

**“You worked *where* this summer?!”**

**A brief summary of my experiences working at the International Livestock**

**Research Institute in Nairobi, Kenya: June-August 2000**

*An internship sponsored by:*

The Iowa Council for International Understanding

The World Food Prize Foundation

Grinnell College Environmental Studies Grant Program

The International Livestock Research Institute

**Em Westergaard**

**World Food Prize Youth Institute participant**

**1994 & 1997**

*“The livestock revolution, driven by consumers,  
is inevitable, but its effects—for good or ill—on  
smallholders and the environment  
will depend to a large extent on the work of researchers.”*

--Synergies in Science:  
Intercenter Collaboration to Eradicate Hunger and Poverty  
(2000)

## **Forward**

The following is a highly un-technical and moderately subjective account of my summer from a professional perspective. In no way am I claiming that the contents of this paper adequately address all the incredible topics I discovered over the course of my two month internship. Nor does it even begin to address the profound ways in which this internship effected me personally. It doesn't introduce all the amazing people I met and worked with along the way and it doesn't even cover all of the projects I worked on. After all, how can one put into words and upon paper such an incredible experience?

## **Introduction**

In September of 1994, I met John Crystal in the basement of Westminster Presbyterian Church. Earlier in the year, I had been asked to prepare a paper on sustainability and food security for the first annual World Food Prize Youth Institute. Knowing virtually nothing about agriculture, I interviewed Mr. Crystal in an attempt to learn more about the problems facing it, both in Iowa and around the world. I cannot recall exactly what was said on that Saturday morning in the basement of Westminster, only that the conversation started a chain of events that would eventually lead me to the office I sit in as I write this, in the middle of Kenya.

Mr. Crystal fascinated me with his conversations of international agriculture and his experiences around the world. When I later that year attended the World Food Prize ceremonies and the Youth Institute—then just a small gathering of about 20 high school students—I was amazed at the attention given to agriculture. Having grown up in Des Moines, only occasionally visiting my relatives' farms in rural Iowa, I thought of agriculture as something distant and not too terribly important. But through the Youth Institute and my conversations with John Crystal, I began to understand just how ubiquitous agriculture is in the world today.

Those ideas lay dormant in me for three years, until, as a senior in high school, my advisor during the first Youth Institute asked me to prepare another paper, this time regarding Sub-Saharan Africa and food security, for the fourth annual Youth Institute. By this time, the Youth Institute had grown significantly, including dozens of high school students from across Iowa. Once again, I started thinking of all the ways agriculture permeates society and of food security and its importance in the future and yet I still relegated these thoughts to the back of my mind once the Youth Institute was finished.

Later that year, another teacher of mine informed me of an essay contest on sustainable development sponsored by the American Society of Civil Engineering.

Knowing my past participation in the World Food Prize, he suggested I enter. Having a multitude of incredibly incoherent ideas regarding sustainability, I submitted a paper, written in the pre-dawn hours on the postmark deadline. Imagine my surprise when, in November, I received a letter congratulating me on winning the high school essay contest and inviting me to present my paper at the International Civil Engineering Conference, in Manila, Philippines. At the conference, I listened to discussions on environmental development, sustainability, natural resource management and conservation. It was at that point in my education that I realized that I had developed more than a passing interest in the subject of sustainability and the environment. This was something that I wanted to learn more about.

In the fall of 1998 I entered Grinnell College—which John Crystal spoke so highly of four years ago—as an intended biology major. I wanted to learn more about Environmental Studies and ecosystems, tying together sustainability and conservation. However, I found that I wasn't satisfied with studying only the biological aspects of these issues. I found myself becoming more and more interested in the economic implications of environmental studies and also in Global Development Studies, which looks at the broader area of international development, including environmental sustainability. Unfortunately, Grinnell does not offer a major incorporating all the components I was interested in, so I decided to try and create my own major. After months of planning and organizing, in June of 2000, I received my notice that I was officially an Independent Major in International Development. The major combines biology, economics, environmental studies and global development studies, and will hopefully give me the opportunity to study more in depth the issues that first interested me so many years ago, talking with John Crystal.

How did I end up in Kenya? In January of 2000, as I was planning my independent major, I realized that I needed an internship to count towards my graduation requirements. I remembered talking with another student at Grinnell who was a

participant with me during the Youth Institute in 1998 and hearing about how she had done an internship through the WFP. Having no other information than what I had received from Amanda a year ago, I called up the WFP Foundation and inquired. Almost five months later, I found myself stepping off of a 747 jet into the night in the middle of Africa. I had been given an internship at the International Livestock Research Institute (ILRI) based in Nairobi, Kenya. The International Livestock Research Institute is a fairly young institution, created in January of 1995 out of the merger between two CGIAR sites: the International Laboratory for Research in Animal Disease (ILRAD), based in Nairobi, and the International Livestock Centre for Africa (ILCA), based in Addis Ababa, Ethiopia. It is a member of the Consultative Group on International Agricultural Research (CGIAR) and works with many other research institutes in Kenya and around the world to improve the lives of poor people through improving livestock production.

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### **The Problem**

By the year 2020, Africa's population will increase by 2.5 billion people (ILRI, 2000). This enormous swell in the population will severely strain the continent, as food production falls further and further behind demand. To add to the problem of food security in Africa, income is also expected to rise in the next 20 years, and because livestock products are normal goods--meaning that as income increases, demand for the products will increase--individuals will consume more livestock products than they do now (Staal et al, 2000; Mankiw, 2001). This, coupled with the increasing population, indicates that demand for livestock products--including milk and meat--will more than double by the year 2020 (Mohammed-Saleem, 1995; ILRI, 2000). How will Africa be able to supply the food needed?

Even in the past two decades, food production in Africa has not been able to keep up with increasing population (Logan-Henfrey, 1992). If food supply is to meet demand in the future, livestock production must increase. However, land is already becoming scarce and it is clear that current methods of agricultural production cannot accommodate the anticipated upsurge in demand for livestock products.

To complicate things even more, livestock production efficiency in the developing world (including sub-Saharan Africa) is one-fourth that of the developed regions (ILRI, 2000).

Goals of food security and standard-of-living increases will not be met by simply adjusting policy or by enacting emergency aid programs. Research must be done to find new ways of increasing production and production efficiency in developing countries. ILRI is involved in this effort.

Research at ILRI deals with a plethora of topics, including livestock health and nutrition, smallholder dairy markets, public health issues caused by livestock products, farm intensification, crop and livestock systems management and genetically-modified organisms. ILRI's long-term goals include:

- improving the productivity of crop-livestock farming systems
- conserving the natural resources that sustain crop-livestock farming

While at ILRI, I worked with the Market-oriented Smallholder Dairy Project, one of the major areas of research at ILRI. This project was concerned with dairy markets in Kenya, how and why they fail and what can be done to correct these failures. I also worked with a collaborative project between ILRI, the International Centre for Research in Agroforestry (ICRAF), the Kenya Agricultural Research Institute (KARI) and the Ministry of Agriculture (MoA). This project, the System-wide Livestock Program dealt with the effects of farming systems and livestock on soil fertility. Finally, I prepared a research paper for my college discussing the cattle disease trypanosomosis.

## **The Kenyan Dairy System**

Dairy farming in Kenya is performed predominately by smallholder farmers, contributing approximately 56% of all milk produced and 70% of the marketed milk in Kenya. The average farm has between two and three cows, most of these being dairy cattle (80%), although some are indigenous breeds (Omore et al, 1999). From these small farms, the portions of milk not being consumed on-farm are sold, most likely through the informal “hawker” market. These hawkers buy raw milk from farmers and sell it (still raw) to others, usually in urban areas. Farmers may also sell to local dairy co-operations that may or may not process the milk. Sub-projects of the MOSD look at how the infrastructure and dairy production technology can be improved to support market growth, ways of improving livestock health and nutrition, and processes of agricultural intensification and how they impact the dairy market.

Infrastructure is one of the most important characteristics of the dairy market. Before 1992, the dairy sector was regulated by the government, however when the market was liberalized in ‘92 and the market came under more intense supply and demand pressures, prices fell and the infrastructure began collapsing (Omore, 1992).

Due to government changes and privatization of most of the country’s services, including road maintenance, water allocation, electricity generation and welfare services are virtually non-existent. This lack of basic services has made rebuilding the dairy market even more difficult. Services like insemination, veterinary care and even adequate feed for livestock are difficult to procure and prices of milk are unsteady (Omore, 1999).

One of the factors leading to the dairy market’s instability is the lack of adequate roads which allow the farmers and hawkers access to the buyers and sellers. Whether a farmer can get his milk to the market is highly dependent upon the condition of the roads between his farm and the market. Geographers at ILRI are working to create accurate and updated roadmaps for various markets in Kenya to begin to understand where milk is going and coming from and how easily it can traverse the market. A major constraint to



this is the lack of road maps available for most of Kenya, therefore one of the projects MOSD is working on is the construction of updated road mapping and classification. The geographer I worked with over the summer responsible for this project was Tineke de Wolff.

One faces many problems when attempting to revamp the road maps of an entire country, the first one being: what is a road? Kenya has many different types of “roads”, ranging from tarmac (paved) roads to mud roads. Often, the roads are classified as: paved, unpaved but all-season roads, and unpaved seasonal roads. However, I found that these definitions change depending on who you’re talking with. For example, while working with de Wolff in western Kenya, we took one such road from one village to another while it was raining. While I would definitely classify this particular road as a seasonal road--because it took hours to navigate it while raining and was complete mud--another person we talked with classified this as an all-season road.

Another problem involves finding out where all the roads are. While it would be most accurate to drive around the country marking all the roads, this is highly inefficient and resource-consuming. de Wolff started by speaking with the roads departments in all of the districts, but found that often, these departments only record classified roads and do not include any unclassified roads. She also found that even these departments did not always have the most updated maps. One strategy de Wolff used to compensate for this was to survey the various tea factories in the area. These factories are dependent upon deliveries of tea leaves from farmers in the area and thus keep track of the location and condition of the roads, and also work to maintain some of these roads, to ensure that they maintain their supply of tea leaves.

I accompanied de Wolff on two of her trips to Western Kenya and the Embu/Meru district in central Kenya (near Mt. Kenya). This was a fascinating experience because it allowed me to see many parts of Kenya which I would not otherwise have seen, and also because I was able to interact with many of the Kenyans working with the

roads departments, the tea factories and various other governmental and non-governmental agencies.

### **System-wide Livestock Program**

The System-wide Livestock Program (SLP) looks at declining fertility in the Kenyan highlands and how livestock impact soil fertility.

Declining soil fertility is a major problem in the Kenyan highlands and is jeopardizing the future of smallholder farming and food security in East Africa. As population densities increase and land continues to be subdivided with each generation, the land available to a household is diminishing rapidly (Lekasi et al, 1998). Intensification<sup>1</sup> of the land is required to feed the growing population, but with potentially disastrous consequences for the land. People are more often farming land not suitable for farming, and the traditional practice of observing fallow systems<sup>2</sup> is almost completely gone (ILRI, 1999). Erosion is increasing while soil fertility is declining. When this happens, crop yields fall and Africa falls further and further behind in its effort to feed its bulging population.

In parts of the East African Highlands, population density is as high as 1000 persons/km<sup>2</sup> (2200 persons/mile<sup>2</sup>), and the average farm size is often not more than one hectare per household (Lekasi et al, 1998). Land must be intensively cropped in an attempt to meet the increasing demands for food. Because farms are most often also financially constrained, the farmers try to get as much out of the land in the form of crops and livestock without putting anything back. Because of the high price of inorganic fertilizers, most cannot afford to apply the ample amounts of nutrients needed to sustain crop yields and soil fertility (ILRI, 1999). This trend of intensive agriculture is putting

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<sup>1</sup>Intensification refers to the agricultural practice in which farming is concentrated and intensified due to diminishing farm sizes.

<sup>2</sup>A fallow system is the practice of rotating cultivated land to allow the soil to regain nutrients, and thus fertility.

enormous pressure on the land and leading to severe and often irreversible environmental degradation (SLP, 1999).

The Consultative Group on International Agricultural Research has created a program to study the causes of soil fertility depletion. The CGIAR has centers around the world and the SLP is a joint effort of many of these centers. SLP has many different components and research areas, one of which looks at the productivity and sustainability of crop-livestock systems. This project, a joint effort between ILRI, ICRAF, KARI and MoA is currently researching the role of livestock in soil fertility.

The continuous cropping and intensive farming in the Kenyan highlands has no doubt led to decreased soil fertility and most agree that nutrient balances on these intensive farms are negative. What SLP is studying is whether livestock on a farm can slow the nutrient depletion.

Livestock are an important part of the smallholder farming of the Kenyan highlands, because they are able to convert inedible products like crop residues and grasses into nutritious products like milk and meat. More importantly to soil fertility, livestock can also provide organic fertilizer to the farmer that often cannot afford inorganic fertilizer (ILRI, 1999). The crop residues that it feeds off of could be used as organic fertilizer, but it would take months for them to decompose and release their nutrients for the crops to use. Ruminants can make this nutrient turnover happen much more quickly because the rumen bacteria can easily break down the crop residues and release them in the form of manure (ILRI, 1999). This aspect of livestock usage is most important to the study of soil fertility. Between 80-95% of the nitrogen (N) and phosphorus (P) consumed by livestock is excreted. If this is used on crops, it can significantly increase the amount of nutrients in the soil, even though overall nutrient content may be declining (Lesaki et al, 1998). Livestock can also serve as a vehicle for importing nutrients. Because intensification has required that farmland be used more for

mixed crops and less for animal feed, many farmers now buy fodder for their animals. SLP intends to look at just how much livestock effect soil fertility.

My role in SLP was to help analyze data collected in preliminary surveys in the Embu district in central Kenya. 263 households were surveyed to obtain baseline information on farming systems and the presence of livestock in the area.. I spent much of the summer cleaning up the database, standardizing the responses and reviewing the answers for accuracy. Although this may seem like incredibly mundane work, I actually found it fascinating to look at the original surveys and to have a chance to look at all the data in it's original form. I learned a great deal about the Kenyan agricultural system and the social structure of agricultural households simply by pouring over the data for a few weeks. This project also required an extensive literature search that I learned much from.

### **Trypanosomosis**

The final project which I worked on involved the cattle disease trypanosomosis. One of the major constraints to improving cattle productivity in sub-Saharan Africa is a disease called trypanosomosis. Trypanosomosis presents many problems for Africa, and much research is being done to find new treatments, cures and prevention's.

Generally considered the most important cattle disease affecting sub-Saharan Africa (SSA), trypanosomosis is caused by the trypanosome parasite, which is transmitted by a number of different species of the tsetse fly (all genera *Glossina*). More commonly known to cause sleeping sickness in humans, trypanosomosis also affects cattle, camel, horses, sheep, goats and pigs. It has been present in Africa for centuries, and references to livestock and human sickness from it can be found in many folk tales of indigenous people.

Researchers at ILRI have found that some cattle in West Africa are resistant to trypanosomosis and they are now attempting to determine the causes of this trypanotolerance. Many believe that if the genetic factors responsible for

trypanotolerance can be found, a vaccine can be developed to treat trypanosusceptible cattle. Researchers are doing this using genetic mapping techniques and comparative mapping.

This project was very engaging because it gave me the chance to look at some of the actual research going on involving genetics, epidemiology and immunology<sup>3</sup>. As a student interesting in biology, it was very reassuring to know that people actually do interesting and meaningful research in the real world.

## **Implications**

What did all of this research mean? There were times throughout the summer that I wondered that. Although all of these projects are interesting as scientific articles, I kept wondering how the information would get back to those people who really needed it. How would the farmers find out whether they were utilizing their livestock most efficiently? What would the updated roads mapping do for the average farmer that lives dozens of kilometers away from the nearest all-weather road? And what does the average small-scale agricultural household care about the similarities between bovine and murine genomes and their trypanotolerance? Perhaps not much, but the research being done at ILRI is providing the foundation for more involved projects aimed at integrating the results of these projects into real-world applications that benefit the farmers of Kenya, East Africa and the world. ILRI also organizes feedback sessions with the people involved in their studies for projects such as SLP and MOSD, in an attempt to keep the research focused on those who will benefit most from it.

I admit, I began the summer a bit skeptical of the top-down development so prevalent in Africa today. ILRI's funding comes mainly from the British and US aid

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<sup>3</sup>For more information on trypanosomosis and ILRI's research, please see author's paper entitled [Trypanosomosis in sub-Saharan Africa](#)

agencies Department for International Development (DFID) and United States Agency for International Development (USAID), respectively. It also receives funding from international agencies including the World Bank. This is typically the type of development that my fellow Grinnellians enjoy protesting by chaining themselves together, not the type that a Grinnellian usually works for. But I was truly impressed at the level of interaction between ILRI and the communities it worked with. And contrary to the popular beliefs regarding larger development agencies and research institutes, the people I worked with genuinely cared about the people involved in the topics they researched.

It was very rewarding for me to be able to work with such a cast of talented, incredible, energetic and ingenious scientists. As I reach a point in my education where I am beginning to make decisions regarding my career, I felt it was very beneficial for me to experience an aspect of international agricultural research, as this is probably something I will continue to pursue. I think back to that day in 1994 when I first heard about the World Food Prize and muse about how my entire educational and professional career was altered by participating in that first Youth Institute.

### **Things I learned this summer**

I learned that you *can* do something with a liberal arts degree, and that my independent major is not as crazy as some people may think. I learned that people actually do worthwhile research on many different things, and that this research is not entirely based on the physical/natural sciences, but that social sciences also allow for interesting and valid research. I learned that this research actually makes a difference in people's lives. Although I have been to other developing countries, I was reminded of the incredible disparities between developed and undeveloped worlds. I also learned that those labels mean absolutely nothing. As for how the entire experience effected me, I can only say

that this summer has changed me in so many ways, most of which I haven't realized fully yet.

### **Acknowledgments**

Thank you to the Iowa Council for International Understanding, including Lisa Fleming, Jan Davis and Ann Schodde, and The World Food Prize for making these internships available. I would like to thank Grinnell College, the Environmental Studies Grant committee and it's chair, David Campbell for sponsoring me this summer, and Dr. Diane Robertson for serving as my advisor and mentor this summer. Thank you to ILRI's Dr. Bill Thorpe, Dr. Steven Staal, Dr. Dannie Romnie, Dr. Amos Omore, Dr. Joseph Methu, Tineke de Wolff and Emily Ouma for allowing me the privilege to work beside them for eight weeks, for their patience, guidance and insight and also for letting me tag along on so many things. Thanks so much to Rob Eley and Catherine for all your help and thank you to everyone at ILRI for everything you've done for me, and most of all, for your friendship. Thank you for making my summer so wonderful. Words can never express my gratitude for all that you've done for me. I would also like to thank Sharon Fisher and Mike Schafer for pointing me in this direction so many years ago. Thanks to Michelle Seibke, without whom, I think I might have jumped back on the first plane to the States after a week. And finally, to my parents for not showing their fear as I stepped onto that plane at the beginning of June, and to my best friend and kindred spirit, Sara Jensen, for having confidence in me and for reminding me that sometimes you have to do things that scare you.

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