

# ECONOMIC IMPACT OF EXPANDED FEVER TICK RANGE



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**AFPC**

Department of Agricultural Economics  
Texas AgriLife Research  
Texas AgriLife Extension Service  
Texas A&M University

*AgriLIFE* RESEARCH  
& EXTENSION  
Texas A&M System

College Station, Texas 77843-2124  
Telephone: (979) 845-5913  
Fax: (979) 845-3140  
<http://www.afpc.tamu.edu>

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Agricultural and Food Policy Center  
Department of Agricultural Economics  
2124 TAMU  
College Station, TX 77843-2124  
Web site: [www.afpc.tamu.edu](http://www.afpc.tamu.edu)

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David P. Anderson  
Amy D. Hagerman  
Pete D. Teel  
G. Gale Wagner  
Joe L. Outlaw  
Brian K. Herbst



**Agricultural and Food Policy Center**  
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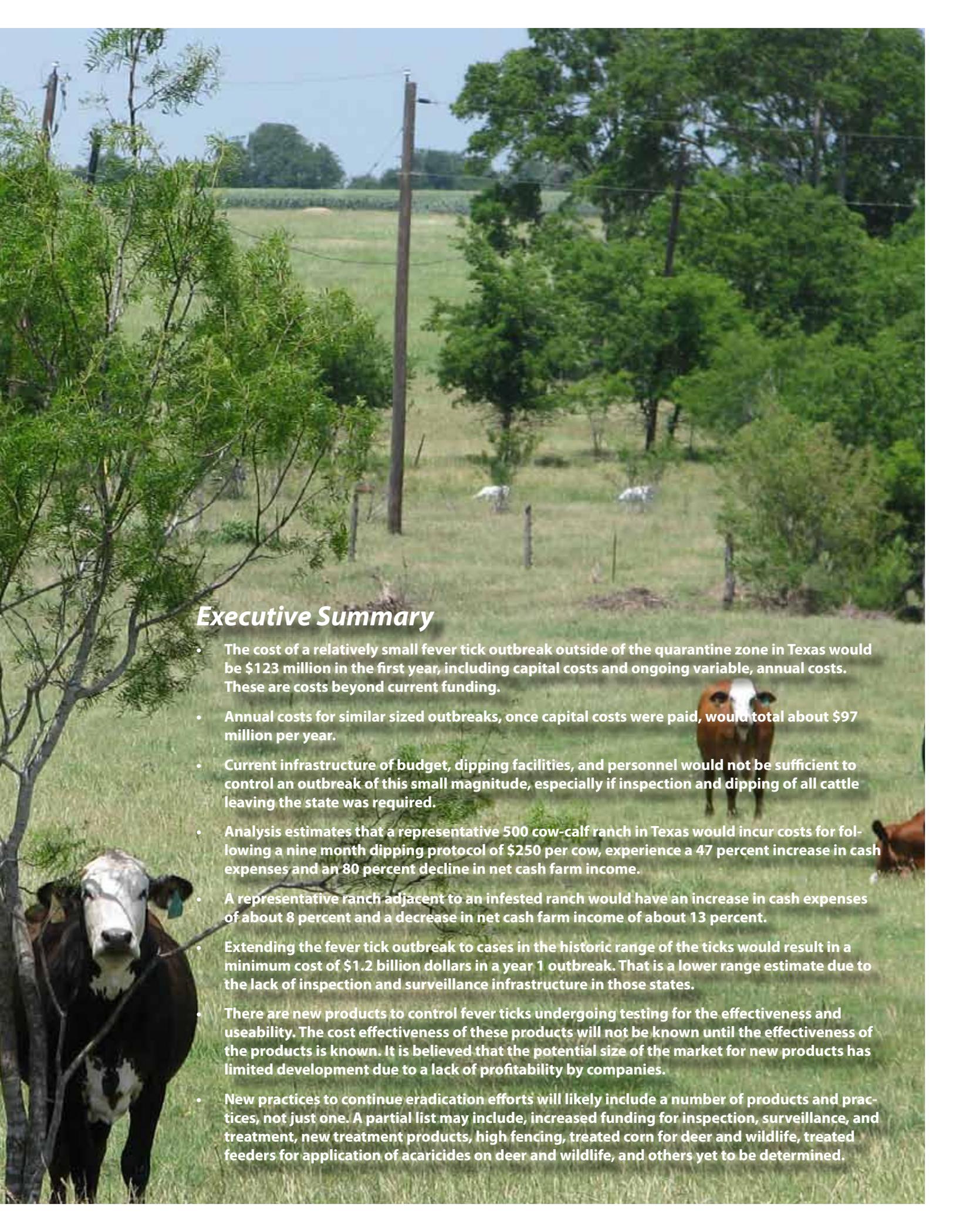
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## *Executive Summary*

- The cost of a relatively small fever tick outbreak outside of the quarantine zone in Texas would be \$123 million in the first year, including capital costs and ongoing variable, annual costs. These are costs beyond current funding.
- Annual costs for similar sized outbreaks, once capital costs were paid, would total about \$97 million per year.
- Current infrastructure of budget, dipping facilities, and personnel would not be sufficient to control an outbreak of this small magnitude, especially if inspection and dipping of all cattle leaving the state was required.
- Analysis estimates that a representative 500 cow-calf ranch in Texas would incur costs for following a nine month dipping protocol of \$250 per cow, experience a 47 percent increase in cash expenses and an 80 percent decline in net cash farm income.
- A representative ranch adjacent to an infested ranch would have an increase in cash expenses of about 8 percent and a decrease in net cash farm income of about 13 percent.
- Extending the fever tick outbreak to cases in the historic range of the ticks would result in a minimum cost of \$1.2 billion dollars in a year 1 outbreak. That is a lower range estimate due to the lack of inspection and surveillance infrastructure in those states.
- There are new products to control fever ticks undergoing testing for the effectiveness and useability. The cost effectiveness of these products will not be known until the effectiveness of the products is known. It is believed that the potential size of the market for new products has limited development due to a lack of profitability by companies.
- New practices to continue eradication efforts will likely include a number of products and practices, not just one. A partial list may include, increased funding for inspection, surveillance, and treatment, new treatment products, high fencing, treated corn for deer and wildlife, treated feeders for application of acaricides on deer and wildlife, and others yet to be determined.

## Introduction

Cattle fever ticks were introduced to the new world by early colonists and explorers through importation of livestock. By the beginning of the 20th century, cattle fever ticks were established in 14 states from Texas to Missouri and east to the Atlantic seaboard, plus southern California. The ticks fed on cattle as a host, resulting in poor condition, low weight gain, slow growth and reduced reproductive capacity. In addition, the ticks (*Rhipicephalus annulatus* and *R. microplus*) transmitted a pathogen that caused disease in cattle throughout the region. The disease produced high mortality among naïve cattle (no previous exposure) and slowed improvement in southern cattle herds. During the late 1800's, cattle moved from Texas to northern markets spreading ticks and dying cattle along the cattle trails, thus the name Texas Cattle Fever (bovine babesiosis). Scientists discovered the relationships between tick feeding, pathogen transmission and disease, and the impact on cattle management. Since the two cattle fever tick species were the only vectors of the pathogens, elimination of Texas Cattle Fever was achieved through a strategy of tick eradication. Two tactics were used to eliminate ticks: 1. Cattle were removed from infested premises, causing the remaining ticks to die by denying them a blood meal; or 2. Cattle were systematically treated with acaricides to eradicate the ticks, thus preventing the repopulation of pastures and rangeland. State and federal eradication programs began in 1906 and steady progress eliminated cattle fever ticks by the 1960's. A permanent quarantine zone along the Rio Grande (the Texas-Mexico border) was established in order to prevent the re-establishment of ticks and bovine babesiosis from Mexico. Mexican cattle presented for importation into the US have to pass a tick-free inspection and undergo compulsory acaricide treatment before entry.

### Cattle Fever Ticks (*Rhipicephalus annulatus* and *R. microplus*)



Use of many different acaricides in Mexico has given rise to acaricide resistant ticks that are now being detected in Texas. The abundance and diversity of native and exotic deer species have increased substantially and today are valued economic assets to landowners; however, white-tailed deer and several exotic species also serve as hosts for cattle fever ticks. Both acaricide resistance and the involvement of alternate hosts pose significant challenges to the strategy of tick eradication.

Today, cattle fever ticks are reemerging in south Texas. If not contained, the ticks could spread throughout the original range of 14 states. During 2009, more than 1 million acres were quarantined for cattle fever ticks in Texas, the largest area under quarantine in more than 40 years. This resurgence has been influenced by changing weather patterns and rangeland vegetation, tick movement on non-cattle hosts, variation in land-use, and acaricide resistance. Native and exotic wildlife pose significant challenges on tick infested premises. Wildlife surveillance, movement and treatment are variables that make tick containment and elimination exceedingly difficult.

This report examines a number of questions asked by Congressman Henry Cuellar. These questions include:

1. What would be the cost to the United States if the status quo of controlling the cattle fever tick is maintained? What would the economic impact be if the cattle fever tick spreads throughout its historical range in the United States? What would be the cost to contain and eradicate an outbreak of cattle fever ticks in the United States?
2. What are the costs to Texas cattle ranchers for complying with the cattle fever tick program regulations for the following classification of ranches?
  - a. Fever tick infested premises
  - b. Fever tick exposed premises
  - c. Adjacent premises
  - d. Premises in a fever tick quarantine zone.
3. What amount of funding is needed to control, then eradicate fever ticks in Texas, and/or prevent the spread of the cattle fever tick from Texas?
4. Are there effective products for the elimination of cattle fever ticks available, but that have not been approved by the Food and Drug Administration for use in the cattle fever tick program? If such products were approved for use, what would the cost savings to ranchers and the cattle fever tick program be if these products were readily available?
5. What are the most cost effective management techniques for managing the cattle fever tick? What are the estimated costs of constructing, operating, and maintaining dipping vats? What would the estimated cost be of constructing game fencing throughout the quarantined areas in South Texas?

This report includes an economic analysis of a fever tick outbreak in Texas. This analysis is used to answer the questions above.

### **Livestock Pens at the Santa Teresa Port of Entry, New Mexico.**



## ***Economic Impact of a Texas Fever Tick Outbreak***

Fever ticks were eradicated from the US down to a portion of the Texas-Mexico border over a 54 year period from 1906 to 1960. Increasing incidents of fever ticks on South Texas ranches has increased concerns about the ability to continue to control fever ticks and keep them in the quarantine zone. A key question is the economic impact of a fever tick outbreak beyond today's quarantine zone.

An outbreak is defined as finding one tick. While the term outbreak sounds like it should be larger, or more widespread, the current program is one of eradication requiring treatment of cattle to eliminate the ticks.

We have made no assumptions on the mode of transport for the ticks outside the quarantine zone to cause the outbreak. In other words, how the ticks got to those locations is not addressed.

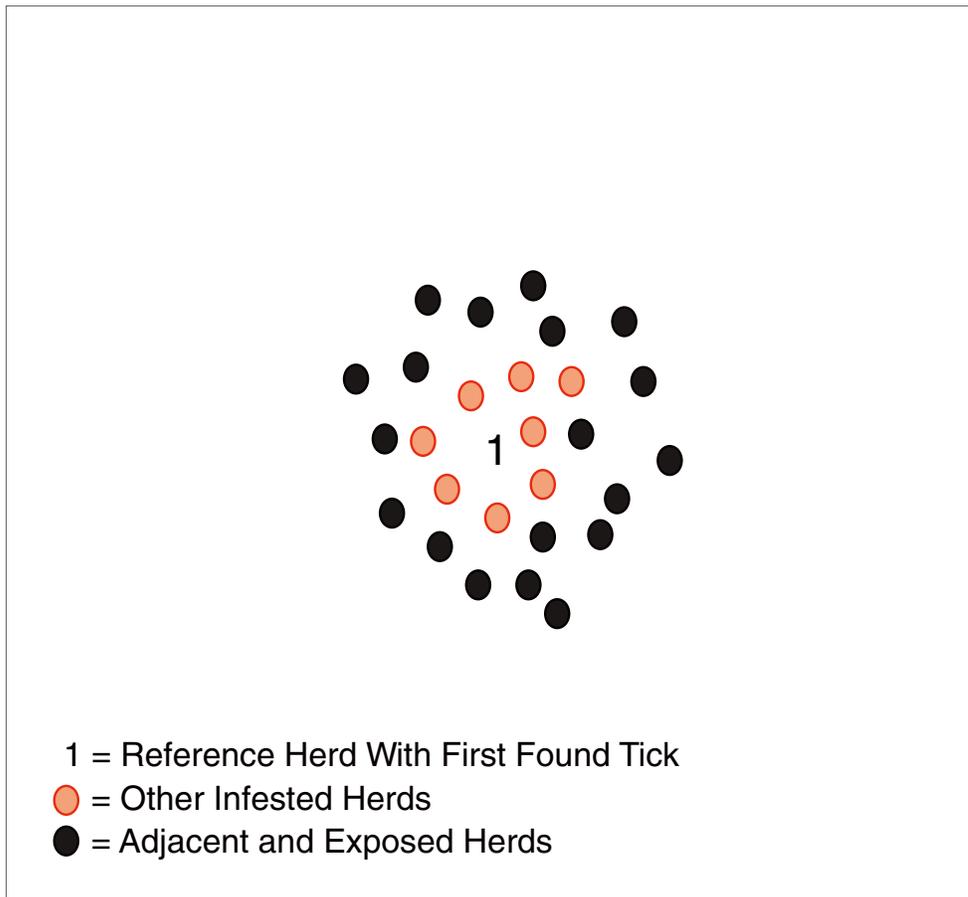
A number of assumptions have been made to model the economic impact of the outbreak. An outbreak is assumed not to be caused by the one and only fever tick that exists in that location. The fever tick represents the first one that is found. Scratching the herd (physical inspection of the animals) on the premises where ticks are found and then scratching animals on adjacent properties results in finding more ticks present. The idea is that it takes some level of tick population in existence to make the population large enough to find the first one. The response to finding the first tick is to search, which results in finding more ticks and more infested properties. The result defines the extent of a spread of the tick beyond its original identified location. An illustration is contained in Figure 1. The originally identified tick is represented by the number 1. Additionally identified tick locations are identified by red dots and black dots represent adjacent and exposed herds.

Texas Animal Health Commission deals with fever tick outbreaks, as they do with other animal disease outbreaks. The requirements for dealing with a fever tick outbreak are laid out in the Texas Agriculture Code, Chapter 167, Tick Eradication. This section of the Agriculture Code is contained in Appendix A for reference. The Code is used in this report as a guideline for assumptions in the economic modeling.

In accordance with the tick eradication protocols, when the ticks are found the ranchers have a choice on how to proceed. The rancher can choose to keep the cattle in the infested premises and comply with a dipping routine until the ticks are eradicated or they can choose to inspect, dip, and vacate the pasture or premises to break the tick lifecycle. Ranchers must present the cattle for inspection and dipping.

### **Livestock Pens at the Santa Teresa Port of Entry, New Mexico.**





**Figure 1.** Illustration of County Boundary With First Herd Found With a Fever Tick and Subsequent Found Infested, Adjacent, and Exposed Herds.

For the purpose of this analysis we have assumed that 95 percent of operations choose to keep the cattle on the premises and follow the dipping routine. Most ranches, today, dip then vacate the pastures due to the expense of the dipping routine. Vacating pastures requires inspection and dipping to insure the cattle are tick free prior to movement. But, as infestations increase, it will become harder for owners to find non-infested properties without added expense of grazing leases, and in all likelihood, require the herd to be sold.

The dipping routine consists of presenting the cattle for inspection and dipping every 14 days for nine months. Depending on the time of the year the ticks are found (Spring) the routine can be shortened to 6 months, but it appeared that a nine month dipping routine was most appropriate. For this analysis, it was assumed that the nine month dipping routine was effective at eradicating the ticks. We acknowledge that the premises will not be released from quarantine status at 9 months, and may be subject to continued surveillance, inspection, and treatment. Activities beyond the 9 month treatment schedule vary and are not included in this analysis.

It is assumed that no bovine babesiosis occurs. While we have pastures that have been infested with fever ticks, we have not had outbreaks of bovine babesiosis. In naïve populations, bovine babesiosis has been found to result in death losses approaching 90 percent. We consider the US cattle herd to be a naïve population.

This report analyses the scenario of simultaneous tick outbreaks involving cattle on in three non-adjacent regions of Texas, all located outside of the current quarantine zone. Each outbreak is focused in a county location of the ecological region where the average herd size is different.

King County is located in the Rolling Plains ecological region and is characterized as having larger ranches with more acres per cow due to the average carrying capacity of the region. This county is on the far western reach of the historical range of the fever tick. Gonzales county is located in the southern end of the Blackland Prairies ecological region and is one of the largest (or has one of the highest densities of) cow-calf counties in Texas. Hunt county is located in the Blackland Prairies region of northeast Texas and is characterized as having comparatively smaller properties and smaller herds of cattle. Table 1 contains the number of infested, exposed, and adjacent herds estimated in the model results. The total number of heard effected in this scenario is 1,658, which is about one percent of all the operations with cattle and calves in Texas.

**Table 1.** Number of Fever Tick Infested, Exposed, and Adjacent Premises in Model.

Region/Country	Infested	Exposed	Adjacent
King County	10	20	44
Gonzales County	95	188	417
Hunt County	120	237	527

Cost parameters for the economic model are based on information from the Texas Animal Health Commission and the USDA/APHIS Tick Force. This analysis assumes that unlimited labor, supplies, and budget allow for the regulatory program to be implemented as soon as ticks are found. That means that TAHC is assumed to have the personnel and equipment – including mobile dipping vats and the chemicals for the dipping vats – available in sufficient numbers to contain this outbreak.

An outbreak of this size is assumed to trigger some actions by neighboring states. One action is to require all cattle leaving the state to be inspected and dipped prior to shipping. To further control the outbreak, all cattle sold would be required to be dipped following sale. This was accomplished in the model by assuming a dipping facility would be constructed at each livestock auction market in the state. There were 147 livestock auction markets in Texas as of December, 2008 (USDA). Cattle sold directly would also have to be dipped at those facilities.

#### **Ranch Level Economic Impacts**

The economic impacts of a fever tick outbreak is estimated using the Agricultural and Food Policy Center's (AFPC) representative ranches. The AFPC maintains two representative ranches in Texas. One is a 500 cow-calf ranch in Guthrie, TX (King County) and the other is a 200 cow-calf ranch in Gonzales County. The initial fever tick outbreak scenario included these two counties to tie the analysis to the representative ranches.

The King County representative ranch runs 500 cows on 20,000 acres of native range, half owned and half leased. Calves are run on wheat pasture then sold as feeder cattle. The Gonzales representative ranch runs 200 cows. Drought forced 30 percent herd liquidation in 2006 and continued drought has not allowed herd expansion. More representative ranch characteristics are contained in Appendix B.

The data for these representative ranches is developed and maintained by the Agricultural and Food Policy Center with a panel of producers using a consensus building interview process. The ranchers develop, on paper, what a ranch, representative of the area looks like. Production data includes the number of acres, number of cows, calf crop, number of replacement cows, and sale weights. Financial data includes calf prices, labor, fuel, grazing costs, and all other costs associated with running a ranch.

#### **Livestock Pens at the Santa Teresa Port of Entry, New Mexico.**



The representative ranches are analyzed using a whole farm simulation model (FLIPSIM) developed by AFPC. The producer panels are given pro forma financial statements for the representative ranch to verify the accuracy of the data.

The ranch financial performance is then simulated out to a 6 year planning horizon. Calf prices, costs, interest rates, and inflation rates, among other costs, over the planning period are projected by the Food and Agricultural Policy Research Institute. The simulated ranch, using the projected prices, provides a baseline for policy analysis.

Three ranch level scenarios are analyzed as a response to being infested with fever ticks. The first is to round-up and dip all cattle every 14 days for 9 months, in accordance with the tick eradication protocol. The second scenario requires the ranch to inspect, dip all the cattle and then vacate the infested pastures for 9 months. The third scenario models the economic impact of the ranch being adjacent to an infested ranch, but not infested itself. Modeling assumptions are:

- The dipping option includes rounding up and presenting all cattle for dipping every 14 days for 9 months.
- Dipping assumes that the 9 month protocol works and that the ticks are eradicated by the process without further work.
- The vacating option includes rounding up all cattle for inspection, dipping twice, and moving the cattle to another property.
- The vacating option includes leasing more grazing land at current lease rates. It assumes that there are properties available for rent and that rates do not increase due to the demand for the property for that purpose.
- The adjacent alternative includes rounding up and presenting the cattle for inspection and dipping twice.

Ranch level costs associated with the dipping protocol for nine months are estimated to be \$250 per cow. Labor costs for rounding up all cattle every 14 days are charged at \$10 per cow. An additional \$30 per cow is estimated for increased maintenance and repair on fences and facilities due to increased use. This estimate is drawn from repair and maintenance currently on the representative ranches. This cost estimate does not include increased death losses, weight loss, and reduced calf numbers due to the increased amount of cattle working. It also does not include any ranch infrastructure capital costs for working pens or additional feed and water supplies while cattle are held for dipping. Neither representative ranch has full time employees working on the ranch. The dipping routine would require additional full time employees.

Cost estimates provided by TAHC personnel indicate a wide range of costs experienced by current ranches dipping cattle. These estimates range from \$94 to \$125 per cow. The major difference in this estimate is that the ranch already had 3 full time cowboys and hired one additional cowboy to only work on fever tick related work. The other 3 full time cowboys reported spending a large portion of their time on fever tick related cattle working rather than the work they were doing previously. The estimates include changes in ranch actual costs rather than costing out the actual costs expended related to fever tick work.

Figure 2 contains the percent change in cash expenses for the representative ranches for each scenario: dip for 9 months, vacate pastures, adjacent ranch, for the year 2010. For each ranch, the dipping protocol increases cash expenses by almost 50 percent. The vacating pasture option increased costs by about 12 percent and 21 percent on the Guthrie and Gonzales ranches, respectively. In this option the cattle were kept, but additional pasture was leased at current rates to keep the herd intact. Simply being adjacent to an infested ranch increased costs almost 10 percent due to inspection and dipping.

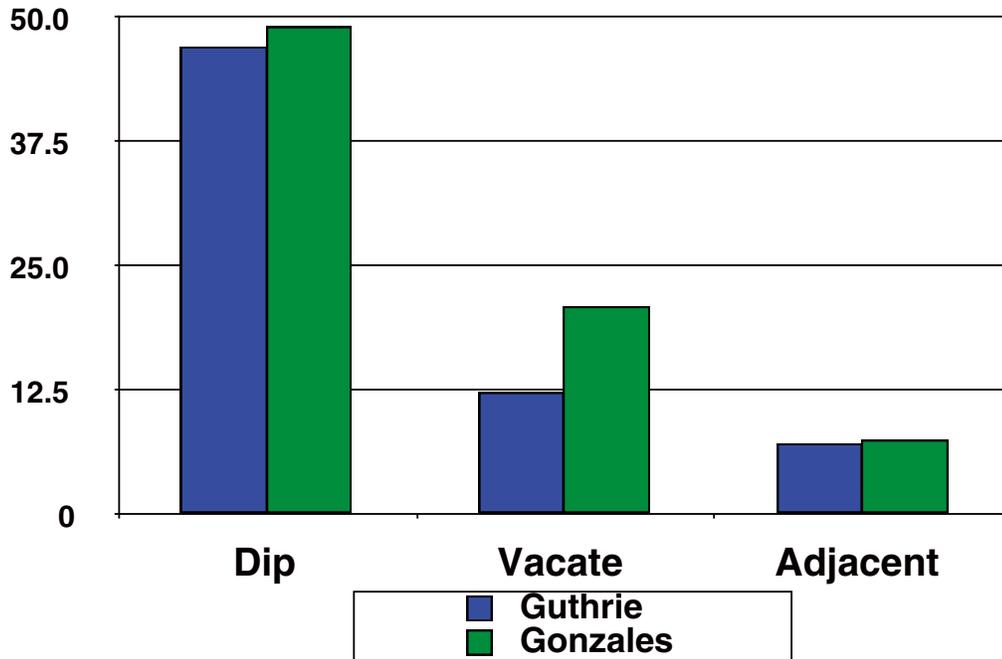
Figure 3 contains the impact on net cash farm income (NCFI) in 2010 for the representative ranches under the same three scenarios. NCFI decreases about 150 percent for the Gonzales ranch. The increase in expenses required to follow the dipping protocol results a negative NCFI. NCFI on the Guthrie ranch is reduced approximately 80 percent. Vacating pastures and being an adjacent ranch result in significant declines in NCFI for both ranches.

Recent experiences with fever ticks in South Texas has extended the period of continued inspection and surveillance for ticks on ranches following the dipping protocol. Due to changing experiences a longer period of surveillance could be required which would, in turn, require cattle to be presented for inspection longer than the nine month dipping period.

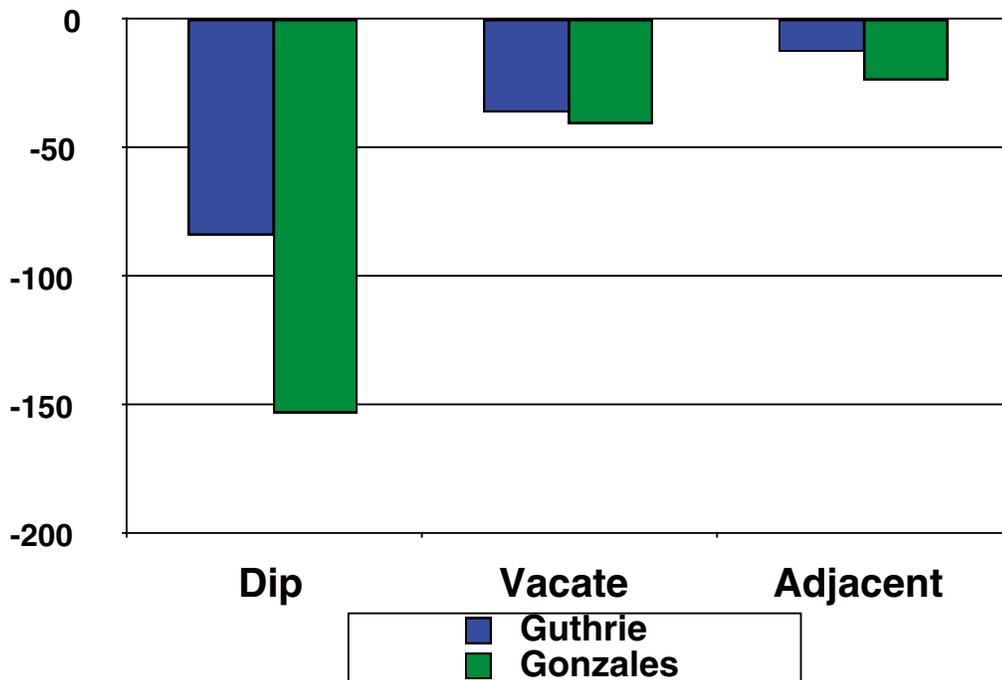
### **Tick Eradication Costs and Physical Losses**

The dipping program described above may result in some level of animal loss from the extensive handling of the animals. In addition, the stress of the handling may cause some shrinkage. The costs of tick eradication include the cost to producers of rounding up and penning animals to present them for dipping, as well as the cost to the TAHC of the chemicals, personnel and equipment necessary to follow the dipping procedure. These costs are outlined in Table 2.

The cost model is a static, one year model that estimates the cost of eradicating ticks in each of the three regions outside the buffer zone where fever ticks are found. Costs are broken out by infested premises, exposed premises and adjacent premises since the response protocol differs by these classifications. For more detail refer to Appendix A. Some costs, such



**Figure 2.** The Percentage Change in Cash Expenses on Representative Ranches Dipping for Fever Ticks, Vacating Pasture, and Being an Adjacent Ranch.



**Figure 3.** The Percentage Change in Net Cash Farm Income on Representative Ranches Dipping for Fever Ticks, Vacating Pasture, and Being an Adjacent Ranch.

**Table 2.** Cost Category Elements in the State Tick Eradication Cost Model.

Loss Item	
Death Loss	Dipping population × percent dipped × death loss per dipping × number of dippings for infested premises and exposed premises only
Premature Sale Loss for calves <sup>1</sup>	market value of calves × reduction in market value × actual dipping population × Premature Sales Percentage × Percent who vacate premises
Chemical <sup>2</sup>	(number of vats × pesticide cost per vat)/2 -additional pesticide cost savings
Water	Cost of water for one vat × number of vats required for dipping
Dipping Labor	Actual Dipping Population × Labor cost/head × region dippings per year
Additional Scratch Labor	(Actual Dipping Population × Percentage of Owners who Vacate × Additional Times Scratched after Vacate)/Number of Cattle on Ranch × Labor Cost/Person/Day
Roundup	Actual Dipping Population less calves × Roundup cost/head/roundup × dippings/yr
Transportation <sup>3</sup>	Actual Dipping Population × Trans cost/head/roundup × dippings/yr
Dipping Animal Loss <sup>4</sup>	Cripple/Injured + Weaning Weight Loss + Delayed Breeding Loss
Other Loss	Pasture Vacation Loss + Chemical Disposal + Interest and Depreciation on Equipment + Regular Tick Force Patrol in the rest of the buffer zone
Total Tick Eradication Cost	Death Loss + Premature Sale Loss + Chemical + Water + Dipping Labor + Additional Scratch Labor + Roundup + Transportation + Dipping Animal Loss + Other Loss
New Dipping Facilities	Saleyard facilities in Texas × Cost to build a dipping facility

**Table 3.** State Tick Eradication Costs.

Cost Category	Cost in US\$
Infested Premises	\$20,742,273.27
Exposed Premises	\$38,856,620.82
Adjacent Premises	\$10,194,911.20
All Premises	\$18,439,355.62
Total Tick Eradication Cost	\$88,233,160.92
Saleyard Dipping	\$9,015,639.13
New Dipping Facilities	\$25,734,310.00
<b>Total Cost</b>	<b>\$122,983,110.04</b>

as water cost per vat, chemical cost per vat and chemical disposal cost per vat, will not vary by type of premises; these are collected under the “all premises” cost category. In addition, it is assumed that should other states begin to doubt Texas’ ability to contain fever ticks a protocol of scratching and dipping each animal that leaves the state will be requested. We assumed border checks going out of the state would not be required for an outbreak of this size, but at each sale facility in Texas dipping facilities would need to be constructed so loads of cattle shipping out of state can be scratched and dipped prior to departure. The cost assumptions come primarily from three sources. Namely, the Deitrich *et al.* (2000) study was used for some of the general assumptions on dipping animal loss, death loss, and premature sale loss. Expert opinion including TAHC and participants at the Tick Summit held in October, 2009 was used on current chemical costs, likely actions by producers (i.e. premises vacation vs. systematic dipping) and dipping capacity that exists now. General literature and Texas Agricultural Census data was used for animal populations and for the likelihood of finding ticks on other premises after the first tick is found.

The costs of this reasonably small outbreak are presented in Table 3. The cost of eradicating ticks from infested, exposed and adjacent premises through systematic dipping and pasture vacation assuming no limitations on labor and chemical are estimated at \$88 million for one year. This is in addition to existing Tick Force activities elsewhere in the buffer zone. The enforced dipping of cattle being shipped out of state before movement would cost \$9 million for one year; it can be assumed that this policy would be in place for a longer period of time but this additional cost is not included here. The cost of new dipping facilities to meet this increased demand is \$26 million. This is a one-time cost that would be depreciated over time as these would be permanent concrete vats located at saleyards. The total cost for one year for an outbreak starting with three infestations would be \$123 million dollars.

## Implications

Larger outbreaks than this scenario, of finding 3 initial ticks, result in higher costs due to more producer impacts through more operations dipping and larger outlays by TAHC. The capital costs are largely captured in the initial outbreak. Extrapolating to an outbreak only 3 times the size of the initial scenario leads to some serious implications. Under this larger outbreak, a simple calculation yields that 48 herds would have to be dipped every day. That would require 2,243 vat charges. A vat charge is the filling of the dipping vat with the label rate level of chemical to dip the cattle. If it took 3 people to work the equipment to dip the cattle then that is an additional 144 employees of TAHC. Those are employees they do not have currently.

It was assumed that there were no infrastructure bottle necks delaying tick eradication. One of those was labor and another was budget. It appears that even a relatively small outbreak detailed in this report would be enough to cause a major bottleneck. Another potential bottleneck in the system is the availability of the chemical to use in the dipping facilities. This analysis uses the current chemical, CoRal, with which to eradicate the ticks. CoRal is made by one company for this purpose. TAHC estimates the amount needed each year and orders it 4 to 6 months in advance in order to have the necessary supplies for the coming year. An outbreak of any size would be likely to exceed existing supplies and could exceed the plant capacity to produce it in a timely manner.

The impact of potential infrastructure bottlenecks are not explicitly modeled in this analysis, but the implications of them are highlighted. Their potential existence and effect is a risk in a fever tick outbreak that may be of much larger significance to eradication.

There are several other potential implications of a fever tick outbreak. The assumption has been made that all cattle would have to be dipped upon leaving the state. That is a decision that would be made by animal health officials in other states. It seems a reasonable assumption given that the spread of ticks from both King and Hunt counties could reasonably include counties in Oklahoma. This subject has been discussed in the past by animal health officials.

Fever ticks are controlled to eliminate the host for the pathogen causing bovine babesiosis, so that its occurrence is eliminated. It is likely that an outbreak of fever ticks of this relatively small magnitude could force neighboring states to require testing all cattle leaving the state for bovine babesiosis and require that cattle be held until test results were obtained. This analysis does not assume this requirement. Industry costs would be significantly higher if this was required.

This analysis has not included losses to bovine babesiosis cases. If mortality approaches 90 percent in naïve populations, then individual ranch losses where the disease occurred would be substantial. In addition, no international trade effects from the occurrence of bovine babesiosis have been assumed. Bovine babesiosis is a reportable disease, meaning that incidences have to be reported to animal health officials. Other disease incidences have triggered large international trade impacts, for example, BSE and FMD.

These results also have made no special assumptions regarding dairies and feedlots. The only effect included has been inspecting and dipping all cattle leaving the state. Some determination about whether or not feedlot cattle had to be dipped would have to be made by animal health officials. If it was determined that fed cattle had to be dipped upon shipping for slaughter then these results underestimate the amount of capital costs necessary to build dipping vats.

### **Expansion to Historic Range**

The historic range of the fever tick includes all or parts of the 14 states of the Southeastern United States and Southern California (Figure 4). The ticks were brought over to the New World by colonists and explorers in the early 1500s and in the ensuing years expanded their range throughout the Southeast. Eradication began in 1906 and by 1960 the ticks were pushed down to the current zone on the Rio Grande River border with Mexico. It took 54 years to eradicate the ticks to their current area from which they are expanding again. The last areas, and presumably the hardest areas, to eradicate ticks were parts of Central and South Florida and portions of East Texas. Certainly, the climate and terrain played a role in the difficulty in eradication.

What would happen if the fever tick was allowed to expand from its current area in the expanded quarantine zone back to its historic range? There are no models currently to model the spread of ticks or the speed of tick movement across distances to get to the historic range. When ticks were introduced there were no impediments to tick infested livestock movement, which allowed them to spread from the location of introduction. The cattle drives of the 1800s moved tick carrying cattle on the trails where the ticks were spread everywhere along the trail. Eradication took 54 years to move from the range in Figure 5 to the Texas-Mexico border.

Today, risks of fever tick spread from Mexico, or outside of the quarantine area of south Texas and into the southeastern US historic range are, in part, linked to the dynamics of animal transportation in livestock and wildlife industries. Animals move within and across state lines for a variety of reasons, including:

- Consequence of trade, both legal and illegal,

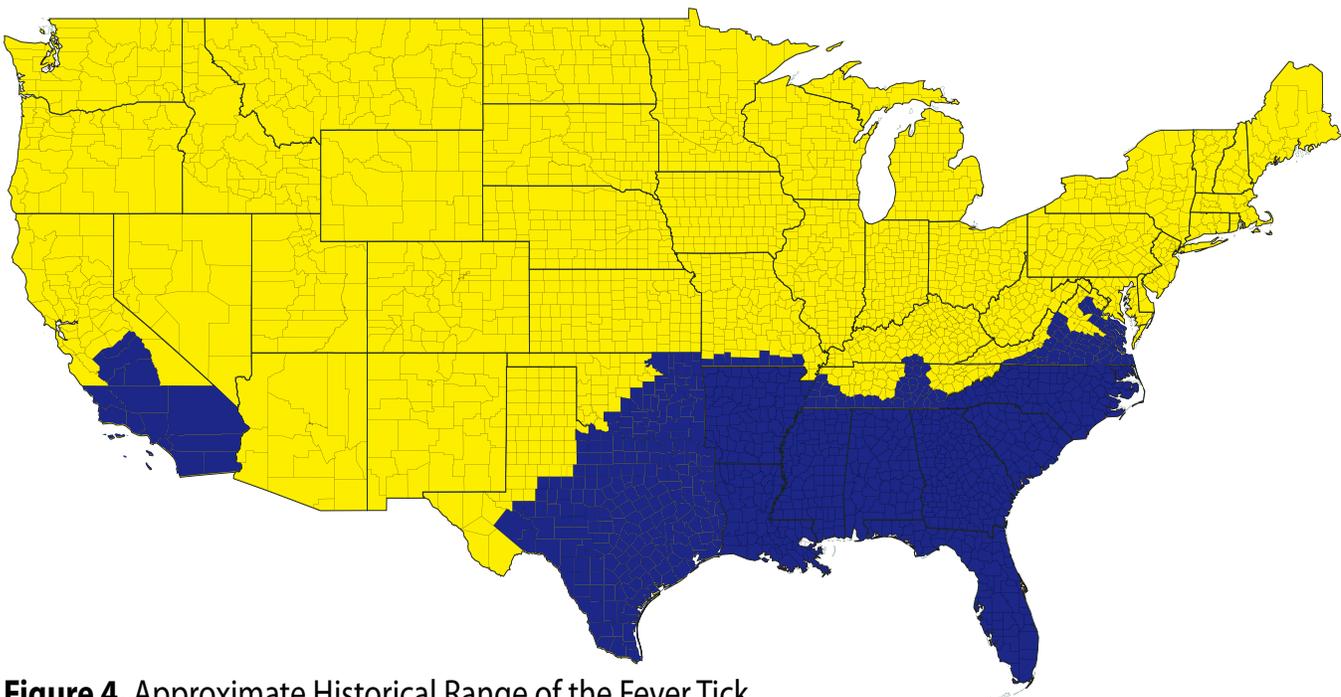
**Table 4.** Cattle Numbers, Operations, and Value in the States Within the Historical Range of Fever Ticks.

State	All Cattle	Beef Cows	% of Nation's Beef Cows	# of Operations With Cattle and Calves	Value (\$1,000s)
Texas	13,300,000	5,140,000	16.4	149,000	11,730,000
Oklahoma	5,540,000	2,073,000	6.6	55,000	4,644,000
Arkansas	1,890,000	937,000	3.0	29,000	1,411,800
Missouri	4,150,000	1,968,000	6.3	64,000	3,698,000
Louisiana	840,000	499,000	1.6	14,400	729,800
Alabama	1,280,000	669,000	2.1	25,000	962,500
Mississippi	970,000	503,000	1.6	21,000	772,200
Georgia	1,060,000	524,000	1.7	19,500	937,900
Florida	1,720,000	958,000	3.1	18,900	1,504,800
South Carolina	380,000	183,000	0.6	10,000	328,000
North Carolina	820,000	367,000	1.2	19,000	647,400
Tennessee	2,040,000	997,000	3.2	48,000	1,618,800
Kentucky	2,300,000	1,070,000	3.4	45,000	1,920,000
Virginia	1,550,000	665,000	2.1	24,000	1,271,700
California	5,150,000	610,000	1.9	16,500	6,976,000
Total	42,990,000	17,163,000	54.7	558,300	39,152,900

- Consequence of drought (movement to better forage), and
- Between enterprise locations of the same ranch.

Success and spread of an undetected tick introduction to a new site will be influenced by the number and types of animal hosts, habitat types, and climate. Thus, introductions into the original range where there is relatively higher rainfall, lush vegetation, and both livestock and wildlife hosts will likely be more successful, spread faster, and be more difficult to eliminate. Native and exotic wildlife in these sites would likely amplify local spread and maintenance of ticks. Tick surveillance, detection and containment are clearly critical elements of security.

Table 4 contains data on the cattle industry in the historic range of the fever tick, by state. The region contains 17.2 million beef cows, or 55 percent of the nation's beef cows. The 2008 value of the cattle and calves in the region was \$39.1 billion.



**Figure 4.** Approximate Historical Range of the Fever Tick.

**Table 5.** Deer Proof Fencing Costs per Foot and per Mile.

Costs per Foot	Subsequent Costs per Mile
\$3.00	\$15,840
\$4.00	\$21,120
\$5.00	\$26,400
\$6.00	\$31,680
\$7.00	\$36,750

That accounted for 41 percent of the nation's value of cattle.

To estimate outbreaks in the historic range, assumptions were made similar to those for the Texas results. These assumptions are:

- Outbreaks occur in states throughout the range.
- These outbreaks are controlled by dipping in a nine-month protocol.
- Dipping facilities are built at auction markets.
- Cattle are required to be dipped before leaving the state.
- Infrastructure and personnel can be put in place to control the outbreak in year 1.

Under these assumptions the initial costs to control fever tick outbreaks across their historical range would be \$1.2 billion. That is for relatively small outbreaks comparable to the Texas outbreak modeled previously. This does not assume that the fever ticks would become endemic in their historical range. If that were to occur, costs would increase drastically as more cattle were treated annually and more outbreaks occurred.

#### ***The Role of Wildlife in Tick Spread***

Cattle are the preferred host for fever ticks. But other livestock and wildlife can host the ticks and/or offer mechanical transport for movement of ticks. Information is not complete on the ability of wildlife to host fever ticks, meaning that the ticks can live and complete their life cycle on wildlife. Wildlife movements and their relationship to fever ticks are the subject of ongoing scientific research and in some cases, little is known about these relationships. But the importance of wildlife in the Texas environment requires the mention of this in this report. White-tailed, axis and red deer, elk, nilgai, and aoudad appear to be effective hosts for fever ticks.

Much research has been done regarding the relationship between white-tailed deer and fever ticks. The consensus is that white tailed deer are hosts for fever ticks and that ticks can and do complete their life cycles on white tailed deer. White tailed deer can and do provide a reservoir for fever ticks and have contributed to the loss of effectiveness of pasture vaccination as an eradication tool.

Other wildlife including feral swine, coyotes, and a number of exotic deer and antelope species need to be investigated in order to determine whether they can serve as a mechanism of transport and/or acceptable host for completion of the fever tick cycle.

Cattle Egrets are a non-native bird to North America, initially documented in 1954. Egrets can also serve as mechanical vectors for ticks. They have been linked to the spread of ticks carrying heartwater disease. Egrets have also been found to carry tropical bont ticks and have spread them in the islands of the Caribbean. Egrets are migratory birds and can travel long distances.

It is unknown if coyotes can serve as hosts for fever ticks. However, they can host other ticks. The role of other wildlife in the movement of fever ticks is an open question.

#### ***New Products and Management***

The recommended treatment to eradicate fever ticks is to apply CoRal to cattle using a plunge dip vat every 14 days to prevent completion of the fever tick life cycle. This approach was used to model this economic analysis. Other products are needed as reviewed and suggested by Perez de Leon *et al.* (2010) and some elements are in various stages of testing. For example, Dectomax®, a formulation of Doramectin, applied by injection, appears to eliminate fever ticks for up to 28 days and is under review for use in the eradication program. There are potential advantages for products that can extend treatment intervals beyond 14 days and use different methods of application, including less animal stress associated with fewer round-ups, less labor and facilities needs, and greater flexibility for treatment where dipping vat infrastructure is not available.

The concept of developing and using anti-tick vaccines in fever tick programs has also received attention Perez de Leon *et al.* (2010). The anti-tick vaccine Gavac®, is produced in Cuba and has been used in many countries including Mexico.

The TAHC has facilitated permits for importation of the vaccine for testing and Foreign Animal Disease Laboratory, Plum Island, NY, has completed safety testing on the product. Gavac® will now undergo testing in the US over the next 1-2 years to determine its true effectiveness, assess its utility in an eradication program, and to assess costs.

There continues to be a need for new product development that has a longer residual life to reduce the number of times cattle must be treated. Products that can be administered orally through feed or blocks that would be effective for live-stock and wildlife. Some incentive for companies to develop products that have a limited use, for example, fever ticks, or to produce and release new products profitably for these limited markets.

The only current management strategy is eradication of fever ticks. Since the beginning of the eradication program eradication strategies have relied on dipping livestock and pasture vacation to break the tick life cycle. New management tools in the pipeline or yet to be developed would still have to be evaluated for their cost to producers or evaluated for cost effectiveness. Other management practices could include controlled burns to reduce tick habitat. Controlled burns are a well known practice, but may require evaluation from a tick management objective. Another practice could be some kind of incentive to keep the cattle on the property so that, as the preferred host of the ticks, dipping would be more effective at further eradicating the ticks. Given the cost differences detailed above, incentives to keep cattle on the property could be extensive. The realities of evolving interactions of cattle fever ticks with cattle, wildlife and different landscapes bring complexities requiring integration of numerous tactics for the strategy of eradication to be successful (Perez de Leon *et al.* 2010).

### **Game Fencing**

The cost of game fencing can be ascertained through bids from builders and other surveys. A recent survey conducted by the National Agricultural Statistics Service for Texas AgriLife Extension Service included custom rates for fence building (NASS). Survey respondents reported costs for an eight-foot high deer proof game fence with steel posts at an average of cost per mile of \$15,270.90. The survey responses ranged from a minimum of \$6,600 per mile to a maximum of \$21,753.60 per mile. This survey does not designate separate costs for water gaps and reinforced corner posts, both of which increase costs.

A survey of deer breeders in 2007 by the Agricultural and Food Policy Center reported deer fencing construction costs of \$7.00 per foot. Those costs reflected higher materials costs due to the world wide boom in steel costs which simply illustrates that building costs can fluctuate substantially. These costs may also reflect a more substantial fence with sophisticated water gaps meant to constrain deer in a valuable deer breeding operation. More recent estimates of costs range from \$4-\$5.00 per foot. Table 5 contains estimated costs of fencing per mile based on per foot costs and is included as a simple reference tool.

Maintenance is an often ignored part of high fencing. This is particularly true in areas with feral swine populations. Ongoing research by Texas AgriLife Extension Service indicates this situation (Bodenchuck). Wildlife services personnel traveled "game proof" fences and recorded the number of "feral hog sized" openings in and under the fence. The number of holes averaged 2.64 per mile with a range of 0 to 5 per mile. By using snares on the fence holes a passage rate of 2.35 entries per 100 "hole nights" was estimated. Movement of wildlife through holes in game fences may provide mechanical transport for tick movement. It is clear that fencing, as a potential management aid, must include ongoing maintenance expenses and not just a one-time capital outlay. Provision of fence maintenance funds where private fences make up part of a management plan may also be an important consideration.

### **Other**

There remain a number of areas for research to continue to explore better and more effective tick management. As a one-host tick, the opportunity to continue to eradicate the tick is available. Funding to continue necessary research has been difficult to arrange. The current USDA, NIFA grant program has no funding for tick borne disease research. Given the estimated costs of a minimal outbreak, the economic risks remain extreme.

A multi-institutional and truly interdisciplinary research program would meet US needs and serve as a model for pro-active risk management. Outcomes would save livestock and wildlife, reduce the use of chemicals in the environment, and mitigate the cost of eliminating new tick vectors of livestock diseases.

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# Appendix A

AGRICULTURE CODE CHAPTER 167. TICK ERADICATION  
AGRICULTURE CODE  
TITLE 6. PRODUCTION, PROCESSING, AND SALE OF ANIMAL PRODUCTS  
SUBTITLE C. CONTROL OF ANIMAL DISEASES AND PESTS  
CHAPTER 167. TICK ERADICATION

SUBCHAPTER A. GENERAL PROVISIONS

Sec. 167.001. DEFINITIONS. In this chapter:

- (1) "Commission" means the Texas Animal Health Commission.
- (2) "Enclosure" includes a pasture, pen, or lot.
- (3) "Inspector" means an inspector of the commission, including a local inspector, a county or district supervising inspector, and the chief inspector.
- (4) "Livestock" means cattle, horses, mules, jacks, or jennets.
- (5) "Peace officer" includes a sheriff, constable, or other peace officer authorized to perform services in the county in which services are required.
- (6) "Tick" means any tick capable of carrying Babesia, otherwise known as "fever."
- (7) "Exotic livestock" has the meaning assigned by Section 161.001(a)(3) of this code.

Acts 1981, 67th Leg., p. 1436, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1987, 70th Leg., ch. 637, Sec. 7, eff. Aug. 31, 1987; Acts 1989, 71st Leg., ch. 836, Sec. 53, eff. Sept. 1, 1989.

Sec. 167.002. CARETAKER OF ANIMAL. A person is subject to this chapter as the caretaker of an animal if the person:

- (1) is the owner, part owner, lessee, occupant, or caretaker of land or premises, and controls that land or those premises, on which the animal is located;
- (2) is the parent of a minor child who owns an interest in the animal, unless a person other than the parent is the legal guardian of the minor child's estate; or
- (3) is the administrator, executor, or guardian of an estate that owns the animal, or owns land on which the animal is located, and controls the estate by reason of the administration or guardianship.

Acts 1981, 67th Leg., p. 1436, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.003. GENERAL POWERS AND DUTIES OF COMMISSION. (a) In accordance with this chapter, the commission shall eradicate all ticks capable of carrying Babesia in this state and shall protect all land, premises, and livestock in this state from those ticks and exposure to those ticks.

(b) In carrying out this chapter, the commission may:

- (1) adopt necessary rules;
- (2) employ necessary personnel, including a chief inspector, chief clerk, stenographers, and clerks, and assign the personnel to perform duties authorized by this chapter or incidental to its enforcement;
- (3) assist and cooperate with county officials; and
- (4) enter into cooperative agreements with other state agencies or agencies of the federal government.

(c) The commission by rule may provide for the manner and method of dipping saddle stock and stock used for gentle work and for the handling and certifying of that stock for movement, but unless the commission so provides, the stock is subject to this chapter as other livestock.

Acts 1981, 67th Leg., p. 1436, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.004. CLASSIFICATION OF ANIMALS OR PREMISES AS INFESTED, EXPOSED, OR FREE FROM EXPOSURE. (a) If a tick is found on a head of livestock, the following are classified as tick infested:

- (1) each head of livestock that is in the same herd or is then or thereafter on the same range or in the same enclosure as the animal on which the tick is found; and
- (2) the range or enclosure in or on which the animal is located.

(b) The commission by rule shall define what animals and premises are to be classified as exposed to ticks. The commission shall classify as exposed to ticks livestock that have been on land or in an enclosure that the commission determines to be tick infested or exposed to ticks or to have been tick infested or exposed to ticks before or after the removal of the livestock, unless the commission determines that the infestation or exposure occurred after the livestock were removed and that the livestock did not become infested or exposed before removal.

(c) Animals, land, and premises classified as tick infested or exposed to ticks retain that classification until the classification is changed by the commission in accordance with this chapter.

(d) Animals, land, and premises in the tick eradication area may not be considered to be free from exposure to ticks unless:

- (1) the commission has officially classified the animals or premises as free from exposure and filed a copy of the order making that classification in the office of the supervising inspector of the county in which the animals or premises are located; or
- (2) the supervising inspector of the county in which the animals or premises are located, under the authority of the commission, has classified the animals or premises in writing as free from exposure and filed the written classification in the supervising inspector's office.

Acts 1981, 67th Leg., p. 1437, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.005. ERADICATION, FREE, AND INACTIVE QUARANTINE AREAS. (a) The tick eradication area is composed of counties and parts of counties designated for tick eradication under Section 167.006 of this code.

(b) The free area and the inactive quarantine area are composed of counties and parts of counties designated by the commission to be part of the applicable area.

(c) The commission may transfer a county or part of a county from the tick eradication area, the free area, or the inactive quarantine area to another type of area as the commission considers advisable or necessary.

Acts 1981, 67th Leg., p. 1437, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.006. DESIGNATION OF TICK ERADICATION AREA. (a) The commission may designate for tick eradication any county or part of a county that the commission determines may contain ticks.

(b) The commission shall give notice that a county or part of a county is designated for tick eradication by:

- (1) publishing a brief notice of the designation in a newspaper published in that county or that part of the county, as applicable; or
- (2) posting a brief notice of the designation at the courthouse door of the county.

- (c) The notice must prescribe a date on which the designation is to take effect and must be published or posted before the 10th day preceding that date. The county affected by the designation shall pay the expenses of giving notice.
- (d) The designation of a county or part of a county for tick eradication takes effect on:
  - (1) the date specified in the notice, if the notice is published or posted within the time prescribed by Subsection (c) of this section; or
  - (2) the 10th day following the day on which notice is published or posted, if the notice is not published or posted within the time prescribed by that subsection.

Acts 1981, 67th Leg., p. 1437, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.007. TICK ERADICATION IN FREE AREA. (a) The commission may conduct tick eradication in the free area and may establish quarantines and require the dipping of livestock in the free area as provided by this chapter. The commission shall designate in writing the land or premises in the free area in which tick eradication is to be conducted.

- (b) An owner or caretaker of livestock in the free area and the commissioners court of a county all or part of which is located in the free area shall cooperate with the commission in the manner provided by this chapter for tick eradication in the tick eradication area.

Acts 1981, 67th Leg., p. 1438, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.008. INSPECTIONS. The commission may order the owner, part owner, or caretaker of livestock to gather the livestock for inspection at a time and place prescribed in the order of the commission. The commission shall serve written notice of the order not later than the 12th day before the day of inspection. A person on whom an order is served is entitled to request and obtain a hearing in the manner provided by this chapter for hearings on orders to dip livestock.

Acts 1981, 67th Leg., p. 1438, ch. 388, Sec. 1, eff. Sept. 1, 1981.

#### SUBCHAPTER B. QUARANTINES; REGULATION OF MOVEMENT OF ANIMALS AND COMMODITIES

Sec. 167.021. GENERAL QUARANTINE POWER. (a) The commission may establish quarantines on land, premises, and livestock as necessary for tick eradication.

- (b) The commission in writing may release a quarantine established under this chapter if the commission considers it necessary or advisable to do so.

Acts 1981, 67th Leg., p. 1438, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.022. QUARANTINE OF TICK ERADICATION AREA. (a) The order designating a county or part of a county for tick eradication shall contain a provision quarantining that county or part of a county.

- (b) A quarantine under this section has the effect of quarantining all land, premises, and livestock in the area quarantined, regardless of whether any person's land, premises, or livestock are specifically described in the quarantine order.

Acts 1981, 67th Leg., p. 1438, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.023. QUARANTINE OF FREE AREA. (a) The commission by written order may establish a quarantine in the free area if necessary for the purpose of regulating the handling of livestock and eradicating ticks or exposure to ticks in the free area or for the purpose of preventing the spread of tick infestation into the free area.

- (b) The order of the commission establishing a quarantine in the free area shall designate the land or premises to be quarantined.
- (c) The commission shall give notice of a quarantine established in the free area by:
  - (1) delivering notice to each owner or caretaker of livestock in the area to be quarantined or to each owner or caretaker of land or premises in the area on which livestock are located;
  - (2) posting written notice at the courthouse door of each county in which the area to be quarantined is located; or
  - (3) publishing notice in a newspaper published in each county in which the area to be quarantined is located.

Acts 1981, 67th Leg., p. 1438, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.024. MOVEMENT IN OR FROM QUARANTINED AREA. (a) Unless a person first obtains a permit or a certificate from an authorized inspector, the person may not move livestock in a quarantined area:

- (1) from land owned, leased, or occupied by one person into or through any other land owned, leased, or occupied by another person; or
- (2) onto any open range, public street, public road, or thoroughfare.
- (b) Unless the person first obtains a permit or a certificate from an authorized inspector, the owner or caretaker of livestock in a quarantined area may not move the livestock, or permit the livestock to be moved, from an enclosure owned, leased, or occupied by that person, from any open range, street, road, or thoroughfare, or from any land that the person does not own or control, into any other enclosure or other land owned, cared for, or controlled by that person, if:
  - (1) the livestock are subject to dipping under this chapter and the land or enclosure to which the livestock are moved:
    - (A) is classified in the records of the county supervising inspector as being free from ticks; or
    - (B) has been released from quarantine by the commission; or
  - (2) the livestock are subject to dipping but are not being dipped under this chapter in the conduct of regular systematic tick eradication by the commission and the land or enclosure to which the livestock are moved is owned or controlled by that person and:
    - (A) tick eradication work is being conducted there; or
    - (B) the land or enclosure is vacated under the direction of the commission for the purpose of tick eradication.

- (c) The owner or caretaker of livestock located in a quarantined area may move livestock, or permit livestock to be moved, to and from dipping vats for the purpose of dipping the livestock on a regular dipping date at the vat to which the livestock are to be moved or on another date designated by the inspector in charge of the vat. The movement of livestock under this subsection must be in accordance with the rules of the commission. Any other movement is considered to be in violation of the quarantine.

- (d) In this section, "other land" means land that is separated from the land from which movement is made by a fence, dividing line, or the land of another person.

Acts 1981, 67th Leg., p. 1439, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.025. MOVEMENT IN OR FROM INACTIVE QUARANTINED AREA. A person may not move livestock or permit livestock to be moved from or within the inactive quarantined area except in accordance with the rules of the commission.

Acts 1981, 67th Leg., p. 1440, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.026. MOVEMENT INTO THIS STATE FROM QUARANTINED AREA. (a) A person may not move livestock, or permit livestock of which the person is the owner, part owner, or caretaker to be moved, into this state from an area in another state, territory, or country that is under state or federal quarantine for tick infestation or exposure unless the livestock are accompanied by a certificate from an inspector of the Animal and Plant Health Inspection Service, United States Department of Agriculture.

(b) A person may not move goats, hogs, sheep, exotic livestock, or circus animals into this state from an area of another state, territory, or country that is under state or federal quarantine for tick infestation unless the animals:

- (1) have been dipped free from infestation or exposure; and
- (2) are certified as having been so treated by an inspector of the commission or of the Animal and Plant Health Inspection Service, United States Department of Agriculture.

(c) A person may not move hay, straw, grass, packing straw, pine straw, corn shucks, weeds, plants, litter, manure, dirt, posts, sand, gravel, caliche, or animal by-products into this state for any purpose from an area of another state, territory, or country that is under state or federal quarantine for tick infestation unless the articles:

- (1) have been treated in accordance with the requirements of the commission or the Animal and Plant Health Inspection Service, United States Department of Agriculture; and
- (2) are certified as having been so treated by an inspector of the commission or the Animal and Plant Health Inspection Service, United States Department of Agriculture.

Acts 1981, 67th Leg., p. 1440, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 54, eff. Sept. 1, 1989.

Sec. 167.027. PERMIT OR CERTIFICATE TO ACCOMPANY MOVEMENT. (a) A certificate or permit required for movement of livestock within or into this state must be in the possession of the person in charge of the movement or the conveyance from the point of origin to the point of destination. If the movement is by a transportation company, including a railway or express company, the certificate must be attached to the shipping papers accompanying the movement from the point of origin to the point of destination. On demand of an inspector, the person in charge of the movement or conveyance shall exhibit the certificate or permit.

(b) A certificate required for movement of goats, hogs, sheep, exotic livestock, or circus animals, or for movement of articles listed in Section 167.026(c) of this code, must accompany the movement to the final destination in this state or so long as the animals or articles are moving through this state.

Acts 1981, 67th Leg., p. 1440, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 55, eff. Sept. 1, 1989.

Sec. 167.028. STATEMENT OF POSSESSION AND DESTINATION. On request of an inspector, the owner, part owner, or caretaker, or a person accompanying and connected with a shipment, of livestock that are being moved in this state or have been moved in this state within 60 days preceding the request, shall make a written statement of:

- (1) the name of the owner or the person controlling the land from which the shipment originated and the county in which that land is located;
- (2) the county and the particular place in that county to which the shipment is or was destined;
- (3) the name and address of the person from whom the livestock were obtained, if the livestock were obtained in the 30 days preceding the request, or, if the livestock were not obtained during the 30 days preceding the request, a statement of that fact; and
- (4) the territory through which the shipment passed since leaving the point of origin and through which the shipment is intended to pass before reaching the point of destination.

Acts 1981, 67th Leg., p. 1440, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.029. CONDITIONS, MANNER, AND METHOD OF MOVING AND HANDLING. (a) The commission by rule shall provide the conditions for and the manner and method of handling and moving livestock:

- (1) into, in, and from the tick eradication area;
- (2) into, in, and from quarantined land or premises in the free area;
- (3) into the released part of the free area; and
- (4) into, in, and from the inactive quarantined area.

(b) Livestock must be certified as being free from ticks and exposure to ticks, and must be moved to the destination without exposure, if the livestock are to be moved:

- (1) into the free area;
- (2) from one county to another in the tick eradication area; or
- (3) within a county to land or premises that are classified by the official records of the supervising inspector of the county as being free from ticks and exposure to ticks.

(c) The commission may adopt rules relating to testing, immunizing, treating, certifying, or marking or branding livestock moving into this state from another state or country.

Acts 1981, 67th Leg., p. 1441, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.030. DISINFECTATION OF CONVEYANCE. (a) A person, including a railway or transportation company, who operates a conveyance into which livestock are loaded shall clean and disinfect each car or other conveyance after removal of the livestock unless the livestock are clean and free from ticks or exposure to ticks.

(b) The commission shall adopt rules relating to the cleaning and disinfecting of conveyances.

Acts 1981, 67th Leg., p. 1441, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.031. USE OF SAND AS BEDDING IN CONVEYANCE. The commission may establish quarantines and restrict the use of sand as bedding in a livestock conveyance except for sand from known tick-free sand pits.

Acts 1981, 67th Leg., p. 1441, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.032. MOVEMENT OF COMMODITIES. The commission may establish quarantines and restrict the movement from quarantined areas of hay, hides, carcasses, or other commodities that are capable of carrying ticks.

Acts 1981, 67th Leg., p. 1441, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.033. HANDLING AND REMOVAL OF REFUSE OR DEAD OR INJURED LIVESTOCK. The commission may establish quarantines and regulate the removal and handling of refuse matter from quarantined stockyards, quarantined stock pens, and other quarantined places and may establish quarantines and regulate the handling or removal of livestock that die or are injured in transit.

Acts 1981, 67th Leg., p. 1442, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.051. LIVESTOCK SUBJECT TO DIPPING. (a) Livestock located in the tick eradication area are subject to dipping if the livestock:

- (1) are infested with ticks;
- (2) were exposed to ticks within the nine months preceding an order to dip; or
- (3) are on premises described in an order to dip during the time that the order is in effect and the person to whom the order is issued is the owner, part owner, or caretaker of the livestock.

(b) Livestock located in the free area are subject to dipping if:

- (1) the livestock are infested with ticks;
- (2) the livestock were exposed to ticks within the nine months preceding an order to dip;
- (3) the livestock are on premises described in an order to dip during the time the order is in effect and the person to whom the order is issued is the owner, part owner, or caretaker of the livestock; or
- (4) the commission determines that dipping is necessary to ensure that the livestock are entirely free from infestation.

(c) The commission may require the dipping of livestock that are located in the free area and are tick infested or have been exposed to ticks regardless of whether the livestock or the area in which the livestock are located is under quarantine.

Acts 1981, 67th Leg., p. 1442, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.052. ORDER TO DIP. (a) The commission may order the owner, part owner, or caretaker of livestock to dip the livestock in accordance with the directions of the commission. The order must be dated, in writing, and signed or stamped with the signature of the commission or the presiding officer of the commission.

(b) An order to dip must:

- (1) state the period of time covered by the order;
- (2) describe the premises on which the livestock to be dipped are located;
- (3) state that the person to whom the order is directed shall dip all livestock of which the person is the owner, part owner, or caretaker and which are located on those premises during that time;
- (4) state that the dipping must be done under the supervision of an inspector;
- (5) designate the vat at which the livestock are to be dipped;
- (6) state the dates on which the livestock are to be dipped; and
- (7) state that if the person does not dip the livestock on those dates, the dipping will be done at the person's expense by a peace officer acting in accordance with this chapter.

(c) The order is not required to describe the premises on which the livestock are located by field notes or metes and bounds, but must provide a reasonable description sufficient to inform the person to whom it is directed of the premises or land covered by the order.

(d) An order may require the dipping of the livestock on as many dates as the commission considers necessary for eradicating the infestation or exposure of the livestock or the premises on which the livestock is located.

(e) An order to dip must be delivered to the person to whom it is directed not later than the 12th day before the date specified in the order for the first dipping, not including the date of delivery or the date of the first dipping.

(f) A person to whom an order to dip is directed shall comply with the order and dip the livestock in accordance with the directions of the commission. If the order is not delivered within the time provided by Subsection (e) of this section, the person receiving the order shall begin dipping on the first dipping date that is more than 12 days after the date of receipt of the order and shall continue dipping on subsequent dates as specified in the order.

(g) If the livestock or the premises are not freed from ticks or exposure to ticks before an order to dip expires, the Commission may issue additional orders regardless of whether the livestock were exposed to ticks in the nine months preceding the date of the subsequent order.

Acts 1981, 67th Leg., p. 1442, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1995, 74th Leg., ch. 554, Sec. 32, eff. Sept. 1, 1995.

Sec. 167.053. HEARING. (a) A person is entitled to request and obtain a hearing for the purpose of protesting an order to dip by filing a sworn application with the supervising inspector of the county in which the livestock are located. The application must be filed not later than the 10th day after the day on which the order was received.

(b) Following a hearing, the commission shall transmit its written decision to the supervising inspector, who shall transmit it to the protesting person by delivering it in person or by mailing it by registered mail to the address shown in the hearing application. If the commission overrules the protest, the person to whom the order was directed shall comply with the order.

(c) If the commission's decision is delivered in person, a person whose protest is overruled shall begin dipping the livestock on the first dipping date in the order that is more than two days after the day on which the decision is received. If the decision is delivered by mail, the person shall begin dipping on the first dipping date in the order that is more than four days after the day on which the decision was deposited in the mail.

Acts 1981, 67th Leg., p. 1443, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.054. EXCUSE FROM COMPLIANCE WITH ORDER. The supervising inspector of a county for good cause may excuse a person from complying with an order to dip, but shall be held responsible for excusing compliance without good cause.

Acts 1981, 67th Leg., p. 1443, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.055. PERSONS RESPONSIBLE FOR DIPPING AND ASSISTANCE. (a) A person who owns any interest in livestock subject to dipping or who is the caretaker of that livestock is responsible for the dipping of the livestock under this chapter and is subject to prosecution for failure to dip the livestock.

(b) A husband and wife are jointly and severally liable for the dipping of livestock subject to dipping that belong to their community estate. Each spouse is responsible for the dipping of livestock belonging to that person's separate estate, except that a spouse who is the caretaker of livestock owned by the other spouse is responsible for the dipping of that livestock.

(c) A person responsible for the dipping of livestock subject to dipping shall furnish all necessary labor, at the person's own expense, for gathering the livestock, driving the livestock to the dipping vat, dipping the livestock, and returning the livestock to the person's premises after dipping.

Acts 1981, 67th Leg., p. 1443, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.056. MANNER OF DIPPING. If the commission requires livestock to be dipped, the livestock shall be submerged in a vat, sprayed, or treated in another sanitary manner prescribed by the commission.

Acts 1981, 67th Leg., p. 1444, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.057. DIPPING MATERIALS. (a) The commission shall prescribe by rule the official materials in which livestock are to be dipped under this chapter. A person may not dip livestock for purposes of this chapter in a material other than an official material prescribed by the commission.  
(b) The state, an agency of the state, or an agency of the government of the United States shall, and a county may, furnish the official materials for the dipping of livestock under this chapter.  
Acts 1981, 67th Leg., p. 1444, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.058. DIPPING INTERVALS. A person to whom an order to dip is directed shall dip the livestock on the dates specified in the order, but the order of the commission must provide an interval of at least 13 days, not including any part of a dipping date, between the days on which it directs the livestock to be dipped. The order of the commission may provide an interval longer than 13 days.  
Acts 1981, 67th Leg., p. 1444, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.059. DIPPING FACILITIES. (a) The commissioners court of each county, including a county in the free area, in all or part of which the commission conducts tick eradication shall cooperate with the commission and shall furnish facilities necessary to the dipping of livestock in that county. The commissioners court shall furnish dipping vats, pens, chutes, and other necessary facilities in the number, at the locations, and of the type specified by the commission. In addition, the county, at its expense, shall maintain the facilities and repair or remodel them as necessary, shall provide the water for filling the vats, and shall clean and refill the vats as necessary.  
(b) For the purpose of constructing, purchasing, or leasing dipping facilities, and for the purpose of providing necessary land, labor, or materials, a commissioners court may appropriate money out of the general fund of the county or may incur indebtedness by the issuance of warrants. A warrant issued may not draw interest at a rate of more than six percent per year and may not have a term of more than 20 years. The commissioners court may levy taxes to pay interest on warrants and may establish a sinking fund for the payment of warrants.  
(c) For the purpose of acquiring necessary land for the construction or maintenance of dipping facilities, for the purpose of acquiring dipping facilities that have already been constructed, or for the purpose of acquiring land necessary for ingress and egress to and from those facilities, a commissioners court has the power of eminent domain. The commissioners court shall exercise the power of eminent domain in the manner provided by law for acquiring land for the building and maintenance of public buildings, except that the court shall institute and prosecute condemnation proceedings on written request from the presiding officer of the commission. The request from the commission shall designate:  
(1) the land to be condemned and its location;  
(2) the name of the owner of the land to be condemned; and  
(3) the easement to be acquired for ingress and egress.  
(d) In acquiring land or facilities by eminent domain, the commissioners court may retain the property for permanent use by making appropriate compensation or may acquire the property for temporary use by making proper compensation for the period of time determined necessary by the commissioners court.  
Acts 1981, 67th Leg., p. 1444, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1995, 74th Leg., ch. 554, Sec. 33, eff. Sept. 1, 1995.

Sec. 167.060. DIPPING REQUIRED FOR MOVEMENT FROM QUARANTINED AREA. (a) An inspector may not issue a certificate or permit for the movement of livestock from a quarantined enclosure unless the owner or caretaker of the livestock:  
(1) is cooperating with the commission in the regular systematic dipping of the livestock listed in Subsection (b) of this section; and  
(2) has dipped those livestock on the last two dipping dates that were prescribed for the area in which the livestock are located and that preceded the date of movement.  
(b) In order to be issued the permit or certificate, the owner or caretaker must cooperate with the commission in the regular systematic dipping of livestock of which the person is the owner or caretaker and which:  
(1) are located in the enclosure from which the livestock are to be moved;  
(2) are located in quarantined enclosures that connect with the enclosure from which the livestock are to be moved, including an enclosure that:  
(A) connects with an enclosure that connects with the enclosure from which the livestock are to be moved; or  
(B) is on the opposite side of a lane or road from the enclosure from which the livestock are to be moved; or  
(3) are located on the quarantined open range that connects with any of the enclosures under Subdivision (1) or (2) of this subsection.  
(c) If ticks are found on any of the livestock submitted for movement, before the certificate or permit is issued, each head of the livestock must be dipped at intervals of not less than every 7th day nor more than every 14th day and found free from ticks at the last dipping.  
(d) The commission may waive the enforcement of this section for good cause. A waiver of the commission must be in writing.  
Acts 1981, 67th Leg., p. 1445, ch. 388, Sec. 1, eff. Sept. 1, 1981.

#### SUBCHAPTER D. STOCKYARD REGULATION

Sec. 167.081. DESIGNATION OF FACILITY TO HANDLE CERTIFIED LIVESTOCK. (a) The commission may designate a stockyard that is in the tick eradication area or in the free area and is open to the public for yarding, marketing, and selling livestock as a facility to handle intrastate movements of livestock certified by an inspector to be free from ticks or exposure to ticks. A stockyard so designated shall provide tick-free facilities for the handling of that livestock in accordance with this subchapter.  
(b) A designation under this section is effective for 24 months following the day on which notice is served, and the commission may redesignate a facility for the purpose of this section.  
Acts 1981, 67th Leg., p. 1445, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.082. NOTICE AND HEARING. (a) The commission shall give written notice of a designation under this subchapter to the stockyard company or to the owner, operator, or other person in control of the stockyard.  
(b) A person to whom a notice is directed may request a hearing for the purpose of protesting the designation in the manner provided by Section 167.053 of this code for requesting a hearing on an order to dip. The commission shall grant the hearing and give notice of its decision in the manner provided by that section.  
(c) A person whose protest is overruled shall complete the work required to provide tick-free facilities not later than the 60th day following the day on which the person receives notice of the commission's decision.  
Acts 1981, 67th Leg., p. 1446, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.083. MAINTENANCE OF TICK-FREE FACILITIES. (a) A person who owns or operates and is in control of a stockyard designated under this subchapter shall maintain clean and tick-free facilities, including pens, alleys, and chutes, so that livestock certified by an inspector to be free from ticks or exposure to ticks may be received, yarded, weighed, and sold for intrastate purposes without being subject to exposure to ticks.  
(b) In accordance with Subsection (a) of this section, the owner or operator shall maintain tick-free scales, entrances, exits, pens, and territory immediately surrounding the pens.

(c) The stockyard company, owner or operator, or other person in control of a stockyard may not discriminate between interstate and intrastate handling of livestock.  
Acts 1981, 67th Leg., p. 1446, ch. 388, Sec. 1, eff. Sept. 1, 1981.

#### SUBCHAPTER E. ENFORCEMENT

Sec. 167.101. INSPECTORS. (a) The commissioners court of a county in which the commission conducts tick eradication may nominate the number of local inspectors found by the commission to be necessary for tick eradication in that county. The commission shall appoint those persons nominated unless, following appointment of local inspectors, the commission finds that the county is trying to retard tick eradication or is nominating persons who are incompetent or negligent in the performance of duty. In that case, the commission may ignore the nominations of the county.  
(b) If a commissioners court fails or refuses to nominate persons as local inspectors, the commission shall appoint local inspectors without nomination.  
(c) Local inspectors work under the direction and orders of the commission and are subject to discharge by the commission. The commission shall fix and the state shall pay the salaries of local inspectors, but a county may pay the salary and traveling expenses of a local inspector.  
(d) The commission may employ county and district supervising inspectors without nomination by the commissioners courts.  
(e) Only an inspector appointed for the purpose may conduct tick eradication or issue permits and certificates certifying livestock to be free from ticks or exposure to ticks. An inspector shall issue those permits and certificates in accordance with the rules of the commission.  
Acts 1981, 67th Leg., p. 1446, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.102. ENTRY POWER. (a) A commissioner or an inspector, and assistants, may enter public or private property, without a warrant, for the exercise of an authority or performance of a duty under this chapter.  
(b) If an inspector or commissioner desires to be accompanied by a peace officer, the inspector or commissioner shall apply for a search warrant to a magistrate of the county in which the property is located. The magistrate shall issue the search warrant on a showing of probable cause by oath or affirmation.  
(c) The search warrant shall describe the place to be entered in a reasonable manner that will enable the person in charge of the property to identify the property described, but the warrant is not required to describe the property by field notes or by metes and bounds. If the applicant for the warrant seeks to enter the property to determine whether livestock are on the property, the application for the warrant shall state that. If the warrant is obtained for the purpose of seizing or dipping livestock, the application and the warrant shall describe the livestock, state whether the animals are cattle, horses, mules, jacks, or jennets, and give the approximate number of animals. If any of that information is unknown to the applicant, the application and warrant shall state that the information is unknown.  
(d) A search warrant issued under this section authorizes the person to whom it is issued to enter the property for the exercise of an authority or performance of a duty under this chapter and to be accompanied by a peace officer and assistants. In addition, the warrant authorizes the peace officer and the assistants to perform any duty authorized by this chapter.  
(e) A search warrant issued under this section permits entry and reentry for the purposes of this section for a period of 60 days beginning on the day on which it is issued. After that period, additional search warrants may be issued as often as necessary.  
Acts 1981, 67th Leg., p. 1447, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.103. DIPPING OF CATTLE BY PEACE OFFICER ON REQUEST OF INSPECTOR. (a) If a person responsible for dipping livestock fails to dip the livestock at the time and place directed in the order or, prior to a dipping date in the order, states that he or she does not intend to dip the livestock, the inspector in charge of tick eradication in that county shall notify a peace officer.  
(b) The peace officer shall deputize a sufficient number of assistants, to be designated by the supervising inspector of the county, shall enter the property on which the livestock are located, and shall gather and dip the livestock under the supervision of an inspector and in accordance with the directions of the commission.  
(c) The peace officer shall continue to dip the livestock on each dipping date specified in the order until the person responsible for dipping begins and continues the dipping in accordance with that order.  
Acts 1981, 67th Leg., p. 1447, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.104. SEIZURE AND DISPOSAL OF LIVESTOCK RUNNING AT LARGE. (a) An inspector may request a peace officer to seize livestock if:  
(1) the inspector determines the livestock to be running at large or on the open range of a county or part of a county in which the commission is conducting tick eradication under this chapter; and  
(2) the inspector is unable to locate the owner or caretaker of the livestock.  
(b) The peace officer may deputize assistants, shall seize the livestock, and shall dip the livestock, under the supervision of an inspector. The officer shall impound the livestock at a place designated by the inspector or otherwise dispose of the livestock as necessary for the purpose of tick eradication.  
Acts 1981, 67th Leg., p. 1448, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.105. SEIZURE AND DISPOSAL OF LIVESTOCK MOVED IN VIOLATION OF QUARANTINE. (a) An inspector who discovers livestock that are being or have been moved in violation of a quarantine may request a peace officer to seize the livestock and:  
(1) impound the livestock at the expense of the owner; or  
(2) if practicable, return the livestock at the expense of the owner to the point of origin.  
(b) In addition to other expenses, the owner of the seized livestock shall pay the officer a fee of \$2 and the cost of feeding, watering, and holding the livestock.  
Acts 1981, 67th Leg., p. 1448, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.106. INJUNCTION; MANDAMUS. (a) The commission or a resident of this state may sue for an injunction to compel compliance with a provision of this chapter or to restrain a threatened violation of a provision of this chapter.  
(b) A resident of this state may sue for mandamus against a commissioners court to compel the compliance of that court with the duty of the commissioners court under this chapter.  
(c) The commission or a resident of a county or part of a county in which tick eradication is being conducted may sue for permanent or temporary relief to compel a person who is an owner, part owner, or caretaker of livestock to dip that livestock in accordance with this chapter if the person has failed or refused to dip the livestock or has threatened to fail or refuse to dip the livestock. If the court finds that the defendant has been served with an order of the commission to dip the livestock, that the livestock are subject to dipping, and that the material allegations of the plaintiff's petition are true, the court shall enter an order commanding the defendant to dip the livestock in accordance with the directions of the commission at the time and place designated in the order of the commission or in the order of the court. If the defendant fails to comply

with the order of the court, the court may hold the defendant in contempt and punish the defendant accordingly and shall order a peace officer to deputize assistants and dip the livestock in accordance with the order of the court. The expense of dipping the livestock and employing the peace officer and assistants shall be taxed against the defendant as a cost of suit.

- (d) A court may hear and determine a suit under this section in term or in vacation. Notice of the suit shall be given to the defendant as the court determines justice requires.

Acts 1981, 67th Leg., p. 1448, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.107. SALE OF LIVESTOCK DIPPED OR SEIZED BY PEACE OFFICER. (a) A peace officer who gathers and dips or who seizes and impounds or disposes of livestock under Section 167.103, 167.104, or 167.105 of this code is entitled to retain and sell the livestock for the purpose of securing payment for the expenses of handling, including the expenses of holding, feeding, and watering the livestock.

- (b) Not later than the 60th day after the day on which livestock are dipped or seized, the peace officer may sell at public sale to the highest bidder a number of the animals sufficient to cover the secured expenses. The officer shall conduct the sale at the courthouse door of the county in which the livestock are located and shall post notice of the sale at that courthouse door at least five days before the day of the sale.
- (c) If any proceeds of the sale remain after deducting the amount to which the peace officer is entitled, the peace officer shall pay those proceeds to the county treasurer subject to the order of the owner of the livestock.
- (d) A peace officer who dips livestock under Section 167.103 of this code is entitled to act under this section to secure the expenses of each day on which the animals are dipped.

Acts 1981, 67th Leg., p. 1449, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.108. LIENS. (a) A peace officer who gathers and dips or who seizes and impounds or disposes of livestock under Section 167.103, 167.104, or 167.105 of this code has a lien on the livestock for the purpose of securing payment of the officer's fees and the expenses of handling the livestock, including the expenses of holding, feeding, and watering the livestock and the expenses of paying assistants. Instead of retaining and selling the livestock under Section 167.107 of this code, the officer may perfect and foreclose a lien granted by this section.

- (b) A peace officer who dips livestock in accordance with an order of a court under Section 167.106(c) of this code, and the peace officer's assistants, have a lien on the livestock to secure payment of the expenses and costs of the dipping.
- (c) A peace officer may perfect a lien under Subsection (a) of this section by filing a sworn statement of indebtedness with the county clerk of the county in which the livestock are located. The statement must describe the livestock and must be filed within six months after the dipping or other action of the peace officer giving rise to the lien. The statement may cover a single action or actions over a period of time. If the statement covers actions over a period of time, the statement must be filed within six months after the last dipping or other action giving rise to the lien.
- (d) A peace officer may perfect a lien under Subsection (b) of this section by filing a sworn statement covering a single dipping or a number of dippings with the clerk of the district court. The statement must show the number of livestock dipped and must describe the livestock. The statement must be filed within 12 months after each dipping.
- (e) A peace officer may foreclose a lien under Subsection (a) of this section by filing suit against the owner of the livestock in a court of competent jurisdiction for collection of the account and foreclosure of the lien. The suit must be filed within 24 months after the statement is filed with the county clerk. In the suit, the court may not require a cost bond of the peace officer or any person to whom the peace officer has assigned the account. The court shall enter judgment for the debt, with interest and costs of suit, and for foreclosure of the lien on the number of animals that the court determines necessary to defray the expenses and fees secured.
- (f) The court shall foreclose a lien under Subsection (b) of this section after the filing of the statement and shall do so against the number of animals necessary for the payment of the expenses and costs. The court shall order those animals sold as under execution.
- (g) If a lien is foreclosed under this section, the remainder of the proceeds of the sale following deduction of expenses and costs shall be paid to the clerk of the court in which the suit is pending and are subject to the order of the owner of the livestock.

Acts 1981, 67th Leg., p. 1449, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.109. ADMISSIBILITY OF COMMISSION INSTRUMENTS; IDENTIFICATION IN COMPLAINT. (a) A copy of a written instrument issued by the commission is admissible as evidence in any court of this state if the copy is certified by the presiding officer of the commission.

- (b) In a prosecution for a violation of this chapter, the state is not required to include in the complaint, information, or indictment a verbatim copy of a written instrument or proclamation, but may allege the issuance and identify it by date of issuance.
- (c) In the trial of a civil or criminal case under this chapter, in which a certified copy of a commission written instrument or a proclamation is to be introduced in evidence, the instrument or proclamation is not required to be filed with the papers of the cause and the party introducing it is not required to give notice of it to the other party.

Acts 1981, 67th Leg., p. 1450, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1995, 74th Leg., ch. 554, Sec. 34, eff. Sept. 1, 1995.

Sec. 167.110. PRESUMPTION OF EXISTENCE OR SUFFICIENCY OF DIP. (a) In the trial of any case under this chapter in connection with the dipping of livestock or the failure to dip livestock, it is presumed that:

- (1) the dipping vat contained a sufficient amount of dipping solution and the dipping solution had been properly tested; or
- (2) the dipping solution could have and would have been put into the vat and tested if the owner or caretaker had brought the livestock to the vat for the purpose of dipping.

(b) In a criminal prosecution for failure to dip livestock under this chapter, the state is not required to allege and prove that the vat contained dipping solution.

(c) If it is necessary in a court proceeding to prove the test of a dipping solution, it is only necessary to prove that:

- (1) the dipping solution used was one of the official dipping materials prescribed by the commission; and
- (2) the inspector tested the dipping solution in accordance with the rules of the commission.

Acts 1981, 67th Leg., p. 1450, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.111. PRESUMPTION OF OWNERSHIP OR CARE. (a) If an inspector determines that a person is the owner, part owner, or caretaker of livestock subject to dipping and an order to dip is issued and served, it is presumed that, at the time of a failure to dip, the person was still the owner, part owner, or caretaker of livestock subject to dipping located on the premises described in the order. In that case, the state is required to prove only that the person was the owner, part owner, or caretaker of livestock subject to dipping located on the premises at the time the order was served.

- (b) After the service of an order to dip, if there are no longer any livestock subject to dipping located on the premises and if no livestock subject to dipping have been illegally removed, the defendant may file a sworn statement of that fact at the beginning of the trial. If the defendant does not file that statement, it is presumed that the defendant's status as owner, part owner, or caretaker remained unchanged since the service of the order.

Acts 1981, 67th Leg., p. 1451, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.112. VENUE OF CRIMINAL PROSECUTION. The owner, part owner, or caretaker of livestock is subject to prosecution under this chapter in the county in which the livestock and the premises are located, regardless of whether the defendant was in the county at the time of issuance and service of the order to dip, at the time of the failure to dip, or at the time of violation of the quarantine.

Acts 1981, 67th Leg., p. 1451, ch. 388, Sec. 1, eff. Sept. 1, 1981.

Sec. 167.113. CIVIL SUIT AGAINST CORPORATE OFFENDER. If a corporation or an agent of the corporation acting within the agent's scope of authority commits an offense under this chapter, the county attorney of the county in which the violation occurs shall institute a civil suit on behalf of the state in a court of competent jurisdiction for collection of the fine.

Acts 1981, 67th Leg., p. 1451, ch. 388, Sec. 1, eff. Sept. 1, 1981.

#### SUBCHAPTER F. PENALTIES

Sec. 167.131. REFUSAL OF INSPECTION. (a) A person commits an offense if, as the owner, part owner, or caretaker of livestock, the person fails to gather the livestock for inspection at the time and place ordered by the commission under Section 167.008 of this code.

(b) An offense under this section is a Class C misdemeanor unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

Acts 1981, 67th Leg., p. 1451, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 56, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 21, eff. Sept. 1, 1993.

Sec. 167.132. MOVEMENT OF LIVESTOCK IN VIOLATION OF QUARANTINE. (a) A person commits an offense if the person moves, or as owner, part owner, or caretaker permits the movement of, livestock from any land, premises, or enclosure that is under quarantine for tick infestation or exposure in violation of the quarantine without a permit issued by an inspector of the commission or of the Animal and Plant Health Inspection Service, United States Department of Agriculture.

(b) A railroad or other transportation company commits an offense if it permits a head of livestock to enter stock pens in the tick eradication area under the company's control without a written certificate or permit from an inspector of the commission or of the Animal and Plant Health Inspection Service, United States Department of Agriculture.

(c) An offense under this section is a Class C misdemeanor for each head of livestock moved, permitted to move, or permitted to enter the pen unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

(d) Except as provided by this subsection, a person commits a separate offense under Subsection (a) of this section for each county into which livestock are moved within 30 days following the day on which the livestock leave the county in which they were quarantined. A person does not commit an offense for a county if the person complied with the requirements of this chapter prior to entry into that county.

Acts 1981, 67th Leg., p. 1451, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 57, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 22, eff. Sept. 1, 1993.

Sec. 167.133. MOVEMENT OF ANIMALS OR COMMODITIES INTO TEXAS FROM QUARANTINED AREA. (a) A person commits an offense if the person:

(1) moves livestock or, as owner, part owner, or caretaker, permits livestock to be moved into this state in violation of Section 167.026(a) of this code; or

(2) moves animals or commodities into this state in violation of Section 167.026(b) or (c) of this code.

(b) An offense under Subsection (a)(1) of this code is a Class C misdemeanor for each head of livestock moved or permitted to be moved unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

(c) An offense under Subsection (a)(2) of this section is a Class C misdemeanor unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor. A person commits a separate offense under that subsection for the movement of each animal, each animal product, or each shipment of another commodity.

Acts 1981, 67th Leg., p. 1452, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 58, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 23, eff. Sept. 1, 1993.

Sec. 167.134. MOVEMENT OF LIVESTOCK IN VIOLATION OF PERMIT OR CERTIFICATE. (a) A person commits an offense if the person moves or, as owner, part owner, or caretaker, permits the movement of, livestock under a certificate or permit from quarantined land, premises, or enclosures to a place other than that designated on the certificate or permit by the inspector.

(b) An offense under this section is a Class C misdemeanor for each head of livestock moved unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

Acts 1981, 67th Leg., p. 1452, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 59, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 24, eff. Sept. 1, 1993.

Sec. 167.135. FAILURE TO POSSESS OR EXHIBIT PERMIT OR CERTIFICATE. (a) A person commits an offense if the person is in charge of livestock for which a certificate or permit is required or is in charge of the conveyance transporting that livestock and the person fails to possess or exhibit the certificate or permit in the manner provided by Section 167.027 of this code.

(b) An offense under this section is a Class C misdemeanor for each head of livestock moved or conveyed without a certificate or permit as required by Subsection (a) of this section unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

Acts 1981, 67th Leg., p. 1452, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 60, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 25, eff. Sept. 1, 1993.

Sec. 167.136. FAILURE TO MAKE STATEMENT OF POSSESSION AND DESTINATION; MAKING FALSE STATEMENT. (a) A person required by Section 167.028 of this code to make a written statement commits an offense if the person:

(1) fails or refuses to make the statement in accordance with that section; or

(2) makes a false statement under that section.

(b) An offense under this section is a Class C misdemeanor unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

Acts 1981, 67th Leg., p. 1452, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 61, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 26, eff. Sept. 1, 1993.

Sec. 167.137. FAILURE TO DISINFECT CONVEYANCE. (a) A person required by Section 167.030 of this code to clean and disinfect a conveyance commits an offense if the person fails or refuses to clean and disinfect the conveyance in accordance with the rules of the commission.  
(b) An offense under this section is a Class C misdemeanor for each car or other means of conveyance not cleaned and disinfected unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.  
(c) A person commits a separate offense for each day of failure or refusal.

Acts 1981, 67th Leg., p. 1453, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 62, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 27, eff. Sept. 1, 1993.

Sec. 167.138. USE OF SAND AS BEDDING. (a) A person commits an offense if the person uses sand as bedding in a livestock conveyance in violation of a quarantine established or a commission rule adopted under Section 167.031 of this code.

(b) An offense under this section is a Class C misdemeanor unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

Acts 1981, 67th Leg., p. 1453, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 63, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 28, eff. Sept. 1, 1993.

Sec. 167.139. MOVEMENT OF COMMODITIES FROM QUARANTINED AREA. (a) A person commits an offense if the person moves a commodity capable of carrying ticks from a quarantined area in violation of a quarantine established or a commission rule adopted under Section 167.032 of this code.

(b) An offense under this section is a Class C misdemeanor unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

Acts 1981, 67th Leg., p. 1453, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 64, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 29, eff. Sept. 1, 1993.

Sec. 167.140. IMPROPER HANDLING AND REMOVAL OF LIVESTOCK REFUSE OR DEAD OR INJURED LIVESTOCK. (a) A person commits an offense if the person violates a quarantine established or a commission rule adopted under Section 167.033 of this code.

(b) An offense under this section is a Class C misdemeanor unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

Acts 1981, 67th Leg., p. 1453, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 65, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 30, eff. Sept. 1, 1993.

Sec. 167.141. FAILURE TO DIP LIVESTOCK. (a) A person who is the owner, part owner, or caretaker of livestock commits an offense if, after the 12th day following the day on which notice of an order to dip is received, the person fails or refuses to dip the livestock as prescribed in the order, on any date prescribed in the order, during the hours prescribed in the order, under the supervision of an inspector, in an official dipping material, or in the dipping vat designated in the order.

(b) An offense under this section is a Class C misdemeanor unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

Acts 1981, 67th Leg., p. 1453, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 66, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 31, eff. Sept. 1, 1993.

Sec. 167.142. DESTRUCTION OF PUBLIC DIPPING FACILITIES. (a) A person commits an offense if the person, without lawful authority:

- (1) damages or destroys all or part of a dipping vat, pen, chute, or other facility provided under Section 167.059 of this code by use of any means, including cutting, burning, or tearing down or by use of dynamite or another explosive; or
- (2) attempts to damage or destroy all or part of one of those facilities.

(b) An offense under this section is a Class C misdemeanor unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

Acts 1981, 67th Leg., p. 1453, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 67, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 32, eff. Sept. 1, 1993.

Sec. 167.143. FAILURE TO PROVIDE TICK-FREE STOCKYARD FACILITIES. (a) A stockyard company or an owner, operator, or person in charge of a stockyard commits an offense if the person fails or refuses to provide and complete facilities required by the commission under Subchapter D of this chapter within 60 days after the day on which notice of designation is served under that subchapter.

(b) An offense under this section is a Class C misdemeanor unless it is shown on the trial of the offense that the defendant has been previously convicted under this section, in which event the offense is a Class B misdemeanor.

(c) A person commits a separate offense for each 30 days of failure or refusal within the 24 months following service of notice.

Acts 1981, 67th Leg., p. 1454, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 68, eff. Sept. 1, 1989; Acts 1993, 73rd Leg., ch. 548, Sec. 33, eff. Sept. 1, 1993.

Sec. 167.144. REFUSAL TO PERMIT SEARCH. (a) A person commits an offense if the person refuses to permit a person to whom a search warrant is issued under Section 167.102 of this code, that person's assistant, or a peace officer, to enter the property described in the warrant or to perform a duty under this chapter.

(b) An offense under this section is a Class B misdemeanor.

(c) A person commits a separate offense for each day of refusal.

Acts 1981, 67th Leg., p. 1454, ch. 388, Sec. 1, eff. Sept. 1, 1981. Amended by Acts 1989, 71st Leg., ch. 836, Sec. 69, eff. Sept. 1, 1989.

## Appendix B

**Appendix Table B.** Characteristics of Representative Ranches.

	TXRB500	TXSB200
<b>County</b>	King	Gonzales
Pastureland		
Acres Owned	10,000.00	900.00
Acres Leased	10,000.00	775.00
Assets (\$1000)		
Total	6,604.00	3,276.00
Real Estate	5,837.00	2,912.00
Machinery	61.00	140.00
Other & Livestock	706.00	223.00
Debt/Asset Ratios		
Total	0.01	0.04
Intermediate	0.01	0.14
Long Run	0.01	0.01
Number of Livestock		
Beef Cows	500.00	200.00
2009 Gross Receipts (\$1,000)*		
Total	385.20	143.40
Cattle	305.20	104.10
Corn	0.00	0.00
Soybeans	0.00	0.00
Wheat	0.00	0.00
Hay	0.00	6.90
Other Receipts	80.00	32.50
2009 Planted Acres**		
Total	0.00	0.00
Corn	0.00	0.00
Soybeans	0.00	0.00
Wheat	0.00	0.00
Hay	0.00	0.00
Improved Pasture	0.00	0.00
*Receipts for 2009 are included to indicate the relative importance of each enterprise to the farm. Percents indicate the percentage of the total receipts accounted for by the livestock categories and the crops.		
**Acreages for 2009 are included to indicate the relative importance of each enterprise to the farm. Total planted acreage may exceed total cropland available due to double cropping. Percents indicate the percentage of total planted acreage accounted for by the crop.		

