DOI: 10.22055/ivj.2018.110694.1997

Genetic diversity in intron 1 of cGH gene in the indigenous chicken of Marandi breed

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Received: 13.01.2018 Accepted: 24.07.2018

Abstract

The growth hormone of chickens affects the growth and development of chickens, egg production, body type, appetite control, reproduction, and the response of the body immune system. Several studies have shown that the growth hormone gene is a candidate gene for chicken economic traits. The polymorphisms of this gene can be used to improve production, phylogenetic analysis and marker-assisted selection programs. In this study, allelic polymorphism in intron 1 of growth hormone (cGH) gene in the Marandi indigenous chicken examined using PCR-RFLP technique. A total of 100 birds were selected and for detection of mutation in intron 1 of cGH gene (776 bp), the PCR products were digested by *MspI* restriction enzyme. The results showed that the five genotypes and three of the A_1, A_2 and A_3 alleles with a frequency of 24, 4 and 73 percent respectively, identified. The A_3A_3 genotype had the highest (0.50) and the lowest (0.02) frequency was found for A_1A_1 and A_1A_2 genotypes. In the total population, Shannon's information index and Fixation index 0.69 and -0.16 respectively, calculated. According to the Chi-square test, the Marandi indigenous chickens had a Hardy-Weinberg equilibrium for this locus. Considering the high polymorphism of this locus in Marandi indigenous chickens can after determining the genotype and the performance of each genotype in the production of economic traits be used as a marker in genetic selection and breeding programs to improve the economic traits associated with growth hormone.

Key words: Genetic diversity, Intron 1, Growth hormone, Indigenous chicken, Marandi breed

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Refrences

Apa, R.; Lanzone, A. and Micheli, F. (1994). Growth hormone induces invitro maturation of follicle and cumulus-enclosed rat oocytes. Molecular Cell Endocrinology, 106: 207-212.

Byatt, J.C.; Staten, N.R.; Salsgiver, W.J.; Kostelec, J.C. and Collier, R.J. (1993). Stimulation of food intake and weight gain in mature female rats by bovine prolactin and bovine growth hormone gene. American Journal Physiology, 264: 986-992.

Darabi, A.; Fayazi, J.; Roshanfekr, H. and Nasiry, M.T. (2010). Investigation of growth hormone gene polymorphism using PCR-RFLP technique in native poultry in khouzestan province. Journal of Animal and Veterinary Advances, 9 (2): 255-257.

Etherton, T.D. (2001). Porcine growth hormone: a central metabolic hormone involved in the regulation of adipose tissue growth. Nutrition, 17: 789-792.

Etherton, T.D. and Bauman, D.E. (1998). Biology of somatotropin in growth and lactation of domestic animals. Physiology Review, 78: 745-761.

Hoj, S.; Fredholm, M.; Larsen, N.J. and Nielsen, V.H. (1993). Growth hormone gene polymorphism associated with selection for milk fat production in lines of cattle. Animal Genetics, 24: 91-95.

Ip, S.C.; Zhang, X. and Leung, F.C. (2001). Genomic growth hormone gene polymorphism in native Chinese chicken. Experimental Biology and Medicine, 226: 458-462.

Isvandi, S.; Beigi-Nassiri, M.T.; Roshanfekr, H. and Fayazi, J. (2017). Evaluation of Prolactin gene (PRL) polymorphism in Khouzestan native chickens using PCR-RFLP some masses. Iranian Veterinary Journal, 13(1): 26-32. (In Persian).

Jafari, A.; Pakdel, A. and Esmail-khanian, S. (2009). Study of polymorphisms in the introns 1 and 4 chicken growth hormone gene in the native fowls of Isfahan and Mazandaran. Modern Genetics Journal, 4(3): 37-43. (In Persian).

Khakpour, K.; Mardani, K. and Hashemi, A. (2011). Polymorphism of Interon I of Chicken Growth Hormone Gene in West Azerbaijan Native Chicken Using PCR-RFLP. Iranian Journal of Animal Science Research, 21(3): 21-30. (In Persian).

Kelley, S.M. and Felton, D.L. (1995). Experimental basis for neural immune interactions. Physiology Review, 75: 77-106.

Klindt, J.; Buonomo, F.C.; Wise, T. and Yen, J.T. (1996). Endocrine and metabolite responses to porcine growth hormone administered by sustained release implant for different lengths of time in male pigs. Endocrinology, 137: 3689-95.

Kuhnlein, U.N.; Liu, S.; Weigend, J.S.; Gavora, W.; Fairfull and Zadworny, D. (1997). DNA polymorphisms in the chicken growth hormone gene: response to selection for disease resistance and association with egg production. Animal Genetics, 28: 116-123.

Lamb, L.C.; Galehouse, D.M. and Foster, D.N. (1988). Chicken growth hormone cDNA sequence. Nucleic Acids Research, 16: 9339.

Lechniak, D.; Machnik, G.; Szydlowski, M. and Switonski, M. (1999). Growth hormone gene polymorphism and reproductive performance of AI bulls. Theriogenology, 52: 1145-52.

Makhsous, S.G.; Mihoseini, S.Z.; Zamiri, M.J. and Niazi, A. (2013). Polymorphisms of growth hormone gene in a native chicken population. Association with egg production. Bulletin of the Veterinary Institute in Pulawy, 57 (1): 73-77.

Mayahi, M.; Talazadeh, F. and Abdoshah, M. (2018). Comparison of the performance between three strains of broiler chicks in Iran. Iranian Veterinary Journal, 13(4): 100-108. (In Persian).

McDonald, D.G. and Dimmick J. (2003). The conceptualization and measurement of diversity. Communication Research, 30: 60-79.

Miller, S.A.; Dykes, D.D. and Polesky, H.F. (1988). A Simple Salting Out Procedure for Extracting DNA from Human Nucleated Cells. Nucleic Acids Research, 16(3): 12-15.

Pipalia, D.L. (2003). Growth hormone gene polymorphism in Bantam, White Leghorn and Bantamised White Leghorn. Indian Journal of Poultry Science, 38: 206-211.

Rezaei Yazd Abadi, S.; Roshanfekr, H.; Beigi Nasiri, M.T. and Fayazi, J. (2017). Study of polymorphism in intron 4 and exon 5 of ghrelin gene in some masses of Khuzestan native chickens using PCR-RFLP. Iranian Veterinary Journal, 13(2): 22-28. (In Persian).

Simon, D.L. and Buchenauer, D. (1993). Genetic diversity of European livestock breeds. EAAP Publ, No. 66, Wageningen Press, Wageningen, the Netherlands, P: 581.

Tanaka, M.; Hosokawa, Y.; Watahiki, M. and Nakashima, K. (1992). Structure of the chicken growth hormone-encoding gene and its promoter region. Gene, 112: 235-239.

Thakur, M.S.; Parmar, S.N.; Chaudhari, M.V. and Bhardwaj, J.K. (2009). Growth hormone gene polymorphism and its association with egg production in Kadaknath chicken. Livestock Research for Rural Development, 21 (8): 132.

Thakur, M.; Parmar, S.; Tolenkhomba, T.; Srivastava, P.; Joshi, C.; Rank, D. and Pillai, P. (2006). Growth hormone gene polymorphism in Kadaknath breed of poultry. Indian Journal of Biotechnology, 5: 189-194.

Vasilatos-Younken, R. (1995). Proposed mechanism for the regulation of growth hormone action in poultry: Metabolic effects. The Journal of Nutrition, 125: 1783-89.

Yilmaz, O.; Karaca, O.; Ince, D.; Cemal, I.; Yarali, E.; Varol, M. et al. (2014). Nomadic sheep breeding in western Anatolia and the role of animal breeding programs. Journal of Tekirdag Agricultural Faculty, 11(2), 89-97.

Zohari, M.A. (2014). Principles of Poultry Breeding. Tehran University Publisher, Tehran, P: 384. (In Persian).