CHAPTER: 4

Influence of transient timed hypothyroidism in RIR pullets on histomorphology of ovary, ovarian and thyroid hormones and organ growth kinetics.

The post hatch period lasting up to attainment of sexual maturity is a period of both physical growth and physiological maturation of various organs and the body as a whole. Hormonal involvement in regulating post-hatch growth and functional maturity can be considered a distinct possibility. Hypophysectomy induced growth retardation in cockerels (King, 1969) and thyroidectomy induced growth inhibition in ducks and fowls (Assenmacher, 1973) are evidence to this end. Even hyper or hypo corticalism has also been shown to affect growth and development of fowls in post-hatch period (Blivaiss, 1947; Winchester and Davis, 1952; Howard and Constable, 1958; Baum and Meyer, 1960; Nagra *et al.*, 1965; Raheja *et al.*, 1971; King and King, 1973; Kalicharan and Hall, 1974; Carasia, 1987; Barov, 1982; Kuhn et al., 1984; Akiba *et al.*, 1992; Hayshi *et al.*, 1994).

Disruption of thyroid activity by surgical thyroidectomy, radiothyroidectomy or chemical inhibition of thyroid hormones has been shown to retard growth in general. (Blivaiss, 1947;

Winchester and Davis, 1952; Marks, 1971; Wing and Wing, 1973; Howarth and Marks, 1973). Significant reductions in body weight and retarded bone and feather growth with occurrence of obesity in foul due to thyroidectomy have been reported (Blavaiss, 1947). Age specific effects of thyroidectomy on developmental retardation have also been demonstrated (Voitkevich, 1966). Thyroidectomised chicks were noted to be fat with retarded skeletal ossification and feather growth. The liver, adrenal, gonads and kidneys were found to be four times larger than those of controls. Thyroid hormone levels are not only co-related with growth rates (Tanabe, 1965; Voitkevich, 1966) but also with the development of homeothermy (Spiers *et al.*, 1974). Severe hypothyroidism has been reported to decrease muscle mass during growth and thereby suggesting growth and proliferation (King & King, 1973). Exogenous administration of thyroid hormone has been shown to reverse the effect of thyroidectomy (King and King 1973). Provision of thyroxine in moderate doses to intact chicks accelerated growth slightly while still higher doses depressed growth (Singh *et al,* 1968). Variation in the levels of secretion of thyroid hormones during post natal growth has also been reported (Tanabe, 1965). Singh et al, (1968) reported maximum increase in growth rate in chicks between 7 & 39 days. In general, inadequate secretion of growth and thyroid hormones has several retarding effects while

administration of these two hormones to normal animals is without much effect. A stimulatory influence of thyroid hormones on oxygen consumption and tissue metabolism especially, carbohydrate metabolism, and also on early morphogenesis on epidermis and feather growth and molting has been reviewed by Assenmacher (1973). Previous study on transient temporally timed hypothyroidism between 15 and 90 days in RIR pullets had shown differential effects on sexual maturity, initiation of egg lay, biochemical composition of eggs and nutritive value (Chapter 2). In this context the present study is aimed at evaluating the effects of hypothyroidism during different windows on body weight, ovarian and oviducal weights, histomorphology of ovary, follicular dynamics and serum hormone profile.

Results:

Body, ovary and oviduct weights:

The body weight of the chicks showed steady increase from day of hatch till 120 days. The hypothyroid group of chicks also showed a steady increase though with significantly reduced weights during and in the post hypothyroid periods. On a comparative basis, 15-45 and 30-60 days hypothyroid groups showed more significant decrease during the hypothyroid phase, followed by a gradual decrease in the percentage difference in body weight. The 45-75 and 60-90 days hypothyroid group of chicks showed only a marginal decrease during and at

immediate post hypothyroid periods, with an ultimate difference in body weight at 120 days being insignificant (Table: 4.1, 4.2; Fig: 4.1 to 4.4).

Except for the 15-45 day group, all the other hypothyroid groups i.e. 30-60 days, 45-75 days and 60-90 days groups, showed a significant increase in the ovarian weight both on an absolute and relative weight basis.

The oviducal weight showed differential effects while the 15-45 days hypothyroid group showed a significant increment with reference to absolute as well as relative weigh, the 30-60 day group showed a significant increase in absolute weight while in terms of relative weight, it was lesser than the controls. The 45-75 days hypothyroid group showed a decreased oviducal weight, both absolute as well as relative and the 60-90 days group though showed a decrease in absolute weight, there was no difference in terms of relative weight.

The weight of thyroid gland, both absolute and relative, was significantly higher in all the experimental hypothyroid groups.

Histological observations and follicular count:

The ovary of 15 to 45 days hypothyroid groups showed lose stromal tissue with hypertrophied stromal cells. There was a generalized reduction in number of follicles relative to controls with more atretic follicles. Large sized follicles appeared to be

relatively bigger in hypothyroid ovary. The granulosa cell layers were found to be thicker and more in the follicles of hypothyroid ovary. Total follicular count and number of follicles of the size range, 6µm to 120µm, were significantly lower in the 15 to 45 day hypothyroid ovary, however, follicles of 240 to 300 µm size were more in the experimental ovary. Whereas there was no follicles of size more than 400µm in the control ovary, there were a few follicles of this size in the experimental ovary.

The ovary of 30 to 60 day hypothyroid birds also showed a loosened hypertrophied stromal tissue. The number of follicles also appeared to be lesser compared to controls. However, the increased thickness of granulosa layer seen in 15 to 45 days hypothyroid group was not evident. The total follicular count as well as follicles of size range 6µm to 120µm were lesser in the hypothyroid ovary. But follicles of size range of 120 to 300 µm were relatively higher in hypothyroid ovary and number of atretic follicles was also higher.

The ovary of 45 to 75 days hypothyroid hens seemed to have relatively higher number of follicles with noticeably reduced number of atretic follicles. The stromal tissue was again loosely packed with hypertrophic cells. Follicular count revealed significantly higher number of follicles of all sizes. Atretic follicles were also found to be less in number.

The ovary of 60 to 90 day hypothyroid hens also seemed to show relatively more number of follicles with a tendency for increase in medium and large size follicles. The stromal cells and granulosa cells appeared to be hypertrophied. Follicular counts shows reduced number of follicles of size range 6 to 120µm. However, follicles of 121µm and above were found to be significantly greater in hypothyroid group, with the number of atretic follicles being relatively higher. The overall total follicular count was also found to be less. (Table: 4.4; Plate No.1and 2)

Serum hormone profile:

All the hypothyroid group of hens shows significantly reduced T_3 and T_4 levels. The progesterone level was found to be significantly lower in hypothyroid groups of hens.

PLATE - 1

Figs. 1& 3

Ovary of 15-45 day control (NLD) chicks showing dens stromal (S) tissue compare to HPOT chicks. Thical layer (T) is distinctly seen and can be distinguished in to thica interna (TI) and thica externa (TE). **Arrow** :Viteline membrane
(250, 400 ×)

Figs. 2 & 4

Ovary of 15-45 day HPOT chicks showing loose stromal tissues with hypertrophied stromal cells (S). The granulosa cell layers (G) were found to be thicker and more in the follicles of hypothyroid ovary. Large size follicles enclosing yolky ova (OV) appeared to be relatively bigger in hypothyroid ovary. **Arrow:** Germinal epithelium. (400 ×)

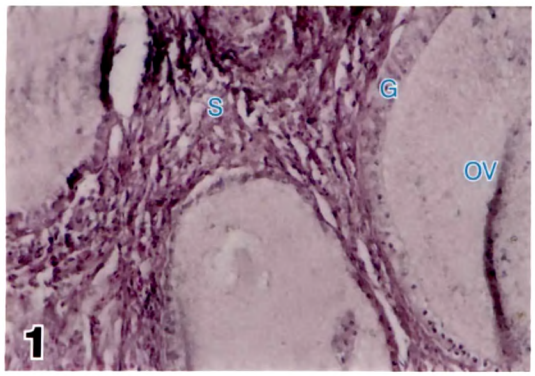
Fig. 5

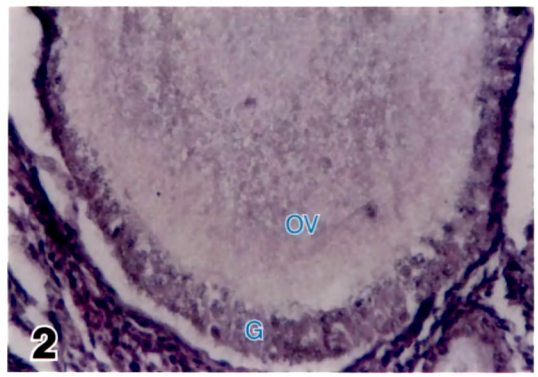
Ovary of 30-60 day control showing large follicles enclosing yolky ova (OV) and covered by thicker granulose (G). (400 ×)

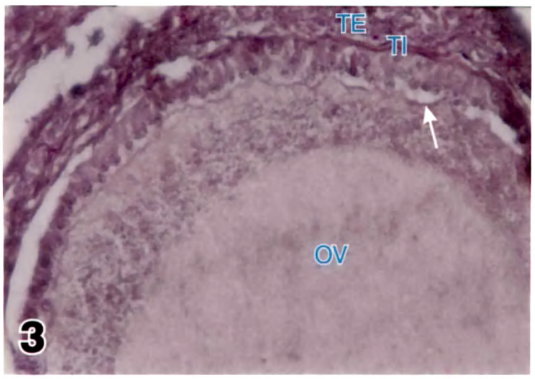
Figs. 6 & 7

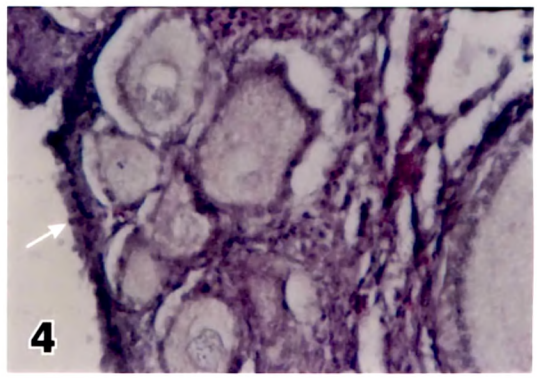
The ovary of 30 to 60 day HPOT birds also showed a loosened hypertrophied stromal tissue the number of follicles also appeared to be lesser compared to control. Note the atretic changes in some follicles (AF). (400 ×)

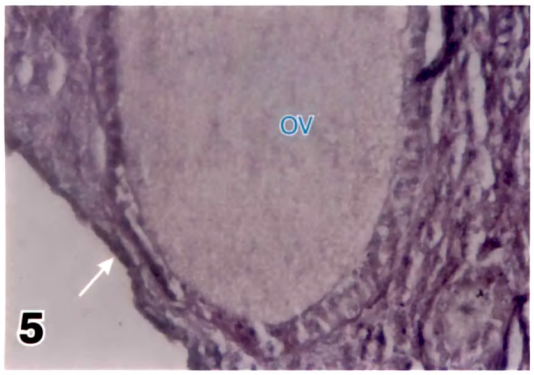
PLATE - 1

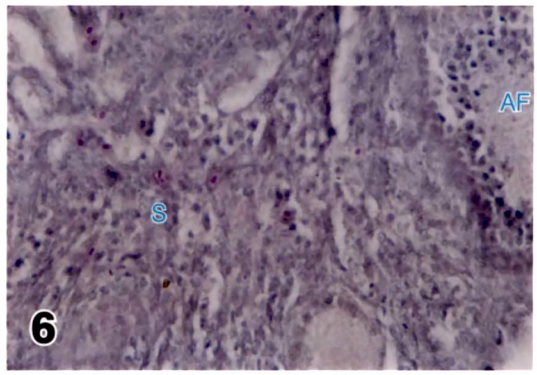












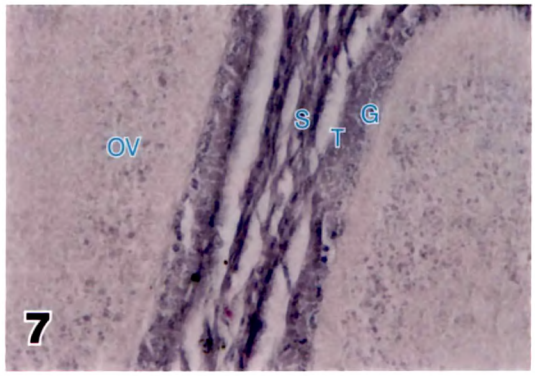


PLATE - 2

Fig. 8

Ovary of 45-75 day control (NLD) chicks showing relatively less number of follicles. Large yolky follicle is characterized by nucleus (N) with distinct nucleolus (arrow) in the centre.

Fig. 9

Ovary of 45-75 days HPOT chicks showing comparatively higher number of follicles with noticeably reduced number of atretic follicles. The stromal (S) tissue was again loosely packed with hypertrophic cells.

Fig. 10 & 12

Ovary of 60-90 days HPOT chicks showing relatively more number of follicles with a tendency for increase in medium and large size follicles. **BV:** Blood vessel

Fig. 11

Ovary of 60-90 days control chicks showing comparatively less number of follicles. Large follicles are evident with thicker granulosa.

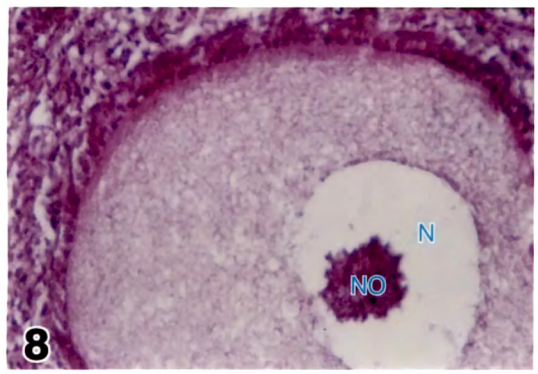
Fig. 13

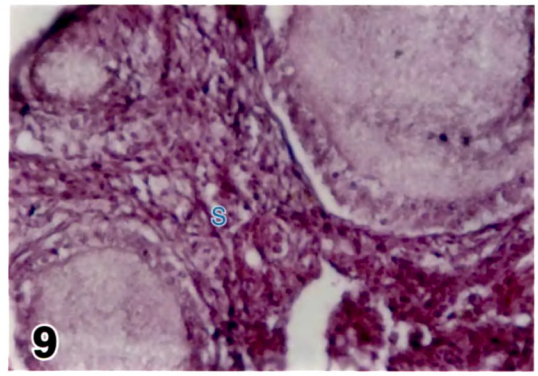
Ovary of 15-45 days SP chicks showing relatively less number of follicles. **SF:** Small follicles.

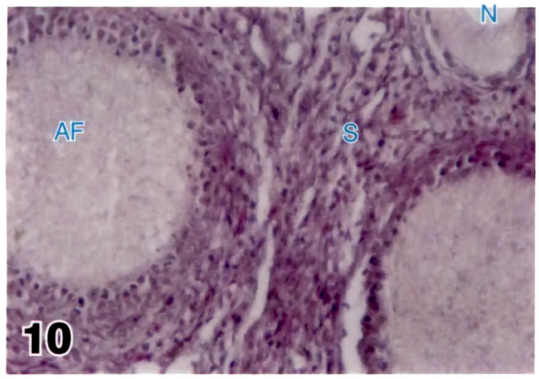
Fig. 14

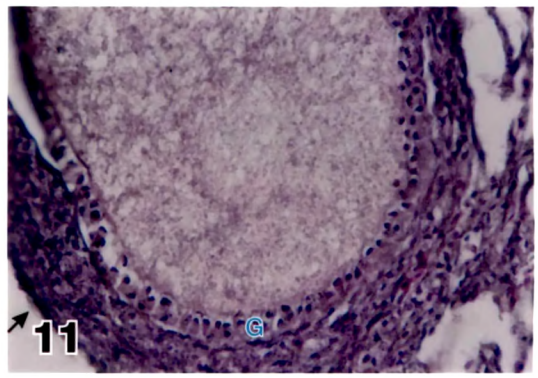
Ovary of 15-45 days HPOT+SP chicks showing higher number of follicles with more compactly packed stromal cells and follicles.
M : Medulla; **SF:** Small follicle; **V:** Vascular stroma

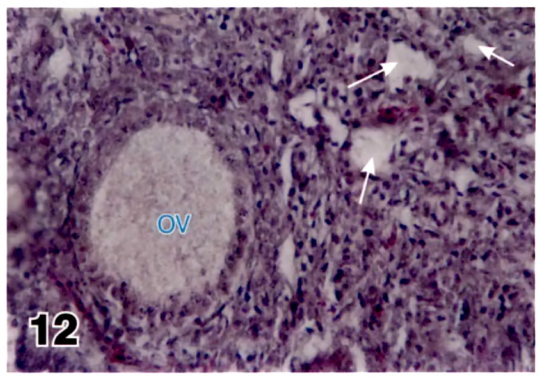
PLATE - 2

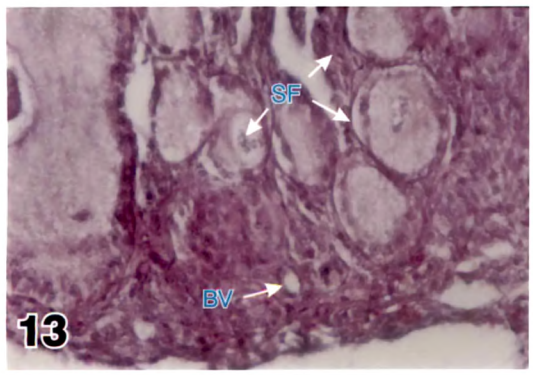












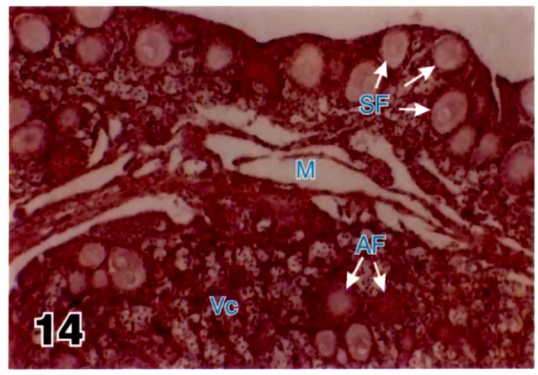


Table4.1: Body weight change under the effect of hypothyroidism at NLD photoschedule

Body wt. of day-old-chick (gm)	Treatment period	Weight change on successive days (gm.)							
		15	30	45	60	75	90	105	120
29.93 ±3.33	Control (NLD)	72.5 ±5.42	175.0 ±3.605	480.6 ±4.09	620.0 ±30.05	850.0 ±30.09	970 0 ±30.05	1350 ±5.01	1446 ±37.11
	15-45	66.6 ±4.401	135^{c} ±3.48	272.3^{c} ±7.88	325^{c} ±16.69	685^{c} ±17.63	810.38^{c} ±29.30	1120^{c} ±50.11	1260^{c} ±30.01
	30-60	-	181.3 ±4.409	318^{c} ±1.732	454.5^{b} ±23.24	705^{b} ±20.13	830^{c} ±23.3	1040^{c} ±31.11	1175^{b} ±62.9
	45-75	-	-	465 ±8.13	541.66 ±10.40	726.66^{b} ±13.01	803.3^{c} ±21.66	1100^{c} ±11.01	1373.3^{b} ±36.66
	60-90	-	-	-	582 ±5.50	711.6^{b} ±20.8	813.3^{c} ±26.0	1100^{c} ±20.0	1333^{b} ±30.0

Group-I: 15-45 day HPOT; Group-II: 30-60 day HPOT; Group-III: 45-75 day HPOT; Group-IV: 60-90 day HPOT

Values expressed as Mean ± S.E, n=6; a: $p \leq 0.05$, b: $p \leq 0.02$, c: $p \leq 0.001$

Table4.2: Organ weight (mg) under the effect of HPOT in NLD photoschedule

Tissue	Weight	Control(NLD)				HPOT			
		Experimental Groups				Experimental Groups			
		Group-I	Group-II	Group-III	Group-IV	Group-I	Group-II	Group-III	Group-IV
Ovary	Absolute	108.00 ±6.505	142.00 ±16.86	176.5 ±11.10	180.66 ±6.500	95.00 ±9.387	176.00 ±1.201	216.5^{c} ±11.500	221.3 ±5.897
	Relative	22.47 ±2.358	22.90 ±3.33	20.70 ±4.180	18.62 ±0.572	34.87 ±5.101	31.435 ±0.213	30.308 ±2.032	27.220^{c} ±0.826
Oviduct	Absolute	42.66 ±8.212	85.00 ±10.00	122.00 ±13.59	168.6 ±24.00	52.00^{b} ±0.577	91 00 ±3.786	103.0 ±8.386	144 00 ±12.00
	Relative	8.87 ±2.352	13.70 ±1.980	14.35 ±2.55	17.33 ±2.12	19.09^{b} ±0.920	20.02^{a} ±0.673	14.17 ±1.407	17.828 ±1.168
Thyroid	Absolute	36.66 ±2.027	55.66 ±11.03	78.00 ±9.00	80.66 ±5.04	50.66 ±7.860	111.33^{b} ±13.54	211.00^{c} ±9.29	240.30^{c} ±21.074
	Relative	7.62 ±0.883	8.97 ±1.66	9.17 ±0.746	8.31 ±0.556	18.60^{c} ±2.078	24.49^{c} ±2.41	29.03^{c} ±2.617	29.54^{c} ±1.129

Control: NLD; Group-I: 15-45 day; Group-II: 30-60 day; Group-III: 45-75 day; Group-IV: 60-90 day
Values expressed as Mean ± S.E, n=6; a: $p \leq 0.05$, b: $p \leq 0.02$, c: $p \leq 0.001$

Table 4.3: Serum hormone levels of HPOT hens at NLD regimens

Hormone	Treatment	Experimental Groups			
		Group-I	Group-II	Group-III	Group-IV
T3 (nmol/lit)	C	1.51 ±0.065	1.39 ±0.118	1.55 ±0.276	1.33 ±0.294
	HPOT	0.905[a] ±0.127	0.82[c] ±0.117	0.93 ±0.067	0.82 ±0.167
T4 (nmol/lit)	C	22.14 ±1.955	21 167 ±1.884	23.466 ±1.648	21.843 ±2.159
	HPOT	18.514 ±2.093	17.619 ±0.856	17.360 ±1.959	19.515 ±1.353
Progesterone (ng/ml)	C	18.52 ±.917	9.984 ±0.882	8.166 ±1.191	7.132 ±0.828
	HPOT	6.294[c] ±1.258	7.354 ±0.742	7.490 ±2.019	6.16 ±1.19

Control: NLD; Group-I: 15-45 day; Group-II: 30-60 day;

Group-III: 45-75 day; Group-IV: 60-90 day

Values expressed as Mean ± S.E, n=6;

a: $p \leq 0.05$, b: $p \leq 0.02$, c: $p \leq 0.001$

Table4.4: Follicular count, under the effect of HPOT, in normal light dark (NLD).

Groups	Treatment	Follicle Type	Follicle Size						Total
			S1 6-90µm	S2 91-120µm	B1 121-240µm	B2 241-300µm	L1 301-400µm	L2 >400µm	
Group I	C	PoF	34.75 ±7.56	14 ±1.52	18 ±1.76	1.8 ±0.73	1.2 ±0.49	-	65 ±8.359
		AF	0.8 ±0.37	3.2 ±1.16	0.8 ±0.2	-	-	-	4.8 ±1.16
	HPOT	PoF	17.5 ±1.5	7 ±4.0	18 ±1.0	3.5 ±1.5	-	0.5 ±0.5	46.5 ±4.5
		AF	0.5 ±0.5	-	2.5 ±0.5	-	-	-	3 ±0.0
Group II	C	PoF	47.66 ±12.13	16.6 ±6.02	8 ±0.44	1 66 ±0.93	0.5 ±0.5	-	77.33 ±7.29
		AF	-	1 ±0.44	2 ±0.77	1.66 ±0.93	-	-	3.66 ±1.12
	HPOT	PoF	31.5 ±0.00	9.5 ±1.5	15.5 ±1.5	2.66 ±0.25	2 ±2	-	58.5 ±1.5
		AF	1 ±0.9	3.5 ±1.5	1 ±0.00	-	-	-	6 ±1.08

Cont.....

Groups	Treatment	Follicle Type	S1 6-90µm	S2 91-120µm	B1 121-240µm	B2 241-300µm	L1 301-400µm	L2 >400µm	Total
Group III	C	PoF	38 ±4	4 ±2	5.5 ±2.5	3 ±1	2 ±2	-	52.5 ±1.5
		AF	4 ±2	2.5 ±1.5	-	-	-	-	6.8 ±0.5
	HPOT	PoF	53.5 ±2.5	19.5 ±0.5	14 ±1	3 ±2	3.5 ±0.5	-	81.5 ±6.5
		AF	2.66 ±0.33	1.00 ±0.57	1.00 ±0.5	0.6 ±0.3	-	-	4.33 ±0.3
Group IV	C	PoF	19.8 ±6.68	5.6 ±1.96	8.4 ±1.12	2.4 ±0.6	3.25 ±1.17	1.75 ±0.92	42.4 ±7.6
		AF	0.4 ±0.24	1.6 ±0.40	1.8 ±0.20	0 2 ±0.20	-	-	4.2 ±0.73
	HPOT	PoF	7 ±2.51	2.66 ±1.2	26 ±19.5	5 ±1.8	1.33 ±1.88	4.33 ±0.33	46.33 ±20.53
		AF	-	0.66 ±0.6	1 ±0.57	-	0.33 ±0.30	-	2 ±1.1

Control: NLD; Group-I: 15-45 day; Group-II: 30-60 day; Group-III: 45-75 day; Group-IV: 60-90 day
Values expressed as Mean ± S.E, n=6; a: $p \leq 0.05$, b: $p \leq 0.02$, c: $p \leq 0.001$; S: Small; B: Big; L: Large

Fig:4.1 Absolute weight of ovary in HPOT hens at NLD photoperiod.

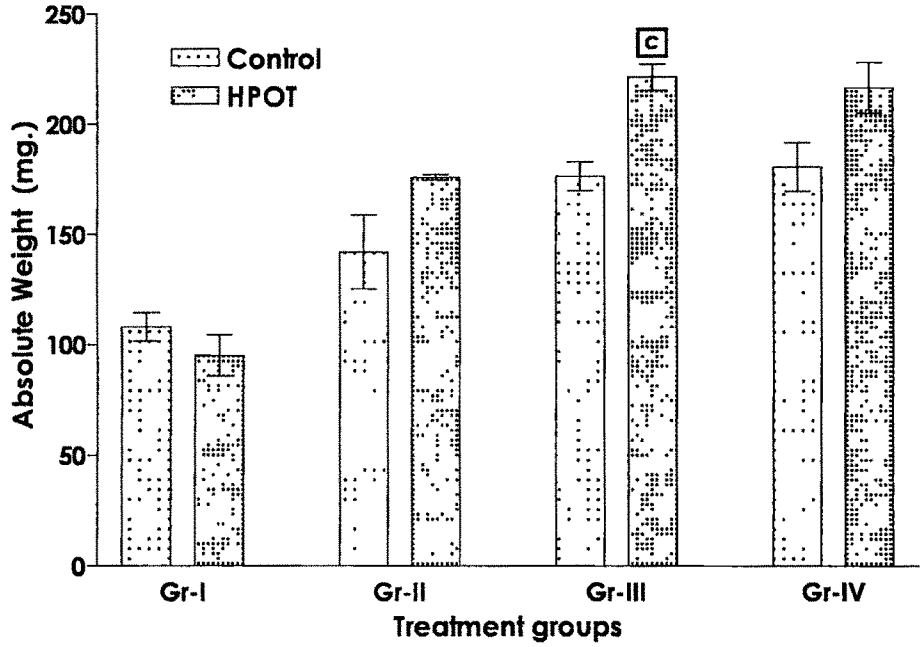
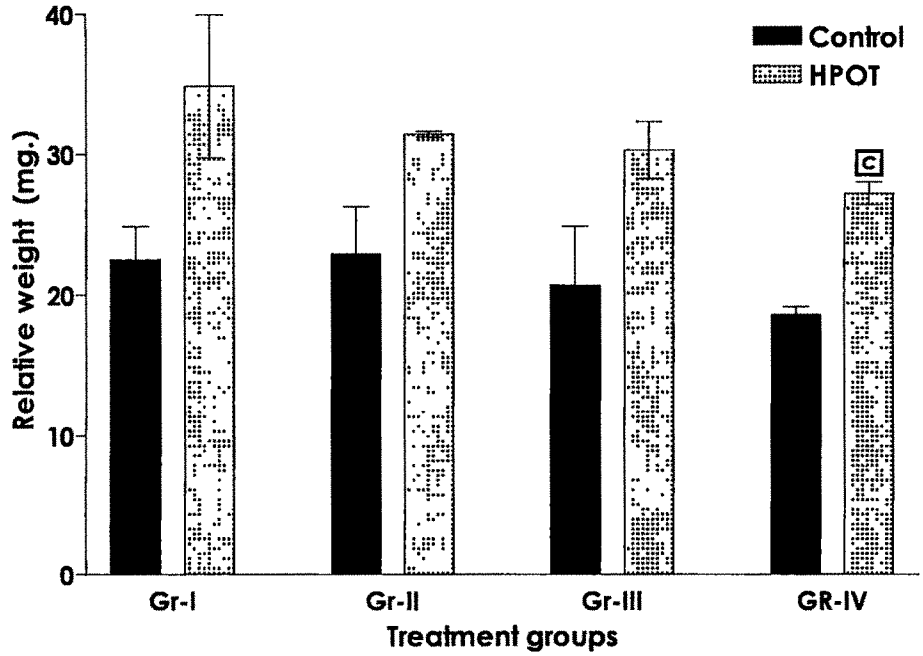


Fig.4.2: Relative weight of ovary in HPOT hens at NLD photo period



Control: NLD, Gr-I: 15-45day HPOT, Gr-II: 30-60day HPOT, Gr-III: 45-75day HPOT, Gr-IV: 60-90day HPOT, a: $p \leq 0.05$, b: $p \leq 0.02$, c: $p \leq 0.001$ of 6 animals

Fig.4.3: Absolute weight of oviduct in HPOT hens at NLD photoperiod.

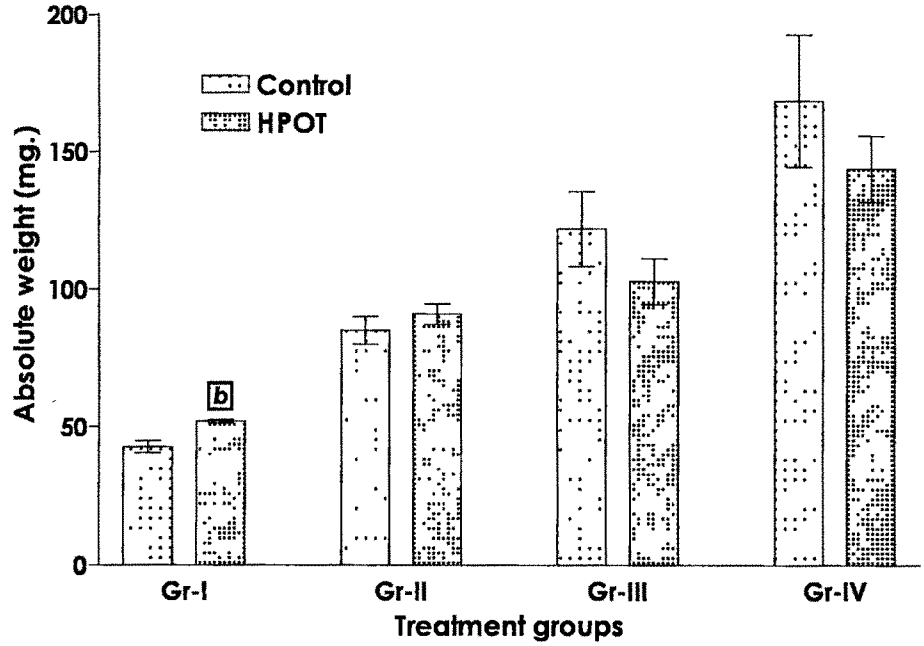
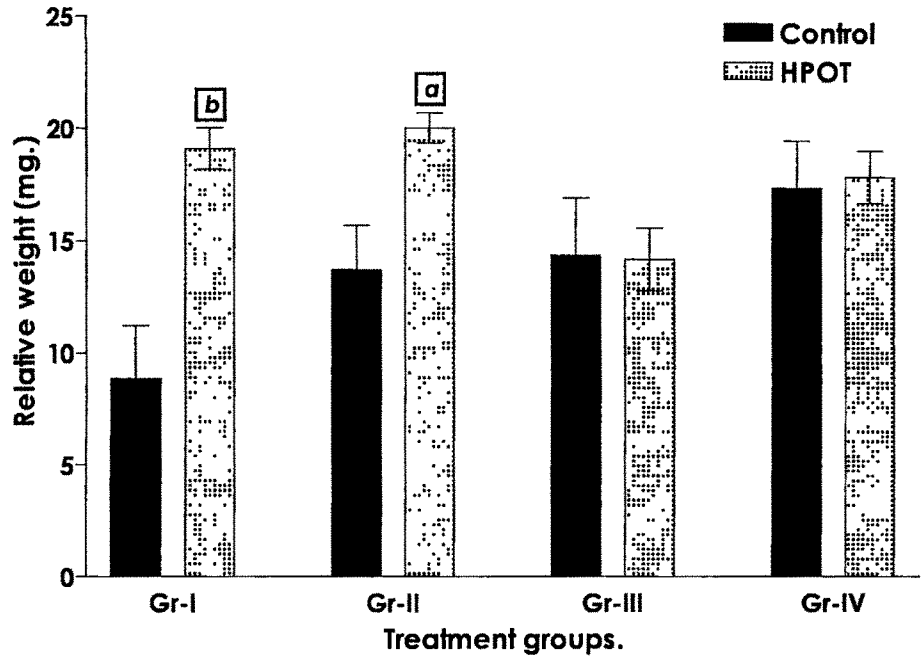


Fig. 4.4: Relative weight of oviduct in HPOT hens at NLD photoperiod.



Control: NLD, Gr-I: 15-45day HPOT, Gr-II: 30-60day HPOT, Gr-III: 45-75day HPOT, Gr-IV: 60-90day HPOT, a: $p \leq 0.05$, b: $p \leq 0.02$, c: $p \leq 0.001$ of 6 animals

Fig.4.5: Absolute weight of thyroid in HPOT hens at NLD photoperiod.

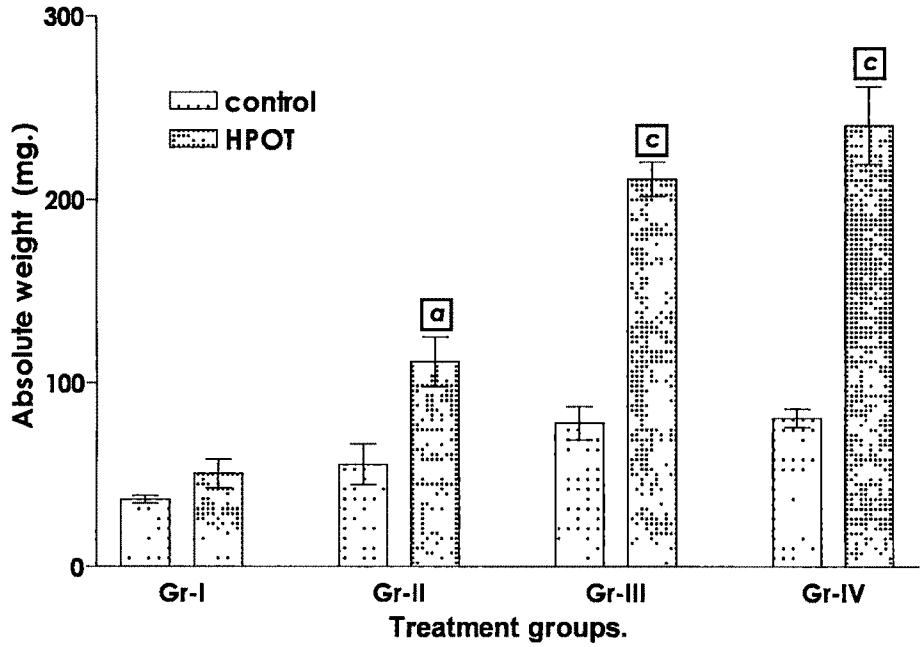
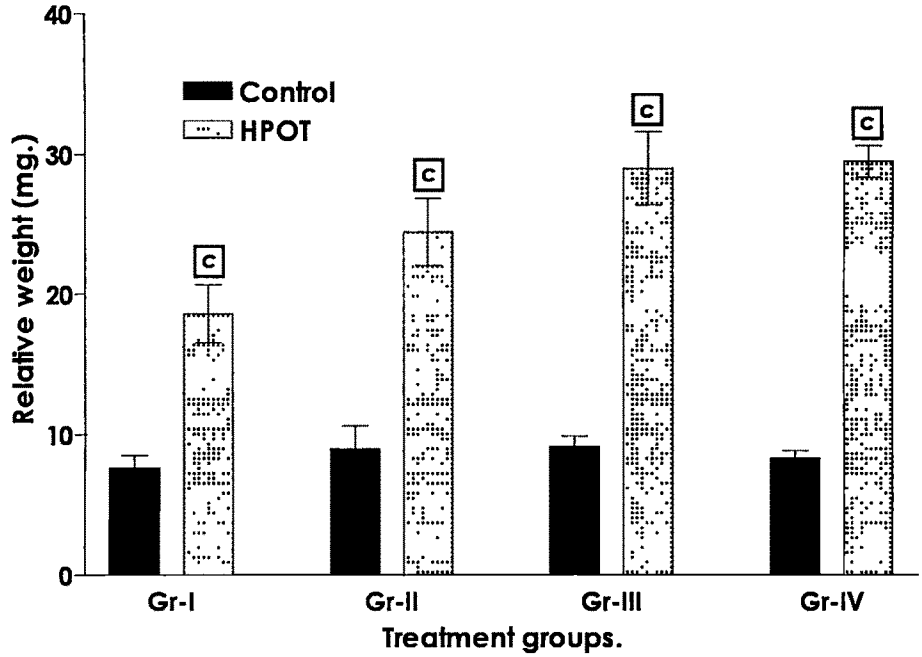


Fig.4.6: Relative weight of thyroid in HPOT hens at NLD.



Control: NLD, Gr-I: 15-45day HPOT, Gr-II: 30-60day HPOT, Gr-III: 45-75day HPOT, Gr-IV: 60-90day HPOT, a: $p \leq 0.05$, b: $p \leq 0.02$, c: $p \leq 0.001$ of 6 animals

Fig.4.7: Serum T_3 levels of HPOT hens at NLD regimens.

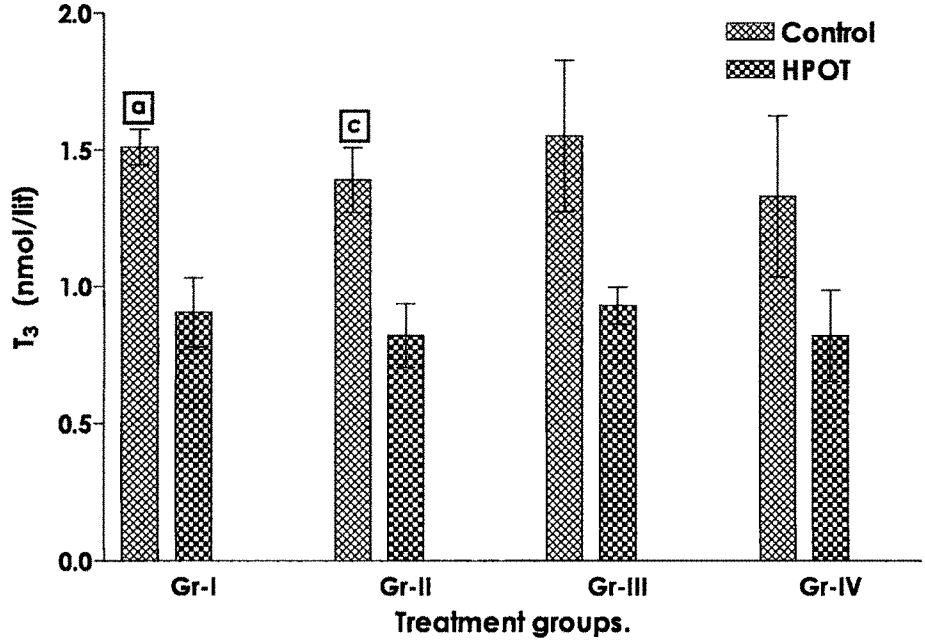
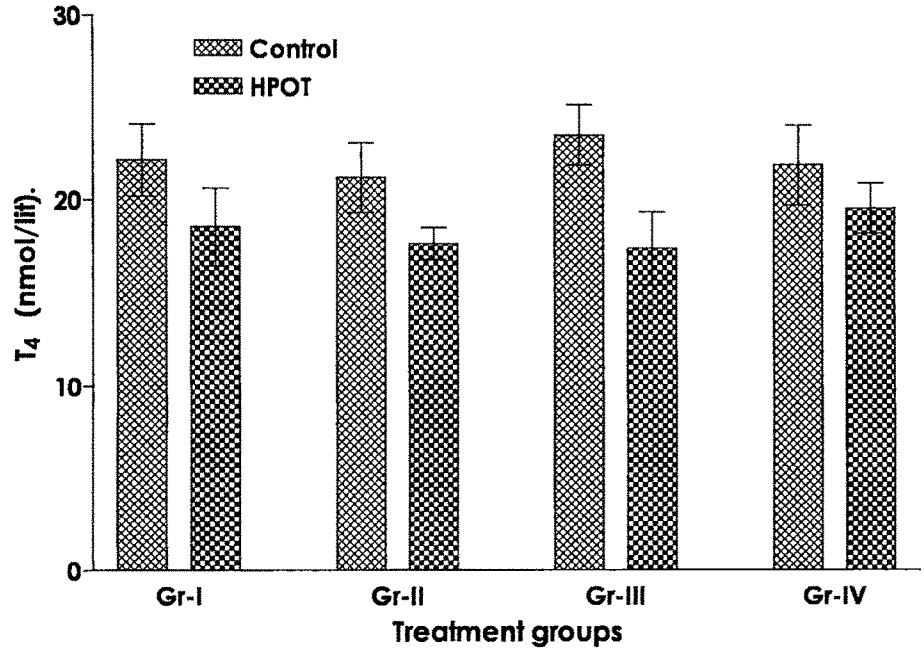
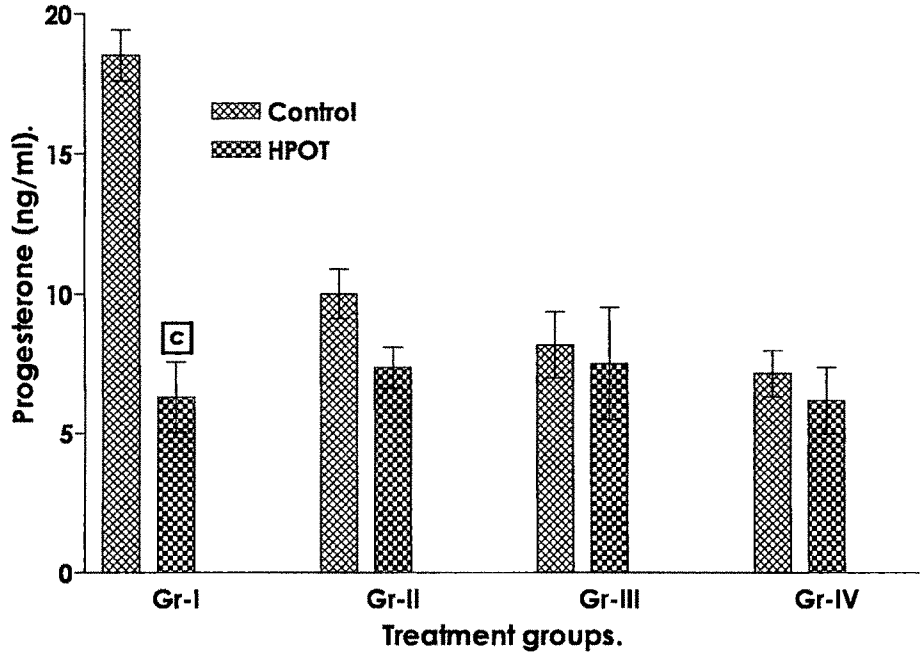


Fig. 4.8: Serum T_4 levels of HPOT hens at NLD regimens.



Control: NLD, Gr-I: 15-45day HPOT, Gr-II: 30-60day HPOT, Gr-III: 45-75day HPOT, Gr-IV: 60-90day HPOT, a: $p \leq 0.05$, b: $p \leq 0.02$, c: $p \leq 0.001$ of 6 animals

Fig.4.9: Serum progesterone level of HPOT hens at NLD.



Control: NLD, Gr-I: 15-45day HPOT, Gr-II: 30-60day HPOT, Gr-III: 45-75day HPOT, Gr-IV: 60-90day HPOT, a: $p \leq 0.05$, b: $p \leq 0.02$, c: $p \leq 0.001$ of 6 animals

Discussion:

Clearly hypothyroidism has a damping effect on body weight gain which is more clearly manifested in the early hypothyroid groups (15-45day and 30-60day) than in the late hypothyroid groups (45-75 day and 75-90day). This is clearly evident by the higher percentage difference in body weight compared with the age matched controls both, during the Methimazole feeding period as well as post withdrawal period. Apparently there is a decreasing sensitivity to hypothyroidism in the advancing age and probably a higher concentration of the goitrogen may be needed to suppress thyroid function with growth.

Decrease in body weight due to hypothyroidism or goitrogen treatment has been effectively shown in the domestic hen of various breeds by different workers (Peebles *et al.*, 1994, 1997; Decuypere *et al.*, 1983; Singh and Parshad, 1978). It has been shown that hypothyroidism induced during earlier ages has more impact and birds of higher ages may have to be fed higher doses of goitrogen to maintain Suppression of plasma T4 concentration (Peebles *et al.*, 1994; Wilson, 1999). In the present study however, thyroid Suppression does not seem to be much different irrespective of the period of Suppression between 15 and 90 days of age as seen by the T3 and T4 levels which are both reduced almost to the same extent in all groups. This is further attested to by the thyroid weight and infact, the

goitrogen induced hypertrophy, which is a marker of thyroid Suppression, is more pronounced in the later groups than in the early groups. Decuypere *et al.* (1983) had shown that Methimazole induced hypothyroidism results in decreased Somatomedin C production without affecting growth hormone level and which was related with the observed decrement in body weight. In this context, it is likely that Somatomedin C production may be more sensitive to thyroid hormone levels at early ages than at late ages during the first three months in the RIR breed of hens. It is also presumable that with the advancing age, thyroid hormone levels may have to be suppressed still more markedly to have an impact on Somatomedin C production. Nevertheless the negative impact on body weight gain is more prominently seen when hypothyroidism is induced between 15 and 60 days than between 45 and 90 days.

An impact of hypothyroidism on the reproductive system is clearly evident by the observed increased absolute and relative ovary weights in all the hypothyroid groups in general except for the 15-45 day group, where it was not statistically different from the control. This hypothyroidism induced increase in ovary weight which is more pronounced in the later hypothyroid groups is co relatable with the progressively earlier onset of egg lay in the temporally timed transient hypothyroid groups (chapter -2). Histologically observable presence of larger follicles in the ovary

of hypothyroid groups of hens again attests to the favourable influence of hypothyroidism on the progression of folliculogenesis. The ovary of all hypothyroid groups of pullets shows a relative higher number of follicles of size range 120-400 µm, with the appearance of follicles of size more than 400µm was in the 60-90 day hypothyroid pullets. Obviously there is a direct correlation between the observed presence of larger follicles, progressively greater and advanced, from 15-45 days to 60-90 days groups of hypothyroid pullets and, the similar progressively earlier initiation of egg lay by 13-43 days recorded relative to controls (chapter-2). These observations suggest that hypothyroidism induced during the second to third months of rearing is more favourable for attainment of sexual maturity and early initiation of egg lay in the RIR breed of hens. A precocious gonadal development as marked by the weight of gonads has also been reported by Singh and Parshad (1978) in their Methimazole treated 9 weeks old chickens. The non-stimulatory effect of hypothyroidism on the weight of oviduct could suggest reduced estrogen stimulation under the hypothyroid state. It is likely that the thyroid hormones exert a permissive influence on estrogen action on the oviduct. Though the estrogen titer of the hypothyroid pullets is not measured, the reduced progesterone level coupled with the observed increase in the number of large follicles in the ovary of hypothyroid pullets may suggest of an increased estrogen

production. Increased fertility during egg lay due to induced hypothyroidism prior to sexual maturity has been shown by Marks (1969). He has suggested this increase in fertility to be due to a physiological hypersecretion of T_4 after the removal of goitrogen from the diet. Precocious puberty in White Leghorn pullets has also been induced by hypothyroidism at early ages (Zukerman & Kunenzel, 1984). Favourable influence of induced hypothyroidism attempted earlier prior to attainment of normal sexual maturity has also been reported by Williams (1994).

Kunenzel *et al.* (1988) have observed significant increase in oviduct weight and length during the first eight weeks of lay in single comb White Leghorn pullets rendered hypothyroidic from 2-12 weeks of age.

The herein observed increased number of larger follicles in the ovary and the earlier reported advancement in the age at first egg (Chapter 2), suggest a possible early activation of the hypothalamic-pituitary axis. In this context, an elevated serum LH level has been shown in Methimazole treated hypothyroid broiler breed of birds (Chiasson *et al.*, 1979). The increased LH level of the hypothyroid birds could be either due to a stimulated LH secretion under hypothyroidism as has been reported in juvenile and adult rats (Larochelle & Freeman, 1974; Bruni *et al.*, 1975; Umezu *et al.*, 1976) or even due to the greatly enhanced TRH release (due to the reduced negative feedback by thyroid

hormones) as TRH has been shown to stimulate LH release in Turkey (Wentworth *et al.,* 1986). It is also likely that the hypothyroidism induced LH increase could be due to reduced metabolic clearance of LH as has also been suggested by Chiasson *et al.* (1979). An increase in number of gonadotroph population in the pituitaries of thyroidectomised is reported in White Leghorn Cockerels (Snapir *et al.,* 1982). It is inferable from these observations that hypothyroidism induced in growing pullets could lead to a precocious activation of hypothalamo-hypophyseal axis with increased gonadotropin output and augmented ovarian development. Considering 5 months as the period of initiation of egg lay in normal RIR hens, hypothyroidism induced in the mid phase i.e. between 2 and 3 months of rearing age seems to be more potent in manifesting the favourable influence on reproductive functions on initiation of egg lay. Apart from these, possible altered intra ovarian paracrine interactions under hypothyroid state also need to be evaluated.

Overall the present results suggest a favorable influence of hypothyroidism on activation of hypothalamo-hypophyseal axis as well as ovarian development with consequent early attainment of sexual maturity and initiation of egg lay possibly due to interaction between gonadotrophic hormones and physiological hypersecretion of thyroid hormones subsequent to withdrawal of Methimazole from the diet.

Summary:

The present study is aimed at evaluating the effects of hypothyroidism during different conditions on body weight, ovarian and oviducal weights, histomorphology of ovary, follicular dynamics and serum hormone profile. Pullets fed with MMI at different ages were maintained under NLD. Group 1: Birds were fed with MMI from 15th day till 45th day of age. Group 2: Birds were fed with MMI from 30th day till 60th day of age. Group 3: Birds were fed with MMI from 45th day till 75th day of age. The results are as follows. The hypothyroid group of chicks showed a steady increase though with significantly reduced weights during and in the post hypothyroid periods. All the hypothyroid groups i.e. 30-60 days, 45-75 days and 60-90 days groups, showed a significant increase in the ovarian weight both on an absolute and relative weight basis. Except for the 15-45 day group, there was a generalized reduction in number of follicles relative to controls with more atretic follicles. Large sized follicles appeared to be relatively bigger in hypothyroid ovary. All the hypothyroid group of hens shows significantly reduced T_3 and T_4 levels. The progesterone level was found to be significantly higher in hypothyroid groups of hens with a maximally increase being seen in 15 to 45 days hypothyroid hen.

Overall the present results suggest a favorable influence of hypothyroidism on activation of hypothalamo-hypophyseal axis as well as ovarian development.