



Factors affecting fertility, hatchability and chick survivability in poultry germplasm under sub temperate conditions

Varun Sankhyan, Y P Thakur, S Katoch and P K Dogra

Animal Genetics & Breeding, DGCN College of Veterinary & Animal Sciences

CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur-176 062

sankhyan@gmail.com

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Abstract

An investigation was carried out to study the effect of season, genotype, age of breeder hen and source of egg collection on fertility, hatchability and chick survivability at Palampur during July 2010 to August 2012. There was significant effect of season on the fertility ($P < 0.01$). The highest average fertility was observed in winter ($90.54 \pm 0.64\%$) followed by monsoon ($86.74 \pm 1.45\%$) and summer ($84.73 \pm 1.67\%$). The highest mean fertility was found in Native, followed by Native x Dahlem Red (DR) and Native x Rhode Island Red (RIR). The highest average fertility and hatchability were observed in 40-60 week age group followed by 26-40 week and 60 and above. The source of collection of egg also has significant effect on hatchability as well as fertility ($p < 0.01$). Eggs collected from farmer's flock had lower fertility ($81.06 \pm 1.33\%$) and hatchability ($67.61 \pm 1.80\%$) when compared with fertility ($88.27 \pm 0.88\%$) and hatchability ($74.70 \pm 1.17\%$) of farm's eggs. The hatchability operation under sub temperate condition of the region can be effectively carried out throughout the year without much reduction in fertility and hatchability, although greater care and managerial precision must be exercised in winter season both during hatching as well as brooding in the region.

Key words: Fertility, hatchability, Chick survivability

Fertility and hatchability are the most important determinants for producing more chicks from given number of breeding stock within a stipulated period. Fertility and hatchability performance of eggs depend on the number of factors like genetic, physiological, social and environmental (Jull, 1970). There are several reports indicating that genotype, age of breeder hen and season has significant effect on hatchability traits. Therefore, the present investigation was planned to study the effect of season, genotype, age of breeder hen and source of egg collection on fertility, hatchability and chick survivability in sub temperate conditions of Palampur in Himachal Pradesh.

The study was conducted at University Poultry Farm, CSKHPV Palampur during July 2010-August 2012. Hatching eggs were collected from breeder hens reared in the farm and purchased from farmer's flock. Breeder hens maintained in the farm belongs to three different genotype viz. Native, crosses of native with Dahlem Red (DR) and crosses of native with Rhode

Island Red (RIR). These breeder hens were categorized in to three different age group viz. 26-40, 41-60 and more than 60. Three different seasons viz summer (April to June), monsoon (July to October) and winter (November – March) were considered throughout the year. Breeder hens at farm were reared under deep litter system with standard feeding and management practices.

One breeder cock was provided for every 10 hens. One nest box was provided for every three hens. Hatching eggs were collected thrice daily and sorted according to genotype of hens. Eggs with sound shell, proper shape were selected while cracked abnormal and odd colored eggs were excluded. Eggs were properly cleaned and stored around 15°C with 75% relative humidity for 3-5 days. While collecting the local eggs from farmer's flock managed under traditional backyard production system proper care was taken to collect the freshly laid sound and well shaped eggs. The collection was done from farmers maintaining the adequate hen: cock ratio so as to ensure the adequate fertility. These eggs were stored under the

same condition as farm eggs, but maximum up to 3 days. Eggs were hatched by electric incubator having the capacity of 15000 eggs for setter and 5000 eggs for hatcher. Before introducing new batch of hatching eggs, the incubator was cleaned and fumigated to prevent pathogenic infection. Setting and hatching temperature for dry bulb was 99°F and 98°F, respectively and for wet bulb was 85°F and 90°F, respectively so as to give desired relative humidity throughout the entire incubation period. The temperatures were monitored thrice daily and adjustment was made if needed. The eggs were identified properly for different classification groups and were turned after one hour automatically by programmed device. On the 7th and 12th days of incubation, the eggs were candled to identify and remove infertile eggs. The remaining eggs were transferred from setting trays to hatching trays on 19th day of incubation. On 21st day, hatched out

chicks were collected and counted. Hatchability percentage was calculated by the number of chicks hatched divided by total number of eggs set and multiplied by 100. Data were subjected to analysis of variance (ANOVA) with the help of a computer package program (SAS). Least Significant Difference (LSD) test was performed to compare differences among the means.

There was significant effect of season on the fertility ($P<0.01$) (Table 1.). Among different season of hatching the highest average fertility was observed in winter (90.54±0.64%) followed by monsoon (86.74±1.45%) and summer (84.73±1.67%). Significant effect of season on fertility was also reported by Islam *et al.* (2008) and Chowdhury *et al.* (2004). The average hatchability in summer, monsoon and winter was 72.42±1.98%, 73.34±2.08% and 75.40±1.34%, respectively. The difference between the hatchability among different seasons was

Table 1. Least Square Means ± SE of fertility, hatchability and chick survivability in sub temperate Palampur region of HP

Sub-class description	Batches (No)	Eggs/batches (No)	Fertility (%)	Hatchability TES (%)	Chick Survivability (%)
Overall mean	54	195.00±13.66	87.19±0.84	73.65±1.08	94.62±0.25
Season					
Summer	18	215.22±17.88	84.73±1.67 ^A	72.42±1.98	95.56±0.33 ^A
Monsoon	20	174.25±20.67	86.74±1.45 ^{AB}	74.20±2.08	94.86±0.34 ^A
Winter	16	198.19±31.76	90.54±0.64 ^B	74.35±1.34	93.27±0.49 ^B
		NS	**	NS	**
Genotype					
Native	15	184.46±27.52	86.33±1.50	75.79±2.07	94.72±0.43
Native x DR	15	245.86±25.62	88.34±1.02	75.36±1.31	94.55±0.65
Native x RIR	24	168.58±20.25	87.02±1.55	71.24±1.82	94.60±0.32
		NS	NS	NS	NS
Age (weeks)					
26-40	14	225.76±33.66	85.54±1.46 ^A	73.41±2.20 ^{AB}	95.26±0.44
40-60	20	190.55±23.02	91.19±0.47 ^B	78.68±1.11 ^A	94.87±0.39
61 and above	20	178.45±18.59	86.26±1.56 ^A	70.81±1.46 ^B	93.92±0.33
		NS	**	**	NS
Source of eggs					
Farm	46	196.54±15.73	88.27±0.88 ^A	74.70±1.17 ^A	94.62±0.26
Farmer's flock	8	186.13±19.46	81.06±1.33 ^B	67.61±1.80 ^B	94.61±0.87
		NS	**	**	NS

NS: Not significant ** Significant ($p<0.01$); DR, Dahlem Red ; RIR, Rhode Island Red

however not found statistically significant ($p>0.05$), which was in accordance with earlier report of Babiker and Musharaf (2008).

There was comparatively much greater reduction in hatchability when compared as % reduction over fertility in winter (17.9%) as compared to summer (14.5%) and monsoon (14.4%). This may be attributed to the fact that during extreme winter there was much more difficulty to continuously maintain the hatcher and setter temperature with the precision capable in other season. There were significant differences in chick survivability during different season ($p<0.01$), which was $95.56\pm 0.33\%$, $94.86\pm 0.34\%$ and $93.27\pm 0.49\%$ for summer, monsoon and winter, respectively. Chicks hatched in winter season had more mortality (up to 6 week of age) followed by monsoon and summer. The comparatively higher mortality in chicks hatched during winter season can be attributed to the fact that there was difficulty in maintaining the appropriate brooding condition continuously due to low temperature especially during night hour.

Effect of genotype on fertility and hatchability has been shown in Table 1. The highest mean fertility was found in native, followed by Native x DR and Native x RIR. Similar trend was observed for hatchability but the differences for fertility and hatchability were not statistically significant ($p>0.05$).

Among three different age group of breeder hen

there were statistically significant differences in the fertility and hatchability ($p<0.01$). The highest average fertility and hatchability were observed in 40-60 week age group followed by 26-40 week and 60 and above. The result of present finding was in accordance with earlier reports (Islam *et al.* 2008, Suarez *et al.* 1997 and Das 1994).

The source of collection of egg had significant effect on hatchability as well as fertility ($p<0.01$). Eggs collected from farmer's flock had lower fertility ($81.06\pm 1.33\%$) and hatchability ($67.61\pm 1.80\%$) when compared with fertility ($88.27\pm 0.88\%$) and hatchability ($74.70\pm 1.17\%$) of farm's eggs. This might be due to the fact that not all critical factors for ensuring proper collection and handling of eggs for hatching purpose were taken care at farmer's doorstep compared to standard procedure at farm. The differences in chick survivability with respect to source of collection were not significant ($p>0.05$).

The hatchability operation under sub temperate condition of the region can be effectively carried out throughout the year without much reduction in fertility and hatchability. Greater care must be exercised in winter, since the finding suggest that in spite of higher average fertility observed in winter season there was comparatively higher percent reduction in hatchability and lower chick survivability.

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