Friday, February 23, 2024

Abstract Submission Form

Title (Mr./Mrs/Dr./Prof.) Dr.

Presenting author Po-An Tu

Institute

Institute/company: Northern Region Branch, Taiwan Livestock Research Institute, Ministry of Agriculture

Adress: No.207-5, Pitoumian, Xihu Township

ZIP/Postal code: 368003 City: Miaoli

Country: Taiwan

Insert all authors and institutions

P. A. Tu1, M. K. Yang1, Y. H. Yeh1, J. W. Shiau1, J. F. Huang2 & Y. H. Chen1

1Northern Region Branch, Taiwan Livestock Research Institute, Ministry of Agriculture, No.207-5, Pitoumian, Xihu Township, Miaoli 368003, Taiwan
2Taiwan Livestock Research Institute, No.112, Farm Road, Hsinhua, Tainan 71246, Taiwan
Corresponding Author: hsuan@mail.tlri.gov.tw

Preferred presentation Poster

Preferred session Session 2: SC Milk Analysis – New tools to extend the horizon of milk mid-infrared spectrometry

Email of corresponding author hsuan@mail.tlri.gov.tw

Title of your paper Investigating the Impact of Heat Stress and Subsequent Recovery on Fatty Acid Profiles in Bovine Milk

Insert ABSTRACT text

Heat stress (HS), particularly prevalent in tropical regions such as Taiwan, poses significant threats to animal health, dairy production, and the composition of milk. This stress affects not only the welfare and productivity of cows but also increases the costs of herd management, thereby impacting the profitability of dairy farming. Under the ongoing climate change, Taiwan is expected to experience more frequent high-temperature days, emphasizing the need to evaluate and mitigate the adverse effects of HS on dairy production. HS induces various physiological changes in dairy cattle, including increased respiration and heart rates, along with a rise in core body temperature. The most profound impacts of HS are observed in the form of reduced dry matter intake and a decline in milk yield. These changes are attributed to energy-intensive metabolic adaptations that cattle undergo for heat dissipation, which in turn contribute to the decrease in milk production. An experimental study of HS was conducted over 4 consecutive days, with a daily average temperature-humidity index (THI) exceeding 74, followed by a recovery period with an average daily THI below 68. Milk samples were collected bi-daily during this period, which included a

baseline phase (days 1-3), the HS phase (days 2 and 4), and the recovery phase (days 2 and 4). These samples were analyzed for their fatty acid (FA) profiles, including saturated FA (SFA), unsaturated FA (UFA), mono-unsaturated FA (MUFA), poly-unsaturated FA (PUFA), short-chain FA (SCFA), medium-chain FA (MCFA), long-chain FA (LCFA), total de novo FA, mixed FA, and preformed FA, using MilkoScan FT+ 300 equipped with Fourier-transform infrared spectra. The results from this experiment showed that HS caused a significant reduction in the relative percentage of SFA, de novo FA, mixed FA, MCFA, C14:0, and C16:0 FAs, accompanied by an increase of that in UFA, preformed FA, LCFA, C18:0, and C18:1 FAs. These changes in the FA profile are expected to alter the physical properties and nutritional value of milk fat. While some FA levels partially returned to normal during the recovery phase, they did not fully revert after short periods of recovery. This study highlights the metabolic adaptations of lactating cattle in response to acute HS. There was a noticeable shift in the milk FA profile, characterized by a decrease in FAs predominantly containing SCFA to MCFA, and an increase in those primarily consisting of LCFA. These alterations in FAs could potentially serve as biomarkers for HS in dairy cattle, providing a valuable tool for daily monitoring and management. In conclusion, HS profoundly influences the FA profile of bovine milk, signifying a metabolic shift towards increased LCFA. This alteration, not completely reversible even in a short-term recovery phase, strengthens the critical need for effective HS management and abatement strategies in dairy farming. This is particularly urgent given the rising global temperatures, which could exacerbate the HS challenges to the dairy industry in Taiwan.

Enter keywords milk, fatty acid, heat stress, recovery