

Johnes Disease and Manure Management

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Johnes Disease is a contagious, usually fatal disease affecting the small intestine of ruminants. Infection is through oral ingestion of *Mycobacterium avium subsp. tuberculosis* (MAP). Farm surveys suggest that a significant percentage of U.S. dairy herds have one or more animals testing positive for Johnes Disease. One study found that 22% of U.S. dairy herds are infected by MAP, but the disease is increasing in prevalence and it's likely that the current infection level is somewhat higher. Young ruminants, especially those under six months of age, are much more susceptible to infection than are older ones. Ingestion of manure containing the MAP pathogen is the most common way animals become infected. Therefore, manure application to forages is a potential source of infection.

Prevent infection of calves and young heifers

Every effort must be made to prevent ingestion of manure by calves and young heifers. Pastures should not be manured during the season the calves and heifers have access to them. MAP can live for at least six months under certain field conditions. However, MAP is quite susceptible to high pH, and there's evidence suggesting that lime application can kill the pathogen. Therefore, if soil analysis indicates a need for agricultural lime, it should be applied at or near the time you apply manure to pastures grazed by young stock.

MAP survival on ensiled forages from fields topdressed with manure

Two Japanese studies found 100% mortality of MAP in properly ensiled alfalfa that was inoculated with the pathogen. While these were laboratory studies with dried alfalfa that was reconstituted to typical silage moistures, the results are encouraging. However, some MAP survived when alfalfa wasn't properly fermented due to high forage dry matter content: While there was 0% survival at both 25% and 40% DM, 13% of MAP survived at 55% DM. Since fermentation often isn't as good in the spoiled silage layer on top of the silo, this is one more reason to remove and discard this material. While it would be beneficial to have field-scale trials confirming that proper silage fermentation kills MAP, it appears that ensiled forages that were topdressed with manure can safely be fed to cows and older heifers providing these steps are taken:

1. Topdress manure as soon as possible following forage harvest to permit sufficient time for environmental conditions to reduce MAP levels. Both sunlight and drying have been found to kill MAP.
2. Use care in mowing and raking or combining windrows, to avoid contamination of forage with manure residues.

3. Use good ensiling techniques including proper dry matter content (generally 30-40% DM), rapid filling, adequate packing, covering as soon as the silo is filled, and use of a silage inoculant.
4. Allow sufficient time for complete fermentation before feeding the silage.

MAP survival on forages topdressed with manure and harvested as dry hay

Less is known about MAP survival on forages that are topdressed with manure and then harvested as dry hay. While a 30-day interval between manure application and harvest should significantly reduce MAP numbers due to the combined effects of drying, sunlight and precipitation that washes some of the manure from plants, there's some question of MAP mortality in any manure adhering to the underside of leaves. Until more is known about this, it would be best to avoid feeding to calves and young heifers any dry hay that was topdressed with manure. Obviously, the status of Johnes Disease on a particular farm will play a significant role in the importance of following these guidelines.

Field Situation	Animal Class	Manure topdress?
Pastures	Calves and young heifers	No
Pastures	Cows	Avoid
Dry hay	Calves and young heifers	Avoid
Legume and grass silage	All	OK
Summer annual silage	All	OK
Summer annual greenchop	All	Avoid