Influence Of Heat Stress On Human Monocyte Derived

Influence of Heat Stress on the Reproductive Performance of Dairy Cows in the Moderate Climate of the Temperate LatitudeInfluence of Heat Stress on Dairy Cattle PerformanceInfluence of Heat Stress on Reactivity of Isolated Chicken Carotid Artery to VasoconstrictorsHeat Stress and Animal ProductivitySpringer Science & Business Media

In Chapter 5, the effect of late gestation heat stress on the growth and immune function of dairy calves was examined. Relative to those from the cooled dams, calves from heat-stressed dams had lower birth weight but similar growth rate during the pre-pubertal period and lower passive immunity and impaired cell-mediated immunity before weaning. In conclusion, heat stress during the dry period impairs mammary gland development before parturition, alters insulin action at peripheral tissues in early lactation and compromises the immune function of offspring.

Global warming has led to renewed interest in the occurrence of heat stress in the population along with its determinants and consequences. Heat stress can create unsafe working conditions and affect the health of workers. Heat waves are also unsafe and in 2003 led to many avoidable deaths in Europe. Most heat stress research has been conducted in high-income countries in temperate latitudes. This leaves knowledge gaps regarding heat stress and its effects for tropical settings. Thailand is a tropical developing country where average

temperatures have increased over the last 50 years and further increase is expected. Heat stress has been shown to be a serious problem in a variety of Thai workplaces. But several important public health questions remain and they are the focus of this thesis. The questions are as follows: are there any health impacts of heat stress i) on Thai workers? ii) on the overall population in Thailand? iii) expected for the Thai population in future due to the projected increase of temperature? To answer these research questions, five studies were carried out. They investigate the occurrence of heat stress and its association with various health outcomes, including death. The first four studies use heat exposure and morbidity data from a large national Thai Cohort Study (TCS) covering the period 2005 to 2009. The fifth study uses national weather and mortality data covering 1999 to 2008. The first study explores the relationship between self-reported heat stress and psychological distress and overall health status of Thai workers using TCS data. There was a strong association between heat stress and worse mental health outcomes among workers. The second study uses TCS data on heat stress and occupational injury among Thai workers. The evidence connects heat stress and occupational injury and also identifies several factors that increase heat exposure (male sex, rural residence, physical job). The third study relates heat stress and incident kidney disease amongst Thai workers using longitudinal TCS data that documented prolonged heat exposure. Heat stress was a significant risk factor for kidney disease among male workers,

especially physical workers age 35 years or more. The fourth study shows that health and wellbeing decreased (low energy, emotional problems, and low life satisfaction) as more heat stress interfered with daily activities (sleeping, daily travel, work, housework and exercise). So heat stress has an adverse health impact on the overall population. The final study shows that Thai mortality from 1999 to 2008, adjusted for weather and air pollution, varied by air temperature. A U-shaped association between monthly maximum temperature and mortality was found for each season (hot, wet, and cold), and each region (North, Northeast, South, and Centre). The 4 degrees Celsius increase in temperature from climate change, as expected by 2100, could increase annual heat-related deaths by 32,000 as well as increasing other impacts on health and well-being. The health impact information in this thesis points to the need to improve health surveillance and public awareness regarding risks of heat stress in Thailand.

The book is designed to provide a flowing description of the physiology of heat stress, the illnesses associated with heat exposure, recommendations on optimising health and performance, and an examination of Olympic sports played in potentially hot environmental conditions. In the first section the book examines how heat stress effects performance by outlining the basics of thermoregulation and how these responses impact on cardiovascular, central nervous system, and skeletal muscle function. It also outlines the pathophysiology and treatment of exertional heat illness, as well as the role of hydration status during exercise in the heat. Thereafter, countermeasures (e.g. cooling and heat acclimation) are covered and an explanation as to how they

may aid in decreasing the incidence of heat illness and minimise the impairment in performance is provided. A novel and particular feature of the book is its inclusion of sport-specific chapters in which the influence of heat stress on performance and health is described, as well as strategies and policies adopted by the governing bodies in trying to offset the deleterious role of thermal strain. Given the breadth and scope of the sections, the book will be a reference guide for clinicians, practitioners, coaches, athletes, researchers, and students.

Objective 1 was to investigate effects of heat stress and breed on milk and component yield for Holstein and Jersey cows on the same farm. Objective 2 was to determine the effects of breed on udder health as measured by somatic cell count (SCC) during times of heat stress. Data were collected from DHIA records of 142 Jersey cows and 586 Holstein cows from the University herd at Mississippi State University. During heat stress Jersey milk yield and 4% fat corrected milk (FCM) increased (P

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productivity. Studies are also done in her lab on partitioning of heat loss from skin and pulmonary system of cattle and buffaloes as a result of exercise or exposure to heat stress. Dr. R.C. Upadhyay is working as Head, Dairy Cattle Physiology Division at National Dairy Research Institute, Karnal (India). He graduated in Veterinary Sciences and obtained his PhD degree in Animal Physiology. His area of recent research is climate change, stress, and environmental physiology. His major research accomplishment is on climate change impact assessment of milk production and growth in livestock. His work also involves studying methane conversion and emission factors for Indian livestock and use of IPCC methodology of methane inventory of Indian livestock. Heat shock protein-70 expression studies in cattle and buffaloes are also done in his lab. Draught animal power evaluation, fatigue assessment, work-rest cycle and work limiting factors form the highlights of his work. Studies on partitioning of heat loss from skin and pulmonary system of cattle and buffaloes and electrocardiographic studies in cattle, buffalo, sheep and goat are also undertaken in his lab. He has more than 75 research papers, four books and several book chapters to his credit. Technologies developed and research done by him include methodology of methane measurement: open and closed circuit for cattle and buffaloes; inventory of methane emission from livestock using IPCC methodology; livestock stress index: thermal stress measurement based on physiological functions; and draught power evaluation system and large animal treadmill system. He received training in Radio-nuclides in medicine at Australian School of Nuclear Technology, Lucas heights, NSW, Australia in 1985 and Use of radioisotopes in cardiovascular investigations at CSIRO, Prospect, NSW, Australia, during 1985-86. He has guided several post-graduate and PhD students. He is recipient of Hari Om

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Heat stress poses major challenges to the dairy industry, disrupting the well-being and productivity of cows. Besides affecting lactating cows, exposure to heat stress during the dry period increases core body temperature (CBT) and alters hormonal profile and mammary gland development, ultimately affecting milk yield in the subsequent lactation. Reproductive performance is severely reduced in dairy cows exposed to heat stress. Even though it is well accepted that estrus expression is reduced during periods of heat stress, it is not clear whether herd-level indicators of estrus-detection efficiency, such as insemination risk, are impacted during periods of heat stress. This dissertation focused on exploring the use of CBT during the dry period as a predictor of postpartum health, production, and reproductive performance during the subsequent lactation. Furthermore, potential implications of heat stress and other seasonal stressors on insemination risk were evaluated. Study 1 investigated the relationships between CBT during the dry period and health, milk production, and reproduction during the subsequent lactation. Dry cows with increased CBT were more susceptible to health disorders and had reduced milk yield early in the subsequent lactation. No association was observed between CBT during the dry period and reproductive performance after

parturition. Study 2 explored factors associated with CBT in dry dairy cows and focused on determining the ideal time of the day to assess CBT of heat-stressed dry cows. Core body temperature was increased in cows pregnant with twins and was associated negatively with gestation length. Furthermore, results indicated that 2215 h is the most appropriate time of the day to assess CBT of dry cows exposed to heat stress. Study 3 aimed to compare physiologic and metabolic characteristics of cooled cows classified as having high or low CBT during the dry period. In addition, this study investigated the association between CBT during the dry period and health, milk yield, and reproductive performance after parturition. Cows with high CBT during the dry period had distinct concentrations of pregnancy-associated glycoprotein and indicators of energy balance during the transition period and had reduced milk yield compared with low-CBT cows. Furthermore, CBT during the dry period was a useful predictor of postpartum health disorders. Reproductive performance, however, did not differ between cows that had high or low CBT during the dry period. Study 4 investigated temporal patterns of insemination risk in large dairy herds and explored associations between insemination risk and herd-level traits. Seasonal variation of insemination risk was minimal, with increased insemination risk observed during autumn. Greater values of

insemination risk were observed in dry-lot herds, with low mortality of cows, and longer voluntary waiting period for primiparous cows. In summary, assessment of CBT in dry cows may be a useful tool to identify groups of cows more likely to present health disorders and impaired productive performance after parturition. In addition, insemination risk is not reduced during the summer, but it is severely affected by herd-level traits such as housing system, mortality of cows, and voluntary waiting period for primiparous cows.

"The concept for this text arose from the 18th Discover Conference on Effect of the Thermal Environment on Nutrient and Management Requirements of Cattle, which was held at the Brown County Inn in Nashville, Indiana November 2-5, 2009"--Pref.

The validity of Johne's disease herd status programs and on-farm disease control programs that rely on established 'cutpoints' (e.g., S/P ratios) for ELISA serological tests such as the HerdChek® (IDEXX Laboratories Inc., Westbrook, Maine) may be susceptible to varied seasonal test accuracy. An observed depression in the proportion of a large central Texas dairy herd classified as "positive" during the months of July and August led to our investigation. We hypothesized that there exists a seasonal variability in serological response to Mycobacterium avium subsp. paratuberculosis that

is directly related to heat stress. We further hypothesized that a reciprocal response may occur during periods of heat stress that results in a greater risk of fecal shedding in subclinically-infected animals. Starting in October 2002, we invoked a testing regime that included multiple testing of 720 individual adult cows over each of four seasons including spring, summer, fall, and winter. We collected serum on a cyclic, monthly basis from three random groupings of cows, and, based on the ELISA results, collected fecal samples from the 20% of cows with the highest S/P ratios. We continued to sample in this manner for the period of one year and at the end of that period, analyzed the serum en masse. The ELISA outcome values were treated both as categorical and continuous variables (e.g., S/P ratio). The potential lagged effects of heat stress on S/P ratio, as well as the potential for a change in test result (negative to positive or vice versa) due to heat stress were assessed. The results for fecal culture were analyzed on a categorical scale and were compared to the ELISA results to explore the possibility of a reciprocal response. In the present study, we did not observe any of the significant seasonal effects of heat stress on S/P ratios and proportion seropositive to MAP that were observed in the historical (and less valid) cross-sectional time-series data conducted in 2001. In addition, we found no evidence to support a hypothesis linking seasonal

heat stress to the risk of fecal culture positivity for the causative bacterium for Johne's disease.

Two strategies to reduce impact of heat stress on high producing dairy cows were examined. The first was to recalculate the temperature-humidity index (THI) using high producing dairy cows under diurnal summer conditions. This re-evaluation confirmed that current THI values underestimate the severity of heat stress levels. Therefore, cooling of dairy cattle during warm summer months should begin at a THI of 68.A second objective involved three studies carried out to evaluate use of niacin in dairy cow rations to improve evaporative heat loss and resistance to heat stress. Niacin is known to cause intense vasodilation in human and lab species. We hypothesized that increasing vasodilation would improve evaporative heat loss in dairy cows. In the first niacin study, supplementation of lactating dairy cows with an encapsulated rumen by-pass form of niacin (NIASHURETM; Balchem Corporation, New Hampton, NY) and proved effective in alleviating some affects of heat stress during mild thermal stress. This was observed through increased evaporative heat loss, increased water intake to support the increased sweating rate, decreased rectal and core temperatures. Past research demonstrated that the possible mechanism for vasodilation affects seen by niacin were most likely due to prostaglandin D secretions. Niacin apparently may act through increased prostaglandin D and E production and secretion by Langerhans cells which then act upon vascular endothelial prostaglandin D receptors to increase vasodilation. Additionally, we and others have now shown that these prostaglandins induced elevated heat shock protein gene expression leading to improved cellular viability under heat stress conditions (42 ðC). No studies have evaluated impact of encapsulated niacin on milk yield and

composition during periods of thermal stress under commercial dairy conditions. Therefore, the objective of the last study was to examine the effects of encapsulated niacin during heat stress on milk production and composition as well as core body temperatures under commercial conditions. We concluded that feeding encapsulated niacin did reduce body core temperature but did not increase daily milk yields; however, milk fat and protein percentages were increased thereby, increasing 4% fat- and energy-corrected milk yields significantly when animals were fed encapsulated niacin. Demystifies the genetic, biochemical, physiological, and molecular mechanisms underlying heat stress tolerance in plants Heat stress—when high temperatures cause irreversible damage to plant function or development—severely impairs the growth and yield of agriculturally important crops. As the global population mounts and temperatures continue to rise, it is crucial to understand the biochemical, physiological, and molecular mechanisms of thermotolerance to develop 'climate-smart' crops. Heat Stress Tolerance in Plants provides a holistic, cross-disciplinary survey of the latest science in this important field. Presenting contributions from an international team of plant scientists and researchers, this text examines heat stress, its impact on crop plants, and various mechanisms to modulate tolerance levels. Topics include recent advances in molecular genetic approaches to increasing heat tolerance, the potential role of biochemical and molecular markers in screening germplasm for thermotolerance, and the use of next-generation sequencing to unravel the novel genes associated with defense and metabolite pathways. This insightful book: Places contemporary research on heat stress in plants within the context of global climate change and population growth Includes diverse analyses from physiological, biochemical, molecular, and genetic perspectives Explores various

approaches to increasing heat tolerance in crops of high commercial value, such as cotton Discusses the applications of plant genomics in the development of thermotolerant 'designer crops' An important contribution to the field, Heat Stress Tolerance in Plants is an invaluable resource for scientists, academics, students, and researchers working in fields of pulse crop biochemistry, physiology, genetics, breeding, and biotechnology.

The changes in yield were accompanied by raised rectal temperatures and reductions in feed intake of 31.5, 27.5, and 0%, respectively. When the heat stress was removed, feed intake in Jerseys and Friesians returned to pre-stress levels and production subsequently followed it. [Authors' abstract].

Thirteen male volunteers performed cycle ergometer maximal oxygen uptake (V02 max) tests in moderate (21 C, 30% rh) and hot (49 C, 20% rh) environments, before and after a nine-day heat acclimation program. This program resulted in significantly decreased (P0.01) final heart rate (24 bt/min) and rectal temperature (0.4 C) from the first to last day of acclimation. The V02 max was lower (P

This study was concerned with the assessment of the effects of two stress conditions on 16 basic dimensions of perceptual-motor performance. Subjects were tested under conditions of heat stress (86° F effective temperature for a period of six hours) and prolonged activity (24-hour continuous activity, with two 2-hour rest periods). In general, perceptual-motor performance levels were well maintained under these stress conditions. Under heat stress, six tests showed facilitation, while two

showed degradation of performance. Facilitation under heat stress was accounted for in terms of arousal theory under which activities requiring minimal information processing and involving simple motor reactions appear to benefit from the alerting component of arousal. Under prolonged activity, two tasks showed facilitation and one showed degradation in performance. These effects were explained in terms of requirements specific to the individual tasks. In general, there was essentially no change in performance effectiveness during the 24-hour period of prolonged activity. Under heat stress, oral temperature and pulse rate increased significantly, lending support to the inference of increased arousal. Under prolonged activity, no change was noted in oral temperature, pulse rate, or blood pressure. This was consistent with the general lack of change in the performance measures indicating this level of stress was well tolerated. To an extent compatible with the intensity of the stress conditions which were used, the basic dimensions of perceptual-motor performance appear differentially sensitive to stress. The results offer insight as to the mechanisms whereby stresses such as were used in this study affect more complex operational performance. The findings of this investigation demonstrate the usefulness of the integrated measurement system as a device for the study of human performance.

Onderzoeksresultaten uit het westelijk deel van de Verenigde Staten over de invloed van de omgeving (weer- en temperatuursomstandigheden), voeding, houderijsysteem en transport op stress