

STUDI KARAKTERISTIK SIFAT KUANTITATIF DAN MARKER GEN MC4R PADA INDUK KAMBING PERANAKAN ETTAWA

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INTISARI

Kambing Peranakan Ettawa (PE) merupakan kambing hasil upgrading antara kambing Kacang dan kambing Jamnapari (Ettawa) dari India. Gen melanocortin 4 reseptor (MC4R) merupakan sepasang receptor protein G yang diekspresikan pada inti hipotalamus, mempengaruhi aktivitas saraf simpatik, fungsi adrenal dan tiroid, dan sebagai media bagi leptin dalam meregulasi keseimbangan energi dan homeostasis, dengan tugas utama mengatur asupan makanan dan keseimbangan energi. Penelitian ini bertujuan untuk mengidentifikasi karakteristik sifat kuantitatif induk kambing PE, mengidentifikasi *Single Nucleotide Polymorphism* (SNP) gen MC4R, mengetahui sebaran frekuensi alel dan genotip gen MC4R, dan mengetahui hubungan antara genotip gen MC4R dan sifat kuantitatif induk kambing PE. Penelitian ini dilakukan di 78 Farm Yogyakarta dan Laboratorium Genetika dan Pemuliaan Ternak Fakultas Peternakan Universitas Gadjah Mada, dengan menggunakan sejumlah 14 ekor induk kambing PE. Materi penelitian yang digunakan yaitu data karakteristik sifat kuantitatif berupa bobot badan, panjang badan, lingkaran dada, tinggi pundak, dan sampel darah induk kambing PE. Penelitian ini dilakukan dengan dua tahap yang pertama adalah pengambilan data sifat kuantitatif, sampel darah dan yang kedua analisis laboratorium. Metode penelitian yang dilakukan antara lain persiapan sampel DNA, amplifikasi DNA dengan primer *forward* dan *reverse* dari gen MC4R, sekuensing DNA, identifikasi SNP, pemetaan enzim restriksi dan identifikasi genotip. Analisis yang dilakukan yaitu menghitung frekuensi genotip dan alel, menghitung keragaman genetik, heterozigositas, koreksi ukuran tubuh, dan hubungan antara genotip gen MC4R dengan sifat kuantitatif induk kambing PE. Hasil penelitian menunjukkan bahwa SNP g.595 C>A tidak terdapat perbedaan yang nyata antara lingkaran dada, bobot badan, dan genotip kambing PE. Terdapat perbedaan yang nyata antara panjang badan dan genotip kambing PE berdasarkan SNP g.745 A>G, SNP g.746 T>C, SNP g.749 T>C, dan SNP g. 888 A>G. Enzim restriksi yang direkomendasikan pada penelitian selanjutnya yaitu SspI dan DpnII. Kesimpulan dari penelitian ini adalah SNP g.745A>G, SNP g.746T>C, SNP g.749T>C, dan SNP g.888A>G dapat digunakan sebagai marker gen.

Kata kunci: kambing Peranakan Ettawa, karakteristik sifat kuantitatif, MC4R, marker gen, *single nucleotide polymorphism*.

STUDY OF QUANTITATIVE CHARACTERISTICS AND MARKERS OF THE MC4R GENE IN ETTAWA CROSSBREED GOATS

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ABSTRACT

The Ettawa Crossbreed goats is the result of upgrading between Kacang goat and Jamnapari goat (Ettawa) from India. Melanocortin 4 receptor gene (MC4R) is a pair of G protein receptors, expressed in the hypothalamic nucleus that affects sympathetic nerve activity, adrenal and thyroid function, and as a medium for leptin in regulating energy balance and homeostasis, the main task is to regulate food intake and energy balance. The study aims to identify quantitative characteristics of Ettawa Crossbreed goats, to identify Single Nucleotide Polymorphism (SNP) of the MC4R gene, determine the distribution of allele frequencies and MC4R genotypes and to determine the relationship between the MC4R gene genotypes and the quantitative traits of . This research was conducted at 78 Farm Yogyakarta and the Laboratory of Genetics and Animal Breeding, Faculty of Animal Husbandry, Gadjah Mada University, using some 14 Ettawa Crossbreed goats. The research material used was quantitative characteristic data in the form of body weight, body length, chest circumference, shoulder height, and blood samples of Ettawa Crossbreed goats. This research was conducted in two stages, the first is the collected of quantitative data, blood samples and the second is laboratory analyzed. The research methods involved prepared of DNA samples, DNA amplification with forward and reverse primers from the MC4R gene, DNA sequenced, identified of SNPs, restriction enzyme mapped, and genotype determined. The analysis was carried out by calculating the genotype and allele frequencies, calculating genetic diversity, heterozygosity, body size correction, and the relationship between the MC4R gene genotype and the quantitative traits of Ettawa Crossbreed goats. The results showed that SNP g.595 C>A there was no significant difference between chest circumference, body weight, and genotype of Ettawa Crossbreed goats. There was a significant difference between body length and genotype of Ettawa Crossbreed goats based on SNP g. 745 A>G, SNP g. 746 T>C, SNP g. 749 T>C, and SNP g. 888 A>G. The recommended restriction enzymes or further research are SspI and DpnII. The conclusion is SNP g.595C>A, SNP g.745A>G, SNP g.746T>C, SNP g.749T>C, and SNP g.888A>G can use as gene marker.

Keywords: Ettawa Crossbreed goats, quantitative characteristics, MC4R, gene marker, single nucleotide polymorphism.