Health and Markets, Universal Beef Issues

Master of Public Health Field Experience Report

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MPH Field Experience
September 1, 2008
Location: Paraguay

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Abstract

To complete my combined veterinary and public health (DVM/MPH) degree requirements, I spent 12 weeks (June 1, 2008 to September 1, 2008) working in South America on animal and human health issues along with Joan Talbott, DVM / MPH candidate. The field of veterinary medicine is very closely linked to public health. My area of interest in public health is infectious diseases and zoonoses so I chose to work with the USDA for my field experience. Dr. David Ashford, DVM, MPH, DSc, Assistant Area Director, USDA-APHIS, IS agreed to be our field supervisor.

The overall goal was to gain knowledge of the job responsibilities and career pathways for veterinarians in public service and public health, and the specific roles and responsibilities of these agencies.

First Goal

The first goal of my experience was to increase awareness of the specific differences and challenges of eradication versus control programs in developing countries, the design and implementation of intensive national health programs, and the details of Foot and Mouth disease and epidemiology. The project included training and experience in outbreak investigation, GIS, surveillance, and the epidemiologic methods of cross-sectional serologic studies.

Second Goal

The second goal of my experience was to study the role of relevant governmental and non-governmental organizations in animal and human health (the National Ministries, the Animal and Plant Health Inspection Service, the World Health Organization, the US Agency for International Development, other agencies in the Department of State, and Peace Corps).

Rio de Janeiro

After spending a week in a Spanish language immersion course in Buenos Aires, Argentina, Joan and I arrived in Rio de Janeiro for the RIMSA Conference. Our field supervisor, Dr. David Ashford, arranged our itinerary.

15th Annual RIMSA Conference

On June 11 and 12 we attended the 15th Annual RIMSA Conference, which is a meeting of all the Ministers of Health and Agriculture in the Americas. It is the only regional forum for collaboration and coordination on issues related to veterinary public health which includes the participation of the Ministers of Health and Agriculture from PAHO Member States. Through RIMSA, PAHO receives the political support necessary to develop technical cooperation with these countries in that area. Every country in North and South America was represented and lectures were in English, Spanish, French, and Portuguese with headsets provided in all four languages. The Theme of the 15th RIMSA was "Agriculture and Health: Alliance for Equity and Rural Development in the Americas". RIMSA was organized this year through PANAFTOSA of the PAHO/WHO, jointly with IICA and the Brazilian Government. Following are the lectures I attended:

1. **Development of agrofood chains: *socioeconomic and environmental challenges, and windows of opportunity for equitable development and health;*** Jeffrey Max Jones, Undersecretary of Agribusiness Promotion, Mexico's Secretary of Agriculture, Livestock, Rural Development, Fisheries, and Food (SAGARPA)

2. **Five years of economic growth in the Americas: *contribution of the agricultural and livestock sector to the Millennium Development Goals (MDG);*** Christopher Hansen, Sub General Director of IICA

3. **Rising Food Prices: *Latin American and Caribbean context and strategies;*** José Graziano da Silva, FAO´s Regional Representative in Latin America and the Caribbean

4. **Climate Change: *impact on the environment, agriculture, and health;*** Jorge Monge, Ministry of Environment and Energy, Costa Rica

5. **Agriculture, Nutrition and Health: *Cuba's Experience;*** Emerio F. Serrano Ramírez, General Director, of Veterinary Medicine Institute, Ministry of Agriculture of Cuba

6. **The Americas Free of Trans Fats: *Canadian's Experience;*** Janet Beauvais, General Director of the Food Directorate, Ministry of Health, Canada

7. **Agrotourism, Ecotourism, Sustainable Tourism and Health: *Opportunities for rural development and sanitary challenges. The case of Jamaica;*** Hugh Cresser, Deputy Chief of Party for the USAID funded "Rural Enterprise, Agriculture and Community Tourism Project" in Jamaica

8. **Health in Rural Areas;** María Julia Muñoz, Minister of Public Health, Uruguay

9. **Equitable health care: *neglected diseases in neglected populations;*** Ricardo Cañizares, Regional Undersecretary of Coast-Insular Health, Minister of Public Health, Ecuador

10. **Zoonosis and Public Health Emergency;** Wanderson Cléber de Oliveira, Coordinator of the Center of Strategic Information on the Health, Ministry of Health, Brazil

11. **Opening;** José Gomes Temporão, Minister of State of the Health, Brazil; Reinhold Stephanes, Minister of State of the Agriculture, Livestock and Supply, Brazil

In addition to attending the informative and complicated meeting we had a great opportunity to meet the former director of the Zoonoses Unit of PAHO, Dr. Primo Arambulo, Dr. Albino Belotto (the current Director of PANAFTOSA, PAHO and former Director of both PAHO's Zoonoses Department and Infectious Diseases Department), Dr. Mike Chaddock (current director of International Programs for AAVMC), Mr. Phil Bradshaw (President of GIEFA), Dr. Jurgen Scjhludt (Director of the Department of Food Safety and Zoonoses at WHO, Geneva), Dr. Rosas (Director of PAHO), Dr. Bob Bokma (OIE representative for the United States), and Dr. Raymond Dugas (PAHO Public Health Veterinarian in Guatemala), and Dr. Dorothy Geale (Foreign Animal Disease Senior Veterinarian for the Canadian Food Inspection Agency).

Current Health Issues

It was an astonishing opportunity for me to be able to converse with these experts in my field of interest. The major current health issues that were the focus of the meetings included food shortage, clean water supplies, and Hemispheric Foot and Mouth Disease eradication program efforts. Representatives from all the countries in North and South America were present and this allowed me to gain an understanding on specific problems that each country is facing.

For example, the Canadian representative spoke about removing Trans-Fats from foods which is a very far reach from many other countries that just want to be able to feed their people. We also met with most of the staff at PANAFTOSA. PANAFTOSA is the PAHO center in South America that is in charge of food safety, zoonoses as well as vesicular diseases including foot and mouth disease.

On June 13 we toured the PANAFTOSA facility in Rio and listened to a lecture by Dr. Jurgen Scjhludt explaining the WHO's current initiatives. After the tour and a delicious

barbecue, we were honored to meet with Albino Belotto and the other special guests for coffee. Dr. Primo Arambulo, Dr. Albino Belotto, and Dr. David Ashford reviewed the history of the center from the formation as an OAS center to the FMD outbreaks in Mexico, and the historical relevance of placing FMD in the WHO. Dr. Arambulo's poignant quote (paraphrasing here) was, "Knowledge of history of these decisions and the programs allows for improved planning in these areas for the future."

On June 16, we returned to PANAFTOSA and met with a risk analysis team from USDA-APHIS in Washington. The team consisted of: Dr. Alan Terell (USDA Area Director in Brazil) and Dr. Stephanie Kordick (USDA Import Risk Analyst). We were able to sit in on the meetings they had with PAHO's representatives. They were in Rio to discuss opening up the beef trade market to the United States. Their jobs consist of visiting the region and ranches with the meat the United States would import, visiting packing houses and also meeting with the regulatory agencies to see how diseases are being controlled. After that, they wrote an extensive report about the risks of opening the market, and the suggested requirements that should be written into the contract. This entire process will take around 3-5 years to be complete. Continuous negotiations go back and forth between countries. However, negotiations with the United States are unique in that they take much longer than between many other countries. The team had recently visited a region in western Brazil with a cattle producer from the United States who wanted information about basic security and guidelines in place for food safety. It was an eye-opener to see how complicated the process of international trade really is.

In the afternoon on June 16 we got a briefing on the Hemispheric FMD Eradication Program efforts by Dr. Jose Yanez from the epidemiologist unit at PANAFTOSA. He explained to us that in order to have a successful eradication program there has to be an understanding of the movement of animals and the ecological conditions that affect the region. In Paraguay it is very important to mount an equal uniform approach to the whole area in order to eradicate the disease. The movement of the animals is going to depend on the Trans-boundary price. For example in Paraguay in order to control this movement of animals they would need to enforce better border controls. Currently most of Paraguay does not have any form of physical borders separating it from its neighbors. In the past 10 years the outbreaks have been in a radius of 500 km, and that area is centered over Paraguay. All the outbreaks were of the same viral sequence and included 5 different countries and 30 million head of cattle. He also explained that in Paraguay there is a much stronger private sector than public sector. On the western side of Paraguay there is a shortage of veterinary services and with the absence of the public sector the private sector has taken-over the over-seeing of the eradication program. He stressed to us that in order to have the Hemispheric FMD Eradication Program be a success in all the countries of South America there has to be good coordination between the private and public sector.

Asuncion

SENACSA

We arrived in Asuncion, Paraguay on June 17. We spent the first week there getting oriented to all the different organizations and setting up our program with the help of our supervisor, Dr. Ashford. On June 18 we met with Dr. Jugo Corrales (President of SENACSA), Dr. Primo Feltes (Director of Technical Services), and Dr. Stella Maciel (Chief International Affairs Unit) to get introduced and to arrange our program.

We also were given a tour of every aspect of the facility. During the tour we met with directors of all five areas of SENACSA. The five areas include administration and finance, laboratory, animal products, animal health, and technical services. The laboratory does work and testing for FMD, Rabies, Bovine Spongiform Encephalopathy, Classic Swine Fever, Equine Infectious Anemia, Tuberculosis, Brucellosis, New Castle Disease, and Avian Influenza. The laboratories were very different from those that are found at Kansas State, and they did not use the most up-to-date tests. Soon they are going to build a new Level 3 Biosecurity Building with help from the European Union on the SENACSA grounds. They were very kind to give us such a thorough tour, but I am not sure it was necessary for us to meet with the financial administrator. We did not have much to discuss with him.

On June 19 we had our first meeting with the epidemiologists at SENACSA Dr. Norman Ramirez and Dr. Victor Maldonado. We received an overview on what SENACSA does and information about Paraguay. Paraguay has 10 million head of cattle and 106,445 herds. Paraguay has 40,675,000 hectares of land and 26,000,000 hectares is used for cattle. The total population in Paraguay is 5,742,000 people and only 3% of the population lives in the Chaco even though it is 61% of the country. The producer has to pay 1% of the current market price per head at inspection to SENACSA. That is their form of the Beef Check-Off. With the FMD Eradication Program they will purchase the vaccine for the producer and bring it to the ranch to be used if the herd size is less than 100. If the herd size is greater than 100, the producer must purchase the vaccine and call SENACSA when they are going to inject it in order to be monitored. SENACSA has found that if they rely on the smaller producers to purchase the vaccine on their own it does not happen. An additional fun fact I learned about Paraguay is that it is the 4th largest producer of soybeans in the world.

FMD Vaccination Campaign

Friday June 20th was the official start of the FMD vaccination campaign of the season. We knew we were headed to a ranch, but we had no idea that we were going to be a part of a large press conference. We were seated in front of the cameras along with Dr. Eusebio Manuel Cardozo (ranch owner and Vice President of the Rural Association), Dr. Juan Nunez (President of the Rural Association), Dr. Jugo Corrales, Dr. Manuel Barboza (Director of Animal Health at SENACSA), and Alfredo Molinas (Minister of

Agriculture for Paraguay). It was very new experience for me to be on that side of the cameras, and there were a lot of cameras! This was the first example that we saw of the public sector, (The Rural Association), and the public sector, (SENACSA), working together. After the press conference, everyone went to the corral to capture that actual first cow being vaccinated on camera. They had multiple people vaccinate the first few cows in order to get pictures of numerous representatives giving the first vaccination.

After that we had the opportunity to tour the ranch. Dr. Cardozo has a wide variety of animals including bison, goats, Appaloosa horses that he purchases from Georgia, and cattle. Another aspect of the ranch we were able to tour was the production of Stevia, a natural sweetener that has no calories. We visited a large shed that was full of the dried products packaged up and ready for shipment. Everyone was given a small bag with some of the dried plant to taste. We were also given a tour of the new stevioside factory they are building to be able to export the soluble crystals called Ka'an he'e. Stevia is the single heated natural sweetener in the world and it is native to Paraguay. With the assistance of Rediex, they are hoping to make stevioside into one of major export items of Paraguay. Currently China and other countries of Asia are now the world's largest suppliers of stevioside, but they produce only two crops per year, whereas in Paraguay they can grow up to five crops a year. After the tour and talking with Dr. Cardozo I realized what a great example he is of a motivated Paraguayan who is trying to improve Paraguay's economy.

IICA

During our first week in Asuncion we also had meetings with two additional organizations in Paraguay that are very closely involved with the agriculture economy. We met with Inter-American Institute for Cooperation on Agriculture (IICA) and talked with Dr. Carlos Franco and Fatima Almada Chavez.

IICA is a specialized agency of the Inter-American System, and its purposes are to encourage and support the efforts of all the member countries to achieve agricultural development and well-being for rural populations. IICA has been around for six decades and has accumulated a wealth of knowledge regarding agriculture, rural territories, the diversity of peoples and cultures, and the agro-ecological diversity of the hemisphere, all of which are important for crafting creative solutions to a wide variety of problems and challenges. IICA has offices in all the member countries, and this allows them to have the flexibility it needs to move resources between countries and regions in order to promote and adapt cooperation initiatives intended to address national and regional priorities, facilitate the flow of information, and improve the dissemination of best practices. The headquarters are in Costa Rica, with offices in 34 countries of the Americas, an office in Miami, which is responsible for the Inter-American Program for the Promotion of Agricultural Trade, Agribusiness and Food Safety, as well as an office for Europe located in Madrid, Spain. IICA's vision is to be the leading agricultural institution in the Americas and the partner of choice by virtue of the quality of the technical cooperation it provides in response to the needs of all the members, and its contributions to sustainable agricultural development, food security and rural prosperity.

REDIEX

The second organization that we visited was Red Investment and Export (Rediex). It is a country project based on exporting as an efficient tool to accomplish the well-being of the Paraguay population under the ministry of industry and commerce. Rediex was set up with the donation of 2 million U.S. dollars by the Taiwan government.

Rediex includes many different sector boards which are headed by one representative from the private sector. The sector board is composed of public and private organizations and the universities, which are directly associated to the sector. The companies or groups of companies belonging to the sector boards are in turn assisted in their process of internationalization by means of projects jointly financed by the National Export Plan, which are aimed at doing intelligence and market prospecting work, participation in fairs, and the adaptation of products. We met and talked with Dr. Jose Luis Laneri, who works in the sector board of meat, about what needs to be done in order get Paraguayan beef accepted into the United States. We discussed that in order to get the trade started it would be a good idea to find a market in the United States that would want to buy their hormone-free grass-fed beef.

The following four weeks we spent working with SENACSA to gain an understanding of all the aspects of SENACSA. I was very surprised to learn that 80% of their funding comes from the Paraguay Rural Association which is like the National Cattleman's Association in the United States. This meant that the Rural Association pretty much controls SENACSA, which at first I thought could be very negative, but after spending six weeks working with SENACSA, I have discovered that it is very much a positive thing. I think that we have gained an excellent understanding of the politics that go into improving a developing country's agriculture in order to compete in the world market.

The FMD Eradication Program is very important in Paraguay because in order to export their meat in the global market they must remain free of FMD. We arrived in Paraguay just when the European Union had agreed to start importing Paraguayan beef. Everyone was very excited and the price of beef was already starting to climb. Paraguay required that no hormones be used in cattle production and the EU only wanted to have an animal identification system in place before they would import. In order to learn about the animal ID program we visited the Rural Association headquarters. The program is called SITRAP and is basically established by the Rural Association but monitored by SENACSA. It is currently a voluntary program for producers and when the EU opens trade they will only accept the animals in the program. The producers are given a registry book that is kept at the premises. The book has to be signed by both the owner and veterinarian and is monitored monthly. When the premises are registered all existing cattle are given a white tag, when calves are weaned they are given a yellow button, and when calves are moved they are given a yellow tag. The ear tags and buttons include a number and bar code which is only scanned at the packing house. Currently they are reporting 3% loss of buttons and 5-8% loss of the tags. Visiting Las Mercedes, Ganaderia Tuyuyu, a ranch about an hour and a half from Asuncion, that is using the SITRAP system, enabled us to see how it works on the farm. We were able to check the book and see the cattle with the tags.

The books at the ranch were well maintained and the records were up to date. The ranch has 2,000 head of Brahman and Braford cattle. We saw cows with calves, weaned calves, and feeder calves. The ranch size is 1,500 hectares with 20 separate pastures where they rotational graze their cattle. They supplement with ground coconut rinds, minerals, and salt.

SENACSA's computer system used to control and monitor animal movement and vaccination is SIGOR. The SIGOR database has every premise and cattle owner registered. The SIGOR system includes the SITRAP system. The SIGOR system is used to monitor FMD vaccination with the country by registering how many doses of vaccine are purchased, how many cattle are vaccinated, and records any animal movement. They have over 70 control points throughout Paraguay to monitor all the premises and movement of livestock. Whenever cattle are moved within Paraguay, it is entered into the program on the computer and paperwork is printed out to send with the cattle and for the owner. If the animals have any identification, it is recorded along with their brands. In the rural remote area of Paraguay they unfortunately do not have enough control points to monitor the movement.

Another major obstacle in remote area is the lack of infrastructure. There is only one road that goes north out of Asuncion. During a FMD vaccination campaign each SENACSA control point has a fiscalizador who is trained to monitor every FMD vaccination at the ranches. The fiscalizador is a part time facilitator hired by SENACSA only during the FMD vaccination campaign. SENACSA does have a problem finding part time workers in the remote rural areas of Paraguay. I think it is also very difficult to employ reliable workers who take their jobs seriously. The fiscalizador has a very important job in the FMD disease eradication efforts. If they allow the ranch workers to leave the vaccine out in the sun, the vaccine becomes ineffective. The ranch owner is required to notify their regional SENACSA office when they are going to vaccinate so that they the staff can be there to count the cattle and make sure that the vaccine is handled properly. One concern is that in the Chaco region of Paraguay the SENACSA control points and offices are very spread out. Many ranchers might not want to deal with the hassle of having SENACSA monitor them or inspect the cattle if it is a long distance from the ranch. Another concern that can arise for SENACSA is having trouble hiring reliable fiscalizadors in the very rural areas.

SENACSA has divided Paraguay into 7 health sanitary regions. Within each region there are many zones, and each zone has a SENACSA office. Each region has a coordinator whose responsibilities include: planning and directing the region's activities, represent the region, manage procedures during an emergency in the region, report on the region, and evaluate all the chiefs of the zones within the region. We visited one regional coordinator's office and listened to a power point presentation on his duties. His region includes 25,723 ranches and 1,867,794 cattle. The personnel in his region include 15 veterinarians, 24 administrative assistants, and 35 health inspectors. The size of the region is 20.002 KM^2 – 14.667 KM^2.

An additional aspect of SENACSA is the inspection controls stations. SENACSA has 21 stations in Paraguay. We visited the inspection control point close to the Argentinean border which is just north of Asuncion. It sees on average of 2,000 animals per day and about 50 trucks. They have an 800 hectare quarantine facility for animals with health problems, no documents, and/or no brands. After the animal is in the quarantine facility for 2 years SENACSA will gain ownership of it. We also visited a private port called Puerto Falcon on the border with Argentina. A SENACSA veterinarian is stationed at the port inspects the shipments, makes sure that container temperatures are continuously monitored, all the correct paperwork is present on all exports, and all shipments are secure. Another SENACSA veterinarian position is an inspector at a packing house. We were able to tour the packing house with three SENACSA veterinarians. One of the veterinarians was probably the most entertaining SENACSA employee we had the honor of meeting. He spoke very good English. The plant was very similar to the packing plants in the United States that I have visited. They kill 90 animals an hour. We were able to tour every aspect of the plant starting with the unloading dock, the special inspection unloading dock, the kill floor, trimming and packaging. They spray all live animals and trucks including the wheels and trailers with sodium bicarbonate. They explained to us and demonstrated what the SENACSA inspectors were doing. At the beginning of the production line they have a person inspecting all the feet looking for any signs of FMD. SENACSA also has inspectors at sale barns to inspect animals. We visited two sale barns and talked with the SENACSA veterinarians working at them. The cows are not checked for pregnancy at the barns, and no blood tests are done there. It is necessary to have papers proving they have been vaccinated for FMD and blood tests done for Brucellosis to give to the SENACSA veterinarian at the sale barn. The main job of the veterinarians at the sale barn is to receive and look over the paperwork. At one of the barns we also were there when they were drawing blood from the cowboys' horses for Equine Infectious Anemia tests. We visited with numerous SENACSA veterinarians and employees, and they all treated us courteously. They were extremely excited to tell us about their jobs, and every place we visited had us sign their guest log book.

We traveled from Asuncion to the Brazilian border with Drs. Victor Maldonado and Gloria Alarcon. Both are SENACSA veterinarians in the epidemiology department. On our trip to the border we made some stops along the way at SENACSA regional and zone offices to listen to SENACSA officials. At each control point or office the veterinarians in charge would explain what their job entailed. The SENACSA control station in Saltos del Guaira at the border with Brazil was unique because it is in the Zona de Alta Vigilancia. This is the area of higher concern and includes 15 km on both sides of the border. The objectives within this higher concern area are to maintain the FMD free status within the country, protect the susceptible animals by vaccination, and control the movement of the animals at the border. This was created because there is not a physical border in place so cattle can walk back and forth between countries, and many ranches have land that is on both sides. SENACSA has mapped out all the ranches within the Zona de Alta Vigilancia using a GPS system. All the cattle in this zone are given a tag when they are first vaccinated for FMD. All the cattle within this zone on the Paraguay side have to have red tags and the cattle on the Brazil side within

the zone have green tags with yellow buttons. In the zone on the Paraguay side there are 547 ranches and 147,387 cattle. The cattle do not get a new tag every year even though they need to be vaccinated every year, so you really only know that the cattle have been vaccinated at least once for FMD. When we were visiting the border area, we also visited a SENACSA inspection station at a port along the river and a ranch during a FMD vaccination. The fiscalizador was there at the ranch to monitor the process, to record how many cattle were vaccinated and to verify that the vaccine was handled properly. The armed, (with knives and guns), ranch hands vaccinated the cattle. Currently 80% of the Paraguayan border has this status, so this is a program that includes Argentina, Brazil, and Bolivia.

After leaving the ranch we drove along the Brazilian border for about 3 hours. The border was a red dirt road, and some of the time we were in Brazil. There were cattle along the road and often in between the two roads that make the border for each country. The area was very pretty and looked about like eastern Nebraska except with Palm Trees and without houses. We arrived at a large ranch near the border called Estancia Americana. One of the owners was visiting at the time and offered to let us stay at the lodge for a couple of nights. The ranch is 44,000 acres with 20,000 head of cattle and 4,000 horses. We toured the ranch and were able to see Nelore, Brangus, Brahman, and Caracu cattle. Part of the ranch is within the 15 km from the border, so it is in the Zona de Alta Vigilancia and those cattle had in the red ear tag. They were very generous, and Joan and I toured part of the ranch on horseback. They wean their calves at 8 months and examine the calves at 8, 17, and 24 months and any calves not up to their high standards are sent to be fattened.

The International Expo in Asuncion was from July 5 until July 19. We spent a lot of time at the Expo doing many different tasks thanks to Dr. Marcos Medina, who is a veterinarian in private practice as well as the veterinary advisor to the Rural Association. There were lectures at night on a wide variety of topics that we were able to attend. SENACSA had a lecture every night at their building. We also had the opportunity to attend some lectures put on by the Rural Association, who is responsible for the Expo. One especially interesting lecture we were able to listen to was by the OIE representative for North and South America, Dr Luis O. Barcos. He spoke about the requirements set in place by the OIE and how the OIE comes up with the requirements for diseases. He said that when the OIE sends out the draft to countries to review only a few countries reply like the United States, Australia, New Zealand and sometimes Argentina and Brazil. He explained that when other countries like Paraguay do not respond they do not have any say on the OIE requirements.

Every night starting at 9:00 pm there was an auction with a different breed. The breeds at the Expo were Brahman, Nelore, Brangus, Santa Gertrudis, Braford, Gelveih, Limosin, Hereford, Montana, Bonsmara, and Angus. The first week of the Expo non-broke cattle were sold, and the second week the show cattle were sold. It was a great atmosphere with a lot of bidding, all you can eat steak and cornbread, music, and fireworks. We also attended receptions put on by various breed organizations and the Antiaftosa vaccine company reception. At these receptions and dinners we were able

to meet and talk with Dr. Octacilio Echenagusia (President of the Uruguay Rural Federation) and Dr. Guido Nayar Parada (President of Bolivia Rural Federation), Ing. Carlos Pereira Benza (President of the Brahman Association in Paraguay). During the day at the Expo there was judging. We watched Hereford, Quarterhorse, Criollo, Nelore, and Bradford competitions. We were able to be a part of the Brahman competition. The Brahman judge was Dr. David Husfeld from Texas, and he was gracious enough to let us assist him for the entire day. It was a great learning experience and fun to be able to help him with the judging.

The Chaco

The final aspect of my field experience was spending four weeks working in Chaco, Paraguay. The Chaco is the northern region of Paraguay with very few people and many cattle. We traveled 470 kms north of Asuncion by bus to Filadelfia, a German Mennonite town of 4,000 people.

Fernheim Corporative

Fernheim Cooperative in Filadelfia was very cordial in allowing us to work with them. Filadelfia was settled by German Mennonites in the 1930s that were fleeing The Soviet Union. The Chaco Paraguay where they ended up was a very harsh and tough region to farm. One resident of Filadelfia said that for freedom any land looks good to the persecuted people. The land had sandy soil and was covered with brush filled with thorns and trees. Some left but the ones who remained learned how to clear the land in order to have pasture, store water for the dry season, and to work together. Today there are three different German Mennonite Colonies in the Chaco and each has their own cooperative.

The Fernheim Cooperative has a supermarket, restaurant, hotel, book stores, furniture stores, pharmacy, hospital, nursing home, agricultural extension service, veterinarian clinic, packing house, peanut factory, milk factory, mechanic shop, gas stations, schools, colleges, and a bank. The income from all the businesses are shared and managed by the Coop.

We worked with the Technical Assistance Office which includes the agriculture extension service and veterinarians. They provide assistance to all members of the Coop at a very low cost, but the office receives 0.75% of the sale price on all meat, milk, and crops. Anyone can call the office and ask for a veterinarian, but they get charged a much higher fee if they are not members of the Coop and all members of the Coop have to be taken care of first. Meat production is 75% of the agriculture production in the colonies. They ship 2,000 kg every week to Dubai. They also export meat to Chile, Russia, Brazil, Peru, and Israel. They started dairy production in the 1950s with the help of Robert Unruh of Kansas State University. They have 90% Holsteins in the Coop. The crops that are grown in this region are peanuts, saffron, sorghum, sesame seeds, and castor beans for oil. They also grow a lot of gatton panic grass which is a grass from Australia that does very well in the Chaco. They will rotate it among other crops and harvest it in the dry season. They also sell the gatton panic seeds. The Mennonite Communities in the Chaco have been very successful and have given the Paraguayan government hope for the rest of the Chaco.

ATF

We worked along with the six veterinarians at the Fernheim Cooperative Technical Assistance Office (ATF) while in the Chaco. The director of ATF is also a veterinarian,

and he supervised our work. The level of learning in the veterinary schools in Paraguay is well below the level in the United States. There are numerous veterinary schools but not enough jobs for all the graduating veterinarians. Dr. Marcos Medina explained to us that the private practice veterinarians are paid much better than the public, and that causes the quality veterinarians to enter private practice. In order to get hands-on experience the veterinary students either have to shadow a private practice veterinarian or get it after school.

Four of the veterinarians that I worked with at ATF were very good veterinarians, and their work was pretty much 100% cattle work. I saw very little differences in examination, treatment, and veterinarian work done by those veterinarians. They were always very curious on how things are done in the United States and wanted my assistance. The cattle aspect of the veterinary practice is modern and operates like a veterinary clinic at home. This type of practice is unheard of in the rest of Paraguay.

The first two weeks we were there we went with the veterinarians on their calls and assisted them. They have both dairy and beef cattle in the area so I saw a variety of work. I went on calls for milk fever, mastitis, lameness, dislocated shoulder, Anaplasmosis, Texas Cattle Fever, and a rectal abscess. I also assisted with numerous bull soundness exams and rectal palpation.

The other two veterinarians do mainly small animal and laboratory work. Both are more recent graduates and have not yet completed their thesis to be Doctors of Veterinary Medicine. The only time that I rode with either of those two was on a horse call and I was not impressed on how it was handled. We did not even enter the pen where the horse was. The veterinarian asked for the history and looked at the face before treating it with Penicillin and Vitamins. The horse had not been tested for Equine Infectious Anemia for the past 2 years, so the veterinarian just assumed that was the problem.

Crea Groups

While working at ATF we also were able to participate in their Crea groups. The Fernheim Coop has seven small groups of producers that meet once a month to visit a ranch and discuss it together. Five of the groups are beef cattle producers and two are dairy producers. They only allow 12 people to a group and they are grouped based on personalities. They take turns visiting each members' operation at different times of the year. The owner gives a tour of their ranch and explains how he operates. After an outdoor barbecue everyone sits around and discusses how and why things are done. Each group has a veterinarian as a member, and they talk on a topic at each meeting.

The Crea groups were started during a very dry year so that other ranchers could learn from each other how to stay in business. They are not competitive, and everyone seemed opened to discuss how things should be done. The first ranch that we visited with the Crea group was a neighbor to a member of the Coop that allowed us to visit his ranch as well. It was a ranch owned by a Frenchman called Amapola. The manager gave us a very detailed tour of the ranch. Amapola has composite breeds. They have

a new embryo transfer facility at the ranch and excellent corrals. Amapola is 6,000 hectares, and they have 6,000 head of cattle with 1800 being cows. The cows are rotated every 15 days by their AI date. They supplement their feeder calves with cotton seed and ground corn shipped from Eastern Paraguay.

With a different Crea group we visited two ranches owned by a South African who has lived in the Chaco for 20 years. He had recently purchased the second ranch and was still in the process of clearing the land of the trees and brush. In order to use any land in the Chaco it has to be cleared because it has such thick brush and trees. It takes at least 2 years to get the land cleared for use. They first take a bull dozer and push the wood into rows. Behind the bull dozer another tractor is spreading grass seeds. After setting for a year they usually push all the remaining wood into the center and burn it. Once the pasture is established it can support one cow per acre.

Research with Anaplasmosis

The second part of our time at ATF we spent working on research with Anaplasmosis. They currently are having a lot of trouble with the disease and wanted some work done in that area. We were very excited to help them out in this manner. They first wanted to do a study similar to one done in Brazil that used the Agglutination Card Test. We were able to talk them into using an ELISA test because many studies have proven that it is much more suitable test for epidemiological studies. We were told that they would pay for 450 tests.

It was up to us to set up the study. We set up a study with the help of Dr. Hans Coetzee and Dr. Mike Sanderson to look at the antibody levels in 13 herds in the Coop. We took a total of 490 samples and discarded any poor samples. We drew blood samples from the caudal tail vein, spun the samples, and sent the serum to a private laboratory in Asuncion to have the ELISA test done. I have attached the report of our work. It was an immense experience for me to have to design the study and be in charge of the research. It was challenging at times to determine the best methods of doing the work here, but it helped that everyone was very interested in the results. Numerous ranchers within the Coop agreed to let us take samples from their herds, and we were allowed to use all the ranches that the Coop owns.

Rodeo Trebol

The last week we were in the Chaco was during Rodeo Trebol, an expo for this region of the Chaco. We had the opportunity to do much more hands-on veterinary work at this expo than the large one in Asuncion. The first day of the expo I assisted in accepting and inspecting cattle for the finished cattle competition. Producers brought in 4 calves that were ready for slaughter that were the same breed and age. We weighed the groups and determined the total difference in weight of the 4 calves. After that I assisted a judge in determining the best groups. After this competition the calves were all sent to the local packing house to see how the carcasses ranked. The same groups that won the live competition did not win the carcass competition. The carcasses were

judged on percent of meat, rib eye area, and fat content. It was a learning experience to go into the packing house and listen while the veterinarians in charge of the judging explained about the carcasses. The crossbreeds that were the most impressive were the Nelore and Charolais. Their carcasses weighed 60% of their live weight. We assisted in all the judging at the expo and attended a couple night talks by SENACSA. The first lecture we listened to was on BSE and the second was on the Meat Market. Paraguay has 15 packing houses that are certified for exportation of meat and 70% of those are HACCP certified. Currently the only packing house that the EU is accepting exports from is the Fernheim Cooperative's packing house called Frigochaco.

I had a positive experience working in the Chaco and with ATF. They were very charitable and provided our lodging and food. The director also invited us into his home numerous times. He is very interested in sending a veterinarian from ATF to do a possible Masters degree at Kansas State.

Conclusions

SENACSA

The time I spent working with SENACSA helped me gain invaluable insight into the control of FMD. This field experience provided me with an understanding on what we would have to do in the United States if FMD were spread. A strong vaccination program works as long as the ranchers comply with the program. In order for the United States to be fully prepared for this threat, I think that a mandatory animal identification system should be put in place. This would provide the monitoring of cattle and a vaccination program for all public health disease threats. Currently Paraguay is free of FMD with vaccination, but I still concluded there were improvements that I would recommend. SENACSA has a very detailed paper system to track the movement of animals. That system could be improved by using the computer system more to monitor the animal movement and thus be able to connect all the check points to each other. The major problem with the system was the absence of check points in the northern part of Paraguay. Many ranchers could move animals without ever passing a check point station. I felt that in order for Paraguay to be fully prepared for any disease outbreak they also need to establish a mandatory animal identification system. For example in the packing house that we visited, someone was checking each animal's foot for signs of FMD, but what would be the response if a possible lesion were found. The calf most likely would not have had a tag or any type of identification to determine where the calf came from and what other animals were exposed. This is a very important issue with zoonotic diseases because it would be critical to be able to trace back the calf for possible human and animal exposure.

SENACSA has placed FMD as the number one priority which was extremely important but unfortunately at the expense of some zoonotic diseases. Brucellosis and tuberculosis programs are not monitored as closely and I felt the public was not educated about the public health dangers of these diseases. Another major public health concern was rabies. While working in the Chaco we had a call for a neurologic bull. The veterinarian felt that the number one rule-out was rabies but the owners chose not to euthanize. The veterinarian explained that ranchers never what to euthanize even when rabies are strongly suspected. Instead they work with it until the animal dies, and some even go on to eat the animal. Zoonotic diseases are very dangerous and it is extremely important that the Animal Health Organization spend time and resources educating the public on the health risks.

We were very blessed to be able to live with Dr. Marcos Medina and his family while working in Asuncion. He is a private practice veterinarian and the advisor to the Rural Association. He is a very knowledgeable veterinarian that is striving to improve Paraguay. As I had mentioned previously the Rural Association provides 80% of SENACSA's funding. Before the Rural Association stepped in to help with the FMD Vaccination Efforts less than 30% of cattle were being vaccinated and now it is over 90%. By living with him we learned a lot about the Rural Association, and the work he

does for them. He spends around 50% of his time being their advisor, and the other 50% of his work is consulting and reproduction work at ranches.

Our time working with SENACSA left me with the impression that they were somewhat disorganized and lacked motivation. The veterinarians that we worked with were very considerate, but they did not seem to realize everything we wanted to accomplish while working with them. They often ran very late and did not always carry through with their promises. Fortunately for us our final 5 weeks of our field experience with the help of Dr. Medina was set up to spend time working with the private veterinarian sector in the Chaco. Dr. Jugo Corrales, the President of SENACSA, wanted us to be taken care by SENACSA and was not happy to hear that we were going to work with private veterinarians. Unfortunately we brought the power struggle to ATF, and the director had to work with SENACSA. For a couple days during our second week at ATF Dr. Corrales required Dr. Norman Ramirez to travel to Filadelfia to follow us around and during our third week Dr. Victor Maldonado traveled to Filadelfia.

The past 12 weeks has been a remarkable experience for me. I had the opportunity to meet numerous outstanding individuals and make excellent contacts for my future. The overall goal was to learn about the job responsibilities and career pathways for veterinarians in public service and public health, and learn about the specific roles and responsibilities of these agencies. I have definitely accomplished this goal over the past 12 weeks.

Public Health Veterinarians and Politics

One of the major aspects of public health veterinarians that I gained a lot of insight into was the political aspect. All the politics that go into every decision that is made was very surprising and a little frustrating at times. My experience was unique because I was able to work with both the private and public sector veterinarians. I feel that I had the opportunity to work closely with both groups and see the struggles both have. The plan for my field experience was to work with SENACSA for the entire 12 weeks of my time here. The field experience did not work out exactly according to plan, but that is to be expected in a situation like this. But what was the most unexpected to me was that at times I felt we were the rope in a tug-of-war between the public and private sector.

It was a very good experience for me to see so many aspects of veterinary work. I had the opportunity to work with veterinarians involved in trade negotiations, disease eradication, public health promotion, animal inspection, animal health, government regulations, research, and politics. Part of the field experience is seeing how developing countries are working to improve their agriculture and eradicate diseases. We heard numerous times from different speakers the importance of the public and private sectors working together, but this experience for me was very genuine by seeing them actually struggling but in the end working together. I am very thankful for this opportunity to spend time in another country, and I know that I will benefit from this experience for the rest of my career.

Appendix

List of Abbreviations and Acronyms

ATF	Assistance Technia of Fernheim Cooperation in Filadelfia, Paraguay
FAO	Food and Agriculture Organization of the United Nations
FMD	Food-and-Mouth Disease
GIEFA	Inter-American Group for Foot and Mouth Disease Eradication
IICA	Inter-American Institute for Cooperation on Agriculture
OAS	Organization of American States
OIE	World Organization on Animal Health
PAHO	Pan-American Health Organization
PANAFTOSA	Pan-American Foot-and-Mouth Disease Center of the Pan-American Health Organization/World Health Organization
REDIEX	Red Investment and Export
RIMSA	Inter-American Meeting, at Ministerial Level, in Health and Agriculture (taken from the Spanish acronym for Reunión Interamericana, a Nivel Ministerial, en Salud y Agricultura)
SENACSA	National Service of Quality Animal Health of Paraguay
SIGOR	SENACSA computer system
SITRAP	Animal Identification System for Paraguay
WHO	World Health Organization

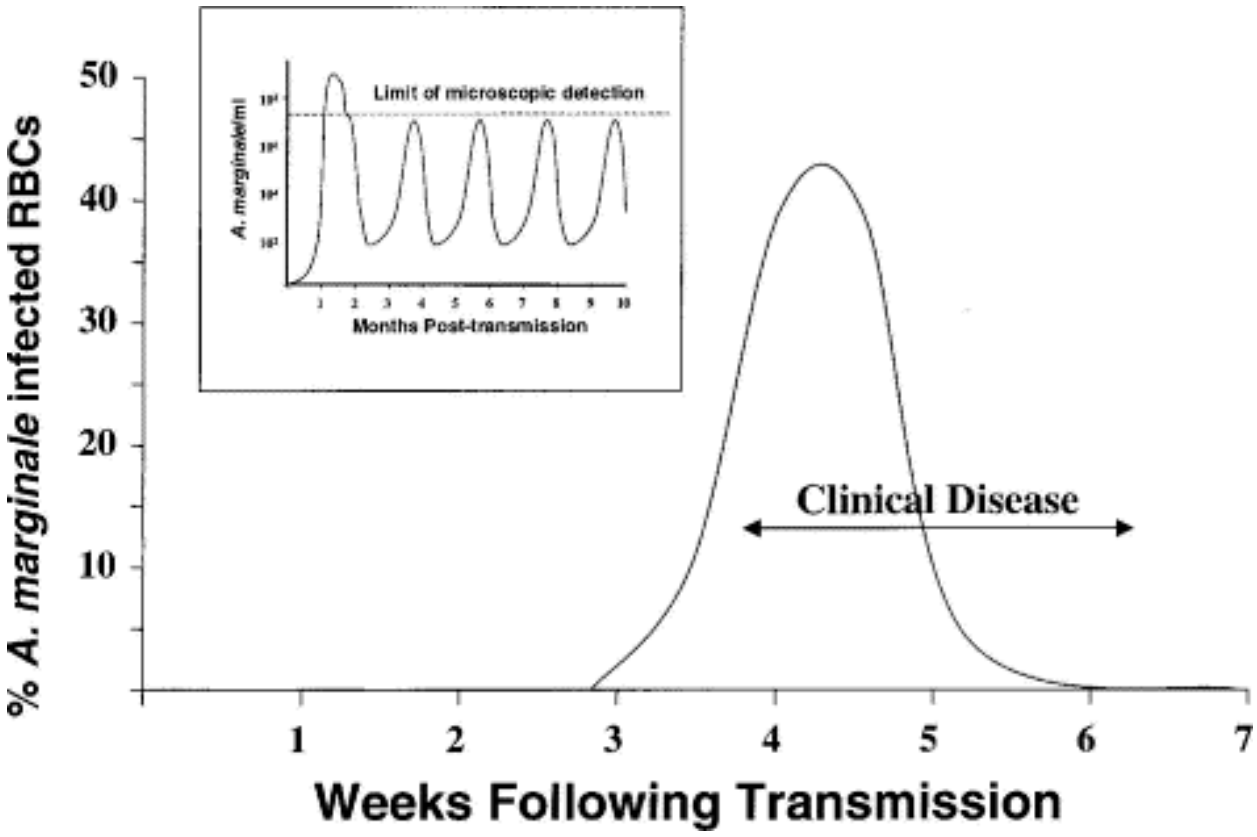
Research with Anaplasmosis Report

Anaplasma marginale serosurvey
Cooperativa Fernheim
August 26, 2008
Sara McReynolds and Joan Talbott

There is a growing concern over the presence of “tick fever” or tristeza in cattle herds in Cooperativa Fernheim. Tristeza is responsible for important economic losses due to mortality and decreases in meat and milk yield. Indirect losses also result from treatment of the disease and application of control measures

Tristeza describes three diseases, Anaplasmosis, Babesiosis and Piroplasmosis. All three of these diseases are caused by a microscopic organism called a piroplasm which attacks the red blood cells. These hemoparasites cause a marked anemia, a decrease in red blood cells, which can result in fever, depression, dehydration, difficulty breathing and animals going off feed. Infected animals exhibit these clinical signs during the acute phase of the disease. When they recover from the initial infection, they have not completely cleared the disease and are called carrier animals. Carrier animals can also result from in utero infection.

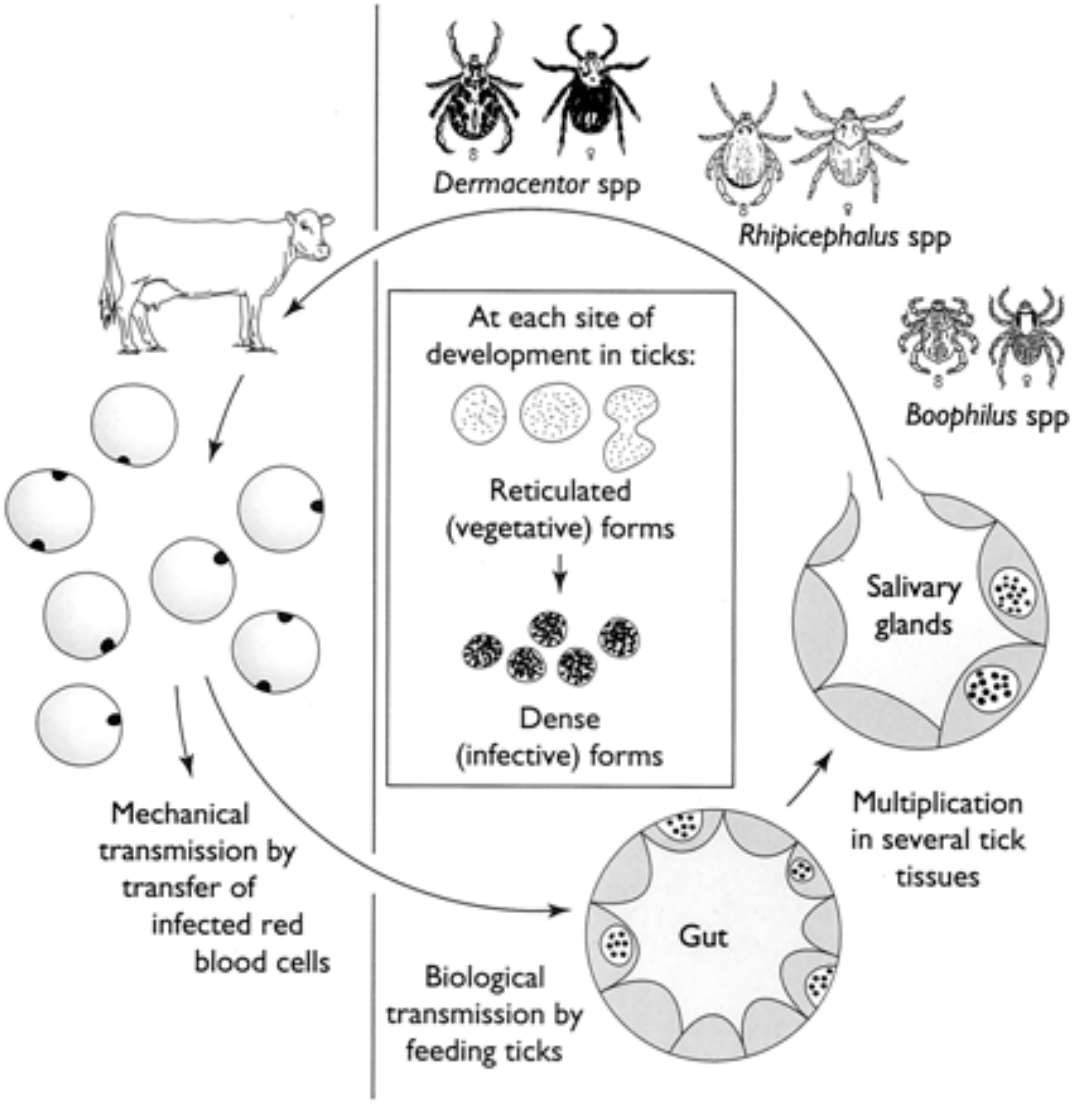
The table below shows the cyclic nature of the disease in carrier animals. As the number of infected red blood cells rises, so does the immune response of the animal. Usually the number of infected red blood cells is lower than the detection threshold by blood smear and complement fixation and can only reliably be detected by c-ELISA.



Hans Coetzee, BVSc, Cert CHP, MRCVS

Anaplasma marginale is spread between cattle by several different species of ticks. Between 27% and 50% of ticks biting carrier animals become infected and can then spread the disease. It can also be transmitted via fomites such as needles and tagging as well as by other insects such as biting flies.

Below is an illustration of the life cycle of *Anaplasma marginale*.



Kocan et al, Clin Micro Reviews, October 2003, p. 698-712, Vol. 16, No. 4

Two types of tests available to determine the presence of antibodies to Anaplasma marginale are the complement fixation test (previous standard) and the c-ELISA. Studies have shown that the c-ELISA test is much more sensitive than the complement fixation test. This means that the c-ELISA test is much more likely to detect antibodies in carrier animals.

The object of this study was to determine the prevalence of positive antibodies to of one these species, *Anaplasma marginale*, among cattle in several different herds, both beef and dairy, associated with Cooperativa Fernheim. Blood samples were drawn from the caudal tail vein. The blood was spun down, chilled, and the serum was sent to Prof. Dr. Antonio Rodriguez Sanchez at Centro de Diagnostico Veterinario for testing using the c-ELISA method. The results are in the following table.

Location	Number of Samples	Number Positive	Percent Positive
Estancia Aguila	45	45	100.00%
Chacra Experimental	33	33	100.00%
Dos Banderas	38	38	100.00%
Corrales	31	29	93.55%
Litchfelde	12	12	100.00%
LP 1 - Stahl	43	42	97.67%
LP - Lowen	28	20	71.43%
LP 2 - COOP	54	44	81.48%
LP 3 - COOP	43	41	95.35%
LP 4 - COOP	35	34	97.14%
Erwin Weins	26	26	100.00%
Konrad Reiger	9	9	100.00%
Campo I	50	48	96.00%

Conclusions

In six of the 13 herds studied, 100% of the animals tested positive for antibodies to Anaplasma marginale.

Some people believe that certain animals appear to have more resistance (ex. Brahman and Brahman crosses) while others appear to be more susceptible to these diseases (European breeds.) This study looked only at the antibody response of cattle to infection and based on this study, we found no evidence to support that Brahman cattle are less likely to have an antibody response to infection. Further studies should be done to determine whether or not Brahman and Brahman crosses show more, less, or the same clinical signs as European breeds.

The purpose of vaccination is to create an antibody response to the disease in question. In this case, almost all of the animals tested already have an antibody titer against *Anaplasma marginale*. Vaccination in this case is not recommended because the desired response of the vaccine is already present.

Because the majority of the animals in these herds have an antibody titer, it is likely that a naïve animal introduced into the herd would contract the disease and exhibit severe clinical signs.

Recommendations

New animals introduced into these herds should already have an antibody titer against Anaplasma marginale (either by vaccination or natural exposure.)

Clinically ill animals should continue to be treated with the current protocol. This includes the appropriate dose of a tetracycline such as terramycin, an NSAID such as

flunixin meglamine when a high fever is present, and other ancillary therapy such as vitamins when deemed necessary by the veterinarian.