

学 位 論 文 要 旨	
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題 目	A genetic study on defective characteristics in Japanese Black cattle (黒毛和種の不良形質に関する遺伝育種学的研究)
<p>In this study, we investigated the defective characteristics to get the genetic insight about defective appearance and stillbirth in Japanese Black cattle.</p> <p>Defective appearances, including white spotting (WS), tongue defect (TD), and nipple defect (ND) was reported that the annual incidences of these defects were increasing, and the incidence of heifer calves was significantly different between normal and defective dams in WS and TD ($p < 0.01$). We estimated genetic parameters of defective appearances of Japanese Black heifer calves housed in the Kagoshima Prefecture. Variance and covariance were estimated using the Gibbs sampling algorithm. The estimated heritability ranged from 0.29 for TD to 0.76 for WS. Percent breeding value (%BV) estimates indicated high variation in WS and ND among sires, reflecting higher heritability. Furthermore, there was a positive linear relationship between the %BV estimate of a sire and the mean incidence rate of each defect in his female offsprings. TD was positively associated with other defects. Therefore, genetic factors strongly affect the incidence of defective appearances in Japanese Black cattle. Moreover, we investigated a relationship between WS and carcass traits. As a result, phenotypic and genetic correlations between WS and carcass traits were non-correlated, suggesting non-relatedness. Furthermore, we investigated a relationship between a <i>MITF</i> gene SNP (g.32386957 A>T) related to WS in foreign breeds (Fontanesi et al. 2012) and WS in Japanese Black cattle bred in Kagoshima Prefecture. 40 non-spotted and 39 spotted DNA samples were used for genotyping. Genotyping was performed by direct sequencing and allele-specific PCR, respectively. As a result, we observed both alleles of the g.32386957 A>T SNP in this population. Furthermore, composition of the SNP genotypes was clearly different between non-spotted and spotted groups ($P=1.53 \times 10^{-6}$), suggesting that the g.32386957 A>T SNP was also strongly associated with WS in Japanese Black cattle. Variation in the <i>MITF</i> gene clearly explained the differences between non-spotted and spotted phenotypes but, at the same time, it was also evident that this SNP does not completely link to the WS in Japanese Black cattle. Moreover, we explored candidate SNPs affecting WS by using genome-wide association study (GWAS), however, there was no SNP related WS.</p> <p>Reproductive ability is receiving increased attention from beef cattle producers in Japan due to the high production cost and insufficient supply of feeder calves in Japanese Black cattle. Stillbirth can be one of the influential factors in calf production. However comprehensive research has not yet been conducted on the trait in Japanese Black cattle. In this study, we estimated genetic parameters of stillbirth in Japanese Black cattle in Kagoshima. We defined stillbirth as calf mortality between 244 days after successful insemination and a day after parturition. The single-trait threshold sire-MGS model was used for parameter estimation. The annual incidence of stillbirth ranged from 1.8% to 2.2%. The estimated heritability both direct and maternal for stillbirth was 3.1% and 3.3%, respectively. This estimate was lower than that previously reported in Japanese Black cattle.</p>	