Journal of Research in Ecology

An International Scientific Research Journal

ISSN No: Print: 2319 –1546; Online: 2319– 1554

Original Research

Investigation of economic traits on the hybrid broiler (Ross 308) differing genotypically for insulin gene hormones using correlation and regression coefficients

Authors:
Al-Anbari EH

Institution:
Animal Production Department, College of Agricultural, University of Baghdad, Iraq.

Corresponding author:
Al-Anbari EH

ABSTRACT:

The objective of the present study was to investigate the correlation and regression for some economic traits on hybrid broiler Ross 308 that differ on the genotype for insulin gene. Two hundred one- day-old chicks of Ross 308 were reared for five weeks in a closed system and divided based on the genetic structure of the insulin gene into two groups *viz*., hybrid and dominant structures. Initial Body weight (IBW), Initial Length of Body (ILB) and some physical characteristics were measured. The results showed a high correlation ($P<0.01$) between the Live Body Weight (LBW) and Carcass Weight (CWT). It was 0.97 for the dominant structure while 0.56 for the hybrid structure. Significantly, the correlation between body length A_5 with the length of keel bone C_5 and the circumference of the breast B_5 in the dominant structure was 0.35, 0.34 respectively, and between the breast circumference B_5 and thigh circumference D_5 was 0.50 for dominant structure. As for the hybrid structure, the correlation value was of high significance ($P>0.01$) between C_5 with D_5 when the correlation value was 0.70. And significantly, the correlation values were 0.56, 0.61, 0.58, 0.50, and 0.48 between LBW and CWT and B_5 with C_5 and D_5, and between A_5 with D_5 and C_5 respectively. The dominant genotype showed a significant regression coefficient $P<0.05$ for the relative weight of thighs Y_3 by IW which was 0.004 and for wings Y_5 by ILB which was 0.0009 at the same level of significance. The hybrid structure showed a significant regression coefficient for Y_3 in IW, and for Y_2 in ILB was 0.02 and 0.04 respectively. The regression coefficient for relative weight of the breast B_5 for ILB was 0.003 higher significantly ($P>0.01$) for the hybrid structure. Meanwhile, in the dominant structure, LBW and CWT compared to the by ILB were recorded as 0.04 and 0.02 respectively. It can be concluded that the correlation and regression values for some economic traits can be used for early selection of chicks for breeding as a preferred genetic structure or as required by the market on the basis of genetic structure of the insulin gene.

Keywords:

Ross 308, Insulin gene hormone, Correlation and regression coefficients, Broiler economic traits.

Article Citation:
Al-Anbari EH
Investigation of economic traits on the hybrid broiler (Ross 308) differing genotypically for insulin gene hormones using correlation and regression coefficients
Journal of Research in Ecology (2018) 6(2): 1867-1875

Dates:
Received: 02 July 2018 **Accepted:** 08 Aug2018 **Published:** 03 Sep 2018

Web Address:
http://ecologyresearch.info/documents/EC0600.pdf

Journal of Research in Ecology

INTRODUCTION

Poultry is a substantial contributor of food supply to all the world. It has been reared for decades and the main target for poultry breeders is to obtain the appropriate weight through the shortest possible breeding period, at low production cost with fine profit. Hence, the closed system is the most useful way to control all the conditions and the changes in broilers (Carrate *et al*., 2009). Many commercial breeds of broilers have been devised to secure commercial herds with low cost of production, depending on their economic characteristics, in addition to the continuous variation that is affected by their genetic content, where quantitative characteristics are affected by a large number of genes (Le *et al.*, 2001). Prescott *et al*. (1985) demonstrated that hybrid broilers are better than their ancestors due to the effective selection programs which has the basic roll in the improvement of genetically modified genes (Leterrier *et al*., 1998). However, continuous selection for some traits with combinations of desirable traits, accompanied by genetic changes in the commercial hybrid of many of these traits (Marks, 1995) led to the emergence of strains with good physical characteristics, rapid growth and higher feed conversion ratio, however, the continuation of the election to increase body weight is accompanied by negative effect on health, such as the appearance of swollen leg and increased body fat and others. In order to overcome these problems, the current trend has become dependent on the involvement of several areas including modern genetic selection techniques and genome studies. Ewart (1993) pointed out the need to study and involve molecular genetics, axis gene, marker genes and candied gene for inclusion in genetic selection and improvement programs (Beuzen *et al*., 2000). The insulin gene is one of the candidate genes due to the wide association with many of the production parameters such as growth, evolution, physiological structure and lipid deposition, rather than it as an receptor in the plasma membranes of the adipose muscle and lever (Nie *et al*., 2005). In order to integrate some genes of the genetic structure of domestic birds with some of the basics of poultry breeding and improvement, the current research trend included correlation coefficients and regression between some primary body measurements and some other measurements at the end of the breeding period in a sample of Ross 308 broiler chickens isolated on the basis of their genetic structure of insulin gene hormone. They are dominant and hybrid for the purpose of adopting disclosure of these structures and take advantage of the early election programs according to the values of correlations and regression between the traits.

MATERIALS AND METHODS

The experiment was carried out at the poultry field of the Faculty of Agriculture, University of Baghdad, Abu Ghraib, in order to study the values of correlation coefficients and regression between some of the economic characteristics in two genotypes of the insulin gene hormone in broiler Ross 308. Therefore, 200 one day-old chicks were divided based on their genetic structure into two structures: dominant and hybrid numbered in wings in addition, the chicks were fed starter, grower and finisher diets. The Initial Body Weight (IBW) was measured with a sensitive scale while ILB was measured by using a measuring tape after laying the chicks on a lateral level surface with the start of the tape in front of the beak till the middle finger of the posterior limbs. At the age of five weeks long live body A_5, breast circumstance B_5, keel length C_5, thigh circumstance D_5, leg length E_5 and live body weight LBW were measured (B_5 measured by the ligament of the measuring tape around the top of the breast area) whereas (C_5 from the sternum to the end of the keel bone). After slaughtering, carcass weight CWT, dressing percentage DRE, the relative weight for cuttings were recorded based on the percentage of the weight of the cuts divided by CWT for each of the breast muscle Y_1, back

Table 1. Correlation coefficient values of primary body weight with weight ratios of cuttings in dominant and hybrid structures of insulin gene in the broiler Ross 308

S. No	Traits	Dominant structure	Hybrid structure
1	Y_1	-0.0025^{NS}	0.2794^{NS}
2	Y_2	-0.0225^{NS}	-0.428^{NS}
3	Y_3	-0.369*	0.0150^{NS}
4	Y_4	-0.0078^{NS}	0.4479^{NS}
5	Y_5	0.0681^{NS}	0.020^{NS}
6	Y_6	-0.1153^{NS}	-0.1069^{NS}

* Y_1: Relative weight of the cuttings; Y_2: Relative weight of the back + neck; Y_3: Relative weight of thighs; Y_4: Relative weight of the liver; Y_5: Relative weight of wings, Y_6: Relative weight of abdominal fat.

Table 2. The values of correlation coefficients between the length of the primary body ILB and the correlations of the cuttings of the dominant and the hybrid structures of insulin gene in the broiler Ross 308

S. No	Traits	Dominant structure	Hybrid structure
1	Y_1	-0.0052^{NS}	0.1882^{NS}
2	Y_2	0.2661^{NS}	-0.1120^{NS}
3	Y_3	-0.0991^{NS}	-0.0494^{NS}
4	Y_4	0.15588^{NS}	-0.359^{NS}
5	Y_5	0.16860^{NS}	-0.543*
6	Y_6	-0.1654^{NS}	-0.0815^{NS}

* Y_1: Relative weight of the breast; Y_2: Relative weight of the back + neck; Y_3: Relative weight of the thighs; Y_4: Relative weight of the liver; Y_5: Relative weight of the wings; Y_6: Relative weight of abdominal fat.

area + neck Y_2, thighs Y_3, Y_4 liver weight, Y_5 wings and abdominal fat Y_6 according to the method of Al-Fayadh *et al*. (2011).

RESULTS AND DISCUSSION

Table 1 showed the values of correlation coefficients between IW and the weight ratios of cuttings in the dominant and the hybrid structure of the insulin hormone gene in broiler. In the hybrid genotype, the correlation values were all insignificant, however, there were two traits associated with the IW and with each of Y_2 and Y_6 which were 0.42 and 0.10 respectively. The highest value of 0.44 for the IW correlation coefficient with the relative weight of the liver Y_4 and 0.1 for the thighs Y_3. For the dominant structure and for the same table, most of the values were also insignificant. Significantly, the value of IW was associated with Y_3, which was 0.36. The correlation value was insignificant for the dominant structure of IW with Y_5 that reached 0.068. The insignificant correlation values might be due to the fact that the used broilers were a commercial hybrid chosen for it is a commercial trait, also it can be due to the effect of the initial body weight of the chick on the overall weight. Monika *et al*. (2011) indicated that the initial weight of the heavy hatchery has a direct effect on the final weight compared to the low weight of chicks for the same breeding period. Additionally, lower initial weights for the used chicks gave insignificant correlation values with Y_1 (Zangana *et al*., 2011).

Table 3. The correlation values between primary body weight, body length, live body weight, carcass weight, and dressing percentage in broiler Ross 308 for the hybrid genotype of the insulin hormone gene

S. No	Factors	ILB	LBW	CWT	DRE
1	IW	-0.03^{NS}	0.04^{NS}	0.12^{NS}	0.02^{NS}
2	ILB	----	-0.16^{NS}	0.11^{NS}	0.33^{NS}
3	LBW	----	----	0.56*	-0.59**
4	CWT	----	----	----	0.32^{NS}
5	DRE	----	----	----	----

* IW: Primary body weight; ILB: Primary body length; LBW: Live weight; CWT: Carcass weight; DRE: Dressing percentage.

Table 4. The correlation values between initial body weight, body length, live body weight, carcass weight, and dressing percentage in broiler Ross 308 for the dominant genotype of the insulin hormone gene

S. No	Factors	ILB	LBW	CWT	DRE
1	IW	-0.09^{NS}	0.27^{NS}	0.24^{NS}	-0.09^{NS}
2	ILB	----	-0.37*	-0.41*	-0.21^{NS}
3	LBW	----	----	0.97**	-0.0002^{NS}
4	CWT	----	----	----	0.22^{NS}
5	DRE	----	----	----	----

* IW: Initial body weight; ILB: Initial body length; LBW: Live weight; CWT: Carcass weight; DRE: Dressing percentage.

Table 5. The correlations between the physical measurements at the age of five weeks for hybrid and dominant structures of broiler Ross 308

Hybrid genetics					
Volumetric measurements	**A5**	**B5**	**C5**	**D5**	**E5**
A_5	----	0.22^{NS}	0.48^{*}	0.50^{*}	-0.03^{NS}
B_5	----	----	0.61^{**}	0.58^{**}	0.47^{NS}
C_5	----	----	----	0.70^{**}	0.23^{NS}
D_5	----	----	----	----	0.19^{NS}
E_5	----	----	----	----	----
The dominant genotype					
Volumetric measurements	**A5**	**B5**	**C5**	**D5**	**E5**
A_5	----	0.34^{*}	0.35^{*}	-0.06^{NS}	-0.13^{NS}
B_5	----	----	0.16^{NS}	0.50^{*}	0.28^{NS}
C_5	----	----	----	0.18^{NS}	0.15^{NS}
D_5	----	----	----	----	0.24^{NS}
E_5	----	----	----	----	----

* A_5: Live body length; B_5: Breast circumference; C_5: Length of shear bone; D_5: Thigh circumference; E_5: Leg length.

Table 2 illustrated the correlation coefficients between ILB and the weight ratios of the dominant and hybrid structures of broiler Ross 308. For the hybrid structure, the correlation values showed wide variation, although most of them were not significant, the only positive correlation value was insignificant with a relative weight of Y_1 for the breast muscle, which was 0.18 and a significant decrease ($P<0.05$) with Y_5 in hybrid structure and the recorded value was 0.543. The ILB correlation values with the relative weights of the other cuttings were low and not significant, although there were some differences between them in the same genetic structure. The dominant genetic structure showed that the correlation values were insignificant and the positive values were higher with Y_2 at 0.26 whereas the Y_5 was 0.168 in addition, the Y_4 was 0.155. This composition recorded insignificant and negative values at 0.16, 0.155, 0.005 for the ILB correlation with the Y_6, Y_4 and Y_1 respectively. The obtained results were in agreement with the findings of Al-Hajo and Al-Fayadh (2007) who reported that the effect of the initial length of the chick with continued growth results showed an increase in the length of the body in general. The obtained insignificant values, confirmed the increase in bone length as all measured traits were in the fifth week, which accompanied by an increase in the structural muscles located on it. However, the decline and the insignificance of values can be explained by lowering ILB affect, the value of it is correlated with the other values. Al-Anbari *et al*. (2013) noted that the chicks with long or medium body length was superior in CWT, Y_1 compared to the short-body chicks, adding that the body length of the chick after the hatching was considered the preferred method for predicting the efficiency of the chick's performance. Al-Hajo and Al-Fayadh, (2007) detected that a significant ($P<0.01$) correlation between CWT, DRE and Y_1 with B_5 and carcass length. In addition, a positive correlation between the abdominal fat and the intestines with LBW was noted (Al-Anbari and Mohamed, 2017). Overall, there is no convincing evidence of differences in the body weight, response to the obesity of the intestines, and the Rose strain has been genetically altered due to the selection to increase BLW and other traits (Marks, 1995).

Table 3 shows the correlation coefficients between IW and ILB with LBW, CWT and DRE for hybrid broiler Ross 308. The correlation coefficient was insignificant between IW and ILB where it was 0.03. The values of the correlation were positive and not significant with LBW, CWT, and DRE and the detected values were 0.04, 0.12, and 0.02 respectively. Insignificantly, the correlation values between the ILB with other characteristics were decreased and the lowest value was -0.16 with LBW. However, the correlation coefficient was positive with CWT and DRE as 0.11 and 0.33 respectively. Also, Table 3 declined that there was insignificant correlation value between CWT and DRE which was consistent with Al-Hajo and Al-Fayadh, (2007) who described the relation between CWT, DRE and LBW. Al-Anbari *et al*. (2013) showed a significant correlation between ILB with LBW at the age of 42 days, and it was consistent with the obtained results

Table 6. The correlation values between initial body weight with the physical measurements at the age of five weeks for hybrid and dominant structure of broiler Ross 308

S. No	Traits	Dominant structure	Hybrid structure
1	A_5	- 0.394^{NS}	0.31412^{NS}
2	B_5	0.1106^{NS}	0.1557^{NS}
3	C_5	- 0.063^{NS}	- 0.0281^{NS}
4	D_5	- 0.1416^{NS}	- 0.039^{NS}
5	E_5	0.293^{NS}	- 0.1792^{NS}

* A_5: Live body length; B_5: Breast circumference; C_5: Length of shear bone; D_5: Thigh circumference; E_5: Leg length.

Table 7. The correlation values between initial body length with the physical measurements at the age of five weeks for hybrid and dominant structures of broiler Ross 308

S. No	Traits	Dominant structure	Hybrid structure
1	A_5	0.1591^{NS}	0.08822^{NS}
2	B_5	0.1654^{NS}	-0.296^{NS}
3	C_5	0.0726^{NS}	0.1048^{NS}
4	D_5	0.0113^{NS}	0.0129^{NS}
5	E_5	-0.1125^{NS}	-0.1720^{NS}

* A_5: Live body length; B_5: Breast circumference; C_5: Length of shear bone; D_5: Thigh circumference; E_5: Leg length.

from this study at the age of 35 days while a significant correlation between ILB with IW at the age of seven days was detected. Although it has been isolated on the basis of the genetic structure of the insulin hormone gene, The correlation values of some traits may be attributed to the long or medium length after hatching, where it excels in the CWT, DRE, Y_1 and the breast width which reflected by the length of the shear bone.

The correlation coefficients between IW and ILB with LBW, CWT and DRE for dominant broiler Ross 308 were pointed in Table 4. Low insignificant correlation values between IW with ILB, LBW, CWT, and DRE were recorded as -0.09, 0.27, 0.24 and -0.09 respectively. It was also shown that the ILB was associated with other characteristics, although there was a significant difference, with values of - 0.37, -0.41 for LBW, CWT and 0.21 for DRE. A significant correlation ($P<0.01$) value was 0.97 for LBW with CWT while the correlation value was low and insignificant with DRE which was 0.0002. CWT was also associated with the DRE ratio of positive 0.22. The results of the present study were in line with Wolanski *et al*. (2006) who found that low and insignificant correlation between IW (or after hatching) with LBW at the age of 6-weeks, which was 0.12. Chambers and Fortin (1984) added that the continued growth and consequent increase in bone length led to increase the structural muscles located on it which results in an increase in the DRE and Y_1. Monika *et al*. (2011) noted the effect of IW of chicks on the production performance during the breeding period, despite the chicks were raised under the same conditions, but different in their genetic susceptibility to express their genetic content. Molenaar *et al*. (2007) noted that there was a relationship between ILB and IW with the production performance of broiler. Additionally, Rance and his colleagues pointed that obtaining the genetic correlation between carcass characteristics and body components in broiler Ross indicated the possibility of holding a theatrical selection, despite some of the factors can be inherited or due to the interfered of genetic with environment, which can be led to insufficient election even with highest correlation value. Willemsen *et al.* (2008) noted that the correlation value between ILB with IW at one day old was not consistent between the Ross and Cobb strains in addition, the early hatches have ILB higher than those hatched later, hence, it is possible to select chicks with a dominant genetic structure of the insulin hormone gene, immediately after hatching, where the value of the correlation means for the selected chicks will reach a higher LBW and CWT at the age of five weeks.

Table 5 shows the correlation values between physical measurements at the age of five weeks of 308 Ross by gene composition of the insulin gene. In hybrid genetics, the correlation values between physical measurements varied in their significance, with the highest

Table 8. The regression coefficient values of cutting weights for hybrid and dominant structure of Insulin hormone gene in broiler Ross 308

S. No	Traits	Hybrid structure		Dominant structure	
		ILB	IW	ILB	IW
1	Y_1	0.97^{NS}	0.98^{NS}	0.48^{NS}	0.29^{NS}
2	Y_2	0.020^{*}	0.90^{NS}	0.64^{NS}	0.09^{NS}
3	Y_3	0.60^{NS}	0.04^{*}	0.07^{NS}	0.004^{*}
4	Y_4	0.49^{NS}	0.01^{NS}	0.012^{NS}	0.31^{NS}
5	Y_5	0.37^{NS}	0.7^{NS}	0.0009^{*}	0.01^{NS}
6	Y_6	0.03^{NS}	0.007^{NS}	0.29^{NS}	0.07^{NS}

* Y_1: relative weight of the breast; Y_2: relative weight of the back + neck; Y_3: relative weight of the thighs; Y_4: relative weight of the liver; Y_5: relative weight of the wings; Y_6: relative weight of abdominal fat.

($P<0.01$) value between C_5 and D_5 which was 0.70 while the high significant correlation for B_5 with D_5 and C_5 recording mean values of 0.58, 0.61 respectively was noted. Additionally, A_5 showed a significant correlation value ($P<0.05$) with D_5, C_5 at means of 0.50, 0.48 respectively. The other characteristics had positive insignificant correlation values except for A_5 with E_5 where the correlation value was negative and not significant (0.03). The obtained results can be explained as the broiler of the present study was a commercial hybrid and were selected to increase body weight and breast width with short legs, which considered to be features of the commercial hybrid and this may explain the low correlation between A_5 and E_5. For the dominant genotype, Table 5 illustrated the presence of different correlation values between all the traits with higher significant value between B_5 and D_5 which was 0.50. The A_5 was significantly ($P<0.05$) correlated with C_5 and B_5 with mean values of 0.35, 0.34 respectively. However, the A_5 was not significant and low or negative with the E_5 and D_5 with values of 0.13, 0.06, respectively. The significant correlation values of the two genotypes in agreement with Al-Anbari and Mohamed (2017) who noted that many body measures are a good indicator of a skeletal size such as length of shear bone, breast circumference, leg length, stubble, and leg circumference. In addition, the high correlation between B_5 and C_5 showed the highest value of the hybrid genotype which was 0.61. Therefore, the individuals carrying this structure must come from fathers with a wide breast.

To study the correlation coefficient values between IW with physical measurements at the age of five weeks for the hybrid and dominant structure of broiler Ross 308, Table 6 detected that insignificant correlation values with IW was noted with negative correlation for most of them. In hybrid structure, the correlation values were positive with A_5 and B_5 with mean values as 0.31 for A_5 and 0.15 for B_5. However, most of the correlation values for the dominant structure showed negative and insignificance with IW except B_5 and E_5 with a mean values at 0.11 and 0.293 respectively. Additionally, the lowest insignificant value was C_5 with mean value of 0.06 while the recorded values for D_5, A_5 were 0.14, 0.39 respectively.

Table 7 indicates insignificant correlation values between ILB with physical measurements at the age of five weeks for the hybrid and dominant structure of broiler Ross 308. For hybrid structure, positive correlation values were recorded between ILB with C_5, A_5 and D_5 with the mean values of 0.1, 0.08 and 0.01 respectively. Moreover, positive insignificant correlation values between ILB with A_5, B_5 with the mean of 0.15,

Table 9. The regression coefficient values of physical measurements at the age of five weeks for hybrid and dominant structure of insulin hormone gene in the broiler Ross 308

S. No	Traits	Hybrid structure		Dominant structure	
		ILB	IW	ILB	IW
1	LBW	0.04*	0.001^{NS}	0.096^{NS}	0.05^{NS}
2	CWT	0.02*	0.0011^{NS}	0.36^{NS}	0.04^{NS}
3	Dress	0.26^{ns}	0.60^{NS}	0.59^{NS}	0.004^{NS}
4	A_5	0.40^{ns}	0.03^{NS}	0.001^{NS}	0.23^{NS}
5	B_5	0.38^{NS}	0.56^{NS}	0.003^{**}	0.001^{NS}
6	C_5	0.70^{NS}	0.73^{NS}	0.69^{NS}	0.917^{NS}
7	D_5	0.95^{NS}	0.45^{NS}	0.96^{NS}	0.88^{NS}
8	E_5	0.55^{NS}	0.11^{NS}	0.52^{NS}	0.50^{NS}

* IW: Initial body weight; ILB: Initial length of body, LBW: Live weight; CWT: Carcass weight; DRE: Dressing percentage; A_5: Live body length; B_5: Breast circumference; C_5: Length of shear bone; D_5: Thigh circumference; E_5: Leg length.

0.16 respectively. The obtained results from the present study was in agreement with Goliomytis *et al.* (2003) who indicated an insignificant correlation between the studied traits for different hybrid structures reared from 1-154 day of the age. Al-Anbari *et al*. (2013) noted the significant effect of ILB with IW at the age of seven days while it was insignificant at the end of the breeding period. Also, the effect of ILB on CWT, DRE, C_5, B_5 was detected (Ibrahim, 2010). The insignificant correlation may attributed to the lower weight and lower body length of chicks compared to the chicks that showed significant values.

Table 8 shows the regression coefficient values for the cutting relative weights with IW and IBL. The significant value of the studied trait mean the number of units for this trait that change if the gradient changes with one unit, hence most of the studied traits and their regression with IW and ILW have detected insignificant regression coefficient values. For the dominant structure, a significant ($P<0.05$) regression was revealed for Y_3 on IW and for Y_5 on ILB with means of 0.004 and 0.0009 respectively. Regarding hybrid structure, higher regression value for Y_3 on IW was 0.04 and for Y_2 on ILB was 0.020.

Insignificant and positive regression values for carcass traits and physical measurements on IW and ILB at the age of five weeks for dominant and hybrid structures of broiler Ross 308 were demonstrated (Table 9). Significantly, the highest regression value ($P<0.05$) for B_5 on ILB was 0.003 which indicate the number of units that change B_5 if the ILB changed one unit in the hybrid structure. Meanwhile, the dominant structure showed an insignificant positive regression value except for LBW and CWT on ILB and the recorded values were 0.4, 0.02 respectively. The obtained results were in line with Al-Anbari *et al*. (2013) who noted that each extra 1 cm of ILB gives an increase in IW which gradually decreases with the age through a regression of weight on the length in addition, low regression value for IW on LBW was also recorded. The insignificant values can be attributed to the reared commercial hybrid in the present study (broiler Ross 308) and the role of the selection that focused on specific traits in order to meet the consumer's desire to provide market requirements of chicken with a wide breast circumference or higher relative weight for wings, thighs, abdominal fat and so on. Moreover, the effect of initial chick's weight (IW) on LBW and Y_1, the effect of ILB on physical measurements, effects of sex where the males have a higher conversion ratio with a higher breast circumference than females, are possible reasons for the insignificant values. Additionally, the significant values obtained in the present study can be imputed to the effect of genetics of the insulin hormone gene, which can be reliable for early selection of some desired traits.

CONCLUSION

Modern genetic analysis using DNA marker or gene polymorphisms can be used in earlier selection programs for broiler depending on its relationship between body scales or measurement like correlation and regression which could be a useful tool to avoid high costs resulting in short period of rearing. The high correlation values obtained in the present study gives the possibility of benefiting from these traits not only in selections but also in predicting future weights or traits.

REFERENCES.

Al-Anbari EH and Mohamed HJ. 2017. Determination of Insulin gene INSg polymorphisms and their relationship with some productive traits in both sexes of hybrid broiler Ross308. *The Iraqi Journal of Agricultural Science*, 48(6):1381-1388.

Al-Anbari EH, Abbas AA, Al-Samarai FR, Al-Shamire JS and Al-Zaidi FH. 2013. Effect of using cumin oil (*Cuminum cyminum*) as feed additives on broiler analysis and growth curve of broiler. *Global*

Journal of Bio-Science and Bio-Technology, 2(3): 326-330.

AL-Hajo NN and AL-Fayadh H. 2007. The effect of age on some characteristics of carcasses from 8 to 16 weeks old broiler. *Iraqi Poultry Sciences Journal*, 2(2): 214-226.

Beuzen ND, Stear MJ and chang KC. 2000. Molecular markers and their use in animal breeding. *Veterinary Journal*, 160(1): 42-52.

Carrate S, Wang Z, Coto C, Yan F and Waldroup W. 2009. Effect of pellet diameter in broiler starter diets on subsequent performance. *The Journal of Applied Poultry Research,* 18(3): 590-597.

Chambers JR and Fortin A. 1984. Live body and carcass measurements as predictors of chemical composition of carcass male broiler chickens. *Poultry Science*, 63(11): 2187-2196.

Ewart J. 1993. Evaluation of genetic selection techniques and their application in the next decade. *British Poultry Science*, 34(1): 3-10.

Goliomytis M, Panopoulou E and Rogdakis E. 2003. Growth curves for body weight and major component parts, feed consumption, and mortality of male broiler chickens raised to maturity. *Poultry Science,* 82(7): 1061-1068.

Le BD, Berri EC, Baeza E, Millet N and Beaumont C. 2001. Estimation of the genetic parameters of meat characteristic and of their genetic correlations with growth and body composition in an experimental broiler line. *Poultry Science*, 80(7): 839-843.

Leterrier CN, Rose N, Constantin P and Nys Y. 1998. Reducing growth rate of broiler chickens with a low energy diet does not improve cortical bone quality. *British Poultry Science*, 39(1): 24-30.

Marks HL. 1995. Genetics of growth and development. World Animal Science, Poultry Production. P. Hunton, ed. Elsevier, Amsterdam. 170-182 p.

Molenaar R, Reijrink M, Meijerhof R and Van Den Brand H. 2007. Relationship between hatching length And weight on later productive performance in broilers. *World's Poultry Science Journal*, 64: 599-604.

Monika M, Stepinska M and Lukasiewicz M. 2011. Effect of the initial body weight of Ross 308 chicken broilers on the rate of growth. *Animal Science Journal*, 49: 121-125.

Nie Q, Lei MJ, Ouyang H, Zeng H, Yang ZG and Zhang X. 2005. Identification and characterization of single nucleotide polymorphisms in 12 chicken growth-correlated genes by denaturing high performance liquid chromatography. *Genetic Selection Evolution*, 37(3): 339-360.

Prescott NJ, Wathes CM, Kirkwood JK and Perry GC. 1985. Growth, food intake and development in broiler cockerels raised to maturity. *Animal Production*, 41(2): 239-245.

Willemsen H, Everraet N, Witters A, De Smit S, Debonne M, Verschuere F, Garain P, Berckmanse D and Bruggemon V. 2008. Critical assessment of chick quality measurements as an indicator of post hatch performance. *Poultry Science*, 87(11): 2358-2366.

Wolanski NJ, Renema RA, Robinson FE, Carney VL and Fancher BI. 2006. Relationship between chick conformation and quality measures with early growth traits in males of eight selected pure or commercial Broiler Breeder strains. *Poultry Science*, 85(8): 1490-1497.

Zangana BS, Ahmad AS and Al-Zawbae RR. 2011. Effect of chick weight and sex on dressing present and cuts for broiler Coob 700 at 35 age. 1-dressing percent

and cuts for caracas broiler. *Environmental Bio-Chemical Science Journal*, 6(1): 47-61.