

Sex-linked gene for auto-sexing in Japanese quail¹T.Sasidhar, ²M.Moorthy, ³K.Rajendran ⁴K.Mani

Department of Poultry Science, Veterinary College and Research Institute, Namakkal, Tamil Nadu, India - 637 002

Correspondence Author: T.Sasidhar, Department of Poultry Science, Veterinary College and Research Institute, Namakkal, Tamil Nadu, India - 637 002**Type of Publication:** Original Research Paper**Conflicts of Interest:** Nil**Abstract**

A sex-linked dominant and recessive gene present in the sex chromosome which is transmitted from the female parent to the male offspring and male parent to the both male and female offsprings. Manchurian Golden (Brown) quail carrying the sex-linked recessive gene for brown plumage pattern was crossed with British Range (Black) quail carrying the sex-linked dominant gene for black plumage pattern and resulting offsprings appeared with Brown and Black plumages. The chicks were reared up to 4 weeks of age and it has been noticed that all Brown chicks were females and all Black chicks were males.

Keywords: Manchurian Golden x British Range, sex-linkage, sex-linked plumage, auto-sexing.**Introduction**

Auto-sexing at day-old age is practiced commonly in broilers, recently sex-linked brown plumage color has been used for auto-sexing in the quail industry. The sex-linked dominant gene is responsible for silver type plumage (S) and sex-linked recessive gene for golden type plumage (s) (North, 1972) and fast feathering x slow feathering, barred plumage x non-barred plumage are the other common sex-linked traits in broiler chicks.

Auto-sexing means self expression of sexes by appearance and it is necessary to auto-sex the quail for sex separate feeding to gain more weight, but it is very difficult to separate the sexes at the day-old. In British Range variety of quails, the plumage pattern clearly shows the dissimilarity between the male (rusty brown in the breast) and female (black spots in pale background) at the age of three weeks. In order to overcome the sexing problem, sex-linkage is carried out in Japanese quails for auto-sexing. Mizutani (1974) stated sex-linked recessive gene as SBC strain and this strain was established at Hiroshima University. The sex-linked brown and the sex-linked cinnamon genes were segregated for auto sexing purpose. YBC strain was established at NIBS (Nippon Institute of Biological Science) and is a random-bred white eggshell strain segregated for sex-linked brown, sex-linked cinnamon and autosomal yellow plumage colour genes.

The plumage pattern of the quails is easily distinguishable at day-old by crossing sex-linked recessive male with the dominant female. In poultry, the female is heterozygous and the male is homozygous, so the female decides the sex of the offspring and sex-linked recessive gene is inherited to the offsprings.

Materials and Methods

100 British Range (Plate 1) female were crossed with 30 Manchurian Golden (Plate 2) male in the ratio of 3:1 for maximum fertility. 500 eggs were collected for a period of one week and incubated for 18 days. 380 chicks were hatched out with two distinct colour patterns among which 80 chicks were found to have brown plumage and remaining 300 chicks had black plumage pattern. Further for confirmation of sex differences, chicks were reared up to 4 weeks.

Plate 1. Japanese quail - British Range male and female



Plate 2. Japanese quail - Manchurian Golden male and female



Results and Discussion

The birds were grown up to 3 weeks of age and among 380 chicks hatched, 80 chicks with light brown plumage pattern were found to be female and the remaining 300 chicks were found to have rusty brown plumage in the breast region indicated as male. This sex-linked transmission of plumage colour pattern from the female parent to the male offsprings and male parent to the both male and female offsprings through the gene present in the Sex chromosome.

The plumage colour of the male Manchurian Golden quail is predominantly dark brown and adult female has light brown colour. British Range males are characterized by a rusty brown throat and breast feathers while adult females have pale breast feathers that are speckled with dark coloured spots. The genetical finding in this experiment clearly showed sex-linked recessive gene for plumage pattern which was carried by Manchurian Golden Japanese quails and sex-linked dominant gene present in British Range Japanese quails.

The above findings were in close agreement with Homma (1968) who reported a sex-linked recessive mutation called Sex-linked dilute. Wakasugi and Kondo (1973) also referred the same mutation as Sex-linked brown (br/br). Adult female mutants are reddish sandy colour and adult homozygous males are also reddish diluted but darker than the females. The results of the study are in agreements with the findings of Lauber (1964), Sittmann *et al.* (1966), Homma *et al.* (1968) and Homma and Jinno (1969).

Black gene is dominant and brown gene is recessive. When British Range female (Brw) and Golden Manchurian male (brbr) are crossed (Plate 3), the F1 progeny females are brown plumaged and males are black plumaged. The recessive gene in brown male is transmitted to the both male and female offsprings but the dominant black gene in female changed only the male offspring to black and left the female offspring as brown (Figure.1 and Plate 4). If the same principle of sex-

linkage is not expressed in reciprocal cross by interchanging the sex of the parents, the offsprings will be all black plumaged males and females. Brown recessive trait will not be expressed in any one of the offsprings (Figure.2). There is no possibility of sorting them by colour to segregate the males and the females (North, 1972).

Plate 3. MANCHURIAN GOLDEN ♂ X BRITISH RANGE ♀



Plate 4. Manchurian Golden female and British Range male chicks



Figure 1. Flow Diagram showing Dominant and Recessive gene expression in opposite sex of offsprings

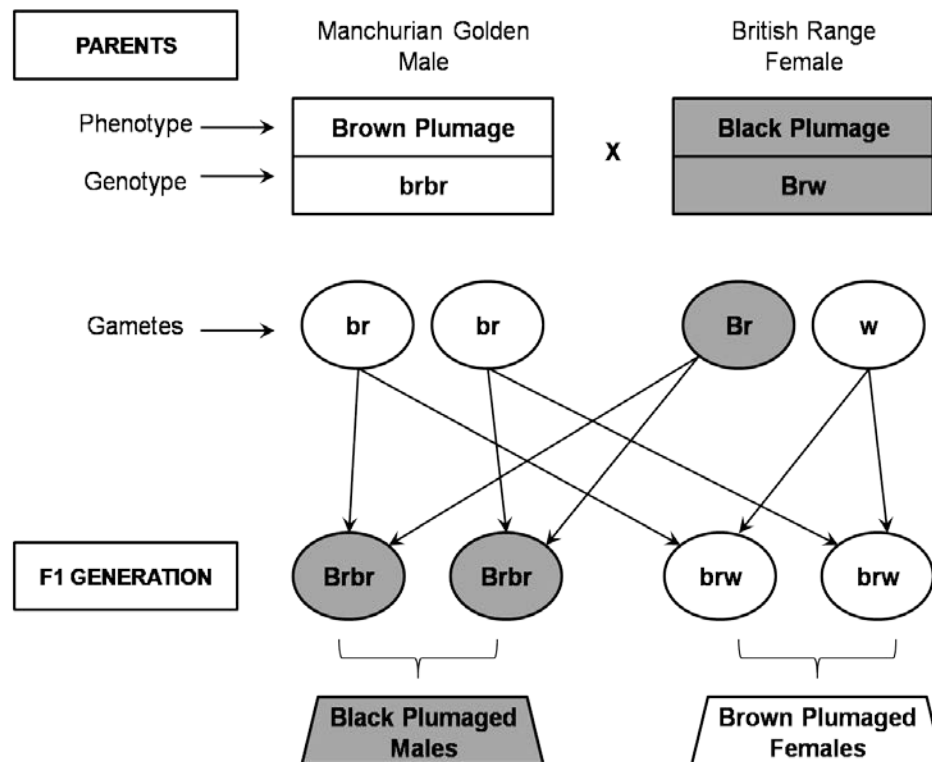
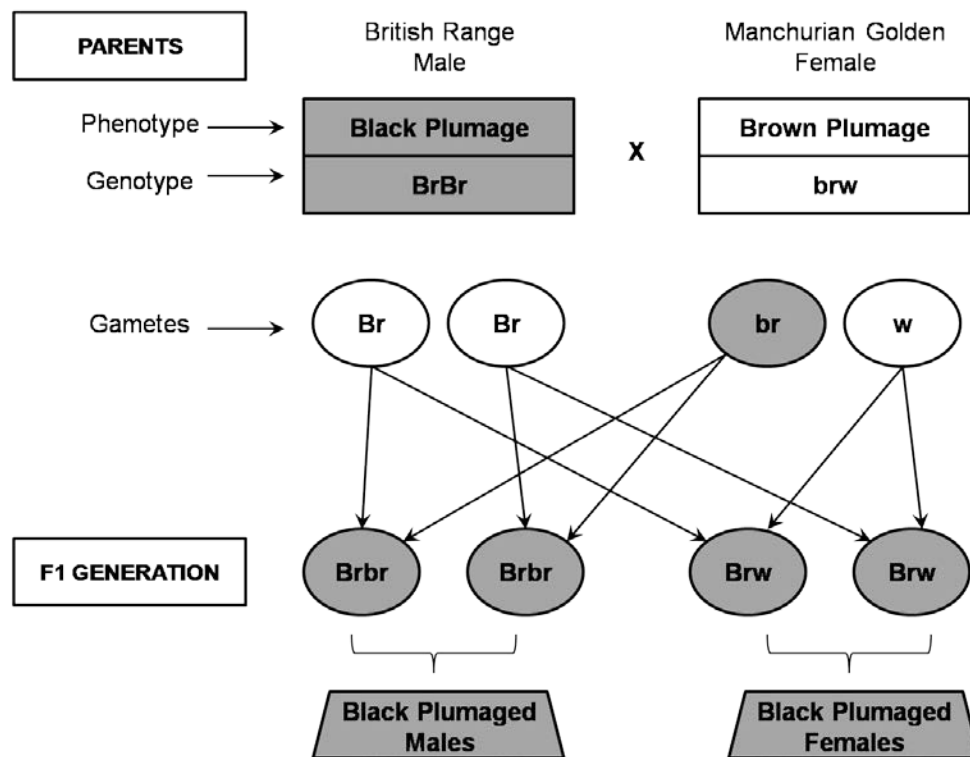


Figure 2. Flow Diagram showing reciprocal cross of sex-linked parents



References

1. Fujiwara, A., Mizutani, M., Ono, T. and Kagami, H. (2005) "Recessive Black": A Plumage Colour Mutant in Japanese Quail. *J. Poult. Sci.*, 42: 64:69.
2. Homma, K. (1968) Sex-linked dilute character in the Japanese Quail. Proceedings of the Japanese Society for Zootechnical Science, The 55th meeting, p. 47.
3. Homma, K. and Jinno, M. (1969) Sex-linked plumage characters in the Japanese quail. Proceedings of the Japanese Society for Zootechnical Science, The 57th meeting, p. 82.
4. Minezawa, H. and Wakasugi, N. (1977) Studies on a plumage mutant (black at hatch) in the Japanese Quail. *Jap. J. Genet.* 52: 183-195.
5. Mizutani, M. (1974) The Japanese Quail. Laboratory Animal Research Station, Nippon Institute for Biological Science, p. 143-163.
6. Lauber, J. K. (1964) Sex-linked albinism in the Japanese quail. *Sci.*, 146: 948-950.
7. North, M.O. (1972) Commercial Chicken Production Manual. 3: 409-410.
8. Wakasugi, N. and Kondo, K. (1973) Breeding methods for maintenance of mutant genes and establishment of strains in Japanese Quail. *Exp. Animals*, 22 : 151-159.

Acknowledgements

The author's generous, esteemed and profound sense of gratitude to: **Dr. S.C.Edwin, Ph.D.**, Professor and Head, Instructional Livestock Farm Complex, Tirunelveli, for his valuable motivation and pioneer research in Japanese quails and **Dr. U. Prabhakaran., M.V.Sc.**, for his support during the study.