

# Survival of *Mycobacterium bovis* during forage ensiling

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## Introduction

Understanding potential transmission modes of *Mycobacterium bovis* (MB), the causative agent of bovine tuberculosis, is important for mitigating the risk of cattle herd infections. Cattle feed contaminated by MB from oral secretions of infected wild white tail deer in Northeast Michigan is believed to be a major route of MB transmission to nearby cattle herds. Ensiled feeds are commonly fed to cattle in this region, but it is unknown if MB can survive the ensiling process. The objective of this study was to determine if MB could survive the ensiling process of feedstuffs that are commonly used to feed cattle in Northeast Michigan.

## Materials and Methods

Forages (alfalfa, mixed forage with mostly grass, and whole plant corn) commonly ensiled in Northeast Michigan were harvested from Michigan State University farms using standard practices. Freshly harvested samples were ensiled under laboratory conditions using a vacuum packing system. Prior to ensiling, forages were inoculated with MB. At days 0, 1, 2, 6, 8, 10 or 13, 15, 28, 56 or 66, and 112 (0=immediately after inoculation), samples of forages were analyzed by both liquid (BACTEC) and solid media (Middlebrook 7H11) culture and quantitative real-time PCR. In addition, parallel non-infected control samples were submitted for forage analysis to assess fermentation quality.

## Results

Based on forage analysis profiles, the alfalfa and corn forages underwent acceptable fermentation while the mixed mostly grass was ensiled at too high of a dry matter content and underwent less than optimal fermentation. MB was not cultured nor was the DNA from MB detected in any control samples of ensiled feedstuffs. MB was cultured from all forages immediately after inoculation at the day 0 time point. Subsequently, MB was cultured out to day 2, 28, and 2 for alfalfa, mixed mostly grass, and corn forages respectively. MB DNA was detected by PCR in all ensiled forage at all time points.

## Significance

The inability of MB to be cultured following ensiling suggests the risk of MB contaminated forages serving as source of transmission following ensiling is low. The ability to culture MB in the mixed mostly grass silage for a longer period of time may have reflected the less than optimal fermentation process, and supports fermentation as being detrimental to MB viability. Although MB could not be cultured for an extended period of time, DNA evidence of MB could be detected for the duration of the study. It is unknown if this is DNA that is protected in inactivated bacteria or could represent dormant MB

# Impact of stockmanship training on dairy farms

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## Introduction

Cattle are handled daily on dairy farms. Cow-human interactions can influence cow-flow and production as well as well-being of cows and their handlers. Our objectives

were to study the stockmanship (low stress cattle handling) knowledge, skills, and behaviors of workers on larger dairy operations and to evaluate the impact on cattle flow and on cattle handling skills.

## Materials and Methods

Six large dairy farms (400 to 1000 milking cows) and their employees in Minnesota and Wisconsin participated. Cameras were installed overlooking the home pen, holding pen, and in the parlor to capture human-animal interactions and cattle behavior at milking time. Farms were filmed 3 months before and 3 months after the bilingual on-farm stockmanship training. Filming was conducted in the fresh cow group at different milking times. Pre-determined human and animal behavior activities were scored on selected shifts from pen to parlor.

## Results

The majority (87%; 40 of 46) of interviewed dairy employees indicated that the stockmanship training pro-

vided them with new insight towards cow behavior. Most participants found the stockmanship tips helpful (90%), had implemented them into their daily routine (85%), and found that it had positively impacted their attitude towards working with cows (55%). Often the impact on cattle handling and cow behavior were dependent on the farm. General observations included: 1) overall less escape behavior was seen from cows in the home pen, 2) a higher percent of cows faced the milking parlor in the holding pen, and 3) less handling errors and kicking was observed in the milking parlor after the training.

## Significance

In conclusion, dairy employees valued training about stockmanship and positive changes in cow behavior were observed after herds had participated in the training.

# Use of antibiotics on U.S. dairy operations

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## Introduction

Veterinarians are the primary health providers and/or consultants on most dairy operations. In this role, veterinarians are usually involved in the selection and use of antibiotics. Preventing drug residues in milk and meat has always been a priority for veterinarians, and guidelines for judicious use of antibiotics are available to dairy practitioners. The use of antibiotics in livestock agriculture is coming under increased scrutiny because of the focus on reducing antibiotic resistance. In the past few years, the Food and Drug Administration (FDA) has released 2 guidance documents for industry. One document recommends that drugs important to human health (i.e., medically important) no longer be labeled for use in animal feed for growth promotion and/or feed efficiency, while the other calls for veterinary oversight during the administration of these drugs in feed or water. The objective of this study was to describe the use of antibiotics on dairy operations.

## Materials and Methods

The National Animal Health Monitoring System (NAHMS) Dairy 2014 study was conducted in the nation's top 17 dairy states. These states represented approximately 80% of US dairy operations and dairy cows. During March through July 2014, veterinary medical officers or animal

health technicians visited 265 dairy operations that had at least 30 cows. Multiple questions from the study's questionnaire focused on antibiotic use during 2013 in the following cattle classes: preweaned, weaned, pregnant, and adult. Statistical software, which accounted for the complex study design, was used to provide estimates reflective of the US population of dairy producers.

## Results

Ionophores were fed to weaned heifers on 50.5% of operations and fed to 62.7% of all weaned heifers. Similarly, 39.3% of operations fed ionophores to pregnant heifers, representing 46.8% of all pregnant heifers. Cows were fed ionophores on 37.0% of operations, with a higher percentage of medium and large operations feeding ionophores to cows (56.2 and 62.7%, respectively) compared with very small and small operations (20.4 and 27.7%, respectively;  $p < 0.0001$ ). The largest use of non-feed antibiotics was dry cow therapy, where 88.5% of operations reported dry treating all cows, and overall 93.0% of all cows were dry treated. For dry-cow therapy, beta lactams were the predominant drugs used and 22.3% of dry-treated cows received third generation cephalosporins. Diarrhea was the most common disease in preweaned heifers: 21.3% of all heifers were affected with diarrhea, and 15.9% of all heifers were treated with antibiotics for diarrhea. The primary antibiotics given for diarrhea