Relationship of Initial Chick Weight to Body Weight of Egg-Type Pullets

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ABSTRACT In an attempt to determine whether initial chick weight affected body weight of commercial egg-type pullets just before the onset of egg production, two experiments were conducted. Results showed that initial chick weight (1 day of age) influenced average body weight of commercial egg-type pullets both at 12 and 18 weeks of age.

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INTRODUCTION

There are indications that the commercial egg industry in the southern United States has a problem with the spring-hatched, summer-reared groups of pullets in attaining sufficient pullet body weight at the onset of production for maximum egg production during the laying period (McNaughton *et al.*, 1977). Creger (1974) noted that for each strain of commercial egg-type pullet, a certain weight range is necessary if laying performance is to be optimum.

McNaughton *et al.* (1977) noted that 12-week body weight influenced 20-week body weight of egg-type pullets when the pullets were reared from 12 to 20 weeks of age under summer temperature conditions. If the pullets had reduced body weights at 12 weeks of age and then were reared after 12 weeks of age under summer temperature conditions, the pullets would have reduced body weights at the onset of egg production.

The objective of this study was to determine if a difference in initial chick weight was still evident in 18-week body weight of pullets.

EXPERIMENTAL PROCEDURE

In Experiment 1, hatching eggs were obtained from one commercial strain of egg breeder flock that was 43 weeks of age. The eggs were commercially sized, hatched on July 13, 1976, and chicks were obtained from two egg-weight groups. The two egg-weight groups were 45 to 54 g and 57 to 64 g.

In Experiment 2, chicks hatched on May 30, 1977, were obtained from one commercial strain of egg breeder flock that was 40 weeks of age. These chicks were sorted into two weight groups at the hatchery immediately after hatching. The two weight groups were 34 to 37 g and 40 to 45 g. The commercial strain used in Experiment 2 was not the same as that used in Experiment 1.

All chicks were vaccinated for Marek's disease, gumboro, bronchitis, Newcastle disease, fowl pox, and avian encephalitis in accordance with normal vaccinating procedures. In Experiment 1, both chick weight groups were reared from 1 day of age in cages and litter floor pens. Cages were 51 × 122 × 35 cm high, and floor pens were 1.5 × 3.66 m. Twenty pullets were started in each cage, and 60 pullets were started in the litter floor pens. The litter was new pine shavings. In Experiment 2, both weight groups were reared in cages. In Experiment 1, the chicks were wing-banded for identification and intermingled and reared; both egg-weight groups were represented in each pen or cage. In Experiment 2, the two chick-weight groups were not intermingled.

The diets fed were standard type containing approximately 20% protein with a metabolizable energy level of 3012 kcal/kg of feed from 0 to 12 weeks of age. From 12 to 18 weeks of age, the pullets received a standard diet containing approximately 14% protein with a metabolizable energy level of 2921 kcal/kg of feed.

The pullets were brooded and reared in a light/temperature controlled-environment house described by Reece *et al.* (1969). The house temperature was maintained at 32.2 C for the first week, 29.4 C for the second week, 26.7 C for the third week, and 23.9 C for

TABLE 1. *Effect of initial chick weight on body weight of commercial egg-type pullets reared in cages (Experiments 1 and 2) and in litter floor pens (Experiment 1)*

Average chick weight (1 day, g)	Average 12-week weight (g)	Average 18-week weight (g)
	Reared in cages (Experiment 1)	
32.2[a]	911[a]	1214[a]
35.2[b]	936[a]	1240[a]
	Reared in litter floor pens (Experiment 1)	
32.2[a]	875[a]	1132[a]
35.2[b]	925[b]	1184[b]
	Reared in cages (Experiment 2)	
35.7[a]	913[a]	1105[a]
42.6[b]	957[b]	1150[b]

[a,b]Differing letters denote significance at the .05 level of probability for each column and within each rearing condition.

the fourth to the 12th week for both experiments. For the 12th to the 18th week, in Experiment 1 the temperature was 23.9 C. In Experiment 2, a 24-hr linear temperature cycle ranged from 24 to 35 to 24 C for the 12- to 18-week period, which simulated a summer temperature regime that is prevalent in the southeastern United States (Reece *et al.*, 1969). Lighting was continuous for the first 5 days at an intensity of approximately 20 lux. From 6 days to 18 weeks of age, 9 hr of continuous light were supplied each 24-hr period at an intensity of approximately 8 lux.

For the cage-reared group in Experiment 1, 72 and 84 chicks were started in 12 replicates for chicks hatched from eggs weighing 45 to 54 g and 57 to 64 g, respectively. For the floor-reared group in Experiment 1, 60 chicks from each egg-weight classification were started in 3 replicates. In an effort to obtain the desired cage or floor-pen density in Experiment 1, pullets of the same age but from a different breeder flock were used and considered as blanks.

In Experiment 2, 20 pullets were used in each of 12 replicates for each of the two

TABLE 2. *Weight range percentile of 18-week-old commercial egg-type pullets as related to initial chick weight*

Weight range (g)	Percentage of population					
	Initial chick weight (Experiment 1, cage)		Initial chick weight (Experiment 1, litter floor pen)		Initial chick weight (Experiment 2, cage)	
	(32.2 g)	(35.2 g)	(32.2 g)	(35.2 g)	(35.7 g)	(42.6 g)
850 – 889	0	0	2.0	1.6	.4	0
890 – 929	0	0	6.1	0	3.0	1.3
930 – 969	2.4	1.8	6.1	3.3	3.4	1.3
970 – 1009	2.4	0	4.2	6.6	6.9	4.2
1010 – 1049	7.1	7.0	4.2	4.9	13.7	6.3
1050 – 1089	7.1	3.5	18.4	14.8	18.5	15.2
1090 – 1129	11.9	7.0	14.3	9.8	13.7	10.5
1130 – 1169	4.8	10.5	6.1	1.6	15.5	19.4
1170 – 1209	19.0	12.3	10.2	13.1	9.9	17.7
1210 – 1249	7.1	12.3	6.1	11.5	6.0	9.7
1250 – 1289	11.9	5.3	6.1	6.6	3.9	6.8
1290 – 1329	7.1	14.0	6.1	9.8	2.6	3.3
1330 – 1369	4.8	5.3	6.1	6.6	2.1	2.6
1370 – 1409	4.8	12.3	2.0	4.9	0	.8
1410 – 1449	2.4	0	2.0	3.3	.4	0
1450 – 1489	2.4	7.0	0	0	0	.4
1490 – 1529	2.4	1.8	0	0	0	0
1530 – 1569	2.4	0	0	1.6	0	.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

chick-weight classifications. A total of 480 pullets was used in Experiment 2.

The analysis of variance was used to analyze the data (Steel and Torrie, 1960).

RESULTS AND DISCUSSION

In Experiment 1, chicks hatched from eggs weighing 45 to 54 g and 57 to 64 g weighed an average of 32.2 and 35.2 g, respectively, at 1 day of age (Table 1). In both the cage-reared and floor-reared groups (Table 1), chicks weighing 32.2 g at 1 day of age weighed less at both 12 and 18 weeks than chicks weighing 35.2 g at 1 day of age. The difference at 12 and 18 weeks of age was not significant at the .05 level of probability for the cage-reared group in Experiment 1.

In Experiment 2, chicks weighing 35.7 g at 1 day weighed significantly less at 12 and 18 weeks of age than chicks weighing 42.6 g at 1 day of age (Table 1). Mortality to 18 weeks of age was 2.5% for chicks weighing 35.7 g at 1 day and 2.9% for chicks weighing 42.6 g at 1 day of age. The variation in 18-week body weight for each initial chick-weight group for the two experiments is given in Table 2. The median weight for the total population was 1210 g when the grouping was made in 40-g increments between the 850- and 1569-g range. For Experiment 1, 54.7% of the cage-reared pullets with an initial chick weight of 32.2 g and 42.1% of those with an initial chick weight of 35.2 g weighed less than 1210 g at 18 weeks.

In Experiment 1, 71.6% of the floor-reared pullets with an initial chick weight of 32.2 g and 55.7% of those with an initial chick weight of 32.2 g weighed less than 1210 g at 18 weeks of age. In Experiment 2, at 18 weeks of age, 85% of the pullets with an initial chick weight of 35.7 g and 75.9% of those with an initial chick weight of 42.6 weighed less than 1210 g.

The data in Table 2 show the considerable variation in 18-week body weight of egg-type pullets, regardless of initial chick weight. The frequency distribution data (Table 2) show a shift in the weight range classifications due to initial chick weight great enough to produce the average 18-week body weight differences given in Table 1.

The effect of initial chick weight on growth rate of broilers has been documented by O'Neil (1955), Goodwin (1961), Gardiner (1973), and McNaughton *et al.* (1978). The growing time of the meat-type bird is considerably less than that of the small-type bird bred specifically to lay eggs.

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