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EFFECT OF AGE ON FERTILITY AND HATCHABILITY OF RAJASRI BIRDS

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Abstract: A study was conducted to assess the fertility and hatchability of Rajasri bird at various ages (35 to 71 weeks). Hatch able eggs of 750 numbers were collected once in 4 weeks interval (35 to 71 weeks age) from Rajasri parent stock where the birds were reared under deep litter system (flock mating). Eggs were collected, selected, graded and fumigated, set in the setters of incubator at 99.9°F dry bulb and 84°F wet bulb temperatures up to 18 days. Eggs were transferred into hatcher at 19th day where the dry and wet bulb temperatures were maintained at 99°F and 86°F respectively. Break open studies were conducted after 21 days of incubation. Fertility percentages on total eggs set basis and early, mid, late deaths, hatchability percentages on total eggs basis and number of fertile eggs basis were calculated. Results of this study revealed that as age advances fertility per cent was significantly decreased, early, mid and late deaths were significantly increased, hatchability was significantly decreased basing on total eggs set and fertile eggs set. Hence this study suggested that Rajasri birds can be utilized as parents up to 67 weeks of age for maximum fertility and hatchability.

Keywords: fertility, hatchability, age, Rajasri bird.

INTRODUCTION

Rajasri bird is a medium sized egg type backyard chicken variety developed by Sri Venkateswara veterinary university in coordination with AICRP on Poultry for egg Hyderabad. The bird resemblesdesi birds in plumage pattern and shank length. Laying capacity of 160-180 eggs per annum. Egg shell is brown in colour similar to desi egg and these birds can withstand adverse climatic conditions. The hatchery plays a key role for maintenance of production chain of birds in large scale. Many factors influence the hatchability percentage of Rajasri birds**.** The factors that contribute to hatchability are fertility of eggs, embryonic mortality during incubation, and condition in incubator. Factors that have been associated with increase in embryonic mortality include, prolonged egg storage, abnormal egg storage conditions, season of the year, nutrition, egg size and age of the breeders. Some studies showed that the efficiency of reproduction of broiler breeders

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decreased with age, because it is related to the quality of hatching egg such as the internal egg composition or ratio, larger egg weight, poorer shell quality, increased early and late embryo mortality and other problems. Gualhanone *et al.,* (2012) observed that age did not have any impact on the hatchability parameters of Cobb 500 broiler breeder. On the other hand, Islam *et al.,* (2008) observed the best egg fertility and hatchability at hens aged between 41 and 60 weeks. Also, Al-Bashan and Al-Harbi (2010) and Othman *et al.,* (2014) reported the effect of age of females on fertility, hatchability parameters, and embryonic mortality during incubation period in Japanese quail. Only few researchers attempted to analyse the development of embryos in eggs derived from hens at different ages. Alsobayel and Albadry (2012) reported about the embryonic mortality in early and final stages of incubation of eggs obtained from laying hens aged 24–52 weeks. However, they did not observe any influence of female age on these traits. The information about fertility and hatchability of Rajasri bird was very scanty hence the study was conducted to examine the effects of flock age (35, 39, 43, 47, 51, 55, 59, 63, 67 and 71 weeks old) on fertility, hatchability traits, early, mid and late embryonic mortalities in a Rajasri flock.

Material and methods

Selection of birds

A total of 50 males and 300 females (male to female ratio 1:6) close to standard body weights were selected and managed under deep litter system. Male to female ratio was kept constant throughout production period. Any male observed sick or weak during the production period was immediately replaced with good quality healthy male adopted from spare males kept at farm. Birds were vaccinated according to general vaccination programme and fed according to ICAR 2013 recommendations. Birds were managed under uniform managemental conditions under deep litter system by offering adlibitum feed and water from 35 to 71 weeks age.

Collection, Fumigation and storage of eggs

Eggs were collected twice in a day over 7 consecutive days (140 to 150 eggs/day). Substandard eggs with misshapen, cracked, dirty, blood-stained, toe-punched and elongated were rejected and only oval shape good quality intact eggs were selected for hatching. A total of 750 eggs were selected/time from the breeder farm at 35, 39, 43, 47, 51, 55, 59, 63, 67and 71 weeks of age. The eggs were cleaned with a clean dry cloth then fumigated with potassium permanganate and formaldehyde at 1x concentration (1:2 ratio) up to 20 minutes.

The eggs were stored in plastic egg filler trays at 21ºC temperature and 75% relative humidity for seven days (King Ori, 2011).

Incubation and hatching conditions

The eggs were set in setter trays, the setter was operated at a temperature of 99.9°F and 84°F dry and wet bulb temperatures respectively, during the first 18 days of incubation. Eggs were turned after every hour. On 19th day of incubation, eggs were transferred to hatch baskets and placed in a hatcher. The dry bulb temperature was decreased to 99.0°F and the Wet bulb temperature was increased to 86°F. After 21 days of incubation all hatched chicks were taken out from hatcher and shifted to chick room of hatchery.

Breakout analysis

All hatched chicks counted to assess hatchability percentage on total set eggs and fertile egg basis. After removing hatched chicks from hatch basket, all unhatched eggs were broke open to assess the infertility, approximate day of embryonic deaths. Embryonic mortalities were grouped into three categories, early (first week of incubation), mid (second week of incubation) and late (third week of incubation). The days of embryonic mortalities were assessed on the basis of embryo development from total egg set. The eggs showing no embryonic development were considered as infertile eggs. Infertile egg percentages were calculated on the basis of set eggs. After assessing infertile eggs, hatchability percentage of fertile eggs was calculated. Candling was not performed due to brown colour egg shell;it is difficult to assess fertility, internal qualities and early embryonic mortality.

Statistical analyses

Statistical analysis of the data was carried out according to the procedures suggested by Snedecor and Cochran (1989). The data obtained were subjected to one-way ANOVA. Difference between means were tested at the 5% probability level using Duncan's LSD test.

RESULTS AND DISCUSSIONS

The influence of age on fertility and hatchability traits (early, mid and late embryonic deaths, hatchability on total egg set and fertile egg set basis) of Rajasri birds were given in table1. Rajasri bird age was significantly (P>0.001) affected the fertility % but there was no significant difference from 35 to 67 weeks of age, fertility % was significantly decreased at 71 weeks of age compared to other age groups. High and low fertility rates were observed in this study at 55 and 71 weeks age. Similarly some studies conducted by Abudabos (2010) at 26, 32, 36, 44 weeks age, Salahi *et al.,*(2012) at 46,73,107 weeks age, Iqbal *et al.,* (2016) at

30,45,60 weeks age and Nowaczewski *et al.,*(2016) from 26 to 64 weeks age in broiler breeders and they also concluded that as age advances fertility rate was decreases.

As age advances the Rajasri birds were shown significantly (P>0.001) more early deaths from 35 to 71 weeks. Significantly less early embryonic deaths were observed at 39 weeks age than 47 to 71 weeks age groups but there was no significant difference among 35, 39 and 43 weeks age group. The results of the present study concurred with the findings of Iqbal *et al.,* (2016) at 30, 45, 60 weeks age in broiler breeders and concluded that as age advances the rate of early embryonic deaths were increases.

Table 1. Effect of age on fertility and hatchability parameters in Rajasri birds

Age of the bird (wks)	Fertility %	Early death %	Mid death %	Late death %	hatchability % on total set egg basis	hatchability % on fertile egg basis
35	95.71±0.70^{a}	3.00±0.58^{de}	2.54±0.30^{cde}	5.29±0.58^{bc}	88.42±0.36^{a}	92.39±0.31^{a}
39	94.23±2.31^{ab}	1.60±0.17^{e}	1.20±0.12^{e}	2.70±0.29^{d}	88.74±1.15^{a}	94.17±1.15^{a}
43	95.84±1.73^{a}	2.50±0.58^{de}	2.00±0.29^{de}	3.82±0.58^{cd}	87.52±1.73^{a}	91.32±0.76^{ab}
47	95.81±1.73^{a}	4.00±0.58^{cd}	3.18±0.58^{cd}	4.00±0.58^{cd}	84.63±1.73^{a}	88.33±2.31^{ab}
51	94.68±1.15^{ab}	4.09±0.58^{cd}	3.80±0.58^{bc}	5.32±0.58^{bc}	81.37±0.71^{abc}	86.29±1.73^{abc}
55	96.30±1.51^{a}	4.40±0.58^{bcd}	2.81±0.23^{cd}	6.00±0.58^{bc}	83.09±3.04^{ab}	86.24±2.41^{abc}
59	90.41±1.51^{bc}	4.59±0.58^{bcd}	3.20±0.12^{cd}	7.07±0.58^{b}	74.85±0.58^{bc}	82.80±0.58^{bc}
63	94.08±1.12^{ab}	6.00±0.58^{bc}	4.64±0.58^{b}	9.41±1.15^{a}	74.04±6.82^{c}	78.55±6.32^{cd}
67	93.90±0.66^{ab}	8.68±1.15^{a}	4.63±0.58^{b}	7.10±0.58^{b}	73.60±1.80^{c}	78.35±1.37^{cd}
71	88.45±1.17^{c}	6.24±0.58^{b}	9.04±0.58^{a}	11.35±1.15^{a}	61.86±3.51^{d}	70.14±4.90^{de}
SEM	0.58	0.40	0.40	0.50	1.69	1.52
P	0.010	0.000	0.000	0.000	0.000	0.000

Means with different alphabets in rows differ significantly (P<0.001)

Mid deaths were significantly increased along with increasing the age of Rajasri birds from 35 to 71 weeks. Significantly less mid embryonic deaths were observed at 39 weeks age than 47 to 71 weeks age groups but there was no significant difference among 35, 39 and 43 weeks age group. Significantly high mid embryonic mortalities were observed at 71 weeks age than other age groups of Rajasri birds. Similarly Iqbal *et al.,* (2016) found that less mid embryonic deaths at 45 weeks of in broiler breeders.

Late deaths were significantly increased along with increasing the Rajasri birds age. Significantly less late mortalities were noticed at 39 weeks age group than other age groups

but there was no significant difference was noticed among 39, 43, 47 weeks age groups. 63 and 71 weeks age groups had shown significantly high late embryonic mortalities among the all age groups. Similar results were reported by Alsobayel (1992) in Saudi Arabian Baladi chicken. In contrary Alsobayel and Albadry (2012) reported that there was no effect of age on late embryonic mortality of white leg horn egg.

Basing on the total egg set hatchability was significantly not differed from 35 to 59 weeks age of Rajasri bird but significantly poor total egg set hatchability was noticed from 63 to 71 weeks age when compared with 35 to 59 weeks age groups. On fertile egg basis hatchability was significantly not differed from 35 to 59 weeks age of Rajasri birds but significantly poor hatchability was noticed from 63 to 71 weeks than other age groups. Significantly high and low hatchability rates were observed at 39 and 71 weeks age groups. The results of this study were inconsonance with the findings of Islam et al., (2008) observed the best egg hatchability at hens aged between 41 and 60 weeks than higher age groups. Similarly Iqbal *et al.,* (2016) at 30,45,60 weeks age and Nowaczewski *et al.,*(2016) from 26 to 64 weeks age in in broiler breeders and they concluded that as age advances fertility rate was decreases. In contrary Gualhanone *et al.,* (2012) observed that age did not have any impact on the hatchability parameters of Cobb 500 broiler breeder.

Decreased in fertility, hatchability at 59^{th} week of age might be due to that at that age bird were exposed to high ambient temperature (41°c temperature and 93% humidity). These findings were supported by (King Ori, 2011).

CONCLUSION

Results of this study revealed that as age advances fertility per cent was significantly decreased, early, mid and late deaths were significantly increased, hatchability was significantly decreased basing on total eggs set and fertile eggs set. Hence this study suggested that the Rajasri birds can be utilized as parents up to 67 weeks of age with maximum fertility and hatchability.

REFERENCES

[1] Abudabos, A. (2010). The effect of broiler breeder strain and parent flock age on hatchability and fertile hatchability.*International Journal of Poultry Science*, *9*(3), 231-235.

[2] Al-Bashan, M.M., & Al-Harbi, M.S. (2010). Effects of ambient temperature, flock age and breeding stock on egg production and hatchability of broiler hatching eggs. *Europianjournel of Biotechnology and Bioscience*, *2*, 55-66.

[3] Alsobayel, A.A. (1992). Effect of protein rearing diet and age on fertility and hatchability parameters of Saudi Arabian Baladi chickens. *Journel of King Saudi University*, *4*, 47-54.

[4] Alsobayel, A.A., & Albadry, M.A. (2012). Effect of age and sex ratio on fertility and hatchability of Baladi and Leghorn laying hens.*Journel of Animal and Plant Sci*ence *22*(1), 15-19.

[5] Gualhanone, A., Furlan, R.L., Fernandez-Alarcon, M. F., & Macari, M. (2012). Effect of breeder age on eggshell thickness, surface temperature, hatchability and chick weigh. *Revista Brasileira de CiênciaAvícola*, *14*(1), 09-14.

[6] Iqbal, J., Khan, S.H., Mukhtar, N., Ahmed, T., & Pasha, R.A. (2016). Effects of egg size (weight) and age on hatching performance and chick quality of broiler breeder. *Journal of applied animal research*, *44*(1), 54-64.

[7] Islam, S.S., Hossain, M. B., & Khan, M.K.A. (2008). Effect of genotype, age and season on hatchability of egg. *Bangladesh Journal of Animal Science*, *37*(1), 17-22.

[8] King'Ori, A.M. (2011). Review of the factors that influence egg fertility and hatchability in poultry. *International Journal of Poultry Science*, *10*(6), 483-492.

[9] Nowaczewski, S., Babuszkiewicz, M., & Kaczmarek, S. (2016). Effect of broiler breeders' age on eggshell temperature, embryo viability and hatchability parameters.*Annals of Animal Science*, *16*(1), 235-243.

[10] Nutrient Requirement of Animals - Poultry (ICAR-NIANP), 2013

[11] Othman, R.A., Amin, M.R., & Rahman, S. (2014). Effect of egg size, age of hen and storage period on fertility, hatchability, embryo mortality and chick malformations in eggs of Japanese quail (Coturnix coturnix japonica). *IOSR Journal of Agriculture and Veterinary Science*, *7*(1), 101-106.

[12] Salahi, A., Khabisi, M.M., & Esmailizadeh, A.K. (2012). Effects of pre-incubation upside-down positioning of eggs from breeder flocks with different ages on hatchability and chick quality.*Animal production science*, *52*(4), 269-275.

[13] Snedecor, G.W., & Cochran, W.G. (1989). Statistical methods, 8thEdn.*Ames: Iowa State University. Press Iowa*.