Full Length Article

INFLUENCE OF DIFFERENT MATING RATIO ON THE FERTILITY AND HATCHABILITY OF *"TANUVAS NAMAKKAL QUAIL-1 BREEDERS"*

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ABSTRACT

A biological experiment was conducted to study the effect of different mating ratio on fertility and hatchability of TANUVAS Namakkal quail-1 breeders. The experiment was conducted by using two hundred and fifty adult birds of the age 15-25 weeks (males:25 and females:125) and 35-45 weeks (males:25 and females:125) TANUVAS Namakkal quail-1 breeders. The different male: female ratios viz. T_1 (1:2), T_2 (1:3), T_3 (1:4), T_4 (1:5) and T_5 (1:6) were maintained in cages separately. All the birds were reared as per the standard management procedure and fed with Japanese quail breeder diet. The fertile eggs were collected from each male: female ratio separately for 28 days period. Eggs were set in the incubator and per cent hatchability, infertile, embryonic mortality and dead-in-shell were studied. The results of the experiment revealed that the hatchability was highly significant ($P<0.01$) in T_3 group (77.62%) with a mating ratio of 1:4 in 15 to 25 weeks age group and in T_2 group (72.83%) with a mating ratio of 1:3 in 35 to 45 weeks age group. From this study it could be concluded that the optimum mating ratio for "TANUVAS NAMAKKAL Quail-1" breeder for younger age group is 1:4 and for older age group is 1:3.

Keywords: Fertility, Hatchability, Mating ratio

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INTRODUCTION

Japanese quail (*Coturnix coturnix japonica*) has been reared through centuries in the world. Japanese quails are commercially grown for eggs and meat. In India, commercial farming of Japanese quails are increasing day by day as less maintenance and investment is required as compared to other birds.

Japanese quail farming becoming popular because of its rapid growth, small size, less floor space requirement, short incubation period, early sexual maturity, high egg production, less susceptibility to diseases, low feed requirement and low housing costs compared to different species of poultry.

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Japanese quail farming is a profitable enterprise for small and marginal farmers. Japanese quails are marketed for meat at the age of 30 days when it attains a body weight of 180 to 200g. It attains sexual maturity at the age of 42 days and can be used for egg production up to 52-55 weeks during which it can produce more than 200 eggs.

The parental age of Japanese quail of 10 and 20 weeks had a significant effect on fertility and hatchability (Seker *et al.,* 2004). The 1:4 male-female mating ratio might be the choice that resulted in reasonable number of chicks in breeder flocks for commercial production (Narinc *et al.*, 2013)

Reproductive performance of birds plays important role in deciding the cost of production of day-old chicks. Mating ratio, pre-incubation storage period of hatching eggs influences the fertility and hatchability of eggs. Fertility, hatchability, embryonic mortality, dead-in-shell are important reproductive indices which affects the chick production (Majhi *et al.,* 2016).

MATERIALS AND METHODS

A total of 250 adult *TANUVAS Namakkal Quail-1* breeders at the age of 15 to 25 weeks (Male: 25 and Female: 100) and 35 to 45 weeks (Male:25 and Female:100) maintained at Poultry Farm Complex, Department of Poultry Science were selected for the biological experiment. The different male: female ratio were maintained in cages separately and reared as per the standard management procedure. The birds during the experimental period were fed with Japanese quail breeder diet formulated as per BIS standards by using locally available feed ingredients.

The birds in each mating ratio were divided into five replicates containing 25 males and100 females in each age group. The fertile eggs from each group were collected separately and incubated to study the reproductive performance.

Table 1. Details of different treatment groups

Treatment	Male: Female ratio	15 to 25 weeks age (28 days)			35 and 45weeks age (28days)		
		Replicates	No. of birds		Replicates	No. of birds	
			Male	Female		Male	Female
T_1	1:2	5	5	10	5	5	10
T_2	1:3	5	5	15	5	5	15
T_3	1:4	5	5	20	5	5	20
T_4	1:5	5	5	25	5	5	25
T_5	1:6	5	5	30	5	5	30
		Total	25	100	Total	25	100

RESULTS AND DISCUSSION

Hatchability

The mean (±S.E.) per cent hatchability of *TANUVAS Namakkal Quail-1* breeder (15 to 25 weeks and 35 to 45 weeks) eggs produced under different mating ratios are presented in Table 2 and 3 respectively.

The statistical analysis of data on mean per cent hatchability (15-25 weeks) revealed highly significant (P<0.01) difference among treatment groups. The treatment (T_3) with mating ratio of 1:4 had superior (77.62%) hatchability when compared other treatment groups. The hatchability percentage of other treatment groups with the mating ratio of 1:2, 1:3, 1:5 and 1:6 did not differ significantly.

The statistical analysis of data on mean per cent hatchability (35-45 weeks) revealed highly significant (P<0.01) difference among treatment groups. The treatment (T_2) with mating ratio of 1:3 had superior (72.83%) hatchability when compared other treatment groups. The hatchability percentage of T_1, T_3 and T_4 groups did not differ significantly among themselves but T_5 differ significantly with other treatment groups which might be due less number of males (1:6). The reduced mating ratio (1:3) in the age group of 35 to 45 weeks when compared to the mating ratio of (1:4) in the age group of 15 to 25 weeks might be due to influence of age and body weight which was increased in the older age group when compared to the younger age group.

This was in agreement with Khalil *et al.* (2011), Karousa *et al.* (2015) and Raji *et al.* (2015). But Ipek *et al.* (2004) reported that breeder age and mating ratio had significant effect on hatchability. But Ali *et al.* (2013), Ayoola *et al.* (2017) and El-Sheikh *et al.* (2019) recorded that hatchability was highest in mating ratio 1:1 and Majhi *et al.* (2016) recorded that hatchability was highest in mating ratio 1:5.

Infertile

The mean (±S.E.) per cent infertile of *TANUVAS Namakkal Quail-1* breeder (15 to 25 weeks and 35 to 45 weeks) eggs produced under different mating ratios are presented in Table 2 and 3 respectively.

The statistical analysis of data on mean per cent infertile (15 to 25 weeks) did not differ significantly among treatment groups. The infertile percentage was numerically higher in T_1 (16.23%) and T_5 (16.55%) groups when compared to other treatment T_2 (15.76%), T_3 (14.13%) and T_4 (15.98%) groups. This might be due to excess males in T_1 with a mating ratio of 1:1 and less number of males in T_5 with a mating ratio of 1:6.

The statistical analysis of data on mean per cent infertile (35 to 45 weeks) did not differ significantly among treatment groups. The infertile percentage was numerically higher in T_1(19.94%) and T_5(19.95%) groups followed by T_4 (19.07%), T_3(18.53%) groups and lowest value recorded in T_2 (18.03%).

This was an agreement with the findings of Khalil *et al.* (2011) and Raji *et al.* (2015). But Ipek *et al.* (2004) and El-Sheikh *et al.* (2019) concluded that fertility was highest in the mating ratio 1:2 and 1:3. Dere *et al.* (2009), Santos *et al.* (2015) and Ayoola *et al.* (2017) reported that differences among fertility were not statistically significant for parent age.

Embryonic mortality

The mean (±S.E.) per cent embryonic mortality of *TANUVAS Namakkal Quail-1* breeder (15 to 25 weeks and 35 to 45 weeks) eggs produced under different mating ratios are presented in Table 2 and 3 respectively.

The statistical analysis of data on mean per cent embryonic mortality (15 to 25 weeks) did not differ significantly among treatment groups. The embryonic mortality percentage was numerically higher in T_2(4.96 %) followed by T_5(4.92%), T_1 (4.37%) and T_4 (3.95%) groups and lowest value recorded in T_3 (3.60%) group.

The statistical analysis of data on mean per cent embryonic mortality (35 to 45 weeks) did not differ significantly among treatment groups. The embryonic mortality percentage was numerically higher in T_3 (6.64%) followed by T_5(6.49%), T_4(6.20%) and T_1(5.84%) groups and lowest value is recorded in T_2 (5.04%) group.

The per cent embryonic mortality was numerically lower in 15 to 25 weeks age group when compared to 35 to 45 weeks age group. This was in consistent with the findings of Seker *et al.* (2004) who concluded that as parental age increases the embryonic mortality also increases. But Othman *et al*. (2014) reported that no significant difference was observed between age of breeders and embryonic mortality. The present study observation was also similar to the findings of Raji *et al.* (2015) who reported that embryonic mortality was higher in the age group 35-52 weeks than the younger age group (≤ 10 weeks).

Dead-in-shell

The mean (±S.E.) per cent dead-in-shell of *TANUVAS Namakkal Quail-1* breeder (15 to 25 weeks and 35 to 45 weeks) eggs produced under different mating ratios are presented in Table 2 and 3 respectively.

The statistical analysis of data on mean per cent dead-in-shell (15 to 25 weeks) did not differ significantly among treatment groups. The dead-in-shell percentage was numerically higher in T_1 (4.95%) followed by T_3 (4.73%), T_2 (4.72%) and T_5(4.59%) groups and lowest in T_4 (4.38%).

The statistical analysis of data on mean per cent dead-in-shell (35 to 45 weeks) did not differ significantly among treatment groups. The dead-in-shell percentage was numerically higher in T_5 (4.95%) followed by T_1 (4.79%), T_4 (4.68%), T_3 (4.24%) groups and lowest in T_2 (4.10%).

CONCLUSION

The hatchability had significant effect in *TANUVAS Namakkal Quail-1* breeders at the age of 15 to 25 and 35 to 45 weeks of age with different treatment groups. In *TANUVAS Namakkal Quail*-1 breeders, the fertility, embryonic mortality and dead-in-shell had no significant effect in both 15 to 25 and 35 to 45 weeks of age with different treatment groups.

From this study it could be concluded that, the optimum mating ratio for "*TANUVAS NAMAKKAL* Quail-1" breeder for younger age group is 1:4 and for older age group is 1:3.

Table 2. Mean (±S.E.) hatchability, infertile, embryonic mortality and dead-in-shell of *TANUVAS Namakkal Quail-1* breeder (15 to 25 weeks) eggs produced under different mating ratios

Treatment	Hatchability (%)	Infertile (%)	Embryonic mortality (%)	Dead-in-shell (%)
T_1	74.45^{B}±1.88	16.23±3.09	4.37±0.84	4.95±0.48
T_2	74.56^{B}±2.81	15.76±2.13	4.96±1.03	4.72±0.58
T_3	77.62^{A}±0.72	14.05±1.03	3.60±1.98	4.73±0.77
T_4	75.69^{B}±2.16	15.98±2.23	3.95±1.59	4.38±0.64
T_5	73.94^{B}±2.09	16.55±2.06	4.92±0.47	4.59±0.68

Value given in each cell is the mean of 6 observations.

$^{A-C}$Means within a column with no common superscripts differ significantly (P<0.01).

Table 3. Mean (±S.E.) hatchability, infertile, embryonic mortality and dead-in-shell of *TANUVAS Namakkal Quail-1* breeder (35 to 45 weeks) eggs produced under different mating ratios

Treatment	Hatchability (%)	Infertile (%)	Embryonic mortality (%)	Dead-in-shell (%)
T_1	69.43^{B}±1.66	19.94±1.71	5.84±0.50	4.79±0.85
T_2	72.83^{A}±0.39	18.03±1.26	5.04±0.98	4.10±0.95
T_3	70.59^{B}±1.19	18.53±1.89	6.64±0.70	4.24±0.14
T_4	70.05^{B}±1.43	19.07±1.29	6.20±0.50	4.68±0.54
T_5	68.63^{C}±1.67	19.95±0.82	6.49±0.49	4.93±0.11

Value given in each cell is the mean of 6 observations.

$^{A-C}$Means within a column with no common superscripts differ significantly (P<0.01).

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