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Relations Between Day-old Chick Length and Body Weight in Broiler, Quail and Layer

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Abstract: This study was made to investigate the relations between day old chick length and body weight in broiler, quail and layer chicks. Day old chicks in all kind of poultry were assessed based on length as short, middle and long by measuring the length of stretched chick from the tip of the beak to tip of the middle toe using a ruler. Then, they were weighed. There was a significant positive correlation between the day old chick length and body weight in all groups in broiler and quail chicks. The body weight and chick length uniformity in long groups in all poultry was better than the short groups. In a conclusion, measuring body length may be a useful tool to estimate growth potential rather than using hatch body weight.

Key Words: Broiler, quail, layer, chick quality, chick length, body weight.

Günlük Yaştaki Broyler, Bıldırcın ve Yumurta Tavuğu Civcivlerinde Canlı Ağırlık ve Beden Uzunluğu Arası İlişkiler

Özet: Bu çalışma günlük yaştaki broyler, bıldıcın ve yumurta tavuğu civcivlerinde canlı ağırlk ve beden uzunluğu arasındaki ilişkileri araştırmak amacı ile yapılmıştır. Günlük yaştaki civcivler beden uzunluklarına göre kısa, orta ve uzun olarak üç gruba ayrılmış, canlı ağırlıkları belirlenmiştir. Beden uzunluğu yatay bir düzlem üzerine uzunlamasına yatırılan civcivin gaga ucundan orta parmak ucuna kadar bir cetvel ile ölçülerek belirlenmiştir. Broyler ve bıldırcın civcivlerinde bütün gruplarda beden uzunluğu ve canlı ağırlık arasında önemli düzeyde pozitif bir korelasyon saptanmış, canlı ağırlık ve beden uzunluğu yönünden bir örneklik uzun gruplarda daha yüksek bulunmuştur. Çalışmada günlük yaştaki civcivlerde canlı ağırlık yerine beden uzunluğunun büyüme potansiyelini belirleme amacı ile kullanılabileceği sonucuna ulaşılmıştır.

Anahtar Kelimeler: Broyler, bıldırcın, yumurta tavuğu, civciv kalitesi, beden uzunluğu, canlı ağırlık.

Introduction

Previous experience and research demonstrated that the quality of the day-old chick has a big influence on the growth and final growth performance of the poultry[5,15]. There are lots of parameters for measuring or describing chick quality. Visual score, Tona or Pascar score and day-old chick weight are commonly used for measuring chick quality[2,6,13]. Usually chick weight is used as an indicator for chick quality. Although this is an easy and highly objective measurement, the value is relative. Day old chick weight is highly correlated with egg weight, but does not give a good indication for chick development. Joseph et al.[4] reported that hatch weight differences are largely explained by variations in residual yolk mass. Chick length was recently suggested as a measure to control chick quality and predict bird performance[3]. But

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there are limited findings about the chick length, especially in laying hens and quail. This study was planned to investigate relations among the day old chick length and body weight in broiler, quail and layer.

Material and Methods

The experimental procedures employed in this study were in accordance with the principles and guidelines set out by the Committee of Faculty of Veterinary Medicine on Animal Care, in Bursa, in Turkey. 400 day old male broiler chicks (Ross PM3), 315 day-old mixed-sex quail chicks (Coturnix coturnix Pharaoh) and 120 day-old female layer chicks (Lohman LSL) were assessed based on chick length as short, middle and long. Then, chicks in each group of poultry were weighed, individually. Chick length was taken by measuring the length of stretched chick from the tip of the beak to tip of the middle toe using a ruler and recorded in centimeters (cm). Chicks length groups and their measurement interval in each kind of bird are presented in table I.

Table I. Length intervals (cm) in short, middle and long chick groups in each kind of poultry.

Groups	Broiler chick	Layer chick	Quail chick
Short	< 18.0	<17.8	<11.6
Middle	18.0-18.3	17.8-18.2	11.6-11.9
Long	18.3<	18.2<	11.9<

Day old chick uniformity is expressed as the percentage of chicks whose weight fall within 10% of the flock's average weight and the percentage of chick length that falls within 3% of the average chick length. Correlation coefficient is calculated between chick length and body weight at hatching day[11]. All tests were performed in SPSS® computer software 13.00[12].

Results

Mean day-old chick length in the groups in layer, broiler and quail are presented in table II. There was a significant difference for the chick length in all groups in all kind of poultry.

The mean day-old body weights in the length groups for each kind of poultry are shown in table III. It was found that a significant differences for day old body weight in broiler and quail ($P<0.001$, $P<0.001$), except for layer chicks. Length of long chicks in all kind of poultry had the greatest hatch weight, whereas short chicks had the lowest hatch weight.

Table II. Day-old chick length in layer, broiler and quail (cm).

Groups	Layer	Broiler	Quail
Short	17.41 ± 0.04^{c}	17.28 ± 0.03^{c}	11.25 ± 0.27^{c}
Middle	18.02 ± 0.02^{b}	18.16 ± 0.04^{b}	11.76 ± 1.21^{b}
Long	18.53 ± 0.03^{a}	18.72 ± 0.04^{a}	12.22 ± 1.95^{a}
Significance	*0.001*	*0.001*	*0.001*

a-c within columns, values with different superscript differ significantly

Table III. Day-old chick body weight in different kind of poultry (g).

Groups	Layer	Broiler	Quail
Short	32.43 ± 0.39	47.31 ± 0.27^{c}	6.96 ± 0.65^{c}
Middle	33.06 ± 0.34	49.15 ± 0.40^{b}	7.38 ± 0.66^{b}
Long	34.20 ± 0.27	50.71 ± 0.44^{a}	7.86 ± 0.55^{a}
Significance	0.350	0.001	0.001

a-c within columns, values with different superscript differ significantly

Day-old body weight (BW) and chick length (CL) uniformity in the length groups in layer, broiler and quail groups are presented in table IV. There were significant differences for CL uniformity in broiler and BW uniformity in quail. In general, long length groups in all poultry had the greatest uniformity as a statistically or numeric. The uniformity percentages in all groups in layer were 100%.

Table IV. Body Weight (BW) and Chick Length (CL) uniformity in the groups (%).

	Layer		Broiler		Quail	
Groups	BW	CL	BW	CL	BW	CL
Short	87.50	100.00	86.19	85.71^{c}	75.23^{c}	95.24
Middle	87.50	100.00	91.90	100.00^{a}	85.71^{ab}	100.00
Long	92.50	100.00	92.38	96.66^{b}	90.47^{a}	97.14
Significance	n.s	n.s	n.s	0.001	0.009	n.s

a-c within columns, values with different superscript differ significantly
n.s : no significant

Correlation coefficient for day old chick length and body weight in broiler, quail and layer are presented in table V. Day-old chick

length in short, middle and long groups in broiler and quail were correlated with day-old body weight, significantly. There were no significant positive correlations between the day old chick length and body weight in the layers.

Table V. Correlation coefficients for day old chick length and body weight in the groups.

Groups	Layer	Broiler	Quail
Short	0.076	0.304**	0.292**
Middle	0.110	0.174*	0.340**
Long	0.017	0.245**	0.212*

*P<0.05, **P<0.01

Discussion

Day old chick vitality combined with high uniformity in a hatch of day old chicks is a prerequisite to optimum farm management and achieving the lowest possible feed conversion. The poor quality chicks, combined with poor management, will result in unacceptable variations in bird size and their performance. Uniformity based on chick weight may be used to predict mortality in the first week. Good uniformity makes it possible to manage the flock to a greater body weight, a lowest mortality and feed conversion. Current industry standards dictate that to achieve good uniformity, 80-85% of birds must fall within 10% of the average flock weight and 3% of the average chick length per flock[1]. In this study, all groups in all kind of poultry in day old-age have an excellent uniformity with having a 85% of birds fall within 10% of the average chick weight or 3% of the average chick length[10]. Only, body weight uniformity in short groups in quail was found to be lower than excellent or good uniformity value (80-85%). In general, the body weight uniformity in long group in all birds was better than the short groups. We found that there are significant positive correlations between the day-old body weight and chick length in quail and broiler chicks. Positive correlation coefficient between the day old body weight and chick length in layer chicks was numeric. These results were found similar with the finding of Molenaar[7], Molenear et al.[8], Msoffe et al.[9], and Wolanski et al.[12] who reported that a positive correlation between chick length at day 0 and chick weight at day 7.

As a conclusion; chick length uniformity in each group was found greater than body weight uniformity. In layer chicks group, chick length uniformity was 100%. And also, correlation coefficients between body weight and chick length were positive. Chick length may be an indicator for chick quality and potential growth because of longer chick would have better uniformity and might have better developed organs. Therefore, at hatch, measuring body length may be a useful tool to estimate growth potential rather than using hatch body weight.

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