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THE PRESIDENT'S MESSAGE

Reaching Out

This fall, the University of Minnesota College of Veterinary Medicine set a new record, receiving 1,489 applications (for 104 spots) from students wanting to pursue a career as a veterinarian. As a member of our admissions committee, I spent several days reading approximately 100 of these applications. I came away with three general impressions of the applicants:

- A majority were mature, highly motivated and talented, with an impressive array of experiences
- A majority demonstrated ample ability and willingness to work hard
- The vast majority had no exposure to, or stated interest in, food animal medicine

The latter observation should be of no surprise, given that only 14% and 17.8% of the U.S. and Canadian populations, respectively, live in rural areas, and given that farm and ranch families comprise less than 2% of both U.S. and Canadian populations. But does this mean that we are restricted to this tiny pool when recruiting future food animal veterinarians? There is ample evidence to the contrary. Sure, many present-day bovine vets were raised on a farm/ranch and/or had a veterinarian parent. Myself? I was raised on a dairy farm where my dad taught me to drive a tractor and work with cattle, and my mom taught me a love of biological systems and the value of an education. I was extremely lucky to be mentored by our herd veterinarian, Dr. Ewen Ferguson (AABP Bovine Practitioner of the Year, 2000), along with several other accomplished veterinarians. In high school, I was involved with the local 4-H veterinary club managed by a local veterinarian, and I participated in a high school co-op program that allowed me to walk over the bridge once per week to spend an afternoon at the clinic. Arguably, I was on a logical track to be inspired to become a food animal veterinarian.

Having this traditional background is not essential, however. Indeed, many of AABP's finest come from non-traditional backgrounds. Dairy veterinarians Paul Rapnicki, Gordie Jones and Steve Eicker grew up in Detroit. Don Niles and David Reid grew up in Milwaukee and Rhode Island, respectively. What factors turned these dazzling urbanites to bovine medicine? And in



knowing that, can our profession strengthen opportunities to entice more non-traditional or underrepresented folks to consider a career in bovine medicine?

With a view to answering some of these questions, I recently completed an informal survey of four AABP members who come from non-traditional backgrounds. I asked about their upbringing, when/how they first considered bovine medicine, and any unique challenges they faced. They were also asked their thoughts on words of advice for veterinary students and for practicing veterinarians. This unscientific convenience sample was intended to represent both women and men with a range of years in the profession, and includes:

- Dr. Bom Harris, Virginia Tech 2008. Old Dominion Veterinary Services, Ruther Glen, Va.
- Dr. Dayna Locitzer, Cornell 2020. Green Mountain Bovine Clinic, West Chesterfield, N.H.
- Dr. Blaine Melody, Wisconsin 2017. Lander Veterinary Clinic, Turlock, Calif.
- Dr. Bill Wavrin, Minnesota 1985. Sunny Dene Ranch, LLC, Mabton, Wash.

These individuals each have fascinating stories to tell, so much so that I cannot do them justice in this brief letter. However, if I had to summarize some of the major points it would be to say:

- These individuals have all succeeded greatly, despite having a non-traditional background.

- Without exception, they had the work ethic, tenacity and wisdom to learn about farm systems and the practice of bovine medicine, even if many of their more “traditional” classmates had a head start.
- They each stressed the importance of having mentors who inspired, trained and encouraged them, whether in high school, undergraduate or veterinary college, or their early years in practice.

If you have a few minutes to spare, I encourage you to grab a coffee and read their personal stories in this newsletter insert, or you can find them at (https://aabp.org/resources/2023/godden_vet_stories.pdf). If you are a practicing veterinarian, please read these stories with a view to being reminded that smart, ambitious young people can overcome many challenges, regardless of their origins, when given appropriate opportunities and encouragement. I urge you also to consider whether there are opportunities for your practice to step up its involvement to inspire youth in your own community, whether they be from traditional or nontraditional backgrounds. Examples could include involvement with 4-H clubs, high school co-op or internship programs, or collegiate internship or mentorship programs, among others. And if you are a veterinary student, I would encourage you to read these vignettes and consider that, regardless of your background, you must develop a deep understanding of the industries and farm systems you will strive to serve, and also that you must take the initiative to seek out training and mentoring opportunities outside of the classroom.

In summary, recruiting should ideally begin at a younger age, and we should keep an open mind as to where we recruit from, since students from non-traditional or underrepresented backgrounds can be equally successful as those from traditional backgrounds. The health of our profession is made stronger by diversity, one aspect of which is our origins.

Thanks for all you do, and take good care of yourself.

Dr. Sandra Godden

SAVE THE DATE!

American Association of Bovine Practitioners Annual Conference

2023	Milwaukee, Wisconsin	September 21-23
2024	Columbus, Ohio	September 12-14
2025	Omaha, Nebraska	September 11-13

AABP Recent Graduate Conference

2023	Knoxville, Tennessee	February 10-11
2024	Knoxville, Tennessee	February 9-10

DISCLAIMER

The AABP does not take responsibility for information contained in or accuracy of the abstracts published in this newsletter.

ACTIVITIES AND ADVOCACY

The following are activities AABP leadership has been involved in for the benefit of members and the industry:

- AVMA House of Delegates and Veterinary Leadership Conference, Chicago, Ill. – Delegate Dr. Hunter Lang, AABP Emerging Leader Dr. Nicholas Shen, Executive Director
- Arkansas Senate Ag, Forestry and Economic Development Committee Hearing, Little Rock, Ark. – Executive Director
- AVMA Pentobarbital Residues in Rendered Products Working Group, Schaumburg, Ill. – Executive Director
- NCBA Convention, New Orleans, La. – President, Executive Director

AABP NEWS

The Bovine Practitioner, Volume 56, No.2 Now Available Online

Peer-reviewed papers selected for *The Bovine Practitioner*, Volume 56, No.2, are now available online. Visit <https://aabp.org> and under the Publications tab, click on *The Bovine Practitioner*. The publication is searchable as well as open-access.

Under the Publications tab you can also find conference proceedings, *Have You Herd?* podcasts, monthly newsletters, e-newsletters, author guidelines and newsletter abstracts.

Call for AABP Reviewers

Are you interested in serving as a peer reviewer for *The Bovine Practitioner* and research grants for the AABP Foundation? One challenge in managing a peer-reviewed journal is finding reviewers to assist in ensuring the scientific integrity of articles that are published. Research grants that are submitted to the AABP Foundation are also sent out for review to ensure that the research supported by the Foundation has scientific merit and is clinically applicable to practicing beef and dairy veterinarians.

Please consider signing up to be a reviewer by going to the online publication site for *The Bovine Practitioner* by going to the Publications tab of the website or at <https://bovine-ojs-tamu.tdl.org/bovine/login>, and click on

the register link in the top right corner. When you register, you can sign up to be a reviewer but must list your areas of interest and expertise. You do not need academic credentials beyond a veterinary degree to serve as a reviewer! Please sign up so that our associate editors and Foundation Board has a list to select from to assist our organization with publication of journal articles and research projects.

Recorded Sessions from 2022 AABP Annual Conference Now Available

AABP membership includes free access to all recorded sessions from the annual conferences, recent graduate conferences and webinars. To access, click on the purple cow head logo at the bottom of any AABP webpage or at https://aabp.org/members/cont_ed.asp. Members can also listen to presentations on their mobile device by downloading the free “BCI Mobile Conference” app from your device’s app store. RACE-approved CE certificates are available after viewing on a web browser and passing a quiz. Note that certified CE is not available through the app. Search for conferences or session tracks using the search feature or set conference location to “webinar” to find recorded webinars. View upcoming webinars at the Members tab on the website and add them to your calendar.

AABP would like to thank the partnership with the Kansas State University Beef Cattle Institute, Dr. Brad White, and the Kansas State University students for assisting with the recordings and hosting the CE portal for AABP members.

Student Case Presentation Competition AABP 56th Annual Conference

The AABP Program Committee seeks abstract submissions for the 2023 Student Research/Clinical Case Presentation Competition to be held Thursday, September 21, 2023 at the 56th AABP Annual Conference in Milwaukee, Wis.

Submit cases online at <https://aabp.org/students/case/default.asp> by **April 14, 2023, 5:00 pm EST**.

For a category involving four or fewer entries, one award of \$1,500 will be provided. For a category involving five or more entries, a first-place award of \$1,500 and a second-place award of \$750 will be presented.

Contact your AABP faculty representative for more information and for assistance in preparing your abstract. Contact Dr. Tracy Potter (tlpotter62@gmail.com) or Dr. Fred Gingrich (fred@aabp.org) for questions.

Call For AABP and AASRP Research Summaries Abstracts 56th AABP Annual Conference

The 56th AABP Annual Conference will feature scientific sessions focused on cutting-edge research that is directly applicable to the health, welfare and productivity of cattle and small ruminants.

Oral presentations made by graduate students in the AABP Research Summaries will be eligible to compete in the AABP Graduate Student Research Summary Presentation competition. The top three presenters from the graduate student competition will receive cash awards.

Abstracts must be submitted electronically by **April 14, 2023 by 5:00 pm EST**. The abstract submission portal opens Jan. 2, 2023, and will be available at aabp.org. Select the Conference link at the top of the page, then click on the Abstract Submission link located in the submenu.

For questions on AABP abstracts, contact Dr. Whitney Knauer (knaue20@umn.edu), Dr. Jared Bourek (jbourek@gmail.com) or Dr. Fred Gingrich (fred@aabp.org). For questions on AASRP abstracts, contact Dr. Clare Scully (cscully@lsu.edu).

AABP Beef Cow Nutrition Seminar

Are you a cow-calf veterinarian interested in offering nutrition consulting services to your clients? Do you have challenges attending CE meetings during calving or preg check season? Do you want to come to AABP seminars not associated with the annual or recent graduate conference? If you answered YES, then AABP is offering a seminar for you!

Feed cost makes up over 50% of the total cost of keeping a beef cow and many producers could use assistance in allocating those resources wisely. Unlike their dairy counterparts, beef cow-calf producers spend a small amount of their feed dollars off farm as much of their feed is raised. Because of this, many beef producers do not utilize the services of a nutritionist. This is where you fit in.

We will discuss the basics of beef cow-calf nutrition and outline how you can get paid for your advice. We will spend about half of a day in lecture/discussion mode and a full day will be spent working with the BRaNDs beef cow nutrition program from Iowa State. You will need a computer with Microsoft Excel to run the BRaNDs program. We expect that the day you return to practice you will be ready to consult with your first client to help them save money on their winter ration AND provide improved nutrition for their herd.

The seminar faculty are Dr. Mark Hilton and Dr. Sara Linneen. These instructors have experience in providing nutrition consulting to cow-calf producers and are eager to teach you how to immediately incorporate this service into your practice. The seminar will be June 22-23, 2023 at the

AABP office in Ashland, Ohio. Registration is limited to 20 AABP members and is now open.

To register and find out more information, visit https://aabp.org/seminars/display_seminar.asp?seminar=2023-BEEF.

AABP COMMITTEE REPORTS

Meaningful Relationships are Important

Last month in her President's Message, Dr. Godden shared some excellent information regarding the importance of having meaningful relationships in our lives. Family and friends are important. As I read her article, I recalled that Dr. Jim Thomas reported that many recent graduates working in bovine practice experience feelings of isolation, burnout and overwhelming stress. Too many of them leave bovine practice. His findings were the subject of an AABP webinar on December 14. Following the webinar, I sent a summary of it out on AABP-L. That summary sparked a lot of exchange of opinions.



I encourage all of us to be caring of ourselves and of others. If you are a practice owner, take time to know every member of your staff. Look for opportunities to relieve stress. This could come in the form of a flexible schedule, a better practice vehicle, or upgraded office space. Show interest in them as people. Provide positive feedback whenever possible. I was fortunate to have these things provided in my first job right out of veterinary school 50 years ago. I later learned that many of my classmates did not fare so well.

If you are the one feeling the isolation, stress and burnout, take advantage of the resources Dr. Godden mentioned. These include mentors available through AABP, plus virtual support groups. More resources are listed on the AABP website at https://www.aabp.org/task_force/task_force_resources.aspx.

Talk to a colleague, friend, family member or pastor. Don't try to tough it out alone.

*Submitted by Dr. Charlie Gardner,
AABP Mental Health Task Force*

GENERAL INFORMATION

Food Armor® Training

The next in-person Food Armor® training will be March 10-11, 202, at Hotel Indigo, Madison, Wis. This program is approved for 11 CE credits. Any veterinary student or

recent graduate (15 years or less) qualifies for a paid travel stipend (\$375 for those traveling by car or \$650 for those who fly) upon completion of the training. Rooms are \$189/night in a block reserved under Food Armor, on a first-come basis. Rooms must be reserved by February 9 to get the reduced rate. In-person training includes a 12-month subscription to the Food Armor Online Courses. For more information visit <http://www.foodarmor.org/home-ascent/grant-supported-food-armor-training-opportunity/>.

Two Upcoming AABP Webinars

Postpartum Uterine Health in Dairy Cows

Friday, Feb. 17, 2:00-3:00 pm Central

Dr. Stephen LeBlanc will present data on the pathogenesis, diagnosis and treatment of postpartum uterine disease in dairy cows: metritis, purulent vaginal discharge and endometritis. Attendees will learn about recent research on how and why dairy cows develop metritis and endometritis, and use this to develop rational monitoring and treatment programs with their clients.

Join the webinar at

<https://us06web.zoom.us/j/89437017092?pwd=TUhzEczOEJMVG9ONUxwV2lrZzlrUT09>; use access code 560297.

Vaccination to Prevent Respiratory Disease in Calves

Dr. Amelia Woolums

Wednesday, March 15, 2:00-3:00pm Central

In the first six months of the life of a calf, respiratory disease is either the #1 or #2 most common cause of sickness, depending on the calf's exact age. Historically, it was thought that vaccination couldn't be useful to prevent disease in calves in this age group, because maternal antibodies would suppress vaccine responses. However, research supports the concept that calves with maternal antibody can be vaccinated effectively in the first six months of life, although various factors impact the degree and duration of this protection. In this webinar, we'll discuss the evidence for efficacy of vaccination to prevent respiratory disease in young calves, the factors that impact how well respiratory vaccination works in this age group, and the things we still don't understand very well when it comes to the practice of vaccinating calves to prevent respiratory disease.

Join the webinar at

<https://us06web.zoom.us/j/84110115899?pwd=anZYVt5Q53djaU1hSG8xQzRSRm5LZz09>; use access code 505791.

AABP members can find all upcoming webinars at <https://aabp.org>, select the Members tab, then click on Webinars. To view previous webinars, click on the purple cow head logo at the bottom of any AABP webpage, and under the Conference Location dropdown menu, scroll down and select Webinar, then click Search.

Evaluation of Growth Performance, Carcass Characteristics, and Methane and CO₂ Emissions of Growing and Finishing Cattle Raised in Extensive or Partial-intensive Cow-Calf Production Systems

Z. Carlson*, L. McPhillips, R. Stowell, G. Erickson, M. Drewnoski, J. MacDonald

An experiment was conducted over 2 yr to measure performance and greenhouse gas (GHG) emissions of weaned calves from two cow-calf production systems. Crossbred steers and heifers ($n = 270$, initial body weight (BW) = 207 kg, SD = 35) were used in a randomized complete block design, with treatments applied to the cow-calf system. Treatments were: 1) a traditional system consisting of April to June calving with smooth bromegrass pasture and grazed corn residue as forage resources (TRAD); 2) an alternative system consisting of July to September calving utilizing partial-drylot feeding, summer-planted oats, and corn residue grazing (ALT). Calves from both production systems were weaned at the same age and grown (diet NEg = 1.05 Mcal kg⁻¹) for approximately 117 d. The calves then transitioned to a high-grain finishing diet (year 1: NEg = 1.32 Mcal kg⁻¹; year 2: NEg = 1.39 Mcal kg⁻¹) and fed to a targeted 1.52 cm backfat. Growth performance in the grower phase resulted in greater ($P < 0.01$) average daily gain (1.39 vs. 1.22 ± 0.02 kg), greater gain:feed ($P < 0.01$; 0.157 vs. 0.137 ± 0.003) for ALT calves compared to TRAD calves. However, a lower initial BW ($P < 0.01$; 185 vs. 229 ± 4.9 kg) resulted in a lower ending BW ($P < 0.01$; 347 vs. 371 ± 2.9 kg) for ALT calves compared to TRAD calves in spite of improved growth performance. In the finisher phase, ALT calves gained less (1.52 vs. 1.81 ± 0.218 kg; $P = 0.02$), were less efficient (0.139 vs. 173 ± 0.0151; $P = 0.01$) but exhibited similar hot carcass weights (HCW) (388 vs. 381 ± 3.8 kg; $P = 0.14$) compared to TRAD calves. Each pen of calves was put into a large pen-scale chamber that continuously measured carbon dioxide (CO₂) and methane (CH₄) for 5 d during the grower and finisher phases. The average CH₄ and CO₂ production per unit of feed intake was used to calculate total GHG emissions over the entire grower and finisher phase. Overall, there were no differences ($P \geq 0.17$) between treatments for CH₄ per day and per kilogram dry matter intake (DMI). However, ALT calves tended to produce less ($P \leq 0.10$) CO₂ per day and per kilogram DMI than TRAD calves. Overall, methane emissions were greater in ALT calves (110.7 vs. 92.2 ± 8.3 g CH₄ kg⁻¹ HCW; $P = 0.04$) than TRAD calves. The ALT calves required 27 additional days on feed to market, which resulted in more total CH₄ per animal across the entire

feeding period ($P = 0.02$) than TRAD calves. Production systems that reduce days to market to achieve similar HCW may reduce GHG emissions.

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Submitted by the AABP Beef Health Management Committee

A Review Of The Effect Of Nutrient And Energy Restriction During Late Gestation On Beef Cattle Offspring Growth And Development

N. Waldon*, K. Nickles, A. Parker, K. Swanson, A. Relling

Changes in the environment, including nutritional changes, can influence fetal and postnatal development of the offspring, which can result in differences in growth, metabolism, reproduction, and health later in life. In beef cattle research on energy and protein restriction during late gestation appears to be contradictory. Therefore, in this review, we will examine the nutrient requirements recommended for this period. We are summarizing contradictory data on effects on offspring performance with possible explanations of the reason for why the data seems contradictory. We will finish by discussing some areas that we consider important for further research to increase the knowledge on how maternal nutrition influences offspring development. In particular, suggestions are provided on the need for more accurately measuring nutrient and energy supply and use and the impact on subsequent epigenetic effects. This will improve understanding of nutritional effects during gestation on offspring performance.

* Department of Animal Science, The Ohio State University, Wooster, OH 44691

Submitted by the AABP Beef Health Management Committee

A Randomised Control Trial to Evaluate the Effectiveness of a Commercial Vaccine for Pinkeye in Australian Beef Cattle

M. Kneipp*, A. Green, M. Govendir, M. Laurence, N. Dhand

Pinkeye (a generic term to describe infectious bovine keratoconjunctivitis) is a significant disease of cattle

worldwide, impacting productivity and animal welfare. One commercial pinkeye vaccine, a systematically administered *Moraxella bovis* bacterin, has been available in Australia since 2007. This is the first field trial of the effectiveness of this vaccine for the prevention of naturally occurring disease in Australia. Extensively run beef herds in southwest Queensland that regularly experienced pinkeye were enrolled in the trial and animals were randomly allocated to vaccinated and control groups in different proportions in each herd. The subsequent incidence of clinical pinkeye between the two groups was compared for animals less than one-year-old. Data were analysed from 649 cattle from five herds over two pinkeye seasons: three herds of 390 calves from 1st November 2019 to 20th January 2020 and two herds of 259 calves from 23rd September 2020 to 21st April 2021. Pinkeye was common with 24% of all calves (156/649) contracting the disease during the trial. Univariable and multivariable binary logistic mixed-effect models were fitted to account for clustered data and potential residual confounding due to sex, weight, breed, coat colour, and periocular pigmentation. The incidence of pinkeye was not significantly different between vaccinated and control groups, both alone ($p = 0.67$) and after adjusting for sex and weight differences ($p = 0.69$). The vaccine was not protective against naturally occurring pinkeye under the field conditions.

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GENERAL INTEREST

J Vet Diagn Invest January 2023
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Sources of Variance in the Results of a Commercial Bovine Immunoglobulin G Radial Immunodiffusion Assay

A. Thompson*, R. Wills, D. Smith

Radial immunodiffusion (RID) is used to quantify IgG concentration in neonatal beef or dairy calf serum; variability has been noted that may affect the precision and accuracy of assay results. We determined the source, range, and homogeneity of variance in the results of a commercial bovine IgG RID assay (Triple J Farm). To estimate the variance in the precipitin ring diameter, we used 6 sera, measured 28 times across 8 plates and 4 lots, and 3 standards with known IgG concentrations, measured 75 times across 69 plates and 5 lots. The source of diameter variance was determined using variance partition coefficients for lot, plate, and repetition. We used 11 different methods to generate standard curves to convert RID precipitin ring diameters to IgG concentrations. The Levene test of homogeneity of variance ($\alpha = 0.1$) was used

to evaluate the equality of variance between the standards or serum precipitin ring diameters and calculated IgG concentrations. Lot and plate contributed minimally to the diameter variance. Precipitin ring diameters had equal variance. Calculated IgG concentrations for serum not requiring dilution had equal variance. A linear equation from aggregated standards, performed within the same day, had greater accuracy for the calculated IgG concentrations of the standards compared to other equation methods. Regardless of standard curve methodology or IgG concentration, variability inherent to the assay limits its clinical usefulness.

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DAIRY

J Dairy Sci December 2022
<https://doi.org/10.3168/jds.2022-22205>

Changes in Genetic Trends in U.S. Dairy Cattle Since the Implementation of Genomic Selection

F. Guinan*, G. Wiggans, H. Norman, J. Dürr, J. Cole, C. Van Tassell, I. Misztal, D. Lourenco

Genomic selection increases accuracy and decreases generation interval, accelerating genetic changes in populations. Assumptions of genetic improvement must be addressed to quantify the magnitude and direction of change. Genetic trends of US dairy cattle breeds were examined to determine the genetic gain since the implementation of genomic evaluations in 2009. Inbreeding levels and generation intervals were also investigated. Breeds included Ayrshire, Brown Swiss, Guernsey, Holstein (HO), and Jersey (JE), which were characterized by the evaluation breed the animal received. Mean genomic predicted breeding values (PBV) were analyzed per year to calculate genetic trends for bulls and cows. The data set contained 154,008 bulls and 33,022,242 cows born since 1975. Breakpoints were estimated using linear regression, and nonlinear regression was used to fit the piecewise model for the small sample number in some years. Generation intervals and inbreeding levels were also investigated since 1975. Milk, fat, and protein yields, somatic cell score, productive life, daughter pregnancy rate, and livability PBV were documented. In 2017, 100% of bulls in this data set were genotyped. The percentage of genotyped cows has increased 23 percentage points since 2010. Overall, production traits have increased steadily over time, as expected. The HO and JE breeds have benefited most from genomics, with up to 192% increase in genetic gain since 2009. Due to the low number of observations, trends for Ayrshire, Brown Swiss, and

Guernsey are difficult to infer from. Trends in fertility are most substantial; particularly, most breeds are trending downwards and daughter pregnancy rate for JE has been decreasing steadily since 1975 for bulls and cows. Levels of genomic inbreeding are increasing in HO bulls and cows. In 2017, genomic inbreeding levels were 12.7% for bulls and 7.9% for cows. A suggestion to control this is to include the genomic inbreeding coefficient with a negative weight to the selection index of bulls with high future genomic inbreeding levels. For sires of bulls, the current generation intervals are 2.2 yr in HO, 3.2 in JE, 4.4 in Brown Swiss, 5.1 in Ayrshire, and 4.3 in Guernsey. The number of colored breed bulls in the United States is currently at an extremely low level, and this number will only increase with a market incentive or additional breed association involvement. Increased education and extension could be beneficial to increase knowledge about inbreeding levels, use of genomics and genetic improvement, and genetic diversity in the genomic selection era.

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Submitted by the AABP Genetics and Genomics Committee

Vet Clin Path
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December 2022

Hematologic Profiles and Development of Innate Immune Function in Healthy Holstein Calves During the Pre-weaning Period

L. Morita*, C. Martin, K. Da Silva, A. Woolums, D. Hurley, V. Gomes

The development and state of innate immune cell function during the first 90 days of life in dairy calves have not been fully described. This transversal study attempted to examine the changes that occur in circulating blood cells and the innate immune response in healthy calves from birth to 89 days of age. Healthy Holstein calves represent three windows of development, G1 from 1 to 7 days old (n = 26), G2 from 30 to 40 days old (n = 28), and G3 from 60 to 89 days old (n = 36) were sampled once each from a single herd. A few biomarkers of the general health and innate and inflammatory immune responses were measured. The youngest calves had the lowest red blood cell (RBC) counts, cell hemoglobin concentration means (CHCMs), red cell distribution widths (RDWs), and cell hemoglobin contents of mature red blood cells (CHm) compared with the other groups. They also had the lowest iron concentrations and highest intracellular myeloperoxidase indices. However, white blood cell (WBC) and lymphocyte concentrations gradually increased from G1 to G3. G2 calves had the lowest serum protein concentrations and highest number of innate immune cells compared with the other groups. Calves were able to

mount phagocytic and ROS responses from birth. The physiologic responses of circulating blood cells and innate immune responses in dairy calves are shown according to age. Neonates had limitations in several RBC and WBC indices and immunologic responses that would likely impact overall vigor and health. Fortunately, these limitations resolve by 90 days of age.

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January 2023

Dynamics of Metabolic Characteristics in Dairy Cows and Their Impact on Disease-free Survival Time

J. Reyes*, E. Walleser, A. Sawalski, K. Anklam, D. Döpfer

Dairy cows are at a greater risk of disease due to increased energy demand during the transition period. Blood biomarkers including beta-hydroxybutyrate (BHBA)¹ and non-esterified fatty acids (NEFA)² are routinely used to identify animals in a state of negative energy balance (NEB)³. Recent research demonstrates cattle have varied response to NEB, that requires multiple blood biomarkers to characterize. This research identified five subcategories (cowtypes) of metabolic responses in transition dairy cows: Healthy, Athlete, Clever, Hyperketonemia, and Poor Metabolic Adaptation Syndrome (PMAS)⁴. The data set used in this study was collected in Germany by VIT - Vereinigte Informationssysteme Tierhaltung w.V. from 2016 to 2020. Health issues with time of diagnostic were included in the dataset. Using previously reported prediction models for blood BHB and blood NEFA and milk Fourier-transform infrared spectroscopy (FTIR)⁵ data, the cowtypes in our dataset were predicted. The objective of this study is to evaluate the association of the cowtypes with the disease-free survival time in dairy cows during early post calving using an accelerated failure time regression model. Additionally, transition probabilities of the population dynamics between cowtypes are studied by means of a Markov chain model. Using Healthy cowtype as reference level, Athlete, Clever, and PMAS cowtypes were found to be significant for the disease-free survival probability (P < 0.01). Conversely, Hyperketonemia cowtype was not significant (P = 0.182). Compared to the Healthy cowtype, all other cowtypes had a negative effect on the survival probabilities, which was higher for PMAS cows. Furthermore, after computing the estimated population transition probabilities among cowtypes, the stationary distribution of the Markov chain, along with bootstrap confidence intervals were computed. The results showed 0.091 (95% CI:0.089,0.092), 0.077 (95% CI:0.074,0.078), 0.684 (95% CI:0.067,0.069), 0.138 (95%

CI:0.136,0.139), and 0.009 (95% CI:0.008,0.010) of probability of being in Healthy, Athlete, Clever, Hyperketonemia, and PMAS cowtype, respectively. These estimates represent the proportion of cows belonging to the different cowtypes in a herd; information which may prove useful for herd management. The application of blood biomarker predictions using milk FTIR allows us to investigate differences between predicted cowtype and

movements between these states and the association with time to disease. Further research will improve our understanding of the dynamic nature of the transition period.

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