

Ketotic cows display dynamic changes in nonesterified fatty acid composition of serum and milk

Lei Liu ^{1,2}, Taiyu Shen ¹, Wei Yang ¹, Hongjiang Yu ¹, Sansi Gao ¹, Baoyin Huang ¹ and Chuang Xu

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¹ College of Animal Science and Veterinary Medicine, Heilongjiang Bayi Agricultural University, Daqing, Heilongjiang, 163319, China

² College of Veterinary Medicine, Hunan Provincial Key Laboratory of Protein Engineering in Animal Vaccines, Collaborative innovation center of safety production of livestock and poultry in Hunan, Hunan Agricultural University, Changsha, Hunan, 410128, China

* For correspondence; email: xuchuang7175@163.com

Abstract

Nonesterified fatty acids (NEFA) play significant roles in etiology and pathology of ketosis, and ketotic cows have lipid metabolism disorders, but the dynamic fatty acid composition (FAC) in serum and milk during perinatal period is largely unexplored. We hypothesize that ketotic cows will display different FAC in serum and milk NEFA pools, and fatty acid related indicators for ketosis prediction can be screened. Twelve cows were finally recruited and divided into healthy control group (C group, n=6) and ketosis group (K group, n=6). Blood samples were collected from -7 d to 21 d postpartum; milk samples were collected from 3 d to 14 d postpartum. FAC of those samples was then analyzed by means of Gas Chromatography-Mass Spectrometer (GC-MS). Five fatty acids displayed statistical differences in composition of blood NEFA between C and K group ($P < 0.05$ or $P < 0.01$), namely C12:0, C16:0, C17:0, C18:1n9 and C22:1n9. Eleven fatty acids in milk NEFAs showed differences in composition, mainly saturated fatty acids (SFA). SFA%, unsaturated fatty acids% (UFA%), mono-unsaturated fatty acids% (MUFA%) and SFA/UFA in serum NEFAs were also different between groups ($P < 0.05$ or $P < 0.01$). Of note, C18:1n9/C12:0 and C18:1n9/C22:1n9 in serum NEFAs of K group were significantly higher than those in controls on 7 d before calving ($P < 0.05$ and $P < 0.01$, respectively), suggesting the ratios were of potential to be used as indicators for prediction of ketosis. Those data indicated that ketotic cows possessed a different NEFA composition in blood and milk, and prediction of ketosis using fatty acid related indicators seemed possible.