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Effect of temperature on growth and feed consumption rate of korean ring necked pheasant (*Phasianus colchicus*)

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Abstract
A study was conducted to know the relation between temperature, growth and feed consumption rate in Korean Ring-Necked Pheasants. Three cages of same size (7.25 x 4.15 m ''30 m^2 area, per bird space 10 $m^{2"}$), were selected for a pair of pheasants in each cage. Six chicks of 15 days old were selected (3 males and 3 females) for three cages i.e. C1, C2 and C3 having 1 male chick and 1 female chick in each cage. It was observed that feed consumption rate was also decreased, decline in feed consumption rate 6.62, 8.23 and 8.74 respectively of three groups 1, 2 and 3. Maximum feed conversion rate was recorded during 1st week of study and minimum during last week of study in all groups. In the present study week wise feed conversion ratio (FCR) was statistically significantly different (p<0.01) whereas no difference (p>0.01) was observed among the three groups.

Keywords: Growth rate, Temperature, Pheasants

1. Introduction
The Korean Ring-Necked pheasant (*Phasianus colchicus*) belongs to family (Phasianidae) and simply known as the pheasant [1]. It is inhabitant to Asia and has been widely introduced in different places as a game bird [2]. In parts of its habitat, namely in spaces where not any of its associations occur such like in Europe. Pheasants are chick like bird in size, shape and structure [3]. The male ring-necked pheasant is a magnificent looking bird, and having a shiny dark green head with little feathery horns like growth, an uncovered red face [3]. A white loop lies around neck, and a shiny copper colored chest. The female is lesser showy and having blotchy brown and black and smaller in size than male bird [4]. A male pheasant in length approximately ranges from 34-36 inches (86.36cm-91.44cm), having a 20-23 inches (50.9cm-58.42cm) tail and weighs about 2.25 to 2.50 pounds (1.02-1.13kg) [5]. The female is smaller than male and only 25 inches (63.5cm) long having a 11-12inches (27.9-30.1cm) long tail and weighs about 1.75-2.0 pounds (0.8-0.91kg) [5].

1.1 Distribution
The Korean ring-necked pheasants are endemic to China. It is found in most regions of South Dakota, except some area of Black Hills [6].

1.2 Feeding habit
In winter and fall, Pheasants feed on seeds chiefly grain from homestead fields and also on leaves, grasses along with wild growth from the soil, creepy and crawlies [7]. The feeding routine of spring and summer season is comparable, so far with a more significant inflection on creature prey in addition with greenery. They eat bugs too, like crickets, grasshoppers, caterpillars, snails, scarabs, and additionally ants and other insects [7, 8]. Pheasants are scavenger of fields, forest margins, grassy pastures, and territories brushy cover. This bird also feed on thrown away grain/seeds from cow muck from the fields. Pheasants obtain their most of their nourishment from the start, by burrowing through their beaks [6]. These birds also obtain feed from buried seed and roots of the plants from the depth of more than 7 cm beneath the soil level. They in addition at times borrow in herbs, shrubs and small bushes or trees for organic product of plants, leaves, and buds [9].

The pheasants need little amount of water and they fulfill their need of water from berries, seeds, dew and rain water pools [8]. The reason, pheasants are so often seen all along roadsides in cultivated areas is that they, like many other seed and grain eating birds, eat gravels. The small stone pebbles accumulate in the gizzard of birds and serves as an assistance in breaching up hard food particles like seeds and grains [10]. The present study was conducted to evaluate the effect of temperature on growth and feed consumption of Korean ring necked Pheasant, *Phasianus colchicus.*

2. Materials and Methods

The current study was conducted at Wildlife Breeding Center of Punjab Wildlife Research Center (PWRC), Gatwala, Faisalabad, from 29th of July, 2016 through 29th of September 2016 for a period of 9 weeks. Three cages of same size were selected for a pair of pheasants in each cage by following the scheme presented [11]. So six birds of 15 days old were selected (3males and 3 females) for three cages i.e. C1, C2 and C3 having 1 male chick and 1 female chick in each cage.

The birds were fed on breeder hen diet containing 180 g crude proteins, 11.3 milli Joule Metabolizable Energy and 30 g calcium per kg diet [12]. Feeding was done once a day from 08:00 am to 010:00 am whereas watering was done twice a day i.e. at 08:00 am and at 05:00 pm. The cages were cleaned every day to avoid any disease outbreak.

The medication/vaccination of birds was done at the start and middle of the trail on the prescription of local Veterinary Officer. The medicines/vaccines included Complicap (CRD) @ 1cc/1 liter of water for 5 days, Tesgovit @ 1 gm/3 liter of water for 4 days, Ciprosol @ 1cc/2 liter of water for 4 days and Mucolator @ 100mg/liter of water for 5 days. Water soluble vitamin minerals premix, lysine and methionine were added for 4 days in drinking water of birds. This process was repeated after every two weeks. The ND Vaccine was given once in study period. The following data were collected:

2.1 Feed Consumption (g)

A measured quantity of breeder feed 200g/bird was offered to each group for 1st four weeks, later on it was increased to 300g/bird for the rest of the study period. Next day the rejected/unconsumed feed was weighed to record feed intake by each group [13]. The pots were cleaned and again filled with fresh feed and this weighing process was repeated every day up to 9 weeks. Total and average feed intake per bird was calculated on weekly basis. This was done on the assumption investigated that feed intake is significantly affected by stocking density [14].

2.2 Feed Consumption Rate

Feed consumption rate for every group was recorded on weekly basis by using the formula:

Feed Consumption Rate = Weight gained/ Feed consumed × 100 [10].

2.3 Daily Temperature

Daily ambient temperature was recorded by using analog thermometer on daily basis for three times to get average daily temperature.

2.4 Statistical Analysis of the Data

All the data obtained were analyzed using a Completely Randomized Design (CRD) [15] with the help of a computer package programme MINITAB (MINITAB, 2000).

3. Results

During the entire study period the ambient temperature declined continuously. It was observed that feed consumption rate was also decreased, Table 1, 2 and 3 showed the decline in feed consumption rate 6.62, 8.23 and 8.74 respectively of three groups 1, 2 and 3. Maximum feed conversion rate was recorded during 1st week of study and minimum during last week of study in all groups (Table 1, 2, and 3). In the present study feed conversion ratio (FCR) was statistically significantly different at statistical level (p<0.01) (Table 4). All the three groups showed statistically no difference in feed consumption in 9 weeks study period among them at statistical level (p>0.01)

Table 1: Average ambient temperature, weight gained, average feed consumed and feed consumption rate of group 1 of Korean Ring-Necks Pheasant during the nine weeks of the study.

	Temp. (C)	Wt. Gained (g)	Feed Consumed (g)	Feed consumption Rate (%)
Week 1	35.20	160	560	28.57
Week 2	31.28	130	670	19.40
Week 3	31.14	115	640	17.96
Week 4	32.14	165	665	28.81
Week 5	31.93	135	725	18.62
Week 6	30.71	155	770	20.12
Week 7	29.00	150	825	18.18
Week 8	27.28	120	885	13.56
Week 9	26.00	60	905	06.62

Table 2: Average ambient temperature, weight gained, average feed consumed and feed consumption rate of group 2 of Korean Ring-Necks Pheasant during the nine weeks of the study

	Temp. (C)	Wt. Gained (g)	Feed Consumed (g)	Feed consumption Rate (%)
Week 1	35.20	165	580	28.44
Week 2	31.28	135	630	21.42
Week 3	31.14	125	685	18.25
Week 4	32.14	145	660	21.97
Week 5	31.93	145	680	21.32
Week 6	30.71	150	720	20.83
Week 7	29.00	130	760	17.11
Week 8	27.28	115	800	14.37
Week 9	26.00	70	850	08.23

Table 3: Average ambient temperature, weight gained, average feed consumed and feed consumption rate of group 3 of Korean Ring-Necks Pheasant during the nine weeks of the study

	Temp (C)	Wt. Gained (g)	Feed Consumed (g)	Feed consumption Rate (%)
Week 1	35.20	155	520	29.80
Week 2	31.28	140	665	21.05
Week 3	31.14	120	660	18.18
Week 4	32.14	130	710	18.30
Week 5	31.93	140	785	17.83
Week 6	30.71	145	790	18.35
Week 7	29.00	155	830	18.67
Week 8	27.28	135	880	15.40
Week 9	26.00	80	915	08.74

Table 4: Comparison of feed conversion rate tested through completely randomized design

Source	DF	Adj SS	Adj MS	F-Value	P-Value
FCR (Weekly)	8	794.13	99.266	23.58	S**
Error	18	75.77	4.210		
Total	26	869.90			

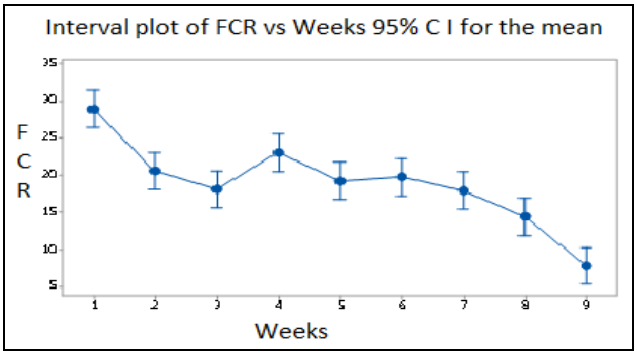

Fig 1: Interval plot of Feed consumption rate vs weeks

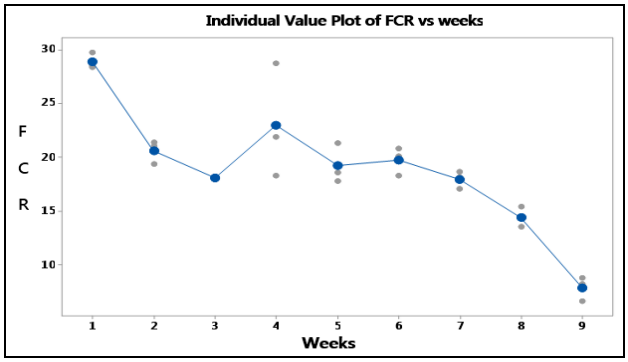

Fig 2: Individual value plot of Feed consumption rate vs Weeks

Table 5: Feed consumption

Source	DF	Adj SS	Adj MS	F-Value	
feed cons	24	17891.7	745.5	2.39	N.S
Error	2	625.0	312.5		
Total	26	18516.7			

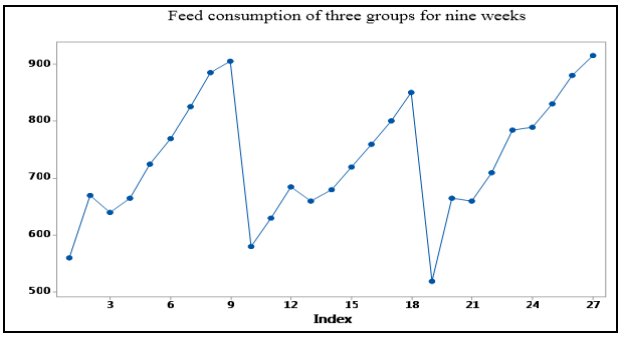

Fig 3: Comparison of feed consumption rate among three groups

4. Discussion

In the present study statistically maximum feed consumption rate (29.80%) was observed during 1st week of study when the mean ambient temperature was recorded as 35.2 °C. As the ambient temperature was decreased upto 26 °C during the study period and the age was increased, there was significant decline was noted in feed consumption rate i.e. the minimum feed consumption rate of 9th week of study was only 6.62%. The results of the present study are also supported by the findings of Reece [16] who performed an experiment to find the effect of temperature and age on body weight and feed efficiency of broiler chickens and found the growth rate was declined with the decline of temperature i.e the growth rate at 26.7 °C were 6% less at 35th days and 10% less at 55th days than at 15.6 °C.

The results are also in close similarity with Ricklefs [17] who observed the relationship between the growth rate in birds and their development and found that the growth rate decreased with increasing body weight in an allometric fashion, with slopes of –0.26 to –0.42 and the rate of growth in body weight was found to be closely associated with the rate of development of function same results are shown in this experiment as in Fig. 2 and Fig. 3 slopes are showing decline in growth as the age was increasing.

Similar results were obtained in an experiment conducted by Reece [16] in which broiler chicken were feed and grown at different environmental conditions varied on the basis of temperature. Gained body weight and ratios of feed conversion was reduced as in the present study. With the decrease of temperature growth rate was decreased.

Samarakoon [18] also showed the same results between FCR and age. He found the FCR was decreased significantly (P<0.05) throughout the study period with the increase of age. FCR was decreased with the increasing age. Males showed a significantly (P<0.05) higher growth performance than females from day 36 to 42. Males had the peak performance on 36th day and females on 35th day of study.

Maximum FCR (29.80%) was observed at temperature of 35.2 °C and minimum (6.62%) at 26 °C. From the studies it is being concluded that by controlling the temperature at optimum level better production can be gained. And we can get a lot of benefit at commercial level of production.

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