

L-Thyroxine and Thyroid Stimulating Hormone Secretion Rates of Young Adult and Aged New Hampshire Hens.* (31805)

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The concurrent estimation of L-thyroxine secretion rates (TSR) and the thyroid stimulating hormone secretion rates (TSH-SR's) of chickens have been reported previously (1). It was observed that, although there was a significant difference between the TSR's and TSH-SR's of hens tested in late spring and summer, there was no difference between 1- and 2-year-old hens(1).

That there is a rapid decline in TSR in immature birds and mammals is indicated by recent studies of Tanabe(2) in cockerels and by Narang and Turner(3) in female rats (see reviews of earlier literature). The literature is very limited, however, in regard to the influence of advanced age upon the TSR. Gregerman(4) reported a higher TSR in a group of rats 24 months of age compared with animals 12 or 3½ months of age. It does not seem reasonable for older animals to have higher TSR's. It has been suggested that the results observed may have been due to higher TSR's in the hens which lived to 2 years of age.

The purpose of this investigation was to determine the effect of aging on pituitary-thyroid activity in chickens from 1 to 4 years of age.

Materials and methods. Sixteen 1-year-old, 12 2-year-old, 14 3-year-old and 11 4-year-old New Hampshire hens were available for this study. The TSR's and TSH-SR's were determined by the methods described previously (1), except that the normal release rate of thyroidal-I¹³¹ and experimentally induced release rate of thyroidal-I¹³¹ due to exogenous TSH‡ was established by thyroid counts made at 24- rather than 48-hour intervals.

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TABLE I. Relation of Thyroid Hormone Secretion Rates (TSR's) and Thyroid-Stimulating Hormone Secretion Rates (TSH-SR's) of Adult Aged New Hampshire Hens During Late Winter Maintained at a Mean Temperature of 55°F.

Group age, yr	No. birds per group	TSR, μg L-T ₄ /100 g bw/day (mean) $\pm$ SE	TSH-SR, m μ /100 g bw/day (mean) $\pm$ SE
1	16	.89 $\pm$.12	3.6 $\pm$.37
2	12	1.06 $\pm$.17	4.5 $\pm$.42
3	14	.91 $\pm$.15	3.5 $\pm$.45
4	11	.91 $\pm$.12	3.5 $\pm$.61
Total	53	Combined means .94 $\pm$.07	3.8 $\pm$.23

TSR's and TSH-SR's of individual groups are not significantly different according to Analysis Variance for group comparisons.

The estimation of TSR's and TSH-SR's was carried out during the late winter months (February and March). However, some heat was available so that a mean temperature of 55°F (13°C) was maintained.

Results. The mean TSR's of these hens were 0.89 μg L-thyroxine/100 g bw for 1-year-olds, 1.06 μg for 2-year-olds, 0.91 μg for 3-year-olds and 0.91 μg for 4-year-olds. The mean TSH-SR's were 3.6, 4.5, 3.9 and 3.5 m μ TSH/100 g bw, respectively (Table I). The mean TSR's and TSH-SR's of these hens were not significantly altered within the range in age of 1 to 4 years. Therefore, these data on 53 adult New Hampshire hens when combined give a mean TSR of 0.94 μg of L-thyroxine and a mean TSH-SR of 3.8 m μ of TSH/100 g bw.

Discussion. TSR's of 2- to 14-week-old cockerels and 25- to 115-day-old female rats have been shown to decrease with age(2,3). However, in a study(5) of TSR in New Hampshire chickens from 6 to 28 weeks of age no significant decline of TSR was detected.

In young growing calves ranging in age from 3 weeks to 3½ months and from 7 to 10 months TSR was observed with advancing age and only a slight statistically in-

significant decline in TSH-SR was found(6). However, it should be pointed out that at 7 to 10 months of age these calves were still growing quite rapidly and could not be considered adult.

In the previous studies on immature fowl (2,5) the TSR's presented are, in general, considerably elevated as compared to the TSR's determined in this study. The breed of chicken used(5) was the same as for the present investigation. The thyroidal activity of growing chickens was also unaffected by changes in environmental temperature(5) as opposed to the observed depression of both pituitary TSH and thyroid hormone secretion of mature birds exposed to increasing temperatures(1). The present report supports the previous data in that mean TSR and TSH-SR of these birds, studied at 55°F, is increased as compared to values obtained following exposure to heat(1).

Unfortunately no data are yet available for TSH-SR's of immature growing fowl. However, it can be postulated from the available evidence that pituitary TSH output and, therefore, thyroidal activity of immature fowl are significantly higher than in the adult, but once the chicken reaches the adult stage this

depressed pituitary-thyroid activity becomes more susceptible to alterations by environmental temperature.

Summary. TSR's and TSH-SR's of 53 adult New Hampshire hens ranging from 1 to 4 years of age were determined. No significant changes of TSR or TSH-SR occurred with increasing age within these adult stages. These birds had a mean TSR of $0.94 \pm .07$ μ g of L-thyroxine/100 g bw and a mean TSH-SR of 3.8 ± 0.23 m μ of TSH/100 g bw during late winter when the temperature was controlled to a mean of 55°F. However, this level of thyroidal activity represents a depression when compared to available data on the immature growing fowl.

1. Hendrich, C. E., Turner, C. W., Proc. Soc. Exp. Biol. and Med., 1964, v117, 218.
2. Tanabe, Y., Poultry Sci., 1965, v44, 591.
3. Narang, G. D., Turner, C. W., Proc. Soc. Exp. Biol. and Med., 1966, v121, 203.
4. Gregerman, R. I., Endocrinology, 1963, v72, 382.
5. Stahl, P., Pipes, G. W., Turner, C. W., Poultry Sci., 1961, v40, 1036.
6. Hendrich, C. E., Turner, C. W., J. Dairy Sci., 1964, v47, 1007.

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Age as a Factor Influencing the Level of Parthenogenesis in Eggs of Turkeys. (31806)

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Studies of parthenogenetic development in turkey eggs were initiated at this Station in 1952. Continuing studies have demonstrated repeatedly that both genetic and physiological factors may play an important role in the expression of parthenogenetic development.

Following the initiation in 1954 of a selective breeding program based on the progeny test method, the average level of parthenogenesis in eggs of virgin Beltsville Small White (BSW) hens increased from about 16 to over 45%(1). Likewise, significant increases in

the level of parthenogenesis have been recorded following the inoculation of virgin BSW hens with certain live poultry viruses (2,3,4). The present study was undertaken to obtain information on the possible influence of age of the turkey hen on the percentage incidence of parthenogenesis in eggs produced during the first and second laying season.

Materials and methods. A total of 163 virgin BSW hens was involved in this 6-year study. Each of these was outstanding with respect to number of parthenogenetic eggs produced during the first laying season. On completion each year of the 60-90-day par-

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