IDENTIFIKASI KERAGAMAN GEN MC4R SAPI PERSILANGAN BELGIAN BLUE, WAGYU, DAN BRAHMAN CROSS SERTA HUBUNGANNYA TERHADAP BERAT DAN UKURAN TUBUH SAAT LAHIR

INTISARI

Muhsin Wicaksono Albakri
16/399159/PT/07277

Melanocortin-4 Receptor (MC4R) adalah pasangan protein G *reseptor transmembran-7* yang banyak diekspresikan di hipotalamus yaitu bagian otak yang terlibat dalam pengaturan nafsu makan, regulasi metabolisme, dan bobot badan. Penelitian ini dilakukan untuk mengidentifikasi keragaman gen MC4R pada sapi persilangan Belgian Blue, Wagyu dan Brahman Cross serta hubungannya terhadap berat dan ukuran tubuh saat lahir. Penelitian dilakukan di PT. Widodo Makmur Perkasa, Klaten, Jawa Tengah. Materi yang digunakan ialah 24 ekor sapi persilangan Belgian Blue, Wagyu, dan Brahman Cross dengan komposisi Belgian Blue Cross-Brahman Cross (BBX-BX, n = 5), Belgian Blue Cross-Wagyu Cross (BBX-WagyuX, n = 2), Wagyu Cross-Belgian Blue Cross (WagyuX-BBX, n= 3), dan Wagyu Cross-Brahman Cross (WagyuX-BX, n = 14). Materi lain yang digunakan ialah data *recording* ternak berupa data berat dan ukuran tubuh saat lahir. Penelitian dilakukan dalam dua tahap. Tahap pertama adalah pengambilan sampel darah dan data *recording* serta tahap kedua analisis DNA. Analisis DNA dilakukan untuk identifikasi keragaman gen MC4R dan analisa hubungan genotip dengan fenotip. Analisis yang digunakan adalah perhitungan frekuensi gen dan alel sederhana, pengujian keseimbangan Hardy-Weinberg, perhitungan heterozigositas, dan analisis variansi pola searah. Hasil penelitian menunjukkan bahwa gen MC4R bersifat polimorfik dengan satu *single nucleotide polymorphism* (SNP) di posisi 1133 C>G dan termasuk *missense mutation*. SNP 1133 C>G mempunyai dua alel yaitu C dan G dengan tiga genotip (CC=5, CG=10, dan GG=9). Uji keseimbangan Hardy-Weinberg menunjukkan bahwa populasi sapi berada dalam keseimbangan genetik. Nilai heterozigositas menunjukkan bahwa ternak memiliki variasi genetik yang rendah dengan nilai Ho sebesar 0,416 dan He sebesar 0,487. Hasil asosiasi menunjukkan bahwa SNP 1133 C>G pada Gen MC4R tidak mempunyai pengaruh yang signifikan terhadap berat, panjang badan, lingkar dada, dan tinggi gumba saat lahir. Dapat disimpulkan bahwa polimorfisme gen MC4R (SNP 1133 C>G) hanya dapat digunakan untuk membedakan genotip ternak tetapi saat ini belum dapat digunakan sebagai alat pendukung seleksi untuk berat dan ukuran tubuh saat lahir.

Kata kunci : *Crossbred beef cattle*, Heterozigositas, Keragaman, MC4R, SNP

IDENTIFICATION GENE DIVERSITY OF MC4R ON CROSS OF BELGIAN BLUE, WAGYU, AND BRAHMAN CROSS AND ITS RELATIONSHIP BETWEEN OF THE WEIGHT AND BODY SIZE AT BIRTH

ABSTRACT

Muhsin Wicaksono Albakri
16/399159/PT/07277

Melanocortin-4 Receptor (MC4R) is a pair of G-proteins transmembran-7 receptors was expressed in hypothalamus which part of brain that are involved in regulation of appetite, metabolic regulation, and body weight. This study aimed to identify the MC4R gene diversity in the MC4R on cross of Belgian Blue, Wagyu, and Brahman cross and its relationship with the body weight and size at birth. This study was conducted at PT. Widodo Makmur Perkasa, Klaten, Jawa Tengah. 24 head of cross of Belgian Blue, Wagyu, and Brahman cross which compossed Belgian Blue Cross – Brahman Cross (BBX-BX, n=5), Belgian Blue Cross-*Wagyu* Cross (BBX-*Wagyu*X, n = 2), *Wagyu* Cross-Belgian Blue Cross (*Wagyu*X-BBX, n= 3), and *Wagyu* Cross–Brahman Cross (*Wagyu*X-BX, n = 14) were used in this study. The record of weight and body size at birth were also used in this study. This study was conducted in two steps. The first step was blood sampling as well as data collecting and the second step was DNA analyze. DNA analyzed was conducted to identify the diversity of MC4R gene and analyze the relationship between the genotypes and phenotypes. The results showed that MC4R gene was in polymorphic with one of Single Nucleotide Polymorphism (SNP) at 1133 C>G which was included missense mutation. SNP 1133 C>G had two allels (C and G) with three genotypes (CC=5, CG=10, and GG=9). Based on Hardy-Weinberg equilibrium test showed that the population of cattle was in genetic equilibrium. The heterozigosity values showed that the population of cattle had low varieties of genetic with Ho in 0,416 and He in 0,487. The result of association analyzed showed that SNP 1133 C>G in MC4R gene had not significant difference which with the weight, body length, heart girth and wither's height at birth. It can be concluded that the polymorphism of MC4R genes (SNP 1133 C>G) can be used to distinguish the cattle genotypes but it can not be used as the selection tools for body weight and size at birth.

Keyword: Crossbreed beef cattle, Diversity, Heterozigosity, MC4R gene, SNP.