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Selective Breeding of Japanese Quails for Improvement of Performance

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A B S T R A C T

An experiment was conducted to study the effect of selective breeding of Japanese quails for improvement of performance. A total of 2765 quails were procured from Poultry Experimental Station as baseline population based on their body weight. Out of which 1850 quails with higher body weights were selected as parents to produce 1200 progeny quail chicks. The overall growth performance such as body weight, body weight gain and feed conversion ratio parameters were recorded weekly intervals till the birds attain six weeks of age, sex wise. The body weight of the progeny (214.09±0.75g) obtained from baseline and selected female quail population (211.72±0.0975g, 213.04±1.233g respectively) was found to be higher than the parental population body weights at the end of the growth period. Similarly, the body weight gain was found to be higher in the progeny (38.68±0.65g) than the parental population (37.72±1.027g, 37.15±0.882g respectively) at six weeks of age. The feed conversion ratio of the progeny ranged from 1.89±0.02 (first week) to 4.73±0.07 (sixth week) which was found to be better feed conversion ratio compared with baseline and selected population during the growth period. The body weight and body weight gain of the progeny (212.88±0.91g and 34.64±0.52g respectively) obtained from baseline and selected male quail population was also found to be higher than the parental population. The FCR of the progeny ranged from first week (2.36±0.04) to six weeks (5.17±0.07) of age. Age at first egg in the flock was 55.79 to 56.53 days and 50% of the birds came to egg production on 59th day. The percentage of hen day egg production was 31.236, 69.911 and 54.812% eggs in 16th, 32nd and 46th week respectively. At the age of 17th to 32nd weeks the hen day egg production reached peak, later the production was decreased.

Introduction

Japanese quail (*Coturnix Coturnix Japonica*) is a popular commercial line. Quails can be used for meat production within a short period (4-5weeks) and matures at an early age of 6 weeks so that female birds are usually in full production by about 8 weeks (Jatoi *et al.*, 2013). Selective breeding is the most important technique, to improve the genetic potential of birds in a given set of environmental conditions (Hussain *et al.*, 2013). Selective breeding is found to be a major tool behind the significant improvement in growth rate and carcass yield of indigenous breeds (Bhatti and Sahota,

1994; Bhatti *et al.,* 1992). In any genetic improvement program, body weight is one of the most important traits for a number of reasons including its relation with other meat production traits and its relative ease of measurement (Caron *et al.,* 1990). It is further stated that the most significant trait for evaluating different livestock species especially in meat production environment is growth. It can be enhanced by improving environmental aspects such as feed, housing, management etc. and by choosing the suitable mating system, sex ratio and parental age and by improving its genotypic value by selection and/or by cross breeding (Parks, 1971). Continuous inbreeding, uncontrolled mating and poor knowledge of selective breeding are considered to be the main factors behind the deterioration in the production performance of quails (Jatoi *et al.,* 2013).

Materials and Methods

An experiment on selective breeding of quails for improvement of performance was conducted at Poultry Experimental Station, College of Veterinary Science, Hyderabad. A total of 2765 quails were procured from Poultry Experimental Station as baseline population based on their body weight. Out of which 1850 quails with higher body weights were selected as parents to produce 1200 progeny quail chicks. Chicks were maintained under standard managemental conditions.

The overall growth performance such as body weight, body weight gain and feed conversion ratio parameters were recorded weekly intervals till the birds attain six weeks of age in all three populations sex wise. The traits measured were age at first egg (AFE) and 50% of the egg production. The percentage of hen day egg production was recorded in the 16^{th}, 32^{nd} and 46^{th} week respectively. Statistical analysis of the traits studied was done as per Snedecor and Cochran (1989).

Results and Discussion

Female quail birds' performance

The body weights of the baseline, selected and progeny population from day old to 6 weeks of age were ranged from 8.10±0.089g to 211.72±0.097g, 7.93±0.116g to 213.04±1.233 g and 8.01±0.07g to 214.09±0.75g, respectively (Table 1). The bodyweight gain of the progeny was found to be higher at 3 weeks of age (50.29±0.94g) and at the end of six weeks of age the body weight gain of progeny was observed to be 38.68±0.65g compared with selected population (37.15±0.88g) and 37.72±1.03g in baseline population (Table 2). The feed conversion ratio of the progeny ranged from 1.890±0.02 at first week of age to 4.731±0.07 at 6 weeks of age compared to selected population which ranged from 1.823±0.031 to 5.806±0.136 and baseline population which ranged from 1.951±0.025 first week to 5.88±0.157 at six week of age (Table 3).

Male quail birds' performance

The body weights of the baseline population, selected population and progeny were found to be 7.926±0.124, 8.104±0.14 and 8.00±0.09 g at day old and increased to 205.93±1.282g, 206.72±1.336g and 212.88±0.91g at six weeks of age, respectively (Table 4). The body weight gain and feed conversion ratio of the progeny were ranged from 17.14±0.26g to 34.64±0.52g and 2.36±0.04 to 5.17±0.07 at first week of age to six weeks of age, respectively compared with selected population (17.45±0.393g to 31.76±1.017g and 2.388±0.05 to 7.095±0.169 from first week to six weeks of age) and baseline population (16.79±0.343g to 30.01±0.683g and 2.34±0.06 to 7.151±0.258 from first week and to six weeks of age) as shown in tables 5 and 6 respectively.

Table.1 Body weight (g) of female Japanese quail birds from 0 to 6th week

	0 wk	1wk	2nd Wk	3rd Wk	4th Wk	5th Wk	6th Wk
Base line population	8.10±0.089	26.75±0.271	48.18±1.144	98.78±1.251	139.73±1.453	174.0±1.322	211.72±0.0975
Selected population	7.93±0.116	28.10±0.372	49.80±0.788	96.66±0.963	141.62±1.593	175.89±1.45	213.04±1.233
Progeny	8.01±0.07	27.38±0.23	69.78±0.74	113.33±1.48	140.67±1.07	175.41±0.95	214.09±0.75

Table.2 Body weight gain (g) of female Japanese quail birds from 0-6th week

	0 wk	1wk	2nd Wk	3rd Wk	4th Wk	5th Wk	6th Wk
Base line population	-	20.18±0.259	40.45±1.124	50.59±1.3	40.96±1.232	34.27±1.057	37.72±1.027
Selected population	-	21.77±0.346	41.87±0.78	46.86±1.116	44.97±1.493	34.27±0.853	37.15±0.882
Progeny	-	20.94±0.22	41.20±0.71	50.29±0.94	42.86±0.96	34.74±0.67	38.68±0.65

Table.3 Feed conversion ratio of female Japanese quail birds from 0 to 6th week

	0 wk	1wk	2nd Wk	3rd Wk	4th Wk	5th Wk	6th Wk
Base line population	-	1.951±0.025	1.981±0.047	2.14±0.092	3.631±0.127	5.67±0.173	5.88±0.157
Selected population	-	1.823±0.031	1.821±0.032	2.201±0.061	3.324±0.121	5.514±0.23	5.806±0.136
Progeny	-	1.89±0.02	1.91±0.03	2.42±0.07	3.49±0.09	4.26±0.05	4.73±0.07

Table.4 Body weight (g) of male Japanese quail birds from 0 to 6th week

	0 Wk	1 Wk	2 Wk	3 Wk	4 Wk	5Wk	6 Wk
Base line population	7.926±0.124	25.16±0.388	54.04±0.966	98.82±1.163	141.49±1.406	174.17±1.509	205.93±1.282
Selected population	8.104±0.14	24.90±0.372	50.71±0.905	93.66±1.093	141.85±1.52	176.71±1.386	206.72±1.336
Progeny	8.0±0.09	25.03±0.27	52.47±0.67	96.39±0.82	141.66±1.03	178.24±0.98	212.88±0.91

Table.5 Body weight gain (g) of male Japanese quail birds from 0 to 6th week

	0 Wk	1Wk	2nd Wk	3rd Wk	4th Wk	5th Wk	6th Wk
Base line population	-	16.79±0.343	25.81±0.911	42.95±0.983	48.19±1.186	34.85±1.034	30.01±0.683
Selected population	-	17.45±0.393	28.88±1.062	44.79±1.231	42.67±1.377	32.68±1.188	31.76±1.017
Progeny		17.14±0.26	27.43±0.71	43.92±0.80	45.26±0.94	36.58±0.71	34.64±0.52

Table.6 Feed conversion ratio of male Japanese quail birds from 0 to 6th weeks

	0 Wk	1 Wk	2 Wk	3 Wk	4 Wk	5Wk	6 Wk
Base line population	-	2.34±0.06	2.866±0.09	2.432±1.406	3.211±0.127	5.958±0.181	7.151±0.258
Selected population	-	2.388±0.05	3.11±0.087	2.354±0.058	2.857±0.066	5.458±0.199	7.095±0.169
Progeny		2.36±0.04	2.98±0.06	2.39±0.07	3.04±0.08	4.25±0.06	5.17±0.07

Table.7 The mean percentage of hen day egg production of quails birds

Age	% HDEP		
	16th Week	**32nd Week**	**46th Week**
Mean % HDEP	31.236	69.911	54.812
SEM	0.824	0.370	0.867
N	600	600	600

Age at first egg in the flock was 55.79 to 56.53 days and 50% of the birds came to egg production on 59th day. Average hen day egg production was 31.236, 69.911 and 54.812% eggs in the16th, 32nd and 46th week respectively. At the age of 17th to 32nd weeks the hen day egg production reached peak, later the production was decreased (Table 7).

The progeny showed improved body weights which might be due to the positive response of selection resulting in higher body weight as a response to selection (Hussain *et al.,* 2013). Similarly improved body weight in Japanese quail was also observed in birds selected for higher body weight in many other studies as well (Baylan *et al.,* 2009; Syed Hussein *et al.,* 1995; Tozluca, 1993; Nestor *et al.,* 1982). Anthony *et al.,* (1996) observed that selected lines of Japanese quail produced heavier carcasses and more meat. Hussain *et al.,* (2016), observed that that the selected group birds showed significantly higher average daily and cumulative feed intake which resulted in higher bodyweights. Khaldari *et al.,* (2010) recorded a improved genetic gain of body weight through selection process, in Japanese quails.

Higher body weight in selected birds were also reported in other studies as well (Siegel, 1987), Anthony *et al.,* (1986), Collins and Abplanalp (1968) and Marks (1975). Higher daily and cumulative feed intake in selected birds may be due to their body size as well as increased egg weight as a result of selection for body weight (Hassan *et al.,* 2008). In a very recent study Akram *et al.,* (2012) observed significant differences between two generations (G0 and G1) of Japanese quail being selected for higher four week body weight through selection procedures. Anthony *et al.,* (1986) observed the higher body weight gain in selected birds as compared to random breeds. Khaldari *et al.,* (2010) also observed better FCR in three selective generations of Japanese quail. Best FCR to a certain body weight could be partially due to lower maintenance costs and lower fat deposition of birds with higher growth rate (Pym, 1990).

Selection for better FCR in broiler chickens resulted in direct selection for carcass leanness (Buyse *et al.,* 1999). Hussain *et al.,* (2016) observed the age at first egg was about (47.75±1.339 days) in selection birds of G2. It might be attributed to the genetic make-up of the birds, their overall body conditions and the seasonal variations in day length because the onset of egg production is considered a combined factor of chronological age, overall body condition and day length (Krapu, 1981; Reddish *et al.,* 1993).

In conclusion the present study showed that the growth and production performance can be enhanced through selection process. The body weight was increased as age increases in both male and female quail population. Body weight gain increased up to 3weeks and there after it decreased in both populations under study. Feed efficiency was better in earlier ages and it decreases as the age progress. Peak egg production was observed at 32 weeks of age there after it decreases.

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