

MICHIGAN STATE

U N I V E R S I T Y

Dear Cooperator,

Thank you for participating in Juliana Leite de Campos and Andrew Steinberger's research on antibiotic use measurement and analysis on Wisconsin dairy farms in 2017. If you recall, these researchers visited your dairies and collected digital records of antibiotic use on your farm. On behalf of all researchers, including Ajay Sethi, Garret Suen, John Shutske, Nasia Safdar, Ashley Kates, and Tony Goldberg, we want to provide an update on what we have learned.

Quantification of antimicrobial usage in adult cows and preweaned calves on 40 large Wisconsin dairy farms using dose-based and mass-based metrics:

[This study](#) analyzed data from cows and pre-weaned calves to understand the antibiotic doses per herd and doses per body weight. The ultimate goal of this research was to describe and understand antibiotic use from a dose-based and mass-based perspective.

Variation in partial direct costs of treating clinical mastitis among 37 Wisconsin dairy farms:

[This study](#) analyzed the costs of milk discard and drugs to treat mastitis. Costs were compared between farms, treatment type, cow parity, and DIM. Reducing the duration of treatment could decrease both the cost of treatment and amount of antimicrobials used.

Incidence and treatment of bovine mastitis and other diseases on 37 dairy farms in Wisconsin:

[This study](#) analyzed disease incidence, treatment used, and health outcome in dairy herds. Older cows early in lactation were most likely to contract a disease and had the highest chance of culling. Preventing metabolic diseases and managing bacterial diseases are crucial to reducing antimicrobial usage.

Your willingness to participate in the project was vital to the success of the research. The generous gift of time, including meeting with the researchers on your farm, sending your dairy health records, and completing a survey with additional herd health information was crucial to ensuring robust data collection. We appreciate your confidence in the scientific process in allowing the research team to analyze your antimicrobial usage records.

Included are research summaries using data collected at your farm. If you have further questions, please contact the Antimicrobial Stewardship Lab or visit our website. The complete papers can be found online.

As always, we value your data privacy. All information you have shared with us remains confidential and is anonymized when published. Your data is stored securely and has only been accessed by the research team.

Again, thank you,

Dr. Pamela Ruegg



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Research Summary for “Quantification of antimicrobial usage in adult cows and preweaned calves on 40 large Wisconsin dairy farms using dose-based and mass-based metrics.”

Key findings:

- Ceftiofur (Spectramast LC and DC, Cefenil RTU) and cephalosporins (Today, Tomorrow) were the most used antibiotics
- In the herds studied, each animal received antibiotics for an average of 6.3 days per year (range 2.2 to 15.5 days)
- Adult cows received the most antibiotic doses, but preweaned calves received more antibiotics per bodyweight than adults
- Differences in defining a dose (such as 4 vs 1 IMM tube) and single or multiple treatments per day make it challenging to compare farm antibiotic usage

Antibiotic use looks different depending on how you measure it:

	Adult Cows	Preweaned Calves
Dose-based (doses per animal per day)	<p>■ Injectable ■ Intramammary</p>	<p>■ Injectable ■ Oral</p>
Mass-based (mg of antimicrobials per kg of body weight)	<p>■ Injectable ■ Intramammary ■ Oral</p>	<p>■ Injectable ■ Oral</p>

Adult cows received more doses of intramammary antibiotics, but a larger volume of antibiotics from injections. Very few oral antibiotic doses were given, but almost 6% of antibiotics by weight were given orally. Preweaned calves received more doses of antibiotics as injections but had more oral antibiotics per bodyweight.

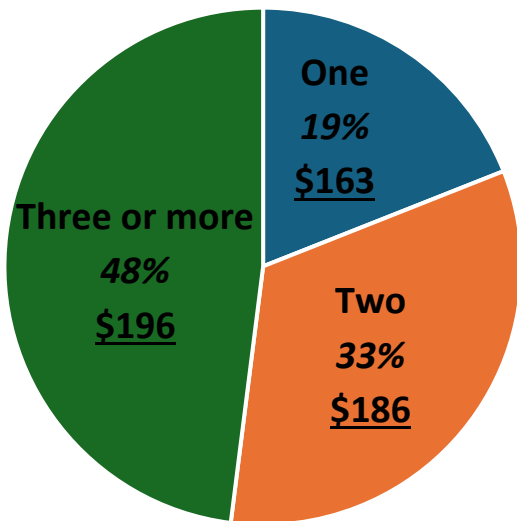
Citation: de Campos JL, Kates A, Steinberger A, Sethi A, Suen G, Shutske J, Safdar N, Goldberg T, Ruegg PL. Quantification of antimicrobial usage in adult cows and preweaned calves on 40 large Wisconsin dairy farms using dose-based and mass-based metrics. *J Dairy Sci.* 2021 Apr;104(4):4727-4745. doi: 10.3168/jds.2020-19315. PMID: 33551167.

Research Summary for “Variation in partial direct costs of treating mastitis among 37 Wisconsin dairy farms.”

Key findings:

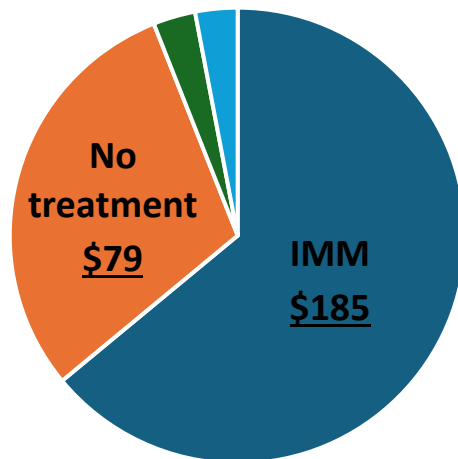
- Partial direct costs are the costs of milk discard and antibiotics or supportive therapies to treat mastitis
- The average partial direct cost was \$192 (range \$118-\$337)
- Using antimicrobials cost an average of \$209 per case, treating without antimicrobials cost an average of \$87 per case
- Most of the direct cost was due to milk discard, so milk price, cow productivity, and DIM should guide treatment decisions
- Partial direct costs could be decreased by \$65 per case if the minimum label duration of antimicrobials was used

Incidence and cost vary by number of lactations



Clinical mastitis become both more common and more expensive to treat as lactation increases

The type of therapy affects the partial direct cost



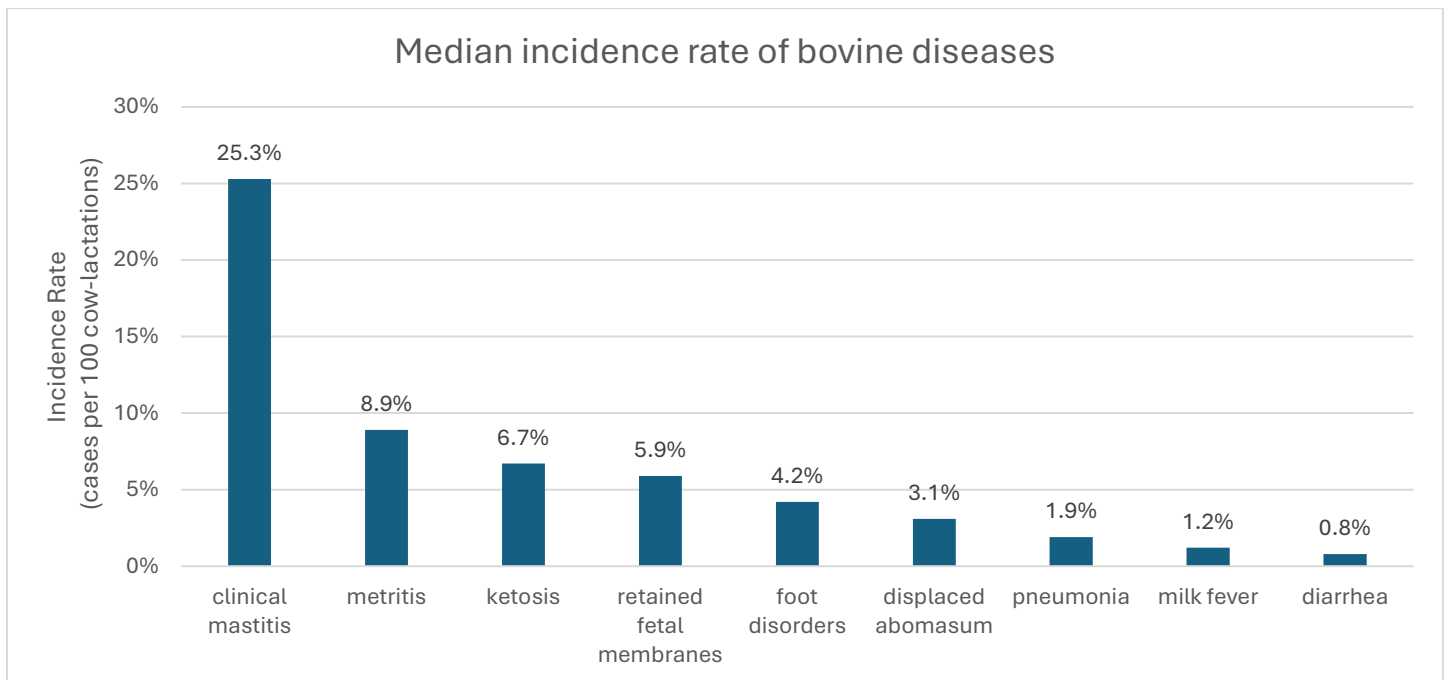
Cases treated with both IMM and INJ antimicrobials had the highest partial direct costs, possibly because these cases were more severe. Other scenarios included only INJ, IMM and supportive therapies, or supportive products alone.

Citation: Leite de Campos J, Gonçalves JL, Kates A, Steinberger A, Sethi A, Suen G, Shutske J, Safdar N, Goldberg T, Ruegg PL. Variation in partial direct costs of treating clinical mastitis among 37 Wisconsin dairy farms. J Dairy Sci. 2023 Dec;106(12):9276-9286. doi: 10.3168/jds.2023-23388. PMID: 37641286.

Research Summary for “Incidence and treatment of bovine mastitis and other diseases on 37 dairy farms in Wisconsin.”

Key findings:

- Most diseases occurred in older cows in early lactation
- All 37 farms reported clinical mastitis, with an incidence rate between 1 and 50%
- 36% of clinical mastitis cases were not treated with antibiotics
- Ceftiofur was the most used antibiotic to treat bacterial diseases
- Because metabolic diseases like milk fever and ketosis increase the risk of bacterial diseases, preventing them is an important factor in reducing antimicrobial usage
- For all diseases, lower parity and earlier lactation cows were more likely to remain on the farm



More than 30% of cows with first cases of displaced abomasum, clinical mastitis, retained fetal membranes, diarrhea, and foot disorders did not receive antibiotics.

More than 50% of cows with first cases of pneumonia, metritis, and clinical mastitis received the antibiotic ceftiofur (Spectramast LC and DC, Exenel, Excede).

Citation: Gonçalves JL, de Campos JL, Steinberger AJ, Safdar N, Kates A, Sethi A, Shutske J, Suen G, Goldberg T, Cue RI, Ruegg PL. Incidence and Treatments of Bovine Mastitis and Other Diseases on 37 Dairy Farms in Wisconsin. *Pathogens*. 2022 Nov 1;11(11):1282. doi: 10.3390/pathogens11111282. PMID: 36365033; PMCID: PMC9698317.