

Tuberculosis (*M. bovis*) Eradication in Livestock

A new problem with an old disease



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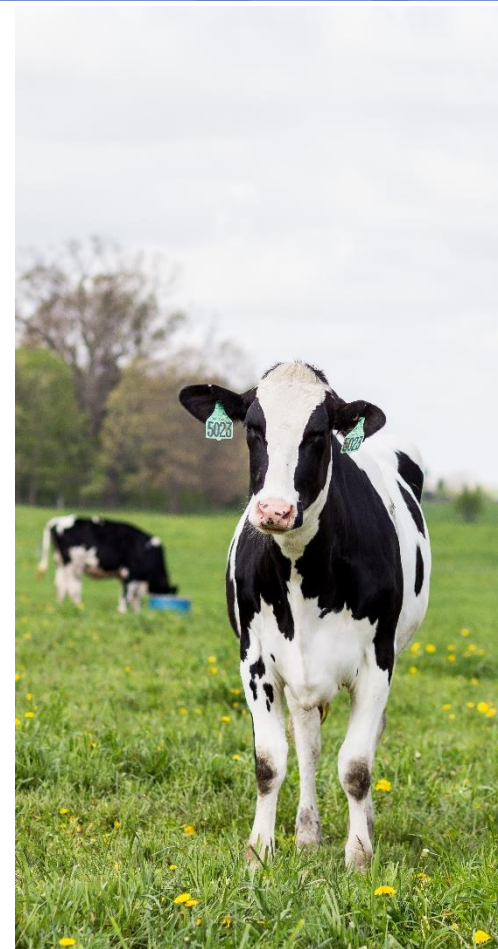
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TB Control/Eradication in Livestock

- TB is one of the oldest diseases in recorded history
 - 19th century – 20% of all human deaths
 - Currently 9 million new infections and 2 million deaths per year
- 100 year old effort in the U.S.
 - Primarily in cattle and swine; more recently cervids (deer/elk)
- Currently 5-10 new infected livestock herds found per year (1 million herds in the U.S.)





Why a Bovine TB Eradication Program?

- M. bovis was a significant part of the human TB problem
 - 20-30% of TB cases were likely related to cattle or cattle products
 - 25% of tuberculosis cases in children were caused by M.bovis
- Large and growing problem in livestock
 - 10% of dairy cattle and 2% of beef cattle were infected (1915)
 - 2/3 of condemned carcasses were for “tuberculous meat”
 - European cattle herds were highly infected, showing where disease might lead if left unchecked





How do we attack TB?

- Surveillance
 - Ante-mortem/on-farm
 - Sensitive/expensive
 - Post-mortem/slaughter plants
 - Insensitive/economical
- Epidemiology
 - Identify infected and exposed
 - History is critical, but we can't communicate with the patient!
- Eradication
 - Eliminate infected and exposed

Surveillance



Eradication



The Old Model - Bulk of the TB Effort is Diagnostics

- Largest volume of TB surveillance is visual inspection of carcasses for lesions
 - 30 million/year
- Ante-mortem testing is used for epidemiologic and preventative reasons
 - 1 million+/year
 - Potential source or exposed herds, surveillance in high-risk areas, testing prior to sale
- Stepwise diagnostics – screening is only the first step
 - moving from less specific to more specific tests
 - Intradermal, comparative intradermal, gamma interferon, PCR, mycobacterial culture



Why so much emphasis on diagnostics?

- Accurate identification of infection is critical
 - Consequences of infection are significant
 - Financial/Emotional on family
 - Other farms related due to animal movements
 - Industry-wide
 - Treatment is not an option
 - Antibiotics are not approved in food producing animals
 - Dose and duration are cost prohibitive
 - You don't want to “accidentally” put someone through this.



Why are we still at it after all this time?

- The bug
 - Dang that bug!
It hides (from our tests)
 - And it waits
(in and on things)
 - And it infects –
everything!

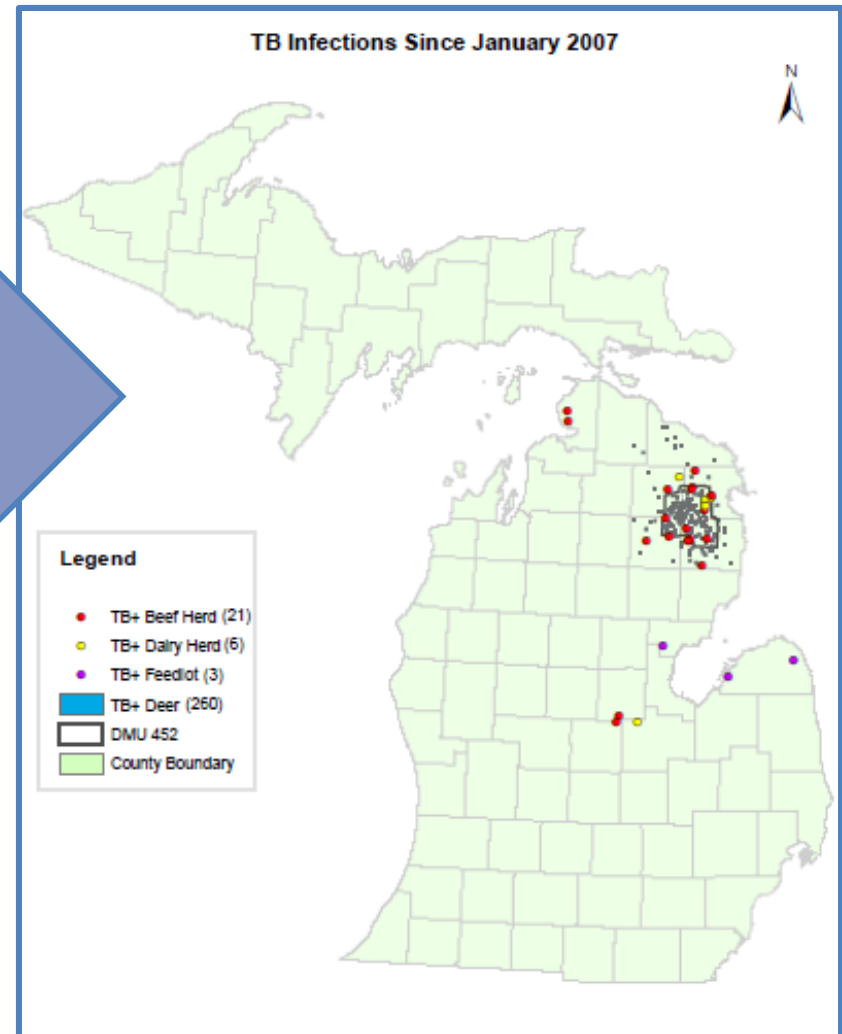




Michigan's added problem – TB in Wild Deer



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Wildlife Reservoirs – Why do we have TB in Wild Deer in Michigan?

- High deer density
- Focal concentrations caused by supplemental feeding and baiting





Wildlife Reservoirs

- Difficult to impossible to eradicate
 - Can't test at individual level
 - Large populations
 - Delivery of prophylaxis or treatment difficult
 - Random inconsistent movements and exposure
- Indirect/fomite transmission must be controlled
 - TB can remain infective in the environment for months
 - Extremely low dose needed for infection
 - Livestock share their silverware and don't cover their mouth when they sneeze!
- Take home message – It's not going away in the deer anytime soon!



The New Model in Michigan; separating deer from cattle – literally and conceptually

Protect herds from getting infected in the face of a long-term reservoir of infection



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Change a Culture – Deer Management





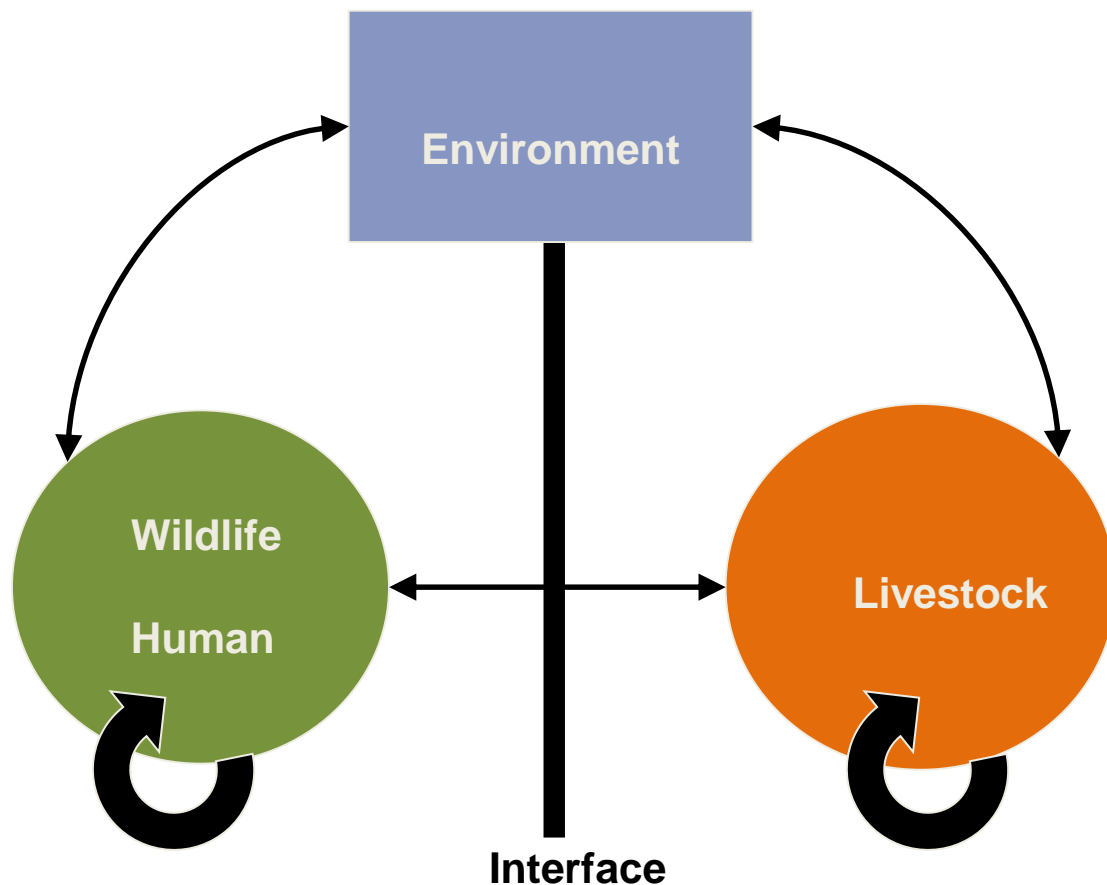
Change a Culture – ... and Cattle Management





TB Transmission – One Health

- Farmers
- Wildlife Biologists
- Veterinarians
- Researchers
- Physicians
- Livestock Experts
- Programmers
- Feed Producers
- Meat Processors
- Livestock Saleyards
- Transporters
- Conservationists
- Hunters
- Wildlife Enthusiasts





Change a Culture

- Teams of people offering to help someone with what they can't do themselves
 - Change from a regional battle to a farm-by-farm battle
 - Individual response for specific risks
- Make farmers as much as an expert as you are
 - Get them to the level where they can protect themselves
 - Manage deer populations on a local level until you can manage them on a wider scale level.



Change a Culture



- Bring communities of farmers together
 - Shared values
 - Shared difficulties
 - Shared solutions
- Don't lead a horse to water – Make him thirsty!

