PROFIL PRODUKSI SUSU DAN KERAGAMAN GENETIK BERDASARKAN GEN MELANOCORTIN-4 RESEPTOR PADA KAMBING SAPERA YANG DIPELIHARA DI KETINGGIAN TEMPAT YANG BERBEDA

INTISARI

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Penelitian ini bertujuan untuk mengetahui daya adaptasi, profil produksi susu dan keragaman genetik pada kambing Sapera berdasarkan Gen MC4R di ketinggian tempat yang berbeda. Penelitian ini dilakukan di Bumi Nararya Farm dan El Farm, yang masing-masing terletak di ketinggian 761 m dpl dan 97 m dpl. Kedua peternakan tersebut mewakili dataran tinggi dan dataran rendah di wilayah Yogyakarta. Jumlah sampel induk pada masing-masing lokasi 14 ekor. Anak kambing Sapera pra sapih masing-masing 14 ekor perlokasi diambil sampel darahnya untuk analisis DNA. Profil produksi susu, konsumsi pakan, respon fisiologis, daya adaptasi dan berat badan kambing Sapera untuk membandingkan di kedua tempat pemeliharaan yaitu dataran rendah dan dataran tinggi di analisis menggunakan *Independent sample t-test* dengan *Software* SPSS version 25.0. Keragaman genetik gen MC4R dianalisis dengan *software* Popgen32. Asosiasi SNP Gen MC4R dengan pertambahan bobot badan harian di analisis dengan *ANOVA* dan *Independent sample* t-test. Temperatur dan kelembaban lingkungan di dataran tinggi berada pada kondisi nyaman sedangkan di dataran rendah diatas kisaran normal untuk ternak kambing. Nilai rerata THI menunjukkan bahwa kambing Sapera di dataran tinggi dibawah cekaman panas sedang sedangkan di dataran rendah berada pada kondisi stress. Nilai rerata *Adaptability Coefficient* (AC) menunjukkan bahwa daya adaptasi kambing Sapera di dataran tinggi lebih baik daripada di dataran rendah. Konsumsi nutrisi kambing di dataran tinggi lebih besar daripada dataran rendah ($P<0,05$). Rerata konsumsi bahan kering, protein kasar, serat kasar, dan *total digestible nutrient* kambing di dataran tinggi berturut-turut adalah 1,39 kg/hari; 136,54 g/kg $BB^{0,75}$/hari; 118,47 g/kg $BB^{0,75}$/hari dan 410,53 g/kg $BB^{0,75}$/hari sedangkan di dataran rendah 0,56 kg/hari; 56,76 g/kg $BB^{0,75}$/hari; 148,86 g/kg $BB^{0,75}$/hari dan 273,07 g/kg $BB^{0,75}$/hari. Rerata produksi susu, kadar lemak, kadar protein, *total solid* dan berat jenis susu kambing di dataran tinggi adalah 1.663,61 ml/hari; 4,66%; 4,47%; 14,34% dan 1,032 g/ml sedangkan di dataran rendah 1.007,69 ml/hari; 6,51%; 15,04%; 4,57%; 1,026 g/ml. Teridentifikasi 3 SNP yaitu SNP g.998A>G, g.1079C>T dan g.1151C>T pada anak kambing Sapera yang dipelihara dikedua lokasi penelitian pada target Gen MC4R. SNP g.1151C>T pada kambing Sapera dipelihara di dataran tinggi menunjukkan frekuensi genotip heterosigot CT paling tinggi sebesar 79%. Kesimpulan dari penelitian ini adalah perbedaan ketinggian tempat menyebabkan perbedaan respon fisiologi seperti laju respirasi dan denyut jantung, perbedaan konsumsi pakan dan nutrien, produksi dan komposisi susu kambing Sapera.–Kambing Sapera di dataran tinggi menunjukkan daya adaptasi yang baik dengan produksi susu lebih tinggi tetapi tetapi kadar lemak susu lebih rendah. Genotip AA pada SNP g.998A>G memiliki pertambahan bobot harian lebih tinggi di bandingkan dengan genotip AG pada anak kambing Sapera di dataran rendah ($P<0,05$), sehingga SNP g.998A>G dapat dijadikan marker genetik sifat pertumbuhan sebagai alat seleksi pada kambing Sapera.

Kata kunci: *Adaptability coefficient,* Kambing Sapera, Respon fisiologis.

PROFILE OF MILK PRODUCTION AND GENETIC DIVERSITY BASED ON MELANOCORTIN-4 RECEPTOR GENE IN SAPERA GOATS RAISED AT DIFFERENT ALTITUDES

ABSTRACT

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The objective of this study was to determine the adaptability, profile of milk production, and genetic diversity in Sapera goats based on the MC4R gene at different altitudes. The study was done in Bhumi Nararya Farm (BNF) and El Farm, which are located at around 761 m asl and 97 m asl. Those farms respectively represent high and low altitude of Yogyakarta region. Number of sample was 14 goats per location and 14 pre-weaning Sapera goat kids per location were sampled for DNA analysis. Profile of milk production, feed consumption, physiological response, adaptability and body weight of Sapera goats between highland and lowland were analyzed by Independent sample t-test using Software SPSS version 25.0. Genetic variations were analyzed by Popgen32 software. Association studies were analyzed by ANOVA and Independent sample t-test. Results showed that enviromental temperature and humidity in the highland were at a comfortable condition while in the lowland were outside the normal range for goats. The average values of THI indicates that Sapera goats in highland are under medium heat stress while in lowland are severe stress. The average values of AC indicates that adaptability of Sapera goats in the highland was greater than those in lowland. Sapera goats feed comsumption in higland was higher than those in lowland ($P<0,05$). The average consumption of dry matter, crude protein, crude fiber, and total digestible nutrient in highland were 1,39 kg/day; 136,54 g/kg/$BW^{0,75}$; 118,47 g/kg/$BW^{0,75}$; 410,53 g/kg/$BW^{0,75}$ respectively, while those in lowland were 0,56 kg/day; 56,76 g/kg/$BW^{0,75}$; 148,86 g/kg/$BW^{0,75}$; 273,07 g/kg/$BW^{0,75}$. The average of milk production, fat, protein, total solid and specific gravity of Sapera goats in highland were 1.663,61 ml/day; 4,66%; 4,47%; 14,34%; and 1,032 g/ml while in lowland were 1.007,69 ml/day; 6,51%; 4,57%; 15,04%; 1,026 g/ml. Three SNPs were indentified which were SNP g.998A>G, g.1079C>T and g.1151C>T in Sapera goat kids raised in both study locations at the target MC4R gene. The SNP g.1151C>T in Sapera goat kids raised in the highlands showed a higher frequency of CT heterozygosity genotypes at 79%. It can be concluded that different altitudes resulted differences on physiological response which are respiration rate and heart rate, differences in feed consumption and nutrient, milk production and composition of Sapera goats. Sapera goats in highland had an excellent adaptabiity with higher milk production but lower milk fat. The AA genotype at SNP g.998A>G exhibits a higher daily weight gain compared to the AG genotype in Sapera goat kids in lowland areas ($P<0,05$). Therefore, SNP g.998A>G can be used as a genetic marker for growth traits as a selection tool in Sapera goats.

Keyword: Adaptability coefficient, Sapera goats, Physiologycal responses