

TEXAS ANIMAL HEALTH COMMISSION



Bovine Tuberculosis Risk Assessment – El Paso and Hudspeth Counties

September 1, 2014

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Executive Summary

House Bill 1081 directed the Texas Animal Health Commission (TAHC) to conduct a study, with a report to be submitted by September 1, 2014, regarding the current risk of bovine tuberculosis (TB) in areas determined to be at high risk for TB. This area is defined by TAHC rule as the Movement Restriction Zone (MRZ). This report details the results of that study and includes recommendations based on the risk assessment conducted by TAHC.

The TAHC is currently and has historically been heavily involved with TB eradication efforts at the state, national, and international level. Bovine tuberculosis (TB) is an infectious, granulomatous, zoonotic disease caused by the bacillus *Mycobacterium bovis*. The Cooperative State-Federal Tuberculosis Eradication Program began in 1917 with the goal of eradicating this disease due to its severe economic and animal health impacts on the US cattle industry. When the Program was initiated in 1917, herd prevalence was 5%. National herd prevalence is now .001%, and all states currently have a TB Free status except California (due to affected dairies) and parts of Michigan (due to wildlife reservoirs).

Testing methods for bovine TB have seen a number of improvements since the implementation of the MRZ, however no test is 100% sensitive at detecting the disease in any species. Advances have been made in ante mortem (live animal) testing for bovine TB in certain cervids, and in confirmation testing of cattle identified as TB suspects on the Caudal Fold Test (CFT). The screening test of choice in cattle remains the CFT. The CFT detects approximately 84% of TB infected animals, making it possible that an infected herd may be missed using the current screening methods.

The MRZ, which effectively prohibits dairies from operating in the zone, was established in 2001 in parts of El Paso and Hudspeth counties. The MRZ was necessary due to the persistence of TB in the area despite aggressive and costly surveillance and eradication efforts conducted continuously since 1985. Intensive investigations and dedicated studies did not determine the source of infection for the dairy herds. The role of wildlife, human and environmental factors contributing to the persistence of disease in this region were studied. The conclusion drawn from the study was that cattle appeared to be the only known reservoir of *M. bovis* in the area. Since the establishment of the MRZ, as well as the associated depopulation of dairies in the area and surveillance in other susceptible species, no new cases of bovine TB have been confirmed within the area. Testing of TB-susceptible species in the MRZ in 2014 indicates that earlier eradication and control measures were effective and the area remains free of bovine TB.

Bovine TB in Mexico was and continues to be a concern with regard to possible introduction of this disease into Texas. There were at least 10 bovine TB affected dairies in the period between 1985 and 2000 in Chihuahua, Mexico, just across the Rio Grande from the El Paso area. A case-control study by USDA- Center for Epidemiology and Animal Health (CEAH) on 7 affected dairies in El Paso and 27 control dairies in the southwestern U.S. concluded that, of multiple factors studied, the only factor that was statistically significant was the proximity to the

US-Mexican border. A separate spatial analysis by USDA-CEAH suggested the closer any El Paso dairy was to a particular Mexican dairy, the greater the herd's risk of being quarantined.

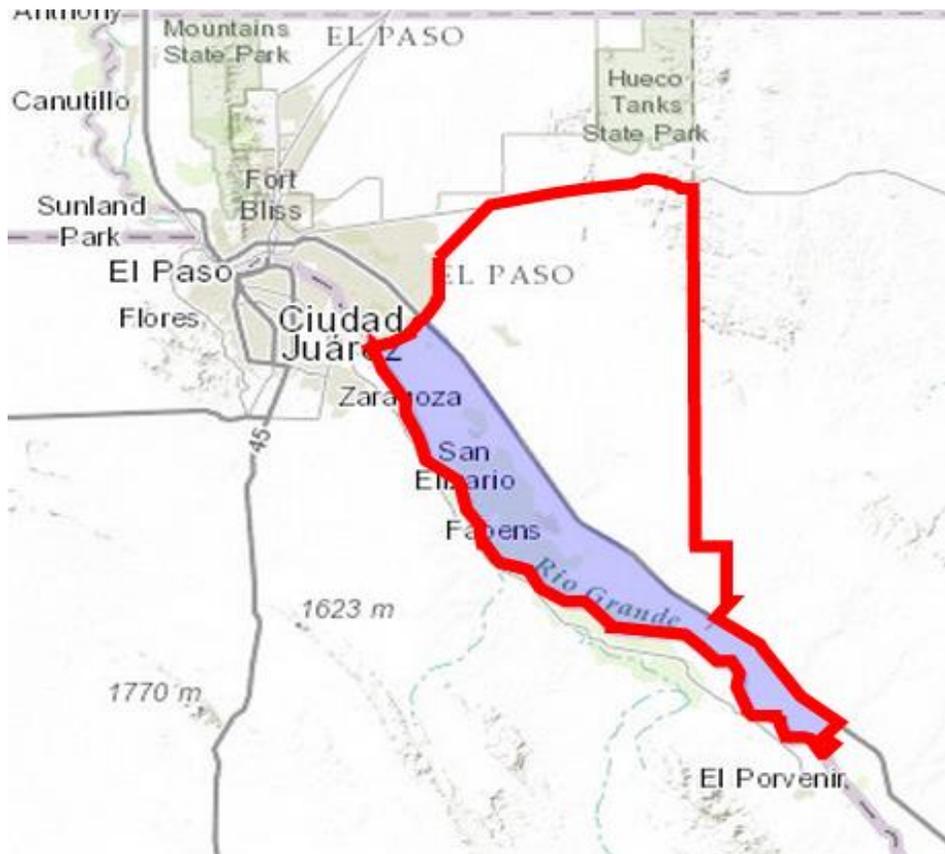
Molecular genotyping techniques confirmed the same three distinct strains of *M. bovis* were present in cattle in El Paso, Texas, Las Cruces, New Mexico and Juarez, Mexico. How these disease agents were being moved across the border was never proven, and remains a factor to be considered in any action taken now regarding safeguards against recursion. There are indications that Mexico has made some progress in controlling bovine TB in the area nearest to the MRZ. In June 2014, a review of the state of Chihuahua, Mexico was conducted by a team of experts organized and led by the United States Department of Agriculture, Veterinary Services (VS). This review resulted in an upgrade of 56 municipalities from Accredited Preparatory status to provisional Modified Accredited (MA) status, including those municipalities bordering the MRZ in Texas. One of the qualifications for MA status is herd prevalence below .5% in the zone in the past 12 months. The provisional designation in this case means that in addition to the regular requirements for MA status areas, a whole-herd test of the herd of origin will be required after January 1, 2013. While some information regarding two large dairies near the MRZ was provided as evidence of TB-free status, several small dairies are reported to be in operation. No information has been provided to the TAHC on their status.

In 2006, Texas achieved and then maintained its TB Free status through depopulation of affected dairies in El Paso and Hudspeth counties, establishment of the MRZ, repeated area testing, implementation of entry test requirements on dairy animals from other states, test requirements on Mexico origin rodeo cattle, and official identification requirements to facilitate tracing suspect animals. Two bovine TB affected herds have been discovered in the state since Texas gained TB Free status, one dairy and one beef herd. Subsequent investigations showed no connection to a geographical area near the border. The TAHC continues active surveillance and eradication efforts statewide, and has rules in place targeting other high-risk populations of animals. The most recent efforts have been directed at mitigating the risks of TB transmission posed by commingling dairy heifers from multiple herds at calf ranches, and adopting rules allowing approved feed yards to receive restricted animals to be grown, tested, and later released back into production.

In summary, significant progress has been made in the bovine TB eradication program and the MRZ proved to be a useful tool in the Texas program. While re-evaluating existing rules is appropriate at this point in the program, caution is still warranted due to the potential impacts to the state and the U.S. if bovine TB were allowed to regain a foothold. One potential complication is that federal funds available for depopulating herds are on the decline. The only option available to dairymen and owners of large TB-affected herds in the future will likely be a test-and-removal program. While this type of program has been used with some success in herds in other areas of Texas and in other states, it proved to be largely unsuccessful in affected herds in the El Paso area.

After considering the available information, it is the conclusion of TAHC that if dairies are allowed to operate in the El Paso area, the risk of bovine TB re-establishing and then spreading to other herds is low but still significant. It is recommended¹ that the Surveillance Area within the MRZ be dissolved, but the Affected Area within the MRZ remain designated as at-risk for bovine TB as a safeguard against costly recurrence. It is further recommended that requirements for annual testing of all cattle, bison, captive cervid, exotic bovid, and camelid herds within the Affected Area be removed and the testing interval, if necessary, be determined epidemiologically by the Commission.

El Paso Movement Restriction Zone



KEY:

∩ Current Movement Restriction Zone

■ High Risk Zone/Affected Area

Unshaded area within MRZ represents Surveillance

¹ This risk assessment and recommendations found herein in no way affect or change the terms, agreements or other requirements established by USDA and outlined in 9 C.F.R. Part 50.

Bovine Tuberculosis – the disease

Bovine tuberculosis (TB) is an infectious, granulomatous disease caused by the acid-fast bacillus *Mycobacterium bovis*. It is found in many species worldwide. Cattle and other bovids are commonly the reservoir hosts, but other species may play a role in the epidemiology of bovine TB as spillover hosts. After an infection is established in reservoir hosts, it can persist in the population without an outside source of introduction and may also be transmitted to other species. In spillover hosts, infection in the population cannot persist indefinitely unless there is re-infection from another species or a change in the population that enhances interspecies transmission. (USDA-APHIS-VS-CEAH)

Bovine TB has a broad host range and can infect all warm-blooded vertebrates, including humans. The incubation period for bovine TB may last several months or longer. During the course of infection, some animals may be asymptomatic, but disease may progress rapidly in others. Clinical signs (that often include progressive emaciation and weakness) may appear with stress or age and are dependent on the location of lesions. Animals with gastrointestinal involvement may have diarrhea or constipation. Signs of respiratory involvement include coughing, dyspnea, or exercise intolerance. Aerosolization (the creation of tiny, infected droplets which can be inhaled by other animals) is the most infectious route of transmission and is responsible for 80 to 90% of the cases in cattle. This route of transmission is more likely when animals are concentrated, especially in barns and other enclosed areas. Historically, dairies are more likely to be infected with bovine tuberculosis than beef herds, and may be more extensively infected than beef herds. Presumably, the persistence and propagation of *M. bovis* is due in part to the higher animal density in dairy herds. Animals have also become infected through wounds and exposure to contaminated urine. Intrauterine transmission has been documented. Livestock can also become infected if they share a common watering or feeding place contaminated with saliva and other discharges from affected animals. Milk contaminated by bacilli from mammary infections may serve as a source of infection to animals and to humans consuming unpasteurized dairy products.

M. bovis reportedly survives 18 days in stagnant water and may survive days to a few months in pastures or in feces. The variability of survival of the agent depends on temperature and humidity. A cold, moist environment is protective; ultraviolet light deactivates the mycobacterium. The hot, dry, and sunny environment around El Paso should inactivate *M. bovis* rapidly. However, moist areas of manure buildup or standing water protect the organism.

(Dr. M. Schoenbaum and Dr. B. Meyer)

TB Diagnosis

The Caudal Fold Test (CFT) is the screening test of choice in cattle and some other species, and can be administered by accredited veterinarians and State or Federal veterinarians. Cattle are injected intradermally with Purified Protein Derivative (PPD), also known as tuberculin. The injection site is examined 72 hours later for any swelling, which would indicate an inflammatory

response. An animal with a response on the CFT is classified as a TB suspect. The animal must undergo additional testing to rule out cross-reaction with other mycobacterial species common in birds and soil. CFT responders must be tested by Comparative Cervical Testing (CCT), or Bovine Interferon Gamma Assay (gIFN) (cattle only), or necropsied and examined for TB.

The CCT may only be administered by authorized State or Federal veterinarians, who compare responses to injections of bovine PPD tuberculin and avian PPD tuberculin at separate sites on the neck. Cattle with proportionally greater response to bovine PPD tuberculin are classified as suspect or reactor. Suspects may be retested; reactors are necropsied and examined for TB.

The gIFN test is a blood test that measures cell-mediated response to bovine PPD tuberculin and avian PPD tuberculin. Animals classified as suspects may be retested; reactors must be necropsied and examined for TB. The gIFN has been an approved test in the U.S. since 2001. It has the advantages of a shorter time to detection (1 to 4 weeks after infection), and less animal handling.

Necropsy of TB-suspect animals involves examination of lungs, liver and lymph nodes for granulomas, the characteristic manifestation (lesion) of Mycobacterial infection in mammals. Any granulomas along with tissue from specific lymph nodes are submitted to a laboratory for additional diagnostics.

At the laboratory, some of the tissue is fixed, sliced into thin sections, and special stains are applied. Microscopic examination is conducted, looking for organisms resembling Mycobacteria or the characteristic cellular response when Mycobacteria are present in the body.

A Polymerase Chain Reaction (PCR) assay is conducted on other un-fixed or “fresh” tissue collected from the TB-suspect animal, which looks for DNA evidence of *M. bovis*.

The definitive test for bovine TB is bacteriological culture. Fresh tissue is used to inoculate culture plates. The TB organism is slow growing, and plates must be monitored for up to 42 days before a final readout.

When the CFT is conducted followed by the CCT on responders, approximately 57% of infected animals are detected. When the CFT is conducted followed by the gIFN on responders, approximately 65% of infected animals are detected. When the CFT is conducted followed by necropsy of all responders, approximately 76% of infected animals are detected. (USDA-APHIS-VS-CEAH)

Testing an entire herd gives a more accurate determination of disease status than individual animal testing. Screening individual animals may miss infection, while the odds of detecting infection increase when the entire herd is tested and multiple infected animals are present.

State and federal animal health officials use the information available on the testing and epidemiology of bovine TB in designing surveillance methodologies, in developing entry requirements to prevent the introduction of TB-infected animals, and in developing herd plans to clear known infected herds.

History of TB eradication efforts in the El Paso milkshed

Bovine tuberculosis was initially detected in the El Paso area in early 1985 as a result of slaughter trace backs to two dairy herds in New Mexico and one dairy herd in Texas. Tuberculosis was confirmed in all three herds on the initial herd test. Epidemiological tracing of sales from these herds led to confirmed infection in one additional dairy herd in Texas and one additional dairy herd in New Mexico. All five of these affected herds were located in an area referred to as the El Paso milkshed.

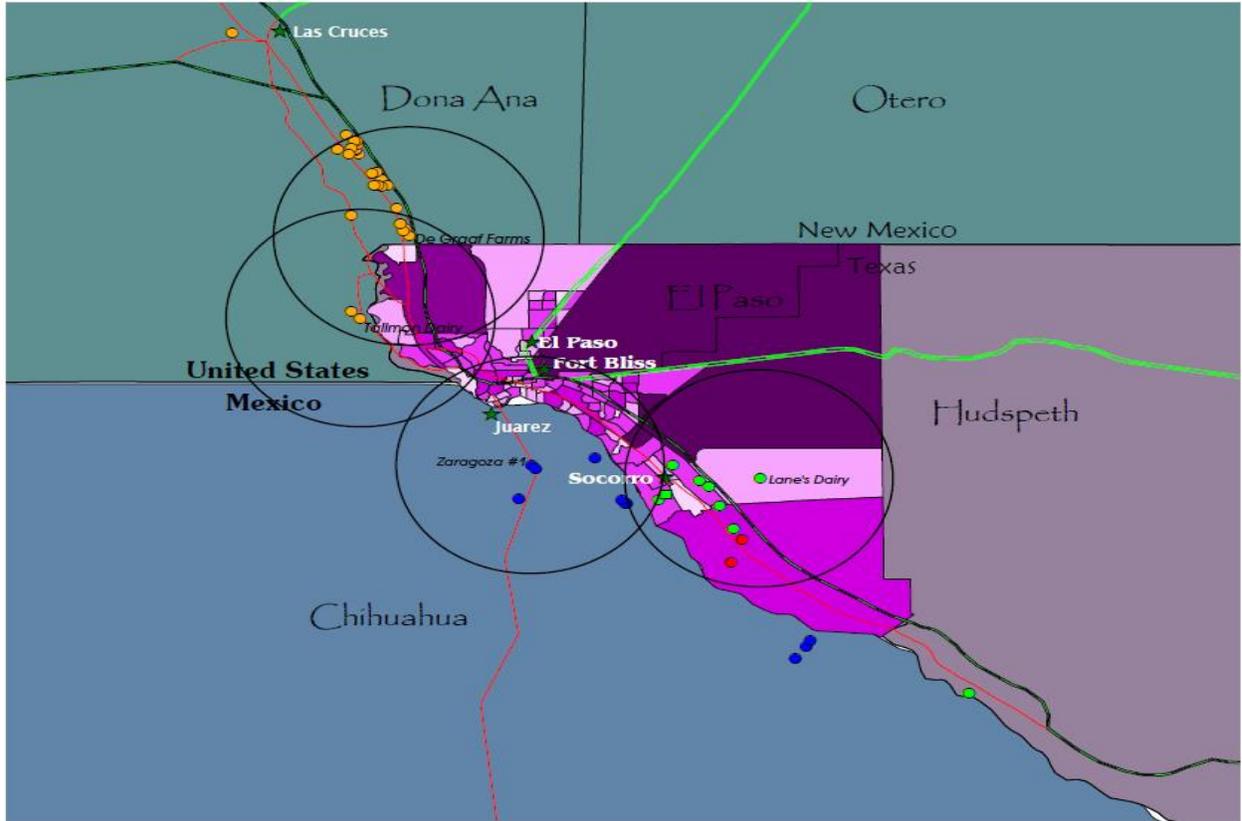
At the time, the El Paso milkshed consisted of approximately 30-40 dairy herds along a 40-mile stretch of the Rio Grande from Las Cruces, New Mexico, to 20 miles south of El Paso, Texas. The Texas portion of the milkshed bordered Mexico along the Rio Grande. Several of the dairies were within 2 miles of the river. Approximately 10 to 12 of the milkshed herds were located in Texas and remaining herds were in New Mexico. The herds varied in size from 100 to 3000 milking cows.

Officials in Texas and New Mexico established a taskforce, which in turn determined that the potential for exposure to *M. bovis* warranted an area test to include all dairy herds in the milkshed. In 1985, state and federal regulatory veterinarians and animal health technicians tested more than 35,000 animals in 32 New Mexico herds and 11 Texas herds. The taskforce, following procedures in Veterinary Services Memorandum 552.15, used the caudal fold test (CFT) as the primary test to detect infection in the herds. In some herds, officials used the comparative cervical test (CCT) as a supplemental test to the CFT.

The initial area test of the El Paso milkshed was completed in 1985, disclosing five additional affected herds. The number of TB confirmed herds in the milkshed now stood at 10, with 5 herds in Texas and 5 herds in New Mexico. In investigating the sources of the infection, the taskforce determined that seven of the infected herds received animals from one common herd, most likely before 1982. The remaining cattle of this common herd made up one of the herds originally confirmed as infected in 1985. Some officials speculated that the common source herd originally became infected by the addition of *M. bovis* infected cattle of Mexico origin into the herd. Possible sources for the outbreak, other than the common source herd, included purchases of replacement heifers from dealers, acquiring heifers that had been in contact with Mexico origin steers in feedlots, and contact with humans infected with *M. bovis*. Program epidemiologists postulated that more than one source of the infection was likely.

(Dr. Jerome E. Freier)

Figure 1 El Paso Dairies- 10 mile Buffers



- Las Cruces Dairies
- Infected Dairies
- Non-Infected Dairies
- Mexican Dairies
- Non-Infected Heifer Rearing
- Roads
 - ≡ Interstate
 - ≡ Other U.S. Highway
 - ≡ Parallel Highway

El Paso County, TX Population 1999

- 900-3900
- 3901-6900
- 6901-9900
- 9901-12,900
- 12,901-15,900
- 15,901-18,900
- Texas
- New Mexico
- Mexico

Complete herd depopulation, followed by cleaning and applying disinfectants to the facility, was and is the preferred method for management of tuberculosis affected herds in the United States. The federal and some state governments pay indemnity on animals slaughtered for tuberculosis. The states of Texas and New Mexico did not have programs to pay indemnity, and federal indemnity funds were limited. Budgetary considerations and restrictions influenced the decision by producers and regulatory officials to use a test-and-removal program rather than depopulation for some of the affected diaries. The test-and-removal approach to clearing an infected herd had been successful historically in about 67% of cases in other geographic areas of the United States. (Dr. M. Schoenbaum and Dr. B. Meyer)

Typical test-and-removal herd plans called for a CFT on the entire herd at 60 day intervals. Officials required the slaughter (with standard indemnity) and postmortem examination of any responding animals. When officials found no evidence of bovine tuberculosis in these reactors for two consecutive tests, three additional negative tests of the entire herd at 60, 180, and 365-day intervals released the herd from quarantine. Accepted standards for the eradication of *M. bovis* in the United States at the time required that a herd be tested each year for five years after the quarantine release.

Of the 10 affected herds found through slaughter trace back, epidemiologic tracing, and the 1985 area test, 5 were depopulated by federal funds or by the Dairy Herd Buyout Program (Agriculture Stabilization and Conservation Services). The remaining five herds were managed under tuberculin-testing and removal plans. Four herds met requirements and were released by the end of 1987; one herd was not released until 1989. Released herds entered a five year post-quarantine testing period. The quarantines were re-applied, however, when tuberculosis was confirmed in each of the five herds during subsequent annual tests.

All Texas dairy herds in the milkshed were tuberculosis tested as part of an area surveillance from 1991 to 1993. This round of testing, combined with trace back efforts on tuberculosis infected animals detected through slaughter surveillance, led to the discovery of five new affected herds. All five herds tested negative for bovine TB in the 1985 area test. These herds were in addition to the five herds in Texas already under quarantine and discussed previously.

Some regulatory officials suggested that these repeatedly quarantined herds were the result of reintroduction of the agent from outside the herd. Others contended that *M. bovis* remained in the herd during the periods of quarantine release. Both concepts were seen as important to evaluate in regard to eliminating the infection.

The question of how these herds became infected or re-infected became paramount to understanding the epidemiology of bovine tuberculosis in the area. Little information regarding the source of tuberculosis surfaced during investigations of these new infected herds. The potential sources of infection were similar to those postulated for the infected cattle herds studied in 1985.

In 1992, regulatory officials released the last two infected New Mexico dairies from quarantine. No new infected herds were detected in the state from 1986 to 1993. In making this determination, New Mexico state officials relied on a slaughter surveillance program, although some officials questioned the sensitivity of slaughter surveillance for detecting infected herds in the El Paso milkshed. In 1994, New Mexico completed an area test in the Las Cruces area (Dona Ana County) involving 23 dairies with 35,300 cattle. One herd was confirmed to have tuberculosis following the detection of lesions in one animal among 4,206 cattle tested. This case led state officials to initiate the Pasteurized Milk Ordinance testing in the spring of 1995. In the years that followed, additional affected herds were detected through this regular testing and slaughter surveillance in other geographical areas of New Mexico, but bovine TB was no longer a recurring issue in the Las Cruces portion of the El Paso milkshed.

In 1995, one Texas beef herd located south of El Paso near the community of Tornillo was quarantined following a trace from slaughter. Tuberculosis was confirmed in 4 of 246 animals following the initial herd test. This was the first known case of tuberculosis in beef cattle in the El Paso area in over ten years. The source of infection appeared to be contact with M-branded steers which strayed from a local feedlot in 1992. The herd was depopulated with federal indemnity.

In 1996, two dairies in Texas and one dairy in Las Cruces remained under quarantine for tuberculosis. As a result of the recently detected beef herd and ongoing occurrences of tuberculosis in dairy herds, an area test was initiated to include all beef herds and dairies located in the Rio Grande valley from El Paso and extending 80 miles south along the river. Bovine TB eradication campaign officials in Chihuahua committed to a similar project on their side of the river as well. The outcome of this effort in Mexico is unknown to TAHC.

The Juarez milkshed included approximately ten large dairies located south and east of Juarez. Limited documentation was available to accurately estimate the prevalence of tuberculosis in these dairies. Partial herd testing had been conducted in many of these herds with reported tuberculin test response rates of 20 to 25%, indicating these herds were likely infected with *M. bovis*.

[Epidemiology of Bovine Tuberculosis in the El Paso milkshed](#)

The given situation in the Texas portion of the El Paso milkshed promised to undermine efforts to eradicate bovine tuberculosis from the United States. Continued efforts to determine the factors responsible for infection were necessary to assure continued progress in the bovine tuberculosis eradication campaign, and a number of projects were initiated.

A 1993 case-control study by USDA- CEAH on 7 affected dairies in El Paso and 27 control dairies in the southwestern U.S. examined a variety of factors including herd size, source of original herd, replacement stock, number and history of hired workers, neighboring livestock, and distance from the U.S.-Mexico border. Analysis of these factors suggested that proximity to the border was a significant factor, and was the only factor that was statistically significant.

The 1997 Texas Legislature funded a bio-survey to investigate the potential reservoirs and vectors of tuberculosis in the El Paso area, in an effort to answer the question of why bovine tuberculosis eradication efforts were unsuccessful. A cooperative project between six state and federal agencies investigated the role of wildlife, human and environmental factors contributing to the persistence of disease in this region. The conclusion drawn from the study was that “within the limits of the procedures employed, the results indicated that non-bovine reservoirs were not a factor in the prevalence of bovine tuberculosis in the El Paso milkshed. Cattle still appear to be the only known reservoir of *M. bovis* in this area.” The full study was published in Preventive Veterinary Medicine 43 (2000), with the title “Failure to identify non-bovine reservoirs of *Mycobacterium bovis* in a region with a history of infected dairy-cattle herds.” (Pillai, Widmer and Ivey)

A separate study by USDA-CEAH completed in 2000 investigated spatial relationships, including soil, water and vectors as possible factors to explain infection in El Paso. Logistical regression analysis suggested the closer any El Paso dairy was to a particular Mexican dairy, the greater the herd’s risk of being quarantined. See Figure 1 for a map showing the locations of quarantined dairies near El Paso, Texas, Las Cruces, New Mexico, and Juarez, Mexico, at the time.

The source of recurrent infection in these herds was and remains inconclusive. Based on thorough epidemiological investigations conducted in each herd, and testing of dairy employees, it did not appear that purchased replacement stock nor contact with affected dairy personnel were sources of exposure. In addition, based on their experience with four similar tuberculosis infected dairies located in Las Cruces, New Mexico, and Comanche, Texas, which participated in the approved testing and herd management protocols and in which the disease did not resurface in following quarantine release, epidemiologists determined that they could not attribute the cause in El Paso to recrudescence or latent infection, alone.

Regulatory officials and disease experts considered all of these factors, and believed that the continuing occurrences of tuberculosis in the El Paso dairies were the result of the tuberculosis epidemic that continued in the Juarez dairies, and that they could not eradicate TB in El Paso until the disease was controlled in Juarez. Officials did not know how the disease moved across the Rio Grande nor how to mitigate that risk. (Dr. Terry Beals)

Bovine TB Buffer Zone Depopulation Program

By the year 2000, the problem of bovine TB in the El Paso milkshed had persisted for 15 years despite aggressive surveillance and eradication efforts. Nine of the ten dairy herds remaining in this area of Texas had been or were under quarantine for tuberculosis. The majority of herds released under test-and-removal herd plans had to be placed under quarantine again when subsequent annual herd tests disclosed tuberculosis. From 1993 to 2000, the only TB affected herds in Texas were those in El Paso and Hudspeth Counties.

Risk factors in the El Paso milkshed identified at the time as potential sources of tuberculosis included back-grounding heifers in feedlots, purchasing heifers from dealers, proximity to the Rio Grande, and contact with other reservoirs or vectors.

Epidemiologists suspected that the TB organism was somehow being transferred from affected dairies in Juarez to dairies in Texas and New Mexico, then spread between U.S. dairies through the sale and purchase of replacement animals. It was not until molecular genotyping techniques became available in recent years that this suspicion was confirmed. Molecular genotyping identifies the unique genetic profiles among *M. bovis* strains that arise over time through genetic mutations. Comparison of genetic fingerprints of *M. bovis* isolates from dairies in Mexico and the U.S. identified three distinct strains. All three strains were found in dairy cattle in both countries. One Texas dairy was affected by two different strains of *M. bovis*.

Dairy producer concerns in 2000 included the uncertainty of the source of infection, indemnity rates for TB suspect animals that had to be removed from the herd, and over-condemnation (the number of TB suspect animals identified through repeated herd testing).

Regulatory officials' concerns at the time included the lack of understanding of the epidemiology, limitations of diagnostic procedures, recurrent infection, costs of eradication, and the likelihood of TB eradication in the area. (Dr. Dan A. Baca)

The costs of TB eradication efforts from 1985 to 1999 for the TAHC were estimated at over \$8 million. Texas dairy producers estimated loss in milk production associated with herd tests, loss in production for removal of a wet cow for a period until a replacement comes into production, and loss associated with the difference between total compensation (state, federal, and salvage) and fair-market-value for destruction of animals during the same time period to be \$3.5 million. (Dr. Linda L. Logan)

There was growing acceptance that the most effective solution to the ongoing tuberculosis problem might be voluntary depopulation of dairies in the El Paso milkshed, with compensation, and a subsequent ban on reestablishment of dairy operations in the area. A lengthy, complex, multi-jurisdictional effort was initiated to realize this solution.

In October 2000, the U.S. Secretary of Agriculture issued an emergency declaration concerning the national TB situation. In December 2000, Congress appropriated funds to pay affected dairymen and owners a fair market value for their cattle and for easements on their facilities which would prohibit using these facilities for concentrated animal feeding operations in the future.

In 2001, the TAHC adopted Title 4, Texas Administrative Code, Chapter 43, Subchapter D, concerning Movement Restriction Zone (MRZ). Sections 43.30 defines the boundaries of the MRZ, and further divides it into an Affected Area containing all known affected herds, and a Surveillance Area separating the Affected Area from the rest of the state. Section 43.31

establishes testing requirements in the MRZ specific to the Affected Area and Surveillance Area. (Appendix I)

Also in 2001, the 77th Legislature amended Texas Health and Safety Code, Section 435.006, Permit to Sell Milk. That statute states that the Texas Board of Health (now known as the Texas Department of State Health Services), may not issue a permit to a person for a producer dairy located in an area infected with or at a high risk for bovine tuberculosis, as determined epidemiologically and defined by rule of the Texas Animal Health Commission. (Appendix II)

In July 2002, USDA VS adopted regulations at Title 9, Code of Federal Regulations §50.17 governing the implementation of the buffer zone depopulation program. These regulations specified that all dairy operations in the buffer zone had to agree to depopulate their dairies within 3 years after all eligible owners had signed their respective agreement, and cease all dairy farming and other activity on their properties until the adjoining area of Mexico had been declared free of bovine tuberculosis, but in any event not less than 20 years after all agreements were signed.

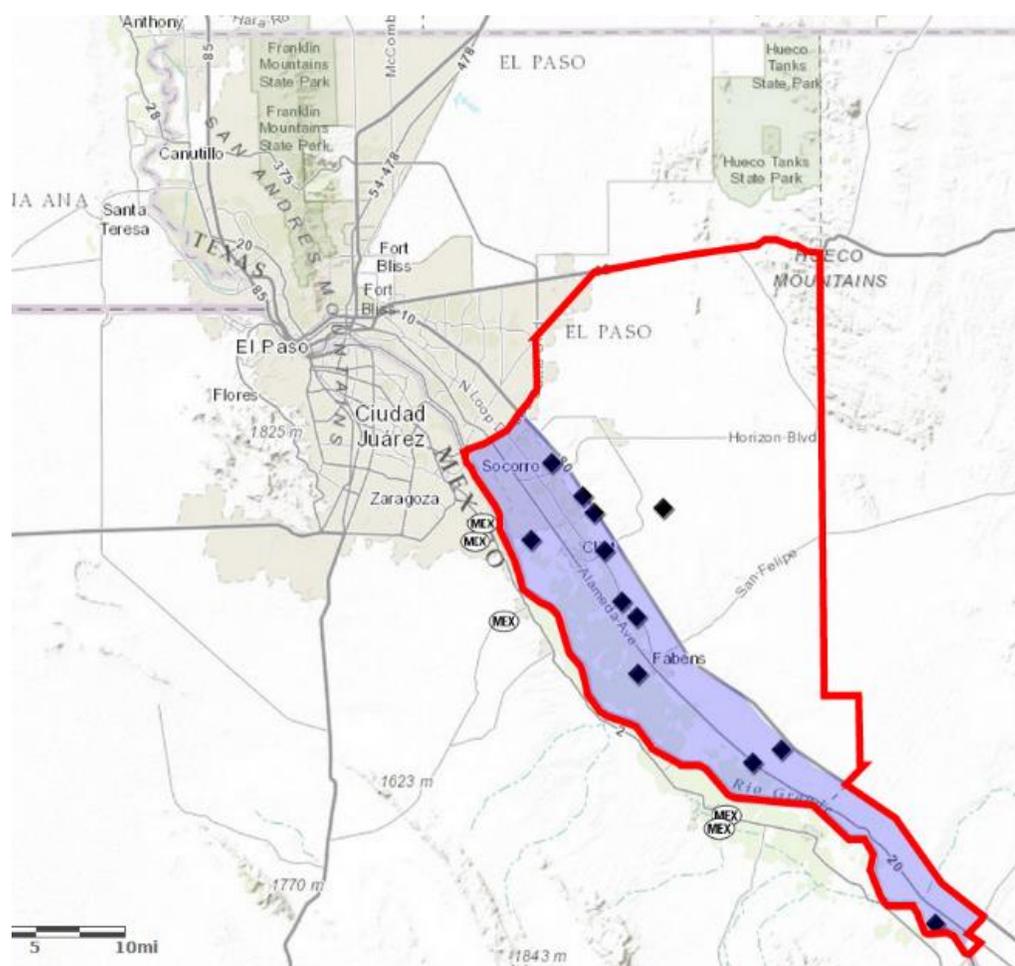
In addition to the indemnity payment for cattle and 20-year-minimum conservation easement on affected properties, the buffer zone depopulation program also covered expenses incurred in relocating equipment of a reverse osmosis plant and a fluid milk processing plant in El Paso County. (Appendix III)

The initial amount appropriated by Congress for the depopulation program was approximately \$42 million. Due to lengthy negotiations and other factors, the depopulation did not start until 2003. By the time it concluded in 2006, the total cost was approximately \$57 million.

From 2007 to 2008, after all ten dairies were depopulated, whole herd testing of beef cattle herds and goat herds in the MRZ was conducted to determine the status of bovine TB in the zone. Through a cooperative effort with the USDA, Wildlife Services, sampling of coyotes and feral carnivores in the MRZ continued until 2008. Sampling of wildlife began during earlier efforts to achieve Split State status, and continued until an adequate number of samples had been collected to detect infection with a 95% confidence at a 2% prevalence. Ongoing TB surveillance in wildlife includes examination of mule deer that have been struck by automobiles in and near the MRZ. To date, bovine TB has not been detected in wildlife in the MRZ or any other location in Texas.

Figure 2

El Paso Depopulated Dairies



- KEY**
-  Current Movement Restriction Zone
 -  Dairies Depopulated in 2003-2006
 -  Mexico Dairies currently in operation
 -  High Risk Zone

USDA Bovine Tuberculosis Eradication Program Overview

Once the most prevalent infectious disease of cattle and swine in the United States, bovine TB (caused by the bacteria *Mycobacterium bovis*), caused more losses among U.S. farm animals in the early part of last century than all other infectious diseases combined. The Cooperative State-Federal Tuberculosis Eradication Program, which started in 1917 and is administered by the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), State animal health agencies, and U.S. livestock producers, has nearly eradicated bovine TB from the Nation's livestock population. Herd prevalence has been reduced from 5%, when the bovine TB program began, to less than .001% today. Many consider this one of the

great animal and public health achievements in the United States. The presence of bovine TB in humans has also been reduced as a result of several factors, including the eradication program and pasteurization of milk. However, the ultimate goal of eradication remains elusive as animal health officials continue to detect TB sporadically in livestock herds.

The TB program regulations are located in Title 9, Code of Federal Regulations, Part 77. Policy and program standards are found in the 2005 Bovine Tuberculosis Uniform Methods and Rules, memorandums and guidance documents. APHIS completed new proposed regulations and supporting standards, yet to be published, for the brucellosis and TB programs in fiscal year 2012. Under the proposed approach, the C.F.R. will provide the legal authority for the programs while the details of the programs will be prescribed in a program standards document. These proposed regulations and supporting standards are currently under departmental review. Once published, APHIS plans to provide an extended comment period of 90 days.

Within USDA, the TB Eradication Program is administered by Veterinary Services (VS), working in conjunction with state animal health partners. Collectively, the agencies invest considerable resources in a comprehensive program aimed at preventing, detecting, and eliminating bovine tuberculosis. These objectives are accomplished through a range of activities from national disease surveillance at slaughter establishments, live animal testing conducted by private veterinarians, investigation and management of infected animals and herds, herd accreditation, interstate movement requirements, and managing the risk of TB in cattle presented at the border for entry into the United States.

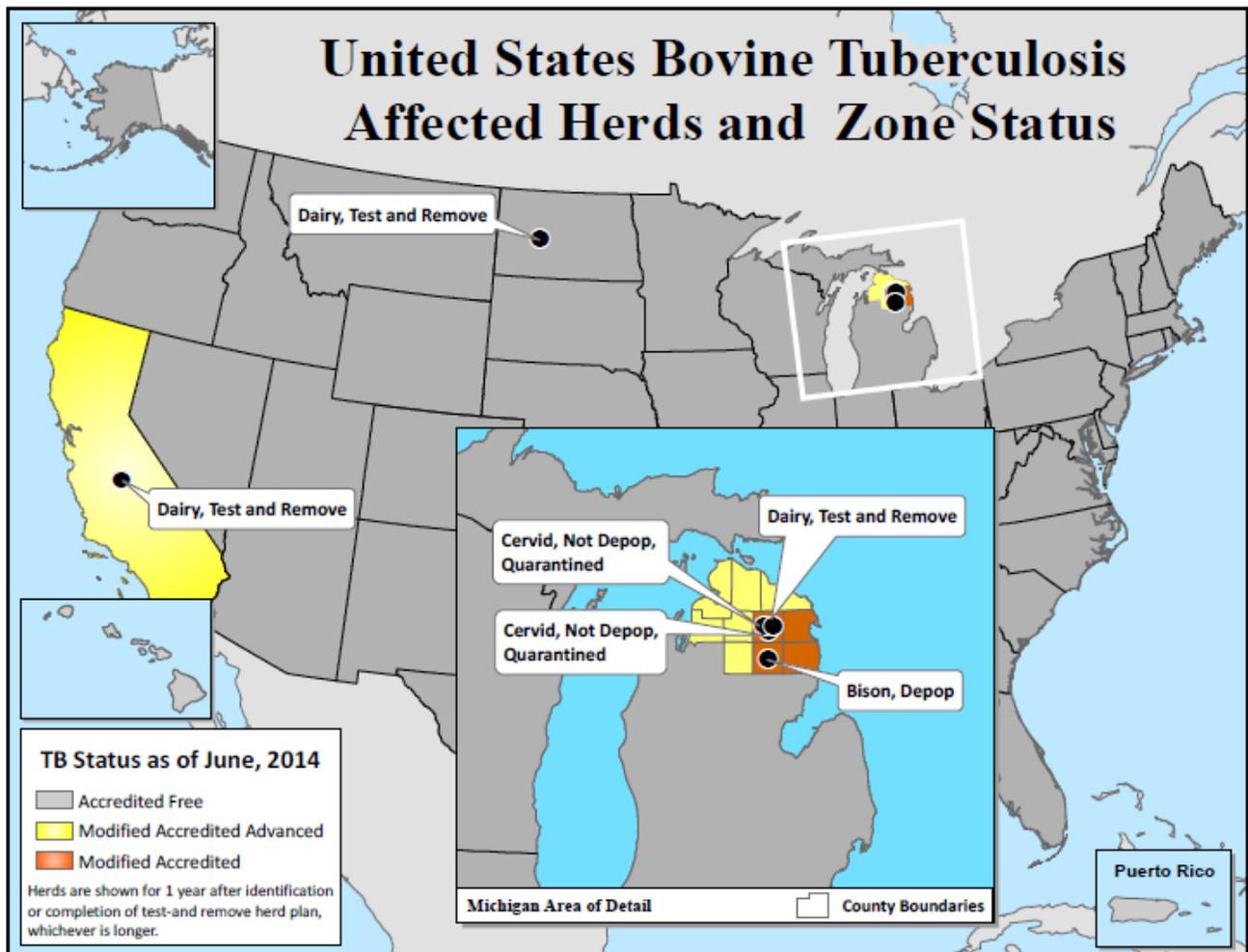
The prevalence of TB infection in the United States is extremely low. However, TB-affected herds continue to be detected. From 2005 to July 2014, 80 TB-affected cattle and cervid herds were detected, including 21 dairy, 50 beef, 1 mixed, and 8 captive cervid herds. During this same time period, 218 TB-infected animals were detected through surveillance at federally inspected slaughter establishments, including 134 (62%) in Mexican origin cattle.

When TB infection is detected in a cattle or captive cervid herd, the premises is quarantined to reduce the risk of disease spread and animal health officials work with the herd owner to develop a plan to eliminate TB from the herd. In 2009, VS adopted a new policy regarding the disposition of domestic TB-affected herds. VS, because of limited funding, no longer recommends whole herd depopulation as the primary means of disease management for bovine TB. Instead, VS will determine if a test-and-remove or depopulation management plan will be supported with Federal indemnity for each TB-affected herd based upon each herd's unique circumstances. To aid in managing TB-affected herds, VS developed an epidemiological model for investigators to use to estimate the probability of a TB-affected herd being free of infection after implementing a defined herd testing protocol. This model incorporates specific factors associated with the herd and information about the accuracy of currently approved tests for TB.

Controlling and eradicating bovine TB in the United States relies on preventing entry of infected animals, rapidly detecting disease where it exists, and identifying potential source herds and exposed herds through tracing.

(Kathleen A. Orloski)

Figure 3



Mexico Bovine TB Eradication Program

The Mexican Bovine Tuberculosis Eradication Program has been officially recognized by the U.S. Secretary of Agriculture since the 1970s. The U.S. cattle industry and regulatory officials required that importation of Mexican cattle meet minimum standards to help assure the progress made toward eradication of bovine TB in the United States was not compromised. Although its scope was nationwide, the Mexico program was primarily focused on compliance with export requirements with the exception of those herds which were certified as Free Herds. These herds were located mostly in the northern states of Mexico and their purpose was to facilitate cattle export. The program showed poor progress in the control and eradication of bovine TB.

In 1993, the Mexican Federal government created the National Commission for the Eradication of Bovine Tuberculosis and Brucellosis (CONETB, by its Spanish abbreviation). CONETB is in charge of regulating this campaign and designates the Coordinator and Supervisors in the States who contribute to the operations of the campaign and who observe the compliance

of the regulations of the Emergency Norm (which was published in 1994 and established control and eradication procedures).

At present, the campaign strategies are based on working to reduce the prevalence of the disease in certain zones and in States with international recognition or in eradication phase.

Mexican States seeking equivalent status to the United States TB Program

VS conducts reviews within Mexican States or regions when requested by the Mexico's animal health authorities, when there is reason to believe that the requesting State will meet U.S. criteria for comparable status, or when the status of a previously qualified state or region needs to be re-evaluated. These evaluations use the conditions and criteria that follow the regulations outlined in Title 9, Code of Federal Regulations, Part 92, "Importation of Animals and Animal Products: Procedures for Requesting Recognition of Regions." Sections of Veterinary Services Memorandum No. 552.41 include the appropriate observations and conditions for the evaluation of each region. In addition, tuberculosis criteria outlined in 9 C.F.R. Part 77 as well as the current version of the Bovine TB Eradication-Uniform Methods and Rules (UM&R) (effective January 1, 2005), must be evaluated to ensure equivalency.

Summary of conditions:

Condition I: Must have adequate legal authorities, organization, and effective veterinary infrastructure, in the requesting region, to carry out regulatory programs for the eradication of bovine TB.

Condition II: Must provide data and other information that adequately describe the history and current bovine TB disease status of the region. For the purposes of the reviews, an affected herd is a herd of livestock in which there is strong and substantial evidence that *M. bovis* may exist. This evidence should include, but is not limited to, any of the following: histopathology, polymerase chain reaction (PCR) assay, bacterial isolation or detection, testing data, and epidemiological evidence, such as contact with known sources of infection.

- Non Accredited (NA) States/regions: no recognized TB program, or TB is prevalent in more than .5% of the total number of herds of cattle and bison in the State or region for the most recent year
- Accredited Preparatory (AP) States/regions: TB is prevalent in less than .5% of the total number of cattle and bison herds for the most recent year
- Modified Accredited (MA) States/regions: TB is prevalent in less than .1% of the total number of cattle and bison herds for the most recent year
- Modified Accredited Advanced (MAA) States/regions: TB is prevalent in less than .01% of the total number of cattle and bison herds for the most recent year
- Accredited-free States/regions: Must demonstrate a zero % prevalence of affected cattle and bison herds in the State or region for the previous 5 years, or have been free from TB

for 2 or 3 years since depopulation of the last affected herd, depending on the previous status of the State/region.

Condition III: Must provide data and other information that adequately describe the bovine TB disease status of all regions adjacent to the evaluated region.

Condition IV: Must have an active, functioning bovine TB eradication program that provides for quarantine of infected herds, epidemiological investigations and testing of suspicious herds and animals, procedures to clean up infected herds, and procedures for cleaning and disinfecting contaminated premises. Specifically, data must be provided that support the maintenance of an effective trace-back system to identify and locate suspicious herds targeted by surveillance. A complete epidemiological investigation and a whole-herd test must be conducted, and the owner must implement a herd plan.

Condition V: Must provide data addressing the status of vaccination for bovine TB if any is being attempted.

Condition VI: Must provide data and information that thoroughly describe how the requesting region is separated from regions of higher risk by physical, legal, or artificial boundaries.

Condition VII: Must have in place regulations, movement control stations, and/or patrols as needed and sufficient health requirements that reduce the risk of importing TB-infected cattle from regions of higher risk.

Condition VIII: An accurate livestock census that will allow calculation of herd and animal prevalence rates for bovine TB based on different types of livestock operations (i.e., beef, commercial dairy, dual purpose, etc.)

Condition IX: Must have an active, ongoing surveillance methodology for bovine TB, and provide data describing all surveillance. Over 95% of all cattle slaughtered for wholesale or retail purposes, within and from regions with status, must be under TB surveillance (TB testing or inspected at slaughter). Each slaughter plant must submit at least one granuloma for TB diagnosis for every 2,000 regular kill adult (2 years and older) cattle killed. The State or region must complete official TB testing of 100% of all beef and dairy herds to be eligible for initial recognition of equivalent TB status.

Condition X: All laboratories used to support bovine TB eradication program activities for the region must be approved by Mexico federal animal health authorities.

Condition XI: Must provide information regarding procedures and policies that are in place in case bovine TB is found in a region considered to be free from or of very low TB prevalence.

(USDA-APHIS-VS)

Current Bovine TB Status of Mexico (Chihuahua)

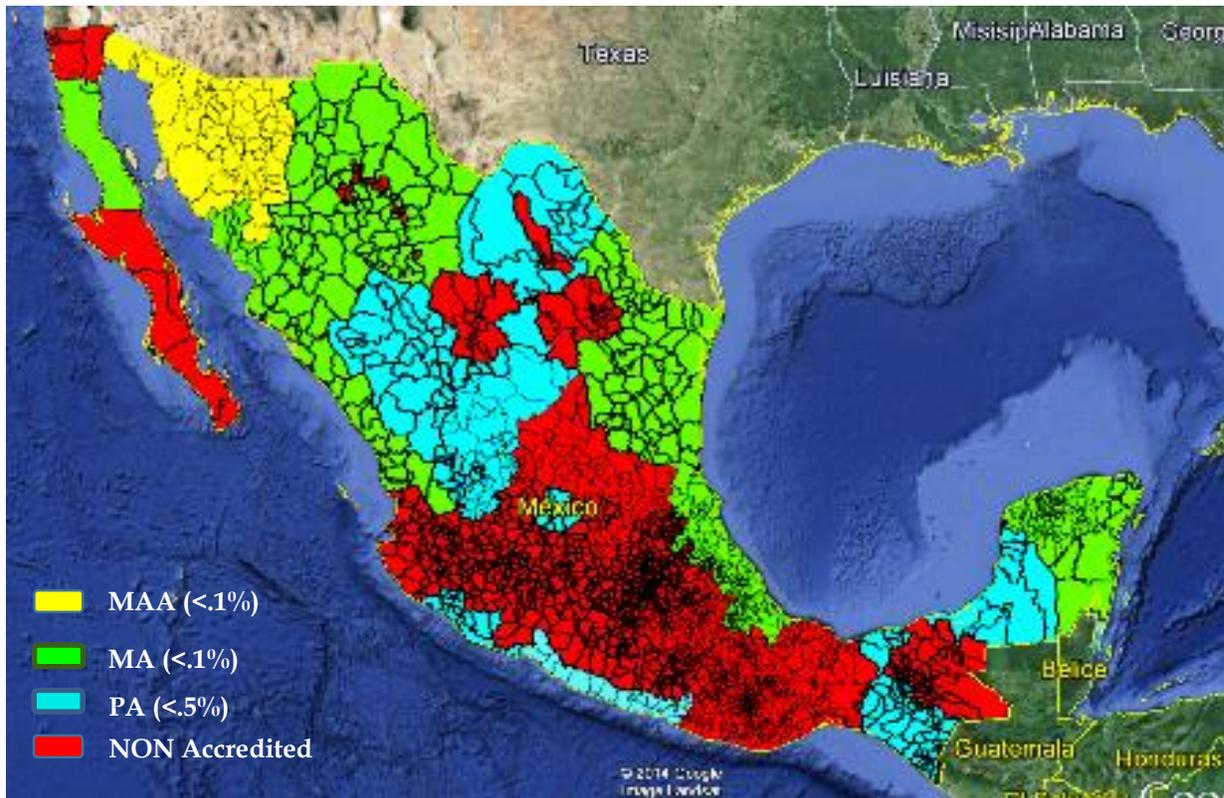
While Mexico appears to be making progress toward controlling bovine TB in beef cattle populations, the prevalence in dairy cattle populations remains high in much of the country. A TB program review was conducted for the state of Chihuahua in June 2014 by a team of U.S. state and federal veterinarians (details of this review are not available outside of VS). On July 16, 2014, VS provisionally upgraded 56 municipalities in Chihuahua, Mexico to Modified Accredited (MA) status from the prior Accredited Preparatory (AP) status. To qualify as MA, herd prevalence must be less than .5% for the most recent 12 months. The municipalities in Chihuahua bordering the Texas MRZ are included in this reclassification. Under regular MA status, a whole-herd test of the herd of origin is not required prior to importing cattle to the U.S. However, the U.S. review team found sufficient risk remained to warrant requiring a valid whole-herd test conducted after January 1, 2013 for cattle presented for entry into the U.S. from provisional MA zones in Chihuahua.

Information obtained through emails from a representative of Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA) in Chihuahua and forwarded via the VS office in Mexico City indicates there are two large dairies and several small dairies currently in operation near the Texas MRZ.

- Dairy “E” was tested for quarantine release in January 2011 with 4,506 negative cattle. While a statement was made that this dairy is currently negative, no details of tests or slaughter surveillance subsequent to the 2011 quarantine release were provided.
- Dairy “Z” was released by depopulation (date not provided), and apparently restocked. Information provided indicates the herd is recognized as TB-free, and has been tested annually since March 2010. The numbers tested range from 1,387 to 1,887 head. The number of suspects identified through testing was not provided.
- Mention was made of several smaller dairies operating in the area. Information on the TB status of these herds has been requested but not received at the time of this writing.

Mexico TB Status 2014

Figure 4



Texas TB Eradication Program

The TAHC has long recognized that bovine TB poses a threat to the health of both animals and humans in Texas, and the presence of affected herds can have a deleterious effect on the marketability of Texas livestock. For these reasons, a significant portion of agency resources have been and continue to be dedicated to the prevention, control, and eradication of bovine TB in Texas.

The stated mission of the Texas Animal Health Commission is to:

- protect the animal industry from, and/or mitigate the effects of domestic, foreign and emerging diseases;
- increase the marketability of Texas livestock commodities at the state, national, and international level;
- promote and ensure animal health and productivity;
- protect human health from animal diseases and conditions that are transmissible to people; and
- prepare for and respond to emergency situations involving animals.

Texas Animal Health Commissioners and agency leaders are proactively involved in the bovine TB eradication program at state, national, and international levels. TAHC representatives

have participated on the Binational Committee (BNC) for TB since it was formed under the auspices of the United States Animal Health Association in 1993. Over the years, TAHC representatives have been part of TB program review teams in many Mexican and U.S. states. The TAHC has assisted in efforts to improve TB diagnostics through validation of a number of tests including the gIFN.

The state, in partnership with animal health officials in the U.S. Border states of California, Arizona and New Mexico, adopted the Border States Consensus Document in August 1994 to address the chronic problem of tuberculosis in imported Mexican steers and spayed heifers. Border States chief animal health officials developed criteria which required exporting states in Mexico to achieve defined levels in their TB control and eradication programs in order to export cattle to the Border States. In addition, the TAHC also adopted post-entry quarantine and retest requirements for Mexican-origin breeding cattle as an additional safeguard. At least 16 additional U.S. states also amended their regulations to be consistent with this agreement. As a result of this initiative, the number of TB infected Mexican-origin feeder cattle detected at slaughter establishments in Texas declined precipitously from an all-time high of 309 cases in 1993, to 9 cases in 1998.

This initiative demonstrated the effectiveness of strict animal health importation requirements and the importance of sound methods of disease prevention in achieving the goal of total eradication of bovine TB in Texas and the U.S.

The Border States Consensus Document was amended in 1995 and 1998 to include a prohibition on feeder cattle of dairy breeds, which were known to have a higher prevalence of bovine TB than feeder cattle of beef breeds. This prohibition along with many of the criteria laid out in the Border States Consensus Document have been made part of the federal importation rules, helping to reduce the number of TB cases in imported fed cattle nationwide.

The TAHC recognized the risk presented by "M" branded steers which are from Mexico to be used for potential rodeo and/or roping stock. These cattle have a longer lifespan than feeder cattle, and often commingle with other rodeo stock and domestic breeding cattle, thereby increasing the likelihood of tuberculosis transmission. The TAHC implemented post-entry and annual tuberculosis test requirements on these cattle to mitigate the risk. (4 T.A.C. § 51.8(b)). Official identification is also required on this type of cattle to facilitate tracing. *Id.* VS recognized the benefit of these rules and made this part of the Animal Disease Traceability (ADT) program. (9 C.F.R. § 86.5(c)).

Through the difficulties encountered in attempts to trace TB exposed animals from affected herds, the TAHC and the Texas dairy industry recognized the benefit of official identification on all dairy cattle prior to movement. As such, 4 T.A.C. § 43.2(n) was adopted in 2006, and has since benefitted TB and other disease investigations.

The TAHC also recognizes the risk of disease transmission at dairy calf ranches, where animals from many different herds and often different states are raised together. Initial steps are

being taken by the Commission to address this risk through surveys of calf ranches to better quantify these risk factors.

VS officials have indicated that funds for herd depopulation will continue to decrease in the coming years, effectively removing the option for depopulation from owners of affected herds, leaving only the test-and-removal method. Under current practices, most large dairy operations are not equipped to raise calves on-premises. Replacement heifers are sent to dairy calf ranches to be raised and returned when ready to enter the milking string, a practice prohibited by the disease quarantine. In June 2014, the TAHC adopted 4 T.A.C. § 43.7 which authorized and established standards for Authorized Calf Ranches and Authorized Grower Facilities. These rules allow operations meeting certain requirements to receive restricted (exposed to disease) animals, test these animals until disease free status is assured and then allow the cattle to safely re-enter dairy and breeding operations.

Texas Bovine TB Status

Prior to the year 2000, Texas had achieved state-wide MAA status by U.S. TB program standards. Changes in the U.S. TB eradication program in 1999 for the first time provided for Split-State status for bovine TB, allowing for two levels of infection within a State separated by a geographical boundary. This provided an opportunity to improve the status of most of the state because during the preceding seven years the only TB affected herds in Texas were those near El Paso.

The TAHC worked closely with VS to meet the conditions, and Texas was granted Split-State status on November 22, 2000. The area later designated as the MRZ was assigned MAA status, with the remainder of the state recognized as TB Free. Texas producers benefitted from the Split-State status because cattle from the TB Free area were allowed to move interstate without a TB test.

Texas enjoyed Split-State status until 2003 when routine slaughter surveillance confirmed bovine TB in two herds in the TB Free area of the state. One affected herd was a dairy and the other a purebred beef herd. Texas' TB Free status was suspended, and the TAHC worked diligently to formulate a plan to regain status.

A five-point plan for regaining TB Free status was developed and implemented by the TAHC and VS. The plan called in part for TB testing the highest risk herds in the state, dairies and purebred beef herds. Prevalence of TB had historically been shown to be higher in purebred beef operations than in non-registered beef herds. All dairies in the state were tested, approximately 850 herds, as were 2,000 randomly selected purebred beef herds. Epidemiologists determined the number of beef herds tested to achieve the desired level of confidence that TB would be detected if it existed in this population. Bovine TB was confirmed in one dairy herd. None of the beef herds tested were confirmed positive. The affected dairy herd was depopulated with federal and state indemnity.

In 2006, high-risk testing of dairy and beef herds was completed and all dairies in the MRZ were depopulated, which allowed Texas to attain TB Free status state-wide for the first time.

Since 2006, Texas has maintained TB Free status. Although bovine TB was confirmed in two herds, the state still qualified for TB Free status under U.S. TB program standards because the two herds were discovered three years apart and not linked epidemiologically.

One of the bovine TB affected herds was a dairy in the San Angelo area, disclosed in 2009 through testing by private veterinary practitioners for herd dispersal. The herd consisted of three dairy facilities managed as one herd. The epidemiological investigation of the herd resulted in initiation of traces on 5,451 animals, and involved a minimum of 13 states. High-risk zones were designated within a two-mile radius around each of the three dairy operations to identify herds at risk for the possibility of adjacent spread of bovine TB. This resulted in testing of eight beef herds, four dairies and six goat herds. In total, approximately 65,000 cattle in 65 herds were tested. Wildlife surveillance was initiated within a five-mile radius of each of the three operations; included in the surveillance study were whitetail deer, raccoon, opossum, coyote and bobcat. Samples were submitted to the National Veterinary Services Laboratory (NVSL) to confirm the presence or absence of *M. bovis* in any of the selected species in the area.

In addition to approximately 65,000 dairy cattle tested in Texas due to potential exposure to TB, out-of-state traces led to the testing of approximately 65,000 dairy cattle in receiving states. The cost to the TAHC for the Texas investigation was approximately \$1.3 million. Federal indemnity funds were not available to depopulate the herd. A test-and-removal herd plan was developed. The herd was sold to slaughter in 2010, without indemnity.

The second bovine TB affected herd detected after Texas gained TB Free status in 2006 was a commercial beef herd detected through routine slaughter surveillance in 2012. This herd, also in the San Angelo area, was depopulated with federal indemnity. An epidemiological investigation was conducted, and exposed animals were traced through official ear tags and records of sales. Of interest was one particular cow sold from the herd in 2009, before the herd was known to be affected. This cow was bought by a Texas rancher and spent two years in his operation near Fredericksburg, exposing other cattle to TB before being sold again. The buyer shipped the cow to South Dakota, where she was held for TB testing. Skin test results were negative, as required for entry into North Dakota. The trace effort caught up with the cow on a large ranch in North Dakota in 2013. The cow was again skin tested negative, but necropsy and laboratory testing confirmed the presence of *M. bovis*. The ranch in North Dakota was put under quarantine and a test-and-removal herd plan.

In addition to the two confirmed bovine TB affected herds discussed above, routine slaughter surveillance for bovine TB disclosed infection in four adult domestic cattle at different times since Texas received TB Free status that could not be traced to a herd of origin. Slaughter plant and other records indicated these infected cattle might be of Texas origin, but extensive investigation and testing efforts failed to identify an infected source herd.

The fact that four separate instances of bovine TB in the past decade in Texas could not be traced to a herd of origin gives testament to the degree of difficulty encountered in eradicating a disease with a long incubation period and for which there are limitations in diagnostic capabilities, and brings to light the importance of an effective identification system for individual animals.

Bovine TB Investigation in Texas

Upon notification from VS of positive results for bovine TB (*M. bovis*) from an animal at slaughter, TAHC personnel make contact with the owner of the animal for the purpose of restricting any further movement of cattle, obtaining a herd history, and – if possible – history on the origin of the positive animal. Typically the initial contact also serves as an opportunity to schedule TB testing of all adult cattle in the herd. While following up on information gained during initial contact, personnel are also engaged in activities related to analyzing slaughter documents and plant procedures for the purpose of ensuring to the greatest degree possible a proper correlation of any identifications collected with the carcass and the tissues submitted for TB diagnostics.

Identification and testing of the herd of origin begins as soon as possible once positive results are disclosed. Depending on the size and type of herd, whether beef or dairy, one or more veterinarians employed by either VS or TAHC subject all adult cattle in the herd to an intradermal injection of Tuberculin. During this test, there are typically two or more lay inspectors engaged in helping the owners load and sort cattle as well as recording and/or affixing permanent identification on each animal being tested. Under the requirements of the Bovine Tuberculosis Eradication Uniform Methods and Rules, the intradermal injection is then analyzed by the veterinarian at 72 +/- 6 hours after injection by manual palpation and visual observation of the injection site. Any animals considered to display a response at the injection site are then removed from the herd with indemnity and are subjected to an in-depth carcass examination for the presence of lesions consistent with the disease. Whether or not lesions are found, representative samples of selected tissues are submitted to NVSL for analysis.

The initial positive disclosed at slaughter as well as any other positives identified through testing of the source herd which are verified by the laboratory are researched to the fullest extent possible to determine the herd of origin if they cannot be confirmed as natural additions to the herd under investigation. If a positive animal is determined to have entered the herd under investigation from another herd, that herd is investigated as outlined above for any evidence of the presence of bovine TB.

If bovine TB proves present in the source herd by removal of animals from the herd test, the herd is officially placed under disease quarantine. Once under quarantine, a risk analysis is performed by USDA-CEAH to determine whether it is more feasible to eradicate bovine TB in the herd through test and removal or through depopulation of the herd. If determination of the risk analysis is in favor of eradication through test and removal, an agreement in the form of an

official herd plan is entered into by the owner, USDA, and TAHC which outlines and specifies requirements for eventual release of the herd from quarantine for bovine TB. The specific requirements deal with test intervals, classification of skin test positive animals for each test, handling of cull animals and calves that will not be retained as replacements and indemnity for positive animals.

Records of sales of all cattle from the TB affected herd are obtained for a period of five years prior to disclosure of bovine TB in the herd, or the period of time since the herd was first exposed to bovine TB if less than five years. Trace efforts are initiated to determine the final disposition of any breeding cattle that left the herd. Risk analyses are performed on any herds that exposed cattle had resided in since leaving the affected herd to evaluate the necessity of testing those herds.

Wildlife studies are performed in the vicinity of the TB affected herd to determine whether wildlife could have been adversely affected or could possibly have been involved in introduction of the disease. The area to be studied, the species that will be sampled, and the number of each species required for a statistically valid sample are determined in consultation with wildlife agencies and designated TB Epidemiologists.

(Dr. Joel Hall)

El Paso current status

A critical part of this risk assessment is to determine the current disease status of livestock in the MRZ. The TAHC, with the assistance of VS, set out to test herds of cattle, bison, goats, and deer in the high risk area, and dairy herds just outside the high risk area. An Incident Command System approach was utilized to plan the project, coordinate operations, provide logistical support, inform the public, and provide progress reports to TAHC and VS management. Work was accomplished in two phases, a location phase and a testing phase.

The TAHC informed livestock producers of the plan to test and provided justification for testing through a series of press releases and public meetings. With the assistance of Texas A&M AgriLife Extension Service, public meetings were held at the Fort Hancock Community Center on January 21, 2014, and at the Texas AgriLife Center in El Paso on January 22, 2014.

Teams of TAHC Livestock Inspectors and VS Animal Health Technicians located herds of cattle, bison, goats, and deer in the MRZ. Personal contact was made with owners and managers of herds to explain the project and schedule herd tests. Final scheduling of herd tests for the initial February 2014 testing was accomplished by a local VS Veterinary Medical Officer.

Testing teams were made up of a TAHC or VS veterinarian, TAHC livestock inspectors and VS animal health technicians. Radio Frequency Identification Devices (RFIDs) were used to identify animals. Identification numbers were scanned with handheld wands into computers running Mobile Information Management software. Herd and test data transmitted to a database utilized by the TAHC and VS in Texas.

Equipment for the testing phase of the assessment, including squeeze chutes, panels, trailers, and a portable corral, was staged at a secure area of the export facility at Socorro, Texas courtesy of the Texas Department of Agriculture.

All cattle and bison herds in the MRZ have been or will be tested for bovine TB as part of this assessment. Adequate surveillance achieved through testing of commingled cattle and goats allowed the exemption of one deer herd from the testing requirement. A sufficient number of goat herds were tested to detect infection with a 99% confidence at a 2% prevalence. These numbers are displayed below in Figure 5.

The CFT was used as the screening test in cattle, bison, and goat herds. As described previously, testing of livestock for bovine TB with the CFT entails an initial injection of tuberculin in the skin, followed by examination of the injection site three days later. Cattle found positive on the CFT were tested using the gIFN, conducted at the Texas State-Federal Laboratory in Austin. Goats found positive on the CFT were tested using the CCT. All animals tested to date were either negative on the initial CFT, or classified negative (no longer a TB suspect) based on negative gIFN results or negative CCT results. Any bison found positive on the CFT will be tested using the CCT, as the gIFN is not an approved test in this species.

Deer herds were tested using the DPP test. Blood samples were submitted to the NVSL, the only laboratory currently approved to conduct this test. Results for all deer herds were negative.

Figure 5

	Tested	Suspect	Reactor
Dairy Cattle	961	8	0
Beef Cattle	379	3	0
MX Roping Steers	134	0	0
Goats	291	2	0
Cervids	16	0	0

Two herds in the MRZ remain to be tested, a large beef cattle herd of approximately 600 head, and a bison herd of 6 head. Gathering and holding the beef cattle herd for testing presents logistical challenges, in that the cattle graze approximately 240 sections of land and corrals are reported to be in poor condition. The herd is scheduled for testing by the end of October 2014, in cooler weather. The bison herd will be tested when the proper equipment is available to safely

restrain the animals. At this writing the equipment is on order. The results of these herd tests, if other than negative, may change the outcome of this risk assessment.

An ongoing surveillance effort for Chronic Wasting Disease in hunter-harvested mule deer and elk in the trans-Pecos area of Texas provided an opportunity to obtain additional surveillance for bovine TB in an area near the MRZ. TAHC determined that some of the tissues collected in this joint surveillance effort with the Texas Parks and Wildlife Department (TPWD) could also be examined for signs of TB. Representatives of the TAHC and TPWD presented details of the proposed effort at a public meeting for landowners and concerned parties at Sierra Blanca on December 19, 2013. The meeting was arranged by the Texas A&M AgriLife Extension Service. After discussions, attendees expressed support for the effort. Tissue samples from 43 mule deer and elk harvested by hunters in the 2013-2014 season were examined, with no indication of bovine TB detected. This effort helped assure bovine TB is not present in wildlife in far west Texas, and tentative plans are being made to extend the surveillance for the coming hunting season.

Conclusion and Recommendations

Bovine TB, first discovered in the El Paso, Texas and Las Cruces, New Mexico area in 1985, persisted as an animal and human health issue in Texas dairy herds in the area despite aggressive surveillance and eradication efforts. Depopulation of affected dairies and subsequent prohibition of dairy farming in portions of El Paso and Hudspeth counties were drastic but effective measures and key to bringing a chapter in the lengthy battle against recurring bovine TB in the area to a successful end. Historically, dairies are more likely to be infected with bovine TB, and may be more extensively infected than beef herds. Preventing the establishment of dairies in close proximity to animal populations with relatively high prevalence of bovine TB, up to 500 times the herd prevalence in the U.S., provides an effective buffer against recurrence of this disease.

It is the conclusion of the Texas Animal Health Commission that if dairies are allowed to operate in the El Paso area, the risk of bovine TB re-establishing and then spreading to other herds is low but still significant based on the information available at the time of this writing. It is recommended² that the Surveillance Area within the MRZ be dissolved, but the Affected Area within the MRZ remain designated as at-risk for bovine TB as a safeguard against costly recurrence. It is further recommended that requirements for annual testing of all cattle, bison, captive cervid, exotic bovid, and camelid herds within the Affected Area be removed and the testing interval, if necessary, be determined epidemiologically by the Commission.

² This risk assessment and recommendations found herein in no way affect or change the terms, agreements or other requirements established by USDA and outlined in 9 C.F.R. Part 50.

Appendix I
Texas Administrative Code

Texas Administrative Code

<u>TITLE 4</u>	AGRICULTURE
<u>PART 2</u>	TEXAS ANIMAL HEALTH COMMISSION
<u>CHAPTER 43</u>	TUBERCULOSIS
<u>SUBCHAPTER D</u>	MOVEMENT RESTRICTION ZONE (MRZ)
RULE §43.30	Special Requirements for Movement Restriction Zone (MRZ)

Definition of Zone Boundaries: The Movement Restriction Zone ("MRZ") is defined as a geographic area which includes an Affected Area, where bovine tuberculosis occurs or has historically occurred, and a Surveillance Area where the disease has not been detected, but which serves as a buffer area between the Affected Area and the Free Zone of Texas. The boundaries of the referenced zones and areas are as follows:

(1) MRZ: The area of El Paso County and Hudspeth County which lies within the boundaries established by the Rio Grande River on the West; Loop 375 to FM 659 to US 62/180 on the North; the El Paso County line to I-10 to Spur 148 at Ft Hancock on the East; and Spur 148 to the Rio Grande River on the South.

(A) Affected Area within the MRZ: The area of the MRZ in El Paso County which lies west of I-10, as defined above.

(B) Surveillance Area within the MRZ: The area of the MRZ in El Paso County which lies east of I-10, and all of the MRZ in Hudspeth County, as defined above.

(2) Free Zone: The area of Texas not included in the MRZ.

Source Note: The provisions of this §43.30 adopted to be effective April 8, 2001, 26 TexReg 2534; amended to be effective March 4, 2007, 32 TexReg 753

Texas Administrative Code

TITLE 4 AGRICULTURE

PART 2 TEXAS ANIMAL HEALTH COMMISSION

CHAPTER 43 TUBERCULOSIS

SUBCHAPTER D MOVEMENT RESTRICTION ZONE (MRZ)

RULE §43.31 Testing Requirements in Movement Restriction Zone (MRZ)

(a) All cattle, bison, captive cervid, exotic bovid, and camelid herds within the Affected Area must be tested annually.

(b) All cattle, bison, captive cervid, exotic bovid, and camelid herds within the Surveillance Area must be tested on an interval not to exceed two years.

Source Note: The provisions of this §43.31 adopted to be effective April 8, 2001, 26 TexReg 2534

Appendix II

Health and Safety Code

HEALTH AND SAFETY CODE

TITLE 6. FOOD, DRUGS, ALCOHOL, AND HAZARDOUS SUBSTANCES

SUBTITLE A. FOOD AND DRUG HEALTH REGULATIONS

CHAPTER 435. DAIRY PRODUCTS

SUBCHAPTER A. MILK OFFERED FOR SALE AND MILK GRADING

Sec. 435.001. DEFINITIONS. In this subchapter:

- (1) "Board" means the Texas Board of Health.
- (2) "Department" means the Texas Department of Health.
- (3) "Person" means an individual, plant operator, partnership, corporation, company, firm, trustee, or association.

Acts 1989, 71st Leg., ch. 678, Sec. 1, eff. Sept. 1, 1989.

Sec. 435.006. PERMIT TO SELL MILK. (a) A person who offers milk or milk products for sale or to be sold in this state must hold a permit issued by the board. The person must apply to the board or the board's representative for a permit.

(b) After receiving the application, the board or the board's representative may determine and award the grade of milk or milk products offered for sale by each applicant according to the specifications for grades established under this chapter.

(c) The board shall maintain a list of the names of all applicants to whom the board has awarded permission to use a Grade "A" label and remove from the list the name of a person whose permit is revoked.

(d) The board may not issue a permit to a person for a producer dairy located in an area infected with or at a high risk for bovine tuberculosis, as determined epidemiologically and defined by rule of the Texas Animal Health Commission.

Acts 1989, 71st Leg., ch. 678, Sec. 1, eff. Sept. 1, 1989.
Amended by Acts 2001, 77th Leg., ch. 445, Sec. 2, eff. June 4, 2001.

Appendix III

Code of Federal Regulations

§§ 50.15–50.16

(a)The claimant has failed to comply with any of the requirements of this part:

(b)All cattle, bison, and captive cervids 12 months of age or over in the claimant's herd have not been tested for tuberculosis under APHIS or State supervision: *Provided, however*, that cattle, bison, and captive cervids destroyed because of tuberculosis are exempt from this testing requirement if the cattle, bison, and captive cervids are subjected to a postmortem examination for tuberculosis by a Federal or State veterinarian.

(c)There is substantial evidence that the owner of the animals or the agent of the owner has in any way been responsible for any attempt to obtain indemnity funds for the animals unlawfully or improperly.

(d)At the time the cattle, bison, or captive cervids in the claimant's herd were tested for tuberculosis, the cattle, bison, captive cervids, or other live- stock in the herd belonged to or were on the premises of any person to whom they had been sold, shipped, or delivered for slaughter unless or until all of the cattle, bison, captive cervids, and other livestock remaining on the premises or in the herd from which the tested cattle, bison, or captive cervids originated are tested or otherwise examined for tuberculosis in a manner satisfactory to the Administrator or his or her designated representative.

(e)If the cattle, bison, or captive cervids were added to a herd while the herd was quarantined for tuberculosis, unless an approved herd plan was in effect at the time the claim was filed. As part of the approved herd plan, cattle, bison, or captive cervids added to a herd quarantined for tuberculosis must:

(1) Be from an accredited herd, as de- fined in § 77.1 of this chapter; or

(2)(i) Be from a herd that tested negative to an official tuberculin test, as defined in § 77.1 of this chapter, during the 60 days before the cattle, bison, or captive cervids were added to the claimant's herd; and

(ii) Have been found negative to an official tuberculin test, as defined in § 77.1 of this chapter, during the 60 days before the cattle, bison, or captive cervids were added to the claimant's herd.

(f)For exposed cattle, bison, or captive cervids destroyed during herd de- population, if a designated tuberculosis epidemiologist has determined that other livestock in the herd have been exposed to tuberculosis by reason of association with tuberculous livestock, and those other livestock determined to have been exposed to tuberculosis have not been destroyed.

(g)For livestock other than cattle, bison, and captive cervids that are destroyed because of association with herds of affected cattle, bison, or captive cervids:

(1) If the livestock did not reside among the herd for a period of 4 months or more;

(2) If the livestock have not received a postmortem examination for tuberculosis; or

(3) If the livestock were added to a herd that was under quarantine for tuberculosis at the time the livestock were added to the herd, unless an approved herd plan was in effect at that time.

[67 FR 7592, Feb. 20, 2002]

§§ 50.15–50.16 [Reserved]

Subpart B—Dairy Cattle and Facilities in the El Paso, Texas, Region

SOURCE: 67 FR 48751, July 26, 2002, unless otherwise noted.

§50.17 Payment.

a) *Eligibility for payment.* Owners of dairy operations, including owners of dairy cattle and other property used in connection with a dairy business or fluid milk processing plant, are eligible to receive payment from the Department under this subpart in connection with a buffer zone depopulation program due to tuberculosis, provided the owners meet all applicable requirements of this subpart and the dairy cattle herd is within the area circumscribed by the following boundaries: Beginning at the point where the Hudspeth-El Paso County line intersects U.S. Highway 62; then west along U.S. Highway 62 to the El Paso Toll Bridge; then southeast along the Rio Grande River to the Fort Hancock-El Porvenir Bridge; then northeast along spur 148 to Interstate 10; then northwest along Interstate 10 to the Hudspeth-El Paso County line; then north along the Hudspeth-El Paso County line to the point of beginning.

(b) To be eligible for payment, each of the owners of dairy cattle and other property within the area described in paragraph (a) of this section must sign and adhere to an agreement with APHIS to do the following:

(1) Cease all dairy cattle operations within the described area and dispose of all sexually intact cattle on the dairy operation premises no later than 3 years after all eligible owners have signed their respective agreements;

(2) Conduct no dairy farming or other dairy activity, including the rearing of breeding cattle, but not including the grazing or feeding of steers and spayed heifers intended for terminal market, within the area described in paragraph (a) of this section until the described area and the adjoining area of Mexico have been declared free of bovine tuberculosis, as determined epidemiologically by APHIS, but in any event for a period of not less than 20 years after all eligible owners have signed their respective agreements.

(3) Allow a covenant to be placed on their properties where dairy operations have been conducted that will prevent the establishment of any breeding cattle operations (not including the grazing or feeding of steers and spayed heifers intended for terminal market) on the premises until the described area and the adjoining area of Mexico have been declared free of bovine tuberculosis, as determined epidemiologically by APHIS, but in any event for a period of not less than 20 years after all eligible owners have signed their respective agreements.

(4) Maintain responsibility for all cattle on the premises used in the dairy operation until those animals are removed from the premises;

(5) Make all arrangements for the removal of sexually intact cattle from the premises;

(6) Notify APHIS officials of the intended removal of all sexually intact cattle from the premises and provide APHIS officials with the opportunity to monitor and evaluate the removal operations; and

(7) Such other terms, provisions, and conditions as agreed by each owner and APHIS.

(c) *Amount of payment for cattle and other property.* Upon approval of a claim submitted in accordance with § 50.20 of this subpart, owners eligible for payments under paragraph (a) of this section will receive payments for cattle and other property, the amount of which is determined by the following rates:

(1) For milking cows, an amount not to exceed \$2,922 per animal; and

(2) For heifers, an amount not to exceed \$834 per animal.

(d) Any dairy cattle added to a premises after the date an owner has signed the agreement required under paragraph (b) of this section will not be included in the rate calculation in paragraph (c) of this section and must be disposed of within 3 years after all eligible owners have signed their respective agreements.

(e) *Amount of payment for certain other property.* In addition to the amounts paid under paragraph (c) of this section, amounts will be paid as follows:

(1) For expenses in relocating equipment of a reverse osmosis plant in El Paso County, TX, an amount equal to the costs of relocating the plant's equipment, not to exceed \$675,000.

(2) In conjunction with the permanent closure of a fluid milk processing plant in El Paso County, TX, an amount not to exceed \$950,000, with payment to be made in the same manner and at the same times, on a pro rata basis, as payments are made to such owners for their dairy cattle and other property.

(Approved by the Office of Management and Budget under control number 0579–0193)

[67 FR 48751, July 26, 2002, as amended at 68 FR 10361, Apr. 4, 2003]

§ 50.18 Identification and disposal of cattle.

(a) All dairy cattle disposed of under this subpart must travel from the premises of origin to their final destination with an approved metal ear tag, supplied by APHIS or the State

Works Cited

- 4 TEX. ADMIN. CODE §§ 43.30-.31 (2014) (Tex. Animal Health Comm'n, Tuberculosis)
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- Dr. Linda L. Logan, DVM, PhD, Executive Director Texas Animal Health Commission. (Austin, TX: 6 October 2000), letter to *Dr. Oliver Williams*.
- Dr. M. Schoenbaum, DVM, PhD and Dr. M. Meyer, DVM, MS. "Tuberculosis in Large, Confined Dairy Herds: Approaches to Elimination." Thoen, Charles O., DVM, PhD and Steele, James H., DVM, MPH. *Assessment of Pathways*. Iowa State University Press, Ames, Iowa 50014, 1995. 131-141. Document.
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- Pillai, Suresh D., et al. "Failure to identify non-bovine reservoirs of *Mycobacterium bovis* in a region with a history of infected dairy- cattle herds." *Preventive Veterinary Medicine* 24 June 1999: 53-62. print.
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- USAHA Committee on Tuberculosis. "Report of the Committee on Tuberculosis." 1995.
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- USDA Animal and Plant Health Inspection Service Rule, 9 C.F.R. Part 77 (2014)
- USDA-APHIS-VS. "Veterinary Services Memorandum No. 552.41." *Guidelines for Tuberculosis (TB) Reviews in Mexico*. Washington, D.C, 2 October 2009.
- USDA-APHIS-VS-CEAH. *Assessment of Pathways for the Introduction and Spread of Mycobacterium bovis in the United States*. Fort Collins, CO, 2009.