

GROWTH AND BLOOD CONSTITUENTS OF IMMATURE NEW HAMPSHIRE FOWL EXPOSED TO A CONSTANT TEMPERATURE OF 99°F. FOR 7 DAYS

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The effect of high environmental temperatures on mortality, growth, feed consumption and thyroid weights of immature fowl fed *ad libitum* has been reported by Wilson and Plaister (1951) and Joiner and Huston (1957). In the studies presented here the effect on growth and blood serum constituents of 5-week old New Hampshire chicks maintained at a constant temperature of 99°F. for a 7-day period has been determined for both *ad libitum* and paired feeding regimens.

METHODS

The equipment used for these high temperature studies has been previously described (Squibb *et al.*, 1954). The New Hampshire chicks used in these experiments were F₁ female progeny from imported stock. The control birds were housed in all-wire cages in a room having a temperature of 70°F. The effects of an environmental temperature of 99°F. was studied under two feeding regimens: (1) *ad libitum*, and (2) paired. All birds were fed an imported mash containing in percent: moisture, 8.4; crude protein, 20.1; ash, 7.2; N.F.E., 55.9; fat, 2.1; and fiber, 6.3.

In experiment 1, *ad libitum* feeding and a crossover design were employed. Fifty-four 5-week old chicks were divided into

two comparable groups. Group A served as controls, while Group B was subjected to a constant temperature of 99°F. At the end of 7 days the groups were reversed for another 7-day period.

In experiment 2, 48 chicks, 5 weeks old, were divided into 4 comparable groups. Groups C and E were subjected to constant temperatures of 70°F. and groups D and F to 99°F. over a 7-day period. In this experiment a cross-over design was not employed. The chicks were paired by limiting the feed intake of the birds housed in the 70°F. environment to that of those maintained at 99°F.

Blood samples were obtained at the end of each 7-day period. The serum was analyzed by the methods of Bessey *et al.* (1946) for vitamin A and total carotenoids, Lowry and Hunter (1945) for total proteins, Lowry *et al.* (1945) for ascorbic acid, and Burch *et al.* (1948) for riboflavin.

RESULTS AND DISCUSSION

These trials with 5-week old New Hampshire female chicks demonstrated an accepted phenomenon that high environmental temperatures will significantly depress feed intake and growth and increase water consumption (Table 1). When paired feeding was employed and the feed intake of the control birds restricted to that of the birds subjected to the 99°F. temperature the weight gains of both groups were similar (Table 1), indicating that within the 7-day experi-

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TABLE 1.—*Feed and water intake and weight gains of New Hampshire chicks fed on ad libitum and paired feeding regimens and subjected to 99°F. temperature.*

Group	No. of chicks	Average feed gm.	Average water ml.	Average Weight gain gm.
<i>Experiment 1—Cross over; feed ad libitum</i>				
First Week				
A—70°F.	27	406	566	135
B—99°F.	27	167	686	13
Second Week				
A—99°F.	27	179	748	—17
B—70°F.	27	522	623	155
<i>Experiment 2—paired feeding</i>				
First Week				
D—99°F.	12	184	948	11
C—70°F.	12	182	431	10
F—99°F.	12	129	888	18
E—70°F.	12	130	420	9

Effect of temperature on feed and water intake and weight gains was highly significant on the *ad libitum* regimen. On the paired feeding regimen the effect of high temperature on water intake was highly significant.

mental period the observed depression of growth was due to the reduced feed intake and not directly to the 99°F. temperature. Further, a comparison of the control groups fed *ad libitum* and paired regimens indicated that restricting the feed intake also reduced water consumption.

It is apparent that the constant environmental temperature of 99°F. had no significant effect on serum levels of total proteins, riboflavin, ascorbic acid and vitamin A. The significantly lower level of serum total carotenoids of the group subjected to 99°F. temperature in experiment 2 was not due to the high environmental temperature since a similar phenomenon was not observed in experiment 1. The higher serum vitamin A level of this group would suggest that a part of the reduction was due to the conversion of the carotenoids to vitamin A.

While high environmental tempera-

TABLE 2.—*Serum constituents of New Hampshire female chicks fed on ad libitum and paired regimens and subject to a constant temperature of 99°F.*

Serum constituents per 100 ml.	Experiment 1 <i>Ad libitum</i> feeding		Experiment 2 Paired feeding	
	70°F. (27) ¹	99°F. (27)	70°F. (24)	99°F. (24)
Total proteins, gm.	3.57	3.37	3.85	3.81
Riboflavin, mcg.	1.20	1.13	2.17	2.07
Ascorbic acid, mg.	2.01	2.23	1.56	1.67
Carotenoids, mcg.	333	332	646	459 ²
Vitamin A, mcg.	38	41	43	51

¹ Number of birds shown in parentheses.

² Significant at the 1% level.

tures had no direct and immediate effect on the serum constituents studied, the depressed feed intake would eventually affect the levels of one or more of the constituents studied. Since this could be of practical significance to poultry raising during seasons of high environmental temperatures, longer periods of thermosstress on chick nutrition should be studied.

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