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VETERINARY TODAY: HEALTH, WELFARE, AND REPRODUCTION MANAGEMENT IN DAIRY COW HERDS

Abstracts

ASSESSMENT OF HEALTH OF DAIRY COW HERDS

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Optimal herd health is fundamental to productivity, sustainability, and animal welfare in modern dairy systems. A comprehensive assessment strategy must address the multifactorial nature of bovine health, incorporating nutrition, disease prevention, reproductive efficiency, and welfare monitoring. Effective herd health management relies on the integration of veterinary expertise, farmer decision-making, and the use of data and technology for continuous monitoring and improvement [1].

Implementation of structured herd health programmes on commercial dairy farms has demonstrated the value of regular health assessments, early disease detection, and proactive interventions. Practices such as routine locomotion and body condition scoring, reproductive and udder health monitoring, and performance benchmarking are essential tools in identifying health trends and informing management decisions [2].

Particular emphasis is placed on the transition period, a critical phase in the production cycle associated with high risk of metabolic and infectious diseases. Transition cow management, including nutritional planning, metabolic profiling, and monitoring of key performance indicators, plays a pivotal role in determining overall herd health outcomes [3, 4].

Integrating these components into a cohesive herd health plan supports improved fertility, higher milk yields, and enhanced animal welfare, contributing to the long-term success and resilience of dairy operations [5].

References

[1] Ingvartsen K.L, Dewhurst R.J, Friggens N.C. 2003. On the relationship between lactational performance and health: is it yield or metabolic imbalance that cause production diseases in dairy cattle? A position paper, Livestock Production Science, Volume 83, Issues 2–3, 2003, Pages 277-308, ISSN 0301-6226, https://doi.org/10.1016/S0301-6226(03)00110-6.

[2] Higgins, H., Green, M. & Madouasse, A. 2012. Facilitating change in herd health. In Dairy Herd Health. Ed M. Green. CABI

[3] Mulligan FJ, Doherty ML. Production diseases of the transition cow. 2008 Veterinary Journal. Apr;176(1):3-9. doi: 10.1016/j.tvjl.2007.12.018. Epub 2008 Mar 14. PMID: 18342556.

[4] Cardoso, F. C., K. F. Kalscheur, and J. K. Drackley. 2020. Nutrition strategies for improved health, production, and fertility during the transition period. J. Dairy Sci. 103:5684–5693. https://doi.org/10.3168/jds.2019-17271

[5] Hall, J. & Wapenaar, W. 2012 Opinions and practices of veterinarians and dairy farmers towards herd health management in the UK. Veterinary Record doi: 10.1136/vr.100318

DIGIT AMPUTATION IN CATTLE

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Digit amputation is usually the recommended surgical therapy for complicated claw disorders in cattle where deeply located structures distal to the fetlock joint are severely infected or injured [1]. An unaffected and load-bearing partner claw is required [2]. Removal of the infected or necrotic tissue (by digit amputation) results in a rapid reduction in pain and lameness, and faster procedures than in the case of resections [2]. In addition, proper drainage of exudate is achieved [2]. After a thorough clinical examination, especially of distal limbs, the prognosis of each case, possible complications and necessary aftercare should be discussed with the owner before making a therapeutic decision. Economic parameters should also be considered [1, 3]. Perioperative pain management, including the application of non-steroidal anti-inflammatory drugs and local anaesthesia, is necessary to improve animal welfare and ensure the safety of the veterinarian during surgery [3]. Intravenous regional anaesthesia is recommended [3, 4]. Multiple methods of digit amputation in cattle have been described [1, 3]. Disarticulation at the proximal interphalangeal joint is our preferred method. The skin is circularly incised proximal to the coronary band. After removing the affected claw, the deep flexor tendon is shortened as proximal as possible within the tendon sheath [1] and the articular cartilage of the distal surface of the first phalanx should be scraped with a bone curette [4]. The amputation wound is left unclosed to heal by secondary intention [2], and a pressure bandage, usually with antibiotic, is applied. Systemic antibiotics are recommended in most cases (at least until the first bandage change) due to local signs of inflammation [5]. The first change of the bandage should usually be made after 3–5 days, depending on the initial lesions. The interval between further bandage changes depends on the progress of healing and the local findings [5]. To avoid direct weight bearing on the amputation stump, which could disturb the healing process, the operated animal should be housed in a box stall with a firm, dry and non-slip floor next to a comfortable bedded resting area [1]. Deep bedded pack with straw is not recommended after surgery [1]. With good surgical therapy, appropriate aftercare and close lameness monitoring, the operated animal could remain in the herd as long as the other animals [1, 2].

Keywords: claw, surgery, cow, lameness, deep sepsis.

References

[1] Heppelmann M., Kofler J., Meyer H., Rehage J., Starke A. Advances in surgical treatment of septic arthritis of the distal interphalangeal joint in cattle – a review. The Veterinary Journal. 2009, 182(2). P. 162–175.
[2] Nuss K., Surgery of the distal limb. Veterinary Clinics of North America: Food Animal Practice. 2016, 32(3). P. 753–775.
[3] Kofler J., Surgical treatment in deep digital sepsis in cattle – Claw preserving methods and claw amputation. Revista Acadêmica Ciência Animal. 2017, 15(Supl.2). P. 45–65.
[4] Starke, A., Heppelmann, M., Beyerbach, M., Rehage, J. Septic Arthritis of the Distal Interphalangeal Joint in Cattle: Comparison of Digital Amputation and Joint Resection by Solar Approach. Veterinary Surgery. 2007, 36 (4). P. 350–359.
[5] Starke, A., Rachidi, F. Surgery of the foot in ruminants. In XXIII Middle European Buiatric Congress Brno, Czech Republic: Congress proceedings 2024, P. 65–66.

ASSESSING TRANSITION COW MANAGEMENT IN DAIRY COWS

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The last decade or so has seen an increasing focus placed on the management of the transition cow largely due to the increasing recognition of the drastic negative consequences of poor transition management on milking cow welfare and performance, not only in terms of cow health and welfare [1,3], but also in terms of lost milk production [4] and reproduction. Understanding of the social environment of the cow has the potential to greatly benefit dairy cow welfare and production and a better understanding of how prepartum management factors influence postpartum health and milk production [4] can help farms to plan facilities and organize the day-to-day management of cows and will assist in improving cow welfare and productivity [5]. This paper will argue that this approach should be extended to cover the entire dry period and suggests possible key parameters for monitoring the processes and outcomes during this critical period [2].

Keywords: transition, health, production.

References

[1] Cook, J. G. 2023. Association between Prepartum Alerts Generated Using a Commercial Monitoring System and Health and Production Outcomes in Multiparous Dairy Cows in Five UK Herds. *Animals*. 13, 3235-3250.
[2] Cook, J. G. and Green, M. J. 2017. What should we be monitoring in the dry cow period to improve milking cow welfare and productivity ? *Proc British Cattle Veterinary Assoc*. 25, 93-99.
[3] Cook, J. G., Pepler, P. T. & Viora, L. 2021. Association of days in close up, gestation length, and rumination around time of calving with disease and pregnancy outcomes in multiparous dairy cows. *Journal of Dairy Science*. 104, 9093-9105.
[4] Cook, J. G., Pepler, P. T., Viora, L. & Hill, D. L. 2024. Assessing Transition Cow Management in Dairy Cows for Improved Health, Milk Production, Pregnancy and Culling Outcomes. *Journal of Dairy Science*. 107, 11381-11397.
[5] Cook, N. B. and Nordlund, K. V. 2004. Behavioral needs of the transition cow and considerations for special needs facility design. *Veterinary Clinics: Food Animal Practice,* 20, 495-520.

CHALLENGES OF INTRODUCING ANIMAL HEALTH VISITS IN LATVIA

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In 2016, the European Union adopted the 'Animal Health Law', and Article 25 laid down requirements for all productive and wild animal establishments to receive regular animal health visits (AHV) from a veterinarian. The goal of AHV is to strengthen animal health by improving disease prevention, through enhanced biosecurity, and disease detection. Regular AHV will improve animal health and welfare, reduce the use of antibiotics, and enhance sustainability and economic efficiency [1].

Currently, in Latvia, the monitoring of infectious diseases (which must be controlled under the EU regulations), control of biosecurity, animal welfare, and the responsible use of medicines in livestock are carried out by official Food and Veterinary Service inspectors. Management of other infectious and non-infectious diseases (diagnosis, prevention, and treatment) and health services in general are provided by private practicing veterinarians. In Latvia, about 250 veterinarians are engaged in the practice of productive or mixed animals. Of these, about 90 veterinarians are hired by herd owners, and about 20 veterinarians are independent and have contracts with several herds for veterinary services. Based on this fact, in 2023, a research project led by the Ministry of Agriculture of Latvia "Development of guidelines for organizing animal health visits and implementation of a pilot project for evaluating the effectiveness of the developed guidelines" was launched. The project is developing guidelines for the implementation of AHV in herds of cows, sheep/goats, poultry, and fisheries. From the perspective of 'Animal Health Law', the AHV must be mandatory, realized by independent private practicing veterinarians, and applied for all herds of productive animals. Due to the small number of independently practicing veterinarians in Latvia, AHV will be introduced gradually, starting with the largest herds. From July 2024, Latvia will have a unified electronic system for accounting for the use of veterinary medicines, with a focus on the use of antibiotics in farm animals (e-VETIS). It will help AHV-performing veterinarians detect health problems at the herd level earlier. The primary challenges for the implementation of AHV in Latvia are multifaceted and demand strategic interventions: 1) to increase the number of independently working farm animals' veterinarians; 2) further education is required in the implementation of AHV; 3) herd health visits (which reduces other herd health problems) need more emphasis in Latvia; 4) there is a lack of public, animal husbandry specialists' understanding of the need for the mandatory AHV; 5) the possibility of duplication of welfare visits by official inspectors and veterinarians should be eliminated; 6) AHV is planned as a paid service for owners of herds, but visits by official inspectors are for free (sponsored by the State).

Keywords: animal health visits, productive animals, infectious diseases.

References:

[1] Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ('Animal Health Law'): https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0429&qid=1602247521175&from=EN

BOVINE PAIN: IMPORTANCE, IDENTIFICATION, AND CONTROL IN MODERN CATTLE FARMS – META-ANALYSIS

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Pain in cattle leads to changes in behaviour, autonomic function, and neuroendocrine activity, resulting in negative emotional responses and compromised welfare [1,4]. Chronic pain can reduce food intake and weight gain while increasing heart rate and blood pressure and decreasing body temperature [1].

Assessing pain in farm animals typically involves monitoring physiological and behavioural changes [1,3,4]. However, pain detection in cattle remains challenging due to their natural stoicism. Cattle have evolved to conceal pain to avoid appearing vulnerable to predators, making it difficult for veterinarians and farmers to recognize signs of discomfort [3,4].

A scientifically developed pain scale helps assess cattle pain by evaluating seven signals, each scored from 0 to 2, with a total score above 5 indicating severe pain. This scale is a valuable tool for both veterinarians and farmers to detect subtle signs of pain [3].

Pain management involves addressing inflammation and systemic processes while minimizing tissue damage. NSAIDs are commonly used to control pain, fever, and inflammation [1,4]. Proper pain relief is crucial during surgical procedures and conditions such as mastitis, metritis, and lameness [1,4]. Studies have shown that administering analgesics after calving improves recovery, appetite, and milk production [1,2]. Pain is also a significant concern during difficult calving for both the cow and the calf [1,4].

Recent advancements in pain assessment have improved our understanding of bovine pain indicators and led to the development of approved analgesics, optimized dosing strategies, and better pain management protocols [1].

Key words: pain, welfare, behaviour, therapy.

References:

[1] Paulo V. Steagall et al. Pain Management in Farm Animals: Focus on Cattle, Sheep and Pigs. Animals 2021, 11, 1483. https://doi.org/10.3390/ani11061483.
[2] Eva Mainau et al. Alteration in Activity Patterns of Cows as a Result of Pain Due to Health Conditions. Animals 2022, 12, 176. https://doi.org/10.3390/ani12020176.
[3] Karina Bech Gleerup. Identifying Pain Behaviors in Dairy Cattle. WCDS Advances in Dairy Technology (2017) 29: 231–239.
[4] David E. Anderson, William W. Muir. Pain Management in Cattle. Vet Clin Food Anim 21 (2005) 623–635.

MODERN REPRODUCTIVE MANAGEMENT IN DAIRY COWS: A COMBINATION OF CURRENT TECHNOLOGIES AND PROVEN CLINICAL EXAMINATION TECHNIQUES

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The reproductive performance of a dairy herd influences the timing of pregnancy during lactation, milk production efficiency, herd demographics and herd replacement dynamics [1]. There has been considerable concern about the decline in reproductive performance of Holstein cows from the late 1950s to 2000 [2]. The significant improvement in reproductive performance after 2000 coincided with the introduction and implementation of synchronisation programmes, the development of automated activity monitoring systems, the modernisation of facilities and many improvements in other aspects of dairy cattle management [3–4]. It is well known that peripartal diseases in particular have a negative impact on the fertility of dairy cows. As our understanding of the underlying biology of subfertility in cows with these diseases is poor, methods to alleviate depression in pregnancy must be holistic and aim to minimise the risk factors that predispose cows to disease [5]. The most commonly used data types in the context of individual animal management were cow activity, rumination, milk yield and milk conductivity. Farmers see benefits in the involvement of the vet and many want to be proactively asked about the data available [6]. Targeted reproductive management aims to identify subgroups of cows that require a specific reproductive management strategy to optimise reproductive performance. Sensor-based technologies for real-time monitoring of individual cow behaviour offer unprecedented opportunities to develop predictive tools for use in targeted reproductive management [7]. Of particular importance appear to be the intensity of an estrus event and the expression of estrus within the voluntary waiting period. Both traits appear to be robust predictors of individual cow fertility and could be used as selection criteria for targeted reproductive management. Targeted reproductive management may also provide an opportunity to reduce the use of reproductive hormones without compromising reproductive performance [8, 9]. This is because the number of cows per production unit continues to increase for economic reasons [10], resulting in increased workload for farmers and vets in aspects such as reproductive assessment, particularly pregnancy diagnosis. Veterinarians are exposed to various occupational hazards, and increased workload is a major contributor to mental instability, leading to mental illness and physical disorders, which disproportionately affect large animal veterinarians. One way to reduce veterinarians' workload and free up time for other useful veterinary examinations is to combine point-of-care pregnancy tests or laboratory tests for bovine pregnancy-associated glycoprotein in plasma or milk with transrectal ultrasonography [11].

Keywords: targeted reproductive management, precision livestock farming, pregnancy diagnostics.

References:

[1] Giordano J. O., Kalantari A.S., Fricke P.M., Wiltbank M.C., Cabrera V.E. A daily herd Markov-chain model to study the reproductive and economic impact of reproductive programs combining timed artificial insemination and estrus detection. Journal of Dairy Science. 2012, 95(9), P. 5442-5460.
[2] M. C. Lucy M. C. Reproductive Loss in High-Producing Dairy Cattle: Where Will It End?. Journal of Dairy Science. 2001, 84(6), 1277-1293.
[3] Carvalho P. D., Santos V.G., Giordano J.O., Wiltbank M.C., Fricke P.M. Development of fertility programs to achieve high 21-day pregnancy rates in high-producing dairy cows. Theriogenology. 2018, 114, 165-172.
[4] Schilkowsky E.M., Granados G.E., Sitko E.M, Masello M., Perez M.M., Giordano J.O. Journal of Dairy Science. 2021. 104(5), 6222-6237.
[5] Santos J. E. P., Ribeiro E. S. Impact of animal health on reproduction of dairy cows. Animal Reproduction. 2014, 11(3), 254-569.
[6] Woudstra S., Kühl S., Krömker V. Utilization of data from precision livestock farming technologies by practicing veterinarians and farmer expectations of the veterinarians'role. 2024, Proceedings XXIII Middle European Buiatrics Congress 2024, Brno, 60.
[7] Giordano J.O., Sitko E.M., Rial C., Pérez M.M., G.E. Symposium review: Use of multiple biological, management, and performance data for the design of targeted reproductive management strategies for dairy cows. Journal of Dairy Science 2022, 105, 4669-4678.
[8] Rial C. A., Laplacette A., Giordano J.O. Effect of a targeted reproductive management program designed to prioritize insemination at detected estrus and optimize time to insemination on the reproductive performance of lactating dairy cows. Journal of Dairy Science 2022, 105, 8411-8425.
[9] Gonzalez T. D., Factor L., Mirzaei A., Montevecchio A. B., Casaro S., Merenda V.R., Prim J.G., Galvão K.N., Bisinotto R.S., Chebel R.C. Targeted reproductive management for lactating Holstein cows: Reducing the reliance on exogenous reproductive hormones. Journal of Dairy Science 2023, 106, 5788-5804.
[10] Vries A. D., Dechassa H., Hogeveen H. Economic evaluation of stall stocking density of lactating dairy cows. Journal of Dairy Science 2016, 99, 3848–3857.
[11] Szelényi Z., Lipthay I., Sánta A., Lénárt L., Répási A., Szenci O. Pregnancy evaluation with a point-of-care pregnancy test in dairy cattle. Theriogenology 2024, 214, 201-205.

HERD HEALTH MANAGEMENT OF DAIRY COWS IN LITHUANIA: WHERE ARE WE?

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The study explores innovative approaches to herd health management in Lithuanian dairy farms, focusing on the use of real-time monitoring systems to enhance disease prevention, improve reproductive management, and optimize overall farm efficiency. Key advancements include automated milk analyzers, in-line sensors, and real-time biomarker monitoring for early detection of subclinical ketosis (SCK) and subclinical acidosis (SCA).

A central hypothesis tested was the relationship between milk fat-to-protein (F/P) ratio and metabolic health status. Data from 320 cows during early lactation revealed that cows with SCK exhibited a 36% higher F/P ratio and elevated NEFA levels compared with healthy cows, while SCA cows had a 23.77% lower F/P ratio. These findings establish the F/P ratio as a robust non-invasive biomarker for early metabolic disorder detection.

The study also highlights the potential of milk composition analysis for monitoring the energy balance, calving ease, and susceptibility to mastitis. Automated systems like the BROLIS HerdLine Milk Analyzer demonstrated high accuracy in measuring fat, protein, and lactose concentrations, offering actionable insights into cow health.

Incorporating these technologies allows for better energy management, reduced greenhouse gas emissions, and enhanced farm sustainability. The findings emphasize the integration of sensor technology in dairy farming as a vital tool for advancing herd health management and addressing challenges related to metabolic disorders and environmental impacts.

Keywords: dairy cow health, milk fat-to-protein ratio, subclinical ketosis, innovative technologies, biomarkers, sustainable dairy farming.

MANAGING SUBACUTE RUMINAL ACIDOSIS IN DAIRY CATTLE

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The feed composition for high-yielding cows under intensive production conditions contributes to subacute rumen acidosis (SARA), which leads to pathologies such as rumenitis, laminitis, reproductive disorders, and decreased productivity and longevity. The first part of the study aimed to investigate the interrelations between reticulo-ruminal (RR) pH, productivity (P), milk fat (MF), milk protein (MP) level and somatic cell count (SCC) in milk. RR pH was established using intra-ruminal boluses *SmaXtec*. The second part of this work investigated whether the rumen wall thickness (RWT) is correlated with the cow chewing activity (ChA) induced by feed composition changes. Initially, four dairy cows (10 to 34 after parturition) were monitored using intra-ruminal boluses over a 79-day period. The dynamic of RR pH was analyzed in context with P, MF, MP, and SCC. Then, RWT in 44 cows (16 first-lactation and 28 older cows) was analyzed relating to data obtained from the neck ties sensors (*Allflex Livestock Intelligence system*). Despite the similar feeding, an individual RR pH fluctuating range in each cow was detected, and it was statistically different in all test cows 6.0 ± 0.05, 6.2 ± 0.04, 6.3 ± 0.06 and 6.5 ± 0.05, respectively, especially between the first and the fouth cow ($P < 0.05$). MF and MP levels were not statistically significantly different just between the 2second and the third cows, but these parameters were higher in the first and fourth cows ($P < 0.05$). The *P* was the lowest in the first cow (26.1 ± 0.32 kg/day), which had the lowest RR pH, and it was significantly lower than in the fourth cow (29.4 ± 0.34 kg/day), which had the highest RR pH. Higher milk yield was in the second and third cows (39.2 ± 0.29 and 31.2 ± 0.31 kg/day). A weak correlation between RR pH and energetically corrected milk ($r = 0.19$; $P < 0.01$) and MP level ($r = 0.35$; $P < 0.01$) were detected in all cows together. In our study, MF, MP, and SCC were not altered statistically significantly due to feed composition changes $P > 0.05$. A negative statistically significant correlation was established regarding ChA and RWT dynamic 10 days after the changes in feeding composition ($r = 0.45$; $P < 0.01$). Cows thad had RWT increased diminished *P* (35.3 ± 6.94 and 40.0 ± 8.14 kg/day, respectively, $P < 0.05$). Diminished ChA and increased RWT tend to diminish cow *P*. The longer lifespan (2760 days) was for the first cow with the higher RR pH, and the second was for the fourth cow (2336 days) with the lowest RR pH. For cows with medium RR pH, it was 2021 and 1797 days, respectively. In conclusion, despite the same feeding composition, the reticulo-ruminal pH dynamic could be in individual ranges for particular cows. Rumen wall thickening is a sign that demonstrates the effect of the feed consumed on the cow organism and productivity.

Keywords: SARA, cow chewing activity, rumen wall thickness.

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EFFECT OF THERMAL ENVIRONMENT ON DAIRY COWS

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Due to global warming, heat-induced stress is becoming an increasingly important problem for dairy cows in Lithuania. A temperature-humidity index (THI) is a single value representing the combined effects of air temperature and humidity associated with the level of heat stress.

The aim of this study was to evaluate the effects of THI on the level of stress hormone cortisol in cows and productivity of dairy cows in climatic conditions of two dairy farms in Lithuania.

The study was conducted in 2019–2020 in two selected dairy farms in southern Lithuania. Necessary data on environmental conditions and productivity of cows on farms were collected, averages of temperature-humidity index were calculated. 20 urine samples were tested to determine the level of stress hormone in cows. Statistics were processed using statistical data analysis.

The largest differences between the average air temperatures (^{0}C), relative humidity (%), air velocity (m/s) and temperature-humidity index values in the farm regions were observed in the winter season.

A statistically significant dependence of cortisol concentration in the body on THI was also found ($r = 0.902$, $P < 0.05$).

In both farms, the highest temperatures-humidity index averages were recorded in 2019 June (74.2 and 73.9). The statistical analysis demonstrated that the temperature-humidity index had a negative effect on the milk yield, fat content and protein content of cows ($P < 0.05$).

Keywords: dairy cows, temperature-humidity index, cortisol, bulk milk characteristics.

SHEEP ANAESTHESIA PROTOCOL EVALUATION FOR TRAUMATOLOGY SURGERIES

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In recent years, approximately 20 000 sheep have been used every year in biomedical research across Europe. Especially orthopaedic studies frequently rely on sheep because of the weight and size of the animal, as well as the regeneration time of healing like in humans. Here, surgical interventions are commonly used, and researchers are obliged to minimize any kind of suffering according to the 3R principle (reduce, refine, replace) and animal's welfare legislation. There is responsibility to ensure appropriate anaesthesia and/or analgesia for all ruminants undergoing painful procedures. The aim of this study is to evaluate how the heart rate and non-invasive arterial pressure of sheep change during traumatological operations.

Twenty female Lithuania black-headed sheep at the age of 13–14 months and 30–35 kg of body weight were obtained and handled at the Biological Research Centre of the Lithuanian University of Health Sciences. Permission for the study was obtained from national regulatory bodies. After arrival, the animals were given 2 weeks of habituation to the staff members and regular handfeeding. Prior to surgery, the sheep were not fasted. The sheep underwent general anaesthesia. The sheep were pre-treated with xylazine (0.05 mL/kg, i.m.) and, after 5 min, with fentanyl (1 mL i.m.) before general anaesthesia was induced using propofol CRI (20 mg/kg/h, i.v.). Following orotracheal intubation, anaesthesia was maintained with propofol (20 mg/kg/h), fentanyl (3 mL/h), 21% of oxygen, and 1 L/min of ambient air by inhalation. Oxygen saturation, temperature, heart rate (HR), respiratory rate (RR) and non-invasive blood pressure were monitored continuously. For local anaesthesia, 2% lidocaine (max. 4 mg/kg,) was administered along the incision sites. As soon as the animals breathed spontaneously, they were ex-tubated and the rumen tube was removed. Regarding pain management, ketoprofen (2 mg/kg, i.v.) was administered following 3 days post-surgery.

In this study, it was observed that only after premedication the heart rate was lower than after starting the procedure after 15 min, 95.8 ± 27.63 and 104.4 ± 31.1 beats per minute, respectively. This can be influenced by the intubation of the animal, because approximately after 10–15 min from laying the animal on the table, the animal was intubated. The heart rate remained within normal range for young sheep throughout the operation. The average duration of surgery was 52 ± 22.5 min. Vital parameters were monitored every 15 min during surgery. During data processing, the dynamics of mean non-invasive arterial pressure were observed, MAP was highest at the beginning, 127 mmHg ± 27.3 mmHg, and slowly decreased during the entire surgery. This is possibly the influence of anaesthetics, as all drugs used for anaesthesia dilate blood vessels and thus reduce arterial pressure. Blood pressure remained higher than normal range during the entire procedure.

The study found that the blood pressure of the sheep remained high even though signs of pain such as the pinch test, reflexes and pupillary movement were negative, ensuring adequate analgesia. An anaesthesia protocol, ensuring analgesia and adequate anaesthesia were used, but closer monitoring is needed in future studies.

STANDING ROMANOV VERSUS LITHUANIAN BLACKHEAD SHEEP HEART ULTRASOUND METHODOLOGY

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Baseline echocardiographic measurements are essential for accurate and reliable diagnostics of cardiovascular diseases. To avoid misinterpretation of echocardiographic images and measurements, establishing standardized reference values is necessary. Several studies have highlighted the suitability of sheep as models for cardiovascular research due to their morphological similarities to humans, including comparable adult heart size, cardiomyocyte nuclei count, venous drainage patterns, and physiological responses to cardiovascular disease induction [1]. Consequently, sheep are widely used and considered reliable in biomedical imaging studies [2, 3]. Additionally, the increasing popularity of sheep as companion animals, appreciated for their gentle nature and ease of care, has elevated the need for precise cardiovascular diagnostics in veterinary medicine [4]. The aim of this study was to establish cardiac ultrasound methodology of two Lithuanian sheep breads to asses baseline cardiac ultrasound measurements.

Physically mature Lithuanian blackhead sheep (LBS) (N = 12) aged 300 to 310 days weighing 33.1 ± 1.47 kg and 20 Romanov sheep (RS) (N = 20) aged 180 to 200 days weighing 22.6 ± 1.80 kg were analyzed in this study. Two-dimensional, M-mode and pulsed wave Doppler echocardiographic studies were accomplished while measuring normal cardiac dimensions, time indices and blood volumes. A 4–5 MHz phased-array transducer was used to acquire the images. The transducer was pressed to the skin approximately 2–3 cm dorsal to the fourth and fifth right intercostal spaces. All the echocardiographic measurements were significantly correlated with body weight and breed.

This study demonstrated that it is possible to perform a cardiac ultrasound examination on standing sheep with ease, without disrupting physiology or causing stress to the animal. The sheep remain calm while standing, able to ruminate and breathe without interruption. No anesthesia was used in this study, meaning the physiological parameters of the heart were not affected. This study results showed that it is possible to measure the left ventricle ejection fraction, which was significantly higher in LBS. The left ventricular posterior wall index (LVPi) and the intraventricular septum index were measured, and LVPi was significantly higher in Romanov sheep. Using ultrasound examination on standing sheep makes it possible to calculate early and late diastolic pressure ratio, which was higher in Romanov sheep. The human cardiac ultrasound protocol was adapted for sheep ultrasound measures, and aortic flow acceleration time as well as velocity time integral were observed in both sheep breeds. Depending on the protocol, the left ventricular diastolic and systolic volume as well as the stroke volume were measured. The observed measurements were higher in LBS.

This study concluded that echocardiography could be used as a tool in diagnosing and further researching cardiac diseases and disorders of Lithuanian blackhead and Romanov sheep.

References:

[1] Locatelli P, Olea FD, De Lorenzi A, Salmo F, Vera Janavel GL, Hnatiuk AP, Guevara E, Crottogini AJ 2011: Reference Values for Echocardiographic Parameters and Indexes of Left Ventricular Function in Healthy, Young Adult Sheep Used in Translational Research: Comparison with Standardized Values in Humans. In J Clin Exp Med 4: 258–264
[2] Sill B, Roy BN, Hammer PE, Triedman JK, Sigg DC, Kelly MF, Nedder A, Dunning PS, Cowan DB 2011: Development of an Ovine Model of Pediatric Complete Heart Block. Journal Surg Res 166: 103-108
[3] Mehrdad Y 2014: Normal Echocardiographic Findings in Lori- Bakhtiari Sheep. HVM Bioflux 6: 45-48
[4] Aleixo ASC, Ferreira DOL, Tsunemi MH, Chiacchio SB, Lourenço MLG. Influence of Dorper lamb development from birth to 120 days of age on clinical and echocardiographic parameters. Sci Rep. 2022 Nov 17;12(1):19726.

ANALYSIS OF FACIAL EXPRESSION IN COWS AS ONE OF ANIMAL WELFARE INDICATORS

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Presently, a key component of animal welfare is the animal's affective (emotional) state and its assessment. Such studies attract great scientific interest focused primarily on negative experiences such as pain, fear, and suffering, which farm animals experience at different stages of their lives. Increased numbers of studies highlight that cows exhibit specific pain behaviours and facial expression as a new and reliable technique which could be developed to recognize and assess pain. Pain in farm animals can be caused by disease, injuries, poor hygiene and housing or inadequate management practice. However, disease (such as mastitis, lameness, peritonitis, etc.) is a major cause of pain in dairy cows, negatively affects welfare, and decreases productivity; therefore, analysis of facial expression can be a valuable early pain detection tool [1–4]. Thus, we aimed to determine parameters of dairy cows (that were affected with subclinical or clinical mastitis) on a facial expresion scale. A total of 30 cows were allocated into equal (N = 10) three groups: 1 (control, healthy cows), 2 (subclinical mastitis) and 3 (clinical mastitis); and photo images (N = 150) based on facial expressions were evaluated. Pain assessment relied on the evaluation of potential pain-related facial expression performances in four regions of the face (each region was scored on a 0–2 scale). Eye and ear position, nostril and facial expression were measured as described in scientific literature [1, 3]. The condition of the changed by 50% ($P = 0.07$) and 37.50% ($P = 0.01$), the ear by 42.85% ($P = 0.06$) and 42.85% ($P = 0.04$), the nostril by 62.50% ($P = 0.18$) and 50.00% ($P = 0.05$), and the facial expression by 33.33% ($P = 0.01$) and 22.22% ($P = 0.001$) in groups 2 and 3 of cows, respectively, compared with the group 1. Early detection (changes in a cow's normal facial expression suggest the presence of pain) of any health problem will ensure that cows can get proper health care as soon as possible, reducing the impact on welfare, productivity and dairy farm economy. We extend our study by developing an automated system (utilizing the power of artificial intelligence) for the detection and analysis of facial expressions.

Keywords: cow, welfare, pain, facial expression, mastitis.

References

[1] Gleerup K. B., Andersen P. H., Munksgaard L., Forkman B. Pain evaluation in dairy cattle. Applied Animal Behaviour Science. 2015, 171. P. 25–32.
[2] Lambert H., Carder G. Positive and negative emotions in dairy cows: Can ear postures be used as a measure? Behavioural Processes. 2019, 158. P. 172–180.
[3] Proctor H. S., Carder G. Can ear postures reliably measure the positive emotional state of cows? Applied Animal Behaviour Science. 2014, 161, P. 20–27.
[4] Ginger L., Ledoux D., Bouchon M., Rautenbach I., Bagnard C., Lurier T., Foucras G., Germon P., Durand D., de Boyer des Roches A. Using behavioral observations in freestalls and at milking to improve pain detection in dairy cows after lipopolysaccharide-induced clinical mastitis. Journal of Dairy Science. 2023, 106 (8), P. 5606–5625.

EVALUATION OF THE TRANSITION PERIOD OF COWS: PRINCIPLES OF STANDARD OPERATING PROCEDURES (SOP)

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The transition period for dairy cows, which spans 3–4 weeks before and after calving, is a critical phase influencing animal health, milk production, and farm efficiency. During this period, cows undergo significant metabolic and physiological changes, making effective management through standard operating procedures (SOP) crucial. Proper nutrition is key during the transition period to prevent metabolic disorders like ketosis and hypocalcemia, which affect milk yield and reproductive performance. A balanced diet with adequate protein, energy, and micronutrients helps facilitate smooth lactation. Studies indicate that feeding strategies with a proper energy-to-protein ratio reduce ketosis risk and enhance milk production [1].

The transition period carries an increased risk of metabolic and infectious diseases, such as subclinical ketosis and mastitis. Regular veterinary check-ups and blood parameter monitoring (e.g., non-esterified fatty acids, beta-hydroxybutyrate) help detect health risks early, enabling timely interventions. Continuous health monitoring during this time reduces disease incidence and improves milk production [2]. Housing conditions significantly impact cow comfort and productivity. Factors such as heat stress, poor ventilation, and inadequate bedding can decrease feed intake and increase disease susceptibility. Research shows that well-ventilated barns and comfortable resting areas improve cow welfare and milk production efficiency, while clean bedding reduces mastitis cases [2, 3] Behavioral changes during the transition period, such as fluctuations in blood calcium levels, can indicate physiological stress and metabolic imbalances. Monitoring cow behavior, including feed intake and lying time, allows for early detection of health issues, enabling preventive actions that support health and productivity [2]. Farm management practices and human factors play a crucial role in SOP implementation. Variations in management practices, herd genetics, and seasonal factors influence cows' responses to transition protocols. Studies show that training farm personnel in SOP principles reduces disease incidence and improves herd performance. Educating staff on proper feeding and health monitoring can reduce metabolic disease rates and boost milk production [2, 3].

Managing the transition period effectively using SOP principles is vital for optimizing cow health and productivity. Balanced nutrition, continuous health monitoring, and appropriate housing conditions are essential. By following evidence-based SOP guidelines, farmers can reduce disease risks, increase milk yield, and improve farm efficiency. Future research should explore genetic differences, seasonal variations, and farm-specific adaptations to enhance SOP effectiveness.

References

[1] Caixeta, L.S.; Omontese, B.O. Monitoring and Improving the Metabolic Health of Dairy Cows during the Transition Period. *Animals* 2021, 11, 352.

[2] Mezzetti, M.; et al. The Transition Period Updated: A Review of New Insights into the Adaptation of Dairy Cows to the New Lactation. *Dairy* 2021, 2, 617–636.

[3] Pascottini, O.B.; Leroy, J.L.M.R.; Opsomer, G. Metabolic Stress in the Transition Period of Dairy Cows: Focusing on the Prepartum Period. *Animals* 2020, 10(8), 1419.

CATTLE C-SECTION: ADVANTAGES AND DISADVANTAGES

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The cesarean section is among the oldest surgical procedures performed in veterinary medicine [1]. The indications for a cesarean operation and the rationale behind making an appropriate decision have been extensively reviewed [2]. Analysis of published cases indicates that the following six major indications collectively account for 90% of all cesarean operations: fetomaternal or fetopelvic disproportion, incomplete dilation or induration of the cervix, uterine torsion, fetal anomalies, abnormal fetal disposition, fetal emphysema [3]. However, among cattle veterinarians, there is a diversity of opinions regarding cesarean sections: some advocate for the procedure, citing its benefits and favorable outcomes, while others contend that it has a negative economic impact and poor long-term prognosis [2]. The main C-section techniques and their advantages are the following [2]:

- Left paralumbar: prevents intestinal prolapse but may cause rumen prolapse and difficulty extracting the calf;
- Right paralumbar: harder to keep intestines inside; used for large calves in the right uterine horn;
- Ventral midline/paramedian: preferred when the cow cannot stand; better for fetal emphysema but challenging suturing and udder interference;
- Ventrolateral (lying): hidden incision, easier uterus access, but high infection and herniation risk;
- Left-sided oblique (standing): commonly used, allows better uterine access and calf extraction but requires physical strength.

The primary determinant of a successful cesarean section in bovines is the timing of the intervention. Early surgical intervention significantly increases the probability of survival for both the cow and the calf. Current veterinary guidelines recommend performing a cesarean section within a maximum of six hours to optimize outcomes [1]. If legs and/or the head cannot be manually repositioned into the birth canal, an immediate decision to perform a C-section should be made [2]. Caution should be taken when predicting the outcome in cases of emphysematous fetuses: fetotomy is not always an option, and in such cases, the survival rate after surgery is also quite low. Intensive post-operative care and high doses of medication are essential for the cow's recovery [4].

Keywords: cesarean section, cattle, pros and cons.

References

[1] Kumar, D., Satish, and Purohit, G.N. (2022). Cesarean Section in Cattle: A Review. *Agricultural Reviews*. 43(2): 154–161. DOI: 10.18805/ag.R-1933

[2] Adugna SA, Kitessa JD, Feyissa CT, Adem SA. „Review on a cesarean section in the cow: Its incision approaches, relative advantage, and disadvantages". *Vet Med Sci*. 2022 Jul;8(4):1626–1631. doi: 10.1002/vms3.808. Epub 2022 Apr 27. PMID: 35474614; PMCID: PMC9297780.

[3] Jos J. Vermunt „ The Caesarean Operation in Cattle: a Review"*Iranian journal of veterinary surgery*, 2008

[4] Hiew, M. W. H., Baird, A. N., & Constable, P. D. (2018). Clinical signs and outcomes of beef cattle undergoing cesarean section because of dystocia. *Journal of the American Veterinary Medical Association*, *252*(7), 864–872. Retrieved Apr 20, 2024, from https://doi.org/10.2460/javma.252.7.864

EFFECT OF LOW FREQUENCY OSCILLATIONS ON CASEIN MICELLE SIZE IN RAW MILK

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The application of vibration therapy of blood flow improvement in the medical field has been explored intensively during recent decades. However, compelling evidence about the health effects of vibration (especially treatment effectiveness) is still unclear. The treatment capabilities of the low power acoustic pulse therapy (APT) have been widely reported. It is known to produce various responses in biological tissues [1, 2]. APT pressure (10 ± 15 megapascal) has been shown to produce new blood vessels and improve tissue function with long term exposure [1]. In our previous investigation [3], an unbalanced vibratory motor was applied to the DeLaval Harmony model milking unit. During in vivo experiments, while milking, the vibrator induced mechanical milking-similar vibrations in the udder. The vibrations were spreading to the entire udder and caused physiotherapeutic effects such as activated physiological processes and increased udder base temperature by 0.57, thus increasing the blood flow in the udder. The application of low-frequency vibrations did not alter observable changes in milk yield and quality parameters oranimal welfare indicators. Moreover, casein micelle size and milk fat globules can vary depending on farming factors (seasonal variation, stage of lactation), and cow genetics [4]. Here, we aimed to estimate the effect of vibration on casein micelle size in raw milk under in vitro conditions. Casein micelle size analysis was performed using Beckman Coulter - Delsa™Nano Series analyzer. Raw milk samples were exposed to the 25-Hz vertical and 41-Hz horizontal vibrations for 15 s (A sample), 1 min (B sample), 2 min (C sample) and 7 min (D sample). K sample (no vibration) served as control. Milk measurement temperature was 24.5–25.00°C, refractive index was 1.3328, viscosity was 0.8980 (cP), scattering intensity was 30617 (cps), and attenuator was 0.3 (%). The average size of casein micelle size in raw milk distributed as follows: 646.1 nm, 642.3 nm, 640.5 nm, 621.5 and 617.6 nm in K, A, B, C, and D samples, respectively. To sum up, we can state that vibration had no significant influence on casein micelle size in raw milk.

Keywords: low-frequency vibrations, cow's raw milk, casein micelles size.

References:

[1] Mariotto S., de Prati A.C., Cavalieri E., Amelio E., Marlinghaus E., Suzuki H. Extracorporeal shock wave therapy in inflammatory diseases: Molecular mechanism that triggers anti-inflammatory action. Curr Med Chem. 2009, 16. P. 2366-2372.
[2] Crowe O.M., Dyson S.J., Wright I.M., Schramme M.C., Smith R.K.W. Treatment of chronic or recurrent proximal suspensory desmitis using radial pressure wave therapy in the horse. Equine Vet J. 2004, 36. P. 313-316.
[3] Sederevičius A., Oberauskas V., Želvytė R., Žymantienė J., Musayeva K., Žemaitis J., Jūrėnas V., Bubulis A., Vėžys J. Effect of low frequency oscillations during milking on udder temperature and welfare of dairy cows. J Anim Sci Technol. 2023, 65 (1). P. 244-257.
[4] Logan A., Day L., Pin A., Auldist M., Leis A., Puvanenthiran A., Augustin M. A. Interactive effects of milk fat globule and casein micelle size on the renneting properties of milk. Food Bioprocess Technol. 2014, 7. P. 3175–3185.

ULTRASOUND SCANNING FOR QUALITY ASSESSMENT OF LONGISSIMUS DORSI MUSCLE IN CATTLE: MEASURING MEAT QUALITY IN LIVE ANIMALS

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The meat industry is observing an increase in the population of purebred animals from the finest meat breeds globally, due to the introduction of innovative solutions in animal husbandry, feeding practices, breeding techniques, and overall management [1]. Ultrasound can be added in breeding programs to select animals with the potential to pass on superior meat qualities [2]. Key indicators of good quality include fat thickness, the area of the longissimus dorsi muscle, hide thickness, the percentage of intramuscular fat, and the marbling score [3]. The aim of this study was to determine the relationship between daily body weight and indicators of quality meat using ultrasound imaging. During the study, a total of 603 cattle scans were performed. Daily weight gain was calculated by deriving the average of age and weight. Ultrasound scan was performed using MyLabOneVET ultrasound equipment (Esaote, Germany). During the scan, the sensor was pressed deep into the muscle for a few seconds until the image on the screen was smooth and consistent. Different structures are visible during the examination: subcutaneous fat, transverse section of the long back muscle, and fat layer near the rib cage. After the examination, the created images are saved. After the examination, the stored images are evaluated and adipose tissue measurements are performed in the scanner, then the muscle area and the fat layer near the ribs are evaluated in this way. The data were calculated using installed formulas, according to which it is possible to accurately calculate the yield percentage while the animal is still alive. The measurement data were coded and compiled using an Excel (MsOffice, USA) calculator. To calculate the relationship between the outcome variables, the Pearson correlation test was performed, and the correlation coefficient R was calculated, which does not depend on the measurement units of the variables. This study was conducted in six different farms in Lithuania. Before each ultrasound examination, the cattle were weighed, and their heads were fixed accurate scanning. After analyzing the collected data, it was found that the daily weight of the animals varied from 0.51 kg/d up to 2.7 kg/d, on average 1.41 kg/d. A weak positive correlation ($r = 0.372$) was found in correlation tests between daily body weight and long back muscle area, $P < 0.01$. The study also analyzed the relationship between yield grade and daily weight gain. It was found that there was no significant correlation between these two parameters. A similar trend was observed when analyzing the relationship between daily body weight and intermuscular fat percentage (IMF): the correlation was very weak, but positive. Analysis of the data on fat thickness and daily weight demonstrated that there was no correlation between these parameters. This shows that the daily weight does not have a significant effect on the thickness of subcutaneous fat. However, a weak positive correlation ($r = 0.383$) was found between daily body weight and the thickness of the longus back muscle, $P < 0.01$.

The results of this study do not prove the benefits of ultrasound scanning. The study found only a weak relationship between the measured parameters. The study has several methodological limitations, so further research is needed to accurately assess the benefits of ultrasound scanning.

References

[1] Briana F. Smith. (2020). Performance and ultrasound guided body conditioning in Angus Crossbred steers following a 12-hour shift in feed time. *Thesis*. 72.
[2] Duff, C., Werf, J., Parnell, J. and Clark, S. (2021). Comparison of two live-animal ultrasound systems for genetic evaluation of carcass traits in Angus cattle. *Transl. Anim. Sci.* 5: 1–11.
[3] Fabbri, G., Gianesella, M., Gallo, L., Morgante, M., Contiero, B., Muraro, M., Boso, M. and Fiore, E. (2021). Application of Ultrasound Images Texture Analysis for the Estimation of Intramuscular Fat Content in the Longissimus Thoracis Muscle of Beef Cattle after Slaughter. Animals. 11: 11–17.

RELATIONSHIP BETWEEN SOMATIC CELL COUNT AND REPRODUCTIVE PARAMETERS IN DAIRY COWS

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Milk yield, somatic cell count and reproductive performance are the main determinants of dairy enterprise profit, and udder health status is a factor that has a detrimental effect on both traits [1]. Rearte et al. [2] have reported the effect of somatic cells counts (SCC) on different indicators of reproductive performance, such as longer days to first service, lower conception risk and higher risk of pregnancy loss. The aim of this work was to analyze the influence of the count somatic cells in cow's milk on reproduction in dairy cows. The study was carried out on 300 Holstein lactating dairy cows, in accordance with the Law on the Care, Keeping and Use of Animals of the Republic of Lithuania. According to the count of somatic cells in milk, cows were selected and divided into three groups: Group 1 – SCC up to 200 thousand/mL (N = 100); Group 2 – SCC 201–400 thousand/mL (N = 100); Group 3 – SCC > 401 thousand/mL (N = 100). Information on cow herd reproduction (service period in days, insemination index, duration of calving in days, first heat after calving in days) was taken from the herd management system. Arithmetic means, their errors and statistical reliability of the data were calculated for each evaluated trait. Statistically reliable data were considered when $P < 0.05$. The study demonstrated a significant relationship between somatic cell count in milk and reproductive performance in dairy cows. Higher SCC levels (> 401 thousand/mL) were associated with a 40.76% increase in the service period, a 1.9-fold increase in the insemination index ($P < 0.05$), and a two-day delay in the first oestrus after calving. Additionally, gestation duration slightly decreased by 0.82% compared with cows with SCC below 200 thousand/mL. These findings highlight the negative impact of elevated SCC on reproductive efficiency, emphasizing the importance of effective udder health management in dairy farming.

Keywords: dairy cows, somatic cell count, reproduction parameters.

References

[1] Krpalkova L., Cabrera V. E., Kvapilik J., Burdych J. Associations of reproduction and health with the performance and profit of dairy cows. Journal of Agricultural Economics - Czech. 2016, 62. P. 385–394.
[2] Rearte R., Corva S. G., de la Sota R.L., Lacau-Mengido I.M., Giuliodori M.J. Associations of somatic cell count with milk yield and reproductive performance in grazing dairy cows. Journal of Dairy Science. 2022, 105. P. 6251–6260.

INFLUENCE OF ESTRUS ON MILKING PARAMETERS IN DAIRY COWS

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Accurate estrus detection is a crucial component of reproductive management in dairy cows, influencing successful fertilization and pregnancy [1]. Effective reproductive management directly impacts milk production and the economic performance of dairy farms. In recent years, automated technologies have become increasingly common in the dairy industry [2]. One of the most significant advancements is the implementation of automatic milking systems (AMS). AMS allows cows to enter milking stalls voluntarily, individually, and without guidance from farm staff [3]. Consequently, understanding how cows interact with their environment and how this influences their behavior and movement through the AMS is essential for the system's success [4, 5].

The objective of this study was to assess the influence of estrus on various milking parameters, including milk yield (kg), milk flow rate (kg/min), and electrical conductivity of milk (μS). The study was conducted in Lithuania using data from 25 Holstein cows in their second lactation and fresh milk cows. Data were collected through the GEA "DairyPlan C21" (Germany) herd management system and the GEA Dairy Robot R9500 automated milking system, which milks the cows 2–4 times per day, based on need. Estrus detection was performed using the GEA CowScout system.

The results showed that during the estrus period, the average daily milk yield per cow was 42.8 ± 1.38 kg, which was 9.95% lower ($P < 0.05$) than the period before estrus and 7.41% lower than after estrus. A 2.32% decrease in milk production was observed after estrus. On the day before estrus, the average electrical conductivity peaked at 477.68 ± 5.18 μS, 8.6% higher ($P > 0.05$) than the estrus day. The average milk flow rate during the study was 2.76 ± 0.14 kg/min, which was 10.9% lower ($P > 0.05$) than the day before estrus. No direct correlation between the milk flow rate and estrus was found. However, estrus had a direct influence on the average milk yield. Comparison of the average milk production on the day of estrus to the day before estrus showed a decrease of 4.78 kg ($P < 0.05$).

Keywords: cow, estrus, milking parameters.

References

[1] Endo N. Possible causes and treatment strategies for the estrus and ovulation disorders in dairy cows. Journal of Reproduction and Development. 2022, 68(2), P. 85-89.
[2] Cogato A., Brščič M., Guo H., Marinello F., Pezzuolo A. Challenges and tendencies of automatic milking systems (AMS): A 20-years systematic review of literature and patents. Animals 2021, 11, P. 356.
[3] Salfer J.A., Siewert J.M., Endres M.I. Housing, management characteristics, and factors associated with lameness, hock lesion, and hygiene of lactating dairy cattle on Upper Midwest United States dairy farms using automatic milking systems. Journal of Dairy Science. 2018, 101(9), P. 8586–8594.
[4] Jacobs, J.A., Siegford, J.M. Invited review: The impact of automatic milking systems on dairy cow management, behavior, health, and welfare. Journal of Dairy Science. 2012, 95(5), P. 2227–2247.
[5] Siewert J.M., Salfer J.A., Endres M.I. Milk yield and milking station visits of primiparous versus multiparous cows on automatic milking system farms in the Upper Midwest United States. Journal of Dairy Science. 2019, 102(4), P. 3523–3530.

POSSIBILITIES TO USE YEAST CELL WALLS POLYSACCHARIDES AND WALNUT NUTSHELLS FOR MYCOTOXIN DECONTAMINATION

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Mycotoxins are toxic secondary metabolites that are naturally produced by specific filamentous fungi [1]. Currently, more than 400 potentially toxic mycotoxins have been identified as dangerous contaminants in food and agriculture that cause significant harm to humans and animals through their carcinogenic, immunosuppressive, teratogenic and mutagenic effects [2]. Dairy cattle are often exposed to multiple mycotoxins that can occur before, during or after harvesting due to the high levels of maize and grass silage in their daily ration. Thus, contamination of feed with mycotoxins in the dairy sector can cause serious feed safety and security issues and significant losses for the ruminant industry.

The purpose of the current study was to assess the effectiveness of *Geotrichum fermentants*, *Rhodotorula rubra* and *Kluyveromyce marxiamus* yeast cell walls polysaccharides and walnut nutshells in reducing mycotoxin levels.

A static in vitro model of the gastrointestinal tract was used as a first assessment tool to determine the effectiveness of yeast cell walls polysaccharides and walnut nutshells in reducing levels of the mycotoxins aflatoxin B1 (AFB1), zearalenone (ZEA), deoxynivalenol (DON) and T-2 toxin concentrations. Mycotoxin concentrations were established using high-performance liquid chromatography (HPLC) with fluorescence (FLD) and ultraviolet (UV) detectors.

It was found that the greatest impact on the reduction of AFB1 and ZEA concentrations was determined with inserted *G. fermentants* yeast cell walls polysaccharides ($P < 0.05$), DON concentration with *R. rubra* yeast cell walls polysaccharides ($P < 0.05$) and T-2 toxin concentration with *G. fermentants, R. rubra* and *K. marxiamus* yeast cell walls polysaccharides ($P < 0.05$). Although the highest mycotoxin reduction effect while using walnut nutshells was established for AFB1 and DON.

The research findings suggest that yeast cell walls polysaccharides and walnut nutshells may be highly effective in reducing mycotoxin concentrations, thereby improving feed safety and quality for dairy cattle.

Key words: mycotoxins, yeast cell walls polysaccharides, walnut nutshells.

References

[1] Munoz-Solano B., Lizarraga Perez E., Elena González-Penas E. Monitoring Mycotoxin Exposure in Food-Producing Animals (Cattle, Pig, Poultry, and Sheep). Toxins 2024, 16, 218.
[2] Szelenberger R., Cichon N., Zajaczkowski W., Bijak M. Application of Biosensors for the Detection of Mycotoxins for the Improvement of Food Safety Toxins 2024, 16, 249.

THE INFLUENCE OF CALVES' AGE ON THE COUNT OF RUMEN BACTERIA AND PROTOZOA

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The anatomy and physiology of the digestive system of a newborn calf and a mature ruminant are distinct. The digestive tract of a newborn calf is considered sterile, but colonization by a variety of microorganisms commences within 20 minutes and intensifies with each day of life [1]. The complex microbiota of the ruminant gastrointestinal tract affects not only the digestion of feed, but also the overall immune system, nutrient absorption, and general metabolism [2]. The present study aimed to investigate the influence of calves' age on the count of rumen bacteria and protozoa.

The eight-month study included 30 clinically healthy Lithuanian Black-and-White Holsteinized calves, aged from three to eight months. They were housed in compliance with the Calf Welfare Requirements. The calves were divided into three groups based on their age: group 1-G included 3-month-old calves, group 2-G included 3.5-month-old calves, and group 3-G included 8-month-old calves. All calves were provided with a balanced diet and had access to water ad libitum. Samples of rumen fluid were obtained from the calves in all groups using a probe. The count of Protozoa was determined in a Fuchs-Rosenthal counting chamber (Blaubrand, Wertheim, Germany) using an Olympus U-TV1X-2 microscope (Tokyo, Japan). The genera of protozoa were identified according to the method of Dehority [3]. Bacterial counts were determined in accordance with the methodologies outlined in the relevant standards: the Aerobic and Facultative Anaerobic Bacteria count according to LST ISO 4833-1:2013; the Lactic Acid Bacteria – LST ISO 15214:2009; the Enterobacteriaceae – LST ISO 21528-2:2009.

In 8-month-old calves, the total protozoa count was on average 18.6% higher if compared with those at 3 and 3.5 months of age. Among all age groups, *Entodinium* was the most dominant genus found in the rumen fluid. The population of aerobic and facultative anaerobic bacteria was on average 45.1% higher in 8-month-old calves than in the groups of younger animals. Lactic acid bacteria and anterobacteriaceae were first detected at 3.5 months of age, with their levels being 46.8% lower and 10.6% higher, respectively, compared to 8-month-old calves. The total count of Protozoa was found to be influenced by calf age to the extent of 68.4%. Furthermore, the count of five protozoa genera *Diplodinium*, *Enoploplastron*, *Entodinium*, *Isotricha* and *Opisthotrichum* were found to be influenced by calf age to the extent of 52.14%. Furthermore, the number of aerobic and facultative anaerobic bacteria was found to be influenced by calf age to the extent of 21.6%. Finally, the number of lactic acid bacteria was found to be influenced by calf age to the extent of 42.3%.

Keywords: bacteria, protozoa, rumen, calves, age.

References

[1] Arshad M. A., Hassan F. U., Rehman M. S., Huws S. A., Cheng Y., Din A.U. Gut microbiome colonization and development in neonatal ruminants: Strategies, prospects, and opportunities. Animal Nutrition. 2021, 7(3). P. 883–895.
[2] Zhang Y., Choi S. H., Nogoy K. M., Liang S. Review: The development of the gastrointestinal tract microbiota and intervention in neonatal ruminants. Animal. 2021, 15(8). 9 p.
[3] Dehority BA. Laboratory Manual for Classification and Morphology of Rumen Ciliate Protozoa. CRC Press; 2018, P. 9–99.

INTERPRETATION OF BLOOD BIOCHEMICAL TEST RESULTS IN CATTLE

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Biochemical testing of cow blood is essential for several reasons, critical to both animal health and the agricultural sector. Routine biochemical blood tests enable the early identification of various diseases, such as metabolic disorders. Early diagnosis facilitates timely intervention, reducing the spread of diseases and enhancing animal welfare. On farms, it is useful to study cows at different stages of lactation and also the cows in the transit period.

Blood tests can identify deficiencies or imbalances in essential nutrients, including minerals and vitamins (magnesium, calcium, potassium, phosphorus). This data is crucial for adjusting feed formulations to maintain optimal health and productivity [1].

Biochemical markers such as glucose, ketone bodies, and liver enzymes (GGT, GOT, GPT, ALP) provide valuable insights into the metabolic health of cows, which is especially important for high-yielding dairy cows prone to metabolic stress that can impact milk production and overall health [2].

Blood tests also evaluate the hormonal status of cows, helping in the management and improvement of reproductive performance. Identifying issues like subclinical ketosis or mineral imbalances can prevent reproductive failures and boost fertility rates.

Early disease detection and treatment lower mortality rates and production losses, yielding significant economic benefits for farmers. Regular biochemical testing ensures cow health, directly influencing milk production efficiency and profitability.

Keywords: cows, blood tests, biochemical markers.

References

[1] Maurya S., Singh O. Blood biochemical profile and nutritional status of dairy cows under field conditions. Indian Journal of Veterinary and Animal Sciences Research. 2016, 45(3). P. 205–210.

[2] Cozzi G., Ravarotto L., Gottardo F., Stefani A., Contiero B., Moro L., Brscic M., Dalvit P. Reference values for blood parameters in Holstein dairy cows: Effects of parity, stage of lactation, and season of production. Journal of Dairy Science. 2011, 94(8). P. 3895–3901.

PRECISION LIVESTOCK FARMING: CHALLENGES, OPPORTUNITIES, PROSPECTS AND ENVIRONMENTAL IMPACTS

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The effects of digitalization are most extensively recorded in the field of dairy cattle husbandry [1]. Precision livestock farming (PLF) is a noteworthy emerging technology that possesses the capacity to significantly transform the livestock farming sector, set apart from several other intriguing developments [2]. The primary objective of PLF is to enhance the efficiency and effectiveness of animal production, as well as improve the overall health and well-being of animals [3]. Smart farming, also known as PLF, has the potential to enhance animal welfare on farms, reduce greenhouse gas emissions and improve environmental performance, facilitate product segmentation and marketing of livestock products, deter illegal livestock trade, and bolster the economic stability of rural regions when implemented effectively [2]. The technologies encompassed in this list are automatic weighing systems, radio frequency identification sensors for detecting and monitoring individual animal behaviour, body temperature monitoring, geographic information systems for evaluating and optimizing pastures, unmanned aerial vehicles for managing herds, and virtual fencing for managing herds and grazing [4]with increased consumption of animal products predominately due to the advancing economies of South America and Asia. As a result, livestock production systems have expanded in size, with considerable changes to the animals' management. As grazing animals are commonly grown in herds, economic and labour constraints limit the ability of the producer to individually assess every animal. Precision Livestock Farming refers to the real-time continuous monitoring and control systems using sensors and computer algorithms for early problem detection, while simultaneously increasing producer awareness concerning individual animal needs. These technologies include automatic weighing systems, Radio Frequency Identification (RFID. The objective is to automate the management of animals on large farms through the use of algorithms and networked smart devices that continuously monitor individual animals, compare this data to expected norms, and make decisions regarding climate, nutrition, and reproduction, among other things [2].

Various techniques were employed to ascertain PLF technology. These methods encompass queries conducted on scientific literature databases, attendance at technological exhibits, and input received from peers.

Consequently, it is anticipated that PLF will enhance the efficiency of animal production, as well as improve animal health and welfare. The implementation of PLF has the potential to facilitate advancements in animal health, production, and welfare. Nevertheless, there is currently little scientific evidence to support the notion that the use of PLF has any discernible effects. It is anticipated that PLF will modify the interaction between animals and humans and will significantly influence veterinary treatment [3].

Keywords: dairy cattle; herd health; precision livestock farming.

References:

[1] Tuyttens, F.A.M.; Molento, C.F.M.; Benaissa, S. Twelve Threats of Precision Livestock Farming (PLF) for Animal Welfare. *Front. Vet. Sci.* 2022, *9*, doi:10.3389/fvets.2022.889623.

[2] Werkheiser, I. Precision Livestock Farming and Farmers' Duties to Livestock. *J. Agric. Environ. Ethics* 2018, *31*, 181–195, doi:10.1007/s10806-018-9720-0.

[3] Kleen, J.L.; Guatteo, R. Precision Livestock Farming: What Does It Contain and What Are the Perspectives? *Animals* 2023, *13*, 779, doi:10.3390/ani13050779.

[4] Tzanidakis, C.; Tzamaloukas, O.; Simitzis, P.; Panagakis, P. Precision Livestock Farming Applications (PLF) for Grazing Animals. *Agriculture* 2023, *13*, 288, doi:10.3390/agriculture13020288.

ENVIRONMENTAL IMPACT REDUCTION: STRATEGIES FOR MITIGATING ENTERIC METHANE IN DAIRY FARMING

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Rising concerns about greenhouse gas emissions from dairy farming emphasize the need for strategies to reduce methane (CH_4) emissions from cattle. Enteric CH_4, generated by rumen microbial fermentation, accounts for 35–55% of on-farm greenhouse gas emissions, with dairy production responsible for over 70% of agricultural outputs [1]. This study evaluates nutritional strategies to mitigate enteric CH_4, focusing on natural feed additives to improve nutrient utilization and lower emissions.

Certain studies propose that substituting grass silage with maize silage enhances rumen fermentation of propionate over acetate, thereby diminishing CH_4 emissions in dairy cows. When maize silage entirely supplanted grass silage in the diet of dairy cows, CH_4 emissions diminished by 8–11% [2]. Feeding cows the red seaweed *Chondrus crispus*, comprising 6% of the dry matter, resulted in a 13.9% reduction in CH_4 [3] large-scale adoption depends on technical and financial factors, as well as validation from pilot studies. </sec><sec><title>Methods</title> A survey was developed to identify barriers and drivers towards the adoption of CH₄-reducing algal-based feeds. Concurrently, a randomized complete block design study was conducted to investigate the effect of <italic>C. crispus</italic> on enteric CH₄ emissions and milk production in a typical Maine organic dairy farm. Twenty-two organically certified Holstein and Jersey cows averaging 29 ± 6.8 kg of milk/d and 150 ± 69 days in milk, were blocked and randomly assigned to a control diet without <italic>C. crispus</italic> (0CC. Cows fed daily with a 1 g blend of essential oils exhaled less CH_4 (444 ± 12.5 L/d) than cows fed a feed without the mixture (479 ± 12.5 L/d) [4]mainly in the form of methane. Essential oils are a group of plant secondary metabolites obtained from volatile fractions of plants that have been shown to exert changes in the rumen fermentation and may alter feed efficiency and to reduce methane production. The objective of this study was to investigate the effect on rumen microbial population, CH4 emissions and milking performance of a mixture of essential oils (Agolin Ruminant, Switzerland. The utilization of tannin or saponin-rich flora has become increasingly favoured for mitigating or eradicating protozoa in the rumen. Another study has shown that a commercial citrus extract diminished methane production while enhancing propionate concentration and the concentration of propionate-producing bacteria *Megasphaera elsdenii* [5]. The incorporation of 41 g of oilseed rape oil per kg of dry matter in the diet resulted in a 22.5% reduction in daily CH_4 emissions from dairy cows [6].

Incorporating specific compounds into cattle diets can reduce methane emissions, improve feed efficiency, and support animal health, offering a sustainable approach to mitigating agriculture's climate impact while maintaining farm profitability.

Keywords: methane emission, cattle, health.

References:

[1] Holtshausen, L.; Benchaar, C.; Kröbel, R.; Beauchemin, K.A. Canola Meal versus Soybean Meal as Protein Supplements in the Diets of Lactating Dairy Cows Affects the Greenhouse Gas Intensity of Milk. *Animals* 2021, *11*, 1636, doi:10.3390/ani11061636.

[2] Gastelen, S. van; Antunes-Fernandes, E.C.; Hettinga, K.A.; Klop, G.; Alferink, S.J.J.; Hendriks, W.H.; Dijkstra, J. Enteric Methane Production, Rumen Volatile Fatty Acid Concentrations, and Milk Fatty Acid Composition in Lactating Holstein-Friesian Cows Fed Grass Silage- or Corn Silage-Based Diets. *J. Dairy Sci.* 2015, *98*, 1915–1927, doi:10.3168/jds.2014-8552.

[3] Reyes, D.C.; Meredith, J.; Puro, L.; Berry, K.; Kersbergen, R.; Soder, K.J.; Quigley, C.; Donihue, M.; Cox, D.; Price, N.N.; et al. Maine Organic Dairy Producers' Receptiveness to Seaweed Supplementation and Effect of Chondrus Crispus on Enteric Methane Emissions in Lactating Cows. *Front. Vet. Sci.* 2023, *10*, doi:10.3389/fvets.2023.1153097.

[4] Bach, A.; Elcoso, G.; Escartín, M.; Spengler, K.; Jouve, A. Modulation of Milking Performance, Methane Emissions, and Rumen Microbiome on Dairy Cows by Dietary Supplementation of a Blend of Essential Oils. *animal* 2023, *17*, 100825, doi:10.1016/j.animal.2023.100825.

[5] Seradj, A.R.; Abecia, L.; Crespo, J.; Villalba, D.; Fondevila, M.; Balcells, J. The Effect of Bioflavex® and Its Pure Flavonoid Components on *in Vitro* Fermentation Parameters and Methane Production in Rumen Fluid from Steers given High Concentrate Diets. *Anim. Feed Sci. Technol.* **2014**, *197*, 85–91, doi:10.1016/j.anifeedsci.2014.08.013.

[6] Chagas, J.C.; Ramin, M.; Exposito, R.G.; Smidt, H.; Krizsan, S.J. Effect of a Low-Methane Diet on Performance and Microbiome in Lactating Dairy Cows Accounting for Individual Pre-Trial Methane Emissions. *Animals* 2021, *11*, 2597, doi:10.3390/ani11092597.

RISK FACTORS DURING PREPARTUM AND THEIR EFFECT ON CALF HEALTH

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Prepartum period has a lot of influence on the health and production of both the cow and the calf. A number of environmental and nutritional factors have a part to play in the metabolic status of the dam, its immune system response, and colostrum quality, which in turn will influence health parameters of the offspring.

One of the main environmental factors, increasing in importance and severity nowadays, would be heat stress that a preparturient dam experiences. A number of scientific papers show that this factor not only has a sudden and severe effect on the cow and reduces the newborns weight and health status but might also have a long-term effect on the future productivity of the offspring.

Nutrition and the metabolic status of the cow during prepartum influences the metabolism of the cow for the upcoming lactation and the health status of the calf. Fatty acid synthesis, quality and quantity modifies certain pathways responsible for the immune response, biosynthesis in the liver and on the mammary gland, especially for the production of the colostrum. A dam, with a compromised metabolism, usually will have an imbalance of fatty acids, which will also be mirrored in the colostrum quality. Not only might the colostrum quality have an impact on the health status of the calf, but the offspring's metabolism is already at risk of being affected in the uterus during development.

Therefore, the prepartum period should be further closely studied and better prophylaxis and wellbeing for the dams should be provided in order to ensure a better health status not only for the cow, but for the ofspring as well. In doing so, future generations of cattle have a better chance of reaching their predisposed potential and the animals have a better chance of surviving for more lactations.

Keywords: offspring, prepartum, metabolism, risk factors, colostrum, heat stress.

References:

[1] Monteiro APA, Tao S, Thompson IMT, Dahl GE. In utero heat stress decreases calf survival and performance through the first lactation. J Dairy Sci. 2016 Oct;99(10):8443–50.
[2] De Koster JD, Opsomer G. Insulin Resistance in Dairy Cows. Veterinary Clinics of North America: Food Animal Practice. 2013 Jul;29(2):299–322
[3] Ling T, Hernandez-Jover M, Sordillo LM, Abuelo A. Maternal late-gestation metabolic stress is associated with changes in immune and metabolic responses of dairy calves. J Dairy Sci. 2018 Jul;101(7):6568–80
[4] Abuelo A. Symposium review: Late-gestation maternal factors affecting the health and development of dairy calves. J Dairy Sci. 2020 Apr;103(4):3882–93
[5] Godden SM, Lombard JE, Woolums AR. Colostrum Management for Dairy Calves. Veterinary Clinics of North America: Food Animal Practice. 2019 Nov;35(3):535–56