



Newsletter

AMERICAN ASSOCIATION OF BOVINE PRACTITIONERS

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THE PRESIDENT'S MESSAGE

PawPaw Looks at Pain Management

Growing up in rural Texas, the only men I knew who were affectionately called "PawPaw" by their grandchildren were ancient-looking and stooped. When my oldest daughter, Dr. Meg Nguyen, was pregnant with her first child (and my first grandchild), she asked what I wanted to be called by my grandchildren. I said, "Anything but PawPaw, that would make me feel really old." Of course, that sealed the deal and all five of my grandchildren call me "PawPaw". After a short period of adjustment, I find great delight in the sound of it.

As I look back on my veterinary career spanning almost four decades, the evolution of pain management perceptions and practices has been the most dramatic change to occur in our profession. During one recent professional exchange, it was insinuated that there might be "generational differences" in how cattle veterinarians perceive and implement pain management protocols.

Pain management concerns and policies are rapidly evolving. Speaking for my generation, I do not recall a single lecture or discussion on pain management in livestock during veterinary school. Appropriate anesthesia for surgery and nerve blocks for dehorning and other minor procedures were addressed, but no mention of post-operative pain management or pain mitigation for routine farm/ranch surgical procedures was mentioned. Even in small animal medicine, I do not recall any discussion on post-operative pain management for spays and neuters. The accepted practice at that time was to do a good job with anesthesia when performing spays and neuters, put them in a cage overnight, and send them home the next day. Sometime between 1980, when I graduated from veterinary school, and 1995, when my wife graduated from veterinary school, pain management protocols for all painful procedures in small animals became the Standard of Care.

Several statements and guidelines, focused on pain management in cattle, have either been approved recently by the AABP Board of Directors (BOD) or are currently being discussed and revised. In March 2014, the AABP BOD approved the *Castration and Dehorning Guidelines* document which included the following statement: "All mechanical and chemical methods of dehorning and

methods of castration are painful, and calves benefit from both the mitigation of the pain associated with the procedure itself and during the recovery and healing period." Currently, this document is being revised and divided into separate documents for castration and dehorning, respectively.

On April 1, 2019, the AABP BOD met by conference call and approved the following statement which was sent as a letter to the National Milk Producers Federation (NMPF) FARM technical writing group on pain management during dehorning/disbudding of dairy calves:



"As reflected by the AABP's dehorning guidelines, we recommend that pain management be considered the Standard of Care during all disbudding and dehorning procedures."

"The prevention and relief of animal suffering" is a core component of the Veterinarian's Oath

we all took to become licensed veterinarians. The word "companion" is not inserted in front of "animal suffering" in this statement.

A focus on prevention of animal suffering goes far beyond product administration. Practical, systems-based approaches are needed to prevent pain and stress in unique production environments. Prescriptive requirements for administration of pain medications without addressing the underlying factors contributing to pain and distress would not ultimately benefit the animals under our care. Genetic selection to remove horns in dairy cattle is long overdue. Likewise, the failure to castrate beef calves (other than those destined for reproduction) very early in life is inexcusable. Pain management, like bovine respiratory disease management, should not be synonymous with the use of pharmaceutical products. These products are a tool, but not the only tools available for pain and distress mitigation.

From my perspective as an age-advantaged beef veterinarian and lifelong rancher, I have some concerns about the logistics for practically mitigating the pain of

castration in certain scenarios, such as extensively managed cow-calf operations. In a large, well-managed cow-calf operation with a relatively short controlled breeding season (60 days) and calves worked one time prior to weaning, how does pain control get implemented without increasing the stress associated with handling (both longer handling times for the castration procedure and potentially an extra handling to administer a pre-operative pain management product)? What is the difference in stress level between restraining a dairy calf managed in an intensive housing environment versus a beef calf raised in an extensive, pasture or range environment? What about increased heat stress if the herd time in the corral is increased? We generally strive to have all herd work completed before noon (or earlier) from May through September because of the heat.

Unfortunately, in many areas of the country, a large percentage of male beef calves arriving at auction market facilities are intact. These bull calves will then be castrated at the next phase of production. We need systems-based solutions for this and other examples to effectively manage pain.

Requirements from large industry stakeholders, such as McDonalds and Costco, will drive future behaviors regarding pain mitigation practices in livestock. Are we up to the challenge to change, to teach and to lead this evolution in farm animal pain management? I'm confident that through the leadership provided by the American Association of Bovine Practitioners and other livestock veterinary organizations, we can be a positive force in this evolution.

When a sharp instrument is used or constricting band applied, pain management is needed. This will become the Standard of Care for both the dairy and beef industries. As bovine veterinarians, we need to have more conversations with colleagues and clients regarding implementation of farm/ranch pain management protocols.

If PawPaw can evolve, teach others and help lead change, YOU can too!

Dr. Glenn Rogers

FUTURE MEETINGS

American Association of Bovine Practitioners

| | | |
|-------------|------------------|--------------------------|
| 2019 | St. Louis | September 12 – 14 |
| 2020 | Louisville | September 24 – 26 |
| 2021 | Minneapolis | September 23 – 25 |
| 2022 | Long Beach | September 22 – 24 |
| 2023 | Milwaukee | September 21 – 23 |
| 2024 | Columbus | September 12 – 14 |

| | | |
|------|--|----------------|
| | AABP Recent Veterinary Grad Conference | |
| 2020 | Columbus | February 20-22 |

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|------|---------------------------------|-------------------|
| | World Association for Buiatrics | |
| 2020 | Madrid, Spain | September 13 – 18 |

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:

- AVC meeting, Omaha, Neb. – Executive Director, President
- Ohio State Food Animal Medicine Student Symposium, Columbus, Ohio – President
- Texas A&M Ruminant Health Class and AABP Student Chapter, College Station, Texas – President
- Dairy Industry Crisis Drill, Indianapolis, Ind. – Executive Director



AABP NEWS

52nd AABP Annual Conference Registration Opens This Week!

Registration for the 2019 52nd AABP Annual Conference in St. Louis, Mo., opens this week and can be accessed online at <https://aabp.org/meeting/register.asp>. This year's conference will be held September 12-14 with Preconference Seminars available Sept. 8-11.

Sessions for cow-calf, feedlot and dairy will be held in addition to practice management, practice tips, clinical skills, Clinical Forums, American Association of Small Ruminant Practitioners and National Mastitis Council sessions, and sessions for students and new graduates. A large exhibit hall, tours, entertainment, meals and the 7th 5K Stampede Fun Run will also be featured.

You can view 2019 Preconference Seminars, Scientific Sessions, events, the registration page and other conference information by visiting <https://aabp.org> and clicking on the Conference tab.

Renew your AABP Dues!

AABP members are invited to renew their dues for 2019-2020. Membership in AABP will expire June 30, 2019. You can pay securely online at <https://aabp.org/dues/>.

Members who reside in the U.S. can pay by check using the invoice mailed to members in May, or by printing the invoice from the online link. For your security, no credit card payments will be accepted via mail, fax or email.

Checks from outside the U.S. are not accepted by AABP's bank, therefore members outside the U.S. must pay by credit card online.

Upon renewal, please consider a donation to the Amstutz Scholarship Fund and the AABP Foundation.

Forgot your member ID number? Find it on your AABP Membership Card or the AABP Newsletter address label. Go to <https://aabp.org/members/email.html> to have your login information emailed to you. Thank you for your support of our organization through payment of your dues!

AABP Edwin Robertson Beginning Embryo Transfer Seminar

The AABP, with the support from the American Embryo Transfer Association, will hold a three-day embryo transfer seminar for beginners August 12-14, 2019, at the Virginia-Maryland College of Veterinary Medicine in Blacksburg, Va. If you want to learn embryo transfer or if you have begun and are struggling, this seminar is for you. You will be taught the most up-to-date techniques by a staff with years of experience at your side.

Superovulated cows will be provided for each student to collect, and then search for, evaluate and freeze embryos on their own. Microscopes, freezers, and all ET equipment will be provided, but you are welcome to bring any equipment with you. All techniques will be discussed and demonstrated on donor cows before you begin your work on the practice cows. Superovulation, collection, freezing, transfer, estrus synchronization, donor scheduling, embryo morphology, and semen quality evaluations will all be discussed in detail. We will also include a discussion on transferring fresh and frozen IVF-derived embryos.

A highly qualified faculty of experts will teach the seminar.

Find out more and register **by July 12, 2019** at http://aabp.org/seminars/display_seminar.asp?seminar=2019%20AABP%20Embryo%20Transfer%20Seminar.

Contact Dr. Randall Hinshaw at 540-246-2697 or e-mail randall@ashbygenetics.com for more information.

Seeking AABP-L Listserve Managers

The AABP Board of Directors is seeking dedicated volunteers to serve as AABP-L listserv managers. We currently are in need of three members to serve in this important role. AABP-L continues to be a highly valued member service.

The role of the listserv manager is to assist the AABP office in answering any questions from members and to ensure compliance with the board approved AABP-L policy. Technical expertise is not required and is provided by the AABP office. Each month there is a primary and secondary listserv manager. The primary manager monitors each message from the list to ensure compliance with AABP-L policy. The AABP executive director assists the primary list serve manager. The primary listserv manager should feel comfortable in emailing members, or

directing the AABP executive director to do so, when members have posts to AABP-L that are not in compliance with current policy. It is anticipated that primary listserv managers would serve two months per year, on a rotating schedule assigned by the IT coordinator. The secondary manager serves as back-up in case of the absence of the primary manager. The current AABP-L policy can be found at https://aabp.org/members/aabpl_policy.asp.

If you are a member who finds value in AABP-L and enjoys monitoring the list, please consider volunteering to your organization in this important role. The term for listserv managers is three years and renewable for a second term upon approval by the Board. For consideration by the Board, please send a letter of interest to Dr. Fred Gingrich at fred@aabp.org prior to May 31.

Have an externship to offer?

Do you enjoy mentoring the next generation of veterinarians? Many students are eager to find externships all across the globe to find clinical cattle experiences. AABP members are encouraged to post their clinic externship experiences on the AABP website. The externship site has been recently updated.

Visit https://aabp.org/jobs/mentor/Find_mentors.asp if you are a student looking for an externship, or if you are a practice offering an externship, you can add your information at this same link. Externship information can also be found under the Jobs menu at <https://aabp.org>.

If you have a job to post or are looking for a job, visit the AABP Jobs board on the AABP homepage.



AABP COMMITTEE REPORTS

Is This a New Problem?

In the AABP Manage Your Rural Practice for Success Workshops, a complaint from the older generation is often echoed, "This younger generation will not work as hard and are not driven as much as we were when we were that age." This works for the individual making the statement, but it may be a little over simplistic.

One longer version of the same complaint is, "The children now love luxury, they have bad manners, contempt for authority, they show disrespect for elders and love chatter in place of exercise. Children are now the tyrants -- not the servants -- of their households. They no longer rise when elders enter the room. They contradict their parents, chatter before company, gobble up dainties at the table, cross their legs, and tyrannize their teachers."

This later complaint is more detailed and really puts the younger generation in the crosshairs. Or does it? It turns out that the last statement was not about Generation Y in 2019 but was uttered by Aristotle (384-322 BC) in reference to the "younger generation" of his time.

Undoubtedly we have differences in “will” and “skill” in each generation. The following table demonstrates the various combinations of the two that we see and may have been experienced by Aristotle.

| | | | |
|-----------|------|-----------------------------------|---------------------------------|
| WILL ↑ | HIGH | Willing Unable GUIDE | Willing Able DELEGATE |
| | LOW | Unwilling Unable DIRECT | Unwilling Able EXCITE |
| | | → SKILL HIGH | |

If we are to lead individuals of varying quantities of will and skill, we need to identify their attributes and lead them in different manners. Possible examples of this group may be the teenager who begrudgingly mows the lawn for the first time. The low will/low skill group must be “directed”. To be successful with this group, you need to identify their motives, develop a vision for success, structure “quick wins”, train/coach patiently and supervise with frequent feedback and clear expectations.

To lead the high will/low skill group, you should “guide” them by reducing risks, obstacles and constraints, providing tools, training, guidance, coaching and feedback up front and relaxing control as progress is shown.

The “excite” group that is high skill/low will needs encouragement. This can be done by identifying the reason for the low will, developing intrinsic motivation incentives, and by monitoring and providing recognition to reinforce positive behaviors.

For the high will/high skill “delegate” segment, you need to basically “get out of the way” by providing freedom in job methodology, communicating trust and recognition, developing stretch goals, broadening responsibilities and by treating them as a partner.

Regardless of your age, if you understand the motives of your team members, what their skill level is, and their willingness to work, you will be better prepared to communicate with your team members and develop an environment that will be most rewarding to all stakeholders.

Submitted by the AABP
Veterinary Practice Sustainability Committee

Legality of Compounded Estradiol for Embryo Transfer

The AABP office has received questions from members regarding the legality of using compounded estradiol products in cattle for embryo transfer protocols. AABP has also been in discussion with FDA about the use of compounded estradiol products in food animals.

Compounding from approved drugs in animals is only permitted under the narrowly defined conditions outlined in

AMDUCA (Section 21 CFR 530.13). To be permitted, extralabel use from compounding of approved animal drugs or approved human drugs must be in compliance with all relevant provisions of 21 CFR 530 (AMDUCA), including the provisions limiting extralabel use to treatment modalities when the health of an animal is threatened or suffering or death may result from failure to treat. The extralabel use regulation also does not provide for compounding from active pharmaceutical ingredients (APIs or bulk drugs, i.e. the raw chemical) for use in animals. Therefore, it is illegal for veterinarians to use or prescribe compounded estradiol for cattle or any form of estrogenic compounds for production purposes including embryo transfer and synchronization protocols.

AABP encourages cattle veterinarians to refrain from administering or prescribing compounded estradiol for the following reasons:

- AMDUCA only allows for extralabel drug use when the health of an animal is threatened. There is no production allowance, particularly for compounding, therefore one cannot use human approved drugs (i.e. ECP, Pfizer) or a different form of an animal approved drug (i.e. growth promoting implants) for production purposes.
- Compounding from a bulk product is specifically prohibited in the AMDUCA regulations.
- The safety, potency, efficacy, stability, sterility and disposition of compounded products is unknown. Compounded products do not undergo FDA inspection, potency testing or efficacy testing. Veterinary compounding pharmacies that also compound for humans are under federal regulation and FDA inspected, however this only applies to the human side of the compounding operation. Veterinary compounding pharmacies do not have this level of oversight. There is no guarantee of the safety or efficacy of compounded products and the liability for the use of such products falls on the veterinarian in the event of an adverse reaction or violative residue.
- Because the safety, efficacy potency and disposition of the compounded product is not known, it is impossible to assign a withdrawal interval for compounded products.
- The use of compounded products in food animals places a veterinarian at a risk of professional liability.

The need for estradiol for successful embryo transfer protocols has not been unequivocally established. For example, data from nearly 7,000 collections did not demonstrate a difference when using GnRH in place of estradiol in the protocol.¹ Additional references are available on the Reproduction Committee page of the website at <https://aabp.org/members/Reproduction.asp>.

Veterinarians who engage in federally prohibited activities put themselves at risk, and also risk the profession’s reputation for appropriate and judicious oversight of pharmaceutical products in our cattle patients. This is especially of concern when using an unapproved and illegally manufactured hormone product.

Please contact the Dr. Fred Gingrich at fred@aabp.org with any questions.

1. Hinshaw RH, Comparison of GnRH and estradiol 17 β for follicle turnover in bovine superovulation protocols. Proceedings of The American Embryo Transfer Association 2013, p. 15.

Submitted by the
AABP Reproduction Committee and the
AABP Committee on Pharmaceuticals and Biologics



DEADLINE REMINDERS

AABP Award Nominations Sought

Do you have a mentor, peer or colleague who is deserving of special recognition? Have you received an award and wish to pay it forward to someone else? Nominate that special veterinarian for one of the prestigious AABP awards, which will be given to recipients at the 2019 52nd AABP Annual Conference in St. Louis, Mo.

Awards include Practitioner of the Year, Excellence in Preventive Medicine, Mentor of the Year, Award of Excellence, Distinguished Service Award and James A. Jarrett Award for Young Leaders. **Award nominations are due by 5pm EDT June 15, 2019.**

For more information, visit the AABP awards page at <https://aabp.org/meeting/nominate.asp>, and access the nomination form at <https://aabp.org/members/nomination/>.

Apply for the Dr. Bruce Wren CE Award

If you are a dairy or beef cattle veterinarian out of school less than 10 years and would like to further your education/training in the area of your choice, apply for the Dr. Bruce Wren Continuing Education Award sponsored by Huvepharma and awarded at the 2019 AABP Annual Conference.

Two \$5,000 individual awards (one for beef, one for dairy) will be awarded to veterinarians currently in a practice. Candidates will design their own award through an application process and judging criteria based on a professional-development plan and reference letters.

Airfare and one-night hotel expenses for the AABP conference will be provided by Huvepharma for recipients. An online application reference letter must be submitted by **5pm EDT, July 15, 2019**, to be considered. Visit https://www.aabp.org/Members/ce_award/default.asp.

DONATE! Amstutz Auction Portal is Open!

Donate an item to the 2019 AABP Amstutz Scholarship Auction, to be held during the 2019 52nd AABP Annual Conference in St. Louis, Mo. Members, exhibitors and students are welcome to donate an item(s) that will help support AABP's premier student scholarship program.

It's easy! Go to <https://aabp.org/auction/> (you can also find it under the Conference tab at <https://aabp.org>) and fill out the online donation form. There is a separate link for student chapter donations on that same page. **All auction donations must be entered online by June 30, 2019.**

Please note that **items are not to be brought to the conference** – AABP assumes no responsibility for handling auction items. Shipping of item(s) and shipping costs to the buyer are the responsibility of the donor. Items will be posted online and on printed posters at the conference.

Who will win the Mark Hopkins Bull this year? Are you a consortium or would like to organize a consortium of bidders to bid on select items in the live auction? Find some helpful information and rules on consortium bidding at <https://aabp.org/auction/consortium.asp>.

The AABP Amstutz Scholarship Committee thanks you for your auction donation and your auction purchases!

AABP Scholarship Applications are Open!

The scholarship application period is open for the three main AABP scholarships. **Applications and reference letters for all scholarships are due by 5pm EDT, June 7, 2019.**

- Amstutz Scholarship – This \$7,500 scholarship is awarded to students in their 2nd year of veterinary school (graduating in 2021) who demonstrate the character, knowledge, experience, motivation and potential to become outstanding bovine veterinarians. Visit <https://aabp.org/Students/scholinfo.asp>.
- AABP Foundation-Zoetis Scholarship – This \$5,000 scholarship is awarded to students in their 3rd year of veterinary school (graduating 2020) who demonstrate the character, knowledge, experience, motivation and potential to become outstanding bovine veterinarians. Visit <https://aabp.org/foundation/zoetis/default.asp>.
- Merck Student Recognition Award – This scholarship provides \$5,000 awards to 2nd and/or 3rd year veterinary students (graduating in 2021 or 2020) who are interested in dairy and/or beef veterinary medicine. Visit https://aabp.org/students/stud_rec_award.asp.

AABP Student Chapter and Faculty Advisor Award Nominations

Has your AABP student chapter been active this year? Nominate it for the 2019 AABP Student Chapter Award! Find the AABP student chapter nomination link at https://aabp.org/students/student_chapter/ (also find it under the Student tab at <https://aabp.org>). **Nominations for the AABP student chapter award are due by 5pm EDT, July 15, 2019.**

Is there an outstanding AABP faculty representative or another faculty who is an AABP member who advises your student chapter? Nominate him/her for the 2019 AABP Faculty Advisor Award to give them the recognition they deserve!

Find the faculty advisor nomination link at https://aabp.org/Students/faculty_advisor/ (also find it under the Student tab at <https://aabp.org>). **Nominations for the faculty award are due by 5pm EDT, July 15, 2019.**



BEEF

Transl. Animal Sci.
Vol. 2, No. 3, pp. 241-253

June 2018

An Epidemiological Investigation to Determine the Prevalence and Clinical Manifestations of Slow-moving Finished Cattle Presented to Slaughter Facilities

T. Lee*, C. Reinhardt, S. Bartle, E. Schwandt,
M. Calvo-Lorenzo

Cattle mobility is routinely measured at commercial slaughter facilities. However, the clinical signs and underlying causes of impaired mobility of cattle presented to slaughter facilities are poorly defined. As such, the objectives of this study were 1) to determine the prevalence of impaired mobility in finished cattle using a 4-point mobility scoring system and 2) to observe clinical signs in order to provide clinical diagnoses for this subset of affected cattle. Finished beef cattle (n = 65,600) were observed by a veterinarian during the morning shift from six commercial abattoirs dispersed across the United States; the veterinarian assigned mobility scores (MS) to all animals using a 1–4 scale from the North American Meat Institute’s Mobility Scoring System, with 1 = normal mobility and 4 = extremely limited mobility. Prevalence of MS 1, 2, 3, and 4 was 97.02%, 2.69%, 0.27%, and 0.01%, respectively. Animals with an abnormal MS (MS > 1) were then assigned to one of five clinical observation categories: 1) lameness, 2) poor conformation, 3) laminitis, 4) Fatigued Cattle Syndrome (FCS), and 5) general stiffness. Of all cattle observed, 0.23% were categorized as lame, 0.20% as having poor conformation, 0.72% as displaying signs of laminitis, 0.14% as FCS, and 1.68% as showing general stiffness. The prevalence of lameness and general stiffness was greater in steers than heifers, whereas the prevalence of laminitis was the opposite (P < 0.05). FCS prevalence was higher in dairy cattle than in beef cattle (0.31% vs. 0.22%, respectively; P ≤ 0.05). These data indicate the prevalence of cattle displaying abnormal mobility at slaughter is low and causes of abnormal mobility are multifactorial.

*Department of Diagnostic Medicine and Pathobiology, Kansas State University, Manhattan, KS 66506

JAVMA
Vol. 254 No. 7, pp. 792-797

April 2019

The AVMA's Definitions of Antimicrobial Uses for Prevention, Control and Treatment of Disease

D. Smith*, P. Gaunt, P. Plummer, H. Cervantes,
P. Davies, V. Fajt

Recent state and federal legislative actions and current recommendations from the World Health Organization seem to suggest that, when it comes to antimicrobial stewardship, use of antimicrobials for prevention, control, or treatment of disease can be ranked in order of appropriateness, which in turn has led, in some instances, to attempts to limit or specifically oppose the routine use of medically important antimicrobials for prevention of disease. In contrast, the AVMA Committee on Antimicrobials believes that attempts to evaluate the degree of antimicrobial stewardship on the basis of therapeutic intent are misguided and that use of antimicrobials for prevention, control, or treatment of disease may comply with the principles of antimicrobial stewardship. It is important that veterinarians and animal caretakers are clear about the reason they may be administering antimicrobials to animals in their care. Concise definitions of prevention, control, and treatment of individuals and populations are necessary to avoid confusion and to help veterinarians clearly communicate their intentions when prescribing or recommending antimicrobial use.

*Representing AABP on the AVMA Committee on Antimicrobials, Starkville, MS 39762

Vet Micro
Vol. 231, pp. 56-62

April 2019

Comparison of the Nasopharyngeal Bacterial Microbiota of Beef Calves Raised without the Use of Antimicrobials between Healthy Calves and Those Diagnosed with Bovine Respiratory Disease

C. McMullen*, K. Orsel, T. Alexander

The role of the respiratory bacterial microbiota in the pathogenesis of bovine respiratory disease (BRD) is still not well defined, limiting our understanding of the disease. Specifically, there is no information on the nasopharyngeal bacterial microbiota of cattle raised without antimicrobials. The objective was to characterize and compare the nasopharyngeal bacterial microbiota in feedlot cattle raised without antimicrobials that were healthy or diagnosed with BRD. Newly-received feedlot cattle (arrival bodyweight ± SD = 218 ± 37 kg) with BRD (n = 82) and pen-matched controls (n = 82) were clinically examined and sampled by deep nasopharyngeal swab (DNS). DNA was extracted from each DNS and the 16S rRNA gene (V4) was sequenced. Alpha and beta diversity were compared between health groups and among 3 days-on-feed (DOF) groups (group A = 3–12 DOF; group B = 13–20 DOF; group C = 21–44 DOF). Observed species richness was

lower ($P = 0.031$) in cattle with BRD compared to healthy ones. Both health status ($P = 0.007$) and DOF groups ($P < 0.001$) were sources of variation in microbiota composition. Differences between health groups were driven by multiple sequence variants, including *Mycoplasma bovis*, *Histophilus somni*, and several *Moraxella* spp. Notably, *M. bovis* was more frequently identified in cattle with BRD. *M. bovis* identification was also higher in cattle sampled at later DOF. The increased identification of *M. bovis* in cattle with BRD reaffirms a potentially significant role for this bacterium in respiratory health.

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DAIRY

J. Dairy Sci.
Vo. 101, No. 9, pp. 8461-8475

September 2018

Effect of Dietary Cation-anion Difference on Acid-base Status and Dry Matter Intake in Dry Pregnant Cows

R. Zimpel*, M. Poindexter, A. Viero-Neto,
E. Block, C. Nelson

The objective was to determine if the reduction in dry matter (DM) intake of acidogenic diets is mediated by inclusion of acidogenic products, content of salts containing Cl, or changes in acid-base status. The hypothesis was that a decrease in intake is mediated by metabolic acidosis. Ten primigravid Holstein cows at 148 ± 8 d of gestation were used in a duplicated 5×5 Latin square design. The dietary cation-anion difference (DCAD) of diets and acid-base status of cows were manipulated by incorporating an acidogenic product or by adding salts containing Cl, Na, and K to the diets. Treatments were a base diet (T1; 1.42% K, 0.04% Na, 0.26% Cl; DCAD = 196 mEq/kg); the base diet with added 1% NaCl and 1% KCl (T2; 1.83% K, 0.42% Na, 1.23% Cl; DCAD = 194 mEq/kg); the base diet with added 7.5% acidogenic product, 1.5% NaHCO₃, and 1% K₂CO₃ (T3; 1.71% K, 0.54% Na, 0.89% Cl; DCAD = 192 mEq/kg); the base diet with added 7.5% acidogenic product (T4; 1.29% K, 0.13% Na, 0.91% Cl; DCAD = -114 mEq/kg); and the base diet with 7.5% acidogenic product, 1% NaCl, and 1% KCl (T5; 1.78% K, 0.53% Na, 2.03% Cl; DCAD = -113 mEq/kg). Periods lasted 14 d with the last 7 d used for data collection. Feeding behavior was evaluated for 12 h in the last 2 d of each period. Reducing the DCAD by feeding an acidogenic product reduced blood pH (T1 = 7.450 vs. T2 = 7.436 vs. T3 = 7.435 vs. T4 = 7.420 vs. T5 = 7.416) and induced a compensated metabolic acidosis with a reduction in bicarbonate, base excess, and partial pressure of CO₂ in blood, and reduced pH and strong ion difference in urine. Reducing the DCAD reduced DM intake 0.6 kg/d (T1 = 10.3 vs. T4 = 9.7 kg/d), which was caused by the change in acid-base status (T2 + T3 = 10.2 vs. T4 + T5 = 9.6 kg/d) because counteracting the acidifying action of the

acidogenic product by adding salts with strong cations to the diet prevented the decline in intake. The decline in intake caused by metabolic acidosis also was observed when adjusted for body weight (T2 + T3 = 1.75 vs. T4 + T5 = 1.66% BW). Altering the acid-base status with acidogenic diets reduced eating (T2 + T3 = 6.7 vs. T4 + T5 = 5.9 bouts/12 h) and chewing (T2 + T3 = 14.6 vs. T4 + T5 = 13.5 bouts/12 h) bouts, and extended meal duration (T2 + T3 = 19.8 vs. T4 + T5 = 22.0 min/meal) and intermeal interval (T2 + T3 = 92.0 vs. T4 + T5 = 107.7 min). Results indicate that reducing the DCAD induced a compensated metabolic acidosis and reduced DM intake, but correcting the metabolic acidosis prevented the decline in DM intake in dry cows. The decrease in DM intake in diets with negative DCAD was mediated by metabolic acidosis and not by addition of acidogenic product or salts containing Cl.

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Foodborne Path. and Dis.
Vol. 16, No. 1, pp. 60-67

January 2019

Age-Associated Distribution of Antimicrobial-Resistant *Salmonella enterica* and *Escherichia coli* Isolated from Dairy Herds in Pennsylvania, 2013–2015

H. Cao*, A. Pradhan, J. Karns, E. Hovingh,
D. Wolfgang, B. Vinyard, S. Kim, S. Salaheen,
B. Haley, J. Van Kessel

Antimicrobial resistance has become a major global public health concern, and agricultural operations are often implicated as a source of resistant bacteria. This study characterized the prevalence of antimicrobial-resistant *Salmonella enterica* and *Escherichia coli* from a total of 443 manure composite samples from preweaned calves, postweaned calves, dry cows, and lactating cows from 80 dairy operations in Pennsylvania. A total of 1095 *S. enterica* and 2370 *E. coli* isolates were screened and tested for resistance to 14 antimicrobials on the National Antimicrobial Resistance Monitoring System Gram-negative (NARMS GN) panel. *Salmonellae* were isolated from 67% of dairy operations, and 99% of the isolates were pan-susceptible. *Salmonella* were isolated more frequently from lactating and dry cow samples than from pre- and postweaned calf samples. Overall, the most prevalent serotypes were Cerro, Montevideo, Kentucky, and Newport. *E. coli* were isolated from all the manure composite samples, and isolates were commonly resistant to tetracyclines, sulfonamides, and aminoglycosides. Resistance was detected more frequently in the *E. coli* isolates from pre- and postweaned calf samples than in isolates from dry and lactating cow samples ($p < 0.05$). Multidrug-resistant *E. coli* (i.e., resistant to >3 antimicrobial classes) were isolated from 66 farms (83%) with significantly greater prevalence in preweaned calves ($p < 0.05$) than in the older age groups. The *bla*_{CTX-M} and *bla*_{CMY} genes were detected in the cephalosporin-resistant *E. coli* from 4% and 35% of the farms, respectively. These

findings indicate that dairy animals, especially the calf population, serve as significant reservoirs for antimicrobial-resistant bacteria. Additional research on the colonization and persistence of resistant *E. coli* in calves is warranted to identify potential avenues for mitigation.

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**Antimicrobial Resistance in Fecal *Escherichia coli*
and *Salmonella enterica* from Dairy Calves:
A Systematic Review**

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The discovery of antibiotics brought with it many advances in the health and well-being of humans and animals; however, in recent years development of antimicrobial resistance (AMR) has increasingly become a concern. Much of the antibiotic use on dairy farms is for disease management in mature cattle, and AMR in fecal organisms is relatively rare in this group. However, young dairy calves often carry high levels of AMR in their fecal *Escherichia coli* and *Salmonella enterica*, which could provide a potential reservoir of AMR genes on dairy farms. To

develop practical and effective antibiotic stewardship policies for dairy calf rearing, it is vital to have a solid understanding of the current state of knowledge regarding AMR in these animals. A systematic review process was used to summarize the current scientific literature regarding AMR in fecal *S. enterica* and *E. coli* and associations between management practices and AMR prevalence in dairy calves in the United States and Canada. Seven online databases were searched for literature published from 1997 to 2018. Multiple studies indicated an association between preweaned calves and increased risk of fecal shedding of resistant bacteria, compared to other animal groups on dairy farms. There also was evidence, although less consistent, of an impact of antibiotic treatment, antibiotic-containing milk replacer feeding, and feeding nonsalable or waste milk (WM) on the presence of AMR bacteria. Overall, the research summarized in this systematic review highlights the need for continued research on the impact of management practices, including antibiotic use, WM feeding, and disease prevention practices in reducing AMR in *E. coli* and *S. enterica* in dairy calves. In addition, few data were available on physiological and microbiological factors that may contribute to the high relative populations of resistant bacteria in young calves, suggesting another valuable area of future research.

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