Effect of Histamine on Egg Production. (28402)

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The toxic effect of histamine in the diet on chickens, has been recently described(1, 2). We have since observed that histamine fed to laying hens inhibited egg production. In this paper we describe the toxicity of histamine on laying hens.

Experimental procedure. All birds were Single Comb White Leghorn, obtained from the Dept. of Poultry Husbandry, Davis. At time of experiment the birds were clinically free of known diseases. The hens were placed in single hanging cages with facilities for collecting eggs. They were fed commercial laying mash. Experimental diets contained various levels of histamine phosphate; percentages of histamine refer to the free base. All hens received a normal histamine free diet for 7 days, and a record of feed consumption and egg production was made. The normal diet then was replaced with the experimental one. Six groups of 5 hens each were fed diets with the different concentrations of histamine. Group I: days 0 to 95—normal diet. Group II: days 0 to 5—normal diet; days 6 to 34—0.1% histamine in the diet; days 35 to 40—normal diet. Group III: days 0 to 27—normal diet; days 28 to 34—0.25% histamine in the diet; days 35 to 40—normal diet. Group IV: days 0 to 5—normal diet; days 6 to 14—0.01% histamine in the diet; days 15 to 27—0.25% histamine in the diet; days 28 to 40—normal diet. Group V: This is the same as Group II, which was continued on different diets as follows: days 41 to 44—normal diet; days 45 to 55—0.25% histamine in the diet; days 56 to 81—normal diet; days 82 to 83—0.5% histamine in the diet; days 84 to 89—normal diet; days 90 to 95—0.5% histamine in the diet.

Results and discussion. Egg production and feed consumption of the hens on normal diet (Group I) are shown in Fig. 4. Hens fed 0.1% histamine (Group II) showed a drop in egg production 6 days after feeding on histamine, and a recovery in egg production 8 days later; no changes in feed consumption were observed (Fig. 1). Hens fed 0.25% of histamine (Group III) stopped laying eggs 2 days following histamine feeding, and had not resumed laying 13 days later when the experiment was terminated. The pattern of egg production and feed consumption of this group is shown in Fig. 2. Although there was a marked drop in feed consumption concomitant with the reduction in egg production, the birds recovered in a short period and their level of feed consumption was almost normal when the experiment was terminated. Group IV was fed 0.01% histamine for 8 days with no effect on either egg production or feed consumption. Following the increase of histamine to 0.25% of the diet an immediate drop in egg production occurred, which continued for 26 days when the hens stopped laying entirely (Fig. 3). The pattern of feed consumption by these birds was similar to that of Group III (compare with Fig. 2). However, the decline in feed consumption was not as sharp as with Group III. The birds recovered within a few days, and were at a normal level of feed consumption.

The last experimental group of hens (V) was the same as Group II which was continued on increased amounts of histamine. After the initial response in reduction in egg production due to 0.1% histamine in the diet (Fig. 1) there was no further effect on egg production, with the higher concentrations of histamine (Fig. 4). A concentration as high as 0.5% of histamine in the diet had no effect on egg production on these "adapted" hens. However, the hens did respond to increasing levels of histamine (0.25 and 0.5%) with a decrease in their feed intake similar to the one exhibited for the 0.25% histamine.

To determine the gross pathology resulting from histamine toxicity, 10 birds were

exposed to 0.25% histamine and necropsied after 4 days at the time of decline in egg production.

Some of the birds did not show gross pathologic changes. The majority had hemorrhagic ovules, petechial hemorrhages in the body fat, a mild hemorrhagic enteritis with excessive amounts of fluid, and desquamated epithelium casts in the lumen. The kidneys were swollen and hyperemic. The proven-

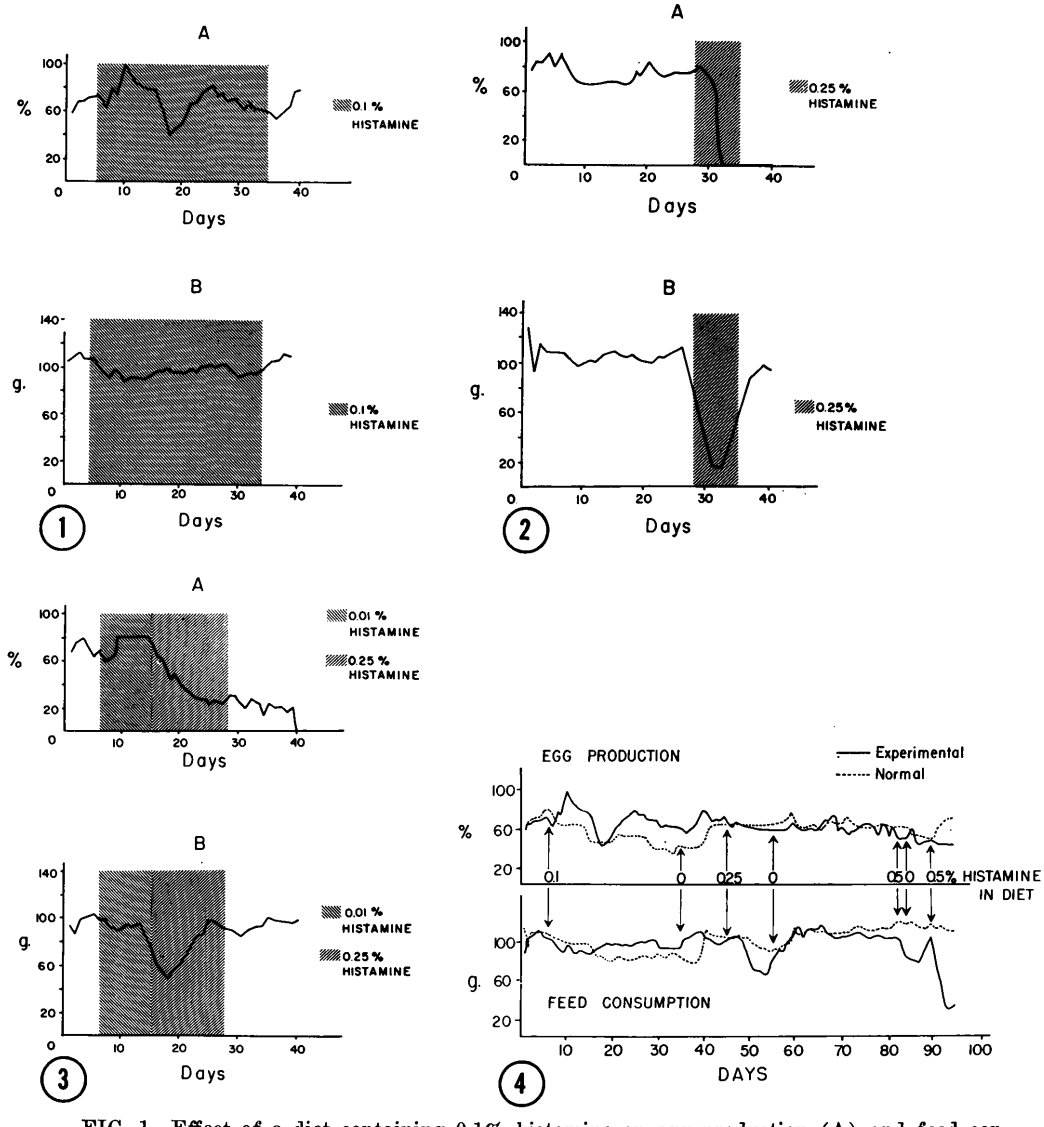

FIG. 1. Effect of a diet containing 0.1% histamine on egg production (A) and feed consumption (B); Group II. Results are plotted as moving averages (of 3 per point).

FIG. 2. Effect of a diet containing 0.25% histamine on egg production (A) and feed consumption (B); Group III. Results are plotted as moving averages (of 3 per point). As a result it appears (also in Fig. 3) that a decline in feed consumption started before experimental diet was used, which did not happen.

FIG. 3. Effect of a diet containing 0.01% histamine followed by a diet with 0.25% on egg production (A) and feed consumption (B); Group IV. Results are plotted as moving averages (of 3 per point).

FIG. 4. Effects of a diet containing 0.1% histamine, followed by diet containing 0.25 and 0.5% histamine, on egg production and feed consumption; Group V. Results are plotted as moving averages (of 3 per point).

triculus was flaccid and contained excessive amount of fluid. The lining of the gizzard was loosely attached to the epithelial layer.

The pathology of laying hens fed histamine is similar to that of chicks fed histamine as described previously(2). The decrease in egg production might be related to the effect of histamine on the reproductive tract or on the endocrine system. These points require further studies.

The small number of hens used precludes definite conclusions from the results obtained from hens fed 0.1% histamine. It is possible that the decline in egg production was within the normal variation. However, the results obtained with the 0.25% histamine are unequivocal. The effect of histamine on feed consumption also seems to be unequivocal: there was no effect at 0.01% and 0.1% histamine and there was a very sharp drop in feed consumption with 0.25% histamine; a decrease which is beyond the normal variation in feed consumption. These results are in accord with previously published data on the effect of histamine on chicks(1).

Our results show that histamine can inhibit egg production and that under certain conditions the response of the hens to this drug is adaptive. In hens fed low concentration of histamine the effects of a larger dose were decreased or abolished. When these higher doses were given to unadapted birds there was complete inhibition of egg production. A diet containing 0.1% histamine was necessary to induce complete adaptation to 0.25%, since a diet containing 0.01% histamine did not induce this adaptation. Hens on 0.25% histamine followed with a normal diet for *30 days* were still refractive to a subsequent dose of 0.5% histamine in diet.

The effect of increased dosage of histamine on feed consumption differed from that on egg production: hens fed low histamine diets were not adapted to higher doses.

The 2 different responses to histamine might possibly be explained by the presence of 2 separate processes, one affecting egg production and one, feed consumption.

It would be of interest to determine if histamine, in nontoxic amounts, administered parenterally, would also have an effect on egg production. Further studies may provide information on factors for regulation of egg production in normal hens. The mechanism of adaptation to histamine is under study.

Summary. When laying hens were fed a diet containing 0.25% histamine, egg production stopped. When this diet was preceded by a diet containing 0.1% histamine, egg production was not affected. The adaptation of hens to histamine in their diets is discussed. The gross pathology of hens fed a diet containing 0.25% histamine is described.

We thank Herrad Ortmayer for technical assistance, and Abbott Co. for a generous supply of histamine diphosphate.

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Received April 11, 1963. P.S.E.B.M., 1963, v113.

Increase in Lysozyme Activity in Kidneys of Irradiation Chimeras.* (28403)

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The wide distribution of lysozymes in plants and animals (tears, saliva, blood plasma, tissues, and secretions) and their lytic action against certain gram-positive and gram-negative bacteria(1) suggests a role for these enzymes in defense of plants and animals against bacterial invasion. The ob-

* Supported by U. S. Atomic Energy Commission.