GMR Genetics and Molecular Research
Online Journal
ISSN:1676-5680

Effect of high-concentrate diet on amino acid transporter expression and milk quality in Holstein dairy cows

Z.L. Xie, P.S. Ye, Y.S. Zhang and X.Z. Shen

Key Laboratory of Animal Physiology and Biochemistry,
College of Veterinary Medicine, Nanjing Agricultural University, Nanjing, China

Corresponding author: Y.S. Zhang
E-mail: yuanshuzhang@njau.edu.cn

Genet. Mol. Res. 14 (2): 5246-5257 (2015)
Received August 7, 2014
Accepted December 10, 2014
Published May 18, 2015
DOI http://dx.doi.org/10.4238/2015.May.18.16

ABSTRACT. In order to evaluate the effect of high-concentrate diet supplementation on milk protein content, six Holstein dairy cows were assigned into high-concentrate diet (HC) or low-concentrate diet (LC) groups (N = 3/group) for 50 days. With regard to milk protein, HC feeding significantly reduced the percentage of milk protein ($P < 0.01$), and milk protein yield also reduced. The milk somatic cell count numbers and N-acetyl-D-glucosaminidase activity was significantly higher ($P < 0.01$) in the HC group than in the LC group. A pre-column derivatization procedure of o-phthalaldehyde was used to analyze the milk amino acid profile, the contents of Asp, Gln, Ala, Ile, Leu, and Lys were significantly lower in milk ($P < 0.05$), but Arg and Phe were significantly higher ($P < 0.05$) in the HC group than in the LC group. The mRNA abundance for amino acid transporters SLC7A8, SLC7A10 ($P < 0.05$), SLC1A3 ($P < 0.05$), and SLC16A10 ($P < 0.05$) were decreased in the HC group. These data indicate that expression of amino acid transporters alters regulation of amino acid utilization and decreases milk quality in dairy cows.

Key words: High-concentrate diet; Amino acid; Amino acid transporter; Cows; Milk quality

