

THE USE OF CHICKS IN VITAMINE TESTS.

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The animals most frequently used for tests on vitamins have been rats, mice, chickens and pigeons. While these animals may possess some advantages yet their use also presents some difficulties in the average laboratory. Rats and mice must be kept well past the suckling stage in order that feeding tests may be made. For such tests pigeons and chickens must be kept in larger numbers and in more commodious quarters than are usually available. Such disadvantages led to the trial of chicks for the purpose of demonstrating to the classes in elementary physiology the role of vitamins in a diet. Chicks were chosen for the test largely because no special cages were necessary, because the rate of growth in the chick is rapid, and the amount of care and attention required is slight.

Because of their reputed hardiness Leghorn chicks were selected. They were purchased as "day-old" chicks (available at almost any season) and were placed in a suitable attic room, heated by hot water and with a large skylight. No attempt was made to keep the temperature constant, although the range was not great usually being between 65° and 75° F.; however, the chicks could hover in an enclosed box beneath the hot water pipes. Until they were a week old additional warmth was supplied by an electric bulb. Water, shell, and grit were constantly available. Foods containing practically no vitamins were placed in a self feeder and all chicks had access to this at all times. Such food consisted of rice flour, highly milled corn meal, and patent or highly milled wheat flour. These were presented to the chicks in a variety of ways and combinations. The more usual method being to have these flours baked into small unleavened loaves which were then dried and ground into crumbs. The only care found necessary in carrying out the test was to see that the food combinations were changed frequently enough that the chicks continued to eat freely of the food offered.

At the beginning of the test the chicks were divided into two lots of equal number and weight. One lot was marked by means of aniline dye (red) on head and wings—the other lot

was left unmarked. The marked chicks were selected as the lot for test while the unmarked were kept as the normal or control chicks.

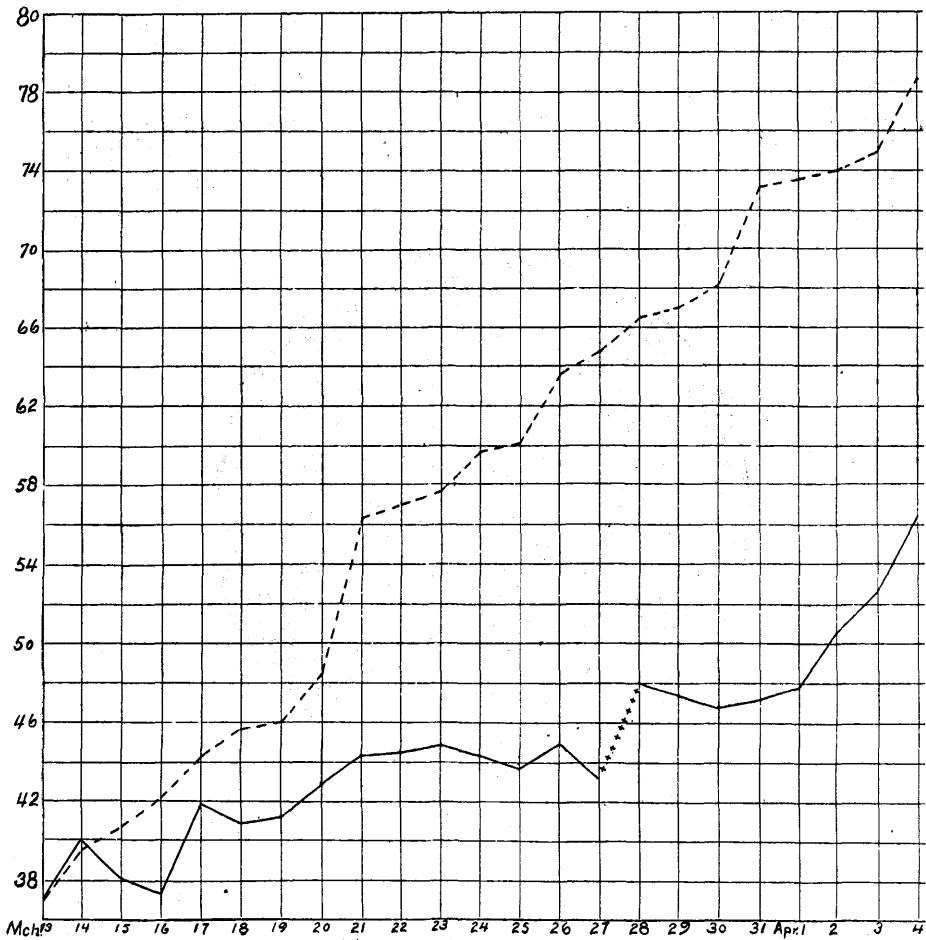
As previously stated both lots fed from the same hopper at all times but in addition to this vitamine lacking food the controls were allowed to partake once a day of foods containing vitamins; such food was usually a well known commercial "starting food," although frequently they were given lettuce, milk, apple, etc. The chart presenting the growth curves of the two lots strikingly shows the immediate differences that were



Typical appearance of the control chicks (left) and of those fed on food low in vitamine (right). Photograph taken April 4th, subsequent to replacing vitamins in food.

obtained in the daily average weight of the chicks (the graph does not show the weights for the first two days—which were almost identical).

One striking feature of the two growth curves is that when the normal chicks gained rapidly (as on March 19, 20, 21) the test chicks likewise show a definite increase, while when the normals' rate of growth slowed down (as on March 22 to 25) the test group failed to gain or even lost weight. The causes of these variations of growth in the controls are yet to be determined.



Curves showing the average daily weight per chick in grammes. Broken line, control chicks. Solid line, chicks fed a diet low in vitamins.

No deaths occurred in the normal group while 33% of the test chicks died. The apparent rapid rise in the curve on March 28th is due to the death of the smallest and feeblest chick which of course resulted in the rise of the average weight of the lot. A second chick died on March 31st and the remainder were in such condition that it was deemed advisable to prevent death if possible by feeding food containing vitamines. Incidentally it is worthy of note that the chicks die very promptly after the appearance of the symptoms of vitamine deficiency, such as the semi-paralysis, refusal to eat, progressive loss of weight, etc. By partially forced feeding the chicks were given small amounts of scraped apple, milk, lettuce, etc.—the result is clearly shown in the graph—April 1st to 4th—the growth rate actually exceeding that of the controls, although the amount of added nutritive material could not have been responsible, being entirely too small in amount. With the addition of the vitamines to the diet the test chicks at once began to eat larger amounts of the hopper feed than previously, the droopy appearance disappeared and they gave the appearance of merely undersized or stunted chicks.

On April 4th the use of the vitamine containing food was again discontinued—the result of further experimentation is yet to be determined. While it is recognized that no new results have been obtained by the use of the chicks it was thought that the very satisfactory demonstration secured was worthy of note at this time, since they apparently lend themselves so happily to laboratory experiment with a minimum of expense and trouble in their care.

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