RAPID ASSAYS TO DETERMINE THE FATTENING POTENCY OF ORALLY ADMINISTERED ESTROGENS IN BIRDS

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Many research workers have shown that the estrogens cause a phenomenal rise in the blood lipids of birds (Lorenz 1938, Landauer *et al.* 1941, Riddle 1942). The resulting fat deposition in the tissues and fat depots of the bird's body is relatively rapid (Lorenz 1943 and 1944). Recent synthetic methods for manufacturing estrogens make their use in fattening poultry economically feasible.

When administered orally (Jaap and Thayer 1944) certain estrogenic chemicals which are relatively impotent in mammals have been found to be much more effective in chickens. This observation has been responsible for the initiation of studies on the oral potency of estrogens, particularly those readily synthesized. Direct measures of fatness are long and laborious and

there is considerable variability between birds. For these reasons the following rapid assay methods became more expedient for isolating and comparing the more potent chemicals.

Two of the assay methods, (1) oviduct weight and (2) feather color, measure the direct estrogenic effect of the chemical in the bird's body. The other two, (3) testis weight and (4) comb size, are indirect. They measure the suppression of the gonadotropic hormones of the bird's pituitary gland. This suppression appears to be proportional to the estrogenic stimulus within the body of the bird. It has been standard procedure to dissolve the chemicals in soybean oil and mix the oil solution in the feed at the rate of one part per hundred.

Chick oviduct weight. In this assay method female baby chicks are fed the estrogenized feed for the first 16 days after hatching. On the 17th day they are killed and their oviducts weighed to the nearest milligram. This test has been valuable in determining relative potency and it correlates very closely with the actual fattening trials.

Feather color. Mature Brown Leghorn cockerels or capons are used for this test. An area of the black breast feathers is plucked at the shoulder level and the estrogen is administered during the growth of the new feathers. Under the feminizing influence of the estrogen the growing part of the feather becomes salmon colored. The width of the salmon bar on the grown feather demonstrates the length of time the body of the bird has been under the influence of the estrogen. This assay has most use in determining the duration of the estrogen stimulus received by the bird.

Testis weight. Male chicks are fed the estrogen during early growth. Their testes are weighed at the end of the test period and compared with those of untreated controls. Differences in weight provide a measure of the estrogenic suppression of the gonadotropins. Since the gonadotropic hormones are active very early, relatively young chicks may be used for this test.

Comb size. The combs of the chickens become smaller as the amounts of male hormones (androgens) are decreased by the estrogenic suppression of the pituitary gland. Fluctuations in length and height of the comb record the amount of androgenic stimulation. By means of this method variations in the estrogenic suppression of the androgens may be followed over varying periods of time in the same animal.

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