

## Eating Behavior of Chicks to 4 Weeks of Age

Yasushi ASAHIDA\* and Ko MIMURA

*Department of Animal Husbandry, Faculty of Fisheries and  
Animal Husbandry, Hiroshima University, Fukuyama*

(Figs. 1-4; Tables 1-3)

In studies concerning the behavior of particular species, the behavior patterns present a problem in the successful care and management. Extensive investigations have been carried out on the behavior of domestic animals, particularly the findings about the behavior of chickens have been reviewed by GUHL and FISCHER (1969)<sup>1</sup>. Diurnal eating patterns of chickens have been studied by SIEGEL and GUHL (1956)<sup>2</sup> and SIEGEL *et al.* (1962)<sup>3</sup>. These research workers indicated that for chickens aging 4-15 weeks the average percentage of the eating time was highest at the beginning and at the end of the daily light period. Recently, WEAVER and SIEGEL (1968)<sup>4</sup> showed that the diurnal eating pattern of broiler chicks, 2 to 56-day old, was consistent too with those reported by SIEGEL and GUHL (1956)<sup>2</sup> and SIEGEL *et al.* (1962)<sup>3</sup>. Little precise information, however, is available on the eating behavior of chicks from hatching and onwards.

The present experiment was designed to observe the eating behavior of chicks in small groups from 3 days of age.

### EXPERIMENT

Three White Leghorn male chicks were used in the present experiment. The birds were reared from hatching to 4 weeks of age as a group in a thermostatically controlled electrically heated brooder using standard brooding procedures. They were fed a commercial mash ration from the second day after birth. Light was provided for 10 hours daily (7:00 a.m.—5:00 p.m.), during the night food was not available but water was accessible at all times. Feeding space allowance per chicks was about 20 linear centimeters.

The chicks were dyed to provide a specific identity for each individual. Observations were made for a 10-hour lighting period on two consecutive days at a week intervals beginning when the birds were 3 days old; the observation and recording of each birds eating at the feeder at 30-second intervals started as soon as the light were turned on and the feeder was attached to the brooder. This observation technique was on the basis of the results of WOOD-GUSH (1959)<sup>5</sup>, who used a time-lapse photography to study the diurnal behavior of small groups of adult chickens and found that a 22-second interval provided a greater accuracy

---

\* Present adress: Department of Animal Science, Faculty of Agriculture, Hokkaido University, Sapporo

than longer intervals between frames. But he suggested that in some types of investigation a 66-second interval might be more useful. A bird was considered to be eating when pecking at the food, also if the pecking had just ceased and was still swallowing food. The feeder was weighed every two hours to determine the amount of intake, those time spaces are hereafter called "period" of the day. On the first day of each week individual body weights were measured.

During the course of the experiment environmental disturbance was eliminated as much as possible.

The data were subjected to analysis of variance techniques by DUNCAN's multiple range test (1955)<sup>6</sup>.

## RESULTS AND DISCUSSION

The body weights for each bird at 0, 1, 2, 3 and 4 weeks of age are presented in Table 1. The chick B grew more slowly than the others after 3 weeks of age

Table 1. Changes of body weight for individual chicks.

Age		Body weight (g)		
(weeks)	(days)	Chick A	Chick B	Chick C
0	3	43	42	40
1	10	72	74	75
2	17	150	133	144
3	24	223	185	220
4	31	326	220	315

indicating no similarity in the growth pattern. They grew, however, normally throughout the experiment.

The mean time spent daily in eating and the number of eating times are shown on Figure 1. The daily time spent in eating is shorter for chicks at 3 days of age than that for chicks 4 days old; the values obtained between 10 and 32 days of age were highest. Thus, between 10 and 32 days of age chicks used 50—60% of a 10-hour day eating, while those at 3 and 4 days of age used only 33% and 42%, respectively.

WEAVER and SIEGEL (1968)<sup>4</sup> indicated that for the first 35 days of life the percentage of chicks eating rate was maintained at a fairly constant level within each light environment, but declined thereafter. On the basis of these results, WEAVER and SIEGEL suggested that older birds needed less time than chicks of younger ages to satisfy their total food requirements. Thus, the importance of adequate feeding space during early ages should be stressed.

JENSEN *et al.* (1962)<sup>7</sup> reported that 21 to 28 days old New Hampshire chicks which were fed mash used 14.3% of a 12-hour day eating when kept in individual pens, yet the values obtained in the present experiment were much higher

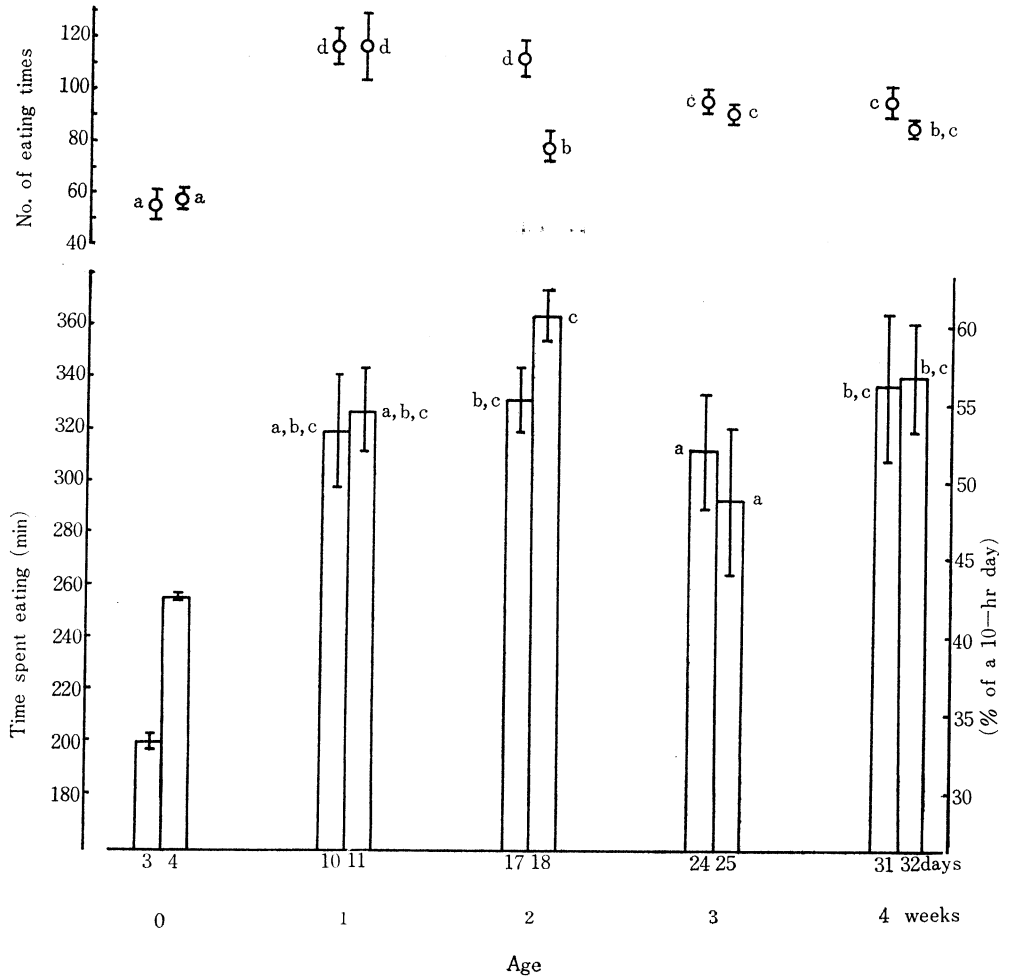


Figure 1. Mean daily time spent eating and number of eating times of 3 chicks. Vertical lines indicate standard errors. Means without a common letter are significantly different ( $P < 0.05$ ).

to the percentages given above.

The differences was probably due to differences of breeds, observation techniques, lighting regimes and number of companions. In the present experiment the chicks were observed at 30-second intervals whereas in the experiment carried out by JENSEN *et al.* measurements were made continuously by means of a stop watch.

It has been shown experimentally that some behaviors, such as the eating one, are enhanced by the presence of other chickens. This phenomenon has been termed social facilitation. TOLMAN and WILSON (1965)<sup>8)</sup> pointed out, in their discussion of the experiments related to the eating of individual chicks in groups, that increased number of like-deprived companions did not increase the amount of social facilitation. If this is true, it is conceivable that social facilitation was very minimal in the

present experiment, because after 14 hours of food deprivation the chicks all ate together at 7:00 a.m. However, further studies concerning the "allelomimetic feeding" in the chicks as suggested by HUGHES (1971)<sup>9</sup> will certainly help solve this problem.

Between 3 and 32 days of age the chicks ate during 34—123 times each 10-hour day. The mean values for the 10, 11 and 17-day old chicks were 100.7, 100.7 and 104.0 times which are greater than that of 18, 24, 25, 31 and 32-day old chicks (69.3, 86.7, 83.3, 87.7 and 78.0 times). At 3 and 4 days of age the lowest mean values observed were 44.0 and 46.3 times.

The daily mean rate of eating, calculated as gram food per minute, is given in Table 2, from this it can be seen that the rate of eating increased with the advance of age in weeks.

Table 2. Average rate of eating by ages.

Age		Amount of intake	Time spent eating	Rate of eating
(weeks)	(days)	(g/10-hr day/3 chicks)	(min/10-hr day/3 chicks)	(g/min)
0	3	17.6	596.5	0.029
	4	20.9	764.5	0.027
1	10	41.2	958.5	0.043
	11	43.8	981.0	0.045
2	17	60.2	995.5	0.060
	18	69.4	1,092.5	0.064
3	24	92.8	936.0	0.099
	25	93.4	880.5	0.106
4	31	128.2	1,013.0	0.127
	32	126.1	1,024.0	0.123

Figure 2 illustrates the distribution of the mean eating activity of three chicks throughout the course of the 10-hour day. The values are shown as the number of 30-second interval observations at which the chicks were eating, expressed as a percentage of the total number of observations in each period of day. Considerable differences existed among ages for the eating activity. Chicks showed greater activity in periods 1 and 5 (7:00 a.m.—9:00 a.m. and 3:00 p.m.—5:00 p.m.), just after the lights came on and just before they were turned off, while the activity was lower during period 3 (11:00 a.m.—1:00 p.m.). Differences between periods 1 and 5 were not significant in 3 of the 5 weeks. At the zero and 2 weeks of age, however, activity was significantly greater during period 5 than during period 1. No reasons for this age-periods of day interaction are offered at this time. Values for periods 2 and 4 (9:00 a.m.—11:00 a.m. and 1:00 p.m.—3:00 p.m.) were generally intermediate to those for periods 1 and 5 and period 3. This diurnal

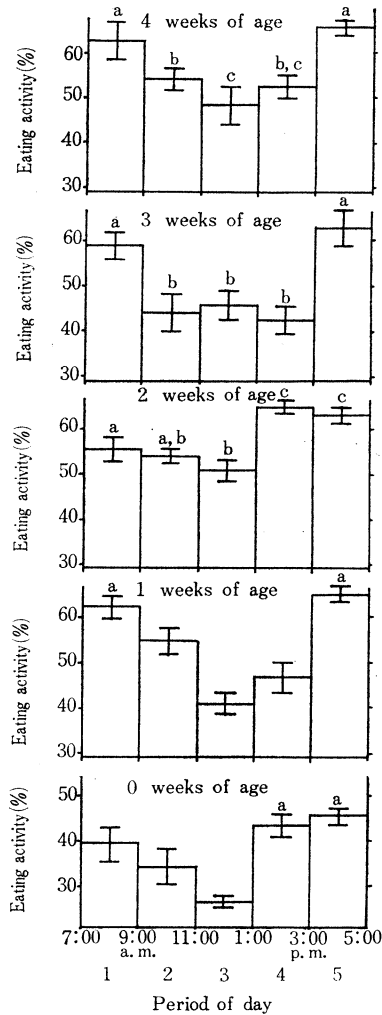


Figure 2. Mean eating activity of 3 chicks per period by ages. Vertical lines indicate standard errors. Means within the same age and without a common letter are significantly different ( $P < 0.05$ ).

rhythm in eating activity was consistent with that of SIEGEL and GUHL (1956)<sup>2</sup>, and SIEGEL *et al.* (1962)<sup>3</sup> and WEAVER and SIEGEL (1968)<sup>4</sup>.

A diurnal rhythm in the food intake is also noted (Figure 3). Food intake according to the periods of the day followed an overall pattern similar to the respective eating activities as shown on Figure 2. An important deviation, however, was observed during the period 5 of food intake observations at the age of 3 and 4 weeks: although periods 1 and 5 showed a greater activity in eating and the differences between 1 and 5 were not significant in any of the 2 comparisons made at 3 to 4 weeks of age. The amount of food intake at the same ages was consistently greater during period 5 than during period 1. These differences in the

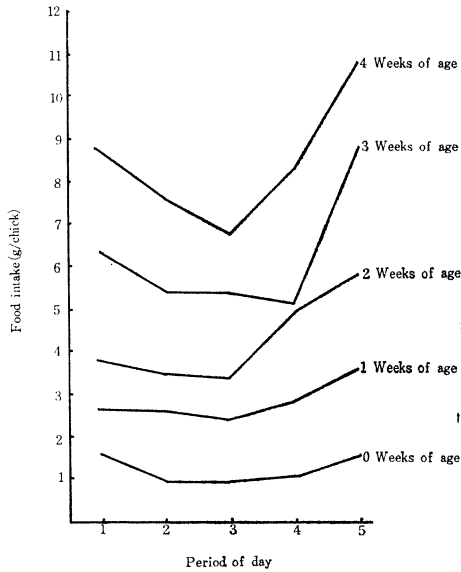


Figure 3. Mean food intake per chick per period by ages.

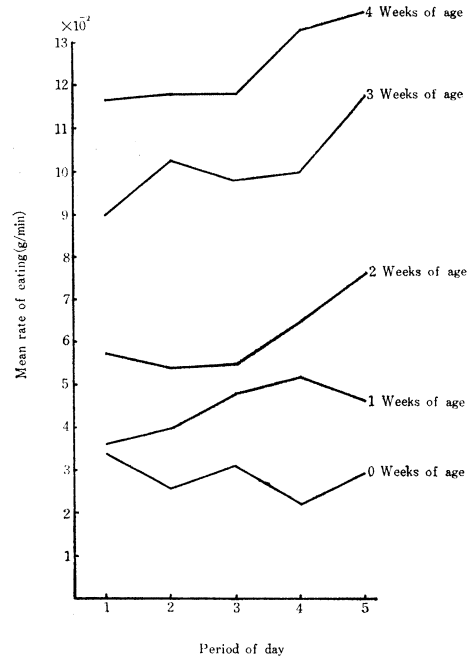


Figure 4. Mean rate of eating of 3 chicks per period by ages.

amount of food intake were reflected in the results for the rate of eating in the daily periods (Figure 4).

The rate of eating during every period of 10-hour day is shown on Figure 4. This rate which provides information on the variability encountered within the 10-hour day at every week of age. However, it is apparent that the older the chicks are, the higher the rate of eating is in the late afternoon.

Significant differences between the chicks in the average time spent in eating were found after 1 week of age, as shown in Table 3. It is of interest to note that after 2 weeks of age, the heavier the chicks are, the less the time they spent eating (Tables 1 and 3).

Table 3. Average time spent eating for individual chicks by ages.

Age		Average time spent eating (min/10-hr day)		
(weeks)	(days)	Chick A	Chick B	Chick C
0	3, 4	227.5 <sup>a</sup>	223.8 <sup>a</sup>	229.2 <sup>a</sup>
1	10, 11	339.5 <sup>a</sup>	344.5 <sup>a</sup>	285.7
2	17, 18	336.0 <sup>a</sup>	371.8	336.2 <sup>a</sup>
3	24, 25	279.2 <sup>a</sup>	354.0	275.1 <sup>a</sup>
4	31, 32	294.0	378.8	345.8

Means within a row and without a common superscript are significantly different ( $P < 0.05$ ).

Since the peck order is the basis of all social behavior in chickens, its effect on the individual has been reported by several research workers (WOOD-GUSH, 1955)<sup>10</sup>. High ranking chickens take priority for food and for greater freedom in the pen. Amongst small groups of female chicks a peck order is formed by the tenth week, while male chicks form one by the eighth week (GUHL, 1953<sup>11</sup>). SIEGEL and GUHL (1956)<sup>2</sup> have observed that by the time the cockerels were 14 weeks of age, avoidance was a prevailing social behavior pattern. Although no effort was made to determine a peck order in the present experiment, an individuality of time spent eating may be correlated partially to the establishment of a peck order.

### SUMMARY

1. A group of 3 chicks were reared from 0 to 4 weeks of age in a brooder with food available *ad libitum* and their eating behavior during 10-hour days was observed.

2. Between 10 and 32 days of age chicks used 50—60% of a 10-hour day eating, while those at 3 and 4 days of age did use only 33% and 42%, respectively. The daily mean rate of eating, expressed as gram food per minute, increased with the progress of age in weeks.

3. The diurnal rhythm in the eating activity agreed with the previous reports. The food intake followed an overall pattern similar to their respective eating activities.

4. The older the chicks, the higher the rate of eating attained in the late afternoon.

5. After 2 weeks of age, the heavier the chicks, the lesser the time spent for eating.

The present experiments were carried out at the Hiroshima University. The competent technical assistance of Mr. F. YAMANE is gratefully acknowledged.

### REFERENCES

- 1) GUHL, A. M. & FISCHER, G. L.: in "The Behavior of Domestic Animals" (HAFEZ, E. S. E. ed.), 2nd ed., pp. 515-553, Baillière, Tindall & Cassel, London (1969).
- 2) SIEGEL, P. B. & GUHL, A. M.: *Poult. Sci.*, **35**, 1340-1345 (1956).
- 3) SIEGEL, P. B., BEANE, W. L. & KRAMER, C. Y.: *ibid.*, **41**, 1419-1422 (1962).
- 4) WEAVER, W. D. Jr. & SIEGEL, P. B.: *ibid.*, **47**, 1148-1154 (1968).
- 5) WOOD-GUSH, D. G. M.: *Physiol. Zool.*, **32**, 272-283 (1959).
- 6) DUNCAN, D. B.: *Biometrics*, **11**, 1-42 (1955).
- 7) JENSEN, L. S., MERRILL, L. H., REDDY, C. V. & MCGINNIS, J.: *Poult. Sci.*, **41**, 1414-1419 (1962).
- 8) TOLMAN, C. W. & WILSON, G. F.: *Anim. Behav.*, **13**, 134-142 (1965).
- 9) HUGHES, B. O.: *Brit. Poult. Sci.*, **12**, 359-366 (1971).
- 10) WOOD-GUSH, D. G. M.: *Brit. J. Anim. Behav.*, **3**, 81-110 (1955).
- 11) GUHL, A. M.: *Tech. Bull. Kans. Agric. exp. Sta.*, No. 73, pp. 48. (1953) cited by WOOD-GUSH (1955)<sup>10</sup>.

## 鶏の幼雛期における採食行動について

朝日田康司・三村 耕

鶏の採食行動は、自らの生理的条件のほか、照明時間および照度・飼料の形状や質・飼槽の大小・つづきの順位・社会的促進などによって大きく影響を受けることは知られている。しかし、幼雛については必ずしも明らかにされていない。そこで、1群3羽の白色レグホーン種雄雛を用いて、餌つけ後2日（3日齢）から4週齢まで採食行動その他を検討した。雛は1日10時間（7:00 a.m.—5:00 p.m.）照明を与え、この間に自由採食させた。各週齢において連続2日間、1羽ごとの採食行動を30秒間隔で観察し、併せて飼料消費量を記録した。

1) 採食に費した時間を、10時間の百分率でみると、3日齢33%、4日齢42%で10日齢以降では50~60%であった。すなわち、餌つけ後ほぼ1週間に、採食に費す時間は急激に増えて、その後3週間はほぼ一定となる。しかし採食速度（毎分採食量、 $g$ ）は週齢につれて明らかに増えることが認められた。

2) 雛は、日齢に関係なく、点灯直後と消灯直前に最も活発な採食活動を行ない、文献の成績と一致した。しかし、採食速度は、週齢につれて午後に増大する傾向が認められた。

3) 2週齢以降において、採食活動の少ない雛の方が体重が大きかった。つづきの順位との関連があるのかもしれない。