15, 13], melengestrol-progestin combination [12] and the ram effect [34]. Depressed fertility following both intravaginal progestin and prostaglandin treatment has been reported in sheep [22]. Fertility appears to be influenced by progestagen content [22]. Traditionally, intravaginal progestins are applied in ewes for 12 to 14 days so as to mimic a luteal phase [1-2]. Prostaglandins or its potent analogues are easier to apply in practice and act by shortening the luteal phase due to its effect on the *corpus luteum* [2]. There are many factors influencing the efficacy of oestrus synchronization protocols. These include the dose of hormone, time and duration of administration, mode of administration, co-treatment, age, breed, ram effect, season and nutrition [16, 5, 22-24, 30, 32, 18, 6, 17, 34, 20].

There are four breeds of sheep native to Nigeria. They include the Yankasa, Balami, Ouda and West African Dwarf sheep [4, 8]. The Ouda sheep is a large sheep breed second only to the Balami in size. They are easily recognized by their distinctive dual coat colour pattern of entirely black or brown forequarters and white hindquarters [4, 25]. Although this breed has a potential for more meat yield compared to Yankasa sheep because of their relatively larger size, studies on this breed are evidently lacking [8]. More so, there is a dearth of information on the application of assisted reproductive technologies such as oestrus synchronization in the Ouda sheep indigenous to Nigeria.

The use of progestagens and prostaglandins in synchronizing oestrus has been evaluated in Yankasa and West African Dwarf sheep [26-30]. However, there are no reports of oestrus induction efficiency in Ouda sheep. The purpose of the current study was to determine the effectiveness of different protocols in synchronizing oestrus in Nigerian Ouda ewes and to compare the resulting fertility following oestrus synchronization.

Materials and Methods

LOCATION, HOUSING AND MANAGEMENT

This experiment was conducted at the sheep unit of the Small Ruminant Research Programme (SRRP), National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Zaria, Nigeria. NAPRI is located in the Northern Guinea Savannah zone of Nigeria between latitude 11 °N and 12 °N and between longitude 7 °E and 8 °E at an elevation of 650 m above sea level with an average annual maximum and minimum temperature of 31.0 ± 3.2 °C and 18.0 ± 3.7 °C respectively. Shika has an average annual rainfall of 1100 mm usually lasting from May to October with a mean relative humidity of 72 % while the hamattern season lasts from November to February with mean daily temperatures ranging from 15 – 36 °C and mean relative humidity of between 20 – 37 %. Does were housed in a pen and allowed to graze within large paddocks, fed *Digitaria smutsii* (wooly finger grass) hay; concentrate supplement (0.5 kg/day), and water provided *ad libitum*.

ANIMALS AND HORMONAL TREATMENT

Ouda ewes (n=30) weighing between 35 to 38 kg with body condition scores (BCS, range 1 - 5) 3.5 – 4.0 [31] and aged between 4 – 5 years were used for this study. Does were divided into five treatments of 6 ewes each. Ewes in groups I, II, III, IV and V received 45mg fluorogestone acetate (OFG), 45mg fluorogestone acetate plus 10 mg prostaglandin combination (OFP), Eazi-Breed CIDR (OCD), Eazi-Breed CIDR plus 10 mg prostaglandin combination (OCP) and 10 mg prostaglandin, respectively. Ewes in groups I and III were treated with progestins (fluorogestone acetate [Chronogest, Intervet, The Netherlands] and Eazi-Breed CIDR [Australia]) for 12 days and administered prostaglandin (Lutalyse® Phizer, USA) on the day of pessaries removal.

OESTRUS DETECTION AND NATURAL MATING

Ewes were placed with sexually experienced Ouda Rams in the ratio 1 Ram to 10 does [2]. Does were observed visually

for behavioral oestrus manifestation twice (0700-1000 and 1500-1800 hours) daily for 5 days following treatments. Standing to be mounted was the cardinal sign used to determine oestrus response. Oestrus activity occurring within 120 hours post administrations of treatments were classified as synchronized. Oestrus response, progestin retention, conception, time interval to initiation and duration of oestrus were evaluated. Oestrus response was calculated as the number of does that showed standing oestrus and subsequently mated, over the total number of does in each treatment group, expressed as a percentage. Time to initiation of oestrus was evaluated as the time (hours) interval from when the treatments were administered to the time when the ewe first expressed standing oestrus (heat) after being exposed to the Ram expressed as mean \pm standard error of mean (SEM) while duration of oestrus was measured as the time (hours) between the first and last standing oestrus expressed as the mean \pm standard error of mean (SEM). Conception rates was evaluated by measurement of non-return rates of oestrus 17-21 days after mating of does on standing heat.

STATISTICAL ANALYSES

Retention, oestrus response and conception rates were expressed in percentages. Data on time to the onset and duration of oestrus were expressed as mean \pm SEM and analyzed using GraphPad Prism version 5.0 (2006) for windows from GraphPad software, San Diego, California, USA (www.graphpad.com). ANOVA was used to compare means between treatment groups. Values of $p < 0.05$ were considered significant.

Results

A 100 % progestagen retention rate was observed for all ewes treated with intravaginal progestins. Similarly, a 100 % oestrus response and conception rates was also observed for ewes in all groups (Table I). Interval from progestagen withdrawal to the onset and duration of oestrus differed significantly ($p < 0.05$) between groups (Table I). Ewes treated with progestin-prostaglandin combinations (Groups II, IV)

Parameters	Groups				
	OFG (n=6)	OFGPG (n=6)	OCD (n=6)	OCDPG	OPG
Retention (%)					
Oestrus response (%)	6/6 (100) ^a	6/6 (100) ^a	6/6 (100) ^a	6/6 (100) ^a	6/6 (100) ^a
Onset of oestrus (h)	45.3 \pm 3.1 ^a	32.4 \pm 5.3 ^b	46.1 \pm 37.2 ^a	31.2 \pm 2.5 ^b	50.04 \pm 4.8 ^b
Duration of oestrus (h)	44.7 \pm 2.4 ^a	29.07 \pm 2.1 ^b	44.5 \pm 1.8 ^a	39.31 \pm 5.3 ^a	29.28 \pm 2.6 ^b
Conception (%)	6/6 (100) ^a	6/6 (100) ^a	6/6 (100) ^a	6/6 (100) ^a	6/6 (100) ^a

Key

% = Percentage

PG = Prostaglandin F2 α

n= Number of does per group

CD = Eazi Breed CIDR

FG= Fluorogestone acetate pessaries

abMean values along the same row with different superscripts alphabets are statistically different ($p < 0.05$).

TABLE I: Retention, oestrus parameters and conception rates of Ouda ewes synchronized using progestins and or prostaglandin.

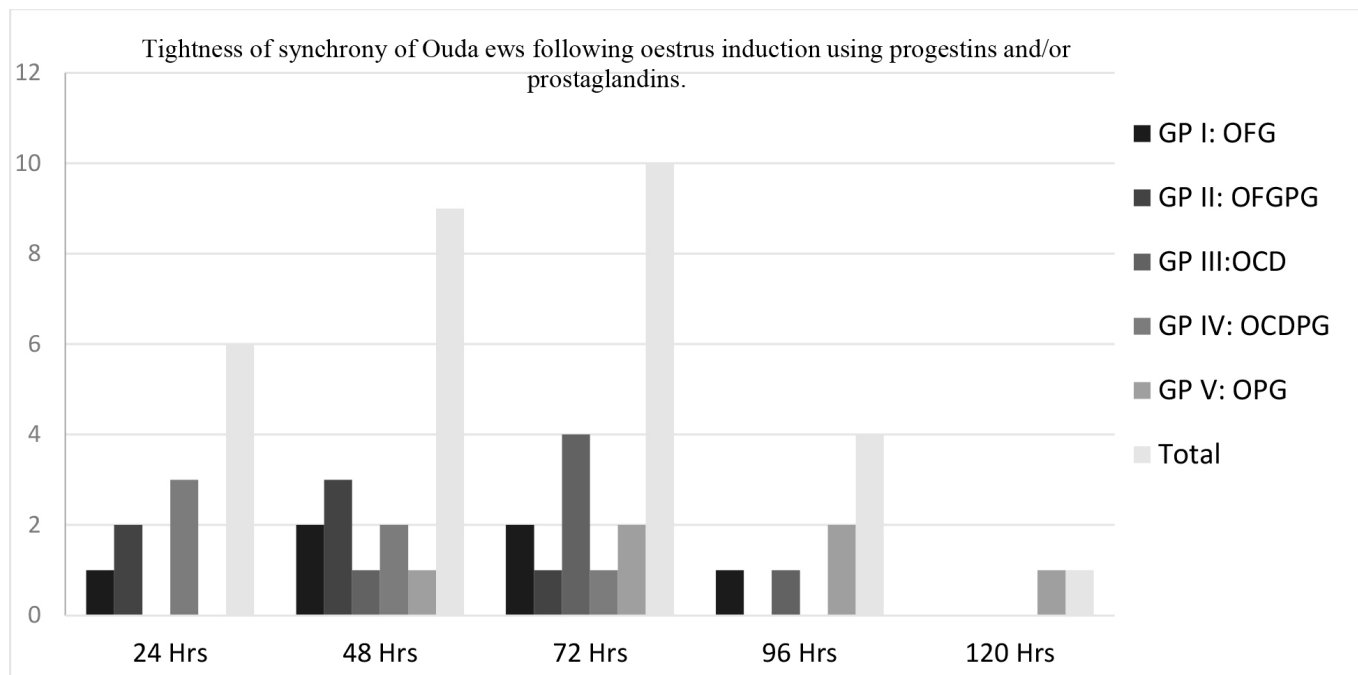


FIGURE 1: Tightness of synchrony of Ouda ewes following treatment with fluorogestone acetate only (OFG), fluorogestone acetate plus prostaglandin (OFGPG), CIDR devices only (OCD), CIDR plus prostaglandin (OCDPG) and prostaglandin only (OPG).

revealed tighter oestrus synchrony compared to ewes treated with progestin alone (Groups I, III) or prostaglandin alone (Group V) (Figure 1). Oestrus activity was observed to commence more in the morning hours than in the evening (Figure 2).

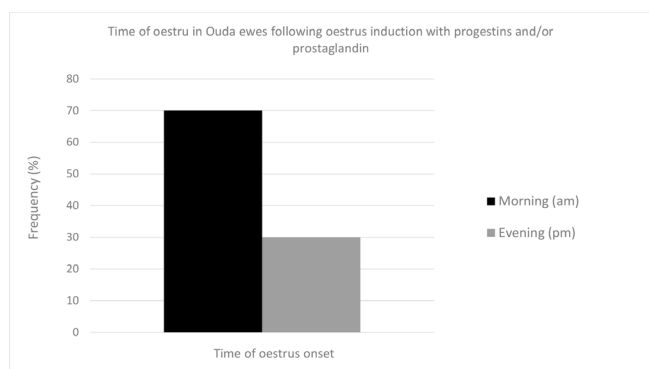


FIGURE 2: Time of oestrus occurrence in Ouda ewes following oestrus induction using progesterins and/or prostaglandin.

Discussion

The results of this study revealed the efficacy of both progesterins and prostaglandin $F_{2\alpha}$ alone or their combinations in inducing synchronized oestrus in Ouda ewes. Furthermore, the results obtained showed that the combination of both progestagen and prostaglandin for oestrus induction could attract extra resources that could be avoided when either of the hormones are used singly. In addition, this study showed that the use of intravaginal progestagen-based oestrus synchronization protocol does not compromise conception in the Ouda ewe, as has been reported in sheep [14, 22, 23]. Generally, the results indicate that the different

synchronization protocols may be exploited for improved reproductive management of breeding ewes. The percentage of ewes exhibiting oestrus in this study is higher than that reported for indigenous Yankasa and West African Dwarf ewes of Nigeria [26-30], and in breeds of sheep where similar hormone treatments were used [32, 34, 20].

In this study, 100 % of the ewes exposed to rams exhibited standing oestrus within 5 d after progestagen withdrawal and prostaglandin administration. The high degree of oestrus synchrony achieved in the progestin-prostaglandin groups and prostaglandin group indicated that ewes received the $PGF_{2\alpha}$ at a time when the *corpus luteum* was responsive. This response is consistent with observations reported by other authors in sheep [9, 33, 34, 26-30].

The administration of progesterins and prostaglandin did not affect the period of onset (AM or PM) as the time of oestrus onset was higher in the morning hours than in the evening. The implication therefore is that adequate attention should be given to oestrus synchronized animals during the morning hours so that they may be bred on standing oestrus.

This study also revealed that type of protocol had a significant effect on the time to onset and duration of induced oestrus as has been reported previously in sheep [5, 29, 32, 26]. The mean time to the onset of oestrus in this study ranged 31 – 50 hours. This is similar to the average reported for other breeds of sheep [5, 29, 32, 26]. The duration of induced oestrus differed significantly between groups and ranged from 29-45 hours. Similar values have been reported in sheep [26-30, 6].

Differences between the results obtained in this study and those of other researchers may be due to differences

in the season of study, breed, species, hormonal treatment or protocol and presence of males during treatment of the females [26-30, 21-24, 31, 11, 19, 34].

Conclusion and Recommendation

It is concluded that either progestagens, prostaglandin or their combination are suitable hormones for inducing synchronized oestrus in Ouda ewes. However, the choice of either agent or method would depend on economic consideration as well as the access to the hormones. Be that as it may, the ease with which the administering prostaglandin is carried out and the reduced handling of the animals make it a better choice in oestrus synchronization programs where rams are kept separate from ewes.

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