

BODY TEMPERATURE OF NEWLY HATCHED CHICKS

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That the normal body temperature of the adult domestic fowl is fairly high (106° to 107° F.) is generally known, but so far as the writer has been able to determine, there are no statements in the literature as to the normal temperature of chicks when first hatched. A beginning was made on a study of this problem in 1918 while the writer was connected with the Poultry Department of the Storrs Agricultural Experiment Station. This paper reports certain phases of that study.

Data were secured on a total of 119 S. C. White Leghorn chicks. These were pedigree-hatched, June 21, 1918, in Prairie State Incubators. Upon being taken from the hatching bags each chick was marked with a numbered leg-band in order that all data might be studied with reference to the parentage of the chicks.

The chicks were grouped into four lots, on a basis of parentage, with as nearly equal numbers as possible in each lot. Lot one contained all chicks which hatched from hens 115, 118, 132 and 135; lot two all chicks from hens 117, 119, 133 and 136; and so on. The distribution of chicks according to sex and female parentage is shown in the following table. All chicks were sired by the same male.

DATA SECURED

Chicks were held in incubators thruout the test. All chicks were weighed to the nearest tenth of a gram at 2-3 P. M. on the day they were hatched. All still living were similarly weighed at 2-3 P. M. on the fifth day after hatching. All chicks in lots three and four were weighed at 2-3 P. M. on each of the four intervening days.

Body temperature of all chicks in lots one and two was recorded night and morning, at 7-8 o'clock, on each of the first five days after hatching, except that in the case of lot two the chicks were so weak and so low in vitality at the end of the test that in many cases their temperature could not be recorded on the thermometer used. The lower limit of the scale was at 95° F. The records for lot two cease with the morning of the fifth day.

Temperature observations were made on the chicks in lots three and four once daily at 1-2 P. M. throughout the five day period.

TABLE I

<i>Lot No.</i>	<i>Hen No.</i>	<i>Male Chicks</i>	<i>Female Chicks</i>	<i>Total</i>
I	115	4	2	6
I	118	1	4	5
I	132	5	4	9
I	135	6	2	8
I	—	16	12	28
2	117	3	4	7
2	119	3	4	7
2	133	6	4	10
2	136	6	0	6
2	—	18	12	30
3	122	6	2	8
3	125	3	6	9
3	127	5	4	9
3	128	4	1	5
3	—	18	13	31
4	138	5	3	8
4	140	5	3	8
4	141	6	4	10
4	144	2	2	4
4	—	18	12	30
All	—	70	49	119

Lots one and three received fine chick grain three times a day on the 3rd, 4th, and 5th days. Lots two and four received no feed at any time. None of the chicks received water or milk. It is the opinion of the writer, altho he has no specific data on the point in question, that the physical condition of lots two and four, and consequently their temperature curves, would have been considerably different if they had been supplied with fresh water, even tho they received no feed.

At the end of the five day period all chicks were killed and their sex determined by post mortem examination.

APPARATUS AND TECHNIQUE

In weighing the chicks use was made of a triple beam balance made by the Central Scientific Company. Little difficulty was experienced in keeping the chicks quiet on the pan for a sufficient time to read their weights. By having an assistant record the weights this operation was performed very rapidly.

In determining temperatures a small size, sixty second, clinical thermometer was used. Temperatures were taken in the rectum and the operation was greatly facilitated by touching the tip of the thermometer bulb in castor oil before attempting to insert it. Chicks were taken from the incubator one at a time in order to eliminate the possibility of the room temperature lowering the natural body temperature thru chilling. This was necessary because of the length of time necessary to read and record temperatures on all the chicks. In other words, the body temperatures as recorded were those maintained by the chicks when kept in an environmental temperature of 98-100°F.

It was not possible to read and record temperatures at a rate of more than forty-five chicks an hour, and the average rate was about forty. This is readily appreciated when one considers that it was necessary to take a chick from the machine, close the door, dip the bulb of the thermometer in oil, insert the bulb in the rectum, read the band number, wait sixty seconds for the mercury to reach a constant level, read and record the temperature, place the chick in a cloth lined box or another incubator, shake down the mercury, and then open the door of the machine and catch another chick. Without the use of castor oil in which to dip the point of the mercury bulb it was impossible to proceed at a rate of more than twenty-five chicks an hour.

OBJECTS

The purpose of the test was to determine the range limits of and variation in body temperature of chicks on each of the first five days after hatching, and to determine whether temperature tended to be constant for an individual, or to fluctuate. If the latter were true, how did it fluctuate? What effect, if any, on temperature would result from withholding food beyond the usual limit of seventy-two hours after hatching? This was expected to throw some additional light on the old question of when chicks should have their first feed and on the justification for the postal ruling requiring the delivery, of chicks shipped by parcel post, within seventy-two hours. Another point for study was the difference between the sexes with respect to body temperature, and the possibility of determining sex by observing this character.

TABLE II. TEMPERATURE IN DEGREES FAHRENHEIT

	1st day	2d day	3d day	4th day	5th day
Males—lot one					
Highest morning-----	106.8	105.3	105.0	106.0	105.8
Lowest morning-----	104.7	103.4	103.4	103.8	100.2
Mean (16 males)-----	106.0	104.3	104.1	105.0	104.7
Highest evening-----	103.0	104.8	105.8	105.0	105.8
Lowest evening-----	101.0	102.4	102.6	102.2	103.2
Mean (16 males)-----	101.9	103.5	103.8	104.0	104.9*
Females—lot one					
Highest morning-----	107.0	104.8	104.8	106.3	105.9
Lowest morning-----	104.4	103.4	102.7	104.6	103.8
Mean (12 females)-----	105.6	104.1	104.0	105.5	105.1
Highest evening-----	102.8	104.7	105.7	105.2	106.0
Lowest evening-----	101.2	102.6	102.6	102.6	102.8
Mean (12 females)-----	102.1	103.5	104.7	104.0	104.5
Males—lot two					
Highest morning-----	106.8	105.4	104.8	104.0	101.6
Lowest morning-----	104.8	103.5	103.3	102.2	96.2
Mean (18 males)-----	106.0	104.3	103.9	103.0	99.7*
Highest evening-----	102.7	104.4	103.6	103.4	-----
Lowest evening-----	101.4	101.6	100.6	100.3	-----
Mean (18 males)-----	102.1	103.6	102.5	101.9	-----
Females—lot two					
Highest morning-----	107.0	105.0	104.6	103.8	101.6
Lowest morning-----	104.6	103.2	101.7	102.4	97.8
Mean (12 females)-----	105.9	104.1	103.6	103.0	99.9
Highest evening-----	103.6	104.2	103.4	103.4	-----
Lowest evening-----	100.8	102.4	101.0	101.1	-----
Mean (12 females)-----	102.3	103.7	102.2	102.4	-----
Males—lot three					
Highest mid-day-----	106.4	106.8	105.0	106.0	105.4
Lowest mid-day-----	104.6	103.4	103.4	104.0	100.8
Mean (18 males)-----	105.6	104.7	104.2	105.0	103.5
Females—lot three					
Highest mid-day-----	106.4	107.3	105.0	105.6	106.0
Lowest mid-day-----	104.6	102.6	103.6	104.0	99.8
Mean (13 females)-----	105.5	104.0	104.2	104.8	103.9*
Males—lot four					
Highest mid-day-----	106.8	107.2	104.2	104.7	102.0
Lowest mid-day-----	104.0	103.2	102.1	101.8	98.5
Mean (18 males)-----	105.9	105.4	103.4	103.4	100.4
Females—lot four					
Highest mid-day-----	106.5	105.6	104.3	104.8	102.9
Lowest mid-day-----	104.1	103.7	102.0	102.4	100.0
Mean (12 females)-----	105.4	104.4	103.6	103.8	101.4

*One chick died before the last records were taken. Fifth day mean based on one less than the indicated number of chicks.

TABLE III. BODY WEIGHT IN GRAMS

	When Hatched	1st day	2d day	3d day	4th day	5th day
Lot three						
Av. of 18 males---	35.2	32.4	30.0	27.7	25.5	23.8
Av. of 13 females---	35.5	32.6	29.9	27.4	25.6	24.0
Lot four						
Av. of 18 males----	37.0	34.4	32.0	29.4	26.6	24.6
Av. of 12 females----	37.0	33.8	31.4	28.9	26.2	24.4

SUMMARY OF THE DATA

In the tables are presented the highest and lowest observed temperatures, together with the mean temperatures morning and evening, for males and females in lots one and two. Similarly, there are presented for the males and females in lots three and four, the highest and lowest observed temperatures taken near the middle of the day, and the mean for males and females separately. It should be remembered that lots one and three were fed on the 3rd, 4th, and 5th days while lots two and four received no food.

The mean daily weight for males and females in lots three and four is also presented. It will be noted that there was in each lot a fairly uniform decrease in weight during the five day period, the amount of this decrease being approximately one-third of the original weight. Feeding did not prevent this loss of weight. In the author's opinion much of this loss can be traced to the fact that the chicks received no water or milk. Further observations are necessary to determine whether chicks actually lose weight during the first few days when under normal brooding conditions.

Graphs are presented to show the changes in successive morning, evening, and early afternoon temperatures for males and females in each of the lots. To each of the curves of observed mean temperatures a straight line has been fitted to show the general trend. It is of interest to note that, in general, morning and mid-day temperatures tend to fall thru the five day period while evening temperatures tend to rise. The three upper graphs refer to male chicks, the three lower to females. Solid lines refer to chicks in lots one and three that were fed, broken lines to chicks in lots two and four that were not fed.

The equations of the fitted straight lines are as follows :

Lot one—morning temperatures of male chicks :

$$y=105.39-.19x$$

Lot two—morning temperatures of male chicks :

$$y=107.50-1.38x$$

Lot one—morning temperatures of female chicks :

$$y=104.74+.04x$$

Lot two—morning temperatures of female chicks :

$$y=107.23-1.31x$$

Lot one—evening temperatures of male chicks :

$$y=101.67+.65x$$

Lot two—evening temperatures of male chicks :

$$y=102.95-.17x$$

Lot one—evening temperatures of female chicks :

$$y=102.16+.54x$$

Lot two—evening temperatures of female chicks :

$$y=102.95-.12x$$

Lot three—mid-day temperatures of male chicks ;

$$y=105.77-.39x$$

Lot four—mid-day temperatures of male chicks :

$$y=107.60-1.30x$$

Lot three—mid-day temperatures of female chicks :

$$y+105.20-.24x$$

Lot four—mid-day temperatures of female chicks :

$$y=106.30-.86x$$

CONCLUSIONS

1) The normal temperature of Single Comb White Leghorn chicks the first day after hatching is 106°F. in the morning and 102°F. in the evening. In early afternoon it is nearly half a degree below the morning temperature.

2) Morning temperature decreases, on the average, during the first five days after hatching.

3) Evening temperature tends to rise during these five days,

4) Mid-day temperature tends to fall more rapidly than morning temperature from the first to the fifth day.

5) There is no evidence to indicate that sex could be determined with anything like practical accuracy by observing body temperature of chicks when hatched.

6) On the evening of the third day after hatching there is a difference of about eight-tenths of a degree Fahrenheit between the mean temperature of males and females. On the morning of the fourth day the corresponding difference is half of one degree Fahrenheit.

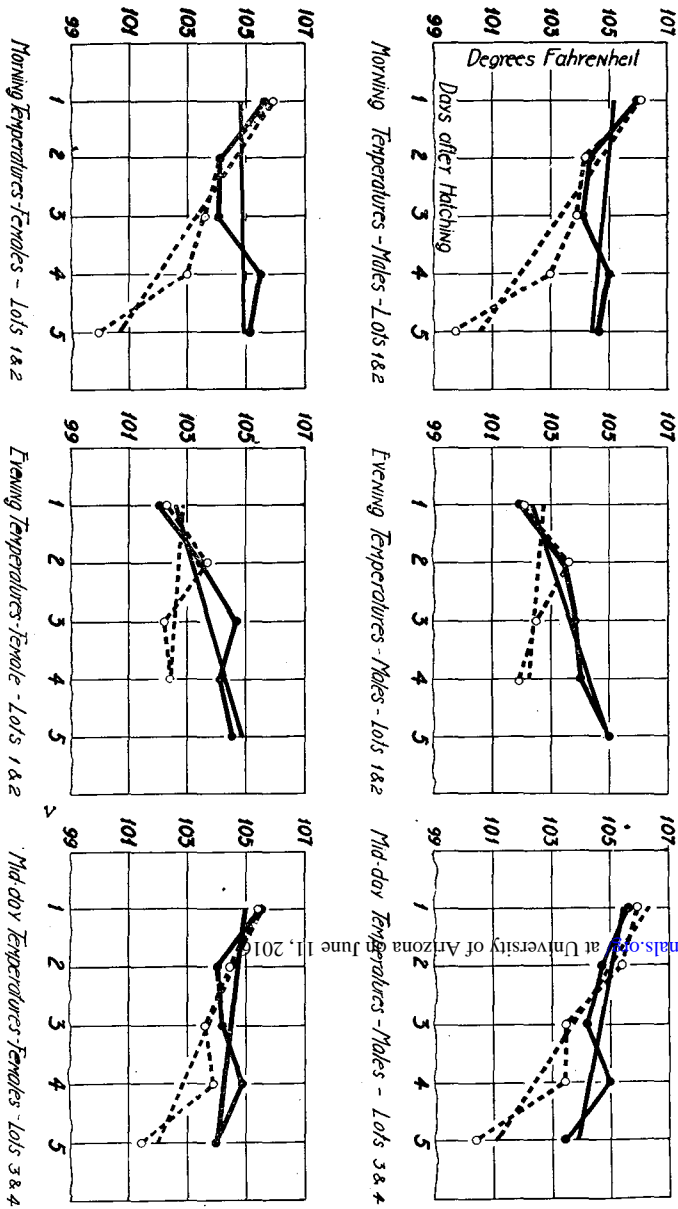
7) The morning temperature of chicks not given food or water for five days after hatching falls very rapidly thruout the period.

8) The evening temperature of chicks not given food or water begins to fall after the second day.

9) This would indicate that chicks should be given food (or water, or both food and water) before they are seventy-two hours old.

10) It would appear that a limit of seventy-two hours for the time of chicks in transit is entirely reasonable.

A summary of the foregoing material was presented at the annual meeting of the American Association of Instructors and Investigators in Poultry Husbandry held at Ithaca, New York, July, 1918.



BODY TEMPERATURE OF S.C. WHITE LEGHORN CHIX JUNE 1918
Observed Mean Temperatures & Filled straight lines. Solid lines-Chix fed grain 3, 4 & 5 days. Broken lines-Chix fed nothing.