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VITAMIN C SUPPLEMENTATION TO HENS' DIETS IN A HOT CLIMATE

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March and Biely (1953) and Baldissera-Nordio (1957), reported beneficial growth response of chicks supplemented with vitamin C. Those comparable diets had already been supplied with aureomycin, a balanced high-energy ration and a commercial mash enforced by vitamins, terramycin and nitrofurazon, respectively. Combs *et al.* (1958) found it valuable to include, in semi-synthetic broiler diets, a supplement of 1,700-2,000 ppm. of vitamin C. Gogus and Griminger (1959) did not observe any growth promoting effect of vitamin C in groups of birds fed a semi-synthetic diet. Other workers claimed increased resistance of vitamin C-fed chickens against diseases (*e.g.* Hill *et al.*, 1955).

Perek and Eckstein (1959) showed adrenal ascorbic acid depletion in laying hens following ACTH injection, and in hens during molt. Further, Perek and Bedrak (1962) have shown adrenal ascorbic acid depletion in cold-treated chicks, as well as after debeaking. The correlation of vitamin C in feed and the birds' environmental stress conditions became to the authors a challenging question. A feeding experiment was initiated with 8 month-old White Leghorn laying hens, in a farm situated in the Jordan Valley, 600

feet below the sea level.

The trial started in spring lasting until October throughout the hottest summer months of the year. The temperature peaks reached in this near-tropical area, are up to 110°F., while the relative humidities wildly fluctuate between 18-95% during the summer, respective to winds direction and strength.

Two hundred and sixteen birds, equally divided into 4 experimental groups, were kept in one row of individual wire cages of a standard laying battery and fed *ad libitum* a commercial mash, mixed weekly on the farm. The three experimental groups received the basal diet plus 25, 75 and 400 ppm. of vitamin C, respectively.

Some of the results are summarized in Table 1. As seen from the table, the three treated groups had an average mortality and culling rate of 7.4, 20.3 and 12.9 respectively while the control group showed a 31.5% in this respect.

Feed efficiency amounted in the experimental groups to 210.4, 206.7 and 202.8 grams feed consumed per one average egg and in the controls 232.2 gm./egg.

The egg production rate reached in treated birds 102.7, 90.6 and 103.5 eggs per hen respectively while the controls yielded only 80.0 eggs per bird.

TABLE 1.—*The effect of 7-months feeding of vitamin C to laying hens*

Vitamin C in feed (ppm.)	Controls	25	75	400
Culling and mortality, % of groups	31.5	7.4	20.3	12.9
Egg production, total eggs/hen	80.0	102.7	90.6	103.5
Feed efficiency, average gm./egg	232.2	210.4	206.7	202.8
Egg weights, average gm./egg	60.1	60.9	61.3	62.7
Egg shell weights, average % of whole egg	9.05	9.87	9.25	9.47

Egg weights averaged 60.9, 61.3 and 62.7 gm./egg respectively in the experimental groups and 60.1 gm./egg in the control hens. Egg shell quality was not significantly improved in any of the three experimental groups, contrary to the findings of Thornton and Moreng (1958, 1959).

Statistical analysis of the results showed high significant advantage ($P < 0.01$) for the treated groups averages in culls and mortality rates as well as in their egg production. Significance of ($P < 0.05$) was calculated in egg weights averages of the experimental groups.

The decrease in the laying level that occurred to the whole flock (ca. 1,000 birds) during the hot season is usually seen in this area and is due to a pronounced physiological fatigue of the environmentally stressed hens.

During the last 110 days of the trial, an identical vitamin C dosage parallel experiment was carried out, using another 240 laying hens located on an opposite row of the same building. Comparable results were obtained, showing again the beneficial effect of the treatment; moreover, the egg production response of the birds indicated a linear correlation to the doses of the vitamin C supplied to their diets. It may be pointed out that from the same year's spring level of 80% and more, the egg yield dropped spectacularly to 25–30%.

It may be concluded from our results that vitamin C supplementation is likely to counteract the environmental heat conditions in laying hens.

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