

学位論文の要旨

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専攻 入学年度	宮崎大学大学院農学工学総合研究科博士後期課程 資源環境科学 専攻 平成 25 年度 (4 月) 入学
学位論文 題目	A comprehensive study on the selection of meat production ability of Japanese Black sire (黒毛和種種雄牛の産肉能力選抜に関する総括的研究)
<p>【論文の要旨】 (和文の場合1,200字程度、英文の場合800語程度)</p> <p>Developments in technology and changes in consumer demands have made it necessary to improve the current selection program. Technologies like ultrasound have made it feasible to estimate carcass traits in live animals and molecular techniques have made it possible to pinpoint genetic markers that affect important traits. The aim of this study was come up with a comprehensive selection program that incorporates recent technological advances and changes in the meat production industry. Thus, the objectives this study were to: (chapter 1) estimate variance components and heritability of growth traits, feed consumption, and feed efficiency in performance test stock; (chapter 2) evaluate the feasibility of using ultrasound technology in the genetic improvement of young Japanese Black bulls; (chapter 3) evaluate the prospects of early slaughter of steers; (chapter 4) determine the association of polymorphisms in the growth hormone (<i>GH</i> NCBI dbSNP rs41923484 and rs134687399), somatostatin (<i>SST</i> rs17870997), growth hormone releasing hormone (<i>GHRH</i> rs380969504), myostatin (<i>GDF8</i> rs383271508 and rs137528458) and leptin (<i>LEP</i> rs29004487, rs29004488 and rs29004508) genes with growth and carcass traits; (Chapter 5) assess the association between polymorphisms in fatty acid synthase (<i>FASN</i>), stearoyl-coenzyme A desaturase (<i>SCD</i>), sterol regulatory element-binding protein 1 (<i>SREBP1</i>), diacylglycerol acyltransferase 1 (<i>DGATI</i>), and nuclear receptor subfamily 1, group H, number 3 (<i>NR1H3</i>) genes with ultrasonic and carcass traits in Japanese Black steers.</p> <p>In chapter 1 and 2, growth, feed consumption and feed conversion efficiency traits were measured in 525 performance test stock. Furthermore, ultrasonic scanning was done at about 11 mo of age between the 6th-7th and 12th-13th rib cross section on the left side to obtain ultrasonic carcass traits. To evaluate the feasibility of using traits in young stock for selection, heritability was estimated. Heritability indicates the degree of correspondence between phenotypic values and breeding values hence the probable success of improving traits through selection. Data were subjected to analysis of variance (ANOVA) and variance components were estimated through mixed model analysis using JMP 5.0.1 (SAS) program. Most estimates of heritability in this study suggest that considerable additive genetic variation exist in the cattle population in Miyazaki prefecture and further improvement of growth, feed intake and feed efficiency, and carcass traits can be done through selection.</p>	

In chapter 3, in order to explore the possibility of reducing the slaughter age of steers to increase production efficiency and competitiveness; serial/longitudinal measurements of ultrasonic traits were taken from 14 to 26 mo of age on 300 Japanese Black steers under progeny testing at the Livestock Improvement Association of Miyazaki and carcass traits were recorded after slaughter. Additionally, serial measurements of body weight, withers height, chest girth and abdominal girth were taken at 9, 14, 20 and 28 mo of age. Analysis of sequentially measured traits was done through multivariate analysis (MANOVA) of repeated measures using JMP[®] 10 (SAS Institute Cary, NC, USA). Steers could attain carcass yield estimate of A grade as early as 18 mo of age and daily gain started to diminish from 24 mo of age. Considering these results, changing consumer demands and globalization, it may be prudent to reduce the slaughter age to about 25 mo.

In chapter 4, in order to better comprehend the association between the aforementioned polymorphisms and growth, serial measurements of body weight, withers height, chest girth and abdominal girth at 9, 14, 20 and 28 mo of age were taken in Japanese Black steers that were under progeny test (n = 280) at the Livestock Improvement Association of Miyazaki. Carcass measurements were taken and their association with genetic polymorphisms was evaluated. An ANOVA was done and *post hoc* analysis was done using Tukey-Kramer's honestly significant test. Polymorphisms in the *GH*, *GHRH*, *GDF8* (rs137528458) and *LEP* (rs29004508) were significantly associated ($p < 0.05$) with some growth and carcass traits. Thus, these polymorphisms can be useful markers for the improvement of growth and carcass traits in Japanese Black cattle.

In chapter 5, in order to have a comprehensive analysis of the association between the aforementioned genetic polymorphisms and ultrasonic traits, longitudinal measurements of ultrasonic traits were taken from 14 to 26 mo of age on 300 Japanese Black steers under progeny testing at the Livestock Improvement Association of Miyazaki. Furthermore, the association of these genetic polymorphisms and carcass traits was evaluated. The polymorphisms in the *SCD* gene and *SREBP1* were associated ($p < 0.05$) with some ultrasonic traits at multiple stages. To add to that, the polymorphisms were associated ($p < 0.05$) with some carcass traits. These findings suggest that the polymorphisms in the *SCD* and *SREBP1* are functional mutations that can aid in selection to improve some ultrasonic and carcass traits.

Overall, a more comprehensive program that is more efficient is feasible through the use of ultrasonic measures and the use of molecular markers.

- (注1) 論文博士の場合は、「専攻、入学年度」の欄には審査を受ける専攻を記入すること。
(注2) フォントは和文の場合、10.5ポイントの明朝系、英文の場合12ポイントのtimes系とする。
(注3) 学位論文題目が外国語の場合は日本語を併記すること。
(注4) 和文又は英文とする。