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SEPTEMBER 2007

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## ***HATCHERY/BREEDER TIP . . .***

### **PREDICTING CHICK QUALITY: WHICH IS BEST - CHICK LENGTH OR HATCH DAY BODY WEIGHT?**

Measuring chick quality has been a difficult issue since the beginning of the poultry industry. There have been many attempts over the decades to evaluate chick quality in the hatchery to predict future performance in the broiler house. One can examine chicks in the hatchery and enumerate conditions such as the incidences of red hocks, open navels, string navels, and other abnormalities. In most circumstances, the percentage of these obviously poor quality chicks is so low that it is difficult to predict how the majority of the chicks will perform as a flock after placement on the farm. There have been attempts to calculate a chick quality index using these variables, but the process was cumbersome and, in many cases, did not accurately predict future broiler performance.

In recent years with intense genetic pressure to improve breast meat yield, there has been an increased incidence of embryos stressed by the failure of incubators to remove excess heat, carbon dioxide, and moisture surrounding the older embryos. Further measurements to assess chick quality were developed, such as taking rectal temperatures of newly hatched chicks. Still, the best measure of chick quality remained the evaluation of chick mortality at one or two weeks of age. Unfortunately, this information is delayed and does not give a quality assessment in the hatchery. Recently, chick length and body weight on hatch day have both been suggested as predictors of broiler performance, and used to assess chick quality in the hatchery. Those who favor chick length say that body weight is not an accurate predictor because of the variability in the weight of the absorbed yolk in the newly hatched chick. Some chicks have as little as 2 g of yolk while others can have as much as 8 g. Those favoring body weight measurements say that measuring chick length is cumbersome; resulting in variation between observers. It has been suggested that longer chicks may be the result of excess heat during the later stages of incubation and that longer chicks do not necessarily result in better quality chicks. Other proponents of hatch day body weight argue that chick length and body weight are highly correlated, and it is easier to measure body weight. The objective of this project was to compare these two methods by measuring individual hatch day body weights and chick lengths and following these chicks through broiler grow out to six weeks of age.

#### **Methods**

Hatching eggs were obtained from a 38 week old breeder flock (Ross male X Ross 708 female) and incubated in the UGA research hatchery. At hatch, 410 chicks were banded, weighed, and measured for length. Length was measured by laying the chick over the ruler and measuring from tip of beak to the longest toe, minus the toenail. They were placed together in an environmentally controlled floor pen and received standard broiler starter and grower diets until six weeks of age. Individual body weights were measured again

at 1, 2, 3, and 6 weeks of age. Chick length has a reputation as being a measurement which can vary between observers and the same person should measure all the chicks so that observer effect does not increase variation. To test this theory, two students each separately measured all chicks for length. All data were analyzed by analysis of variance.

## Results

The effect of measuring chick length by the two observers yielded a small and insignificant difference between observers (slightly more than a 0.2 centimeter difference). The two students' chick length measurements were highly correlated ( $p < 0.001$ ) with a correlation coefficient of 0.77. Therefore, the average of the two observers was used as the chick length for analysis. Nearly all the measurements fell between 17.0 and 20.3 centimeters. There were four chicks that were less than 17.0 centimeters, three of which died. For our study we placed the chick lengths into three groups (17, 18, and 19 cm). A majority of the chicks fell into the body weight range between 38.0 and 53.3 grams. These were divided into three body weight groups (small, medium, and large) for analysis. Averages for the three length and the three body weight groups are presented in Table 1.

**TABLE 1. Chick length & body weight average.**

Chick Length Group	Chick Length Avg (cm)	Body Weight Group	Body Weight Avg (g)
17	17.7	Small	39
18	18.5	Medium	44
19	19.2	Large	49

For the first two weeks after placement chick length in the hatchery was a good predictor of broiler performance based on body weight. However, starting in week 3 the significant differences in body weight began to disappear (Table 2). On Day 21 the longest chick length (19) was not significantly different from the medium length group (18). By Day 42 there were no significant body weight differences between any of the three chick length groups. Note that even though the differences were not significant on Day 42, the longest chicks maintained the heaviest body weight and the shortest group maintained the lowest body weight. It is possible that if the chicks had been sorted by gender at hatch, the differences in body weight between the three length groups may have maintained significant differences through grow out.

**Table 2. Body weight at Day 0, 7, 14, 21, & 42 by chick length at hatch.**

Length Group (cm)	Body Weight (g)				
	Day 0	Day 7	Day 14	Day 21	Day 42
17	43 <sup>a</sup>	125 <sup>a</sup>	373 <sup>a</sup>	625 <sup>a</sup>	2328 <sup>a</sup>
18	44 <sup>b</sup>	134 <sup>b</sup>	402 <sup>b</sup>	665 <sup>b</sup>	2431 <sup>a</sup>
19	47 <sup>c</sup>	148 <sup>c</sup>	434 <sup>c</sup>	722 <sup>b</sup>	2481 <sup>a</sup>

Means within a column with a common superscript do not differ significantly ( $p < .05$ ); Duncan's multiple range test

An analysis of Day 0 body weight as a predictor of broiler performance yielded results similar to the chick length analysis. Although the large Day 0 birds were significantly different from the small group all the way to Day 42, the small and medium groups lost their significant differences by Day 21. The medium and large groups were not significantly different at 7 and 14 days, but were significantly different at Day 42 (Table 3). Similar to the chick length analysis, the small, medium, and large groups maintained their numerical differences through grow out, but the significance of the differences started to fade much earlier in the small and medium groups. Again, gender sorting may have taken out enough variation that the groups may have

been significantly different from each other.

**TABLE 3. Body weights at day 0, 7, 14, 21 & 42 by day 0 body weights (small, medium and large).**

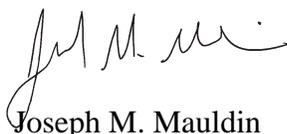
Day 0 Body Weight Group	Body Weight (g)				
	Day 0	Day 7	Day 14	Day 21	Day 42
Small	39 <sup>a</sup>	125 <sup>a</sup>	380 <sup>a</sup>	639 <sup>a</sup>	2332 <sup>a</sup>
Medium	44 <sup>b</sup>	136 <sup>b</sup>	401 <sup>b</sup>	663 <sup>a</sup>	2423 <sup>a</sup>
Large	49 <sup>c</sup>	139 <sup>b</sup>	411 <sup>b</sup>	690 <sup>b</sup>	2469 <sup>b</sup>

Means within a column with a common superscript do not differ significantly ( $p < .05$ ); Duncan's multiple range test.

In this study, the body weight gain was measured on days 7, 14, 21, and 42 (data not shown). Chick length measurements appeared to be a slightly better predictor of body weight gain. Differences in weight gain began to lose significance by Day 21 whereas the Day 0 body weight groups began to lose significance by day 14.

### Summary

Looking at the data in this study, it should be concluded that both hatch day chick length and body weight are fair predictors of future broiler performance. A slight edge should be given to chick length since the length groups maintained significant differences longer into the study than did the Day 0 weight groups. The weakness of this study is that we did not compare gender growth rate differences. Another study is planned to compare broiler performance by chick length and body weight groups at hatch after sexing. The lack of an observer effect between the two students in measuring chick length was also an important finding. It appears that consistent training of observers may overcome observer effects noted in other studies.



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\*\*Consult with your poultry company representative before making management changes\*\*

“Your local County Extension Agent is a source of more information on this subject.”