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学位授与の要件	自然科学研究科 バイオサイエンス専攻 (学位規則第5条第1項該当)
学位論文の題目	Genetic relationship of body measurement traits at early stage of growth and carcass traits in Japanese Black cattle (黒毛和種における発育初期の体測形質および枝肉形質の遺伝的関連性)
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学位論文内容の要旨

Genetic parameters for body measurement traits at 0 month (0-mo) and 4 months (4-mo) of age on 889 Japanese Black calves were estimated by the REML procedure. The body measurements included WH, HH, CD, BL, RL, CW, HW, TW, PBW, HG, CC and BW. Estimated direct heritabilities and maternal heritabilities were low to moderate, at both ages. The direct genetic correlations between 0-mo and 4-mo were moderate to highly positive. Maternal genetic effects were relatively independent of direct genetic effects for body measurement traits and can be considered in genetic evaluation. Estimates of genetic parameters were also obtained for body measurements at 4-mo of 648 and at 8-mo of 545 and carcass traits of 14,972 animals using REML procedure. The carcass traits included CWT, REA, RT, SFT and BMS. Estimated heritabilities for carcass traits were moderate to high. Estimated direct heritabilities for most of the body measurements at both ages were moderate to high. Estimated genetic correlations of CWT and RT were highly correlated at 8-mo except REA and BMS were lowly correlated with all body measurement traits at 8-mo, compared with the estimated result of 4-mo. Estimated genetic correlation of SFT with WH, RL HW and CC at 4-mo and with WH, CD, BL, RL, HG and CC at 8-mo were high and negative. Indicating that it is possible to decrease SFT which can improve body size and body fat thickness of Japanese Black cattle. The results of correlated responses for carcass traits utilizing body measurement traits at both ages were lower than direct response of CWT, REA, RT, SFT and BMS, indicating that genetic improvement of carcass traits by selection of a single body measurement trait at early stage would not be effective. Estimated result of r at 4-mo were 0.68, 0.52 and 0.58 for CWT, RT and SFT, respectively and at 8-mo were 0.75, 0.81 and 0.63 for CWT, RT and SFT, respectively. Comparing with estimated single trait body measurement, the results of r using final model were higher at both ages suggesting that the result of r were more effective for CWT, RT and SFT in selection criterion for Japanese Black bull at early age. As the results of these, Selection response for CWT, RT and SFT were also higher at both ages. Both the realized genetic correlations of carcass with most of the body traits at both ages were underestimated. Upward trend for BMS should be utilized for selection intensity to improve the efficiency of beef production in Japanese Black cattle. The direct genetic trends for all body traits were more fluctuated at both ages but maternal effects were constant for most of the body traits at 8-mo than those of 4-mo, and also most of the body traits were non-significant at both ages, indicating that genetic improvement of this breed by selection of single trait breeding value of body measurements would not be achieved effectively.

論文審査結果の要旨

繁殖農家と肥育農家の生産に分かれる黒毛和種の生産体系において、繁殖農家は生産子牛をセリ市場に出荷する一方、同時に出荷する子牛の淘汰を通じて選抜を行っている。この時の選抜の影響は、黒毛和種の育種体系において影響が大きいと思われるが、これまで詳細な検討が行われてこなかった。本研究はこの点を明らかにすることを目的に行われた研究である。まず、これまでの育種改良のトレンドをみると、枝肉形質では、BMS（牛脂肪交雑基準）、バラ厚、ロース芯面積などの形質を重視した改良にあることを明らかにした。一方、子牛の体尺形質に対しては、ほとんど改良がおこなわれておらず、改良の余地が大きいことが示唆された。そこで、子牛の体尺測定値と体重の遺伝率および遺伝相関を推定した。その結果、選抜育種に反応するに十分な遺伝的変異があることおよび0か月齢および4か月齢の測定値から母性遺伝効果に関する遺伝的変異をかなり正確に把握できることを確認した。一方、枝肉形質を含めた分析では、4か月齢および8か月齢体尺測定値に対する選抜は、枝肉形質の遺伝的改良に影響することを明らかにした。また、この点を有効に活用するため、選抜指数法をつかって形質の選択をはかるとともに選抜反応の予測を行った。その結果、枝肉形質のうち、枝肉重量、バラ厚、皮下脂肪厚などの形質の改良がより一層促進されることが明らかになったが、BMS、ロース芯面積の改良には有効ではないことが明らかとなった。

このように本研究の結果からは、体尺測定値を利用した育種方法に関する新しい知見および黒毛和種の育種に応用可能な知見が得られたと考えられ、博士の学位に値すると判断した。