

Making pathogen-based mastitis treatment protocols work for many dairies

By Amy Vasques

Mild or moderate clinical mastitis is defined as infection or inflammation of the mammary gland that results in abnormalities in milk consistency or color and/or swelling or redness of the affected gland. These cases differ from severe mastitis, which manifests as a systemically sick cow. Cows with severe signs most often need systemic and supportive treatment. The financial impact of all cases of mastitis on U.S. dairies amounts to over \$2 billion annually, with losses attributed to treatment costs, milk loss, milk withholds and decreases in reproductive efficiency. Research indicates that these costs can be reduced without appreciable negative outcomes by selectively treating non-severe cases, rather than treating all cases with antibiotics.

Why does this work? Microbiological characterization of the behavior of mastitis pathogens as well as on-farm clinical trials indicate that groups of pathogens, namely

TABLE 1

Treatment protocols, compliance, and bulk tank and milk production characteristics for moderate-sized New York dairy herds enrolled in a pathogen-based mastitis treatment protocol with 24-hour sample pickup five days per week to drive treatment decisions.

Herd	Treatment Protocol	Compliance	BTSCC Before	BTSCC After	ME305 Before	ME305 After
1	Gram +	—	169,000	125,000	32,650	26,083
2	Gram +	85%	188,000	146,000	32,275	31,135
3	Gram +, Cull <i>S. aureus</i>	96%	139,000	178,000	30,777	30,793
4	Gram +	94%	90,000	89,000	31,360	31,800
5	All but "No-Growth"	73%	109,000	116,000	28,694	28,915
6	Gram +	85%	208,000	195,000	27,744	27,744
Average			165,875	147,500	30,953	29,670

Gram-negative bugs such as *Pseudomonas*, respond poorly to antibiotics. Alternatively, cows with pathogens such as *E. coli* experience high self-cure rates. Additionally, approximately 30 percent of cultures from mastitic cows return negative results.

With this knowledge, many dairies use an evidence-based approach to drive mastitis treatment strategies. For example, implementation of a pathogen-based protocol could involve use of on-farm

culture (OFC) to treat only cows with Gram-positive results. There are several challenges to making on-farm culturing work. It requires a detail-oriented, dedicated individual(s) not only to retrieve samples, inoculate the culture plates, and to read the results, but also to maintain inventory of supplies, keep adequate records, and ensure proper function of the incubator. On-farm culturing may entail frequent training for proficiency,

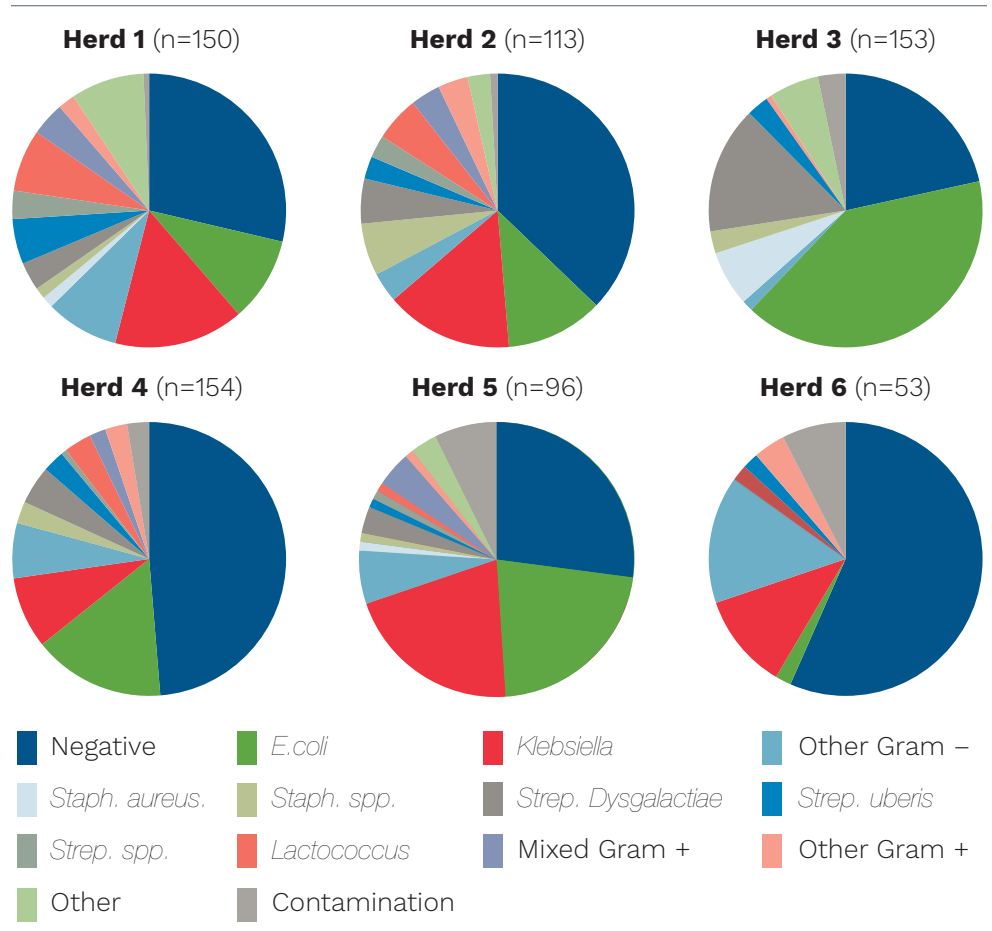
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and some organisms, such as *Mycoplasma* species and *Prototheca*, will not grow using traditional methods or may be difficult to detect.

To explore an alternative to on-farm culturing, our group used culture results generated by a veterinary diagnostic laboratory to drive pathogen-based treatment decisions on six New York dairy herds. Mastitis samples were submitted five days per week with results reported 24 to 36 hours later. This simulated the weekday services offered by veterinary clinics that also have the capacity to culture during a typical workweek. Each enrolled herd milked 500 to 1,000 cows and four of the six dairies treated all clinical cases. The two remaining herds practiced pathogen-based therapy at the time of enrollment: one herd relied on once per week diagnostic lab submissions while the other used on-farm culturing with minimal guidance. All owners and managers were asked to work with their herd veterinarian to develop a protocol that worked for their dairy but were permitted to treat animals on days when samples were not submitted.

FIGURE 1

Distribution of mastitis pathogens from cows with non-severe mastitis on six New York dairy herds.



Briefly, all dairies chose to treat non-contagious Gram-positive pathogens with an intramammary antibiotic. All dairies chose not to treat any quarter with a negative culture result. Variation existed in regards to treatment of Gram-negative pathogens (Table 1).

A total of 719 cases of non-severe mastitis were enrolled. Distribution of pathogens varied by herd (Figure 1) and was the main driver of

antibiotic use (Figure 2). For example, Herd Six elected to treat only Gram-positive pathogens, which amounted to less than 10 percent of their cases. Differences in adopted protocol and pathogen distribution among the six herds resulted in a range of reductions in antimicrobial use (6.8 percent to 92.5 percent). Decreased antibiotic use

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resulted in savings between \$2,200 and \$4,600 per dairy per year when the costs of cultures and antibiotics were accounted for. Other economic benefits that were realized by farms were decreases in milk withhold time, the ability to make quick culling decisions based on culture results, and the ability to target cows with specific types of infections for supportive care.

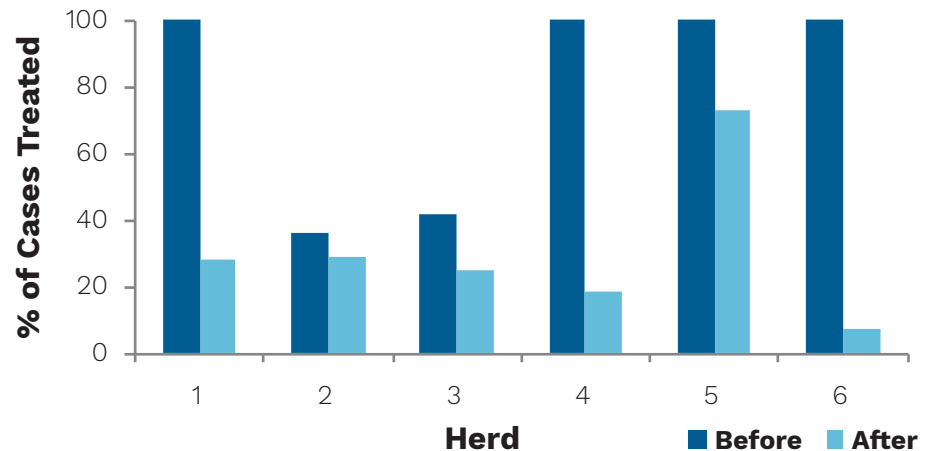
Compliance to the individual protocol was high and ranged from 73 to 96 percent. The least-compliant culture results were for Gram-negative pathogens. Many of these “non-compliant” cases graduated in severity, and cows were subsequently treated with systemic therapy. Bulk tank somatic cell count and mature-equivalent milk production were similar before and after the study for the six dairies (Table 1).

Finally, our study found that good record keeping is imperative to successful pathogen-based protocol, particularly to monitor disease incidents and changes in chronicity. This includes:

1 Recording all disease episodes (including treated and non-treated cows)

FIGURE 2

Percent of non-severe clinical mastitis cases treated with antimicrobials before and after implementation of a pathogen-based treatment protocol by herd. Herds used 24-hour sample pickup five days per week to drive treatment decisions.



2 Use of a single event for each case of mastitis (If multiple treatments or “escape therapy” are used, avoid putting an additional event into the computer.)

3 Consistency of event remarks, including quarter, culture result and treatment

Implementation of prompt reporting of culture results by nearby laboratories can effectively drive pathogen-based clinical mastitis treatment decisions on moderate sized dairies, resulting in decreased use of antimicrobials on all dairies involved. Cultures from all six farms provided data that was useful for decision making,

whether for treatment or culling. No negative outcomes were noted when evaluating bulk tank somatic cell count or milk production. The use of a pathogen-based treatment protocol based on five-day per week results has the potential to decrease antimicrobial use, promote product sustainability and protect aspects of public health. ■

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