Short Communication

EFFECT OF GENETIC MAKEUP AND SEASON ON FERTILITY AND HATCHABILITY OF CHICKEN VARIETIES OF RURAL FARMING

D. Gandhimathi*[1], M. Murugan[2] and S.C. Edwin[3]
Livestock Farm Complex
Veterinary College and Research Institute
Tamil Nadu Veterinary and Animal Sciences University
Tirunelveli, Tamil Nadu, India

ABSTRACT

Data of 229 hatches of commercial country chicken hatchery for a period of four years from 2017-2020 was collected and analyzed to study the effect of genetic makeup and season on fertility and hatchability in chicken varieties developed for rural chicken rearing viz., Aseel cross, Kaveri, Grampriya and Vanaraja. Kaveri chicken varieties recorded significantly higher fertility of 85.04 per cent (P<0.01) followed by Aseel cross, Gramapriya and Vanaraja which are comparable in fertility values of 81.68, 81.33 and 82.80 per cent, respectively. In terms of fertile and total hatchability, Kaveri recorded significantly higher values of 94.16 and 80.08 per cent than other varieties. Winter and North East Monsoon seasons recorded significantly higher value of 89.39 and 87.91 per cent in Kaveri, 85.22 and 83.84 per cent in Aseel Cross and 84.85 and 86.42 per cent in Gramapriya. On the other hand, summer season recorded the lowest fertility rates in all the chicken varieties.

Key words: Chicken varieties, Fertility, Hatchability, Season

INTRODUCTION

India's egg production is 103.32 billion and per capita consumption per annum is 79 eggs for the year 2018-19. The contribution of commercial and backyard poultry is 84.91 and 18.41 billion eggs, which is 82.2 and 17.8 per cent of the total production. (BAHS, 2019). Backyard poultry is still playing critical role in rural livelihood activities especially for farming women. In view of improving the backyard chicken rearing systems, a lot of attempts are being made by various veterinary institutions and one among the same is development of chicken genetic varieties suitable for backyard chicken rearing.

Among those, Aseel Cross (Central Avian Research Institute, Bareilly), Kaveri (Central Poultry Development Organization, Bangalore), Gramapriya and Vanaraja (Directorate of Poultry Research, Hyderabad) are popular varieties and the

*Corresponding author,
email: drdgmathi@gmail.com
[1]Assistant Professor
[2]Professor
[3]Professor and Head

demand for the day-old chicks of the same in rural chicken rearing is encouraging. On the other hand, none of the above chicken varieties have good broodiness to suit themselves for rural chicken rearing, there by artificial incubation is necessary for multiplication and to maintain the supply chain value system to the rural chicken rearing, intensive country chicken farming and chicken nursery business models as well (Gandhimathi *et al.*, 2020). In this context, fertility and hatchability performance of these varieties are playing crucial role in deciding profitability of these hatchery business, when using as parent stocks. Considering that, a data study was designed to analyze the fertility and hatchability performance of chicken varieties namely, Aseel cross, Kaveri, Gramapriya and Vanaraja with reference to genetic group and season.

MATERIALS AND METHODS

Data on 229 hatches of commercial country chicken hatchery of Livestock Farm Complex of Veterinary College and Research Institute, Tirunelveli was collected spreading over a period of four years from 2017-2020, which supplies day-old chicks of various chicken varieties to the farmers on market cost basis namely Aseel cross, Kaveri, Gramapriya, Vanaraja by procuring hatching eggs of these varieties from the government breeder farms. The standard incubation practices being followed in this hatchery includes fumigation of hatching eggs at 2X concentration, maintenance of physical requirements incubation like temperature/ relative humidity (99.5 to 100°F / 58-60 % in setter and 99.0-99.5°F/ 70-72 % in hatcher), hourly turning of eggs, candling of eggs for fertility, pullout on 21st day and grading of chicks. Data on total and fertile eggs set, chicks hatched and supplied were collected for different genetic groups and the same was classified into season wise namely summer (March-May), southwest monsoon (June-August), northeast monsoon (September - November) and winter (December - February) to study the season effect. Mean per cent fertility, hatchability to fertile and total eggs set were worked out for different chicken germplasm and season-wise analysis. The data was subjected to one way classification (ANOVA) statistical analysis using SPSS 20 after making necessary data transformation of the per cent values.

RESULTS AND DISCUSSION

Chicken variety and season wise mean per cent fertility, hatchability to fertile and total eggs set are presented in Table. Analysis of the data revealed that, Kaveri chicken recorded significantly higher fertility of 85.04 per cent ($P<0.01$). Aseel cross, Gramapriya and Vanaraja are comparable in fertility values of 81.68, 81.33 and 82.80 per cent respectively. Asuquo and Okun (1993) opined that, fertility was not influenced by the chicken variety, but it was subjected to variation in accordance with egg size and the medium size egg favours the fertility. Since, Kaveri chicken has also medium sized eggs; compared to other varieties, it may be attributed to the higher fertility of Kaveri than other varieties (Haunshi *et al*., 2012).

Table. Mean (%) hatch performance of chicken genetic stocks developed for rural poultry

Trait	Aseel cross (89)	Kaveri (88)	Gramapriya (40)	Vanaraja (12)
Fertility **	81.68 ^{b}± 0.68 [7.93]	85.04^{a}± 0.72 [7.90]	81.33^{b}±1.29 [10.02]	82.80^{b}±1.48 [6.43]
Hatchability on Fertile Eggs Set **	91.57^{b}±0.45 [4.66]	94.16^{a}±0.39 [3.84]	92.33^{b}±0.78 [5.35]	87.28^{c}±1.15 [4.75]
Hatchability on Total Eggs Set*	74.75^{b}± 0.20 [8.57]	80.08^{a}± 0.76 [8.91]	75.08^{b}± 1.32 [11.11]	72.35^{c}± 1.92 [9.55]
Season wise hatch performance				
Trait	**Summer**	**SW Monsoon**	**NE Monsoon**	**Winter**
Aseel cross	**(20)**	**(28)**	**(19)**	**(22)**
Fertility **	78.40^{b}±7.76	79.78^{b}±1.05	83.84^{a}±1.19	85.22^{a}±0.77
Hatchability to Fertile Eggs Set *	93.20^{a}±0.67	92.78^{a}±0.87	90.48^{b}±1.00	89.72^{b}±0.80
Hatchability to Total Eggs Set ^{NS}	73.46±1.70	74.00±1.70	75.83±1.33	76.50±1.09
Kaveri	**(25)**	**(22)**	**(22)**	**(19)**
Fertility **	79.98^{c}±1.79	84.15^{bc}±0.78	87.91^{ab}±0.66	89.39^{a}± 0.97
Hatchability to Fertile Eggs Set ^{NS}	94.11±0.73	95.20±0.86	93.56±0.65	93.73±0.82
Hatchability to Total Eggs Set **	75.22^{b}±1.73	80.12^{a}±1.07	82.24^{a}± 0.82	83.90^{a}±1.55
Gramapriya	**(10)**	**(13)**	**(09)**	**(08)**
Fertility*	77.78^{b}±2.12	78.37^{b}±2.73	86.42^{a}±1.57	84.85^{a}±2.22
Hatchability to Fertile Eggs Set ^{NS}	92.14±1.80	93.14±1.80	93.01±0.83	90.47±1.05
Hatchability to Total Eggs Set ^{NS}	71.56±2.03	72.12±3.56	80.33±1.25	76.79±2.35
Vanaraja	**(1)**	**(7)**	**(4)**	
Fertility ^{NS}	76.29±0.00	83.39±2.01	83.41±2.84	-
Hatchability to Fertile Eggs Set^{NS}	85.84±0.00	86.92±1.80	88.27±1.95	-
Hatchability to Total Eggs Set ^{NS}	65.49±0.00	72.56±2.72	73.70±3.65	-

Mean values sharing any one common superscript in column did not differ significantly.
**(P<0.05), ** (P<0.01), NS- Not Significant.*
Values in the round brackets indicate the number of observations and values with in the square brackets indicate the Co efficient of Variation (CV) in per cent.
'-' indicate the non-availability of data in the respective group.

In hatchability on fertile eggs set, Kaveri recorded significantly (P<0.01) higher per cent of 94.16 followed by Aseel cross and Gramapriya with comparable values of 91.57 and 92.33 per cent and Vanaraja recorded the significantly lowest of 87.28 per cent (P<0.01) among the four chicken varieties. It is also in agreement with the finding of higher fertile hatchability in medium sized eggs of chicken varieties (Prema *et al.,* 2020).

In terms of hatchability of total eggs set also, Kaveri recorded significantly the highest value of 80.08 per cent and Vanaraja the lowest of 72.35 per cent in its large sized eggs (P<0.05) and it is in accordance with the findings of higher hatchability of medium sized eggs in broiler breeders than large size eggs (Kalita, 1994)

Analysis of data season-wise for fertility separately for different variety revealed that winter and northeast

monsoon recorded significantly higher and comparable fertility values of 89.39 and 87.91 per cent in Kaveri, 85.22 and 83.84 per cent in Aseel cross and 84.85 and 86.42 per cent in Gramapriya than other seasons. On the other hand, summer recorded the lowest fertility rates in respective of all the chicken varieties. It is in agreement with the findings of higher fertility in winter season as against summer season in Beltsville Small White Turkey and Nandanam Turkey varieties (Jegathesan *et al*., 2012; Pandian *et al*., 2017).

On the part of hatchability on fertile eggs set, summer recorded significantly higher value of 93.20 per cent ($P<0.05$) in Aseel and in other three chicken varieties, season effect on hatchability on fertile eggs set is not significant.

Winter recorded significantly higher hatchability to total eggs set of 83.90 per cent in Kaveri ($P<0.01$) than other seasons, in other three varieties, seasonal effect on hatchability to total eggs set was insignificant. It is also in accordance with the findings of higher total hatchability in duck eggs during winter (Chowdhury *et al*., 2004) and during spring season in backyard chicken (Farooq *et al.*, 2003). Based on this, it is evident that depression in hatchability to total eggs set in summer is mainly due fertility factor and not by hatchery performance.

CONCLUSION

Based on above study, it is concluded that Kaveri chicken had significantly higher fertility of 85.04 per cent ($P<0.01$) followed by Aseel cross, Gramapriya and Vanaraja which are comparable in fertility with the values of 81.68, 81.33 and 82.80 per cent respectively. Winter and North East Monsoon seasons recorded significantly higher fertility values of 89.39 and 87.91 per cent in Kaveri, 85.22 and 83.84 per cent in Aseel Cross and 84.85 and 86.42 per cent in Gramapriya. On the other hand, summer recorded the lowest fertility rates in all the chicken varieties. Kaveri shall be considered as country chicken breeder's bird and offering more values in terms of hatch performance. It is also evident that, depression in hatchability to total eggs set in summer is mainly due to fertility factor and not by hatchery performance.

REFERENCES

Asuquo, B. O. and Okun, B. (1993). Effects of age in lay and egg size on fertility and hatchability of chicken eggs. *Nigerian Journal of Animal Production*, **20**: 122-24.

BHAS, (2019). Basic Animal Husbandry Statistics, Ministry of Fisheries, Animal Husbandry and Dairying, Department of Animal Husbandry and Dairying, Krishi Bhawan, New Delhi

Chowdhury, M.M.I., Ashraf, A., Mondal, S.P., Mondol, M. and Hassan, M.M. (2004). Effect of season on the hatchability of duck eggs. *International Journal of Poultry Science*, **28**: 121 -128.

Farroq, M., Javed, K., Durrani, F.R., Irfanullah, K. and Chand, N. (2003). Hatching Performance of backyard hens in Peshawar, Pakistan. *Livestock Research for Rural Development*, 15.

Gandhimathi, D., Murugan, M. and Edwin, S.C. (2020). Economic Evaluation of chick Nursery with various chicken stocks suitable for rural chicken rearing. *Journal of Poultry Science and Technology*, **8**(2): 29 -31.

Haunshi, S., Shanmugam, M., Padhi, M.K, Niranjan, M., Rajkumar, U. and Reddy, M.R. (2012). Evaluation of two Indian native chicken breeds for reproduction traits and heritability of juvenile growth traits. *Tropical Animal Health Production*, **44**(5): 969-973.

Kalita, N. (1994). Effect of egg weight, storage period and position of egg on hatchability. *Indian journal of Poultry Science*, **29**: 281-83.

Pandian, C., Sundaresan, A., Ezhil valavan, S., Hudson, G. and Omprakash, A.V. (2017). Effect of month and season on Hatchability Performance of Turkey. *International Journal of Livestock Research*, **7**(6): 139 -143.

Premavalli, K., Richard Churchil, R. and Omprakash, A.V. (2020). Effect of egg weight of hatching performance of Aseel. *Journal of Entomology and Zoology Studies*, **8**(3): 71-74

Jagatheesan, P.N.R., Anna Anandh, M., Senthil kumar, P., Rajarajan, G. and Paramasivam, A. (2012). Effect of month and Season on hatching performance of Turkey. *Indian Veterinary Journal*, **89**(12): 118 – 119.