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## 不同氨基酸模式对奶牛乳腺上皮细胞酪蛋白合成的影响

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## Effects of Different Amino Acid Patterns on Casein Synthesis in Mammary Epithelial Cells of Dairy Cows

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**摘要** 本试验旨在验证氨基酸模式的不同是否会影响奶牛乳腺上皮细胞酪蛋白的合成。采用完全随机试验设计设置4个组,分别为低蛋白质饲料条件下血液氨基酸模式组(LPBP)、全乳蛋白氨基酸模式组(MP)、80%酪蛋白+20%乳清蛋白氨基酸模式组(CLP)、酪蛋白氨基酸模式组(CP),每组3个重复,并重复试验3次。分别用实时荧光定量PCR(RT-qPCR)和酶联免疫吸附法(ELISA)检测乳蛋白合成基因 $\alpha_{s1}$ -酪蛋白(CSN1S1)和 $\kappa$ -酪蛋白(CSN3)mRNA表达量及 $\alpha_s$ -酪蛋白合成量。结果表明:氨基酸模式能够显著影响CSN1S1和CSN3基因mRNA表达量( $P<0.05$ )。MP组CSN1S1和CSN3基因mRNA表达量分别显著和极显著高于LPBP组( $P<0.05$ 和 $P<0.01$ );相对于LPBP组,MP组CSN1S1和CSN3基因mRNA表达量分别上调了1.70和2.12倍。MP组 $\alpha_s$ -酪蛋白合成量显著高于CLP、CP组( $P<0.05$ ),极显著高于LPBP组( $P<0.01$ )。由此可见,氨基酸模式的不同能够影响奶牛乳腺上皮细胞酪蛋白的合成,全乳蛋白氨基酸模式可能是一种较为理想的氨基酸模式。

**关键词:** 乳腺上皮细胞 氨基酸模式 基因表达 酪蛋白

**Abstract:** The objective of this study was to determine whether different amino acid (AA) patterns could affect casein synthesis in mammary epithelial cells of dairy cows. A completely random design was used. Four AA patterns were as follows: blood in low protein diet AA pattern (LPBP group), milk protein AA pattern (MP group), 80% casein+20% lactoalbumin AA pattern (CLP group) and casein AA pattern (CP group). Each group had 3 replicates, and all experiments were repeated 3 times. The mRNA expression levels of  $\alpha_{s1}$ -casein (CSN1S1) and  $\kappa$ -casein (CSN3) genes and the content of  $\alpha_s$ -casein were determined by real-time quantitative PCR (RT-qPCR) method and ELISA, respectively. The results showed that different AA patterns could significantly affect the mRNA expression levels of CSN1S1 and CSN3 genes ( $P<0.05$ ). The mRNA expression levels of CSN1S1 and CSN3 genes in MP group were significantly higher than those in LPBP group ( $P<0.05$  and  $P<0.01$ , respectively). Compared with the LPBP group, the mRNA expression levels of CSN1S1 and CSN3 genes in MP group were increased by 1.70-fold and 2.12-fold, respectively. The synthesis content of  $\alpha_s$ -casein in MP group was significantly higher than that in CLP and CP groups ( $P<0.05$ ), and was significantly higher than that in LPBP group ( $P<0.01$ ). In conclusion, different AA patterns play a very important role in milk protein synthesis in mammary epithelial cells of dairy cows, and the milk protein AA pattern may be an appropriate AA pattern.

**Keywords:** mammary epithelial cells, amino acid pattern, gene expression, casein

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