RATE OF GENETIC IMPROVEMENT IN BODY WEIGHT COMPONENT AND REALIZED HERITABILITY OF MINERAL COMPOSITION OF BREAST MEAT IN JAPANESE QUAIL (Cotunix coturnix japonica)

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ABSTRACT- A study was conducted to determine genetic improvement in carcass traits, body weight, shank length and realized h^2 of mineral composition in meat portion of Japanese quail in Northern zone of Nigeria. Seven hundred and eighty four (830) chicks of 14 days of age were used and Data obtained were subjected to analyses of variance and realized heritability calculated as appropriate from the following: to determine live body weight, carcass traits in generations and sex, body weight gain and increase in shank length, live body length, carcass traits, weight gain, realized h^2 of body weight, carcass weight, carcass weight part, shank length, and minerals composition in breast meat of Japanese quail. The result shows that the live body weight and carcass trait significantly affects the generations and sex of birds. Live body weight and carcass traits in first generation are lower than base and second generation. The body weight gain and shank length increases at day 35, 42, 49 and 56 in sex of Japanese quail. The realized h^2 of body weight and percentage carcass weight and parts of the traits in Japanese quail shows high h2 (0.40-0.83) and moderate h^2 (0.20-0.40). The h2 for body weight and shank length for the traits are high (0.40-0.99) and moderate (0.20-0.40). The realized h^2 of minerals composition in breast meat of the Japanese quail also shows high h2 (0.46-0.83) in most of the traits and moderate h2 in calcium (0.20) for male and low h2 also in phosphorus for males (0.17) and combined sex (0.13). The moderate to high realized h^2 observation indicates that response to selection for high body weight affects the traits therefore response could be rapid while low h^2 implies that response to selection could be slow therefore response to selection is slow.

Keywords - Japanese quail, generations, sex, weight gain, heritability

1.INTRODUCTION

Quail industry in developing countries is one of poultry sector that will never be neglected this is because they have shorter generation interval and are very prolific. Efforts are therefore towards encouraging the production and exploitation of the genetic make- up of the bird to improve the availability of animal protein constantly because the conventional livestock has not been able to meet up with the demand for animal protein in most developing counties. Quails are known to be dimorphic in sex but many researchers stated that female live body weight and Carcass traits values are higher than the males [1] and [2]. In selection generations live body weight and carcass traits in generation one are lower than base and second generation. Selection for high body weight in Japanese quail positively improved the live body weight and Carcass traits in Japanese quail as they advance in age [3]; [4] and [5] . Selection for increased body weight induced changes in the sizes of various organs [6] and [7] . In studies [8] ; [9]; [10] higher body weight gain was observed in selected birds as compared to random bred.

High h^2 for body weight as birds advances in age was observed by [11]; [12]; [13]; [14]. Differences in h^2 estimates can be attributed to method of estimation, strain, environmental effects and sampling error due to small data act or sample size [15]. The shank length, however, interspecies difference in h^2 are obviously (in Turkeys; 0.54, [16]; in Chickens; 0.31 and 0.33, [17]; 0.58, [18]. The utilization of quail is envisaged to address the protein deficit particularly in rural areas where the deficit is most apparent. Selection base on high body weight is an option to improvement the body weight component and genetically estimates the composition of breast meat in Japanese quail *(Cotunix coturnix japonica)*. The objectives of this research therefore was designed to obtain an understanding to response to genetic improvement in carcass traits, body weight and shank length so as to determine the realized heritability of breast portion of meat in Japanese quail.

2. MATERIALS AND METHODS

2.1. Experimental Site

The study was conducted at the Poultry Unit of Animal Science Department, Faculty of Agriculture, Ahmadu Bello University, Samaru – Zaria. Zaria is within Northern Guinea Savannah zone of Nigeria, latitude 11’ 12˚N and longitude 7’ 33˚E at an altitude of 610M above sea level. The climate is relatively dry, with mean annual rainfall of 700-1400mm, occurring between the Month of April and September. The dry season begins around the middle of October, with dry cold weather that ends in February. This is followed by relative hot, dry weather from March to April, when the rain begins. The mean minimum and maximum daily temperature is about 14° and 24°C during the cool season and 19° and 36°C during the hot season. The relative humidity varies between 19% in the dry season and between 63% and 80% in the wet season as stated by [19].

2.2. Mating Plan

Selection was carried out on the birds at day 56 after weighing all the birds. Those with the highest weight were chosen for breeding consisting of 28 males and 84 females. The selected birds were mated in a constructed cage at the ratio of 1 male to 3 females (1:3) in constructed caged of 10cm x 10cm x 10cm and the birds were identified in accordance with the families and 1500 fertile eggs were hatched to determine the BW, carcass weight, Body Length traits, minerals and chemical composition of meat.

2.3. Management of Fertile Egg

Eggs were collected daily after the birds had reached maturity, as from at each of day 35, 42, 49 and 56 days of age. Eggs were identified by their sire families (28), stored at room temperature lower than 20°C and 65% relative humidity (RH) for a week, and then disinfected with tetra hydroxyl (TH4) mixed with 1 liter of water for spraying on egg surface. Pedigreed eggs were set in the setting trays, depending on their sire families and arranged in a forced draft incubator with temperature of 37.5°C and 65% RH. Eggs were turned automatically every three hours. At the end of the 14th day of incubation, eggs were transferred into pedigree hatching baskets and moved into the hatcher where the temperature was 37.5°C and RH was 70%.

2.4. Incubation and Hatching of Fertile Eggs

Pre-incubation of the fertile egg collected was made by storing them at a temperature of 15°C. Fumigation was done 12 hours before placing them in the incubator. When eggs were set in the incubator, temperature requirement was put at 37.5 °C with humidity of 60% and turning of eggs was at an angle of 45° for 4-6 times a day and the chicks were hatched at day 18 of incubation.

2.5. Experimental Birds and their Management

The research work was with 784 Japanese quails at 14 days of age, purchased from National Veterinary Research Institute (NVRI), Vom, and Plateau State. The management of the young chicks included the provision of supplementary heat for 4 weeks less than 24 hours lighting, and thereafter 13 to 16 hours light and 6 to 8 hours dark cycle. Indoor air temperature for the chicks was 36 °C. Birds were allowed *ad libitum* access to food and water. They were fed with starter and grower diet containing 24% crude protein (CP) and 2904ME, Kcals/kg between 1-35 days of age. Thereafter a breeder diet containing 23% CP and 2800, Kcals/kg ME was fed. The same diets were provided to birds on the selection process across various generations. The minerals and vitamins were adequately supply to cover the requirements according to NRC [20].

2.6. Data collection

Three generations namely base population, G_1 and G_2. The following data were collected on each generation:

2.7. Body Weight

Six hundred and seventy two birds were used to study the body weight (g) traits of the birds. The birds were sexed at day 21 at which point they were feathered. The birds were housed in 28 constructed cages each house 10 male and 10 female quails,. The dimension for the cages was 60cm × 45cm × 45 cm (length breath height). The birds were separated by sex to avoid indiscriminate mating. Three 3 male and 3 female birds from each cage were randomly picked at day 35, 42, 49 and 56 in each generation G_0, G_1, G_2 to estimate the live body weight (g) respectively.

2.8. Measurement of the Live Body Changes (g):

After sexing at day 21, 28 male and 28 female birds from both the parents of base $generation_0$ (G_0), $Generation_1$ (G_1) and Generation $_2$ (G_2) each at day 35, 42, 49 and 56 were randomly selected and body weight increment recorded for each generation and the record were used to estimate growth rate. The increase in body size was measured to the nearest 0.1g.

2.9. Live Body Length Measurement(cm):

Six hundred and seventy two birds were used to estimates Live body weight measurement and shank length measurement traits at interval of day 35, 42, 49 and 56, measurements were taken after sexing at day 21 (point when birds were feathered).

2.10. Carcass Trait Measurement :

The same birds used for live body weight are used twelve hours prior to slaughter live weight (g), 3 males and 3 females birds from each of the 28 cages were deprived of feed and after slaughter, they were defeathered to determine: Carcass Weight (g), Drum stick+ Thigh weight (g), Back weight (g). The following carcass traits were measured to the nearest 0.1gm: Live weight (g): The weight of each live bird was obtained before slaughter using digital weighing machine, Carcass Weight (g): Determined as the difference between the live weight and the weight after bleeding, defeathering and evisceration.

Dressing percentage (DP %): Calculated using the following formula:

$$DP = \frac{\text{Carcass}}{\text{Live body weight}} \times 100$$

Each carcass was cut into retails : Drum stick + Thigh weight (g): Determined by placing the drum stick and thigh on digital weighing machine, Back weight (g): Weight of the back was measured on digital weighing machine, Shank weight (g): Separated at the hock joint and weight measured.

2.11. Body weight gain:

Daily body weight gain during the different growth periods after sexing from day 28 to 35, 35 to 42, 42 to 49, and 49 to 56 were calculated using the improvement body weight gain and percentage improvement body weight gain as follows:

$$\Delta Gg = \frac{W_2 - W_1}{W_1}$$

$$\%\Delta Gg = \frac{W_2 - W_1}{W_1} \times 100$$

Where: ΔGg = Improvement gain, $\%\Delta Gg$ = Percent of improvement gain, W_1 = Initial body weight,

W_2 = Final body weight

2.12. Estimation of Genetic Parametersz

2.13. Response to selection

Where realized h^2 is calculated as response to selection per selection differential (SD) which is the selection differential and refers to the superiority, or inferiority of those selected as Parents (unselected) generation thus $R = P_1 - P_0$ Where: R= Response to selection, P_1 =Mean body weight of offspring, P_0 =Mean body weight of parents(unselected) generation.

2.14. Statistical analysis

All data collected were subjected to analysis of variance using the general linear model (GLM) of SAS [21] . The below model was adopted: $Y_{ijk} = \mu + S_i + B_j + H_{ij} + e_{ijk}$

Where: Y_{ijk}= measurement of individual bird; μ = overall means; S_i = effect of age ith (35, 42, 49 , 56 day); B_j = effect generation j^{th} (1, 2); H_l = efeect of sex l^{th} (l = male and female); e_{ijlk} = random error. Significant differences between means were ranked by using Duncan's Multiple Range Test [22].

parents, Ps as compared to the average of the population, P from which the breeding animals were selected denoted SD= (Ps- P) Where Ps is the average of the selected individuals P is the average of the population before selection. Response to selection (R) is refers to as mean body weight of offspring less Mean body weight of The least square means of live body weight and carcass traits of Japanese quail by generation and sex where shown in Table 1. The result indicated that the body weight and carcass traits of the Japanese quail differed significantly ($P< 0.01$) in generation and sex, except body weight 35d, body weight 42d, % carcass weight, abdominal fat weight, breast weight, % breast weight, % drum + thigh weight, % back weight differed significantly ($P< 0.05$) in sex of birds while body weight 56d, Live body weight, carcass weight, % abdominal fat weight, % breast weight, drum + thigh weight,, back weight and % back weight differed significantly ($P< 0.05$) in generations. The female shows than increased in body traits than males except % carcass weight, abdominal fat weight, %

abdominal fat weight. The generation selected (Gs)

values are higher than G_1 and

Table 1: Least square means of live body weight and carcass traits of Japanese quail by generation and sex

Traits		Sex			Generation			
		Males	Females		G_s	G_1	G_2	
	N	**M**±SE	**M**±SE	LoS	**M**±SE	**M**±SE	**M**±SE	LoS
Body Weight 35d (g)	56	145.0 ± 1.73^{b}	147.8 ± 1.65^{a}	*	175.2 ± 1.54^{b}	134.3 ± 1.67^{c}	157.8 ± 2.28^{a}	**
Body Weight 42d (g)	56	164.0 ± 1.83^{b}	176.5 ± 1.80^{a}	*	199.5 ± 1.78^{b}	163.2 ± 1.73^{c}	185.9 ± 3.18^{a}	**
Body Weight 49d (g)	56	181.2 ± 1.82^{b}	203.6 ± 1.92^{a}	**	205.1 ± 2.10^{b}	178.8 ± 1.34^{c}	193.0 ± 2.17^{a}	**
Body Weight 56d (g)	56	207.3 ± 2.37^{b}	235.8 ± 2.02^{a}	**	220.2 ± 2.56^{b}	202.0 ± 2.76^{c}	217.1 ± 2.67^{a}	*
DAY 56								
Live body weight (g)	556	207.2±1.21	236.0±2.11	**	223.5±3.14	201.3±1.15	215.2±2.25	*
Carcass Weight(g)	56	185.9 ± 1.41^{b}	207.6 ± 1.92^{a}	**	211.8 ± 2.10^{b}	182.41 ± 2.32^{c}	195.9 ± 2.32^{a}	*
% Carcass Weight	56	89.7 ± 0.62^{a}	88.1 ± 0.92^{b}	*	91.6 ± 0.72^{b}	86.3 ± 1.72^{a}	88.9 ± 1.67^{c}	*
Abdominal Fat Weight(g)	56	7.2 ± 0.15^{a}	6.9 ± 0.08^{b}	*	7.7 ± 0.12^{c}	6.0 ± 0.08^{b}	7.3 ± 0.13^{a}	*
%AbdominalFat Weight	56	3.9 ± 0.09^{a}	3.3 ± 0.08^{b}	*	3.9 ± 0.42^{c}	3.4 ± 0.05^{a}	3.7 ± 0.52^{b}	*
Breast Weight (g)	56	70.4 ± 0.36^{b}	77.8 ± 0.23^{a}	*	85.5 ± 0.56^{b}	68.8 ± 0.42^{c}	75.9 ± 0.46^{a}	*
%Breast Weight	56	37.7 ± 0.12^{a}	37.2 ± 0.28^{b}	*	40.5 ± 0.21^{b}	33.4 ± 0.44^{c}	38.7 ± 0.38^{a}	**
Drumstick+ThighWeight (g)	56	44.2 ± 0.24^{b}	57.5 ± 0.25^{a}	**	43.7 ± 0.35^{b}	35.0 ± 0.53^{c}	39.9 ± 0.58^{a}	*
% Drumstick+ Thigh Weight	56	23.6 ± 0.21^{b}	27.3 ± 0.18^{a}	*	37.2 ± 0.32^{b}	19.2 ± 0.39^{c}	30.0 ± 0.22^{a}	**
BacK Weight (g)	56	57.4 ± 0.74^{b}	66.3 ± 0.82^{a}	**	42.3 ± 1.89^{b}	34.0 ± 0.95^{c}	38.4 ± 1.28^{a}	*
% BacK Weight	56	30.7 ± 1.42^{b}	31.7 ± 0.62^{a}	*	38.2 ± 1.32^{b}	28.8 ± 1.28^{c}	35.5 ± 1.62^{a}	*

Means within each row for the sexes and generations with different superscripts differ*= ($P< 0.05$),**=($P< 0.01$); LoS= Level of significance,G0 = Base population;G1= Generation one; G2 = Generation two.

Table 2 : The Weight gain for body weight and shank length in Japanese quail				
Traits	Sex	Weight gain	Growth rate	
			Mean	%
Body Weight 35d (g)	Males	3.76	0.18	18.04
	Females	2.93	0.14	14.02
	Mean	3.34	0.16	16.03
Body Weight 42 d (g)	Males	3.24	1.13	13.24
	Females	3.23	1.13	12.75
	Mean	3.24	0.13	12.99
Body Weight 49 d (g)	Males	1.30	0.05	5.11
	Females	5.60	0.19	19.21
	Mean	3.45	0.13	12.65
Body Weight 56 d (g)	Males	6.80	0.22	22.13
	Females	1.78	0.06	5.67
	Mean	4.29	0.14	13.83
Shank Length 35d (cm)	Males	0.12	0.21	20.51
	Females	0.07	0.13	13.33
	Mean	0.09	0.17	16.97
Shank Length 42d (cm)	Males	0.04	0.09	9.09
	Females	0.09	0.19	18.75
	Mean	0.06	0.14	13.93
Shank Length 49d (cm)	Males	0.09	0.19	18.75
	Females	0.07	0.16	15.87
	Mean	0.08	0.17	17.30
Shank Length 56 (cm)	Males	0.06	0.13	13.00
	Females	0.07	0.16	15.87
	Mean	0.06	0.49	49.45

G_2 has higher values than G_1. The weight gain and growth rate for body weight and shank length in Japanese quail is shown in table 2. The result indicated that there was a general improvement in weight gain and growth rate in body weight and shank length. The male's weight gain for body weight at day 35, 42 and 49 were higher than the females but at day 49 females body weight gain supersede the males. The male's shank length gain was higher at day 35 and 49 than the males but lower than the females at day 42 and 56d.

Table 3: Realized heritability of body weight and percentage carcass weight and parts in Japanese quail

Traits	Response to Selection		Selection Differential		Realized h^2
	Mean	%	Mean	%	
Body Weight 35d (g)	23.41	14.84	40.83	23.31	0.57
Body Weight 42d (g)	22.68	12.20	37.28	18.69	0.61
Body Weight 49d (g)	14.15	7.33	26.29	12.82	0.54
Body Weight 56d (g)	15.02	6.92	18.12	8.24	0.83
DAY 56:					
Live body weight	13.19	6.13	22.2	11.02	0.59
Carcass Weight(g)	13.6	6.94	29.5	13.93	0.46
% Carcass Weight	2.6	2.92	5.3	6.14	0.49
Abdominal Fat Weight(g)	1.3	17.81	1.7	22.08	0.76
% Abdominal Fat Weight	0.2	5.56	0.5	12.82	0.40
Breast Weight (g)	7.1	9.35	16.7	19.53	0.40
%Breast Weight	5.2	13.47	7.1	17.53	0.73
Drumstick +Thigh Weight(g)	4.9	12.28	8.7	19.91	0.56
% Drumstick+ Thigh Weight	10.9	36.0	18.0	48.39	0.22
BacK Weight (g)	4.4	11.46	8.3	19.62	0.22
% BacK Weight	6.7	18.87	9.5	24.93	0.71

The percentage growth rate for the body weight and shank length at day 35, 42, 49 and 56d for males are higher than the females except body weight at day 49, shank length at day 42 and 56d.

Table 3 show the realized heritability of body weight and percentage carcass weight and parts in Japanese quail. The result shows that realized h^2 from moderate to high (0.22 to 0.83).There was general percentage improvement in the traits. The response to selection mean and percentage values were higher in selection differential than response to selection.

The realized heritability of body weight and shank length in Japanese quail is shown in table 4. The result indicated that the realized heritability for most of the traits are high except body weight at day 49 in males, body weight at day 56 in females, shank length at day 35 in males, shank length at day 42 in males and females and shank length at day 56 in males that are moderate 0.34, 0.33, 0.29, 0.22, 0.22 and 0.36, respectively. While low h2 were notice in shank length at day 42 in overall sex mean, shank length at day 42 in overall sex mean as o.07, 0.18 and 0.20, respectively.

Table 4: Realized heritability of body weight and shank length in Japanese quail

Traits	Sex	Response to selection		Selection Difference		Realized h^2
		Mean	%	Mean	%	
Body Weight 35d (g)	Males	14.34	9.13	20.57	12.59	0.70
	Females	9.51	6.12	21.68	12.93	0.42
	Mean	11.93	7.63	21.09	12.75	0.57
Body Weight 42 d (g)	Males	22.71	12.42	22.88	12.22	0.99
	Females	4.64	2.56	10.19	5.46	0.46
	Mean	13.67	7.52	16.54	8.81	0.83
Body Weight 49 d (g)	Males	9.07	3.91	26.64	10.67	0.34
	Females	14.22	5.83	32.93	12.54	0.43
	Mean	11.65	4.90	28.79	11.28	0.40
Body Weight 56 d (g)	Males	17.60	7.07	34.10	12.85	0.52
	Females	9.43	4.06	28.68	10.56	0.33
	Mean	13.52	5.39	31.39	11.69	0.43
Shank Length 35d (cm)	Males	0.20	6.06	0.70	18.42	0.29
	Females	0.05	1.59	0.75	19.23	0.07
	Mean	0.13	4.02	0.72	18.95	0.18
Shank Length 42d (cm)	Males	0.20	5.88	0.90	21.95	0.22
	Females	0.31	5.71	0.90	21.43	0.22
	Mean	0.25	5.80	0.90	21.69	0.20
Shank Length 49d (cm)	Males	0.45	10.26	0.81	19.95	0.52
	Females	0.21	5.83	0.29	6.90	0.72
	Mean	0.35	9.21	0.83	17.52	0.42
Shank Length 56 (cm)	Males	0.45	10.23	1.25	24.04	0.36
	Females	0.80	16.33	1.20	23.53	0.67
	Mean	0.62	13.33	1.21	23.54	0.51

Table 5 show the realized heritability of minerals composition in breast meat of Japanese quail. The result indicated that the realized h2 values were high except the calcium in male which are moderate (o.20) and phosphorus in male and overall mean for male and female which has low value (0.17) and (0.3), respectively. The selection differential mean and percentage values are higher than the selection differential.

Table 5: Realized heritability of minerals composition in breast meat of Japanese quail

Components	Sex	Response to selection		Selection Difference		Realized h^2
		Mean mg/kg	%	Mean mg/kg	%	
Calcium	Males	0.02	2.0	0.10	10.0	0.20
	Females	0.09	9.0	0.16	16.0	0.56
	Mean	0.06	6.0	0.13	13.0	0.46
Magnesium	Males	0.02	2.0	0.03	3.0	0.67
	Females	0.01	1.0	0.02	2.0	0.50
	Mean	0.01	1.0	0.02	2.0	0.50
Iron	Males	0.03	3.0	0.04	4.0	0.75
	Females	0.13	13.0	0.23	23.0	0.57
	Mean	0.10	10.0	0.11	11.0	0.91
Zinc	Males	0.04	4.0	0.05	5.0	0.80
	Females	0.07	7.0	0.11	11.0	0.64
	Mean	0.06	6.0	0.08	8.0	0.75
Sodium	Males	0.01	1.0	0.02	2.0	0.50
	Females	0.01	1.0	0.02	2.0	0.50
	Mean	0.01	1.0	0.02	2.0	0.50
Potassium	Males	0.05	5.0	0.06	3.0	0.83
	Females	0.02	2.0	0.04	4.0	0.50
	Mean	0.03	3.0	0.05	3.0	0.60
Phosphorus	Males	0.01	1.0	0.06	6.0	0.17
	Females	0.08	8.0	0.11	11.0	0.72
	Mean	0.01	1.0	0.08	8.0	0.13

4. DISCUSSION

The live body weight and carcass trait of Japanese quail as affected by generation and sex is shown in table 1. The result indicated that the live body weight and carcass trait significantly affects the generations and sex of birds. The female live body weight and Carcass traits values in most of the traits are higher than the males. This is similar to finding of [1] and [2].

While live body weight and carcass traits in first generation are lower than base and second generation. That implies that selection for high body weight in Japanese quail positively improved the live body weight at day 35, 42, 49, 56 and Carcass traits in Japanese quail. This is similar to finding of [3]; [4] and [5].

In general, the observed changes in the internal organs were associated with the improvement likewise in body weights of the Japanese quail. Selection for increased body weight induced changes in the sizes of various organs. This result is in agreement with the results reported by [6] and [7] .

The body weight gain and shank length increases at day 35, 42, 49 and 56 in sex of Japanese quail as shown in table 2 indicated that select for higher body weight led to positive response to selection which lead to the traits improved weight gain in progressive generations. In similar studies [8]; [9]; [10] higher body weight gain was observed in selected birds as compared to random bred. Therefore this finding suggested that selection for high body weight might lead to improvement in body weight and shank length increased as quail's advances in age. The improvement in shank length might be to enable it whole and carry the body weight of the quail upward when walking in search food and social activities.

He realized heritability of body weight and percentage Carcass weight traits in Japanese quail are shown in table 3. The h^2 for body weight at day 35, 42, 49 and 56 are high in this finding (0.54-0.83). The result is similar to finding of [11; [12]; [13] and [14]. Heritability estimates for body weight has been reported in a wide range by different researchers. Differences in h^2 estimates can be attributed to method of estimation, strain, environmental effects and sampling error due to small data act or sample size [15]. The h^2 of body weight at day 35, 42 and 56 increases with advance in age 0.57, 0.61 and 0.83 respectively, except day 49 which decline 0.57. This is similar to study of [23] noticed that h^2 for body weight of quails tends to increase with age. These indicated that continuous selection for high body weight might subsequently lead to improvement of body weight of the quails as they advance in age.

Selection for improved on high body weight to live body weight and in Carcass traits in Japanese quail lead to moderate h^2 in % Drumstick + thigh weight and Back weight 0.22 and 0.22, respectively. While high h^2 were notice in live body weight, Carcass weight, % Carcass weight, Abdominal fat weight, % abdominal fat weight, Breast weight, % Breast weight, Drumstick + thigh weight and % Back weight ranges (0.40 - 0.76). The high h^2 might be because of non additive genetic effects and sure environmental efforts.

The result of realized h^2 for most of the body weight and shank length traits as shown in table 4 are high except body weight at day 49 in males, body weight at day 56 in females, shank length at day 35 in males, shank length at day 42 in males and females and shank length and day 56 in males that are moderates 0.34, 0.33, 0.29, 0.22, 0.22 and 0.36, respectively. While low heritability were notice in shank length at day 35 in females and overall sex mean, shank length at day 42 in overall sex mean as 0.07, 0.18 and 0.20, respectively. The shank length, however, interspecies difference in h^2 are obviously (in Turkeys; 0.54, [16] in Chickens; 0.31 and 0.33, [17].

Realized h^2 of minerals composition in breast meat of Japanese quail in table 5 indicated that realized h^2 calcium in male, phosphorus in male and phosphorus in combined sex are 0.20, 0.17 and 0.13, respectively, the low h^2 are as a result of adductive genetic effects that affects the traits while mineral components show high h^2 (0.46-0.91), the high realized h^2 might be as a result of non adductive genetic effects and some environmental effects and continuous selection of base on high body weight can remedy the situation.

5. CONCLUSION

The live body weight and carcass trait affects the generations and sex of birds but weights of the traits are lower in first generation than base and second generation. The body weight gain and shank length shows increases at day 35, 42, 49 and 56 in sex of Japanese quail. The realized h2 of body weight and percentage carcass weight and parts of the traits in Japanese quail shows high h2 (0.40-0.83) and moderate h2 (0.20-0.40). The h2 for body weight and shank length for the traits are high (0.40-0.99) and moderate (0.20-0.40). The realized h2 of minerals composition in breast meat of the Japanese quail also shows high h2 (0.46-0.83) in most of the traits and moderate h2 in calcium (0.20) for male and low h2 also in phosphorus for males (0.17) and combined sex (0.13). The moderate to high realized h^2 observation indicates that response to selection for high body weight affects the traits therefore response could be rapid while low h^2 implies that response to selection could be slow therefore response to selection is slow. It is therefore recommended that selection for high body weight can be done immediately to improved on those traits that has moderate to high h2 in generations and also selection can be done at early age day 35 to also improved on those traits that has h2 too and selection for high body weight to improved on the traits can be done to on any of the sex or combined sex of Japanese quail.

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