



## INDUCTION OF OESTRUS OF CYCLIC AND ACYCLIC ASSAM LOCAL GOATS

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### **ABSTRACT**

*A study was carried out to induce oestrus of cyclic Assam Local goat by administration of different exogenous hormone combinations. A total of 36 number of healthy Assam Local does of 8-12kg body weight were considered for the present work. These goats were divided into six groups; each group comprising six number of animals and treated with different six hormonal combinations. The number of goats exhibited oestrus, time taken for onset of oestrus following last treatment, duration of induced oestrus, and conception rate after A.I recorded. All treatments induced oestrus(100%) with or without progesterone priming with gonadotropic hormones indicating all treatment combinations were equally effective. The administration of PGF<sub>2α</sub> only was sufficient to induce oestrus where 5mg of PGF<sub>2α</sub> was equally effective to 10mg of PGF<sub>2α</sub>. Progesterone analogue MAP(6-α-Methyl-17-α-Acetoxy Progesterone) and allylesterol(17-Hydroxy-17α-Allyl-4-Estrene) were equally effective for priming while 750IU of HCG was also equally suitable in comparison to 1000IU of HCG plus 300IU of PMSG with no significant difference between conception rate.*

*Another study was carried out on induction of oestrus of confirmed acyclic nanny Assam Local goats and for this investigation a total of 42 health acyclic goats were considered. The experimental goats were divided in to eight groups each comprising six goats. All groups were treated with different seven hormonal combinations of 5mg, 5.5mg, 5.75mg, and 10mg of PGF<sub>2α</sub>; priming of goats were done with 5mg of progesterone analogues MAP and allylesterenol orally followed by injection of 300IU of PMSG and 750 IU of HCG respectively. The result indicated that the administration of any dose of PGF<sub>2α</sub> only could not induce oestrus of any acyclic animals of any groups. But Priming with progesterone MAP(6-α-Methyl-17-α-Acetoxy Progesterone)and allylesterenol (17-Hydroxy-17α-Allyl-4-Esttrene) for a period of 13-21 days followed by injection of lower doses of gonadotropins (PMSG:HCG) was necessary to induce oestrus of the Assam Local goats. Out of all the goats of group VI, VI and VII exhibited oestrus within 22-26 hours after PMSG:HCG injection with the duration of induced oestrus period ranging from 24 to 46 hours while conception rate was 100% in all responded goats. It was also observed that induction of oestrus and breeding of acyclic goat could be done when prolonged priming with progesterone up to 21 days enabled to breed acyclic goats at own desire.*

**Key words:** Assam Local goat, gonadotric hormones, induction of oestrus , PGF<sub>2α</sub>, priming, progesterone,

## INTRODUCTION

Induction of oestrus of goat is commonly practiced for controlled breeding of cyclic goat by administration of progesterone (Vellee *et al.*,1964), combination of progesterone, PMSG, luteinizing hormones like eCH, HCG and PGF<sub>2α</sub> (Bretzlaff and Madrid, 1989; Hafez and Hafez, 1993) or prostagndin or its analogue (Perera *et al.*,1978; Bretzlaff *et al.*, 1981). But information in regards to Assam Local goat is meager. So, the present work had been carried out to induce oestrus of cyclic Assam Local goat by Administration of different exogenous hormones and find out a suitable treatment for the purpose mentioned. There is a tendency of seasonal acyclicity in goat too. Hence, it is needed to exploit this animal through maximum breeding throughout the year revealed by few workers. Though, some literature revealed different method of induction of acyclic goats (Martemucci and D'Alessandro, 2010, Rahman, 2014 ). Thus, oestrus should be induced in the anestrus season and hormonal therapy is a widely used technique for this purpose and in this context, breeding can be scheduled and performed on a

large number of females in the pre-determined period. This allows does to kid during the whole year, resulting in a better scheduling of product offers to the consumer market. Therefore, synchronization and induction of estrus in goats allows for AI and reproduction management at any time of the year, facilitating the continuous availability of products such as milk and meat (Leboeuf *et al.*, 1998). But information in regards to Assam Local goat is meager. So, the present work had been carried out to induce oestrus of acyclic Assam Local goat by administration of different exogenous hormones and to find out a suitable treatment for the purpose mentioned.

## MATERIALS AND METHODS

A total of 36 number of healthy Assam Local does of 8-12kg body weight were considered for the present work. These goats were divided into six groups; each group comprising six number of animals. All groups were treated as shown (Table 1). Oestrus behavior, number of goat exhibiting oestrus, time taken for onset of oestrus following treatment, duration of oestrus, and conception rate with kidding rate were recorded in respective treated group. A total of another 42 number of healthy Assam Local does of 8-12.50kg body weight were considered for the present work. These goats were divided into seven groups; each group comprising six number of animals. All groups were treated as shown (Table 1). Oestrus behavior, number of goat exhibiting oestrus, time taken for onset of oestrus following treatment, duration of oestrus and kidding rate were recorded. Finally statistical analysis of all data was carried out as Snedecor and Cochran (1994) for interpretation.

## RESULT AND DISCUSSION

*Effect of different treatment in induced oestrous Goats:* The result of the present investigation revealed that all treatment scheduled (Table 1 and 2) revealed that the animals of all the groups induced into oestrus(100%) with or without progesterone primed with gonadotropic hormones indicating all treatment combinations were equally effective to induce oestrus of cyclic Assam local goats where time taken for onset of oestrus following last treatment were not varied significantly when all treated goats were came into oestrus after last treatment within the overall range of 19 to 46 hours and the external signs of induced oestrus of all goats

of all groups was found to be very typical as to the normal oestrus (Arthur, 1973, McDONALD, 1980). On the other hand mean duration of induced oestrus of treated all treated animal groups were also not varied significantly while duration of induced were remain with the range of 29.50-49.00hours. Armstrong and Evans(1983) advocated small doses of gonadotrans in conjugation with administration of exogenous progesterone to goats to induce heat for increasing ovulation. Cartier(1986) described three techniques for oestrus synchronization in goats i.e. luteolysis with PGF<sub>2α</sub>, oestrous cycle block with progesterone compound followed by PMSG injection and a combination of two techniques. However, 5mg of PGF<sub>2α</sub> was equally effective to 10mg of PGF<sub>2α</sub>. So, 5mg of PGF<sub>2α</sub> only was found to be most effective economic dose sufficient to induce oestrus in Assam Local goats without PMSG and HCG where the conception rate was found to be 66.70% and 66.70% in group I and II respectively. Similarly, injection of 750IU of HCG was also equally effective to 1000IU of HCG with 5mg of PGF<sub>2α</sub> and 300IU of PMSG in induction of experimental cyclic goats with the conception rate of 83.33% and 83.33% in group III and IV respectively while conception rate were 100% in group V and VI when attempt had been made to achieve enhanced result of synchronization of goats with 250IU of HCG not successful (Esteves *et al.*, 2013). It was reviewed that although a number of oestrus synchronizing protocol had been developed in goat with the help of the oral use of progesterone for 9-11 days through the route other than orally followed by PMSG or FSH and subsequent administration of prostaglandin or its analogue with the timed artificial insemination becoming a popular protocol for induction of oestrus synchronization(Wildus,1999; Rahman *et al.*, 2008) when allylestrenol (17-Hydroxy-17 $\alpha$ -Allyl-4-Estrene) is a another progesterone analogue commonly using in human being with threatened abortion and premature labour(Cortes-Preto *et al.*, 1980) which is not yet tried in controlling of animal reproduction in terms of priming. But intravaginal sponge with progesterone compound causes sloughing of epithelial layer of vagina with vaginitis (Penna *et al.*, 2013). In the present experiment also priming goats of group V and VI with the same doses of MAP (6- $\alpha$ -Methyl-17- $\alpha$ -Acetoxy Progesterone) and allylestrenol orally fed for 11 days had equal efficacy to suppress occurrence of oestrus and induction of oestrus followed by the same doses exogenous administration of gonadotropic hormones with the conception rate was 100% in both the group V and VI respectively. The luteolytic effect of PGF<sub>2α</sub> in goats had been well demonstrated after

intramuscular injection ( Bosu *et al.* 1978 and Ott *et al.*, 1980). Few authors employed double intramuscular injection of PGF<sub>2α</sub> at 11 days interval to experimental cyclic goats for induction heat and after the second injection said to be 90% of the treated goats exhibited oestrus within a mean period of 53.00 ± 3.00 hours where no mentioning of time of time of 1<sup>st</sup> injection of prostaglandin (Ott *et al.*, 1980, Hackett *et al.*, 1981). The conception of different treated groups were recorded as 66.70%, 66.70%, 83.33%, 83.33%, 100%, and 100% in group I, II, III, V and IV respectively with no significant variation (Table 3). During the breeding season priming of goats with MAP for 13 days, the onset of oestrus for the MAP groups was reported be 48.8±12.0 hours after 5mg of prostaglandin injection (Romano,2004). Oestrus synchronization in goats and sheep was also achieved by controlling of the luteal phase of oestrus cycle either by providing exogenous progesterone or by inducing premature luteolysis in the present experiment as said (Wildus, 2000). Hence, this could be concluded that only a lower quantity of PGF<sub>2α</sub>(5mg) was sufficient standard dose rate for induction of oestrus in cyclic Assam Local goats. Oral feeding of 5mg of the progesterone analogues MAP and allylestrenol with a lower dose HCG(750IU) with 300IU of PMSG were equally effective for induction of oestrus with conception rate than that higher dose rate and MAP respectively (Penna *et al.*, 2013; Hafez and Hafez, 1993) although allylestrenol a human progestational compound (Cortes-Preto *et al.*, 2008).

The result (Table 4) revealed the administration of different combinations of MAP (6-α-Methyl-17-α-Acetoxy Progesterone), allylestrenol (17-Hydroxy-17α-Allyl-4-Estrene), PMSG and HCH with or without prostaglandin revealed that any doses of PGF<sub>2α</sub> could not induce animal of the groups I, II, III and IV while priming with progesterone analogues like MAP and allylestrenol for 13 days followed administration of gonadotropic hormones (group V and VI) induced oestrus of all goats with exhibition of typical heat symptoms (Arthur, 1973, McDONALD, 1980) . It was also observed that all goats (group VII) primed with allylestrenol for a longer period of 21 days followed by intra- muscular injection of gonadotropins effectively induced oestrus of all goats of this group where time taken for onset of oestrus remained within the range of 22-27 hours while duration of induced oestrus was remained within the range of 24-51 hours respectively in group V and VI respectively while the same values were recorded as 23-26 and

24-46 respectively in group VII (Table 5) although allylestrenol a human progestational compound (Cortes-Preto *et al.*, 2008). The conception rate (Table 6) were found to be 100% with kidding number 3, 2 and 2 in responded group V, VI and VII of goats treated respectively. Some authors showed that oestrus could be induced effectively in female goats out off the breeding season with different treatment combination of eCG, HCG, progesterone (MAP) and prostaglandin (Fonesca *et al.*, 2005, Pietroski *et al.*, 2013) with progesterone priming of goats for 6, 9 and 12 days while exposure to higher progesterone concentration accelerates the emergence of a new follicular wave leading to induction of oestrus following administration of gonadotropic hormones (Bras, 2013). Similarly, acyclic cows were also induced successfully with the treatment combination exogenous progesterone, PMSG and equine luteinizing hormones (Singh *et al.*, 2006). But Carnevali *et al.* (1996) reported that to induction of oestrus could be achieved by priming of anoestrous goats treated with progesterone for 11 days followed by 400IU of PMSG with prostaglandin analogue where no luteinizing hormones was used where no justification had been given on the use of prostaglandin in anoestrous goats and it was stated that luteal activity was very low as confirmed by blood progesterone levels of the experimental animals. On the other hand, when ewes of two groups were primed with MAP for 6 and 14 days respectively followed by 600IU of PMSG in an experiment, it was found that short-term sponge treatment (6 days) had better performance in terms of fecundity rate ( $P < 0.05$ ) than the long-term sponge treatment (14 days) in Arabian ewes (Sareminejad *et al.*, 2014). However, higher level of blood progesterone in acyclic animal is necessary to have better response gonadotropic hormone for folliculogenesis when a lower concentration of progesterone in serum of anoestrous goat (Carnevali, *et al.*, 1997; Menchaca and Robians, 2002). Finally, this could be concluded from the present that acyclic Assam Local goats could be bred successfully with priming of the animal by oral feeding of progesterone followed by PMSG and HCG injection.

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Table 1. Treatment combinations used for induction of oestrus of Cyclic goats

Treated groups	Number of goats	Drug combination	Doses	Mode of administration
I	6	PGF <sub>2α</sub> <sup>1</sup>	5mg	Intra-muscularly, single injection between 8-14 <sup>th</sup> day of confirmed cycle
II	6	PGF <sub>2α</sub>	10mg	Intra-muscularly, single injection between 9-14 <sup>th</sup> day of confirmed cycle
III	6	PGF <sub>2α</sub>	5mg	Intra-muscularly, single injection 48hours after PMSG injection
		PMSG <sup>2</sup>	300IU	Intra-muscularly, single injection within 9-17 <sup>th</sup> day of the cycle
		HCG <sup>3</sup>	750IU	Intra-muscularly, single injection 24hours after onset of oestrus
IV	6	PGF <sub>2α</sub>	5mg	Intra-muscularly, single injection 48hours after PMSG injection
		PMSG	300IU	Intra-muscularly, single injection within 12-14 <sup>th</sup> day of the cycle
		HCG	1000IU	Intra-muscularly, single injection 24hours after onset of oestrus
V	6	PGF <sub>2α</sub>	5mg	Intra-muscularly, single injection 48hours after PMSG injection
		MAP <sup>4</sup>	5mg	Orally for 11days, started between day 11-17 <sup>th</sup> of the cycle
		PMSG	300IU	Intra-muscularly, single injection within 9-17 <sup>th</sup> day of the cycle
		HCG	750IU	Intra-muscularly, single injection 24hours after onset of oestrus
VI	6	PGF <sub>2α</sub>	5mg	Intra-muscularly, single injection 48hours after PMSG injection
		Allylestrenol <sup>5</sup>	5mg	Orally for 11days, started between day 11-15 <sup>th</sup> of the cycle
		PMSG	300IU	Intra-muscularly, single injection within 7-17 <sup>th</sup> day of the cycle
		HCG	750IU	Intra-muscularly, single injection 24hours after onset of oestrus

<sup>1,2</sup>Intervet, Boxmer, Holand

<sup>3</sup>Alved Product, 5 Chandra Bagh Avenue, Chennai-4

<sup>4</sup>Nalter, Bushnelt Pvt. Ltd, Mumbai-400 002

<sup>5</sup>Infar(India) Ltd. 182, Acharrya Jagadish Chandra Bose Road, Kokata-700 014

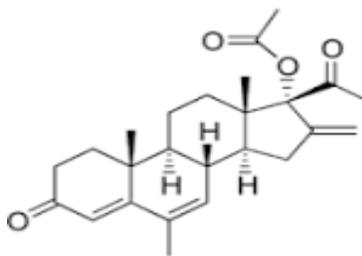
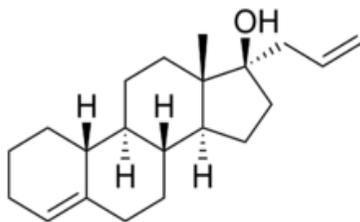


Fig1.6- $\alpha$ -Methyl-17- $\alpha$ -Acetoxy Progesterone(MAP)Fig2.17-Hydroxy-17 $\alpha$ -Allyl-4-Esttrene(Allylestrenol)

Table 2. Oestrus behaviour during induced oestrus of cyclic goats with different treatment combination

Experimental groups	Number of treated goats	Day of cycle treatment stated	Number of goats exhibited oestrus	Time taken for onset of oestrus following last treatment (Hours)	Duration of induced oestrus (Hours)
I	6	8-14 <sup>th</sup>	6	20.75 $\pm$ 0.74 (19-23)	33.50 $\pm$ 0.94 (30-39)
II	6	9-14 <sup>th</sup>	6	21.75 $\pm$ 0.56 (20-23)	32.75 $\pm$ 1.39 (31-39)
III	6	9-17 <sup>th</sup>	6	28.50 $\pm$ 20.07 (22-46)	36.33 $\pm$ 1.96 (29.50-40)
IV	6	12-14 <sup>th</sup>	6	24.50 $\pm$ 0.62 (22-25)	32.50 $\pm$ 1.37 (31.5-36)
V	6	11-17 <sup>th</sup>	6	23.23 $\pm$ 0.35 (21-26)	42.25 $\pm$ 5.01 (31-48)
VI	6	11-15 <sup>th</sup>	6	28.75 $\pm$ 1.11 (24-46)	39.32 $\pm$ 3.18 (35-49)

<sup>1,2</sup>Intervet, Boxmer, Holand

<sup>3</sup>Alved Product, 5 Chandra Bagh Avenue, Chennai-4

<sup>4</sup>Nalter, Bushnelt Pvt. Ltd, Mumbai-400 002

<sup>5</sup>Infar(India) Ltd. 182, Acharyya Jagadish Chandra Bose Road, Kokata-700 014

Table 3. The conception rate of different treated groups of induced oestrus of cyclic goats

Experimental groups	Number of goats exhibited oestrus and A.I.	Number of goats conceived (%)	Number of Kids born/doe
I	6	4(66.70)	2
II	6	4(66.70)	1
III	6	5(83.33)	2
IV	6	5(83.33)	2
V	6	6(100)	3
VI	6	6(100)	3

Table 4. Treatment combinations used for induction of oestrus of acyclic goats

Treated groups	Number of goats	Drug combination	Doses	Mode of administration
I	6	PGF <sub>2α</sub> <sup>1</sup>	5mg	Intra muscularly, double injection at 11 days interval
II	6	PGF <sub>2α</sub>	7.5mg	Intra muscularly, double injection at 11 days interval
III	6	PGF <sub>2α</sub>	8.75mg	Intra muscularly, double injection at 11 days interval
IV	6	PGF <sub>2α</sub>	10mg	Intra muscularly, double injection at 11 days interval
V	6	MAP <sup>2</sup> PMSG <sup>3</sup>  HCG <sup>4</sup>	5mg 300IU  750IU	Orally for 13 days Intra muscularly, single injection 24hours after of last MAP feeding Intra muscularly, single injection 24hours after onset of oestrus
VI	6	Allylestrenol <sub>5</sub> PMSG  HCG	5mg 300IU  750IU	Orally for 13 days Intra muscularly, single injection 24hours after of last MAP feeding Intra muscularly, single injection 24hours after onset of oestrus
VII	6	Allylestrenol PMSG  HCG	5mg 300IU  750IU	Orally for 21 days Intra muscularly, single injection 24hours after of last MAP feeding Intra muscularly, single injection 24hours after onset of oestrus

<sup>1</sup>Alved Product(Dinofertin), 5 Chandra Bagh Avenue, Chennai-4

<sup>2,3</sup>Intervet, Boxmer, Holand

<sup>4</sup>Nalter, Bushnelt Pvt. Ltd, Mumbai-400 002

<sup>5</sup>Infar(India) Ltd. 182, Acharrya Jagadish Chandra Bose Road, Kokata-700 014

Table 5. Oestrus behavior during induced oestrus of acyclic goats with different treatment combinations

Experimental groups	Number of treated goats	Period of Progestosterone treatment	Number of goats exhibited oestrus	Time taken for onset of oestrus following last treatment (Hours)	Duration of induced oestrus (Hours)
I	6	-	0	-	-
II	6	-	0	-	-
III	6	-	0	-	-
IV	6	-	0	-	-
V	6	13	6	23.25± 0.42 (22-24)	43.25 ±3.03 (35-51)
VI	6	13	6	23.27± 0.53 (24-27)	40.45 ±2.28 (40-50)
VII	6	21	6	23.52 ± 0.65 (23-26)	37.26 ±2.67 (24-46)

Table 6. The conception rate of different treated groups of induced oestrus of acyclic goats

Experimental groups	Number of goats exhibited oestrus and A.I.	Number of goats conceived (%)	Number of Kids born/doe
I	6	4(66.70)	2
II	6	4(66.70)	1
III	6	5(83.33)	2
IV	6	5(83.33)	2
V	6	6(100)	3
VI	6	6(100)	3