

TRIP REPORT:
"IMPROVING GOAT HUSBANDRY AND
PRODUCTION IN RURAL ZAMBIA"

COMACO (Community Markets for Conservation), WCS
Luangwa Valley, Zambia
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...as a part of

- "Developing a Participatory Socio-Economic Model for Food Security, Improved Rural Livelihoods, Watershed Management, & Biodiversity Conservation in Southern Africa"

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Introduction

During the summer of 2007, I had the opportunity to participate in a project with COMACO (Community Markets for Conservation), through the Wildlife Conservation Society in Zambia. COMACO's main objectives are to boost local rural economies and biodiversity conservation by teaching and assisting with the development of sustainable agricultural practices. Participation is garnered partly through incentive programs that encourage the reduced and altered consumption of natural resources. This project aims to give local inhabitants of the Luangwa Valley region the tools to develop agricultural practices that will be sustainable gateways to self- and community empowerment. In the process, greater conservation of the rich biodiversity of the region will be ensured. Ensuring biodiversity conservation will also likely boost the tourism industries for these communities. My role in the project was to teach rural Zambians about goat husbandry: how to prevent, identify, and treat diseases common to these animals, which are kept in backyard farm operations.

The project I worked on was made possible through a larger proposal entitled "Developing a Participatory Socio-Economic Model for Food Security, Improved Rural Livelihoods, Watershed Management, & Biodiversity Conservation in Southern Africa." It is a collaborative effort between the Wildlife Conservation Society, Zambian stakeholders, and numerous faculty at Cornell University. The original conservation proposal was constructed by Drs. Alfonso Torres, Alex Travis, and Dale Lewis (of the Wildlife Conservation Society) and last year was funded by the US AID's Sustainable Agriculture and Natural Resource Management Collaborative Research Support Program (SANREM CRSP). As a pilot project, the WCS has established a program which is a community-owned enterprise known as "Community Markets for Conservation" (COMACO), in the Luangwa Valley of eastern Zambia. The Luangwa Valley is extremely rich in biodiversity, however many inhabitants of the region are plagued by poverty and food insecurity. This often drives people poaching as a means of supplementing their small incomes. In addition, the crops that give the fastest yield and return are often those that strip the soil of essential nutrients, forcing people of the region

to clear large areas of land each year to plant new crops. Through COMACO, households are taught sustainable farming practices (such as crop rotation and composting) in exchange for turning in their hunting snares and illegal guns. In addition, households are able to sell their goods at local and regional community-owned markets for higher profits. Thus, economic stability and food security are improved in the communities and biodiversity conservation is promoted simultaneously.

Cornell University faculty, Zambian stakeholders and WCS employees have and will be working in partnership to evaluate the effectiveness of the program, and whether it can be a model that can be transposed into other areas of Southern Africa. Biological, economic and social parameters have and will be assessed. Preliminary results from early 2006 show 60-80% of households showing an increase in food security. Lower numbers of snares found in wildlife poaching areas indicates that poaching efforts are decreasing. Reports have also shown less effort required to capture larger numbers of trophy animals, indirectly suggesting an increase in wildlife density. Anecdotally, during a fall trip to the Luangwe Valley, Zambian COMACO extension officers reported to Dr. Travis an estimated 50% increase in numbers of chickens that had survived into the fall as compared to the previous fall.

The following trip report has been organized mainly chronologically. At the end, find a brief summary of the main problems and concerns identified, estimated benchmarks for the goat production project, and recommendations for areas to focus on for future work.

Chronological Trip Report

I arrived in Lusaka June 7 and spent time starting to work on a manual for goat management. I set up a meeting with the Chief Veterinary Officer at the Ministry of Agriculture, Dr. Francis Mulenga.

Ishaka, then marketing director for Wildlife Conservation Society, took me to Chibolya Market and Rail Small Animal Market in Lusaka. These markets are the two major locations where goats are sold in Lusaka. We were told that June is not “big goat season” so there were not many animals, especially at Chibolya. Chibolya is an open air market with traders and individuals camped out, while Rail Small Animal Market is more of a formalized set-up, with stalls and a more centralized money handling system. Usually traders purchase goats from farmers and transport them live in flat-bed trucks. The trucks that I saw had removable covers which looked like tarps. I was told that the market for goats is rather healthy; usually traders and farmers do not have to spend more than one night there in order to sell all the goats they brought to market. Marketeers rent space at the market from which to sell their animals. At the markets I did not see any constant source of water for the animals, but we were told that they are occasionally brought water in pans. The goats looked in generally good condition. None of them looked very skinny or mangey; there were not many obvious signs of disease in the animals that we looked at. It should be noted that we mainly observed from afar. Goat breeds are not well-classified in Zambia, but most of the animals are East African Dwarf goats, or some variation thereof. There were a few that appeared to be a cross between the native breed and the South African Boer goat, a breed with double-muscling that is significantly larger than the native breed. We also went to several butchers (four in total), including Zambeef and a Halaal butcher. We were interested especially in seeing if the Halaal butcher sold goat, as goat meat is commonly eaten by Muslims.

Goat meat was not sold at any of the butchers, and yet the traders at the live animal markets indicated that they have not had problems selling goats. One possible reason for this is that the goat market in Lusaka is rather informal, meaning that people tend to buy

their goats at a live market and slaughter the animals themselves. Another point may be that for the small size of the goats in Zambia, and the relatively small amount of meat harvested from each animal, there is not enough of a profit for butchers to be motivated to purchase and process goat meat. Once the meat has been processed, frozen, etc., it may not be worth the cost of time and labor, and according to Dr. Harrison Chitambo of the University of Zambia, about 20-30% of the weight of the meat is lost once it is frozen. For butchers, larger goats may be more cost-effective for these reasons.

Some possible target markets may be the Muslim population (which is quite sizeable in Lusaka), and local drinking spots. Lusaka locals have told me that goat meat sandwiches are often served off the grill at some of the bars in town.

As for local marketing in Feira, farmers should be encouraged to sell their goats when they get the highest prices. For example, they should anticipate school fees and sell goats a couple of months in advance so as to avoid the price drop incurred when everyone is selling at the same time.

Here are some of the average prices we noted at the Lusaka markets. Note that no scale was available at the market, so all weights are estimates:

Largest goat, possible Boer-native cross (~100 lbs.) = K 250,000 (\$64)

Largest native type goat (~ 60 lbs.) = K 125,000 (\$32)

Smallest native type goat (~40 lbs.) = K 80,000 (\$20)

Skinny Boer cross = K 120,000 (\$30)

Note: Villagers receive about K 40,000 - K 60,000 (\$10-15) when selling to the middle men who bring the animals to market.

Here are some prices we found in city market for cuts. City market was the only place we found any goat meat, and even there it was limited:

3 lbs. cut (leg) = K 13,000 (\$3)

2 lbs. Loin = K 15,000 (\$4)

At Zambeef, just for comparison, these are some prices we found for beef:

“Prime cuts” beef = K 23,000/kg (\$6)

Ground beef (“steak”) = K 20,000/kg (\$5)

Alice Pell, director of Cornell International Institute for Food, Agriculture and Development (CIIFAD) arrived on the Friday of my second week. We met with Dr. Francis Mulenga, Chief Veterinary Officer at the Ministry of Agriculture. We discussed marketing and health issues. He told us that there is a large market for goat meat in Congo. In

Zambia there is already a system set up to accommodate this market at the northern border with Congo. However, it is not very well organized or formalized. Basically, middle men have a loose network set up to get goats to Ndola, in the Copperbelt. From there, they are moved to Chililabombwe where Congolese buyers cross the border to purchase live animals. Dr. Mulenga also told us that Kasumbalesa is another major marketing area for goats. Middle men can get up to K 400,000 (\$100) per goat in Kasumbalesa!

We also discussed health issues. He said that Foot and Mouth Disease (FMD) and Contagious Bovine Pleuropneumonia (CBPP) are the only two diseases that affect ruminants with state-sanctioned preventative measures. FMD has presently been identified in Southern province, and movement restrictions have been instituted to prevent further spread. FMD is the main disease with a wildlife reservoir (buffalo) of concern to goats. Goats do not suffer as high a morbidity or mortality rate from FMD as cattle, but FMD in goats is still a major concern, especially in mixed livestock populations. Goats may spread it to cattle or other animals without showing any signs themselves, and the disease has been known to cause major losses, especially in the cattle and swine industries. They have tried to put a fence around the area where buffalo FMD

has been identified to prevent the spread from wildlife to domestic species. This is a complicated issue, as the fencing may interfere with natural migratory habits of wildlife.

Other than FMD and CBPP, farmers must pay for vaccines and medications on their own. Dipping for ticks is not state-sanctioned but should be pursued and emphasized, as tick-borne diseases are serious problems for all livestock. There is currently no dip tank in all of Luangwa District. In the case of goats, heartwater disease (*Cowdria ruminantium*) is an especially important illness transmitted by ticks; according to sources at the Ministry of Agriculture, it is the #1 killer of goats in Zambia.

The management strategy for all transboundary animal disease (TADs), such as FMD, is fairly standard. It consists of movement restrictions, surveillance (active and passive, with samples taken by extension officers), and vaccinations (against FMD and CBPP only). All diseases, or suspicions of disease, should be reported immediately to the regional veterinary assistant, district veterinary officer or livestock officer. The report can then be relayed along the appropriate chain of command.

Dr. Mulenga mentioned Golden Valley Research Trust (GVRT) as a resource regarding sustainable development in Zambia (Dr. Mulyokela: 260-1-01214718, gart@zamnet.zm). He also suggests contacting Mr. Mubita (cell: 260-1-097-7-288172) to find out more information about goat dips, as he is in charge of one such facility in Choma.

Goats are an attractive option to many small farmers because they tend to be more “resistant” to disease than cattle. It is not that goats do not get diseases, they just seem to be able to tolerate disease better. Even tse tse fly transmitted trypanosomiasis does not tend to severely affect goats, while cattle producers often suffer significant losses from trypanosomiasis.

On June 17, Alice and I traveled to Feira. On the way there we met the District Agricultural Officer, Christopher Simotowe, at JICA. The next couple of days were spent making courtesy calls to chiefs as well as district officials. We met Trysson

Chunga (Council Secretary), the District Commissioner, and Chiefs Mburuma and Mphuka. We also met Amon Nyirenda, the recently (as of June 2007) appointed District Livestock Officer in Luangwa District. He seems eager to collaborate with COMACO and I think both sides (the district office and WCS) will benefit greatly from an ongoing partnership. We had a conversation with Mr. Nyirenda, Mr. Simotowe, and the veterinary assistant (Joseph Mwanza) about our project and the current state of livestock in the area. Mr. Simotowe thinks that just about every household in Luangwa District is keeping goats. Mburuma and Mphuka chiefdoms already have significant numbers of goats. Mpanshya, Shikabeta and Nyalugwe have formed COMACO goat producer groups, and have started constructing housing structures, but do not yet have goats in significant numbers. An official livestock census was completed in Luangwa District during the month of July, and the results should be analyzed and available soon. We also talked about COMACO's goal of introducing cross-bred Boer goats into the area. Mr. Simotowe recalled that within the past couple of years about 200 Boer goats (pure-breds) had been introduced from Western province into Luangwa District in Mburuma chiefdom. We followed up on the status of the Boer goats later in the week with the Agricultural Extension and Community Development officer who was involved in the distribution of the animals. He told us that all of the pure-bred Boer goats died within about nine months. He said many of them were having convulsions, collapsing and twitching a few hours to a couple of days before dying. Given these signs and the fact that there is no dip tank or major tick control efforts in the area, it is highly likely that the Boer goats died from heart water, which is endemic. Heartwater can present peracutely, acutely or subacutely. It is likely these new animals were coming down with the acute presentation and dying quickly. Native animals might come down with the sub acute presentation more commonly than acute. That could explain why the mortality rate is not as high with the native animals. This, of course, is speculation, as we did not have access to testing facilities or any of the affected Boer goats. We were told that the offspring of the Boer-native crosses were still doing well two years after introduction. Dystocias with the native does were observed, but according to the officer were not a major problem.

Other topics of discussion in the meeting with Mr. Simotowe and Mr. Nyirenda included

border control and livestock movement procedures and protocol. Since Feira is a border area with Mozambique and Zimbabwe, it has been difficult to regulate international livestock movement between the countries. Also, livestock services are not available at all in the area of Mozambique bordering Feira, and selling of Mozambican goats over the border in Zambia without going through any checkpoint is a problem. There are water transport officers from Zambia (which are the veterinary officers themselves) who patrol along the Zambezi River as an attempt at border control, but time, resources and personnel are limited. Mozambique does not have an equivalent service, and I do not think Zimbabwe does either. These factors could obviously have serious disease control implications.

As for the issue of livestock movement from Feira to Lusaka, Simotowe and Nyirenda told us that transporters must obtain a “stop movement order” from the police and get it approved by the livestock office. They must also pay a transport fee (amount not noted). Import papers can be obtained at agricultural headquarters (presumably at the Ministry of Agriculture in Lusaka).

During the remainder of the week, Alice and I continued working on the goat manual, created a goat survey for farmers, made up a timetable for my time in Feira (see attached), and wrote up a budget for implementing the training workshop that I would be facilitating. We decided that the best course of action would be to meet with some of the villagers to get a feel for what should be focused on in the training, and that I should train the 26 extension officers, depot managers and community trainers for two days. The two day training also included an afternoon on poultry management, as per villagers’ request. Then the trainers would go to their areas and train the farmers. This was the most efficient way to complete the training; about 5000 households in the region participate in COMACO projects.

Areas that we felt should be most stressed in the training included nutrition, kid-rearing, breeding management and parasite control. Alice suggested starting protein banks of trees and shrubs that have leaves with high protein content so that farmers can start to

supplement the animals' diets with high quality feed. The two main trees that should be focused on in accordance with the amount of rainfall in the region are *Sesbania sesban* and *Cajanus cajan* (pigeon peas). See goat manual for specific kid-rearing guidelines, but the main thing farmers should put more focus on is ensuring that kids are getting colostrums within the first few hours of life. As for breed improvement, we plan to introduce some Boer crosses into the area to improve the size and production of the animals. Hopefully, we can start with a relatively small number and work out a rotation scheme where the breeding bucks are being shared between production groups so as to reduce inbreeding. The requirements for farmers to receive improved bucks will be for them to have established protein banks, have constructed appropriate housing for their goats, and they also must agree to castrating or selling off their native males. In several meetings with villagers, they seemed to be amenable to these requirements. All remaining suggestions are included in the goat production manual.

On June 19, Alice Pell, Handsen Mseteka (Regional Coordinator WCS), Protazio Phiri (Extension Officer) and I met with villagers in Mphuka chiefdom. There were 17 women and 20 men present. Through the discussion, we learned the following:

- semi-intensive management is practiced with goats; animals are confined in night shelters raised off the ground and left free-range during the day; the animals are currently not receiving any supplements to grazing
- most does kid about 2-3 times per year
- about 1 out of every 3-5 kids survive to weaning; this means there is a 20-33% kid survival rate which is extremely low (can be as high as 90% survival with good management); increasing kid survival will be a major focus and incentive in efforts to improve goat management
- the most common times for kids to die are: immediately after birth, 2-3 weeks of age, and at a few months of age
- major problems and health issues (health issues judged by descriptions of signs):
 - predation (hyenas may even grab goats out of raised shelters)

- goat theft
- major health issues are parasites (mange was specifically mentioned), diarrhea, sore mouth, caseous lymphadenitis, heartwater, tetanus and/or blackleg
- the most common time to sell goats is during the months of November – January
- villagers are getting K 40,000-50,000 from traders for their goats and they do not think these are fair prices

The next week we went back to Lusaka. I got the goat manuals published and obtained supplies for the training. We also met with Dr. Harrison Chitambo on June 27. He is a Zambian veterinarian and holds a PhD in parasitology. His specialization and main interest is in small ruminants, and he has done recent research in goat marketing in Zambia, as well as breed classification and improvement. He is an expert in trypanosomiasis in Zambian domestic ruminants. We discussed health, management and marketing issues. He told us that Boer goats can be kept in Zambia, but only with very good management, and it is not a feasible option in areas where veterinary care is limited. He said that *Haemonchus contortus*, or the “barber pole worm,” is a major limiting factor in rearing goats in Zambia, and it especially affects the Boer goats by causing severe blood loss and anemia. According to him, there are some cross breeds in Chitope. He is in the process of producing some pamphlets about goat cross breeding; it might be useful to follow up with him on this. As for managing improved bucks, he thinks that group work should be encouraged, and that bucks should be rotated between villages or producer groups, which is in line with the ideas we already had about buck management. The ¼ Boer crosses are especially hardy. Some other issues we discussed included:

- recommended castration method for small, low-income farmers is by using elastic bands (or “elastrators”)
- recommended method for goat identification is ear notching; tags may be cost-limiting and spray painting or other paint on the horns usually does not last; branding is done but is not usually the best option for multiple reasons (availability of branding tool, risk of infection, welfare concern)
- measuring goats to monitor whether breed improvement efforts are working; he has developed a “physical size index formula” in a paper that he is trying

to publish in order to identify some size standards and parameters for the different “sub-breeds” of goats in Zambia

- farmers need to be trained or at least sensitized to improving marketing strategies and business skills
- tick borne diseases: Heartwater disease is the major goat killer in Zambia; East Coast Fever more severely affects cattle and is not a major problem in goat populations
- Marketing
 - Currently goat marketing is haphazard in Zambia
 - The marketing chain (farmer → village trader → Lusaka markets)
 - According to Dr. Chitambo’s studies, people want and do consume goat, but often don’t know where to find it
 - There is a Halaal market for goat meat
 - Dr. Chitambo wrote the proposal for Chibolya liaison committee for small ruminants; the committee includes public health officials, police, a veterinarian, and university departments and was partly sponsored by the Belgian government
 - In Kasumbalesa, the Small Livestock Traders’ Association of Zambia (which Dr. Chitambo helped initiate) is planning on opening up another goat market
 - Farmers are getting about 30% or less of the value of the goat at market (middle man gets the biggest share)
 - Turnover for sale of goats is high
 - Goat market is and/or can be booming right now with the current state of cattle (re: CBPP outbreaks, FMD, etc.; even if not major problems, consumer concern regarding these diseases puts pressure on the market)
- Parasite control (some low cost methods, also included in goat manual):
 - Crushed papaya seeds can be given for internal parasites
 - Engine oil with tobacco leaves can be rubbed on the animals to treat and prevent mange and other external parasites
 - Demodectic mange is the most common form of mange in goats
 - Dipping is recommended

In Lusaka, we also met with Dr. Barnabas Chitalu, Project Coordinator for Heifer Project International in Zambia, on June 27. Heifer Project is currently operating projects in Southern, Lusaka, Copperbelt, Eastern and Central provinces. The projects include dairy and draft cattle, meat and dairy goats and bee-keeping. It is important to note that Heifer Project spends 6 months training beneficiaries in livestock husbandry and related issues before the groups even receive any animal. Also, they focus on women groups because they tend to have a much higher success rate than when the animals are given to men, and

the entire household of anyone who is to receive an animal must attend the 6 month training. The point is that the process of introducing livestock cannot be rushed if it is to be done right. Heifer Project also requires that Animal Health Committees are put in place by the farmers themselves. They must pay for their own medications, dewormers and other supplies. In many cases they must prove that they have a plan that will generate income to purchase the animal health supplies before they receive an animal. As for the contract that beneficiaries must agree to and sign, it consists of the following requirements:

- 1) household must attend training
- 2) passing on the “gift;” first born female must be given to someone else in the group (this can be a problem if you have 20 people in the group; sometimes 5-7 years later the last woman has not received an animal, and by that time, the “improved” animal highly resembles the native breed)
- 3) animal belongs to the family (can’t be inherited)
- 4) husband AND wife sign the contract
- 5) animals will be withdrawn if households do not meet stipulations

Heifer Project also has a memorandum of understanding with the Ministry of Agriculture, which supports the sustainability of the project. They also use the local university to help with some of the data analysis. We received training documents and other material from Heifer Project. I can provide materials or more information upon request.

The training workshop occurred on July 5-6 when I returned to Feira. See attached Lesson Plan, and “Goat Management and Health” manual for details on what was covered during the training. Everything in the manual was covered during the training. Attendance was as follows:

| Name | Title | Chiefdom |
|-----------------------|-------------------|--------------------------|
| | | |
| 1. Lloyd Mambwe | Depot Manager | Shikabeta |
| 2. Elias Mwanza | Community Trainer | Mburuma |
| 3. Levison Chisulo | Community Trainer | Shikabeta |
| 4. Kelvin Daka | Depot Manager | Mburuma |
| 5. Juliet Chidambele | Depot Manager | Mphuka |
| 6. Protazio Phiri | Extension Officer | Shikabeta and Nyalugwe |
| 7. Kelvin Kaala | Community Trainer | Mphuka |
| 8. Hamusonde Kelvin | Extension Officer | Mphuka and Mburuma |
| 9. Geoffrey Mwanza | Community Trainer | |
| 10. Mark Chipayeni | Community Trainer | Shikabeta |
| 11. Robson Tembo | Community Trainer | Mburuma |
| 12. Watson Tembo | Community Trainer | Mphuka |
| 13. Innocent Tembo | Extension Officer | Mphanshya and Bundabunda |
| 14. Moffat Tembo | Community Trainer | Mburuma |
| 15. Moses Tembo | Community Trainer | Nyalugwe |
| 16. Modester M. Phiri | Community Trainer | Mburuma |
| 17. Evans Ngulube | Community Trainer | Mphuka |
| 18. Peter Chuba | Community Trainer | Mphanshya |
| 19. Edward Khondowe | Depot Manager | Nyalugwe |
| 20. Edward Lungu | Community Trainer | Mphanshya |
| 21. Tembo Chrispine | Depot Manager | Mburuma |
| 22. Josphat Kamalembe | Community Trainer | Mburuma |

(The attendance logs for the villager training sessions have been included separately. Please note that these logs are not representative of every training session. There were several sessions going on in different areas on the same day, so Handsen and I attended just a small and random selection of the sessions.)

For the remainder of my time in Feira (about three weeks), Handsen and I visited the goat training sessions being conducted by trained COMACO staff. During that time, I noticed that many of the trainers could use some more direction in how to train, in general. So I created a supplement to the goat production manual entitled “Tips for Leading Training Sessions in Goat Management Health” (see attached). It includes a suggested training schedule, objectives for each section, and questions for assessment.

Benchmarks for Project Development

In discussions with Handsen and Dale at the end of my trip, we talked about what is next for the goat production project. An estimated time table for the near future includes:

- by October 2007, villager training in goat production should be completed (one session per week for ten sessions starting in mid-July)
- by November 2007, the protein bank tree nurseries should be ready for transplantation (if seeds are obtained by September)
- by January-February 2008, improved bucks can be introduced; Heifer Project International has offered to allow COMACO to purchase a few starters for K 100,000- 150,000; they receive many of their Boer crosses from South Africa and Zimbabwe
- the goat production survey needs to be completed and analyzed for baseline data before improved bucks are introduced (copy of survey attached separately)

The following are recommendations for future work on the goat production project:

1. Getting a student from the University of Zambia to start working specifically on the breeding management portion of the project would be a good idea.

Possibly a Cornell student could continue working, preferably with the Zambian student, next summer. Some considerations/issues that need to be more thoroughly pursued are:

- a) What is a reasonable number of new animals to start with and how many households or villages will be included in the initial distribution?
- b) How will the improved bucks be shared or rotated between producer groups?
- c) Should a breeding center be at the center of the breeding management aspect? One concern is that by bringing in improved bucks and breeding them to native animals, then having their offspring breed to more native animals, we would end up with essentially the same breed we started with after a few generations. This is a concern that needs to be addressed before improved animals are introduced.

2. More market analysis needs to be done; many questions still need to be answered regarding marketing. Some of these are:

- a) Would a slaughter facility in Feira be a feasible idea? This would require the use of a refrigerated truck and training villagers on slaughter techniques. If not, how will animals be transported to their final destination and how can we ensure getting fair prices for goats for farmers?
- b) Will butchers, restaurants or any continuous purchaser in Lusaka be interested in buying COMACO goats?
- c) What will set COMACO goats apart from others? What's the niche?
- d) How can goat production be linked more directly to efforts and distribution at the Community Trading Center (CTC)?

Dr. Chitambo was kind enough to provide a copy of a goat marketing report he published. It is attached.

3. More definitive links between the goat production project and the conservation aspect of COMACO need to be examined. It is quite evident that the individual effect on increasing the food security of individual households is significant, but how can we connect this project to the larger framework? For example, Dale suggested trying to get documented evidence of people that have previously been fishermen in the Zambezi (which is over harvested) turning to goat production. This could prove to be a challenge, as a much more significant time and resource investment is incurred in raising goats as compared to fishing. What will the incentive for fishermen be? This is just one example of a way that goat production could be linked more directly with conservation.

Here is a wish list for the project. It would be a good idea to look for funding sources or grant possibilities here in the States for some of these items:

- 1) dip tank for ectoparasite control for Luangwa District
- 2) seeds to start protein bank nurseries (can be obtained at ICRAF in Chipata, Zambia, or in Lilongwe, Malawi)
- 3) copies of “Where There is No Vet” for extension officers; maybe the publishers could give a discount for a bulk purchase and fundraisers at Cornell could be done to provide for these extremely useful books
- 4) Boer cross-breeds - some can be obtained from Heifer Project but I don’t think they have large numbers to sell; an additional source may need to be identified

Finally, in a meeting I had with Amon Nyirenda, Livestock Officer, at the end of my stay in Feira, we discussed the necessity of developing a quantitative work plan for the COMACO goat production project. Mr. Nyirenda and Mr. Mseteka were planning on developing this plan soon after my departure. The type of guidelines in the work plan will be along the lines of how many goat shelters should be built by what time, how many new animals should be introduced and by what time, and other quantitative benchmarks for the development of the project.

Once some more preliminary analysis has been made, such as more extensive market

analysis and the analysis of the data from the goat production surveys, I think it will bring some more clarity as to just how much goat production will contribute to the COMACO framework. It seems quite evident that the project will contribute to household food security and stability. And there are also many links between goat production and the other COMACO projects: the manure can be used to fertilize crops and fish ponds, the leaves from the protein banks also make excellent fertilizer, and the by-products from many of the crops can be used as supplemental feed for the goats. From the preliminary analyses and conversations that occurred during my time in Zambia, it seems evident to me that this project has significant potential to make a valuable contribution to the COMACO model.