

Study on the genetic diversities in different Muscovy duck populations with the microsatellite markers derived from Tsaiya duck ⁽¹⁾

Yi-Ying Chang ⁽²⁾⁽⁴⁾ Liang-Yuan Wei ⁽²⁾ Yi-Chen Chen ⁽³⁾ and Hsiu-Chou Liu ⁽²⁾

Received: Feb. 9, 2021; Accepted: Aug. 23, 2021

Abstract

The aim of this study was to investigate the feasibility of Brown Tsaiya duck-derived microsatellite markers as a tool for genetic-structure research and across-generation genetic monitoring in different Muscovy duck populations. We applied eleven Brown Tsaiya duck-derived microsatellite markers to conduct genetic analysis in three generations of Wujie Black Muscovy (BMg9, BMg13 and BMg16) and three white Muscovy duck populations, including the 23rd generation of White Muscovy LRI 1 302 and 304 populations (L302g23 and L304g23), and minimal disease Muscovy duck (MDg12). The results showed that there were 6 to 8 Tsaiya duck-derived microsatellite markers with intermediate to high PIC (polymorphism information content) in different Muscovy duck populations. The average number of alleles in Wujie black Muscovy decreased from 3.2 (BMg9) to 3.0 (BMg16), the average observed heterozygosity decreased from 0.406 (BMg9) to 0.340 (BMg16), and the average expected heterozygosity also decreased from 0.466 (BMg9) to 0.420 (BMg16). There was a slight decrease in the genetic diversity of Wujie Black Muscovy, as the number of generations increased; however, the number of effective allele remained constant across generations while there was no differentiation or only slight differentiation between generations. On the other hand, the three white Muscovy duck populations had an average number of alleles ranging from 2.2 to 2.4 and an average number of effective alleles ranging from 1.6 to 1.7. The highest average observed heterozygosity was 0.358 (L304g23), the lowest was 0.287 (MDg12), and the highest average expected heterozygosity was 0.352 (L304g23), the lowest was 0.315 (L302g23). The 11 Tsaiya duck-derived microsatellite markers showed lower genetic diversities in all three white Muscovy duck populations, when compared with Wujie black Muscovy. However, most of the other markers, except for APT012 and APT033, showed outbreeding trends in the two populations of White Muscovy LRI 1, while three markers remained fixed in MDg12. The results of this study may apply to subsequent and regular genetic monitoring, as well as reference for other conservation research in promoting the sustainable management of Muscovy duck populations.

Key words: Tsaiya duck-derived microsatellite markers, Genetic diversity, Genetic structure, Muscovy duck.

(1) Contribution No. 2677 from Livestock Research Institute, Council of Agriculture, Executive Yuan.

(2) Ilan Branch, COA-LRI, Ilan 26846, Taiwan, R. O. C.

(3) Department of Animal Science and Biotechnology, Tunghai University, No.1727, Sec. 4, Taiwan Blvd., Xitun District, Taichung 40704, Taiwan, R.O.C.

(4) Corresponding author, E-mail: yychang@mail.tlri.gov.tw.