REPORT OF THE COMMITTEE ON PARASITIC DISEASES

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The Committee met on Wednesday, November 9, 2005. At least 35 people were in attendance at the meeting, including 10 members of the Committee. Reports were provided on a number of parasitic diseases issues of interest to USAHA and its members. A summary of the reports is included below.

Dr. Jo-Ann Bentz-Blanco, United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Riverdale, Maryland, gave APHIS perspectives on the Cattle Fever Tick Eradication Program. She reported that perhaps one of the most unusual forms of surveillance that we have is the Cattle Fever Tick Eradication Program. Tick force personnel, often referred to as tick riders, patrol the Rio Grande River on horseback looking for cattle and for feral, stray, or smuggled animals that could be carrying the ticks that cause bovine piroplasmosis or babesiosis. The goal of the program is to prevent the re-introduction and establishment of cattle fever ticks, *Boophilus annulatus* and *B. microplus*, and of bovine babesiosis in the continental United States. The Cattle Fever Tick Eradication Program is a cooperative Federal-State-Industry program. If the ticks were re-introduced into the United States, the ticks and the cattle fever organisms that they carry could have severe adverse economic effect on the beef and dairy industries in the southwestern U.S. from south-west Texas to Virginia, as well as in southern California. Savings to the U.S. livestock industry due to the eradication of these tick vectors were estimated to be one-half to one billion dollars annually.

Initially, the Program's main responsibility was to patrol the international border within the quarantined zone and intercept any stray or smuggled animals that may have entered from Mexico, and to be on the lookout for fever ticks on American cattle. However, since 1967, tick outbreaks in areas north of the quarantine zone have occurred with increasing frequency. These outbreaks have placed an increased burden on the Program's inspectors, who in addition to conducting the Program's mandated activities, are also conducting treatment of deer and exotics (ivermectin treated corn or 4 poster device) in infested premises in hopes of curtailing spreading of the ticks. An ongoing issue of the Program is inadequate resources for personnel, support, supplies, and materials. Historically, the program has worked from a deficit.

The regulations in Title 9, *Code of Federal Regulations*, part 72, Texas (Splenetic) Fever in Cattle, restrict the interstate movement of cattle from areas quarantined because of ticks that are vectors of splenetic or tick fever. Section 93.427, Cattle from Mexico, includes the measures to be implemented at ports to minimize the risk of importing cattle ticks from Mexico.

U.S.-Mexico cooperation is essential to the success of tick prevention and eradication efforts. Accordingly, Mexican and U.S. officials established the Bi-National Tick (BNT) Committee, which includes scientific experts from both countries and encourages an open dialogue regarding tick activities. The BNT Committee meets regularly to exchange information and identify mutually agreeable solutions to issues of concern as they arise.

The immediate plans and goals of the Program are to develop its Strategic Plan and address funding needs so that the Program can successfully meet its performance measures.

Dr. Thomas J. Holt, Florida Department of Agriculture and Consumer Services, Tallahassee, Florida gave a Florida perspective on imported reptiles and exotic ticks. He reported that the uncontrolled importation of tick infested reptiles into the U.S. remains a serious concern. It is currently estimated that 50,000 reptiles are being imported through the port of Miami each week bringing the total per year to more than two million. Many of these reptiles, coming from Africa, Asia, and South America, are infested with ticks exotic to the United States. Little is known of the biology of many of these ticks but at least four of those introduced have been shown experimentally to be capable of harboring Heartwater, a serious livestock disease of Africa with a very high mortality. Ticks on

imported reptiles continue to represent a threat for the introduction of Heartwater and other diseases into the United States.

While the U.S. Department of Interior does ban the importation of certain reptile species because they are endangered or considered invasive, no regulatory actions are taken with respect to the presence of ticks. Tick infested reptiles are then transshipped throughout the U.S. for sale or exhibit.

Dr. M. J. Burridge, Department of Pathology, College of Veterinary Medicine, University of Florida, has carried out extensive research on this issue and has previously reported to this Committee. In a paper published in Veterinary Pathology 113 (2003) 289-320, Dr. Burridge stated, "Since 1962, a total of 29 species of exotic ticks have been introduced into the United States on imported reptiles, with 17 species from the genus Amblyomma, 11 from the genus Aponomma and one from the genus Hyalomma. In the absence of measures to control introduction of these importations, some exotic tick species will develop breeding colonies and become established as indigenous species and some tick-borne diseases may be introduced to wreak havoc among susceptible native populations."

The Florida Department of Agriculture and Consumer Services began a tick identification survey in January 2005. Ticks were submitted by state inspectors, veterinarians, and the general public. Ticks were collected from a cross section of animal host species found in Florida. Approximately 4,000 ticks have been collected and identified. The majority of ticks came from mammalian hosts and represented species most common and native to the Florida geographic area. Approximately 175 ticks were collected from native and imported reptiles that included snakes, tortoises, and lizards. Seven species of African or exotic ticks were identified as Amblyomma/Aponomma species which are African or exotic sub-tropical varieties not native to Florida. These included A. exornatum, A. nutalli, A. latum, A. flavamaculatum, A. aricularium, A. trimaculatum, and A. karneveldi. The A. exornatum identification was the first reporting of this tick from a wild reptile, opposed to an imported reptile, in Florida. Considering the small size and limited time frame of this survey, the finding of these exotic ticks indicates a disturbing increase in the number and scope of invasive tick species entering the United States.

The introduction of exotic ticks and the possibility of foreign animal disease entry through imported reptiles raises significant concerns. Florida currently maintains very strict requirements for livestock moving from the U. S. Virgin Islands because of the presence of Amblyomma and Boophilus ticks. Currently cattle are required to be isolated in tick free areas for at least 21 days, be treated at least three times with an approved acaricide before departure, and again inspected and treated upon arrival in Florida. The impact of such a regimen on cattle moving interstate here on the mainland would wreak havoc on our livestock industries.

Work has also been done in recent years to test the efficiency and safety of different acaricides on reptiles. Dr. Burridge has published a number of articles on this subject. Provent-a-mite is the only commercial formulation of a permethrin product that has received a Section 18 Exempt registration from the U. S. Environmental Protection Agency and is available commercially to treat reptiles and their environments. With proper application, it has been used successfully to eliminate reptile ticks without harm to the reptiles.

During the past year, a team, comprised of reptile importers, breeders, and brokers and state and federal animal health officials, recognizing the need to control ticks infesting imported reptiles, worked together to draft a set of procedures that could be adopted to implement appropriate control measures. This draft protocol includes requirements for permitting, certification, inspection, and monitoring treatments of imported reptiles. Certain facilities could become licensed for handling and treating reptiles and imported reptiles would be handled based on risk (origin and type of reptile).

The USDA clearly has responsibility for addressing this import issue. While a single state can unilaterally take action, the placement of restrictions on imported animals in one state will most likely result only in a change in marketing patterns and greater illegal movement. The Secretary of Agriculture has clear statutory authorities to restrict animal importations to protect our national livestock. With the cooperation of representatives in the reptile industry and the efforts thus far to develop a program for imported reptiles with respect to tick infestations and entry into the U.S., it is important that USDA work with affected industries and affected states to implement control measures.

While the biology of these exotic ticks is still largely unknown, the certainty of continued introduction of very high numbers of potentially dangerous ticks should not be ignored. Measures can be taken to monitor these imports

and ensure reptiles are treated as necessary to protect the United States from invasive ticks that could do immeasurable harm to our livestock industries and the U. S. economy.

Dr. James E. Novy gave an update on eradication of screwworm in Jamaica. As reported to this Committee during the 2004 Annual Meeting, the Government of Jamaica (GOJ), with the assistance of the International Atomic Energy Agency, embarked on a screwworm eradication program in 1998. Sterile flies were being purchased at cost from the Mexico-United States Commission for the Eradication of the Screwworm and USDA-APHIS was being reimbursed for the cost of the airplanes used for transport and dispersal of the sterile flies. The island of Jamaica has been blanketed with sterile screwworm flies each week since August 1999.

With little progress being made toward eradication of the screwworm from Jamaica by the end of 2003, and with requests being made from the GOJ for assistance from the USDA, the Mexico-U.S. Commission was given responsibility to work with the Government of Jamaica to provide that assistance. The USDA, Agricultural Research Service (ARS) also agreed to assist in any way possible.

A trial was set up in March 2004 to evaluate the effect a Jamaica strain of sterile screwworm flies would have as opposed to the release of a Panama strain. The Jamaica strain was released over the eastern one-third of the island for 16 weeks while the remainder of the island received the Panama strain. At the end of June 2004 the release of the Jamaica strain was discontinued since no significant difference was observed in reduction of screwworm infestations compared to the region where the Panama strain was being released.

At the end of June 2004 an independent evaluation of the program was made at the request of Dr. Headly Edwards, Director of Veterinary Services, Ministry of Agriculture, Jamaica. Dr. Edwards serves as the Director of the Screwworm Eradication Program in Jamaica. The independent study was conducted jointly by Mr. Jimmy Bruce, retired USDA-APHIS Entomologist who was contracted by the Mexico-U.S. Commission, and Dr. Aldo Malavasi, Director of the Mediterranean Fruit Fly Program in Brazil who was contracted by the International Atomic Energy Agency (IAEA)/Food and Agriculture Organization (FAO). The report indicated that emphasis needed to be placed on improvement of the quality of sterile flies released. This included the rearing of maximum size insects at the production plant at Tuxtla Gutierrez, Chiapas, Mexico, collecting the sterile flies sooner after emergence at the chill fly facility at Kingston, Jamaica and modifying the airplane release system to eliminate as much damage to the sterile flies as possible during release.

The Mexico-U.S. Commission contracted Mr. Jimmy Bruce to continue working in Jamaica as an advisor to the Director of the program. The IAEA continued to contract Dr. James Novy throughout 2004 to also serve as an advisor to the Program Director. In addition, Dr. Novy managed the employment of 20-25 field inspectors funded by the IAEA. These field inspectors were in addition to the 25-30 field inspectors employed by the GOJ. Mr. Bruce and Dr. Novy worked together to make some modifications to the chill fly units in order to shorten the time of collection of sterile flies after emergence. This would reduce the time that the insects were without food and water after emergence before they were released in the field. Mr. Bruce obtained the assistance of the USDA, APHIS Methods Development unit in Mission, Texas to make some modifications to the airplane release system to reduce any damage that may have been caused to the released sterile flies.

The IAEA terminated participation in the program at the end of December 2004 because no funds were budgeted for continuation in 2005. This included the termination of all of the field inspectors funded by the agency as well as the contract of Dr. Novy. The Mexico-U.S. Commission has continued the contract for Mr. Bruce during 2005.

Consistent release of quality sterile screwworm flies in required numbers combined with field surveillance and wound treatments of animals is deemed necessary to effect eradication of this costly pest. The program in Jamaica has been plagued with periodic interruptions. In September 2004 there was an interruption of about two weeks due to the passage of hurricane Ivan. In April 2005 the refrigeration system malfunctioned on the chill fly collection unit resulting in the released of reduced quality of sterile flies over a period of about four weeks. In June and July 2005 there were problems again with the refrigeration system of the chill fly collection unit, as well as the passage of hurricane Dennis and hurricane Emily. In October 2005 there was another interruption caused by the passage of hurricane Wilma. In spite of the interruptions, there has been about a 48 percent reduction in the number of reported screwworm cases compared to the same period of previous years during the period of September 2004 through September 2005. Screwworm cases continue to be reported, however, from every parish in the country.

In June 2005 USDA-ARS sent an airplane equipped with a release system that had been developed for the dispersal of Mediterranean fruit flies to see if it could be adapted to release sterile screwworm flies. At the same time the amount of sterile flies available for release each week was increased from about 30 million to about 45 million. The eastern one-third of the island is being used to evaluate the effect of this release system. This evaluation is ongoing as of this report.

The GOJ has agreed to fund the program through November 2005 and beyond if significant progress toward eradication is demonstrated. There is growing pressure, however, from some of the GOJ entities to terminate funding of the program. This is being contested by the Ministry of Agriculture since the screwworm has been eradicated from every other country where the sterile flies have been used, and considering the investment that the GOJ has made in this program to date. Termination of the program would be an unfortunate consequence considering the struggling economy of the country of Jamaica. With continued funding at the current level, the assistance of the Mexico-U.S. Commission and the assistance of USDA eradication of the screwworm from Jamaica is feasible by the middle of 2006. Focus can then turn to possible eradication of the pest from the Dominican Republic and Haiti.

Colin Stewart, USDA, APHIS, Veterinary Services, Riverdale, MD, gave a USDA perspective on imported reptiles and exotic ticks. Heartwater (*Ehrlichia ruminantium*) is a tickborne disease that attacks cattle, goats, sheep, and other ruminants. In 1997, exotic ticks capable of transmitting heartwater were discovered at eight reptile operations in seven Florida counties. In 1999, 15 exotic ticks testing positive for heartwater were found at one location on imported reptiles. As a result, the importation of three tortoise species was banned. The ban, however, was never evaluated to determine its impact.

The Office of General Counsel has made it clear that the USDA Animal Health Protection Act does not give the authority to implement a program until regulations are in place and that a program without the appropriate legal backing will not withstand legal challenge. Furthermore, a risk assessment must precede any rulemaking. Currently, the USDA-APHIS-VS, Centers of Epidemiology and Animal Health is in the midst of a risk assessment (estimated completion date: January 2006) to determine the risk of bringing in heartwater via ticks on reptiles. The effectiveness and costs of measures that reduce risks are also being evaluated. When complete, other tickborne diseases may then be evaluated in a similar manner.

Geospatial technologies have had an important impact on the study of vectors and vector-borne diseases. In the National Tick Survey, they are using geospatial methods to determine the distribution of arthropod vectors affecting humans and livestock. Because ticks serve as vectors of many important animal pathogens, knowledge of the geographic distribution of ticks and tick-borne diseases in the U.S. is important in developing surveillance and disease control strategies. The National Tick Survey was initiated by USDA-APHIS to assess the geographic distribution of tick species that are injurious to livestock, equids, and poultry.

Thus far, they have established a geographic database derived from current and historic records from the Smithsonian's U.S. National Tick Collection (USNTC) and USDA-APHIS-VS, National Veterinary Services Laboratories (NVSL) tick identification program to determine the distribution of 33 economically important tick species. This information is used not only to update geographic distributions, it is also combined with data on climate, vegetation, soil, elevation, host demographics, and land use to identify environmental risk factors and to predict locations that may be suitable for the survival of exotic tick species if introduced into the United States.

Worldwide, there are approximately 867 tick species. Of the 85 tick species found in the U.S., only 33 tick species are known to be injurious to animals. Of the approximately 200,000 tick identification records within the USNTC and NVSL databases, we have extracted records for the following eleven tick species: *Dermacentor albipictus* (Winter tick), *D. andersoni* (Rocky Mountain wood tick)*, D. nitens* (Tropical Horse tick), *D. parumapertus* (Rabbit tick), *D. variabilis* (American dog tick), *Amblyomma americanum* (Lone star tick)*, A. cajennense* (Cayenne tick), *A. dissimile* (Iguana tick), *A. imitator* (Imitator tick), *A. inornatum* (Ixodid tick), and *A. maculatum* (Gulf Coast tick). Tabular references for all eleven tick species have been completed to produce county-level distribution maps of each species and point data has been developed for *D. andersoni*, *D. variabilis*, and *A. maculatum* for spatial analysis. We have published county-level distribution information for *D. andersoni* in the Journal of Medical and Veterinary Entomology and for *D. nitens* in the Equine Quarterly Review.

The USNTC database provided 6,256 distribution records for *D. andersoni* including 375 records from Canada. Of the original total, 5,811 records had United States county-level information. The NVSL database provided 89 *D. andersoni* records, 87 of these records had county-level information. Thus, we were able to use 5, 898 records

to develop a county-level based map for the distribution of the *D. andersoni*, the Rocky Mountain wood tick in the United States. Although the timeline of database entries extended from 1903 through 2001, the majority of the records (59%) were submitted between 1921 and 1940. Populations of *D. andersoni* were present in 267 counties in 14 states and the largest proportions of the populations were recorded from Montana (16.5%), Idaho (14.2%), and Colorado (12.4%).

The *D. andersoni* records in USDA's tick geodatabase resulted from flagging, dragging, CO_2 baits, and collections from small, medium, and large animal surveys. Of the 5,898 records used to create the distribution, 71.1% were collected from animal hosts, 24.9% from vegetation, and 3.9% had no collection methods listed. The animal-associated collections were collected from wildlife (53.5%) and from livestock, equids, domestic animals, or humans (17.6%).

Dermacentor nitens, the tropical horse tick, is currently the only known natural vector of equine piroplasmosis in the United States. Of the 7,284 distribution records for *D. nitens* within each database, 6,997 collection records were from other countries. We were able to obtain 244 county-level records from both databases in addition to 43 county-level records collected from various publications for a total of 287 county-level based data. Populations of *D. nitens* were present in 39 counties in 3 states with the majority of the collection records recorded from Cameron County, Texas (74%). The collection records were from 1906 through 2003 with the last recorded collection of *D. nitens* in Florida in 1999 from a horse imported from Columbia. The *D. nitens* records in each database resulted from large-animal surveys with collections from horses, goats, cattle, white-tailed deer, mules, and donkeys.

As part of the development and implementation of a National Tick Survey, we have established an interactive website to update and disseminate information on the distributions of several tick species harmful to livestock, poultry, and wildlife. In addition to distribution maps, pertinent information on life cycles, host associations, seasonal activity, and methods of collecting and preserving ticks were also included on the website for each tick species. A tick map questionnaire was added to the website to supplement our current database as well as verify or change the present status of a particular tick species in the United States.

The National Tick Survey website was completed a few months ago and it is available to APHIS staff members through an internal website. The current release of data for the website contains information on the tropical horse tick, *Dermacentor nitens* and the Rocky Mountain wood tick, *Dermacentor andersoni*. In the near future, we will be adding to the website information on the distributions of *D. variabilis, D. albipictus, D. parumapterus, A. americanum, A. maculatum*, *A. dissimile, A. inornatum*, *A. imitator*, and *A. cajennense*. As soon as USDA Office of Management and Budget approval has been received, the new tick website will be made available to everyone.

Dr. Freeda Isaac, USDA-APHIS-VS, Riverdale, Maryland gave a summary of the piroplasmosis risk assessment for the proposed 2010 World Equestrian Games. The Kentucky Horse Park's (KHP) bid to hold the 2010 World Equestrian Games (WEG) in the KHP depends on USDA approval of the participation of horses positive for piroplasmosis (a tick-borne disease) in field events. The U.S. has previously granted waivers to horses found positive for equine piroplasmosis (EP) to enter the U.S. for competitions such as the 1984 Olympics and the 1996 Summer Olympic Games. Because EP is not endemic in the U.S. and waivers for previous events excluded all field events, the USDA faces a unique challenge. Moreover, if the bid is granted to KHP, this would be the first time the WEG will be held in the U.S. or outside of Europe. Therefore, the Equine Event Piroplasmosis Evaluation Group (EEPEG) of USDA experts in piroplasmosis, tick and wildlife biology, risk analysis, international equestrian competitions, and U.S. importation requirements have carefully assessed the risk of ticks infected with piroplasmosis transmitting the disease to susceptible horses at the 2010 WEG.

For previous events, both in the U.S. and Australia, risk analyses examined issues associated with cross country or the marathon phase of 3-day eventing and excluded EP-positive horses from participating in events with prolonged exposure to vegetation and opportunity for tick attachment. In consideration of this request, the group has examined the occurrence of ticks in Kentucky and the results of a 2002 survey of the KHP conducted in the summer months. The survey indicated a low prevalence of American dog ticks, which are competent vectors of EP, leading the Kentucky State Veterinarian, the American Horse Council, the American Association of Equine Practitioners, and the Kentucky Thoroughbred Association to support the participation of piropositive horses in the field events, under adequate surveillance and monitoring protocols. Overall, the group agreed that the study indicates a low prevalence but recommends additional surveys during the fall months when the WEG will be held.

In addition, the group conducted a site visit to the KHP, a large park area with grounds that have been highly managed for decades making it a unique venue for such an event. The short grass found in the fields and pastures is not characteristic for most areas where horse events would typically occur, thus offering an advantage for tick control. The adjacent farms and pastures also follow the same type of landscaping, making the vegetation management for tick mitigation strategies much easier to fulfill.

The conclusion of the risk analysis was that the possibility of one or more susceptible horses becoming positive for piroplasmosis resulting from the 2010 WEG could be as low as 0.00014 percent (1 in 1,000,000 horses), or as high as 0.0088 percent (9 in 100,000 horses), but is most likely 0.00065 percent (7 in 1,000,000 horses). This broad range is attributable to many variables and tells us that the more effective the tick mitigations and controls, the lower the risk of susceptible horses becoming infected.

To effectively address the potential risk factors for tick incursions onto the KHP grounds and competition courses, the group recommended requirements for tick control including general long-term strategies, preparation of the venue for the games, tick control for horses, and security. Tick experts should work with the KHP to develop a site plan for the field events. Tick surveys should then be conducted along the proposed event courses to determine the need for additional control measures. These strategies are recommended to minimize the risk of introduction of piroplasmosis infection into the local tick population of Kentucky and decrease the risk of infection from EP-infected horses to susceptible horses.

Based on the data and information presented in this paper, the EEPEG recommended that EP-positive horses be allowed to participate in the field events of the 2010 WEG, if the WEG are awarded to the KHP, provided that tick control measures discussed in this document are fully implemented. These strategies should form the basis of an action and tick control plan that can be developed by all parties involved in the planning and execution of the WEG in Kentucky. The USDA, State of Kentucky, American Horse Council, and Fédération Equestre Internationale representatives will work cooperatively to develop and refine a tick control program that will promote the competition at the games as well as prevent piroplasmosis from being introduced into the United States.

Dr. Bob Hillman, Texas Animal Health Commission (TAHC), gave a Texas perspective on the Cattle Fever Tick Program. The battle against Boophilus ticks (*Boophilus microplus* and *B. annulatus*), the ticks that are vectors for Texas Fever or Bovine Babesiosis (*Babesia bigemia and B. bovis)* began in earnest in 1906 when the cooperative Fever Tick Eradication Program was initiated by USDA in cooperation with state animal health agencies and the affected livestock industry throughout the historic range of the Fever Tick. The historic range of the Fever Ticks extended from Southwest Texas northeasterly across Oklahoma and easterly through all of the southern U.S. states and as far north as Maryland. Additionally, areas of southern California hosted fever ticks. The predecessor of the Texas Animal Health Commission was formed in 1893 to fight Texas Fever and its tick vectors. Fever ticks were finally eradicated from the U.S. in 1943. A permanent quarantine zone was established on the Texas side of the Rio Grande River from Del Rio to the Gulf of Mexico as a barrier to reintroduction of Fever Ticks into Texas and other areas of the former range of Boophilus ticks.

In recent years, there has been a significant increase in the incidence of Fever Tick infestations identified in the Quarantine Zone and a corresponding increase in incursions across the Quarantine Zone line into the Fever Tick Free Areas of Texas. A historic high of 117 Fever Tick infestations were identified in federal fiscal year 2005. While the vast majority of these infestations were found in the Quarantine Zone, significant numbers were in the Free Area.

The increase in fever tick infestations in and across the quarantine area of Texas appears to be caused by multiple factors, including the following:

- Lack of Fever Tick control activities in much of Mexico;
- Reduced flow levels in the Rio Grande River for several years resulted in reduction of water barriers to influx of tick infested animals from Mexico;
- Tick infested stray Mexican livestock (approximately 80% of the Mexican origin stray livestock apprehended in Texas are tick infested);
- Other mechanisms for transport of ticks across the border;
- Favorable climactic conditions;
- Wildlife hosts, both domestic and exotic, for Fever Ticks, e.g. White-Tail Deer, elk, nilgai;
- Constraints on tick control and eradication efforts – i.e. a static budget and detailing of the tick force as part of emergency response to animal health emergencies; and

- Acaracide resistant ticks.

During the past year USDA-APHIS-VS in Texas and TAHC have been evaluating the tick situation and have identified several potential mitigation strategies to identify, control and eradicate incursions of Fever Ticks into and across the quarantine zone. These include the following:

- Increase surveillance in the Quarantine Zone;
- Increase surveillance in the Free Zone in areas near infestations in the Quarantine Zone;
- Require treatment of white-tail deer in vacated pastures;
- Prevent movement of white-tail deer from infested pastures under the Texas parks and Wildlife TTT program;
- Increase tick surveillance at South Texas livestock markets and collection points; and
- Scratch and dip all cattle through the seven South Texas livestock markers.

Fiscal and personnel constraints have limited our ability to implement all of the potential mitigation strategies. However, USDA-APHIS-VS in Texas and TAHC have pooled resources to increase tick surveillance both in the Quarantine Zone and the Free Zone; implemented enhanced surveillance at collection points and livestock markets; expanded regulations to provide more effective treatment controls for cattle and to require treatment of certain free-ranging wildlife; and enhanced outreach efforts with livestock producers in the tick impact area.

If we are to regain control of the Fever Tick in and adjacent to the Tick Quarantine Zone in Texas, we must obtain additional resources to enhance and sustain mitigation strategies. Resources are needed at both the state and federal levels in Texas. Needs include:

- Additional federal personnel to conduct prevention, surveillance, treatment and eradication activities in the Quarantine Zone and incursions across the line in the Free Zone;
- Resources for updating and repair of equipment;
- Additional TAHC personnel to conduct inspections and surveillance in areas outside the tick zone and to conduct traceback, treatment and C&D activities in areas outside the tick zone;
- Research, i.e. wildlife, exotic species that can host fever tick; wildlife, exotic hosts for *Babesia spp.*; alternative treatment methods; and
- Support for Fever Tick control activities in Mexico.

The bottom line is that we must not allow the Texas Fever Ticks to regain a foothold in Texas and risk reintroduction of Texas Fever Ticks to their historic range.

Dr. Richard E. Pacer, USDA, and Rupert G. Pegram, PhD, Food and Agriculture Organization (FAO), gave a 2005 progress report on Caribbean *Amblyomma* Program addressing the challenges ahead. The Tropical Bont Tick (TBT), *Amblyomma variegatum*, was first introduced into the Caribbean region in the mid-1700's when infested cattle were imported from Senegal into Guadeloupe. During the past 35 years, it spread and became established on several islands in the Lesser Antilles.

The TBT is associated with acute cases of dermatophilosis, and is an important vector of *Ehrlichia* (formerly *Cowdria*) *ruminantium,* which causes heartwater. The tick and its associated diseases cause high morbidity and mortality in domestic ruminants and wildlife, leading to considerable losses in production.

In 1994 the Caribbean *Amblyomma* Program (CAP) began in 8 English-speaking islands and added the Dutch island of St. Maarten in 1999 with the goal to eradicate TBT from these islands. FAO has provided the lead technical role for the eradication activities of CAP.

To date external donors have invested nearly $13 million (U.S.) into the program with over half of these funds contributed by USDA. Collectively, these funds have made a major positive impact with six of 10 CAP islands (including St. Vincent) considered provisionally free from TBT.

PROGRESS AND CHALLENGES DURING THE PAST YEAR

During the past year, the CAP Regional Coordination Unit (RCU) in Antigua continued to coordinate specific TBT eradication activities on Antigua, Nevis, and St. Maarten/St. Martin, as well as TBT surveillance throughout the Lesser Antilles. However, an island-wide TBT eradication program on Antigua was not possible due to a lack of sufficient funds.

During the past year, the RCU coordinated a regional workshop on data input and management of the Tick*INFO* 4 + GIS database, which is located on the CARIBvet website. RCU personnel also produced quarterly, annual, and other reports.

Despite past successes, a lack of adequate funds in 2005 made it difficult for islands to maintain the status quo against TBT and unfortunately, the future of the program looks bleak. Although national governments continued to provide both financial and material resources to the program, the USDA continued to be the sole external donor to CAP in 2005.

A lack of sufficient funds for surveillance and emergency response during the past 3 years has not allowed for adequate follow-up and surveillance on the islands considered "provisionally free from TBT;" TBT re-infestations have been identified on three of six such islands. In addition, in November 2004 the Amblyomma Program Council declared St. Kitts as "TBT infested" once again following reports of widespread dissemination of the tick on that island. This was disheartening news as it was the original island to be considered provisionally free from TBT in 2001.

CURRENT STATUS AND NEXT STEPS

In 2004 USDA-APHIS officials in consultation with CAP, university, and industry officials wrote a comprehensive 5-year "Strategic Plan to Eradicate TBT from the Caribbean" by 2009; however, adequate funding has not been identify to fully implement this plan to achieve this goal. Although APHIS continues to receive annual appropriated funds under the TBT Line Item, these funds are insufficient to continue TBT eradication efforts in the CAP islands. USDA-APHIS-VS continues TBT control and eradication efforts on St. Croix using funds from alternative sources.

Without an infusion of a significant amount of new funds in the immediate future the primary goal of CAP will shift in 2006 from "TBT eradication" to "TBT surveillance and control." Furthermore, a coordinated, regional program under CAP will likely cease. In addition, distribution of Bayticol acaricide on TBT infested islands, which has been a key to program success to date, will also change from being free-of-charge to distribution on a cost-recovery basis to farmers.

Fortunately, sufficient funds were recently identified to retain the FAO Program Manager throughout FY 2006; however, he will face mandatory retirement from FAO in September 2006. APHIS International Services also announced recent personnel changes and selected a new Caribbean Veterinary Attaché in Santo Domingo, Dominican Republic to begin coordination of USDA contributions to CAP in the coming months.

Following recent reorganization of personnel, the 3-year proposal for an Animal Disease Surveillance network that was written in 2004 has been recently re-submitted to the International Fund for Agricultural Development in Rome with hopes of their funding it; however, no response has been received yet.

CONCLUDING REMARKS

In the Caribbean region, the presence of TBT, and its associated disease dermatophilosis, has caused major losses in productivity in cattle, sheep, and goats. Similar losses in productivity of livestock and wildlife could be expected if TBT were to spread beyond the Caribbean to neighboring countries.

As stated previously at USAHA and National Cattlemen's Beef Association meetings, at the continental, regional level, area-wide eradication of the TBT from the Caribbean is essential to eliminate the foremost, original risk of spread of TBT to the mainland Americas.

Dr. Mat Pound, Dr. Allen Miller, Dr. John George, and Ms. Diane Kammlah, USDA-ARS, Kerrville, TX gave a presentation entitled, "White-tailed Deer and Other Wild Ungulates – Their Influence on the Operational Success of the Fever Tick Eradication Program." Cattle ticks, *Boophilus annulatus*, and southern cattle ticks, *B. microplus* were declared eradicated from 15 states (14 southeastern states plus California) in the U.S. as far back as 1943, however, frequent re-infestations originating from Mexico and coming into Texas across the Rio Grande continue to be found. Eradication measures to detect and eliminate these re-infestations are continuously implemented through cooperative efforts of the USDA-APHIS-VS Tick Eradication Program and the Texas Animal Health Commission. Although most of these incursions are perhaps related to Mexican cattle crossing into the U.S., there is evidence that increasing populations of white-tailed deer and other wild ungulates including nilgai antelope and other exotics may be responsible for the establishment and spread of infestations and also maintenance of tick populations on infested premises where cattle have been vacated in accordance with

regulatory provisions. Recently, there have been numerous confirmed reports of heavily infested white-tailed deer being viable hosts for fever ticks. In addition, data from Zapata County show that during 2004 and 2005 approximately 26% of the adjacent quarantined premises became infested and 10% of the infested quarantined premises became re-infested, which strongly implicates white-tailed deer in transporting and distributing fever ticks among these premises.

Although systematic dipping of cattle continues to be the preferred and proven method of eradicating ticks from infested premises that also have abundant deer populations, simultaneously infested quarantines numbering up to 117 far exceed the available resources of the Fever Tick Eradication Program to employ the 14-day dipping schedule at all sites. Therefore, when the presence of white-tailed deer is suspected or demonstrated to compromise the eradication effort, it is suggested that systemic or topical treatment of deer be implemented to minimize these effects. One such treatment is the use of macrocyclic lactones including ivermectin or doramectin coated onto re-cleaned whole kernel corn and fed to deer at a prescribed dose by employing a calibrated automatic sling feeder. It was determined that in the presence of abundant forage deer will consume only about 1% body weight of corn per day; therefore, corn is a self-limiting diet for deer which makes it an ideal dosing medium. Previous field trials of ivermectin-medicated corn were successfully implemented to control cattle ticks on elk and white-tailed deer on the Apache and Catarina ranches, respectively, within the tick quarantine zone along the Texas-Mexico border. To circumvent the restriction on human consumption of macrocyclic lactone residues in treated venison, it also was suggested that '4-Poster' Deer Treatment Bait Stations and 4-Poster 'Tickicide'®, an oily 10% formulation of permethrin, be used to treat deer when restrictions or situations otherwise prevent use of the medicated bait.

Dr. Miguel A. Borri-Díaz, USDA-APHIS-VS, San Juan, Puerto Rico, gave an update on the Tropical Bont Tick Eradication Program in St. Croix, U. S. Virgin Islands. The Tropical Bont Tick (TBT), *Amblyomma variegatum,* was first observed in St. Croix*,* United States Virgin Islands (USVI) in 1967 when Dr. Duke Deller, State Veterinarian, USVI Department of Agriculture, on a routine visit collected the tick from cattle. At that time in history six (6) adjoining farms on the western end of St. Croix were affected with TBT. By March 1968 the number of TBT infested farms had increased to eleven (11). The appearance of the TBT in St. Croix was associated with the increase in population and spreading out of the cattle egret in the Caribbean region. The USVI Department of Agriculture began an aggressive eradication effort and in 1972 St. Croix was declared free of *Amblyomma variegatum.*

In 1987, after being free of the TBT for fifteen years, Dr. Duke Deller, on a routine sick call to Sion Farms, collected tick samples from a dead bull. These sample were identified at the University of the Virgin Islands as a male and female *Amblyomma variegatum* species.

Due to lack of funds to establish an aggressive eradication program as in 1967 the affected farm was placed on quarantine and the animals involved were routinely sprayed with an acaricide. By September 2003 the TBT infested farms had increased to eight (8).

TBT is associated with acute dermatophilosis, and is an important vector of *Cowdria ruminantium*, which causes heartwater disease in ruminants. Continental United States livestock beef producers developed an interest for the St. Croix Senepol breed of cattle. The presence of the TBT in St. Croix limited the possibility of importation of this breed by interested Continental U.S. livestock beef producers.

In an attempt to encourage importation into Continental U.S. and eliminate the risk of introducing the TBT and its associated diseases USDA-APHIS-VS entered into a Cooperative Agreement to establish a TBT eradication program on St. Croix.

The expected increase in exportation of the Senepol to the U.S. and other countries will greatly aid and increase the economy of St. Croix.

PROGRAM COMMENCEMENT AND PROGRESS

For FY04 $500,000.00 Contingency Funds were allocated for a TBT eradication program in St. Croix. The program will cover eradication efforts from October 1, 2004 through September 30, 2005. TBT program funding for a second year will depend on progress attained towards the eradication effort during the first year of the program implementation.

CURRENT STATUS

St. Croix *Amblyomma* Eradication Project
Project Start: October 1, 2004
Equipment: Two, Four Wheel Drive Pick-up Trucks.
Two, Truck Mounted Spray Rigs.
Two, 1998 Jeep Cherokees.
Field personnel: 1 - Field Coordinator
2 - Surveillance Team
2 - Treatment Team
2 – Animal Warden

Flexibility of duty assignments for the six field technicians insure that work load commitments are covered.
Acaricide Used: Coumaphos @ 0.125% dilution: Bayer Co-Ral ELI 11.6%.

All nine premises are located in the western third of St. Croix, in two areas of approximately two mile radius, separated by two miles of rugged mountain terrain and dense bush.

Feral cattle in the mountainous areas between the infested localities are collected for TBT surveillance study, and as yet have been either tick free or carrying light infestations of *Boophilus microplus.*

Three zones have been established: 1) The Red Zone encompasses the western third of the island. Livestock and horses are visited at two week intervals for complete herd scratch and coumaphos spray treatment; 2) Livestock and horses of the central Yellow Zone are scheduled for surveillance scratches and maintenance of individual animal ID but do not receive acaricide spray treatment; and 3) The eastern White Zone of the island has been declared TBT free after intense surveillance screening, animal ID, and premises registration. Surveillance scratch opportunities are scheduled as random visits and maintenance of individual animal ID.

USDA-ARS, Knipling-Bushland U.S. Livestock Insects Research Laboratory, began technology transfer trials March 17, 2005 at the Oscar Henry Farm, Estate La Grange, Frederiksted, St. Croix, USVI. Dr.'s Allen Miller and Matt Pound, of Kerrville TX; and Dr. Ron Davey, Mission TX have introduced tactic and innovation that may prove to be beneficial for TBT eradication on well managed farms.

All sixteen Senepol of Mr. Henry were injected with a suspension containing doramectin impregnated microspheres. Serum samples of seven of the cohort are monitored to confirm efficacious levels and establish re-treatment interval. 'Dog collars' impregnated with amitraz have been put on the forty-one Virgin Island White hair sheep. The cattle and sheep are fastidiously examined every two weeks. All *Amblyomma* are collected. TBT counts are recorded by host species and entered into the STX-*Tick*INFO data base.

Dr. Joe Corn and staff of wildlife biologists from the Southeastern Cooperative Wildlife Disease Study (SCWDS) began collections of birds and small mammals at, and in close proximity, to the nine known TBT hotspots. Tick larvae and nymphs of undetermined species have been collected from small mammals (mongoose). To date no known tick nymphs or larvae have been encountered on birds. Estate Prosperity has a large population of guinea fowl and peafowl that feed in the TBT infested pastures. No known evidence of ticks has been found on them. Deer and feral cattle will be collected for inclusion in the SCWDS TBT surveillance study.

Dr. Corn will prepare a comprehensive report of the SCWDS St. Croix wildlife TBT surveillance study after their field work is complete. Projected completion date is early December 2005. All ectoparasite specimens are submitted to NVSL for identification.

SENTINEL HORSES ON A KNOWN TBT PREMISES: ESTATE JOLLY HILL

April 2005 we allowed introduction of two easily handled horses onto the premises of Mr. Ted Cohen. They are removed from the premises, with Permit, September 12, 2005 after scratch examination and coumaphos treatment, which is routine for any animal moving within the Red Zone.

During the sentinel trial the two horses were closely monitored for ticks, but not treated with acaricide preparations. Permethrin Fly-Wipe was applied by the owner at three and four week intervals. No ticks, of any species, were found on the horses during the trial. The premises will again be maintained vacant. See premises history under Vacant Premises.

TBT HOTSPOT #9: THE MOST RECENT TBT LOCATION

Hewitt "JaBuda" Pereira – Estate Grove Place: 2 Holstein feeder bulls, 1 sheep, 14 goats.

a) First documented TBT infestation July 11, 2005.
b) The two 14 month old bulls were slaughtered at the VI Dept. of Ag. abattoir 07/11/05. The singleton TBT male was discovered by an abattoir employee.
c) The two bulls were usually tethered in the owners yard, but sometimes tethered them across the street in a grass area approximately 0.20 mile west of the infested pasture of Mr. Alan Vanterpool.
d) The goats and sheep have been under Red Zone surveillance scratch and treatment protocol.
e) No other TBT have been found.

TBT HOTSPOT #8 – THE MOST TBT ACTIVE. SITE OF ARS TRIALS

Oscar Henry – Estate La Grange: 16 Senepol. 30 sheep.

a) First documented TBT infestation February 27, 2004.
b) The infested pastures of Oscar Henry are adjacent to the heavily infested pastures of Art Turo Christensen, separated by 24 feet of asphalt road.
c) Mr. Christensen's sheep were known to stray, cross the road, and enter the fields of Mr. Henry.
d) Deer have been observed crossing from farm to farm with no hesitation.
e) Have been undergoing scratch and treatment since 2002.

TBT HOTSPOT #7 – TBT ACTIVE. IN PROCESS OF DEPOPULATING. WILL BE MAINTAINED VACANT

Alan Vanterpool – Estate Lower Love: 2 Senepol cattle, 1 Holstein feeder calf, 4 horses.

a) First documented TBT infestation December, 2003.
b) Depopulating the premises: The two fractious Senepol, feeder calf, and two of the horses were removed from the premises August 30, 2005 via Quarantine-Out Protocol.
c) Two horses remain but will be removed as soon as buyer can be found.
d) The pen facility was in poor condition. The two Senepol were extremely fractious, difficult to scratch, difficult to treat. Portable corral structure had to be utilized for examination and treatment.
e) The Vanterpool premise is immediately adjacent to "Miss" Drew, and 0.30 mile east of the new TBT hotspot, Mr. Pereira.
f) Have been undergoing scratch and treatment since January 17, 2003.

TBT HOTSPOT #6

Rosalia "Miss" Drew – Estate Lower Love: 140 sheep.

a) First documented TBT infestation July 12, 2002.
b) The only other TBT, a singleton male, ever observed was July 15, 2002.
c) No TBT have been observed since.
d) Have been undergoing scratch and treatment since July 15, 2002.

TBT HOTSPOT #5

John Scribner – Estate Sprat Hall: 2 horses.

a) Owner found, and reported, a singleton male TBT January 15, 2003.
b) Previously, horse had been pastured at Art Turo Christensen's.
c) The only other TBT, a singleton male, ever observed (and collected by owner) was September 25, 2003.
d) Has been undergoing scratch and treatment since January 17, 2003.

VACANT INFESTED PREMISES

There are nine known infested areas on St. Croix. Four are now vacant, and monitored for vacancy. Vanterpool will soon be the fifth 'maintained vacant'.

TBT HOTSPOT #4

Eustice Simon – Estate Grove Place: Vacant since July 2003.

a) Had 4 Senepol cattle.
b) First observed TBT (by owner, after purchase from Vanterpool) December 6, 2002. Only other observation (by owner), March 14, 2003.
c) In July, the cattle were moved back to premise of origin, the TBT infested land of Alan Vanterpool in Lower Love.
d) From the Vanterpool premise they were placed in quarantine pen, treated intensively for three weeks, scratched, sold, and moved.

e) They are under surveillance observation.

TBT HOTSPOT #3

Pam Cohen – Estate Jolly Hill: Vacant since April 2004.

a) Had 6 horses.
b) First observed TBT July 24, 2002.
c) The last observation and collection of TBT (one male, one female) was September 18, 2002.
d) The horses remained under scratch surveillance and treatment.
e) Horses were quarantined, treated intensively, scratched, sold, and moved.
f) They are under surveillance observation.
g) **Sentinel horse trial: April to September 2005. No treatments. Scratch surveillance only. No ticks.

TBT HOTSPOT #2

Chung Garcia – Est. Carlton, Old Golf Course: Vacant since May 2004.

a) Had 5 horses.
b) Was a known TBT infested premise from 2001.
c) Horses were quarantined, treated intensively, scratched, and moved.
d) They are under surveillance observation.

TBT HOTSPOT #1

Art Turo Christensen – Est. Prosperity: Vacant since December 13, 2004.

a) First visual sighting, and photography, of *Dermatophilus congolensis* infected wild cattle by Dr. Patrick Berger, February 2002.
b) First collected and documented TBT July 8, 2002, from a wild Senepol cow, dead of dermatophilosis.
c) Estate Prosperity has been a recurring 'Hotspot' TBT area since the first documented infestation of 1967.
d) The last surviving sheep was delivered to the abattoir November 22, 2004.
e) A portable corral cattle trap was erected October 13, 2004 and monitored daily. The last two wild Senepol, carrying TBT, were trapped December 12, 2004.
f) No humans inhabit the farm.

CONCLUDING REMARKS

In the Caribbean region, the presence of TBT, and its associated diseases dermatophilosis and heartwater disease has caused major losses in productivity and international trade in St. Croix, even though free of heartwater disease, the presence of TBT has affected the exportation of its Senepol cattle to Continental United States as well as to interested South American and Caribbean countries. The presence of *Cowdria ruminantium* vector present prevents regular exportation of the Senepol cattle to countries considered free of *Amblyomma variegatum.* Eradication of *Amblyomma variegatum* will offer St. Croix the opportunity to strengthen their weak economy by increasing revenue through exportation of their highly regarded beef cattle. The reintroduction of *Amblyomma variegatum* into St. Croix in 1987 after fifteen years of being free suggests that total eradication cannot be reached unless all the Caribbean region are free of the TBT.

Four Resolutions were approved by the Committee and forwarded to the Committee on Nominations and Resolutions.