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SERUM OESTRADIOL 17β CONCENTRATION OF HORMONE INDUCED POST-PARTUM ANOESTRUS SOWS

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ABSTRACT

Indigenous post partum anestrous sows of Assam could be effectively brought into ovulatory oestrus by administering combination of PMSG and HCG and áGNRH with satisfactory conception rate. This study, constituting 18 numbers of indigenous post partum anoestrus sows, were divided into three groups, consisting of six animals in each group. Group A was treated with a initial dose of 0.017 (4 ml) of GnRH analogue (Receptal) intramuscularly followed by 0.78 mg (4ml) of $PGF_2\alpha$ analogue (Illirin) on 14 day of initial treatment. After 48 hours of $PGF_2\alpha$ analogue (Illirin) injection 0.008 mg (2ml) of Receptal was given intramuscularly. Animals under group B were treated with single dose of 200 IU (1ml) of PMSG (Folligon) intramuscularly combined with 150 IU (0.5ml) of HCG (Chorulon). Whereas, the animal of group C (control group) were administered with single intramuscular injection of sterile normal saline. All animals were observed for the occurrence of oestrus. Blood collection was done prior to and after treatment on different days in the 3 groups of anoestrous of sows and serum concentration of oestradiol 17β were estimated by RIA (radio immunoassay. Hundred percent oestrus could be achieved in group A and B anoestrous sows than control group (C). Serum oestradiol 17β differed significantly ($P<0.01$) among different groups on different days of oestrus and gestation, after treatment.

Keyword : Anestrus, Indigenous Sows, Hormone.

The indigenous pigs (Sus scrofa domesticus) of Assam are non descriptive. They are of small body size with poor reproductive efficiency. Local farmers generally do not follow scientific management as well as feeding schedule to rear these animal such indigenous pigs are reared in zero or low input system. This has resulted higher incidence of delayed puberty and increased weaning to estrus intervals. In piggery development programme, post partum anestrous is one of the major factor that increases the economic loss of pig farmers. In majority of the cases imbalance of gonadrotopic or gonadal hormones are the predisposing factors of post-weaning anoestrus. But till now only a few research have been made to improve the pig production in India as well as in NE Region[8]. Successful attempts have been made to improve the pig production for meeting the deficiency of animal protein by improving the reproductive efficiency such as to induce estrus in post weaned anestrous sows by administering single or various combinations of hormones by means of $PGF_2\alpha$ or its analogue[2]. Research has shown that lutalyse($PGF_2\alpha$) is effective for inducing luteolysis and thereby oestrus[7]. Extensive studies have been

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carried out on synchronization of oestrus by using $PGF_2\alpha$ in cattle[9] and goat[5] .Perusal of available literature revealed scanty studies on synchronization of oestrus with $PGF_2\alpha$ in local pigs of Assam.

Estrus can be effectively induced in anestrous sows by intramuscular injection of Pregnant Mare Serum Gonadotrophin without significantly affecting the farrowing rate, ovulation rate or subsequent litter size[12]. Combination of PMSG and HCG has been found efficient in inducing fertility in anestrous sows[4].

As the first step towards their improvement and conservation of indigenous pigs, it has become necessary to take up organized studies on their productive and reproductive efficiency. Hence the proposed study was helpful in improving the reproductive efficiency of indigenous pigs of Assam by shortening the non-productive days and will thus contribute towards economic development of the state. Hence, the study was undertaken to study the estrogen level before and after induction of estrus in indigenous sows.

A total of 18 (eighteen) indigenous post partum anestrous sows randomly divided into three groups consisting of six animals in each group i.e. group A, B and C were taken.

The animals understudy failed to resume oestrus till four months of farrowing, were kept under intensive system of rearing, and feeding was done with the standard concentrate mixture at the rate of 2 kg per head per day[14] . Drinking water was given *ad libitum*.

Each post-partum anestrous sow of Group A was treated with an initial dose of 0.017mg (4 ml) GnRH analogue (Receptal) intramuscularly. The animals were then subjected to 0.78 mg (4 ml) $PGF_2\alpha$ (Illiren) injection intramuscularly on 14th day of initial treatment. After 48 hours of $PGF_2\alpha$ (Illiren) injection 0.008 mg (2 ml) of Receptal was given intramuscularly.

Each animal under group B was treated with a single dose of 200 IU (1 ml) PMSG (Folligon) in combination with 150IU (0.5 ml) HCG (Chorulon) intramuscularly on the same day.

The animal of group C (control group) were administered a single intramuscular injection of sterile normal saline.All the experimental animals following treatment were observed for the occurrence of oestrus 3 times a day (morning,noon and evening). Oestrus was detected on the basis of visual and behavioural symptoms exhibited by the animals and acceptance of intromission by a vasectomised boar as per methods of[11] as well as on the basis of oestrogen level.The first acceptance of male by the female was considered as the onset of oestrus.

Blood sample from each ansestrous sow under group A, B and C was collected once on 7 days before treatment, on the day of treatment, on 3rd day of treatment, day of oestrus, 7th and 14th day of oestrus and then at 15 days of interval till day 105 of gestation. Then serum oestradiol 17 â concentration was estimated by radio immunoassay (RIA) using commercial kits Statistical Analysis was then done as per the method of Snedecor and Cochron.

The mean serum Oestradiol 17β concentration before, during and day 3 of treatment and on different days of oestrus and gestation after treatment in indigenous post partum anoestrus sows have been presented in Table 1.

Before treatment, the mean concentration of serum oestradiol 17β was 16.16+0.002, 18.14+0.002 and 16.11+0.002 pg/ml in group A, B and C respectively.There was no significant difference in serum oestradiol 17β concentration among the three groups before treatment.

From the perusal of the Table I it was observed that the mean serum oestradiol 17β concentration increased progressively from day of treatment to day 3 of treatment in group A

(15.48+0.002 to 68.83+0.002 pg/ml) and group B (18.66+0.002 to 73.33+0.002 pg/ml) but not in group C (15.64+0.002 to 18.24+0.002 pg/ml and finally reached a peak level on the day of oestrus in all the three groups (102.40+0.003, 105.10+0.002 and 75.83+0.002 pg/ml in group A, B and C respectively).

From Table I is observed that the mean serum oestradiol 17β level both on day 3 of treatment and the day of oestrus varied significantly (P<0.01) between group A and group C and between B and group C, however, it did not differ significantly between group A and Group B. On 14th day of oestrus the mean serum oestradiol 17β leve varied significantly (P<0.01) between the three groups.

The result of the present study were in well accord with the data of other workers[18] who reported that plasma oestradiol 17β concentration increased significantly before the onset of oestrus and also on the day of oestrus. The increased level of mean serum oestradiol 17β concentration on the day of oestrus might be due to increased secretion of this hormone from Graafian follicle.

In the present study, the serum oestradiol 17β concentration on the day of oestrus was found to be significantly higher in animal treated with hormones compared to the control group. The higher level of oestradiol 17β on the day of oestrus in hormone treated group may be due to more secretion of the oestradiol hormone from the mature Graafian follicle. In hormone treated group sows were able to produce a surge of oestradiol 17β which was associated with oestrus and ovulation. Reported by other workers[6] that by administering of PG 600R (combination of PMSG 400 IU and HCG 200 IU at the time of weaning most likely reduces the incidence of anestrous by stimulating follicular growth thus increasing concentration of oestradiol. Also the increased level of mean serum oestradiol 17β concentration in the animal might indicate that the animals were in follicular phase of the oestrous cycle with lower progesterone concentration on consecutive phase in the same group. These findings were in close agreement with the findings of other workers[8]. The mean serum oestradiol 17β concentration on 7th day post oestrus was found to be lower than the values observed on the day of oestrus in all three groups. Thereafter the serum oestradiol 17β concentration fluctuated throughout the gestation period and found to be higher on day 45 and 105 in comparison with the values observed on other days of gestation. This trend of fluctuation during gestation was found to be similar in all the three groups.

Serum oestradiol 17β concentration differed significantly (P<0.01) among the different groups on different days of gestation (on day 30, 45, 60, 75 and 105). Others [2] have studied the foetal adrenal gland and found that appreciable amount of foetal corticoid causes high concentration of oestradiol 17β in the late pregnancy are of uterine origin. Another worker[13] also reported that high concentration of estrone conjugated was found in the allantoic fluid between 20-35 days of gestation in sows others[16] found that during 12 to 13 day of gestation, estrogen may be secreted by the blastocyst as strong sulphate with the subsequent conversion of part to a free biologically active estrogen n the endometrium. According to other[14], the pig blastocyst develops the capacity to synthesize the estrogen by day 12 and secreted from the gravid uterus after mating. The significantly increasing oestradiol 17β concentration on 105 day of gestation might be due to increase in concentration un-conjugated oestrone and oestradiol 17β in peripheral blood, which increased to a peak value just before parturition[1]. In the sow total urinary estrogen (estrone) rate showed in increase between the second and fifth week of gestation, a decline between the fifth and eight weeks and a rapid increase to a peak at the time of farrowing, which declines rapidly thereafter[10].

The results of the present study suggest that the ovaries of the anoestrous sows are capable of responding to gonadotropic stimulation. The hypothalamic centre responsible for the standing reflex appears to be sensitive to the effect of exogenous gonadotropin stimulation. It was observed that the indigenous post partum anoestrous sows of Assam could be effectively brought into ovulatory oestrus by administering combination of PMSG and HCG and αGNRH , $PGF_2\alpha$ and αGNRH with satisfactory conception

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TABLE : I

SERUM OESTRADIOL 17 β (MEAN+SE) CONCENTRATION (pg/ml) BEFORE DURING AND DAY 3 OF TREATMENT AND ON DIFFERENT DAYS OF OESTUS AND GESTATION AFTER TREATMENT IN INDIGENOUS POST PARTUM ANOESTROUS SOWS.

Group	Before treatment	Day of treatment	3rd day of treatment	Day of oestrus	Tth days treatment	14th day of oestrus	Day of gestation					
							30	45	60	75	90	105
A	16.16± 0.002	15.84± 0.002	68.63± 0.002	182.48 ± 0.003	34.82± 0.002	23.42 ± 0.003	27.68 ± 0.004	33.16 ± 0.002	29.57 ± 0.003	26.28 ± 0.004	30.01 ± 0.004	39.53 ± 0.003
B	16.14± 0.002	16.05± 0.002	73.33 ± 0.002	105.10 ± 0.002	40.64± 0.002	29.30 ± 0.002	28.51 ± 0.002	33.43 ± 0.002	36.06 ± 0.002	25.38 ± 0.002	31.00 ± 0.002	40.84 ± 0.002
C	16.11± 0.002	15.84± 0.002	18.24 ± 0.002	75.69 ± 0.002	33.32± 0.002	17.50 ± 0.003	25.31 ± 0.002	32.61 ± 0.002	33.12 ± 0.016	21.04 ± 0.158	36.09 ± 0.002	31.85 ± 0.002

N.B. Subclass means in a column with at least one superscript in common do not differ significantly.

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