

Effect of Different Housing Systems on Triiodothyronine (T_3) and Thyroxine (T_4) in Chhotanagpuri Ewes

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Abstract

The present study was conducted on 24 non-pregnant parous chhotanagpuri ewes to see the effect of different housing system on the level of Triiodothyronine (T_3) and Thyroxine (T_4) hormones. Animals were randomly allocated to three groups, one control and two treatment. Animals in Group I were kept in hot humid condition where as Group II was maintained in cold condition providing gunny bags and fine sand on the floor. Control animals (Group III) were kept in loose housing system fodder and water were provided ad. libitum. to all the three groups of animals. Level of T_3 and T_4 hormones were estimated during different stages of gestation. Result of present study revealed that the level of plasma Triiodothyronine (T_3) varied significantly within the groups in all the groups while it differed significantly ($P<0.05$) only at day 135 of gestation between groups however, it increased significantly on expected day of parturition in all the three groups. The plasma Thyroxine (T_4) level varied significantly ($P<0.05$) within and between groups at all the stages of gestation. The plasma Thyroxine (T_4) level decreased significantly from day 0 to day 45 and then started increasing up to day 135 of gestation in all the groups. Further the, plasma Thyroxine (T_4) level decreased significantly ($P<0.05$) on expected day of parturition and again increased two days after parturition in all the groups but it was non-significant. Different housing systems did not had any effect on T_3 and T_4 hormone levels, except at day 135 of gestation.

Keywords: Housing, Chhotanagpuri ewe, Plasma, Gestation, Triiodothyronine (T_3), Thyroxine (T_4), RIA.

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Introduction

Sheep population in India is around 49.20 million (according to 1992 census). The country stands sixth in sheep population in the world. The sheep produce 141 million kg mutton 35 million kg greasy wool and 39.78 million pieces of skin annually (Acharya, 2002). Having the knowledge of hormones particularly reproductive hormone, we can diagnose whether animal is pregnant or not and if they are pregnant what is the stage of gestation and how long it will continue to approach parturition. The difference in hormonal level from the normal can judge the case for infertility, abortion and still birth. The present experiment is designed to evaluate the healthy reproductive life of dam with respect to temperature variation in Chhotanagpuri Ewes.

Pregnancy or gestation is one of the important periods of any living organism. It depends mainly on the level of hormones and adequate nutrition. These factors control the normal status of pregnancy and so we must know their relative importance in the period of gestation. Reproduction is closely associated with interaction of hormonal and nutritional status of body.

Materials and Methods

The experiment was conducted at "Mega Seed Sheep project" College of Veterinary Science & Animal Husbandry, BAU, Ranchi, Jharkhand on 24 non-pregnant parous chhotanagpuri ewes. All the necessary precautions were taken to avoid any stress to the animal. The experiment on the animal was approved by the "Mega Sheep

Table-1. Mean \pm SE of Plasma Triiodothyronine (T₃) ng/ml of chhotanagpuri ewes in different Groups at different periods.

Groups	Group-I (Hot & Humid) Mean \pm SE	Group-II (Cold treatment) Mean \pm SE	Group-III (Control) Mean \pm SE
Day 0	^A 1.13 \pm 0.12	^A 1.25 \pm 0.12	^A 1.16 \pm 0.07
Day 20	^A 0.93 \pm 0.10	^A 1.15 \pm 0.12	^A 1.13 \pm 0.09
Day 45	^A 1.06 \pm 0.13	^A 1.10 \pm 0.15	^{AB} 1.29 \pm 0.11
Day 90	^A 1.05 \pm 0.15	^A 1.14 \pm 0.16	^{AB} 1.33 \pm 0.11
Day 135	^A 1.11 \pm 0.14 ^a	^A 1.31 \pm 0.17 ^{ab}	^{BC} 1.52 \pm 0.09 ^b
Expected Day Parturition	^B 1.55 \pm 0.12	^{AB} 1.38 \pm 0.12	^B 1.46 \pm 0.04
Two days after Parturition	^B 1.83 \pm 0.09	^B 1.76 \pm 0.12	^C 1.75 \pm 0.07

*Values having same superscript in a column (capital alphabet) did not differ significantly (P \leq 0.05).

Table-2. Mean \pm SE of Thyroxine (T₄) ng/ml of chhotanagpuri ewes in different Groups at different periods.

Groups	Group-I (Hot & Humid) Mean \pm SE	Group-II (Cold treatment) Mean \pm SE	Group-III (Control) Mean \pm SE
Day 0	^C 41.95 \pm 0.36 ^a	^D 46.26 \pm 0.73 ^b	^C 42.58 \pm 0.72 ^a
Day 20	^B 35.96 \pm 0.39 ^c	^B 38.21 \pm 0.73 ^c	^A 34.07 \pm 0.58 ^a
Day 45	^A 31.69 \pm 0.32 ^a	^A 34.81 \pm 0.40 ^b	^A 31.62 \pm 0.50 ^a
Day 90	^C 39.47 \pm 0.27 ^a	^D 42.12 \pm 0.42 ^b	^B 38.72 \pm 0.53 ^a
Day 135	^{BC} 39.26 \pm 2.03 ^a	^D 46.61 \pm 1.10 ^b	^{BC} 41.17 \pm 1.95 ^a
Expected Day Parturition	^A 32.09 \pm 1.48 ^a	^A 35.57 \pm 0.76 ^b	^A 31.35 \pm 1.06 ^a
Two days after Parturition	^B 52.92 \pm 1.70	^E 55.95 \pm 0.76	^D 52.32 \pm 1.10

*Values having same superscript in a row (small alphabet) and column (capital alphabet) did not differ significantly (P \leq 0.05, P \leq 0.01).

Seed Project”, monitored by ICAR. Animals were randomly divided into three groups, one control and two treatments respectively. Animals in the three groups were offered green fodder i.e. Maize, oat, berseem with addition of concentrate mixture @250 gm/head daily to all experimental animals. Fenbendazole @10mg/kg body weight was administered to all animals before the start of experiment. To determine the level of Triiodothyronine (T₃) and Thyroxine (T₄) hormones, 2ml blood was collected in a heparinised sterile vacutainer. The blood samples were collected at different intervals i.e. Day 0, 20, 45, 90, 135, Expected day of Parturition and two days after parturition. Plasma was separated by centrifugating it at 3000 RPM for 15 minutes and stored at -20°C in deep freeze.

The plasma sample were carried to IVRI, Izatnagar for estimation of T₃ (Lerman, 1953) and T₄ (Marsden, 1975) by Radio Immunoassay kit provided by BARC, Mumbai. Statistical analysis was done as per the method given by Snedecor and Cochran (1994).

Results and Discussion

The mean values of T₃ and T₄ hormone have been depicted in table I and II. The results showed that the level of triiodothyronine increased continuously in all the groups from day 20 to two days after parturition. Analysis of variance showed significant (p<0.01) effects of housing systems within the groups on the level of triiodothyronine. The level of T₃ during mid of gestation remained almost similar in all the three groups, but after two days of parturition there was significant (p<0.01) variability in T₃ level in the blood plasma of chhotanagpuri ewe. The level of T₃ after lambing in all the three groups increased simultaneously with no significant changes. These findings do not agree with the report of Prakash and Rathore (1991) who reported that high ambient temperature depress the activity of thyroid gland. The results of experimental study for T₄ are summarized in Table-II.

The plasma thyroxine (T₄) level varied significantly within and between groups at all the

stages of gestation. The mean thyroxine level in group II (55.95±0.76 ng/ml) was highest as compared to group I and group II i.e. 52.92±1.70, 52.32±1.10 ng/ml respectively. The plasma thyroxine level decreased significantly (P<0.05) from day 0 to day 45 and then started increasing up to day 135 of gestation in all the groups. Decrease in the level of T₄ on the day of lambing and thereafter an elevation is indicated of enhanced utilization as a result of increase in metabolism due to stress of parturition as the level of cortisol in this period also increased and not due to its utilization by mammary gland alone.

Further the level of plasma thyroxine decreased significantly (P<0.05) on expected date of parturition in all the groups and again increased significantly two days after parturition in all the groups but it differs non-significantly reported by Riis and Madsen (1985). The data revealed that thyroxine level decreased during pregnancy on day 45 as a result of decreased T₄ secretion rate and not due to trans-placental transfer as pointed by Mc Donald *et al* (1988). The thyroxine (T₄) level significantly increased two days after lambing which is in agreement to the report of Riis and Madsen (1985), who also recorded continuous increase in thyroxine level up to 20days post-partum.

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Conflict of interest

Authors declare that they have no conflict of interest.

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