Egypt. J. Anim. Prod. 22, No. 1, pp. 19-26 (1982)

Studies on Body Measurements and Dressing Weight of Broiler Chicks

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THE BREED type showed, in general, no significant effect on body length, thigh circumference and keel length. The shank length of each of White Plymouth Rock (WPR) and Cornish (C) breeds was significantly higher than that of cross-bred (C × WPR) and back-cross C × (C× WPR) groups of birds. The dressing weight of each C × (C× WPR) and WPR was significantly higher than that of each C and C × WPR birds.

The birds received the improved diet, were significantly higher in body-length, body circumference and shank length, but significantly lower in thigh circumference and keel length than those of broilers fed on the control ration.

All body measurements were significantly higher in males than in females, except the kell length which was males slightly higher but not significant in males than in females. The dressing weight showed similar trend to that reported in most of the body measurements in each of the two sexes.

The interaction effect of breed and diet showed that the C and WPR surpassed the cross-bred and the back-cross in shank length on the control and the improved diet, at the 11*th* week of age. While the improved diet was, generally, superior to the control diet in their effect on Shank length of all the studied breed types. The interaction effect of breed and diet on breast circumferencefwas significant at the 11*th* week of age. The effect of breed and diet on dressing-weight was highly significant, at the same age.

The relationship among body measurements and between body measurements and dressing weight have been studied through correlaltion as well as through path-coefficient analysis. The correlation studies showed that body length and body and thigh circumferences had positive correlations with dressing weight. The path-coefficient analysis revealed that body circumference was the most important attribute which exerted greatest direct and indirect positive effect on the dressing weight.

Lerner (1939) and Jaap (1941), demonstrated that the body measurements usually give an idea about the type of birds, since they are the major factors that affect body shape and conformation.

The present study was conducted to investigate the body measurements and carcass weight of some pure breeds ; their cross and back-cross broiler chicks as affected by breed, diet and sex.

The direct and indirect effects of some of these body measurements on dressing weight were also studied.

Material and Methods

The study included 1600 day old chicks of C, WPR, CXWPR and CX (cx WPR) with 100 chicks in each of 16 groups on a factorial design basis (4 breeds × 2 sexes × 2 diets).

Body shank and keel lengths and breast and thigh circumferences were measured for five birds in each group. The dressing weight and percentage were estimated for each treated group when slughtered at 12*th* week of age.

The control ration composed of 19.3% CP and 2572 ME Kcal /kg. The respective values were 23% CP and 2948 ME Kcal/kg in the improved ration. The decorticated cottonseed meal (40.6% CP) and local fish meal (40.7% CP) were used as major protein sources in the control diet, versus soybean meal (49% CP) and imported fish meal (70% CP) in the second one.

The statistical analysis was conducted after Sendecor and Cockran (1967). The path coefficient analysis was done according to the method used by Svab (1973).

Results and Discussion

Effect of breed diet and sex on body measurements and dressing weight and percentage

The effect of breed, diet and sex on body measurements and dressing weight and percentages in the different groups of birds at the eleventh week of age, are shown in Table 1.

The breed type showed, in general, no significant effect on the body length; thigh circumference and keel length. However, the body length of WPR was significantly, lower than that of the other breed groups. The shank length of each of WPR and C breeds was significantly higher than that of the cross-bred and back-cross groups of birds. The dressing weight of each CX (cxWPR) and WPR was significantly higher than that of each C and CXWPR birds. The dressing percentage values were nearly equal to that recorded by Moran and Orr (1970) and slightly higher than those obtained by Selim *et al.* (1974).

The birds received the improved diet, were significantly higher in body length, body circumference and shank length, but significantly lower in thigh circumference and keel length than those of broilers fed on the control ration. These results were in agreement with those obtained by Peterson (1975).

TABLE 1. **Broiler body measurements (cm) dressing weight (g) and percentage according to breed, diet; and sex at the eleventh week of age.**

Factors	Items	Body length	Breast circum-ference	Shank length	Thight circum-ference	Keel length	Dressing weight	Dressing %
Breed	WPR	19.10	27.1	7.70	8.8	9.4	806.8	67.5
	C	20.80	27.3	7.60	9.0	9.0	737.9	67.8
	CXWPR	28.70	27.0	6.80	9.0	9.0	706.0	69.1
	Cx (CxWPR)	20.50	27.0	6.90	8.4	8.4	822.3	69.3
	L.S.D <0.05	0.55	N.S.	0.29	N.S.	N.S.	54.8	N.S.
	L.S.D <0.01	0.72	N.S.	0.39	N.S.	N.S.	71.8	N.S.
Diet type	Controlt	19.30	26.4	7.10	9.2	10.1	703.7	67.3
	Improved	21.10	27.7	7.40	8.3	9.3	782.8	69.3
	"F" test.	H.S.*	H.S.	H.S.	H.S.	H.S.	H.S.	H.S.
Sex	Males	20.60	27.5	7.50	9.1	9.9	790.6	98.3
	Females	19.80	26.5	7.10	8.3	9.5	695.8	69.4
	"F" test	H.S.	H.S.	H.S.	H.S.	N.S.	H.S.	N.S.
	Average	21.20	27.1	7.30	8.8	9.4	755.7	68.5

*Not significant. *P<.01

All body measurements were significanly higher in males than in females except the keel length which was slightly higher but not significant in males than in females (Table2). Similar results were recorded by Afifi and Rosheed (1966) and Merritt (1966). The dressing weight showed similar trend to that reported in most of the body measurements, in each of the two sexes. These results were in agreement with those found in WPR by Probhokaran and Panganthan (1971).

The interaction effect of breed, diet and sex on body measurements and dressing weight

The interaction effect of breed and diet at the eleventh week of age was shown in Table 3. The C and WPR pure breeds surpassed the cross-bred and the back-cross in shank length on the control and improved diet, at the

11*th* week of age. The response of the WPR for the improved diet was high in this respect. However, the shank length showed nearly similar values on the improved and control diet in case of C, CXWPR and the CX (CXWPR) birds.

TABLE 2. **Values of the mean squares for broiler body measurements dressing weight, percentage according to breed, diet & sex and their interactions at the eleventh week of age.**

Source of variation	d.f.	Mean square values						
		Body length	Breast circum-ference	Shank length	Thigh circum-ference	Keel length	Dressing weight	Dressing %
Breed & crosses (B)	3	23.7^{xx}	1.6	9.1^{xx}	2.8	4.3	78529.3^{xx}	28.4
Diet type (D)	1	129.6^{xx}	63.8^{xx}	3.6^{xx}	29.8^{xx}	24.8	250035.2^{xx}	99.5
Sex (S)	1	24.1^{xx}	41.0^{xx}	5.6^{xx}	20.3^{xx}	0.2	359576.4^{xx}	13.2
B x D	3	5.2	11.7	1.7^{xx}	0.6	3.6	72402.6	8.5
B x S	3	2.0	3.8	0.3	1.1	2.9	21986.4	10.9
S x D	1	1.9	1.0	0.1	0.2	6.9	406.6	9.3

xx P < .01

The interaction effect of breed and diet on breast circumference was significant, at the 11 *th* week of age (Tables 2 & 3).

The control diet showed slightly higher value in the WPR breast circumference than in the other studied breeds and crosses. While, the feeding on the improved diet showed that the C and CXWPR were more superior than the other breeds and crosses in the same respect. Generally, the breast circumference was better on the improved diet than on the conventional one, in all the studied breed types.

The effect of breed and diet on dressing weight was highly significant, at the 11*th* week of age (Table 2). In general, the improved diet gave better dressing weight than the control diet in all the studied breeds and crosses, except the WPR which was of higher dressing weight on the control diet than on the improved diet. It seemed in general, that the WPR was more reliable as broiler chicks than the other studied breeds and crosses.

TABLE 3. **The significant interaction effect between breed and diet on shank length breast circumference and dressing weight, at the 11*th* weak of age.**

	WPR	C	CXWPR		L.S.D.	
					P < 0.05	P < 0.01
			Shank length (cm)			
D_1	7.25	7.60	6.85	6.95	0.41	0.54
D_2	8.15	7.80	6.90	6.90		
			Breast circuference (cm)			
D_1	26.90	26.70	25.50	26.70	0.29	0.41
D_2	27.40	28.00	28.30	27.30		
			Dressing weight (g)			
D_1	826.00	666.00	636.00	687.00	77.44	101.54
D_2	788.00	810.00	776.00	758.00		

The first order interactions (breed x diet, breed x sex and diet x sex) were insignificant (Table 2).

Correlation studies

The correlation coefficient values represented in Table 4 showed that each of the studied body measurements had positive correlations with dressing weight. The correlations between each of body, thigh circumferences and dressing weight were significant, while the correlation between body length and the dressing weight was not significant.

As regards correlation among various body measurements (Table 5), each attribute had positive and significant correlation with the other one.

TABLE 4. **Correlation coefficient between some body measurements and dressing weight of broiler chickens.**

Characters	Body length (1)	Body circumference (2)	Thigh circumference (3)
Dressing weight	0.2088	0.8082^{XX}	0.6052^{X}

xx P < 0.01 x P < 0.05

TABLE 5. **Correlations between some studied body measurement.**

r_{ij}	r values
r_{12}	0.5580^{x}
r_{13}	0.6346^{xx}
r_{23}	0.7176^{xx}

xx $P < 0.01$ x $P < 0.05$

Path- coefficient studies

In view of the possibility that the simple correlation among the compon ents might be masking the real contribution of the different components to the end product *i.e.* dressing weight, it was decided to undertake a path-coefficinent analysis between the formentioned body measurements and this end product (Table 6).

The body length had a negative direct influence on dressing weight, howe-ver, the simple correlation showed a positive effect.

The negative direct effect of this component was not masked by the posi-tive indirect effect *via* body and thigh circumferences.

TABLE 6. **Path-coefficient analysis between dressing weight (y) and some studied body measurements of broiler chickens.**

Components	r
1, *Body length*	
Direct effect	—0.4416
Indirect effect *via* body circumference	+0.4822
Indirect effect *via* thigh circumference	+0.1683
r_{y1}	+0.2088
2. *Body circumference*	
Direct effect	+0.8643
Indirect effect *via* body length	—0.2464
Indirect effect *via* thigh circumference	+0.1903
r_{y2}	+0.8082
3, *Thigh circumference*	
Direct effect	+0.2652
Indirect effect *via* body length	—0.2802
Indirect effect *via* body circumference	+0.6202
r_{y3}	+0.6052

The direct effect of body circumference on dressing weight was high and positive.This was in agreement with the high value of simple correlation between the two mentioned characters. The indirect effect *via* body length was negative and that *via* thigh circumference was positive; however their values were small (Table 6).

The indirect high positiveeffect of thighcircumference through body circumference was mashed by the small direct effect and the high simple correlation values and the small negative effect *via* body length. The indirect effect *via* body circumference was apparently high and positive. The results shown in Table 7 indicated that body circumference had the highest effect on dressing weight compared to the other two body measurements.

TABLE 7. **Components (direct and joined effects) of the studied body measurements on dressing weight of broiler chicknes.**

Components		Multiple determination coefficient (%)
Direct effect		
Body length (X_1)	P_1^2	+ 19.50
Body circumference (X_2)	P_2^2	+ 74.70
Thigh circumference (X_3)	P_3^2	+ 7.03
Indirect effect		
X_1X_2	$2\,P_1P_2\,r_{12}$	— 42.60
X_1X_3	$2\,P_1P_3\,r_{13}$	— 14.86
X_2X_3	$2\,P_2P_3\,r_{23}$	+ 32.90
	R^2	+ 76.67
	Residual factors	+ 23.33
	Total	100.00

It could be concluded that the path-coefficient analysis revealed that body circumference was the most important attribute which exerted greatest positive influence directly and indirectly upon the dressing weight. Accordingly it may be suggested that the breast circumference may be a reliable index in selection for meat production.

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دراسات على مقاييس الجسم والمتضمن فى كتاكيت التسمين

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أظهرت الأنواع والهجن المستخدمة فى هذه الدراسة تأثيرا غير معنوى على محيط الفخذ وطول عظمة القص بينما كان طـــول قصبة الأرجـــل لكل من نوعى البليموث الأبيض والكورنيش أعلى معنويا من هجين الكورنيش × البليموث والهجين الرجعى كورنيش (كورنيش × بليموث) • كما كان وزن التصـــافى فى كل من الهجين الرجعى والبليموث أعلى معنـــويا عنه فى حالة الكورنيش والهجين الكورنيش × البليموث •

كما كانت الطيور التى غذيت على العليقة المحسنة أعلى معنويا فى طـــول الجسم ، محيط الصدر وطول قصبة الأرجل بينما كانت أقل معنويا فى محيط الفخذ وطول عظمة القص عن بدارى التسمين التى غذيت على عليقة المقارنة

كانت مقاييس الجسم كلها وكذلك وزن التصافى أعلى معنـــويا فى الذكور عنها فى الاناث عدا طول عظمة القص حيث كانت أطـــول قليلا فى الذكور ولكن بدرجة غير معنوية من الناحية الاحصائية •

أظهر تأثير التداخل بين كل من النـــوع والعليقة تفـــوق الكورنيش والبليموث عن الهجين والهجين الرجعى فى طول قصبة الأرجل عند التغذية على العليقة المحسنة وعليقة المقارنة فى عمر ١١ أسبوعا ، بينما كانت العليقة بصفة عامة أفضل من عليقة المقارنة فى تأثيرها على طول قصبة الأرجل لكل الأنواع والجهن موضع الدراسة •

كما كان تأثير التداخل بين النوع والعليقة معنويا بالنسبة لمحيط الصدر ووزن التصافى معنويا عند عمر ١١ أسبوعا •

درست العلاقة بين مقاييس الجسم وبعضها وكذلك العلاقة بين مقاييس الجسم ووزن التصافى عن طريق حساب معامل الارتباط البسيط وتحليـــل معامل الارتباط الى تأثيره المباشر والغير مباشر • وأظهـــرت نتائج الارتبـــاط البســـيط وجود علاقة موجبة بين طول الجســـم ومحيطه ومحيـــط الفخذ وبين وزن التصافى • بينما أظهر تحليل معامل التلازم أن صفة محيط الصـــدر كانت أهم صفة ساهمت بتأثير موجب مباشر وغير مباشر على صفة التصافى فى كتاكيت التسمين موضوع الدراسة •