

IDENTIFIKASI MARKA DNA GEN MC4R PADA SIFAT PERTUMBUHAN DOMBA LOKAL INDONESIA

INTISARI

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Penelitian keragaman genetik pada sifat pertumbuhan memberikan gambaran terkait sumber daya genetik yang memiliki nilai ekonomi sehingga dapat mengarahkan perbaikan mutu genetik berdasarkan pendekatan kandidat genetik pada domba. Penelitian ini bertujuan untuk mengidentifikasi polimorfisme gen MC4R dan asosiasinya terhadap sifat pertumbuhan domba lokal Indonesia. Produk PCR sepanjang 642 bp berhasil diamplifikasi dari 149 sampel darah yang terdiri dari 31 domba Wonosobo, 26 domba Sapudi, 22 domba Batur, 26 domba Garut, 4 domba Dorper, dan 40 domba persilangan Garut-Dorper. Variabel yang dianalisis meliputi identifikasi SNP pada sekuen target gen MC4R, keragaman genetik serta uji asosiasi pada empat SNP (SNP yang minimal memiliki 3 sampel per genotip; 1039A>G di CDS, dan tiga SNP 1403G>A, 1511C>A dan 1526G>C di 3'UTR) terhadap bobot lahir (BL), bobot sapih (BS) dan ukuran tubuh (UT) domba. Hasil penelitian menunjukkan sebanyak 14 SNP ditemukan di antara wilayah CDS dan 3'UTR berdasarkan penyejajaran sekuen DNA sampel dan *Genbank acc no.* NC_056076. Tiga belas SNP tidak menyimpang dari HWE dan memiliki nilai heterozigositas yang rendah, serta satu SNP menyimpang dari HWE. Satu SNP yang menyimpang yaitu SNP 1403G>A memiliki HWP_{value} 0,012 dan He : 0,4813. Terdapat 7 SNP terletak di CDS, dan 7 SNP di area 3'UTR. Tiga dari 7 SNP di CDS termasuk dalam *missense mutation* yaitu SNP 1039A>G, 1279G>A and 1376G>A. *Missense mutation* pada SNP 1039A>G tidak mempengaruhi BL dan BS Domba Persilangan DorperxGarut, maupun UT Domba Wonosobo, Batur, Sapudi. Tiga SNP pada 3'UTR tidak berasosiasi dengan BL dan BS domba Persilangan Dorper-Garut, serta SNP 1403G>A tidak berasosiasi dengan UT Domba Wonosobo, Batur, Sapudi. Oleh karena hal tersebut, dapat disimpulkan temuan SNP gen MC4R pada target penelitian ini dapat digunakan sebagai marka DNA untuk menghitung keragaman genetik populasi akan tetapi tidak dapat digunakan sebagai alat seleksi pada domba lokal Indonesia.

Kata kunci: Domba, Gen MC4R, SNP, Variasi genetik

IDENTIFICATION OF MC4R GENE DNA MARKERS ON GROWTH TRAITS OF LOCAL INDONESIAN SHEEP

ABSTRACT

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Research on genetic diversity in growth traits provides an overview of genetic resources that have economic value, so that it can direct genetic quality improvement based on the genetic candidate approach in sheep. This study aimed to identify polymorphisms of the MC4R gene and its association with the growth traits of local Indonesian sheep. PCR products of 642 bp were successfully amplified from 149 blood samples consisting of 31 Wonosobo sheep, 26 Sapudi sheep, 22 Batur sheep, 26 Garut sheep, 4 Dorper sheep, and 40 Garut-Dorper cross sheep. The variables analyzed included SNP identification in the MC4R gene target sequence, genetic diversity and association tests on four SNPs (SNPs that at least have more than 3 samples per genotype; namely 1039A>G in CDS, and three SNPs 1403G>A, 1511C>A and 1526G>C in 3'UTR) with birth weight (BW), weaning weight (WW) and body size (BS) of sheep. The results showed that a total of 14 SNPs were found between the CDS and 3'UTR regions based on alignment of sample DNA sequences and Genbank acc no. NC_056076. Thirteen SNPs did not deviate from HWE and had low heterozygosity values, and one SNP deviated from HWE. The one SNP that deviated, SNP 1403G>A, had an HWP_{value} : 0.012 and H_e : 0.4813. There were 7 SNPs located in the CDS, and 7 SNPs in the 3'UTR area. Three of the 7 SNPs in the CDS are missense mutations, namely 1039A>G, 1279G>A and 1376G>A. Missense mutation at SNP 1039A>G did not affect BW and WW of DorperxGarut crossbred sheep, nor BS of Wonosobo, Batur, Sapudi sheep. Three SNPs in the 3'UTR were not associated with BW and WW of Dorper-Garut crossbred sheep. SNP 1403G>A was not associated with BS of Wonosobo, Batur, and Sapudi sheep. Therefore, it can be concluded that the MC4R gene SNP findings in this research target can be used as DNA markers to calculate population genetic diversity but cannot be used as a selection tool in local Indonesian sheep.

Keyword: Genetic variation, MC4R gene, Sheep, SNP