

The Effects of Shank Length on Some Production Traits of Japanese Quails (*Coturnix coturnix japonica*) and Male Testes Weight

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This study was carried out to determine the effect of shank length on some production traits and on male testes weight in Japanese quails (*Coturnix coturnix japonica*). A total of 160 same age quails were weighed individually and separated into two groups according to their left shank length at 6th wks of age. The male quails with a left shank length between 33.00-35.90 mm were classified as a short group and (>36.91 mm) classified as a long shank length group. The female quails with a left shank length between 32.00 - 35.90 mm were classified as a short shank length group and (>36.50 mm) classified as a long shank length group. For each of the two leg groups, 2 male-6 female quails were housed in ten separate pens. Shank lengths of quails were measured at 6th and 20th wks of age. The quails were weighed individually at 6th, 8th, 12th, 16th and 20th wks of age. From total of 40 male quail's, the left and right testes weights were weighed at the end of the trial at 20th wks of age. For both, female and male quails, the mean live body weights were significantly lower ($P<0.05$) in the short shank length group at 8th and 12th wks of age. The live body weight increased with increasing breeder age. The egg number per quail was 67.43 in long shank length group and 55.13 in short shank length group and differences were found significant ($P<0.05$). Between 8th and 9th wks of age, the feed consumption per hen per day were 32.97 and 30.21 g, the cumulative feed consumption per day was 263 and 241 g, respectively ($P<0.01$). Mortality rate was 3.33 and 8.34% in female quails, and 2.5 and 0% in male quails, respectively. Testes weight found to be not significant ($P>0.01$) in groups. In conclusion, shank length affected quail's some production traits.

Keywords: Quail, shank length, live weight, production traits, testes weight

Introduction

The two most important criteria of pullet quality are uniformity within the flock and proper live weight at a specific age. Almost anything that adversely affects a pullet will usually be reflected in lower live weights and poorer flock uniformity (Miles and Jacob 2000). The egg layers who had low live weight at the beginning period of egg laying, that caused low number of egg laid (Leeson and Summers, 1997). The shank length is an important measurement of skeletal development which is depends on live weight (North and Bell, 1990; Anonymous, 1997). During sexual development, it is extremely important to maintain weekly live weight gain because any loss of weight can restrict testes development and hence semen production in later life (Nicholson 2003).

The researches for relationships between some body measurements and production traits of other animals are used in animal production, to put on the agenda about a relationship between shank length and production traits and whether these traits will be used in future (Baco *et al.*, 1998; Gulinski *et al.*, 1997). Some researches reported that there were relationships between shank lengths and live weight

(Missou *et al.*, 2003). Bordas ve Merat (1981) found that there was a mid level significant relationship between shank length and feed consumption. One of another study they found that there was a low level relationship between shank length and feed consumption Bordas ve Merat (1975). Yeasmin *et al.* (1998; 2003) reported that birds which had shank length of 6 cm or below was considered as dwarf, while those with shank length above 6 cm were considered as normal size and they found that dwarf deshi hens had got reduced feed intake in comparison with the normal size deshi counterparts.

This research was carried out to determine the effect of shank length on some production traits and male testis weight of Japanese quails.

Material and Methods

In the study, a total of 160 quails that were raised in pens for 6 week were used. Upon reaching six weeks of age, male and female quails were weighed individually and separated into two groups according to their left shank length. The male quails with a left shank length between 33.00 – 35.90 mm were classified as a short group and (>36.91 mm) classified as a long shank length group. The female quails with a left shank length between 32.00 – 35.90 mm were classified as a short shank length group and (> 36.50 mm) classified as a long shank length group. Quails classified according to shank length groups were placed into pens with 1:3 male to female ratio. For each of the two leg groups, 2 male-6 female quails were housed in ten separate pens. Wing numbers were attached to the wings of all birds. Respectively, 14 and 16 hours of illumination were applied during the growth and laying periods. Water and feed were supplied *adlibitum*. All treatment groups were fed a broiler starter diet containing 230 g CP/kg and 12.8 MJ ME/kg during the growth period. A layer diet containing 180 g CP/kg and 11.3 MJ ME/kg was used from the sixth week onwards.

Shank lengths of quails were measured with a digital calliper at at 6th and 20th wks of age. The quails were weighed individually on a digital balance with 0.01 g precision at 6th, 8th, 12th, 16th and 20th wks of age. A total of 40 male quail's left and right testes weights were weighed at the end of the trial at 20th wks of age. The groups were given feed in the morning and in the evening, after weighing, and the feed that remained in the feeder of each group was weighed at every weekend in order to determine the weekly feed consumption at the group level. Mortality was recorded daily. Dead birds were replaced with birds of similar sex, age and shank length to maintain male to female ratios during the trial. All laying eggs were recorded egg number per quail calculated for each shank length group.

The data were subjected to analysis of variance (Minitab, 1998), utilizing ANOVA procedures for balanced data. Analyses for percentage data were conducted after arcsine transformation. Significant differences among treatment means were determined by a Duncan multiple range test.

Results and Discussion

The mean values of shank length's of female and male quails at 6th and 20th wks of age are given in Table 1. In the trial, significant differences were found between 6th wks of age and 20th wks of age shank length values. The shank lengths increased as quail age increased. Adeogun and Adeoye (2004) reported that mean shank length and live weight were found 3.66 cm and 197 g, respectively for quails at the 6th wks of age.

Table 1. Shank length of Male and Female Japanese quails at 6th wks and 20th wks of age (x±sem)

Shank Length Groups	6 th wks of age Shank Length, mm	20 th wks of age Shank Length, mm
Female	**	**
Long	37.98 ± 0.2062 ^a	39.36 ± 0.1750 ^a
Short	35.12 ± 0.1724 ^b	37.64 ± 0.2416 ^b
Male	**	**
Long	38.21 ± 0.4447 ^a	39.11 ± 0.6057 ^a
Short	34.31 ± 0.3518 ^b	35.96 ± 0.3488 ^b

^{a,b} Means in the same column with no common superscript are significantly different at the P<0.01 level.

The effects of shank length on live weight are given in Table 2. The effects of shank length on live weight were found significant at the 8th and 12th wks of age. The live weights increased as quail age increased. The female quail live weights higher than male quails. Adeogun and Adeoye (2004) found that a positive phenotypic correlation between live weight and shank length, indicating that an improvement in live weight will likely lead to improvement in shank length.

Table 2. Mean live weights of male and female Japanese quails at different age periods ($\bar{x} \pm \text{sem}$)

Shank Length Groups	6 th wks of age Live Weight, g	8 th wks of age Live Weight, g	12 th wks of age Live Weight, g	16 th wks of age Live Weight, g	20 th wks of age Live Weight, g
Female	NS	**	*	NS	NS
Long	123.67 ± 3.1794	208.82 ± 3.3245 ^a	217.5 ± 3.5253 ^a	222.8 ± 3.1013	229.80 ± 3.3540
Short	117.14 ± 3.5406	189.27 ± 4.7868 ^b	204.04 ± 4.3353 ^a	215.60 ± 4.2957	220.48 ± 4.4006
Male	NS	*	*	NS	NS
Long	114.64 ± 4.4521	168.08 ± 4.2396 ^a	176.02 ± 4.8407 ^a	181.21 ± 6.7824	188.09 ± 6.7432
Short	109.37 ± 4.6352	154.40 ± 3.0367 ^b	163.56 ± 3.3488 ^b	178.37 ± 3.4075	177.11 ± 3.9595

^{a,b} Means in the same column with no common superscript are significantly different at the P<0.01 and P<0.05 level.

* P<0.05 ** P<0.01 NS: not significant

The effect of shank length on mean feed consumption and cumulative feed consumption are given in Table 3. Bordas and Merat (1975; 1981) reported that there were relationships between feed consumption and shank length of layers. Mean feed consumption and cumulative feed consumption were found significantly high in long shank length group at 8-9th wks of age (P<0.01). The same investigated traits were found high in long shank length group at 11-12th, 15-16th, 19-20th wks of age, but differences were not significant. However, Petek *et al.* (2000) found that feed consumption rate per bird was significantly lower in short shank length layer group than in long shank length group. Missohou *et al.* (2003) reported in their study that Dahlem red commercial hens at the 20th wks of age, of which shank length below 8 cm was accepted as dwarf, feed consumption was lower in dwarf than in normal sized birds.

Table 3. The mean feed consumption and cumulative feed consumption at different age periods ($\bar{X} \pm \text{SEM}$)

Shank Length Groups	8-9 th wks	11-12 th wks	15-16 th wks	19-20 th wks
Feed consumption, g/d/bird	**	NS	NS	NS
Long	32.97 ± 0.4748 ^a	30.72 ± 0.9440	32.25 ± 0.4599	32.38 ± 0.6632
Short	30.21 ± 0.4726 ^b	29.40 ± 1.0380	31.11 ± 0.2121	30.67 ± 0.7655
Cumulative feed consumption, g/d	**	NS	NS	NS
Long	263.82 ± 3.8096 ^a	245.76 ± 7.5498	258.00 ± 3.6680	259.07 ± 5.3123
Short	241.67 ± 3.7832 ^b	235.22 ± 8.2965	248.87 ± 1.6912	245.37 ± 6.1175

^{a,b} Means in the same column with no common superscript are significantly different at the P<0.01 and P<0.05 level.

* P<0.05 ** P<0.01

Table 4. The effects of shank length on some production traits and testes weight of quails ($\bar{X} \pm \text{SEM}$)

	Long Shank Length	Short Shank Length	
Number of laid eggs per quail	67.4 ± 1.65 ^a	55.1 ± 4.34 ^b	*
Mortality rate of females, %	3.33	8.34	
Mortality rate of males, %	2.50	0	
Left Testes Weight, g	2.99 ± 0.1760	2.82 ± 0.1526	NS
Right Testes Weight, g	2.73 ± 0.1967	2.54 ± 0.1332	NS

^{a,b} Means in the same line with no common superscript are significantly different at the P<0.01 and P<0.05 level.

* P<0.05 ** P<0.01 NS: not significant

The effects of shank length on some production traits and testis weight of quails are given in Table 4. The number of laid eggs per quail was found 67.43 in long shank length group and 55.13 in short shank length group ($P < 0.05$). Missohou *et al.* (2003) reported in their study that Dahlem red commercial hens at the 20th wks of age, of which shank length below 8 cm was accepted as dwarf, body weight and number of laid eggs were lower in dwarf than in normal sized birds. Similar to our findings, Merat *et al.* (1994) reported that rate of egg lay of dwarf white leghorn hens was lower than normal sized hens. The high mortality rate was found in short shank length group's of female ad male quails and this result is similar with Petek *et al.* (2000). There were relationship between live weight and testes weight in poultry species (Nicholson 2003). The male live weight was found 188.09 in long shank lentgth group and 177.11 in short shank length group (Table 2). The male left testes weight was found 2.99 g in long shank length group and 2.82 g in short shank length group. The right testis weight was found 2.73 g and 2.54 g, respectively. The male body weight was found numerically high in long shank group and the left and right testes weight of quails was found numerically high in long shank length group.

In conclusion, our trial results showed that some production traits and feed consumption were affected from shank length of quails. The mortality rate of female and male quails is higher and number of laid eggs is lower in short shank length group. Thus, it is important to separate these short shank length quails in the early ages of skeleton development and apply to them a different feeding program. The results were expected to assist quail production, while also contributing to the scientific literature.

References

- ADEOGUN, I.O. and ADEOYE, A.A. (2004) Heritabilities and phenotypic correlations of growth performance traits in Japanese quails. *Livestock Research for Rural Development*, **16**: 12.
- ANONYMOUS. (1997) Dekalb Brown technical handbook. Keskinoglu Breeder Commercial Firm.
- BACO, S., HARADA, H. and FUKUHARA, R. (1998) Genetic trends of body measurements and reproductive traits in a Japanese Black cow population. *Anim. Sci. Technol.*, **69**: 231-238.
- BORDAS, A. AND MERAT, P. (1975) Genetic variation in laying hens and phenotypic correlations of feed consumption corrected for body weight and egg production. *Annales de Genetique et de selection Animale*, **6**: 369-379.
- BORDAS, A. AND MERAT, P. (1981) Genetic variation and phenotypic correlations of food consumption of laying hens corrected for body weight and production. *British Poult. Sci.*, **22**: 25-33.
- GULINSKI, P., LITWINCZUK, Z., MLYNEK, K. and GIERSZ, B. (1997) An attempt at evaluating the relationship between direct body measurements and results of linear descriptive-type assessment of cows. *Prace I materialy zootechniczne*, **50**: 139-145.
- LEESON, S. and SUMMERS, J.D. (1997) Commercial poultry nutrition. The Second Edition, University Books, Guelph, Ontario.
- MERAT, P., MINVIELLE, F., BORDAS, A. and COQUERELLE, G. (1994) Heterosis in normal versus dwarf laying hens. *Poult. Sci.*, **73**: 1-6.
- MILES, R.D. and Jacob, J. P. (2000). Feeding the Commercial Egg-Type Replacement Pullet. University of Florida Institute of Food and Agricultural Sciences the Department of Dairy and Poultry Sciences, Florida Cooperative Extension Service FACTHSHEET PS-48 March, 2000.
- MINITAB (1998) Minitab Release 12.1. Minitab Reference Manual Minitab Inc.State Coll. Pa 16801, USA.
- MISSOHO, A., DIENG, A., HORST, P., ZARATE, V.A., NESSEIM, T. and TCHEDRE, K. (2003) Effect of Dwarf and Frizzle genes on the performance of layers under Senegalese conditions. *Tropical Anim. Hlth. Prod.*, **35**: 373-380.
- NICHOLSON, D. 2003. The art of male management. *Poultry International*, October
- NORTH, M. and BELL, D.D. (1990) Commercial chicken production manual, Fourth edition, Chapman Hall, 315, New York, London.

- PETEK, M., BALCI, F., BASPINAR, H., OGAN, M. and DIKMEN, S.** (2000) The effects of shank length on some production traits of a commercial layer flock. *Uludag University J. Fac. Vet. Med.*, **19**: 129-134.
- YEASMIN, T. and HOWLIDER, M.A.R.** (1998) Comparative physical features, egg production and egg quality characteristics of normal and dwarf indigenous (Deshi) hens of Bangladesh. *J. Appl. Anim. Res.* **13**: 191-196.
- YEASMIN, T., HOWLIDER, M.A.R. and AHAMMAD, M.U.** (2003) Effect of introgressing Dwarf gene from Bangladeshi Indigenous to exotic breeds on egg production. *Intern. J. Poult. Sci.*, **2**: 264-266.