

Mastitis Control Program
for
Environmental Strep.-Infected
Dairy Cows

by

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The term "environmental streps." often is used to replace the terms "non-ag. streptococci" and refers to all forms of streptococcal bacteria other than *Streptococcus agalactiae* that are capable of causing mastitis in dairy cows. Two of the most common forms of environmental streps. are *Streptococcus dysgalactiae* (*Strep. dysgalactiae*) and *Streptococcus uberis* (*Strep. uberis*). Other environmental streps. are *Strep. faecalis* and *Strep. bovis*. Often, various other enterococcus and bacteria may be included in this group of streps due to commonly used milk culture techniques which fail to separate out the different bacteria.

This bulletin will focus mainly on *Strep. uberis* and *Strep. dysgalactiae* infections as they are the environmental streps. commonly found in dairy herds. We will suggest useful control and prevention tips for dairy farmers.

Where can the environmental streps. be found on the farm?

The primary sources of environmental strep. bacteria that cause mastitis are environmental sites on the farm such as bedded housing and calving areas, standing water and soil in open corrals and pens. Any animal concentration areas such as shade trees, waterers, round bale feeders and other traffic areas provide sites of significant bacterial concentration. The most frequent and significant sites for teat end exposure are dry_cow lots or pens, calving pens and fresh cow pens, lots or stalls. In addition, outside dirt lots or yards, ponds and low wet areas increase the

risk of environmental strep. infections. *Strep. dysgalactiae* intramammary infections also are related to milking equipment function and teat end integrity.

Another important source of environmental strep. bacteria is the cow. Environmental streps. have been cultured from the mouth, teat, belly and udder skin and reproductive tract; especially, the vagina. These bacteria readily multiply in wounds and sores on skin. Prior to and during calving large numbers of environmental streps. are deposited onto the bedding from belly skin and uterine discharges. Environmental strep. bacteria from the intestinal tract have been recovered from pasture soil where cows have grazed, while *Strep. faecalis* is a normal inhabitant of animal feces.

Because of their many environmental sources, environmental strep bacteria cannot be totally eliminated from a dairy herd. Therefore, to a large extent, control must rely on prevention programs that limit teat end exposure to these bacteria. Additional cow risk factors to consider are teats that leak milk and teat end problems such as injuries, warts or abnormal structures.

How can environmental strep. infections develop and spread within my herd?

Unlike some of the other forms of bacteria that cause mastitis in dairy herds, environmental strep. organisms are not dependent on the mammary gland for survival. Most mammary gland infections caused by environmental streps. occur during the intervals between milkings when the teat end comes in contact with highly contaminated bedding or other surfaces. In herds

with numerous environmental infections, spread at milking time is also likely especially with *Strep. dysgalactiae* where poor milking techniques and faulty equipment exists. In contrast to coliforms, whose population is highest on sawdust bedding, environmental strep. populations are highest on straw bedding. Chopped straw bedding will maintain a higher population of environmental strep. organisms per gram of bedded area than long straw. In arid areas, recycled manure bedding in freestalls and corrals may also harbor significant numbers of environmental streps.

Other farm conditions that may increase the probability of environmental strep. infections include:

- Overcrowding
- Poor ventilation of all housing areas including bred or springing heifer facilities
- Poorly maintained, dirt-based free stalls
- Recent movement of cows to a new farm or new facilities
- Cow access to farm ponds or muddy exercise lots
- General lack of farm cleanliness and sanitation

The above conditions are of particular concern for dry cows, pre-fresh cows and calving areas.

How widespread can environmental strep. infections be within a herd, and what are the problems they cause?

In well managed herds where a low prevalence of *Strep. ag.* and *Staph. aureus* exists, the environmental streps. may be the major mastitis pathogen. Many problem herds will have 20 to 40% of cows infected with environmental streps.on any given day. Depending on the location of the herd, environmental streps.are often the most common or next most common bacteria isolated from heifers freshening for the first time. Most of these infections usually disappear within one to three weeks after calving. However, some long term, chronic infections may persist for the entire lactation.

Environmental strep infections can range from mild, non-clinical cases, to severe, life-threatening infections. Occasionally, a herd may experience an outbreak of many clinical cases within a few days. The multiple clinical cases will relate to a combination of poor weather and poor housing conditions. Research suggests that approximately 50 percent of cows infected with environmental streps. will exhibit clinical signs of mastitis at some time. Most of the clinical infections occur by 60 days in milk. Close to 60 percent of infections generally last less than 30 days. However, many environmental strep. infections may persist for 100 days or more.

A major increase in environmental strep. infections tends to occur at either the beginning or end of a cow's dry period (see Fig. 1). With appropriate dry cow treatment, new infections at the beginning of a dry period may be held to a minimum. Despite total dry cow treatment, the incidence of environmental strep. mastitis cases may rise toward the end of the dry period. The

effectiveness of dry cow treatment drugs only last 14-21 days. Similarly in prepartum heifers, many infections take place shortly prior to calving.

The probability of a new environmental strep infection occurring during the dry period will also increase as a cow gets older. Older cows are 6 – 7 times more likely to have environmental strep. infections and clinical mastitis in early lactation. Infections caused by these bacteria are most likely to occur when the environment is wet and humidity is high. Depending on the geographical location, this may be during rainy transition periods in the summer or winter.

What signs might tip me off that an environmental strep. problem is present within my herd?

- Development of clinical mastitis in any age cows during the first 30 to 60 days of lactation, despite dry cow treatment.
- Excessive numbers of dry cows that have clinical mastitis during the early dry period when dry cow antibiotic treatment is not used.
- Excessive number of first lactation cows that develop clinical mastitis immediately after calving. Fifty to 70 per cent of environmental strep. infections take place in the last 20 days of the dry period.
- A high percentage of cows with non-clinical mastitis and/or signs of clinical mastitis in rear quarters during the first 30 to 60 days of lactation. This may coincide with uterine infections in the same cows.

- An increase in the herd's somatic cell count in the absence of severe clinical infections. This may be due to environmental strep. infections that increase the SCC in cows that are late in lactation (>200 DIM).
- An increase in clinical mastitis cases in herds where good milking hygiene, teat dipping and dry cow treatment programs that have been implemented on all cows for several years.
- Extremely high SCC (>5,000,000) in one quarter of fresh cows (normally rear quarters). A high percentage of the infected quarters cure within 2 to 3 weeks.

What should I do if one or more of the situations described above applies to my herd?

First, confirm the existence of environmental strep. infections in your herd. Aseptically collect sterile milk samples for culture tests from these groups of cows:

- 15 percent of your lactating herd (or at least 10 to 20 cows) selected at random;
- All cows that have a DHIA linear score of 4 or greater;
- All cows that show clinical signs of mastitis.
- All fresh cows within a week after calving.

The milk samples should be cultured in a qualified microbiological laboratory. Your veterinarian may have the proper lab facilities, or you can submit samples to your state animal health diagnostic laboratory or your milk cooperative. Identification of the environmental streps. down to the species requires several laboratory tests to be certain of the bacterial type.

Results may vary between labs. Costs for the cultures and identification to species may cost as much as \$25 per culture, depending on the organism responsible for the infection and the extent of laboratory tests used.

Will a monthly DHIA somatic cell count (SCC) help to identify environmental strep. infected cows?

While an elevated SCC (>LS 4.0) is not specific for any particular bacteria, it does indicate infection. Since many environmental strep. mastitis cases may last up to 30 days (or longer) and SCCs are taken at monthly intervals, many of the infected cows can be pinpointed via high somatic cell counts. However, if 30 to 60% of fresh older cows and fresh heifers have a high SCC at first test, you should suspect that environmental streps. are the likely causative organisms. However, the DHIA SCC should be used with other methods to identify infected cows. The primary purpose of a somatic cell count program is to use it to identify cows with a high probability of infection. For best results, combine an SCC program with culturing to identify infected animals. The CMT can be used to test fresh cows after the 4th milking and to test cows between DHI tests.

Will monitoring clinical cases of mastitis help to identify a problem?

Many clinical cases of mastitis occur early in lactation and will not be picked up by monthly DHIA SCC testing. It is critical to record all clinical cases and culture results. A pattern of

clinical cases in early lactation combined with culturing and DHI SCC will help identify infected cows and causative organism (s).

If I find that my herd does have a problem with environmental streps, what management steps should I take to correct the problem?

- Focus on cows at greatest risk to new environmental infections such as dry cows, close-up cows and heifers, cows and heifers during calving and recently purchased cows. Re-bed these critical areas frequently (weekly) to prevent bacterial buildup. Housing areas for these animals must be clean and dry!
- Immediately clean up environments that could be a source of bacterial growth. This may include poorly maintained free stalls, bedded packs, overused calving pens, muddy lots or yards, or overcrowded shelter areas where cows congregate during hot or cold weather. When these areas are kept clean on a regular basis, the teats are less likely to become contaminated with bacteria between milkings.
- Immediately remove chopped straw bedding or other fine organic bedding such as sawdust, or ground corn cobs from beneath high-producing cows in the first 60 days of lactation. Avoid bedding dry cows and springing heifers within three weeks of calving on these materials. Preferred bedding materials include wood shavings, long straw or a clean grass pasture. Sand when available is strongly suggested many as THE bedding

material for all dry cows as well as for cows in early lactation. Properly composted, recycled manure may be successfully used in arid areas.

- Provide a dry environment for your herd. Damp, humid and wet conditions are likely to increase exposure to environmental pathogens. In addition, drier bedding materials generally contain lower numbers of mastitis-causing bacteria.
- In the Midwest, it is suggested that dry cows and springing heifers not be housed together on manure packs. When housed in freestalls, cow numbers should not exceed 10 percent of the number of free stalls in the barn. Dry cows and springing heifers can be housed on grass pasture assuming that there are no congregation areas to increase risk of environmental infections. Consider having more than one pasture and rotating between pastures on a weekly basis.
- When sand bedded freestalls are utilized for dry cows and springing heifers, keep their time spent in the calving pens to a minimum. This will minimize exposure to contaminated bedding in the calving area.
- Check for heifers or cows suckling other animals. *Strep. dysgalactiae* and *Strep. uberis* infections in the same quarter on different animals may result from suckling.
- Keep cows on their feet after milking by providing them with fresh feed. This will allow the teat sphincter and keratin lining (the inside of the streak canal) to close after milking before the teat end has a chance to be exposed to bacteria in the bedding.

Should I treat lactating cows with DHI SCC LS 5 or greater and confirmed with an environmental strep. infection?

The response to lactational therapy for all environmental strep. mastitis cases generally is 50 percent or less. Based on this response rate, it is generally not worth the cost to treat non-clinical infections during lactation.

Treatment of clinical cases may be necessary to save the infected quarter or cow. Work with your veterinarian to develop a prudent treatment program and keep records of all treatments and responses. By 21 days after treatment, response to antibiotic therapy can be judged by CMT or somatic cell counts. Successful response is indicated by a CMT of negative or trace on all quarters or a DHI LS of 3 or less.

Some of these streps are very resistant to many commercial antibiotic preparations. Antibiotic resistance (sensitivity) testing will not guarantee successful treatment results.

Prepartum intramammary infusion of antibiotics of cows and heifers at 7 to 14 days before expected calving has been shown to be a successful way to eliminate many of the environmental strep. infections that exist in quarters before calving. Lactating cow antibiotics should be used according to label directions and under prescription from your veterinarian. Recommending pre-partum intramammary therapy assumes that the breeding date is known and expected calving date has been accurately determined. Such treatments are extra-label so consult your local veterinarian and milk buyer prior to treatment. All fresh cows and heifers should be monitored for antibiotic residues. Any animals with a metabolic disorder at calving or a problem with calving will likely retain antibiotics past the first 3 to 4 days of lactation.

Can milking management factors influence the occurrence rate of new environmental strep. infections?

Despite the fact that the majority of new environmental streps infections occur between milkings, milking time infections may occur. A rise in the rate of new infections can be influenced by the following milking factors:

- Wet milking of cows (i.e., the use of excessive water with no drying at prep time)
- Excessive liner slippage
- Using badly worn inflations
- Malfunctioning pulsators
- Improper vacuum levels and low air flow rates

Any of these situations can increase the chance of teat damage occurring, which in turn could increase the probability of new infections.

To help avoid problems associated with wet milking:

- Before milking, wash only teats with running water. Dry each teat thoroughly with an individual towel (paper or cloth) before attaching the milk machine. For dairies using sprinkler and drip-dry pens, sprinkler should be properly adjusted to keep the wash area

confined to the udders and lower body. In these situations, sufficient time should be allowed for the cows to completely dry before the first cow enters the parlor.

- If your housing conditions are extremely sanitary and teats are clean, consider pre-dipping instead of washing. Dip teats in a germicidal teat dip. Allow the pre-dip to remain on each teat for 30 seconds. Dry each teat thoroughly with an individual cloth or paper towel. Spraying the teats with a pre-dip can be used if all surfaces of the teats are covered with dip.
- After milking, turn off vacuum before removing teat cups to avoid reverse milk flow against the teat ends. Check milking equipment regularly to make sure it is functioning correctly.

Note that the use of automatic backflushing units will only have a minor impact on the prevention of environmental streptococci infections since most infections occur between milkings.

Is there anything I can do to prevent or reduce the chances of my herd becoming reinfected with environmental streptococci infections once a problem is eliminated?

Unfortunately, environmental streptococci cannot be completely eradicated from a dairy herd.

However, a long-term prevention program should be a part of any mastitis control program.

For best results, consider following these suggestions:

- In freestall housing, maintain and replace bedding for dry cows, calving cows and milking cows to prevent the "hollowing out of the bedding" that allows milk, manure

and urine to accumulate. Scrape or sweep the rear 2 to 3 feet of free stalls and comfort-type stalls twice a day to prevent manure buildup. Pay particular attention to the closeup dry cows less than 21 days prior to calving.

- Calving areas should be cleaned after each freshening. If this is difficult to accomplish, consider minimizing the time that freshening animals are in the calving pens.
- Freestalls and comfort stalls should be correctly designed for the size of cows that will be housed in them. For proper cow stall platform sizes and freestall dimensions, see the bulletin in this series titled "Mastitis Control Program for Coliform-Infected Dairy Cows". When less than 50% of cows are resting in freestalls by 3 hours after milking and feeding, determine the cause and take corrective action to promote greater stall use.
- Avoid overcrowding of freestall or loafing areas so that cows will not rest in alleyways. This will also provide all animals with opportunity to rest the proper amount of time each day.
- Provide cows with adequate daily amounts of vitamins and minerals - particularly selenium and vitamin E. Studies have indicated that deficiencies of vitamin E and selenium can contribute to an increase in the incidence of environmental mastitis. For lactating and dry cows, Michigan State University dairy nutrition specialists recommend a minimum of 1000 IUs of vitamin E per cow. Ohio State researchers recommend 2000 IUs of vitamin E per day. You will have to weigh the cost of extra vitamin E against any benefit you might expect. Other important trace minerals are copper, zinc, and iron.

- Provide well-ventilated and lighted housing areas to prevent environmental stress.
- Cooperate with your local veterinarian, consultant or dairy team to establish environmental streps control and prevention programs.

What about the use of post-milking teat dips in my herd?

Germicidal teat dips can be effective against gram-positive organisms such as environmental streps. As mentioned previously, pre-dipping with a germicidal dip may be beneficial when cows are entering the parlor clean and dry. Post-dipping is effective against those organisms on the teat skin. Post-dips control the growth of bacteria on the teat skin but their effectiveness is limited to 1-2 hours after dipping. Cows that are exposed daily for 10 to 12 hours of unsanitary housing conditions will still become infected.

Figure 1. The time periods when new cases of environmental streps mastitis are most likely to develop. Relative incidence of new infections: xxx – many; x – few; --- very few.

TIME PERIOD	WITH <u>NO</u> DRY COW TREATMENT	WITH DRY COW TREATMENT
First 10 days of dry period	XXX	---
2 to 3 weeks into dry period	X	X

End of dry period	XXX	XXX
At calving	XX	XX

This is one in a series of bulletins on mastitis control in dairy herds. Contact your county Cooperative Extension Service office for information on other forms of mastitis and how to control them.

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