CORRELATION COEFFICIENT ON INTERNAL EGG QUALITY PARAMETERS IN JAPANSE QUAILS (*Coturnix coturnix japonica*) FED TWO COMMERCIAL DIETS IN NORTH EAST NIGERIA

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ABSTRACT
The study was conducted at the Research Farm of Abubakar Tafawa Balewa University, Bauchi; Nigeria; to study the correlation coefficient of internal egg quality parameters in Japanese quails *(Coturnix coturnix Japonica)*. The results showed that, there are many significant correlations between most of the traits studied for instance between egg weight and albumen weight, Haugh unit vs albumen thickness and egg weight vs yolk index were, r = 0.300, r = 0.921, r = 0.997 and r = 0.481, respectively. However, effects of diets on internal egg quality traits showed significant differences (P<0.05) in yolk height, yolk index, Haugh unit and albumen thickness in the parent stock with respect to the two diets investigated. While in the F1 generation only yolk height, Haugh unit and albumen thickness were significantly (P<0.01) affected by the dietary treatments. There are many significant correlations between many of the traits studied for instance, between egg weight vs albumen weight, feed efficiency vs feed conversion ratio, Haugh unit vs albumen thickness and egg weight vs yolk index. Based on the results obtained, the productivity of quails in the study area is appreciable compared to the level obtained elsewhere. It is therefore recommended that improvement in the genetic make-up and the diets will go a long way towards improving their productivity.

INTRODUCTION
Quail production is becoming increasingly profitable as it has already gained consumer attraction in Nigeria and elsewhere, owing to the very tender, tasty and highly acceptable meat and uniform low cholesterol eggs. Quails have a very short generation interval matures early (35 days) and quail hen lays from 200-300 eggs annually. In the wild, they lay 5-12eggs (Sanford, 1957). Quails egg weight approximately 10g (Smith, 1997). A very fast way of making animal protein available to the growing population is to intensify efforts in micro-livestock production, one of which is quails production. The most popular quail species is *Coturnix coturnix* which includes *Cotunix cotunix coturnix* (European quail) *Coturnix coturnix Africana* (African quail) and *coturnix coturnix Japonica* (Japanese quail). The Japanese quail is the most widely spread and its eggs are commercially produced (Randall and Bolla, 2007). The meat of quail is lean and the egg is low in cholesterol (Schwartz and Allen, 1987). Agwunobi and Ekpengyoung (1990), reported that the meat of quail and the egg have low cholesterol, less fat and higher protein content and is a good quality meat for diabetic and high blood pressure patients, hence quails is of public health significance (Edache *et al.*, 2007). Quails therefore can serve as a source of fast and cheap animal protein for both rural and urban dwellers (Musa *et al.*, 2007).

MATERIALS AND METHODS
Study Area: Bauchi is located in the Northern guinea Savannah and is situated between latitude $9^0$30'N and $12^0$30'N and longitude $8^0$45' and 11^0E. The state has an average altitude of about 600mm above sea level. The temperature ranges from minimum of 9-10^0c in December to January to a maximum of 35-45^0c between April and May. The annual rainfall ranges from 600mm-1300mm (National Office of Statistics 1999).

Source of Experimental Materials: About 230 quail birds were purchased from National Veterinary Research Institute (NVRI) Vom of about 5-6 weeks of age. The birds were transferred to fabricated metal cages inside the poultry house where they were grouped in a ratio of 1 male to 3 females per pen. They were housed in a cage petitioned into 8 units in a completely randomized design. All the chicks were weighted in a group and individually before placing them into the units, each quail was weighed from each unit at weekly interval for seven weeks. There were two treatments with four replicates each of 15 laying birds and 5 males randomly selected and assigned to each treatment. The birds were properly housed in a fabricated metal cages where two commercial feeds and water were given *ad libitum*. Eggs collection, incubation and hatching procedure were done using manually operated waterbed incubator. Brooding, rearing and other

management practices were conducted accordingly. Mean daily feed intake, mean egg production, mean feed conversion and mean egg weight were recorded as described by Orunmuyi (2008) and (Bawa *et al.*, 2010).

Data Analysis

Data was subjected to analysis SPSS (1996) statistical package procedures.

RESULTS

Data on correlation coefficient of internal egg quality parameters in the parent stock are presented in Tables 1 and 2. The results indicated that, some traits exhibited high positive correlations. For instance there is a high positive correlation between albumen thickness vs Haugh unit, yolk index vs albumen thickness, Haugh unit vs yolk index, yolk height vs yolk index, yolk weight vs albumen weight and yolk weight vs yolk height (r = 0.997, 0.319, 0.321, 0.345, 0.347 and 0.554, respectively).

Similarly, there were highly negative correlations between albumen thickness vs yolk width, Haugh unit vs yolk width, yolk width vs yolk index and albumen weight vs albumen thickness(r = -0.398, -0.386, -0.262, -0.151, and -0.139, respectively).

However, the data shows that, some traits were not significantly correlated. For example, the relationship between egg production vs albumen weight, feed efficiency vs egg production, Haugh unit vs egg production, yolk index vs live weight, and shell weight vs feed intake their values being r = 0.000, 0.039, 0.002, 0.039 and 0.035 respectively.

DISCUSSION

Statistically significant (P<0.01) positive correlations on internal egg traits were those between Haugh vs albumen thickness, yolk index vs yolk height, yolk weight vs yolk height in the parent stock. These results indicated that as the yolk weight, height and diameter increases, albumen height increased and the better the albumen quality. This is supported by Akbas *et al.*, (1996), who reported significant positive correlation between yolk height and albumen length (0.48) and Haugh unit (0.56), and between albumen height and Haugh unit (0.97). The negative correlation values with respect of quality traits in the parent stock (-0.066, -0.128, and -0.135) between yolk index vs albumen weight, Haugh unit vs albumen weight and yolk weight vs Haugh unit, respectively). The influence of the treatment diets is highly significant in the parent stock with respect to internal traits such as yolk index, yolk height and albumen thickness

Conclusion

It can be concluded that, quails can successfully be raised and managed on commercial broiler diets, therefore improvement in the genetic make-up and the diets will go along way toward improving their productivity.

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Table 1. Correlation co-efficient among growth performance and egg quality traits in Japanese Quails (parents)

PARAMETERS	AT	AW	EP	EW	FCR	FE	FI	HA	LW	ST	SW	YT	YI	YW	YWt
AT	1.000														
AW	-0.139	1.000													
EP	0.32	0.651	1.000												
EW	-0.188**	0.500**	-0.004	1.000											
FCR	0.071	0.018	-0.054	0.071	1.000										
FE	-0.050	-0.047	0.000	-0.040	-0.420**	1.000									
FI	-0.145	-0.125	0.051	-0.055	0.439**	-0.420**	1.000								
HA	0.997**	-0.128	0.039	-0.191*	0.068	-0.045	-0.0152	1.000							
LW	-0.194*	-0.001	0.100	-0.104	-0.686**	0.631	0.240**	-0.196**	1.000						
ST	-0.262**	0.547**	0.076	0.250**	-0.047	0.002	0.536	-0.246**	0.070	1.000					
SW	-0.120	0.115	-0.076	0.110	-0.057	0.019	0.035	-0.115	0.086	0.681**	1.000				
YT	0.143	0.074	0.033	-0.026	-0.044	0.029	0.029	0.152	0.086	0.255**	0.202**	1.000			
YI	-0.519**	-0.066	0.025	-0.212**	-0.036	0.015	0.003	0.121**	0.039	-0.043	-0.037	0.909**	1.000		
YW	-0.398**	0.543**	0.027	0.159**	-0.027	0.018	0.117	-0.131	0.666**	0.573	0.155	0.262**	0.262**	1.000	
YWt	-0.151	0.151	0.093	0.000	0.223**	-0.022	0.065	-0.135	0.034	0.746**	0.600	0.347**	0.127	0.554**	1.000

Correlation is significant at * P<0.01

Means in homogeneous subsets are similar NS = Not Significance AT = Albumen Thickness AW = Albumen Weight FCR = Feed conversion ratio FE = feed efficiency FI = feed intake HA = Haugh unit LW = live weight ST = shell thickness SW = shell weight YT = yolk thickness YI = yolk index YW = yolk weight YWt = yolk width

Table 2. Correlation co-efficient among growth and egg quality traits in Japanese quails (F1) generation

PARAMETERS	AT	AW	EP	EW	FCR	FE	FI	HA	LW	ST	SW	YT	YI	Y	YW
AT	1.000														
AW	0.680**	1.000													
EP	-0.079	0.174*	1.000												
EW	0.868*	0.764**	-0.140	1.000											
FCR	-0.013	-0.004	0.015	0.006	1.000										
FE	-0.059	-0.064	0.037	0.054	-0.881**	1.000									
FI	-0.182*	-0.206**	0.665**	-0.220**	0.803**	-0.886**	1.000								
HA	0.992**	0.669**	0.059	0.830	0.667**	-0.691*	0.806**	1.000							
LW	-0.047	-0.070	0.200*	-0.083	-0.159*	-0.157	0.452**	0.330**	1.000						
ST	0.384**	0.214*	-0.122	0.515**	0.102	-0.117	-0.691	0.361**	-0.164	1.000					
SW	0.615**	0.104	0.007	0.608**	-0.018	-0.013	-0.105	0.601**	-0.614**	0.328	1.000				
YT	0.872**	0.729**	-0.116	0.919	0.008	-0.097	-0.251**	0.848**	-0.594	0.611**	0.575**	1.000			
YI	-0.382**	-0.329**	0.046	-0.481**	0.055	-0.120	0.078	-0.362**	-0.007	-0.087	0.247**	-0.285**	1.000		
YW	0.758**	-0.656**	-0.105	0.869**	0.003	-0.021	-0.259**	0.716**	-0.087	0.456**	0.484**	-0.805**	0.707	1.000	
YWt	0.699**	0.629	-0.139	0.803**	-0.034	-0.046	-0.32	0.664**	-0.042	0.261*	0.464**	0.957**	-0.519	0.750**	1.000

Correlation is significant at * P<0.01

Means in homogeneous subsets are similar NS = Not Significance AT = Albumen Thickness AW = Albumen Weight FCR = Feed conversion ratio FE = feed efficiency FI = feed intake HA = Haugh unit LW = live weight ST = shell thickness SW = shell weight YT = yolk thickness YI = yolk index YW = yolk weight YWt = yolk width