

动物遗传学

鸡MD基因5'侧翼区多态性与鸡生长和体组成性状的相关研究

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摘要

苹果酸脱氢酶 (Malate Dehydrogenase, MD) 是一种氧化还原性酶, 参与体内多种能量代谢反应。它可以催化苹果酸氧化脱羧生成丙酮酸和CO₂, 并使NADP⁺还原成NADPH, NADPH是脂肪酸合成所必需的载体, 棕榈酸可以利用生成的NADPH来合成长链脂肪酸, MD的活性与脂肪酸合成效率之间存在密切的相关, MD也参与体内骨骼肌、心肌的能量代谢, 并对肌纤维的生长有一定的调节作用。根据鸡MD基因的5'侧翼区序列设计一对引物, 用直接测序的方法在侧翼区检测多态性位点, 在235 bp (GenBank登录号: U49693) 处发现一个SNP位点, 此位点是一个限制性内切酶 (Sph I 酶) 发生变化的位点。以东北农业大学高低脂双向选择系的第8世代肉鸡和东农F2资源群体为实验材料, 用PCR-RFLP的方法进行基因型分析, 建立适合的统计模型, 进行基因型与生长和体组成性状的相关分析。结果表明: 在高低脂系第8世代肉鸡中AA基因型个体的腹脂重和腹脂率显著高于BB基因型个体 (P<0.05); BB基因型个体的大胸肌重和大胸肌率显著高于AA基因型个体 (P<0.05)。在东农F2资源家系中BB基因型个体的大胸肌重和大胸肌率显著高于AA和AB基因型个体 (P<0.05); AA基因型个体的肝脏重和肝脏率显著高于BB基因型个体 (P<0.05)。综上所述, MD基因可能是影响鸡生长和体组成性状的主效基因或与控制生长和体组成性状的主效基因相连锁。

关键词

苹果酸脱氢酶 (MD); 单核苷酸多态; 大胸肌; 腹脂; 鸡

分类号

Correlation Analysis Between Single-Nucleotide Polymorphism of the MD Gene 5'-Flanking Region and Growth and Body Composition traits in Chicken

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Abstract

Malate dehydrogenase (MD) is a key enzyme that plays an important role in energy metabolism. It catalyzes the oxidative decarboxylation of L-malate to yield CO₂ and pyruvate, while simultaneously generating NADPH from NADP⁺. The NADPH generated can be utilized in de novo synthesis of palmitate, which is the precursor molecule for the formation of other long-chain fatty acids. And high levels of MD will also activate muscle development. The current study was designed to investigate the effects of MD gene on growth and body-composition traits in chicken. The eighth generation population of Northeast Agricultural University broiler lines divergently selected for its abdominal fat and Northeast Agricultural University F2 resource population were used in the research. Polymorphisms were detected by DNA sequencing and PCR-RFLP method was then developed to screen the population. A single mutation at the position of the 235 bp (Accession No. U49693) of MD 5'-flanking region was found. The correlation analysis between the polymorphism of the MD gene and growth and body composition traits was carried out using the appropriate statistic model. Least-square analysis showed that the BB genotype birds had much higher pectoralis major weight and percentage of pectoralis major than AA genotype birds (P<0.05). The

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abdominal fat weight, percentage of abdominal fat, the liver weight and percentage of liver weight of the AA genotype birds were much higher than those of BB genotype birds ($P < 0.05$). These results indicate that MD gene is the major gene or is linked to the major gene that affects the growth and body composition traits in chicken. </P>

Key words

[MD gene](#); [SNPs](#); [pectoralis major weight](#); [abdominal fat](#); [chicken](#)

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