

# Hannah Speer

3710 Assinniboine Road  
Havre, MT, 59501

406-265-6115  
hannah.speer@montana.edu

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## **CURRENT ROLE**

**Assistant Professor of Animal Science**, January 2024 to present  
Northern Agriculture Research Center, Havre, MT  
Montana State University

## **EDUCATION**

**Doctor of Philosophy in Animal Science**, August 2023  
Area of study: **Ruminant Nutrition**  
Dissertation: “Consequences of cow-calf production with limited perennial forage grazing”  
University of Nebraska-Lincoln, Lincoln, NE  
Major professors: Drs. Mary Drewnoski and Jim MacDonald

**Master of Science in Animal Science**, August 2019  
Area of study: **Ruminant Nutrition**  
Kansas State University, Manhattan, KS  
Thesis: “Efficacy of guanidinoacetic acid supplementation to growing cattle and relative bioavailability of guanidinoacetic acid delivered ruminally or abomasally”  
Major professor: Dr. Evan Titgemeyer  
Committee members: Dale Blasi and T.G. Nagaraja

**Bachelor of Science in Agriculture**, December 2015  
Major: **Animal Science**  
Fort Hays State University, Hays, KS  
Graduated Summa Cum Laude

## **RESEARCH EXPERIENCE**

**Graduate Research Assistant**, June 2019 – August 2023  
University of Nebraska-Lincoln  
Principal Investigator: Dr. Mary Drewnoski

### **Description of dissertation projects**

A significant amount of pasture was converted to cropland in the early 2000s resulting in limited availability of perennial pasture in the Midwest. Many cow-calf producers have started maintaining their cow herd using summer drylotting and grazing on crop residues in the winter. A component of my research compared an integrated crop and cow-calf system that included summer drylotting of cows, to a more traditional perennial forage-based system. The goal is to better

understand how to advise cow-calf producers in situations where pasture is costly or not available. As the project progressed, we started realizing that despite feeding current NASEM-recommended amounts of supplemental vitamin A, the cows in the integrated system were becoming vitamin A deficient due to limited intake of green grass. At the same time, we started getting questions from producers and nutritionists that were seeing issues in their cows. Thus, I also designed and conducted two experiments to refine the vitamin A requirements of beef cows fed stored forages.

### **Systems project**

- Conducted a 3-year experiment to compare reproductive, health and growth performance of cows and calves in two different August-calving systems: a traditional perennial forage-based system and a drylot/cropland-based system
- Used blood samples to evaluate vitamin and mineral status pre- and post-calving in both systems

### **Vitamin A cow projects**

- Consulted with Great Plains Livestock Consulting on a suspected vitamin A deficiency in a client's cow herd; reviewed literature to discover that little was known about vitamin A requirements of beef cows
- Wrote grant that was funded by Great Plains Livestock Consulting to study supplemental vitamin A requirements of gestating beef cows fed stored forages
- Designed two experiments to evaluate supplemental vitamin A requirements of gestating beef cows fed stored forages
- Conducted liver biopsies on gestating beef cows and their calves to assess vitamin A status to understand how cow vitamin A status impacts calf vitamin A status and calf health
- Identified and employed a method for rapid measure of vitamin A concentration in plasma and liver samples
- Daily feeding and care of 120 gestating cows on-study at the U. S. Meat Animal Research Center housed in drylot pens; cows were individually fed supplemental vitamin A to evaluate relationship between plasma and liver vitamin A concentrations in a diet primarily consisting of stored forages
- Developed diets and supplements for cows managed in confinement
- Assisted with duties during calving season including daily health checks, tagging and vaccinating calves, and treating sick calves as needed

### **Vitamin A survey**

- Conducted survey of consulting industry cow-calf nutritionists and university extension beef specialists to gauge current perspectives and understanding of vitamin A requirements in cow-calf systems

### **Grazing research experience**

- Assist with rumen evacuation procedure for diet sample collection
- Assist with rumen fluid sampling using tubing procedure

### **Feedlot research experience**

- Collect samples for genetic testing on approximately 2,000 head of cattle coming into the UNL feedlot

- Work with a team of approximately 20 graduate students and technicians to practice low-stress cattle handling when assisting with grazing or feedlot experiments
- Ear tagging cattle during initial processing in the feedlot
- Learned how to administer growth-promoting implants

**Graduate Research Assistant, Fall 2016 – May 2019**

Principal Investigator: Dr. Evan Titgemeyer, Kansas State University

\*Proprietary research conducted

- Evaluated ruminal bypass value of guanidinoacetic acid (GAA)
- Assessed how supplementation of GAA to growing cattle fed a corn-based diet affected methionine methyl group flux
- Assisted with research investigating the effects of leucine in conjunction with essential amino acids on lysine utilization in growing cattle
- Cared for cattle housed in a metabolism room requiring ruminal and abomasal infusions of nutrients
- Became proficient in placement of abomasal infusion lines, collecting jugular blood samples, performing muscle biopsies, and jugular catheter placement
- Became proficient in conducting colorimetric assay for plasma haptoglobin concentrations
- Learned to properly conduct assays for determining dry matter, organic matter, and fiber content in feed samples, and protein content in feed, fecal, and urine samples
- Conducted plasma sample preparation for determination of plasma amino acid, GAA, creatine, and creatinine concentrations
- Conducted urine sample preparation for determination of urinary GAA, creatine, and creatinine concentrations

**Undergraduate Research Assistant, Fall 2015**

Principal Investigator: Dr. Robert Keener, Assistant Professor of Animal Science, Fort Hays State University

- Compared the rate of gain and associated economic cost per pound of gain relative to different show pig rations
- Compiled data and results into a poster presented at the Kansas Undergraduate Day at the Capitol to state legislators

**Intern, Summer 2015**

Dr. Tami Brown-Brandl, U.S. Meat Animal Research Center, Clay Center, NE

- Analyzed feed time data from a feeding system designed to monitor frequency of visits of individual pigs to the feeder housed in groups to compare actual vs. predicted time spent at the feeder
- Evaluated information on health, feed delivery, and technical issues that could have explained erratic feeding behavior of an individual animal
- Utilized all the above information in pursuit of understanding feeding behavior in swine to automatically identify individual sick animals in a group setting

## **EXTENSION AND OUTREACH ACTIVITIES**

### **Presentations and Posters**

- Speer, H. F.** 2024. Consequences of cow-calf production with limited perennial forage grazing. Bair Ranch Foundation seminar series, February 8, 2024.
- Speer, H. F.** 2024. Understanding the relationship between nutrition and reproduction. Presented at Montana State Extension's Northeastern Montana winter workshop series, January 29-31, 2024.
- Speer, H. F., H. C. Freetly, K. H. Wilke, and M. E. Drewnoski.** 2022. Vitamin A supplementation to beef cows: effects on cow and calf vitamin A status. Poster at UNL Beef Group meeting, May 2023.
- Speer, H. F., H. C. Freetly, K. H. Wilke, and M. E. Drewnoski.** 2022. Vitamin A supplementation to beef cows: effects on cow and calf vitamin A status. Poster at Nebraska Extension Cattlemen's College, December 2022.
- Speer, H.F., H.C. Freetly, and M.E. Drewnoski.** 2022. Comparison of semi-confined and pasture-based fall calving beef cow systems. Presented at UNL Beef Group meeting, May 2022.
- Speer, H.F., and M.E. Drewnoski.** 2022. Vitamin A research update. Presented at Great Plains Livestock Consulting Annual Meeting, August 2022.
- Speer, H.F.** 2022. Vitamin A in cow-calf systems. UNL BeefWatch YouTube channel. Current views: 918. Available at:  
<https://www.youtube.com/watch?v=ZTFWWuVYOqI&t=397s>
- Speer, H. F.** 2021. Vitamin A in confinement cow systems. Presented at Nebraska Extension Cow-Calf Management with Limited Perennial Acres Workshop Series, December 2021.
- Speer, H. F.** 2021. Vitamin A supplementation in beef cow-calf systems. Poster at Nebraska Extension Cattlemen's College, December 2021.
- Speer, H.F., and M.E. Drewnoski.** 2021. Vitamin A in cow-calf systems: proposed research. Presented at UNL Beef Group meeting, May 2021.
- Speer, H. F.** 2021. Vitamin A supplementation in cow-calf systems. Presented at Nebraska Cattlemen's Mid-year Meeting, June 2021.
- Drewnoski, M. E., and **H. F. Speer.** 2020. Current understanding of vitamin A and E requirements in beef cattle. Presented at Great Plains Livestock Consulting Annual Meeting, July 2020.

**Speer, H. F.,** H. E. Riley, R. A. Cushman, H. C. Freetly, and M. E. Drewnoski. 2020. Alternative heifer development systems utilizing corn residue and cover crops. Presented at UNL Beef Group meeting, May 2020.

### **Publications**

**Speer, H.,** H. Freetly, K. Wilke, and M. Drewnoski. 2023. Vitamin A supplementation to beef cows: it impacts more than just the cow! January/February 2023. BEEF Magazine Digital Edition, p. 5. Available at: <https://informamarkets.turtl.co/story/beef-janfeb-2023/page/5>

**Speer, H. F.** 2022. Are you meeting your cows' vitamin A needs? September 2022. Nebraska Cattleman magazine, pp. 10–12. Available at: <http://nebraskacattleman.org/NCSep2022/>

### **Other activities**

- Radio interview with 560 KMON sharing research experience and future research plans as new Animal Scientist at Northern Ag Research Center in Havre, MT
- YouTube video “Vitamin A in cow-calf systems” featured in March 2022 Multimedia section of Feedlot magazine. Available at: [https://www.feedlotmagazine.com/multimedia/vitamin-a-needs-of-beef-cows/video\\_bb73a829-ca35-50cd-8299-f0ccf055e596.html](https://www.feedlotmagazine.com/multimedia/vitamin-a-needs-of-beef-cows/video_bb73a829-ca35-50cd-8299-f0ccf055e596.html)
- Radio interview with KNEB about PhD research on vitamin A and experiences of conducting research at an outstation (Panhandle Research and Extension Center, Scottsbluff, NE)
- Featured in January 2022 issue of Nebraska Cattleman magazine in the article “Combating Calf Loss Before Birth” discussing importance of vitamin A supplementation to beef cows
- Assisted in developing rations for producer in Norfolk, NE, with cows in confinement and backgrounding calves

### **TEACHING EXPERIENCE**

**Teaching Assistant, “Animal Nutrition and Feeding”,** Fall 2022

Dr. Phil Miller, University of Nebraska-Lincoln, Lincoln, NE

- Taught undergraduate students lectures on topics including: concepts in diet formulation and nutrition, digestive anatomy, and ruminant nutrition
- Aided students with questions on course material
- Graded assignments and exams

**Teaching Assistant, “Animal Systems Analysis”,** Spring 2020, Spring 2021, Spring 2022

Dr. Jim MacDonald, University of Nebraska-Lincoln, Lincoln, NE

- Taught undergraduate students concepts in goal setting, information gathering, and problem solving
- Aided students with questions on course material
- Prepared handouts for students for in-class assignments
- Assisted with grading assignments

## **WORK EXPERIENCE**

### **Environmental Consultant Assistant, Fall 2015 – March 2016**

Fox-Z Consulting, Hays, KS

- Assisted in development of Nutrient Management Plans for livestock producers
- Reviewed daily, weekly, and monthly operation reports of livestock facilities
- Completed necessary paperwork to help producers maintain environmental compliance with the Kansas Department of Health and Environment, Environmental Protection Agency, and Kansas Department of Agriculture

### **Farm Staff, Summer 2014 – January 2016**

Fort Hays State University Farm, Swine Division, Hays, KS

- Bred sows by artificial insemination, vaccinated swine, and processed newborn piglets
- Assisted with farrowing of sows
- Ground grain and mixed swine rations

## **HONORS AND AWARDS**

### **2<sup>nd</sup> place Ph.D. division, Arthaud Graduate Student Presentation Competition, 2023**

- 15-minute oral presentation on research, judged on quality of science and effectiveness of presentation

### **Larrick Graduate Student Travel Grant, 2022**

- \$350 in funding awarded to graduate students for travel to scientific meetings to present research.

### **Plains Nutrition Council Feedlot Nutritionist Boot Camp, 2018**

- Week-long educational event on several aspects of the feedlot industry. Gained knowledge from industry experts and animal science professors about feedlot nutrition, ration formulation, intake management, delivery strategies, supplement formulation and management, grain processing, feed manufacturing, steam flaking/quality control, environmental issues, pen and bunk maintenance, and growth-promoting technologies. Gained valuable information on using data for decision making, analyzing marketing and demand trends, and various academic and industry careers in feedlot nutrition and management

### **Selected to participate in the Kansas Undergraduate Research Day at the Capitol, 2016**

- Presented a poster on research completed as a part of the Undergraduate Research Experience Grant to state lawmakers in Topeka, KS, that evaluated the rate of gain and associated economic cost per pound of gain relative to different show pig rations

### **Undergraduate Research Experience Grant, 2015**

- Funding awarded to conduct research under the supervision of a faculty member at Fort Hays State University evaluating the rate of gain and associated economic cost per pound of gain relative to different show pig rations

### **Dean's Honor Roll, 2012 – 2015**

- Recognition for earning a minimum GPA of 3.60 for each semester attended for undergraduate studies at Fort Hays State University

### **Hays City Silver Academic Award, 2012**

- Received \$800 scholarship as a first-time freshman at Fort Hays State University for achieving a composite ACT score of 24-27. Award was renewed for 3 additional undergraduate years for maintaining a cumulative GPA greater than 3.30

### **Kansas Governor's Scholar, 2012**

- Recognition for being in the top academic one percent of Kansas high school seniors

## **ORGANIZATIONS**

UNL Ruminant Nutrition Culture Cabinet, Fall 2022 – May 2023

- Work with faculty to establish performance and behavior guidelines for faculty and graduate students that are reflective of our program's values of growth, teamwork, responsibility, commitment, and courage
- Develop a mission and vision for the ruminant nutrition graduate program

KSU Animal Sciences and Industry Graduate Student Association, 2016 – 2019

- Provided assistance with department events, such as serving meals or supervising registration tables
- Professional development via guest speakers and workshops

Delta Tau Alpha agricultural honor society, 2014 – 2015 (Secretary, 2015)

- As secretary, compiled meeting minutes and distributed to group members
- Participated in annual highway clean-up

## **PROFESSIONAL DEVELOPMENT**

- Grant Writing Bootcamp. Montana State University. Spring 2024.
- Participated in UNL Ruminant Nutrition book club where we read and discussed "The 7 Habits of Highly Effective People". Fall 2022.
- Attended "Grant Proposal Writing: Getting Started" seminar. University of Nebraska-Lincoln. January 13, 2021.

## GRANTS

- M. Van Emon, D. Boss, J. Dafoe, K. Schlagel, **H. Speer**, and S. Wyffels. 2024. Impacts of Fit N Forget Calf Cover on Calf Growth and Health. Woolover Limited (New Zealand). **\$13,868**.
- D. Atwater, J. Eberly, P. Nugent, **H. Speer**, and S. Wyffels. 2024. Warm-season conversion of Western grasslands: Effects on production and soil health. MSU College of Agriculture Mini-grant Program. **\$49,800**.
- M. E. Drewnoski and H. F. Speer. 2020-2022. “The effect of vitamin A supplementation level on vitamin A status of gestating beef cows”. Great Plains Livestock Consulting (Nebraska). **\$29,668** (funded).
- M. E. Drewnoski and H. F. Speer. 2020-2022. “Developing guidelines for dietary vitamin E requirements of gestating beef cows fed stored forages.” NCR-SARE. Not funded.

## PUBLICATIONS

### PEER-REVIEWED JOURNAL ARTICLES

- Speer, H. F.**, R. A. Cushman, H. C. Freetly, J. Parsons, J. Windh, and M. E. Drewnoski. 2024. Effect of beef heifer development systems utilizing corn residue and late summer planted cover crops on growth, reproductive performance and economics. *Trans. Anim. Sci.* (In preparation).
- Speer, H. F.**, K. H. Wilke, and M. E. Drewnoski. 2024. Effect of vitamin A supplementation on liver retinol concentrations of beef cows and their calves managed in confinement. *Appl. Anim. Sci.* (In preparation).
- Speer, H. F.**, M. S. Grant, M. D. Miesner, and E. C. Titgemeyer. 2022. Effect of guanidinoacetic acid supplementation on nitrogen retention and methionine methyl group flux in growing steers fed corn-based diets. *J. Anim. Sci.* 100:skac283. doi: 10.1093/jas/skac283
- Grant, M. S., **H. F. Speer**, N. D. Luchini, D. A. Blasi, and E. C. Titgemeyer. 2022. Effect of supplemental methionine on health and performance of receiving beef heifers. *Trans. Anim. Sci.* 6:txac113. doi: 10.1093/tas/txac113
- Speer, H. F.**, K. A. Pearl, and E. C. Titgemeyer. 2020. Relative bioavailability of guanidinoacetic acid delivered ruminally or abomasally to cattle. *J. Anim. Sci.* 98:skaa282. doi: 10.1093/jas/skaa282

### ABSTRACTS



- Speer, H. F.,** K. H. Wilke, and M. E. Drewnoski. 2022. Effect of vitamin A supplementation level during gestation on vitamin A status of beef cows and their calves housed in the drylot. Midwest ASAS Annual Meeting, Madison, WI, March 2023.
- Speer, H. F.,** H. C. Freetly, and M. E. Drewnoski. 2022. Evaluating relationships between plasma and liver retinol concentrations in the beef cow and calf. Western ASAS Annual Meeting, Park City, UT, September 2022. *J. Anim. Sci.* 100(S4):6. doi: 10.1093/jas/skac313.007
- Speer, H. F.** and M. E. Drewnoski. 2022. Comparison of semi-confined and pasture-based fall calving beef cow systems. ASAS-CSAS Annual Meeting, Oklahoma City, OK, June 2022. *J. Anim. Sci.* 100(S3):177. doi: 10.1093/jas/skac247.326
- Speer, H. F.,** E. Robinson, and M. E. Drewnoski. 2021. Survey of nutritionists' perceptions of vitamin A requirements and supplementation in beef cow-calf systems. Western ASAS Annual Meeting, Fort Collins, CO, October 2021.
- Speer, H. F.,** H. E. Riley, R. A. Cushman, H. C. Freetly, and M. E. Drewnoski. 2020. Alternative heifer development systems utilizing corn residue and cover crops. Midwest ASAS Annual Meeting, Omaha, NE, March 2020. *J. Anim. Sci.* 98(S3):128. doi: 10.1093/jas/skaa054.220
- Grant, M. S., **H. F. Speer,** W. R. Hollenbeck, R. A. Wahl, N. D. Luchini, D. A. Blasi, and E. C. Titgemeyer. 2019. Effect of Smartamine M on acute phase protein response in receiving beef heifers. ASAS-CSAS Annual Meeting, Austin, TX, July 2019. *J. Anim. Sci.* 97(S3):159–160. doi: 10.1093/jas/skz258.328
- Pearl, K., **H. Speer,** M. Miesner, and E. Titgemeyer. 2018. The effect of supplemental leucine on protein deposition and lysine utilization in growing steers. ASAS-CSAS Annual Meeting, Vancouver, BC, Canada, July 2018. *J. Anim. Sci.* 96(S3):410–411. doi: 10.1093/jas/sky404.901
- Pearl, K., **H. Speer,** O. Khatri, S. Davis, M. Miesner, J. Gonzalez, and E. Titgemeyer. 2018. The effect of supplemental leucine on regulatory signaling in muscle of growing steers. ASAS-CSAS Annual Meeting, Vancouver, BC, Canada, July 2018. *J. Anim. Sci.* 96(S3):270. doi: 10.1093/jas/sky404.591

## **TECHNICAL REPORTS**

- Speer, H.F.,** H.C. Freetly, K.H. Wilke, and M. E. Drewnoski. 2023. Vitamin A in cow-calf production: impacts of maternal supplementation and status on offspring. 2024 Nebraska Beef Report. pp. 25–27. <https://beef.unl.edu/2024-nebraska-beef-cattle-report#:~:text=Vitamin%20A%20in%20Cow%2D%20Calf%20Production%3A%20Impacts%20of%20Maternal%20Supplementation%20and%20Status%20on%20Offspring>
- Speer, H. F.,** H. C. Freetly, and M. E. Drewnoski. 2022. Comparison of semi-confined and

pasture-based August calving beef cow systems. 2023 Nebraska Beef Report. pp. 5–8.  
[https://beef.unl.edu/documents/2023-beef-report/5-8\\_Speer\\_MP117-2023.pdf](https://beef.unl.edu/documents/2023-beef-report/5-8_Speer_MP117-2023.pdf)

**Speer, H. F.,** H. E. Riley, R. A. Cushman, H. C. Freetly, and M. E. Drewnoski. 2020. Alternative heifer development systems utilizing corn residue and cover crops. 2021 Nebraska Beef Report. pp. 28–30. <https://beef.unl.edu/documents/2021-beef-report/mp110-2021-09.pdf>

Grant, M. S., **H. F. Speer,** W. R. Hollenbeck, R. N. Wahl, D. N. Luchini, D. A. Blasi, and E. C. Titgemeyer. 2020. Smartamine M supplementation reduces inflammation but does not affect performance in receiving beef heifers. Kansas Agricultural Experiment Station Research Reports: Vol. 6: Iss. 2.  
<https://newprairiepress.org/cgi/viewcontent.cgi?article=7891&context=kaesrr>

Pearl, K. A., **H. F. Speer,** M. D. Miesner, and E. C. Titgemeyer. 2018. Leucine supplementation did not improve protein deposition or lysine utilization in growing steers. Kansas Agricultural Experiment Station Research Reports: Vol. 4: Iss. 1.  
<http://newprairiepress.org/cgi/viewcontent.cgi?article=7545&context=kaesrr>

### **CONFERENCE PROCEEDINGS**

Drewnoski, M.E., and **H.F. Speer.** 2023. Should We Be Supplementing More Vitamin A to Pregnant Beef Cows? Range Beef Cow Symposium XXVIII Proceedings. pp. 23–30.

### **PRESENTATIONS AND POSTERS**

Drewnoski, M.E., and **H.F. Speer.** 2023. Rethinking vitamin A needs of beef cows. Presented at Range Beef Cow Symposium XXVIII, Loveland, CO, December 2023.

**Speer, H. F.,** K. H. Wilke, and M. E. Drewnoski. 2022. Effect of vitamin A supplementation level during gestation on vitamin A status of beef cows and their calves housed in the drylot. Presented at Midwest ASAS Annual Meeting, Madison, WI, March 2023.

**Speer, H. F.,** H. C. Freetly, and M. E. Drewnoski. 2022. Evaluating relationships between plasma and liver retinol concentrations in the beef cow and calf. Presented at Western ASAS Annual Meeting, Park City, UT, September 2022.

**Speer, H. F.** and M. E. Drewnoski. 2022. Comparison of semi-confined and pasture-based fall calving beef cow systems. Presented at ASAS-CSAS Annual Meeting, Oklahoma City, OK, June 2022.

**Speer, H. F.,** E. Robinson, and M. E. Drewnoski. 2021. Survey of nutritionists' perceptions of vitamin A requirements and supplementation in beef cow-calf systems. Poster at Western ASAS Annual Meeting, Fort Collins, CO, October 2021.

**Speer, H. F.,** H. E. Riley, R. A. Cushman, H. C. Freetly, and M. E. Drewnoski. 2020.  
Alternative heifer development systems utilizing corn residue and cover crops.  
Presented at Midwest ASAS Annual Meeting, Omaha, NE, March 2020.