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“It feels like you have leprosy . . .”

Johnes Disease and Organic Dairy Farms

Mary-Howell R. Martens

That’s how Groton, NY farmer, Tom Brown, recently described his and Sally’s 10 year struggle with Johnes Disease on their long-time organic dairy farm. It is to Tom and Sally and other farmers like them that we dedicate article, struggling against nearly impossible odds to keep their farm afloat, but instead of becoming embittered and frustrated, they want to honestly share their experiences, the things they have learned, their successes and their failures, in hopes that their knowledge and hard-knocks education can perhaps spare other farmers similar problems.

Tom Brown says the possibility of Johnes Disease dawns on you slowly. First you notice that a few of your cows or heifers lose weight unusually fast after freshening and just can’t seem to gain it back, despite good appetites and consuming lots of feed. Milk production just doesn’t peak. Their hair coat looks rough, sort of like a wormy calf. Incidence of other diseases, like mastitis and hoof problems, goes up. Then the diarrhea begins – large quantities of watery or ‘pea soup’ brown or greenish liquid, often explosively expelled. Sometimes the manure has small bubbles in it. "It’s like being behind a liquid slurry manure spreader", Sally says. The cow can lose several hundred pounds in a few weeks and milk production drops, but still she is eating.

So you think – I’ll just ship her and that should take care of it. **THINK AGAIN!** If one cow in a herd shows clinical Johnes Disease symptoms, it is pretty safe to assume this is just the tip of the iceberg, indeed, recent USDA surveys have shown that on average, for every cow in a herd with Johnes symptoms, there are probably 15 that are not yet clinical. This means that removing the one clinical cow is likely to only delay the time when you must address the problem.

The past 10 years have been grueling for Tom and Sally, working closely with the NY State Cattle Health Assistance Program (NYSCHAP) and the state veterinarians, testing and retesting their herd intensively, radically changing their feeding, pasturing, handling, and calf raising procedures. Many cows have been lost or culled, along with most of their farm profits, but finally they think they have it under control, only one older cow still testing positive. As long as they keep her in isolation and continue their vigilance with the rest of the herd, they feel this experience is thankfully behind them. But they know of many other farms in New York and Pennsylvania who haven't been this fortunate, and many more farms that haven't considered Johnes as a possible explanation for other problems on their farm.

"It's the old Ostrich Act" says Sally, but unfortunately, Johnes won't get better by ignoring it.

Johnes Disease is particularly difficult to control largely because detectable symptoms appear a year or more after the cow has been infected, and often long after she has begun infecting others. Actually in this, Johnes acts more like AIDS than like leprosy. While there are tests available for manure, milk and blood, these are not very reliable in the early stages of infection. The milk or blood ELISA test measures antibodies to the organism that causes the disease in the animal. The manure/fecal test detects bacteria present, but can take over 2 months to incubate in the laboratory. A newer PCR test checks for bacterial DNA in the manure - it is much faster and very accurate, but is more expensive.

STAGE 1 is when animals are infected with the bacteria, usually as a young calf or young heifer. Older cows are less susceptible, but still can become infected. Newborn calves easily get infected through contaminated colostrum or dirty teats, since the 'open gut' that lets antibodies in will also admit Johnes bacteria. However, infection usually begins when calves are exposed to manure or milk from infected cows. It only takes 'a thimble-full' of infected milk or manure to infect a susceptible young animal. Young animals do not show any clinical symptoms and currently there are no tests able to diagnose animals in Stage 1. The animals do not shed infective bacteria in their manure so a fecal culture will be negative and the immune system has not generated enough antibodies for these animals to be ELISA positive. The progression beyond stage 1 is often slow and unpredictable - it is even possible that some animals recover from the infection, or simply never progress. Animal stress, and nutritional and disease status seem to play critical role in both initial infection and disease progression.

STAGE 2 is also a subclinical stage, The animals appear healthy and normal, but they begin to shed active bacteria intermittently and therefore can infect other animals. When actively shedding, a fecal test can identify positive animals in stage 2, but generally there are not enough antibodies for an ELISA test to be reliable.

STAGE 3 animals usually still appear normal and healthy, but they present a significant infection risk when they are shedding bacteria in their manure. These animals may also seem more susceptible to other opportunistic diseases, Bacteria can be present in colostrum and milk in about half of these animals, and infection of the calf may occur in pregnant cows, either in utero or during birth. Both a fecal culture and an ELISA test can accurately identify stage 3 animals. The progression from stage 3 to stage 4 often is precipitated by a stressful event, such as calving, other diseases (especially acidosis), social stress, a 'feed insult' like mycotoxins or excess starch/protein, or moving.

STAGE 4 is when the clinical (visible) symptoms develop. Cattle now exhibit diarrhea, weight loss, and decreased milk production, although they usually still have a good appetite. The manure is soupy and the lining of the intestines becomes thickened and smooth, with rapidly decreasing 'villi' for nutrient absorption. Fluid can accumulate under the jaw, causing a characteristic known as "bottle jaw". These animals shed very large amounts of bacteria in manure, colostrum and milk. Infection of the calf may occur in pregnant cows, either in utero or during birth. Occasionally, a temporary recovery may

occur, the diarrhea lessens briefly, but the animal usually relapses.

A few difficult truths again Johnes Disease and organic dairy farming

- ❖ **Because organic dairy farms must pasture their animals** and because most do not have enough land to have permanent separate pastures for heifers and cows and for Johnes positive and negative animals, there is a very high risk of infection while on pasture. Even if you don't pasture cows and heifers together, if the heifers follow the cows, there is still risk since live bacteria can survive in soil or on organic matter for years. The typical Johnes diarrhea from a late stage 3 and stage 4 animal, with its liquid consistency and explosive expulsion, means that large amounts of uneaten pasture can be effectively 'sprayed' . As other animals graze, even if they avoid highly contaminated areas, it is very likely they will ingest sufficient quantities of the spray. In the past, organic dairy farmers could petition their certifier for a variance to keep some cows off pasture in a serious Johnes eradication situation, but this probably is no longer an option with current USDA-NOP organic rules.
- ❖ **Because organic dairy farms must feed whole milk, not milk replacer**, to their calves, this presents a very significant risk if their dairy cows are positive. Some organic dairy farms test all their cows and feed calves only colostrum and milk from repeatedly negative cows, while others pasteurize all the milk they feed to calves - that is valuable protection but cost prohibitive on most typical organic dairy farms. Freezing excess colostrum from negative cows for later use is very important so you aren't tempted to use positive colostrum 'in a pinch'. In the past, organic dairy farmers could petition their certifier for a variance to use milk replacer in a serious Johnes eradication situation, but this may no longer be an option with current USDA-NOP organic rules.
- ❖ In order to increase their milking herd, **many organic dairy farms purchase replacement heifers and cows from other farms**, from cattle dealers, or at organic dairy auctions. Because few organic dairy farms sell their 'good' cows, there is a high possibility of buying a Johnes cow. Bringing in just one infected cow to a clean herd can rapidly spread the infection. It is important to purchase only replacement animals that test negative, and equally, it is truly unethical to sell your positive or suspicious animals to another farmer.
- ❖ Among organic dairy farmers, **there are strong advocates of using designated 'nurse cows'** to raise calves as naturally as possible. Too often the cows assigned this status are the low producers, which could indicate Johnes. To be safe, calves should **NEVER** nurse on a Johnes positive cow, and if you are using nurse cows, never co-mingle with other dairy cows since calves accustomed to suckling are not very reliable about nursing only on 'Mom'. Also be aware that even if a cow tests negative, if there is Johnes positive manure on her udder, a suckling calf can become infected.

- ❖ **Typically organic cows live longer than conventional cows.** Where the average lifespan for a cow on a conventional farm is 4-5 years, organic farms may have cows producing for 10 or more years. Active Stage 4 Johnes is simply less common in a bunch of young first or second calf heifers than in a herd of older cows. Organic dairy farms are also more likely to have Jerseys, Guernseys and other non-Holstein breeds, and there is some evidence that these breeds may be more susceptible.
- ❖ In the past few years, medical science has been investigating the possibility of a link between Johnes Disease in cows, caused by *Mycobacterium avium* spp. *paratuberculosis*, and the very similar human illness, **Crohn's Disease**. While commercial pasteurization theoretically kills the bacteria, some studies have shown that a low level of bacteria can survive. There is also evidence that the bacteria can be present in meat of Stage 4 animals and may not be sufficiently killed by cooking. While this is not conclusive, it makes very good sense avoid drinking raw milk from Johnes positive cows (or commingled milk), especially for children, pregnant women, or people with weakened immune systems.

What can you do?

1. Get your herd tested regularly, especially all animals of breeding age. Currently, experts recommend testing every 6-12 months to identify animals transitioning from subclinical to clinical Johnes. Many states offer Johnes management programs to farmers at minimal cost, with veterinarians and trained staff who can evaluate a farm for risks, offer lab testing, and make useful suggestions on how to implement improved management procedures.

2. Be constantly aware and vigilant of where the risk points are on your farm and educate all your helpers/staff. Infection risk is as simple as just once having manure on your boots when you feed the calves, or just once casually stepping from walkway into the manger, or just once feeding the calves milk from one infected cow. Do your children help in the barn? Do they ever climb from the walkway to manger without first washing their boots? If they feed the calves, do they know to keep their boots away from where the calves may eat? Do you ever use the same loader or skid steer for scraping manure and hauling feed? Consider having a hose in the barn, to make rinsing of boots, tools and machinery easy and convenient.

3. Keep a chart in the barn showing Johnes test status on all cows. If any of your cows test positive, make sure everyone knows not to feed their milk to calves. If any of your cows test positive or if you have reason to suspect they might be positive, consider pasteurizing the calf milk, since although pasteurization doesn't always kill the entire pathogen load, it does certainly significantly reduce the risk.

4. Control your manure and follow where it goes. Manure is the highest risk factor on most farms. Keep manure clearly separated from feeding areas and feed storage, from where calves are, where machinery drives, and where feet walk. In addition to feet (human and bovine), pay attention to possible manure contamination with forks, skid steer loaders, shovels, water troughs, and water runoff. Some farmers have two sets of

shovels, forks and other tools clearly labeled 'feed only' and 'manure only'. In order of priorities, manure control is most important in (1) calving pens, (2) pre-weaning calf pens (3) post-weaning calf pens, and (4) bred heifer areas. At all times remember - where there is mature cow manure, there may be Johnes bacteria. If you have both Johnes positive and negative cows in the herd, Sally Brown recommends having separate calving pens that are kept scrupulously clean to avoid infection at birth.

5. Keep the stress level for calves and cows as low as possible since stress seems to be critical for both susceptibility and disease progression. Learn to evaluate stress by scoring the animal behavior, and learn to identify conditions that can cause stress or reduce comfort. Learn to watch your animals - the way they walk, the way they lie down, the way they eat, the way they graze - for clues about stress level and social interaction. Learn to evaluate manure and feed refusals for additional clues. Control internal parasites. Make sure cows have adequate clean water, and are not crowded/overstocked in the barn or on pasture without enough space to eat, move around and lie down.

6. Make sure all feed rations are adequate and balanced, and that the forage provides sufficient effective fiber. Minimize mycotoxins in forage and grain (especially fermented forage). Calves fed plenty of dry hay and minimal grain seem less susceptible to initial infection. Heifers and cows fed high grain/low forage diets, especially when this results in acidosis, seem more likely to progress to Stage 4 and become heavy bacteria shedders. Certain key micronutrient deficiencies have been implicated in increased susceptibility and disease progression, especially copper, zinc, selenium and manganese. Although this has yet to be fully proven, it certainly makes sense to ensure that these minerals are never deficient.

7. Consider how you handle feed refusals. Many farmers sweep up the feed the milking cows don't eat and give it to the heifers. If there is any chance manure gets into this refusal feed, you may be infecting the heifers.

8. There are no medications, organic or conventional, that will "cure" a cow already infected with Johnes. There is a Johnes vaccine available, but it is limited in value. The vaccine will not eliminate a current Johnes infection, nor will it prevent a calf from getting infected, but it can significantly decrease bacterial shedding into the manure. Most experts feel that the vaccine is valuable only as an additional tool in a comprehensive Johnes program.

9. If you must purchase heifers or cows, try to make sure you buy from clean herds, and get the cow tested before purchase. This is obviously not perfect protection, since a positive cow will test negative in the early stages of the disease, but it is considerably better than not taking this into account at all.

10. Ultimately, your best defense is to be aware of Johnes, what it looks like, how it is spread, what you can do to minimize the risk, and be willing to accept the fact that you - *yes, even you* - may have to deal with it. This disease is common on Northeast dairy farms, organic and conventional, big and small. The state vet has told Tom and Sally Brown that it is the rare farm out that doesn't have some Johnes cows. With a diligent

management plan, your farm can be one of those rare places that keeps Johnes Disease under control!