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EFFECT OF INITIAL WEIGHT OF CHICKS ON PERFORMANCE OF IRAQI LOCAL CHICKENS

Rafea M.T. Khulel* and Magid A. Sabri

Animal production Department., College of Agriculture and Forestry, University of Mosul, Iraq.

Abstract

The objective of this research was to investigate the effect of initial chick weight at the first day of the hatch on subsequent performance of Iraqi local chickens. 150 unsexed chicks of local chickens weighted at first day of hatch then divided to five groups (A, B, C, D, E) according to the initial weight (26.4, 31.89, 36.38, 41.09, 46.91) gm, the birds were reared in a wooden cage consist of individual compartments with dimensions (30×30×40) cm, The feed and water was available adlibitum, The birds and feed weighted weekly by sensitive balance. The result shows that initial weight had a significant effect on body weight, weight gain, feed and protein consumption, and growth rate but not significant on feed and protein conversion, where group E showed the best results, The relationship between initial body weight and productive traits were studied and the prediction equation of productive traits depending on initial weight shows highly significant.

Key words : Initial weight, Local chickens, Performance.

Introduction

Chicks' initial weight has an important effect in the broiler industry as it affects broiler performance (Mendes *et al.,* 2011). (Gardinar, 1973) found that initial weight of male chicks (29.6 -39.4 gm) significantly affected weekly body weight to 6 weeks of age, but not significant in 7 and 8 weeks, while in female chicks weight (29.3-38.4) gm significantly affected body weight to 8 weeks of age at all weeks. (Mendes *et al*., 2011) found that initial weight significantly affected body weight in 42 days of age, and that heaver birds significantly increase feed consumption, but feed conversion did not influenced.(Stringhini *et al.,* 2003) indicated that 35 day body weight significantly affected by initial weight. (Vieira, 2001) stated that there were conflicting results on the effect of one day chicks weight on feed intake and feed conversion, and that slaughter weight related positively to the initial weight.

(Montanhini Neto *et al.,*2013) found that one day chicks initial weight did not affect C.V% of body weight and homogenous at 21, 42 day body weight. (Ng'Ambi *et al.,* 2013) in his study on the effect of egg weight and initial chick weight on performance at 7 weeks of age, where found a significant difference in live body weight were (50-59) gm group was higher than (60-69) gm and that less than 49 gm group consumed feed significantly higher than other groups, and feed conversion improved with egg and chick weight increase. (Al- Nedawi *et al.,* 2019) found that initial chick weight less than 42 gm shows significantly higher final body weight at 5 weeks than (39-42) and less than 39 gm group.

(Jiang and Yang, 2007) studied the effect of initial chick weight L(42.2) M(38.5), S(35.8) gm, were they did not found a significant effect to 10 weeks of age body weight, and the concentration of growth hormone of S group at 4 weeks of age was significantly higher than those of M and L group, and this may stimulate the growth rate of chickens. (Al Shamire, 2016) found that the medium weight of chicks at 1st day of hatch showed a significant improvement in body weight, weight gain, feed conversion, dressing percentage, compared to heavy chicks.

(Kim *et al.,* 2017) found that the duration required to reach the market weight of 2 Kg in 13 native Korean

Author for correspondence : E-mail: rafhkhulel@uomosul.edu.iq

strains was 71.8 days, and the correlation coefficient between early and market weight was significantly positive. (Ahmed, 2000) found that initial chick weight increase significantly, body weight, weight gain, feed consumption, feed conversion. (Petek *et al.,*2010) indicated that body length in day-old chick was more important than body weight in its effect on subsequent performance, and that small chicks show significantly less body weight comparing to middle and large chicks.

(Patbandha, 2017) stated that chicks with high initial weight show significantly more weight up to 15 days than those with low weight, but this difference disappears in the later periods of life.

(Sklan *et al.,* 2003) indicated that no difference was found among chicks hatching with the same weight from maternal flocks of different ages, while from the same flock the higher chick weight tend to contain smaller gastrointestinal tract which affects subsequent performance.

(Geidam *et al.,* 2006) stated that day-old chick weight contains the real chick weight and remaining yolk residue and in case of much yolk is left over, so less development has occurred and the chick quality should be low. (Leandro *et al.,* 2006) found that the heaviest chicks between groups (32,35,40,49) gm showed significantly best performance in body weight at 47 days of age, weight gain, feed consumption. (Michalczuk *et al.,* 2011) in his study on Ross chicks divided into 3 groups (less than 39, 40-42, more than 42) gm, were he found that smaller chicks show significantly better growth rate at different ages (8, 15, 22, 29, 36) days so the bodyweight difference at 42 days of age was not significant. The target of the current research was to study the effect of day-old weight on the performance of Iraqi local chickens to 9 weeks of age.

Materials and Methods

This study was conducted at the college of Agriculture / University of Mosul on 150 unsexed day-old local chicks obtained from a local hatchery. The chicks were weighed individually by an electronic balance with sensitivity (0.1) gm then distributed to five groups by weight (> 45, 40-45, 35-40, 30-35, <35) gm. for the group (A, B, C, D, E) respectively as treatments, and the number of chicks for each group was (35, 53, 29, 22, 11) chicks respectively. The chicks reared in wooden cages consist of individual compartments each with dimensions (30, 40, and 40) cm. The cages placed in a half- opened house equipped with rearing needs as gas brooders, ventilation fans, lighting bulbs (40 watts), and the lighting regime was 23 h / day.

Table 1: Composition of starter, grower, finisher diets*.

Ingredients	Starter	Grower	Finisher
Corn	56	58.1	65
Wheat bran	1.25	-	-
Soybean meal	32	29.9	24
Protein concentrate	5	5	5
Sunflower oil	3	5	4
Lime	1.5	1	0.5
Di-calcium phosphate	0.75	0.5	1
Salt	0.25	0.25	0.25
Premix	0.25	0.25	0.25
ME	3000.62	3201.7	3204.06
Crude protein	21.04	20.09	18.09
Lysine	1.15	1.09	0.95
Methionine +Cysteine	0.73	0.71	0.66

*(NRC, 1994).

All the birds were given standard ration containing (21, 20, 18)% crude protein, and 3000, 3200, 3200 kcal / kg ME during the periods (0-3, 3-6, 6-9) weeks respectively as in table 1, the feed offered ad libitum during the entire period.

All the birds were vaccinated according to the Hygienic program on time.

The results analyzed statistically according CRD design using (SPSS 16, 2009) Software.

The studied traits include, body weight (gm.), weight gain (gm.), feed consumption (gm.), feed conversion ratio, protein consumption (gm.), protein conversion ratio, relative growth rate %.Correlation coefficient between initial weight and productive traits, the regression coefficient of productive traits on initial chick weight was calculated by (SPSS 16,2009) software also.

Result and Discussion

Table 2 shows that initial chicks weight significantly affected body weight in 3, 6, 9, weeks of age, and that group E has a higher body weight than group C, B, A in the 9th week of age, and from table 3 it is clear that the initial weights of chicks affect weight gain at all studied period and that group E showed a significantly higher weight gain than group C, B, A. These results are in agreement with (Mendes *et al.,* 2011), (Stringhini *et al.,* 2003), (Al-Nedawi *et al.,* 2019), and did not agree with (Jiang and yang, 2007), (Petek *et al.,* 2010), (Patbandhe, 2017), (Michalczuk, 2011), who did not found a significant effect of initial weight on body weight.

Table 4 shows that the feed consumption increased with initial weight increase, where the group E consumed significantly higher than group C, B, A during the total

Table 2: Effect of initial chick weight on body weight.

Treats	0-3 week	3-6 week	6-9 week	0-9 week
A	26.4 ±1.46 e	135.66 ±15.36d	392.80+31.99 d	782.71 ± 46.98 d
B	31.89 ±1.53 d	158.94 ±18.15 c	441.53+44.36 c	853.49 ±72.96 c
C	36.38 ±1.52 c	164.90 ±16.1bc	452.97+50.26 bc	882.97 ±86.50 bc
D	41.09 ±1.48 b	173.96 ±17.81 b	474.59 +47.40ab	921.73 ±82.60 ab
E	46.91 ±1.30 a	191.18 ±18.61 a	493.36+54.71 a	928.0 ±81.90 a

Table 3: Effect of initial chick weight on body weight gain.

Treats	0-3 week	3-6 week	6-9 week	0-9 week
A	109.26 ±15.20 c	257.14 ±21.93b	389.91 ±20.96 c	756.31 ±46.90 d
B	127.06 ±17.92b	282.58 ±30.64a	411.96 ±32.76 b	821.60 ±72.70 c
C	128.52 ±16.15b	288.07 ±37.57a	430.0 ±39.74 ab	846.99 ±86.45 bc
D	132.86 ±17.93b	300.64 ±37.97a	447.14 ±39.61 a	880.64 ±82.72 ab
E	144.27 ±18.25 a	302.18 ±37.94a	437.64 ±29.74 a	881.09 ±81.52 a

Table 4: Effect of initial chick weight on feed consumption.

Treats	0-3 week	3-6 week	6-9 week	0-9 week
A	228.45 ±5.69 d	649.92 ±22.79 d	949.69 ±34.99 d	1828.05 ±63.47d
B	240.02 ±14.10 c	690.30 ±48.08 c	1025.16 ±92.98c	1955.48 ±154.92c
C	244.45 ±13.61bc	706.00 ±45.34bc	1053.86 ±90.60bc	2004.31 ±149.29bc
D	251.12 ±13.85 ab	726.37 ±46.01ab	1099.55 ±92.12ab	2007.04 ±151.85ab
E	255.09 ±11.26 a	739.37 ±37.03	1126.00 ±75.15 a	2120.46 ±123.32 a

Table 5: Effect of initial chick weight on feed conversion.

Treats	0-3 week	3-6 week	6-9 week	0-9 week
A	2.12 ±0.25 a	2.54 ±0.19	2.44 ±0.15	2.42 ±0.13
B	1.92 ±0.24 b	2.46 ±0.17	2.49 ±0.15	2.39 ±0.13
C	1.93 ±0.24 b	2.48 ±0.28	2.46 ±0.16	2.38 ±0.19
D	1.92 ±0.28 b	2.44 ±0.27	2.47 ±0.21	2.37 ±0.18
E	1.79 ±0.21 b	2.48 ±0.27	2.59 ±0.14	2.42 ±0.18

Table 6: Effect of initial chick weight on protein consumption.

Treats	0-3 week	3-6 week	6-9 week	0-9 week
A	47.97 ±1.19 d	129.98 ±4.56 d	170.94 ±6.30 d	348.90 ± d
B	50.40 ±2.96 c	138.06 ±9.62 c	184.53 ±16.74 c	372.99 ± c
C	51.33 ±2.86 bc	141.20 ±9.07 bc	189.70 ±16.31 bc	382.23 ± bc
D	52.73 ±2.91 ab	145.27 ±9.20 ab	197.92 ±16.58ab	395.93 ± ab
E	53.57 ±2.36 a	147.87 ±7.41 a	202.68 ±13.53 a	404.12 ± a

Table 7: Effect of initial chick weight on protein conversion.

Treats	0-3 week	3-6 week	6-9 week	0-9 week
A	0.45 ±0.05 a	0.51 ±0.04	0.44 ±0.03 b	0.46 ±0.03
B	0.40 ±0.05 b	0.49 ±0.03	0.45 ±0.03 b	0.45 ±0.03
C	0.40 ±0.05 b	0.50 ±0.06	0.44 ±0.03 b	0.45 ±0.04
D	0.40 ±0.06 ab	0.49 ±0.05	0.44 ±0.04 b	0.45 ±0.04
E	0.38 ±0.04 b	0.49 ±0.06	0.47 ±0.02 a	0.45 ±0.04

period (0-9) weeks, this in agreement with (Mendes *et al.,* 2011), (Petek *et al.,* 2010), and did not agree with (Ambi *et al.,* 2013) who found that the lower initial weight consumed significantly more feed than the higher weights.

Table 5 indicated that feed conversion ratio did not differ between groups except in the first period (0-3) weeks, and this in agree with (Mendes *et al.,* 2011) who found that feed conversion did not influence by initial weight, and (Vieira, 2001) stated that there were conflicting results about the effect of initial weight on feed intake and feed conversion.

Table 6 shows the effect of initial weight on protein consumption were found a significant difference between groups in all periods, in the total period the group E shows the higher protein consumption and this difference was significant comparing to other groups except group D, this result is consistent with results of feed consumption especially all groups have taken the same ration.

Table 7 showed that there were insignificant differences between groups in protein conversion except in the first period (0-3) and (6-9) weeks, and this result was similar to feed conversion as all groups have taken the same feed.

Table 8 shows that the initial weight of chicks affects relative growth rate in all periods were it was clear that growth rate decreased with initial weight increase and the group E was the less growth rate in all periods, this result is in agree with (Jiang and Yang, 2007) who found that small weight chicks shows a significantly higher concentration of growth hormone comparing to medium and large weight chicks.

Table 9 shows the regression equation of productive traits as dependent variable on initial weight were all equations are significant except feed conversion, and it was highly significant for body weight, weight gain, feed and protein

Table 8: Effect of initial chick weight on the relative growth rate.

Treats	0-3 week	3-6 week	6-9 week	0-9 week
A	134.37±6.21 a	97.45±5.05 a	66.45±3.00 a	186.91±1.00 a
B	132.61±6.65 a	94.17±4.90 b	63.73±2.73 b	185.51±1.24 b
C	127.24±6.65 b	93.08±4.63 b	64.50±2.74 b	184.03±1.67 c
D	123.04±7.14 c	92.61±6.88 b	64.12±2.73 b	182.81±1.65 d
E	120.79±5.81 c	88.15±3.18 c	61.34±2.79 c	180.64±1.53 e

Table 9: Regression equations of productive traits on initial chick weight.

Traits/weeks	Model	R^2	F
BW 9	597.617+7.679 x	0.291	0.0001
WG(0-9)	597.617+6.679 x	0.236	0.0001
FI (0-9)	1488.131+14.059 x	0.284	0.0001
FC (0-9)	2.46–0.001 x	-0.0002	0.325
PI (0-9)	284.711+2.655 x	0.284	0.0001
PC (0-9)	0.484–0.0009 x	0.0153	0.0215
GR (0-9)	194.986–0.300 x	0.681	0.0001

BW: body weight; WG: weight gain; FI: feed consumption; FC: feed conversion; PI: protein consumption; PC: protein conversion; GR: growth rate %.

Table 10: Correlation coefficients between initial chick weight and productive traits.

Traits	r	F
BW 9	0.544	0.0001
WG 09	0.491	0.0001
FI 09	0.537	0.0001
FC 09	-0.081	0.3082
PI 09	0.537	0.0001
PC 09	-0.187	0.0215
GR 09	-0.826	0.0001

consumption, and growth rate.

Table 10 shows the correlation coefficients between productive traits and initial weights were these coefficients are significant except for feed conversion, and it was negative for feed and protein conversion and relative growth rate.

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