



John Ogonowski and Doug Bereuter *Farmer to Farmer* Program Volunteer Trip Report Cover Sheet

Name of Volunteers: Maria Bendixen and Mark Kopecky _____

Country of Service: ___Nicaragua_____ Dates of Trip: _18-31 August 2009_____

Persons Assisted Directly ¹ (male):	117		Persons Trained ² (male):	43
Persons Assisted Directly (female):	29		Persons Trained (female):	6
Persons Assisted Directly (total):	146		Persons Trained (total):	49

Recommendations Made by the Volunteer:³

Please summarize the recommendations you made to the groups/organization(s) you assisted. Details of the recommendations should be included in the trip report – this is a summary table only.

Recommendation	Host
Improve communication among agricultural faculty, specialists, and technicians	UNA, Cooperatives
Improve communication from university researchers to cooperative technicians and farmers	UNA, Cooperatives
Institute soil and forage testing program for Boaco Department	UNA, Cooperatives
Expand the application of silvopasture, woody forage crops	UNA, cooperatives, individual farmers
Improve collaboration between individual farmers	Cooperatives, farmer
Improve milking procedures to ensure good udder health and high milk quality	Cooperatives, farmer UNA
Conduct research and demonstrations to instruct farmers on practical ways to conserve forage for the dry season	UNA, cooperatives
Institute milk quality record keeping system on farms	Cooperatives, farmer
Institute horse training clinics for cattlemen	UNA, cooperatives
Institute horse hoof care clinics for farriers and cattlemen	UNA, cooperatives
Improve pasture management through the use of controlled grazing	UNA, cooperatives, farmers
Monitor and measure dry matter intake by cattle of various forage spp.	UNA, cooperatives, farmers

¹ **Persons Directly Assisted** receive face-to-face or hands-on technical assistance, training or advice from the FTF volunteer.

² **Persons Trained** are the number of individuals to whom you have provided technical/instructional training in a more “formal” setting: classroom, workshop, institute/university or on-the-job setting)

³ **Recommendations Made by the Volunteer** indicates what recommendations were made to the host groups/organizations. The definition of “recommendation” is quite subjective, but might include an improved procedure, a technological or management innovation, a useful product or marketing tool, etc. Volunteers might make numerous detailed recommendations.

Improve the use of existing internet-based resources relating to tropical forage management	UNA, cooperatives
Identify existing research on the pH and soil fertility requirements for optimum growth of tropical forages	UNA

FINAL REPORT TO PARTNERS OF THE AMERICAS FARMER TO FARMER PROGRAM

Volunteers: Maria Bendixen and Mark Kopecky

Country: Nicaragua

Dates: 17-30 August 2009

Hosts: Universidad Nacional Agraria, Managua and Camoapa; Cooperative San Francisco de Asis and Cooperative Masiguito, Camoapa.

Primary Purpose: Improve the profitability of the dairy/cattle industry with a focus on forages and milk quality, and to improve the management of horses employed on livestock farms

Executive Summary:

The situation has been described very well in the reports prepared by Otto Wiegand (15 May-1 June 2009) and Anthony Jilek and Gerald Nolte (26 July-10 August 2009.) Briefly, the dairy and cattle business is a major part of the economy of Nicaragua, especially in the Department of Boaco. Production inefficiencies limit the productivity and profitability of the dairy sector. At the root of this is low quality forage production which limits milk production and causes poor growth, along with forcing some farmers to move their livestock to other areas during the dry season. There are also substantial barriers to producing good quality milk, including infrastructure problems like lack of cooling on farms, slow transportation to milk processing facilities, and limited testing and records on individual cow somatic cell count, and milk culturing. Production is inefficient by many standards. For example milk production per cow is about 3 liters per day in Nicaragua and 30 liters per day in the U.S. It is the belief of these two volunteers, and many others, that the most limiting factor in improving production efficiency is poor nutrition. Further, that poor nutrition starts with poor quality and quantity of forage.

Dairy producers use horses extensively to gather cattle for milking and for moving them from pasture to pasture. The hoof health of these horses was less than ideal and there were many lame horses. This was caused mostly by improper trimming and shoeing of the hooves as well as poor nutrition. The horses would benefit from improved forage quality as many were underweight.

For these basic reasons these volunteers are recommending management education in these areas:

- (A) rotational grazing of appropriate forage varieties, feed storage and harvest, and management of stored feed to reduce waste and spoilage;
- (B) educating producers about the effect of mastitis on milk quality, and providing management strategies to prevent and treat mastitis; and
- (C) educating horse owners on horse care and management focusing on hoof care and nutrition.

Background:

The assignment was to continue work on the action plan developed by Nolte and Jilek, with emphasis on grazing management, forage management (forage conservation and variety test plot establishment), and udder health and milk quality, with a secondary emphasis on equine care. Our objectives were to educate farmers, technicians, university professors, students, and cooperative staff in animal health, pasture management, soil quality, feed management, and horse training and hoof care. We were also asked to identify areas of focus for future farmer to farmer volunteers.

A secondary part of the assignment was to make presentations to the Animal Science and Agronomy students of the Universidad Nacional Agraria (UNA) on topics related to our assignment and topics of their choice related to our professional backgrounds.

Activities/ Results:

We worked in Managua on August 18 – 21 with students and faculty at UNA. We met with Bryan Mendieta who is researching a high quality forage from a tree called Moringa. Bryan showed us some of his Moringa plots, the dairy cattle and silage containers from his research, and his testing lab. While we were in Managua, we gave presentations to students and faculty at the UNA animal science campus on silage fermentation and preservation, physiological effects of mastitis, milking procedures, and equine hoof care.

On August 21, we travelled to San Jose de las Remates and presented our information on silage and milk quality to member of the Asociacion de Ganaderos Cerro Alegre. On August 24 -28 we worked in Camoapa. We met regularly with the personnel of the two cooperatives (Masaguito and San Francisco) and a number of faculty and students from UNA: Camoapa and Managua. We presented the same information to the people at the UNA campus there that we had at Managua, and conducted several horse training and hoof care workshops.

Using the report of Jilek and Nolte as a guide, we worked at laying out specific areas for forage research and demonstration plots on two farms. We worked with farmers, technicians, and students on the design, establishment and management of the plots so that they will be better prepared to plant them in their next planting season. This included discussions about species selection, soil fertility and liming, soil quality and herbicide use.

We worked on several farms looking at the milk quality in terms of California Mastitis testing and found that most cows have elevated somatic cell counts. We presented information about how mastitis occurs in the udder of a cow and how it can be prevented. We discussed the possibility that cows were being over milked because the calves were allowed to suckle after the cows had been milked. Several horse clinics were held that covered hoof care, disease management, and training.

Finally, we presented our information on grazing management and milk quality to the members of the Asociacion Camoapa Ganaderos their meeting in Camoapa on 28 August. Through formal presentations and on farm discussions, our objectives were to help interested groups learn new skills and techniques that will lead to the following:

- Improved forage quality
- Improved pasture management
- Increased use of forage conservation practices (silage and hay)
- Improved animal nutrition
- Improved animal health
- Improved soil quality and fertility

The professionals we worked with intend to establish five test plots for improved grass and legume varieties on area farms. These plots will be both grazed and harvested for winter feeding. The plots will be measured for yield, intake, and quality to establish a baseline for using these forages on other farms. The forages in the plots should also be monitored for palatability. The most productive and nutritious feed is useless if cattle and horses will not eat it. Existing research on tropical grass and legume forages and woody species best suited to forage production should be consulted to select the species with the best potential for the region.

Site preparation may be difficult in some areas because of steep terrain and rocky soils. If mechanical site prep is impractical, much of the work may need to be done by hand labor. Whether done mechanically or manually, site preparation may be aided by the careful use of herbicides. Glyphosate is available in the area, and this product could be used effectively to help control existing vegetation while introducing the improved species/varieties.

One area that needs to be looked at closely is soil fertility. We were not able to find any background information on the fertility of the soils in the region and there seems to be very limited potential for farmers (or researchers, for that matter) to get this information. We strongly encourage the University faculty to work closely with the cooperatives to begin a program of soil testing on some representative fincas in the area. The fertility and pH requirements of the various forages also needs to be considered in order to ascertain whether soil amendments are justified. Portable pH meters can be bought for a relatively low price and these should be employed by the researchers and technicians when helping farmers assess existing pastures and potential research and demonstration sites.

There should be existing information on the pH and soil fertility requirements for the optimum growth of the tropical forages suitable for this region, and this information is necessary for knowing what, if any, soil amendments will be beneficial for forage crops in the region. This information may be available from research that has already been done in Nicaragua or from other sources. If it is not available, the research needs to be done to determine what soil amendments these crops will respond to and whether it is profitable to use them.

Innovative farmers are already using a number of leguminous and non-leguminous woody species as forage crops. The use of both woody and herbaceous legumes especially needs to be encouraged. We noted several species of native herbaceous legumes in existing pastures. Some of these, such as Mimosa, do not seem to be useful as forages, but we noted a prostrate legume that may have potential. The native legumes that we examined all appeared to have functional nodules, and the effect of nitrogen fixation on the pasture swards is undoubtedly substantial. If introduced legumes are incorporated into the pasture systems, it will be important to inoculate them with the proper strains of Rhizobia bacteria (if not already present) to ensure that they will be effective at nitrogen fixation.

Agroforestry is another practice that is employed on some farms in the area. This is another area where much more can be done to improve the quality and quantity of forage available throughout the year. Silvopasture and cut-and carry forage harvesting systems with woody species has the potential to provide high quality feed that can be produced in a very sustainable manner. We encourage farmers to actively learn the characteristics of the woody species already present on their farms and to experiment with those that have proven value as forages. We encourage researchers to actively engage the technicians and farmers in establishing demonstrations on farms to show how the use of native and introduced species can be increased in the farming system of the region.

When the plots are harvested and stored for winter feed, the feed should be monitored for ease of storage i.e. how well it ensiles or makes hay. In order to determine this it will be necessary to test the quality of the feed. Feed should be tested for Crude Protein and Net Energy at the very least. These tests should be shared with farmers and used to create book values for feeds harvested at different maturities.

The understanding of controlled grazing systems has really improved in the region over the past eight years. Many farmers are still unsure of the utility of electric fencing, but this could be an excellent tool on many farms. We encourage the technicians to continue to work with farmers to help them understand where this technology can be applied appropriately.

Field days should be held to show other area farmers how the plots performed. This is critical to farmers adopting new techniques, because it extends the reach of the work to a wider audience. It might also be useful to print the results of the work and give it out with the milk payments that farmers receive from the cooperatives. By keeping the focus of farmer education on forage quality and nutrition, we believe that production can be improved more efficiently than by adding purchased feeds. In talking with farmers during our visit we found that purchased concentrates are not as economical as they are in our production system. We believe that nutrition is currently the most limiting factor in dairy/beef cattle productivity. Higher milk production from improving nutrition through forage quality will make for higher returns when improving other aspects like milk quality and animal health. Those higher returns will improve adoption rates for better management practices.

Storing feed for the summer months will greatly improve the nutrition of cattle over their lactations. That should create a more steady supply of milk and improve the efficiency of the dairy industry in Nicaragua. Milk prices are higher in the summer than they are in the winter so there should be an economic incentive to feed cattle better in the summer. The stored feed could also be used to improve the nutrition being provided to the horses on farms. There are already some farmers and researchers using silage as a forage conservation practice. We believe there is good potential for farmers to be able to use inexpensive, locally available materials to make drying racks and storage sheds for dry hay, as well.

Forage testing should become more available to producers. Because there will be a cost associated with testing the feed that will most likely be paid by the producers; the first step is having producers who see the value in knowing their feed quality. Without the ability to test forages ration balancing and even proper forage management will be severely reduced. There needs to be a monetary value put on every percentage point of protein and every mega cal of energy. These values could be taken from concentrates they could be purchasing.

It is also important to find out the typical dry matter intake for the crossbred cattle that are being used. We know that heat stress will greatly reduce dry matter intake in dairy cattle. Dry matter intake should be measured using pasture plating and scaling of stored feed. Even if the quality of the forage is improved the cows still need to eat enough of it to improve performance. This will establish a baseline for measuring palatability of feeds. Increased dry matter intake not only improves milk production but also improves rumen health and reduces the incidence of metabolic diseases.

Milk quality record keeping should be developed further so that disease patterns can be identified. Knowing when cows are getting mastitis whether it is at certain times in their lactation or during the year will help tremendously in managing the disease. Also keeping records on cure rates when cows are treated and not treated will help producers decide how to treat their future cases. This record keeping will require individual cow identification. The cooperatives could help by doing somatic cell count testing from each day or week milk from each farm and sending a report to the farmer about seasonal trends.

Horse hoof care clinics should be set up by the UNA campus or other interested and knowledgeable parties. The clinics should cover shoeing, hoof function, and thrush prevention. Nutrition for the horse should also be covered as many horses were under conditioned and general health and usefulness was suffering. Nutrition also plays a role in hoof health and function. It would be beneficial to establish a farrier school for people that are going to shoe horses.

Comments and Followup:

The dairy and livestock business in the Department of Boaco is improving steadily. We saw many instances of innovative and progressive practices on the farms we visited, but there is still a lot that needs to be done. Forage variety selection, pasture management, soil fertility, milking procedure, milk cooling and processing, and mastitis treatment are areas where we see much potential for improvement. Draft animal care and training is very important to the farmers in the area, and they may be able to benefit from improving some aspects of management in these areas.

In order for progress to continue, we feel it will be necessary for the cooperators from both countries to continue to methodically carry out the plan that was outlined by Jilek and Nolte in their report. Improved forage quality, forage plot research and demonstrations, forage conservation for the dry season, soil and forage testing, milk quality improvement, pasture management, increased use of agroforestry, and improved equine husbandry will all come about through sustained research, outreach, and demonstrations.

We see huge potential for improved communication at all levels: Within and between university departments and campuses, between the universities and cooperatives, and between the university, cooperatives, and livestock associations in the respective communities. This communication needs to be in two-way and at and between every level. We noted an intense spirit of competition between farmers, and we feel that a better approach is through increasing cooperation among the whole dairy and livestock industry in the area. To quote a familiar analogy, a rising tide will elevate all the ships together.

Photos

1. Example of horse hoof showing incorrect shoe fit



2. Maria Bendixen teaching a horse training class in Camoapa



3. Maria Bendixen teaching UNA students about physiological effects of mastitis on the bovine mammary gland



4. Mark Kopecky discussing forage plot layout considerations with farmers, technicians, and students near Camoapa

