

SOME ENDOCRINE ASPECTS
IN POULTRY
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BY

REFAAT KHALIL IBRAHIM RIDI
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Title of Thesis: Some Endocrine Aspects in Poultry.

Name of Candidate : Rifaat Khalil Ibrahim Ridi.

Approved by:-

R. I. El-Shah

J. O. Karam

M. A. El-Ashry

Date: 3 / 1 / 1972.



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INTRODUCTION

The present investigation was conducted mainly for the study of the developmental changes in the thyroid gland and the gonads in Pekin ducks raised under the Egyptian conditions. Few investigators were able to study such changes in the endocrine glands of poultry, however, the information on ducks is rather scanty particularly with relation to the effect of Egyptian environment on both the thyroid and the gonads. The relationship between the developmental changes in the thyroid and reproductive functions in both males and females is also of particular interest and will be discussed.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

I. MORPHOLOGICAL STUDIES

I. OVARY:

Location and Shape:

Only the left ovary and oviduct are functional in birds in general. The right gonad and associated duct remain vestigial (Domn, 1939, Stanley and Witschi, 1940).

Chappelier (1913), mentioned that a functional right ovary and right oviduct were present in the duck; the bird laid two eggs per day. Crew (1931), reported a persistent right ovary in the fowl and Quinn et al. (1939), and Brayant (1944), described a non functional right ovary and oviduct in the chicken. Webster (1948), also observed a large functional right oviduct with a small right ovary in the chicken. Both ovaries are apparently functional in hawks, as reported by Domn (1939) and Von Faber (1958), but only one oviduct is present as showed by Stanley and Witschi (1940), and Von Faber (1958).

Biswal (1954), stated that the functional ovary in the chicken is flattened, pear shaped organ ventral to the posterior vena cava and aorta at the cephalic end of the kidney.

Marshall and Coombs (1957), showed that the ovary of the fowl is attached to the body wall by a short mesovarium. It is a small, flattened yellow organ with small follicles at the inactive state. However, at the active state, it is a large organ composed of five to six large follicles with yellow yolk and a large number of smaller follicles with white yolk. They added that the large follicles are graded in size, whereas, the smaller follicles are more uniform. In addition to these follicles, atretic follicles may be found. After ovulation, the ovary contains also ruptured follicles which disappear rapidly in the fowl.

Kamar and Yamani (1962), reported a case of a six month old Pekin duck with right and left oviducts and left ovary which was twice as heavy as normal.

Bickford (1965), working on the Single Comb White Leghorn mentioned that the right oviduct was fully developed and slightly longer than the left, both oviducts contained normally developing eggs. He added that there was no evidence of a right ovary, but the left ovary was also well developed and active.

The ovary of the light breeds is found to have larger number of visible oocytes than those of general purpose breeds, while the heavy breeds are found to have the lower number. Before sexual maturity, the number of visible oocytes is very low, then increases greatly when sexual maturity attained.

Hutt (1949), estimated that the number of oocytes in the chicken may run into millions. However, Sturkie (1965), stated that only few of these oocytes reach maturity and are ovulated, though, at sexual maturity the individual follicles enlarge and attain a diameter of approximately 40 mm. before ovulation.

Hafez and Famar (1955), studied the developmental changes in the reproductive organs of the domestic fowl and showed that the weight of the ovary of Fayoumi birds was 1.4 gms at five months old. At sexual maturity there was a rapid increase in ovarian weight and reached 25.7 gms. They added that the percentage of ovary weight to body weight was 0.17 before sexual maturity and 2.5 at sexual maturity.

Faber (1957), working on the domestic duck showed that at ten weeks of age body weight and ovarian weight averaged 2346 gms. and 244 gms. respectively.

II. TESTIS

Duck:

Faber (1957), working on the Muscovy ducks recorded that at ten weeks of age, the weight of both testes averaged 265 mg. However, the testes of cross breeds from Muscovy males and Pekin females weighed, more than those of either parent breed, and averaging 499 mg. at the eleventh week of age.

Yamani (1963), working on the Pekin ducks observed that testes increased, gradually, in absolute and relative weight with the advancement of age up to the ninth month, yet a remarkable decline was observed afterwards. However, the weight of the testes was relatively higher on the third and fourth month of age than the previous ages. The rapid increase in testes weight was observed on the fifth month of age and on the subsequent ages, reaching the maximum weight on the ninth month. The average weight of the pair of testes at : 1, 2, 3, 4, 5, 6, 9 and 12 month of age was 0.01, 0.09, 0.126, 0.266, 9.70, 45.13, 118.58 and 44.3 grams, respectively.

Chick:

Location:

Parker (1949), mentioned that the reproductive system of the male chick consists of paired testes, the

epididymi, the vasa deferentia and the penis. The testes are near the cephalic end of the kidneys and ventral to them.

Kumaran and Turner (1949), showed that the two fowl testes are bean shaped. They lie on either side of the vertebral column in the abdominal cavity ventral to the adrenal glands.

Weights:

Latimer (1924), plotted the growth in weight of the testes against gross body weight of a group of White Leghorn and noted a period of slow growth up to 400 grams in body weight (about 50 days), followed by an increase in growth from 400 to 800 grams in body weight (50 to 80 days), then a period of rapid or pubertal growth from 1800 to 1950 grams in body weight (210 to 260 days); and finally a terminal plateau or period following sexual maturity.

Mitchell, Card and Hamilton (1926), found that the weights of both testes increased from 0.1 grams in White Leghorn weighing 0.5 pound to 33 grams in individuals weighing approximately 7 pounds.

Buckner et al. (1933), reported that in a group of White Leghorn cockerels of 14 weeks old with an average body weight of 1152 grams, testes weight was of 2.8 grams. However, in Los Banos cantonese fowls, Fronda and Marcelo (1938), observed a gradual increase in the testes weights at six months of age, but from six to eight months the increase was very rapid.

Hoskins and Koch (1939), stated that cockerels of White Leghorn at 18 weeks of age weighing only 898 grams had testes weighing an average of 6.54 grams.

Parker et al. (1942), observed in a group of White Leghorn roosters averaging 2326 grams in body weight an average testes weight of 19.11 grams.

Latimer, (1924), Parker et al. (1942), Bennett (1947), Kumaran and Turner (1949), Kamar (1959), and Kamar and Mostageer (1960), reported that the male reproductive organs of the chicken increase slowly with age during the first few weeks of age, then a period of rapid growth occurs during the onset of sexual maturity followed by almost no appreciable changes. This period of rapid growth, varies according to breed, locality and environmental changes.

the New Hampshire cockerels. During this interval, the testes from the New Hampshire cockerels doubled their size, whereas, the testes from White Leghorn increased in weight approximately seven folds.

However, during the next four week interval(24 to 30 weeks) the testes of the former breed cockerels made phenomenal growth being almost five times as heavy at the 30 week as at the 24-week stage. Rapid testicular growth from 8-12 weeks was experienced in both breeds. The apparent absence of gonadal growth from 16 to 20 weeks is likewise common to both breeds.

The testes of White Leghorn appeared to be approaching their maturing size at 24 weeks and those of the New Hampshire at 30 weeks. The average total weight of the testes for White Leghorn was .0596, .199, 2.039, 7.85 and 14.09 grams, and for New Hampshire was .0591, .1421, 1.979, 2.70, 2.78, 4.58 and 22.34 grams, respectively at 4, 8, 12, 16, 20, 24 and 30 weeks of age.

Jones and Lamoreux (1942), working on the White Leghorn males from strains selected for high and low fecundity, reported that there was no significant differences in the size of the testes of the two strains.

The average weights of both testes at 4, 8, 12, 16, 20 and 24 weeks were .0612, .5493, 3.526, 5.885, 16.72 and 18.30 grams, respectively for high fecundity and were .0608, 5.456, 6.070, 16.85 and 13.95 respectively for the low fecundity.

Jaap (1947), reported that, at hatching time, the combined weight of both testes was from 2.0 to 22.7 mg. The large testis size in these baby chicks appears to be an embryonic manifestation of early sexual development of the varietal strain and is associated with rapidity of growth rate in the early post-embryonic period. However, the lack of association between early growth rate and testis size has been observed in certain cross breeds. Limited results suggest that large testis might be an expression of hybrid vigor.

Kawahara, (1964), observed that testis weight was reduced at 0, 5, 12 and 43 weeks post hatching in the White Leghorn, Barred Plymouth Rock and Nagoya cockerels and in the first cross breeds of White Leghorn with the other two breeds. The left testis was heavier than right testis and cross breeds exhibited greater asymmetry than pure breeds, especially at the younger ages. He continued that the absolute and relative testis weight