Ketosis is a common metabolic disorder of transition dairy cows during the early lactation period. Cows with ketosis have lower milk yield and reproductive performance, greater risk of other periparturient diseases, and higher culling rate. Although ketosis...
Background: Oxidative stress biomarkers and lipid profiles were used successfully as prognostic and diagnostic biomarkers of many animal diseases. However, their use in the diagnosis of ketosis in dairy cows at post-paturient period is not completely elucidated.

Materials and Methods: Therefore, 25 cows suffered from ketosis at post-paturient period were used in the current study together with 20 healthy cows who served as a control. Blood samples were collected from diseased and healthy animals and the harvested serum were used for determination of oxidative stress biomarkers and the profiles Ketosis is an important problem for dairy cows’ production performance. However, it is still little known about plasma metabolomics details of dairy ketosis. A gas chromatography/mass spectrometry has been extensively studied, not many investigators have focused on the pathobiology of the disease over time. Previous work has been mainly concentrated on the diagnosis, epidemiology, and implications of ketosis around the transition period. There is a grey area with regards to the agents that initiate ketosis and the metabolic pathways involved in the pathobiology of the disease. Moreover, not very much is known about how to prevent ketosis. Most work has been focused on the treatment of ketotic cows. It would be of great interest to both the dairy industry and health specialists to detect ketosis as early as possible and to take appropriate preventive measures. Therefore, the principal objectives of this thesis are: 1) to find evidence of the involvement of innate immunity in the pathobiology of ketosis as well as changes of in carbohydrate and lipid metabolism in pre-ketotic, ketotic, and post-ketotic cows; 2) to determine blood and urine metabolotypes of transition dairy cows before, during, and after occurrence of ketosis; and 3) to identify new screening or predictive metabolite biomarkers of ketosis in the serum and urine of dairy cows as early as 8 weeks before the expected day of parturition. To achieve these objectives, an enzyme linked immunosorbent assay (ELISA) was utilized to quantify and compare selected pro-inflammatory cytokines [i.e., interleukin-1 (IL-1), interleukin-6 (IL-6), and tumor necrosis factor (TNF)], as well as acute phase proteins [(APP), i.e., haptoglobin (Hp) and serum amyloid A (SAA)] in the serum of cows diagnosed postpartum with ketosis and healthy controls (CON) starting at -8 and -4 wks before parturition, during the week of disease diagnosis as well as at +4 wks after calving. We also used several metabolomics tools including direct injection/liquid chromatography-tandem mass spectrometry (DI/LC-MS/MS), proton nuclear magnetic resonance (1H-NMR), gas chromatography-mass spectrometry (GC-MS), and inductively coupled plasma-mass spectrometry (ICP-MS) to quantify and compare metabolites from various analyte groups including amino acids (AAs), acylcarnitines, biogenic amines, glycerophospholipids [i.e., phosphatidylcholine (PC) and lysophosphatidylcholine (lysoPC)], sphingolipids [i.e., hydroxyphosphocholine: SM (OH) and sphingomyelin (SM)], hexose, organic acids, saccharides, ketones, alcohols, mineral elements, and others, in the serum/urine of pre-ketotic (-8 and -4 wks), ketotic (disease wk), post-ketotic (+4 and +8 wks), and CON cows. Results of this study indicate that cows affected by ketosis display alteration of multiple variables of innate immunity as well as amino acid, carbohydrate and lipid metabolism several weeks prior to the diagnosis of the disease. Two sets of predictive biomarker models and one diagnostic biomarker model for ketosis with high sensitivity and specificity were identified in serum and urine, respectively. These newly identified sets (two from serum and two from urine) of ketosis biomarkers can predict the disease much earlier than measurement of ketone bodies during early lactation. Results also demonstrated that cows with ketosis experienced lower dry matter intake (DMI), elevated milk somatic cell count (SCC), and a tendency for lower milk production, and lower milk fat.
(GC/MS) technique was used to investigate plasma metabolic differences in cows that had clinical ketosis (CK, n=22), subclinical ketosis (SK, n=32), or were clinically normal controls (NC, n=22). To research ketosis, potential biomarkers of CK and SK could uncover the same or different modes of metabolites and metabolic pathways in the development and progression of ketosis. Furthermore, new potential metabolites could shed light on new strategies for the diagnosis, prognosis, and prevention of ketosis in the future. Determining the Cost-Effectiveness of Treating Dairy Cows with Subclinical Ketosis during the First Week of Lactation. Brown AJ, Eastridge ML* and Weaver LD. Expenses associated with treating subclinical ketosis were obtained from the farm records and included labor, PPG, and dextrose. The costs of the Precision Extra meter and test strips were not included because every cow gets checked at 4 DIM, as per the on-farm protocol. Labor cost was assumed at $13/h. (2006) Latest findings from research in transition cows: A randomized controlled trial on the treatment of ketosis in post-parturient dairy cows. Minnesota Dairy Health Conference. 7. Merck Veterinary Manual (2016) The Merck Veterinary Manual.