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Veterinary Issues and Livestock Development in Zanzibar: Farmer Practices and Attitudes

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Abstract

The status of veterinary issues, veterinary care, and livestock development on the Zanzibar Archipelago was investigated through interviews with professionals in the fields of veterinary services and livestock development, community animal health workers (CAHWs), and livestock extension officers. In addition, a survey of livestock farmers' access to, attitudes towards, and the actual effectiveness of veterinary care systems and livestock extension services was conducted in Pemba and Unguja. Particular emphasis was placed on comparing famers who had participated in Farmer Field Schools (FFS), a livestock education program run by the Agricultural Services Support Program (ASSP), with those who had not. The results were also analyzed in terms of farmers owning exotic or mixed-breed animals versus those owning only indigenous animals. Dairy cow production was found to be significantly more profitable than keeping local zebu, but exotic chickens were not necessarily more profitable than local chickens. The survey results indicated that while the FFS program was certainly beneficial to farmers, it was most relevant to farmers who were already raising mixed-breed animals. Furthermore, many of the differences found between the two sample groups were likely a result of the FFS selection process, which attracted farmers already owning exotic animals, and not an outcome of the field schools themselves. In order for livestock production to be exploited in Zanzibar in a way that helps alleviate poverty, farmers need financial support to expand and sustain production, at least until their animals become profitable. Future livestock development programs should focus on micro-finance and other such systems of financial or resource support, not just education.

Introduction

Like many developing countries, agricultural production is the primary occupation among rural populations in Zanzibar, a semiautonomous part of the United Republic of Tanzania. Historically known as the 'spice islands' for their production of cloves, cinnamon and other spices, Pemba and Unguja together supported almost 100,000 smallholder agricultural households in 2003, when the last census was completed (NSCA). Agriculture, especially livestock raising, is rarely the sole source of income for a family, and production

from these agricultural households comprised only 21 percent of the islands' GDP in 2003 (NSCA). Agriculture in Zanzibar consists of small-scale polyculture farming, where most small-holdings grow a combination of fruit trees, cassava, vegetables, and rice in suitable areas. As of 2003, a little over a third (36,445) of agricultural households kept large livestock such as goats and cattle, and 66,736 households kept chickens (NSCA). A relic of its socialist past, all land in Zanzibar is owned by the government, and can only be leased. Most rural Zanzibaris do not even lease land, and merely utilize the available land around their homes. Yet with a rapidly growing population and a current population density of 400 people per square kilometer, land use issues are becoming increasingly problematic (Zanzibar Statistics). Most of the food produced is sold and consumed locally, though there is extensive trade between Pemba and Zanzibar, the two major islands of the archipelago. Overall food production is constrained by poor land use practices, poverty, and labor availability—farming is all done by hand, and 70 percent of farmers are women, who are also responsible for child care and household work (ZFSNP). Because of this agricultural underproduction, more than 40 percent of Zanzibar's food needs are met with imported food—60 percent in Pemba—and animal products are a frequently imported commodity.

I. Livestock in Zanzibar

Livestock in Zanzibar are limited in number by scarce grazing areas and a lack of the financial resources farmers need to develop intensive livestock production. Livestock production makes up only four percent of Zanzibar's GDP, yet it plays a significant role in cash income generation for agricultural households, and often determines a household's economic and social status within the community (NSCA). Exotic and mixed-breed animals can be particularly productive and profitable for farmers, especially with the expansion of Zanzibar's tourist market. Yet they have high initial costs and infrastructure requirements, restricting their use.

Indigenous cattle (zebu), goats, and chickens are the most commonly raised livestock in Zanzibar. Because these animals have evolved under the climactic and disease conditions of this region, they are hearty animals, but their productivity is too low to compete with the genetically improved breeds raised in much of the developed world. Livestock production for the vast majority of farmers remains small-scale, with 71 percent of cattle-raising Zanzibaris keeping less than five head (NSCA). Cattle are concentrated in the Micheweni District in Pemba and Central District in Unguja, and over 95 percent remain indigenous. About 10 percent of agricultural households keep goats, again concentrated in Micheweni and Central Districts (NSCA). Less than one percent of these goats are improved milking breeds. Chickens are a staple of many households, even those in towns, but are mostly consumed within the family and kept for special occasions. There are 119,420 improved-breed chickens on the islands, the majority of which are intensively kept layers. In fact, the number of exotic broilers decreased by half between the 1993 and 2003 censuses. Local chickens are the preferred source of meat.

Indigenous animals are kept free-range or tethered outside, and are rarely given supplementary feed beyond kitchen and farm waste. Zebu only produce an average of 2.13 liters of milk per day during the wet season, yet 95 percent of cattle farmers sell some of this milk (NSCA). The local chickens behave like wild birds, laying about four clutches of eggs per year. High population growth and the expansion of tourism has resulted in a growing market for meat, eggs, and especially milk, but Zanzibar's current production of these goods is nowhere near enough to supply this demand—the milk produced on the island rarely makes it past neighborhoods or local markets, and the tourism industry relies on milk shipped from the mainland or abroad. There is huge potential for growth in Zanzibar's livestock industry if higher producing breeds are kept. The focus of livestock development in Zanzibar over the past thirty years has been in providing farmers with the tools to successfully raise mixed breeds, as well as better manage local animals. Exotic breeds are not only expensive to obtain, but their care and maintenance requires technology and investment, something most

Zanzibaris do not have. The success of their introduction is further impeded by their intolerance to local disease and environmental conditions. The Department of Veterinary Services and Department of Livestock are slowly working to mitigate these challenges through improved disease control, education, and technologies, but the government faces similar obstructions in lack of funds, professionals, and local research. They are often dependent upon loans or funding from non-governmental organizations and the World Bank.

II. Veterinary Services

Although Zanzibar's governmental policy goals strive to eventually privatize veterinary care and other livestock services, they are currently government run. In the past, farmers often received veterinary services such as medications for free, but in the last few decades the system has transformed into one where animal owners are responsible for the cost of veterinary treatment, transportation, and medication, with the exception of some immunization and development programs. The Department of Veterinary Services, part of the Department of Livestock and Fisheries, administers the veterinary care system and farmer extension services on the islands. The Unguja office is located in Maruhubi**,** and is also the headquarters of the joint Agricultural Services Support Program and Agricultural Sector Development Program-Livestock (ASSP and ASDP-L), and the World Society for the Protection of Animals (WSPA). These are a few of the externally funded organizations that enable the government to provide special veterinary and extension services throughout Zanzibar. A second department office is located in Wete, Pemba. The Department of Veterinary Services oversees a District Veterinary Office in nine of Zanzibar's ten districts (excluding Stone Town). Run by a District Veterinary Officer, these offices support one or two veterinary clinics within their district, depending upon the animal population.

At an even smaller scale, ASSP has recently trained and installed community animal health workers (CAHW) in selected Shehias (the Shehia is the smallest governmental unit in Zanzibar, often composed of several villages or one section of a city). This CAHW, selected

and trained, but not salaried by the government, functions as the person in contact between farmers and government services. They supply information to the government on the health issues experienced in each village, as well as provide basic health care and advice to farmers about their livestock, or refer them to the district veterinary clinics. These CAHWs are the infancy of privatization in animal health care, in that they charge for their services and act as middle men in the supply of medications, buying them from pharmaceutical distributors and selling them to the farmers as needed. This system of veterinary care attempts to bring knowledge and resources to the village level, but it is not always affordable for farmers, and the CAHW has very minimal training. Nevertheless, the CAHWs are a positive source of support, advice, and communication for farmers in rural areas, the majority of whom have to travel over 10 km to reach the nearest veterinary clinic (NSCA).

III. Disease Burden

i. Cows and Goats

Like much of sub-Saharan Africa, Zanzibar is plagued with several diseases that severely affect the success of livestock farming and milk, meat, and egg production. Tick-borne diseases (TBD), such as East Coast Fever (ECF), babesiosis, and heart water cause the highest disease burden and mortality to cattle, infecting over 10 percent of Zanzibar's cattle at any given time. ECF is an acute disease causing high fever, emaciation, diarrhea, and hemorrhaging in the organs (Merck). *Theileria parva,* the protozoan that causes ECF, replicates in the lymph system, programming the lymph nodes to become cancerous and swell. Traditionally, Zanzibari farmers often branded the swollen lymph nodes to try to cure their cattle. Because the cost of treating a full-grown cow for ECF is over 30,000 shillings plus services, the practice of branding continues, despite its ineffectiveness and the pain it causes the animal.

Vector control is another strategy farmers are using to control ECF. Acaricides can be sprayed over a cow's hide to poison the ticks that try to attach to it, spreading the parasite. Tick populations are dense in many areas of Zanzibar, and hundreds of ticks can infect a cow

at one time. Of the census taken in 2003, 57 percent of cattle keepers reported tick problems, but despite the encouraged use of acaricides to control ticks on the cattle, almost 20 percent of the respondents did not take any control measures against ticks, even hand picking. This may be a result of the cost of acaricides, which run at about 10,000 shillings per adult cow per month, if the cow is sprayed the recommended four times a month. While tick-borne diseases cause mortality in indigenous Zebu, especially as calves, they have a more severe effect on mixed-breed cows, which often lack maternal immunity and any co-evolutionary balance with the parasites. Because of this, these cows must be kept in a shed to reduce their exposure to ticks, and the use of acaricides is essential.

Acaricides have proven effective in eradicating certain tick-borne diseases from the United States, but if they are not used universally, as in Zanzibar's case, the reduced infection rates have the potential to merely lower acquired immunity in the indigenous cattle and increase mortality when cattle are infected later in life. In a further attempt to lessen the disease burden of ECF, the Zanzibar government worked with labs in Nairobi in the late 1980s to develop a strain-specific ECF vaccine for Zanzibar and Pemba (Biwi et al). This method of immunization merely involved infecting calves with an isolated sample of *T. parva* and then treating them—with the intention of building the calves' immunity to the disease in a controlled manner. This type of immunization is risky, does not produce lifelong immunity, and turned out to be difficult and costly to administer properly in Zanzibar, as the vaccine had to be kept in nitrogen during transport. While scientists were initially optimistic about the strain-specific Zanzibar South Stabilate, it was quickly deemed too expensive to produce just for Zanzibar and production was discontinued by the early 1990s. Today cattle in Zanzibar are occasionally administered the more geographically general Maguga cocktail from Kenya, but it is relatively ineffective at producing immunity to Zanzibar's strains of *T. parva.*

Zanzibar has had much more success in eradicating Trypanosomiasis (sleeping sickness), a disease which used to be the primary threat to cattle. A fatal disease to both humans and livestock, this tsetse fly-transmitted disease was eradicated through vector

control. After a ten-year pesticide spraying campaign to bring tsetse fly populations down to a workable level, the Joint FAO/IAEA Division and the Government of Tanzania used the Sterile Insect Technique to exterminate the remaining population. Sterile male tsetse flies were bred in the Tsetse and Trypanosomiasis Research Institute in Tanga, Tanzania, and then over 8 million of them were released onto Zanzibar and Pemba. The females with which they mated laid eggs as normal, but none of their progeny hatched (Tsetse fly). Unaware of their demise, by 1998 the tsetse fly population was confirmed to be eradicated, and sleeping sickness infection was subsequently controlled (Tsetse fly). On a continent where sleeping sickness has prohibited farmers from keeping cattle over wide swaths of land, this was a major public health success story.

While TBDs cause by far the most mortality in cattle, other diseases such as helminthiasis, lumpy skin disease, blackleg, and mastitis also create morbidity and lowered production in cows. Over 80 percent of worm infections are found on Unguja, and only 20 percent of farmers de-worm their animals (NSCA). This may be cost related or just lack of awareness—though worms can cause stunted growth, lowered milk production, and anemia, these symptoms may not be recognized as the result of an infection, and worms are rarely fatal. Lumpy skin disease is a contagious viral disease that emerges during the rainy season, and although it also lowers milk production, it is only treated for secondary infections. Blackleg, a fatal disease that affects the muscles, can be immunized against, or treated with penicillin if caught in time. Mastitis, the infection of the udders with various forms of bacteria, is particularly relevant to the production of dairy cows. The dairy cows in Zanzibar have a much higher rate of mastitis than cows in other countries—84 percent versus 40 percent, according to a study done in 2002 (Gitau et al). This is likely the result of unclean living conditions and poor milking hygiene, such as when milkers do not wash their hands before or between milking cows, spreading bacteria amongst them. Traditional medicines such as muarubaini leaves (smashed and administered with Coke) and haba soda, a common medicine for humans in Zanzibar, are used to treat mastitis. Goats in Zanzibar also suffer from

helminthiasis, lumpy skin disease, and mastitis, as well as high rates of pneumonia. Although they have a higher prevalence of worm burden, fewer farmers de-worm their goats.

ii. Chickens

Newcastle disease presents the major threat to local chickens in Zanzibar, to the extent that a government vaccination program has been initiated. It is an acute, rapidly spreading viral disease of the respiratory system that causes high mortality, and impedes egg laying in mild cases. An attempt to vaccinate all chickens on the island was made in 2009, but supplies ran out and the program halted for over a year. Four months ago, in late 2010, immunizations were reinitiated but are now limited to Shehias participating in the Farmer Field School program. The second cycle of vaccinations began in February 2011. The vaccine is relatively inexpensive for the government—it costs only 4,500 shillings for 1000 birds, though it must be repeated every two months. Furthermore, the effectiveness of the application is dependent upon the farmers, who are given water treated with the vaccine to give to their chickens back home. Farmers have traditionally used local plants such as muarubaini leaves (from the neem tree) and mshubiri mwitu (aloe vera) to treat Newcastle, and one interviewee, Dr. Salim Ahmed felt they perhaps had some benefit. Vaccinations for gumboro and fowlbox, other common diseases in Zanzibar's poultry, are recommended but are also the responsibility of the farmer. Infectious coryza, a respiratory disease, helminthiasis, especially of round and tapeworms, and diarrheal diseases such as coccidiosis and typhoid all commonly infect Zanzibar's chickens. When seeking veterinary care, farmers usually bring one chicken in to the clinic for the diagnosis of the whole flock. A post mortem costs only 300 shillings, while a culture and sensitivity test costs 3000 shillings per animal.

Disease burden is high in Zanzibar, and farmers incur substantial losses in productivity and profit due to it. Effective treatment and many preventative vaccines are available, but farmers must seek them out. Veterinary care in Zanzibar is not affordable for many farmers, and those farmers often become caught in a cycle of livestock loss and poverty because they cannot care for their animals. Many more farmers remain unaware of the health care needs of

their livestock—the majority of rural farmers have only received a few years of schooling, and literacy is low. Yet the veterinarians interviewed in this study felt that most farmers make an effort to treat their animals when needed. Animals hold a high value for the farmers, and they are usually willing to pay for care to the best of their abilities.

IV. Livestock Development

The Department of Livestock and Fisheries runs a number of outreach programs and extension services for farmers, aimed at educating and empowering them to manage and expand their livestock. Livestock development programs have focused on facilitating the introduction and successful production of mixed-breed livestock at the level of small holder farms, as well as encouraging better management practices for local animals. Farmers often favor crop production over grazing animals on what little land they have, but dairy cows and goats are typically raised intensively or semi-intensively, living in a stable and eating cut grasses and supplemental feeds. This is done to encourage productivity and protect them from the environmental stressors and diseases of Zanzibar. Mixed-breed laying chickens are also kept in chicken coops and fed milled grains and supplemental feeds. Although the care and acquisition of exotic livestock is much more expensive than indigenous free-range animals, their productivity creates a higher profit for farmers and cropland does not have to be compromised for their presence. In fact, there have been efforts to teach farmers how to grow feed for their animals in rotation with their other crops, and large livestock in turn provide valuable fertilizer for the soil (Biwi et al.). Alternatively, when disease and nutrition are managed in local animals, farmers can also increase productivity. For instance, the traditional method of poultry farming, where chickens are kept free range to search for their own food, results in a 60 percent loss in production—through disease, predation, theft, malnutrition, and lost eggs (Rural Poverty Portal).

Currently, the major agricultural development program in effect is the Agricultural Services Support Program (ASSP), a 15 year intervention program attempting "to contribute to the objective of greater and sustained agricultural productivity, profitability and farm

incomes" (MANRZ). In 2007, the ASSP and Agricultural Sector Development Program-Livestock (ASDP-L), largely funded by the International Fund for Agricultural Development (IFAD), initiated a participatory educational program called Farmer Field Schools (FFS). Emerging from Indonesia and the Philippines in the late 1970s, the Farmer Field School approach to rural poverty alleviation has now spread across much of Asia and Africa (Simpson and Owens). In Zanzibar, 40 Shehias in each of the nine agricultural districts were selected, and participatory diagnostic appraisals were conducted amongst farmers. These participatory appraisals empowered farmers to articulate their educational needs, and helped them to form groups of 15 to 20 based on common interests and goals. Three hundred and sixty FFSs were then established, 174 of which chose to focus on livestock production (the others focus on crop production).

The FFS is organized around a series of weekly meetings centering on a specific animal—poultry, goats, or dairy cows. The classes are set up to cover an entire season of animal production, lasting about six to nine months. For instance, chicken FFSs teach farmers how to raise cross-bred layers, build chicken coops, use hay box brooders, and care for the health of exotic and local chickens. They also emphasize simple business skills that can make a world of difference, such as record keeping. Through these FFSs, farmers have the opportunity to have their chickens immunized for Newcastle disease. In a few cases, ASSP helped farmers to buy incubators, which can cost up to one million shillings, in order to expand their business (Saleh). Dairy cow-specific FFSs teach farmers about cross breeding, artificial insemination, feed production and nutrition, stable building and cleaning, and milking hygiene. With the cost of building a stable, buying feeds (about 20,000 shillings per cow per month if raised exclusively inside), and obtaining cows, dairy cow investment is difficult. A dairy cow costs about 800,000 shillings, while a local zebu costs less than 200,000. FFS training can help farmers navigate the process of using artificial insemination to produce their own dairy cows, a much more reasonable endeavor (about 10,000 per insemination plus petrol fees).

According to Mr. Khalfan M. Saleh, assistant program coordinator for ASSP/ASDP-L, these Farmer Field Schools have been hugely popular among farmers, and the positive repercussions of such education can already be seen. Over half of the participants have been women, and only one farmer per household is allowed to participate, with the hope that they will pass their new skills and knowledge onto family, neighbors, and their communities. FFSs have continued with the leadership of farmer graduates, who were selected and given additional facilitation skills by the extension officers. In some villages not covered by the FFS program, groups have organized themselves and approached the government for a teacher. Nevertheless, the program does not aid farmers in any way financially, and so its capacity to change farmers' situations is limited—many of the farmers are unable to implement the management strategies they have learned about.

The ASSP/ASDP-L is also involved in funding field-based research collaborations between farmers and government technicians. In one instance, research was done to determine the best brooding system for chickens, between natural brooding, lamps, haw boxes, and leaving the eggs alone. Another program that has recently phased out, the Participatory Agricultural Development and Empowerment Program (PADEP), funded by the World Bank, provided dairy cows, dairy goats, or chickens along with training to communities. The intention was to breed the animals and spread the offspring throughout the participating group. The World Society for the Protection of Animals runs a rabies vaccination, de-worming, and sterilization program for dogs and cats in Unguja, and the Bill and Melinda Gates foundation funds a similar program on Pemba. While not focused on livestock, the treatment of worms and rabies is beneficial to the health of the entire animal community on the island (including humans).

If developed properly, livestock in Zanzibar has the potential to help alleviate poverty among farmers. Current production does not meet the demand for meat, eggs, and especially dairy, yet Zanzibar faces a host of economical and ecological barriers to the expansion of livestock and the introduction of high-producing exotic animals. These include its small area,

high disease burdens, and lack of investment money, technologies, and education. Veterinary services are just barely sustained by the government's budget, and many farmers cannot afford to pay for care. Nevertheless, Zanzibar has made headway in disease control in the past few decades, especially with the eradication of sleeping sickness and the increased use of acaricides against TBDs and vaccines against Newcastle, gumboro, and fowlpox. These measures have made the introduction of exotic and cross-bred dairy cattle and poultry possible and even profitable (Gitau et al.). With the skills and knowledge obtained from Farmer Field Schools, many farmers just require start up funds to invest in exotic breeds or better management practices.

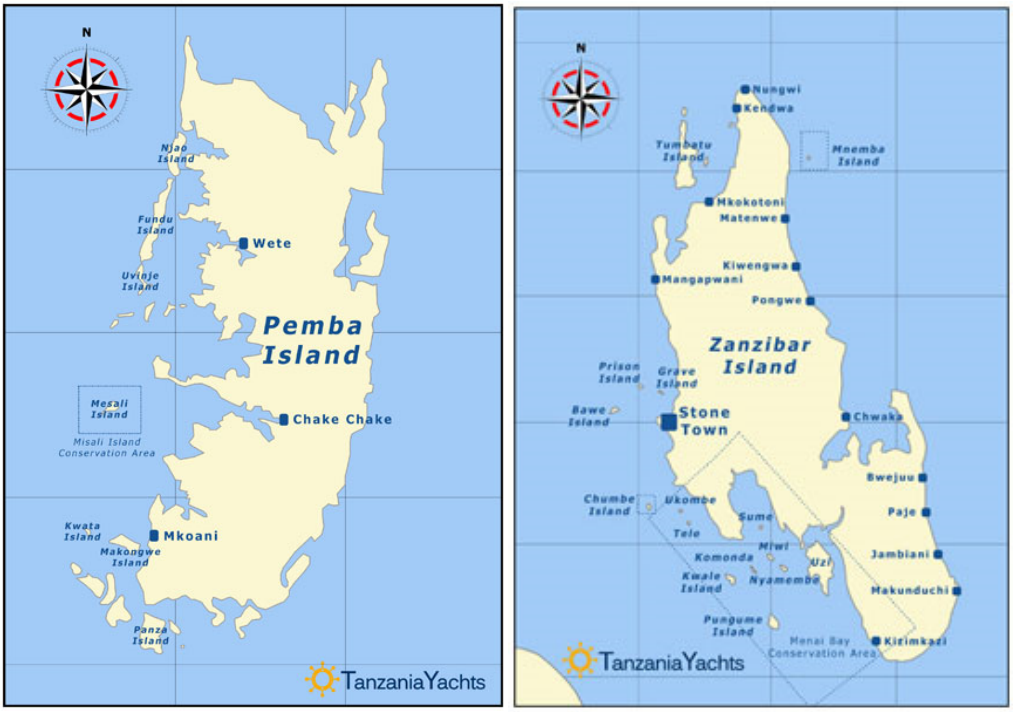
At least on the exterior, the governmental system in place seems genuinely structured to bring as much benefit to the individual farmer as possible. Yet a cycle of poverty remains, where many farmers do not produce enough profit from their livestock to even properly care for their animals, let alone benefit their families. Thus, the reality of Zanzibar's livestock situation needs to be assessed from the perspective of the farmers. The survey given to farmers in this study focused on farmer opinions and attitudes. It sought to understand the perspective and challenges of at least a few farmers struggling to make their livestock profitable. If rural poverty is to be alleviated, these opinions need to be given a voice, and those affected must participate in and guide the process of change.

Study Area

The Zanzibar Archipelago is a semi-autonomous state, consisting of Unguja Island and Pemba Island. Part of the United Republic of Tanzania since 1964, the islands are located about 25 miles off its coast, in the western Indian Ocean. Situated six degrees south of the equator, these tropical islands have two rainy seasons—the long rains take place during the southerly monsoon from March 21 through May, while the short rains are in October and November. December to March is the hottest season, and June through September is cooler and more conducive to growing crops. Pemba is the more fertile island, with deeper soil and less coral rag, but both are heavily farmed. Livestock farmers in nine Shehias throughout four districts

were surveyed, six in Pemba and three in Unguja. Mzambarauni Takao, Jadida, Ukunjwi, and Kangagani are located in Wete District, Msuka Magharibi is located just east of Ngezi Forest in Micheweni District, and Kangani is located near the southern tip of Pemba, in Mkoani District. Kidimni, Kibuyi Muembe, and Chwaka are all located in Unguja's Central District. With the exception of Jadida, a peri-urban Shehia located on the outskirts of Wete Town, the rest of the villages surveyed were rural, with varying distances and accessibility to urban centers. For instance, Mzambarauni Takao is located about nine kilometers south of Wete along the main, paved road, while Ukunjwi is located about the same distance north of Wete, except that it is only accessible via an extremely narrow and poorly maintained dirt track. Kangagani is about twice as far from Wete, but only a few kilometers off of the main road, along a flat, gravel road. There is a veterinary clinic in Ole, a few kilometers from Kangagani. The other veterinary clinic in Wete District is in Wete town. Kangani is at least 15 kilometers from Mkoani, the nearest town, but it is situated along a paved road. Msuka Magharibi is only a few kilometers from Konde, a small Shehia in northern Pemba, but the dirt road leading to it is poor. Each of the villages surveyed in Unguja were along paved roads; Kidimni is the closest to Stone Town, the nearest urban center, Kibuyi Muembe is further, maybe 15 kilometers, and Chwaka village is over 20 kilometers from Stone Town. The closest veterinary clinic for these villages is located in Dunga village, in central Unguja. In addition to the surveys, interviews took place in Chake Chake, Pemba, at the Poultry Farmers Development Organization, in Wete at the Department of Livestock, and at the Department of Veterinary Services offices in Maruhubi, Unguja.

Figure 1 – Pemba Island **Figure 2 – Unguja Island**



http://www.tanzaniayachts.com/about-zanzibar.shtml

Methodology

One of the primary aims of this study was to acquire practical and current information on the status of veterinary issues and challenges in Zanzibar, as well as to investigate livestock development programs in Zanzibar, both from the government and farmer perspective. In written form, this sort of information about Zanzibar is hard to come by, and usually out of date, so interviews were used to obtain the most current and realistic information as possible. Much of the introductory information in this paper is based upon interviews with government officials done during a preliminary study in March 2011. Interviewees included three veterinary doctors—Dr. Ramadhan Juma Ramadhan, head of the Maruhubi Veterinary Clinic, Dr. Kassim Shaali Ame, a field extension officer in Chake Chake, Pemba, Dr. Salim Ahmed, based in Wete—along with the directors of ASSP: Dr. Talibii Saleid and Khalfan M. Saleh (assistant program coordinator). During these interviews a variety of issues were discussed, including the system of veterinary care in Zanzibar, the costs and availability of various veterinary services, the impact and prevalence of common diseases to cows, goats, and

chickens, and their general opinions about the effectiveness and accessibility of the government veterinary care.

These interviews were also used to develop the survey for livestock farmers that this study is based upon. Divided into five parts, the survey assessed the care practices, health, and productivity of livestock, as well as farmer access to and attitude towards veterinary and educational services. It was written in English and then translated into Swahili (see Appendices D and E for the full surveys). During April 2011, this survey was given to 113 farmers in nine Shehias across Pemba and Zanzibar. Seven of the Shehias were methodically selected based upon their remoteness and Farmer Field School (FFS) status. Four had FFSs while three did not. Two more villages, Kangani and Msuka Magharibi, were surveyed without prior knowledge of their FFS status. Kangani turned out to have them while Msuka Magharibi did not. In the end, over half of the farmers surveyed were participating in or had completed livestock education through a FFS course. During survey analysis, particular emphasis was placed on comparing this group with the farmers who have not had this opportunity. Survey result were also analyzed in terms of farmers with exotic animals and those with only indigenous animals.

Surveys were conducted with the help of a district veterinary officer, Abbass Hassan Abdulla in Pemba's Wete District and Bizume Kombo in Unguja's Central District. In the villages with FFSs, the graduated or current class was surveyed, and in the other villages, a group of willing farmers was gathered by the community animal health worker (CAHW) or another village leader. The farmers filled out the survey more or less simultaneously, and sometimes the survey needed to be read aloud, as many of the farmers were illiterate. Sixteen of the farmers filled out a shortened version of the survey, which just focused on attitudes and not animal care and demographics. Four FFS classes were surveyed, three groups learning about chickens and one group focusing on dairy cows. In Kangani and Ukunjwi, the CAHWs were interviewed about their respective experiences and attitudes. Two further chicken FFSs were attended but not surveyed, in the Pandani and Hindi Shehias of Pemba. Makame

Nyange and Abbass Hassan, veterinary officers in Wete District, were formally interviewed about Pemba-specific livestock challenges. Omari Hammad, the executive secretary of the non-governmental Poultry Farmers Development Organization (POFADEO) was also interviewed in Chake Chake, Pemba.

Results and Discussion

I. Demographics of Livestock Farmers

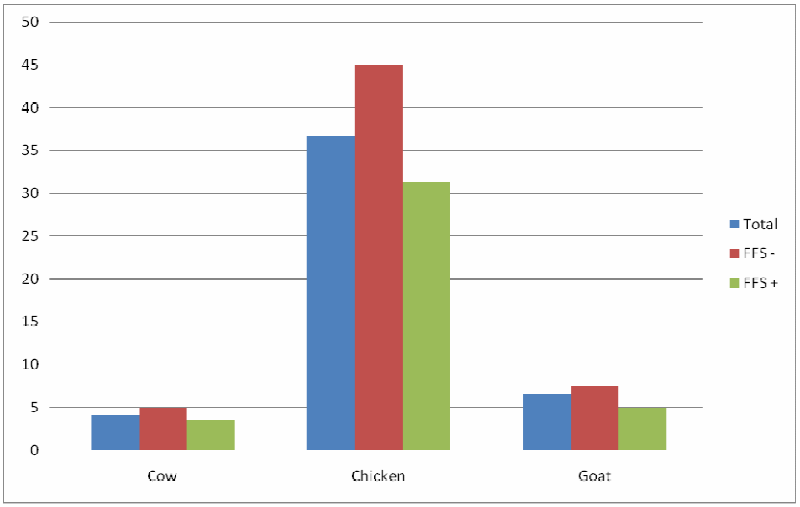
Table 1 – Demographic Results

	Total	Without Farmer Field Schools	With Farmer Field Schools
Shehias		*Kangani* *Msuka Magharibi* *Mzambarauni Takao* *Kangagani* *Chwaka*	*Ukunjwi* *Jadida* *Kangani* *Kibuyi Muembe* *Mzambarauni Takao* *Kidimni*
Sample Size	*113*	*51*	*62*
Avg. Age	*37.5*	*37.25*	*37.75*
Sex	*Female-35.4%* *Male-64.6%*	*Female-10.6%* *Male-89.4%*	*Female-66.5%* *Male-43.5%*
Avg. Years Farming	*6.8*	*5.9*	*7.4*
Avg. Number Cows	*4.1*	*5*	*3.5*
Avg. Number Chickens	*36.7*	*44.9*	*31.3*
Avg. Number Goats	*6.5*	*7.4*	*5*

Of the 113 farmers sampled, the average age was 37 years, with a range of 19 to 56 years and an average of 6.8 years of livestock raising. Eighty percent of farmers surveyed reported a family history of livestock raising. Female farmers made up only 35.4 percent of the total group but 66.5 percent of the Farmer Field School (FFS) sample group. Interestingly, the farmers from Shehias without FFS had a higher average number of cows, chickens, and goats. This could reflect the farmer selection process, however. The FFS sample group was chosen merely because they had participated in a FFS, while the non-FFS farmers were gathered by

the community animal health worker (CAHW) or another village leader in the area, and perhaps there was a bias towards selecting the most proliferative livestock farmers.

Figure 3 – Average Number of Cows, Chickens, and Goats in Relation to FFS Status



II. Cattle

Table 2 – Cattle Raising Demographics and Practices

	Total	Without Farmer Field Schools	With Farmer Field Schools
Sample Size- Farmers with Cows	*51*	*20*	*31*
With Dairy Cows	*25*	*6*	*19*
Avg. Milk Produced (L)	*9.8*	*6.9*	*11.3*
Avg. Monthly Milk Earnings (Tsh)	*139,209*	*189,543*	*63,577*
Avg. Vet. Visits in Past Year	*4.48*	*3.53*	*4.97*
Avg. Amount Spent on Vet. Care	*30,112*	*25,789*	*32,944*
Avg. Num. Cows Lost in Past Year	*1.5*	*1.9*	*1.3*

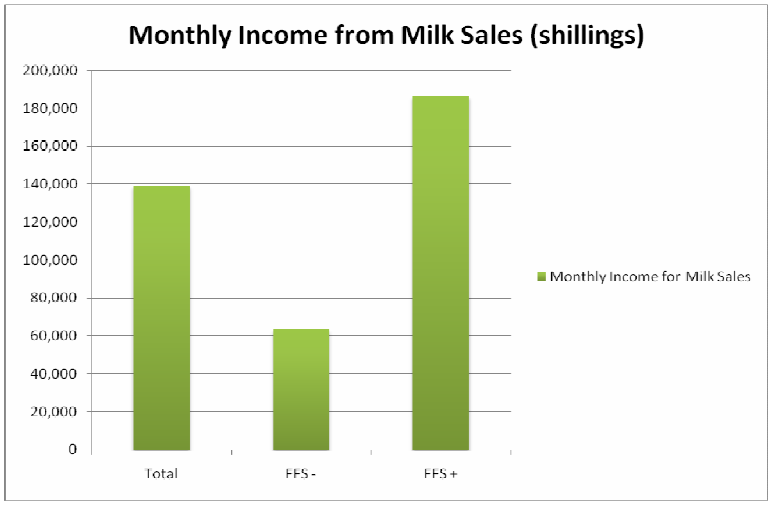
Of the farmers surveyed, 51 kept cattle—31 in the FFS group and 20 in the non-FFS group. The majority of these kept the local zebu, but 25 farmers, concentrated in the FFS group, raised a few mixed-breed dairy cows as well. Many of the farmers spoken with had received their dairy cows through the Participatory Agricultural Development and Empowerment Program (PADEP) that recently phased out in Zanzibar. The majority of zebu were kept on tethers, while the dairy cows were always kept in simple wooden stalls, where they are less prone to ticks and other disease vectors. All the dairy cows were given cut grasses and supplementary food—either corn meal, wheat meal, rice meal or pollard. Zebu, on the other hand, were rarely given supplementary food. Twenty four farmers reported supplementary food as too expensive to adequately supply to their animals, while one marked it as unavailable.

Dairy cows produced an average of 13.2 liters of milk per day, while the zebu produced an average of 2.3 liters; 82 percent of cattle farmers reported selling this milk. Overall, these farmers earned an average of 139,209 shillings per month, but the earnings were drastically different between farmers participating in FFSs versus those who were not. The FFS group earned an average of 189,543 shillings per month while the non-FFS group earned only 63,577 shillings per month. This income discrepancy is at least in part due to the higher ownership of dairy cows in the FFS group—61 percent of FFS farmers have dairy cows while only 30 percent of non-FFS farmers own them. Both of these frequencies are much higher than the population as a whole; in 2002 only five percent of cows were non-indigenous (NSCA). The farmers surveyed represented an artificially high number of dairy farmers because the field school in Jadida, Pemba focused on dairy cows and all 15 participants owned them. Furthermore, the organizers of the non-FFS groups were likely eager to gather the most successful farmers in the village, making dairy farmers overrepresented in the non-FFS group as well.

In 2005, the average yearly per capita income in rural Zanzibar was only 165,540 shillings (about 100 dollars), and surprisingly, only 32,631 shillings of this were earned from agricultural sales (Household Income). Thus, dairy cows have the potential to substantial

increase farmers' economic status. While the estimated incomes presented from the survey should not be taken for fact, they suggest that even zebu can significantly boost income.

Figure 4 – Monthly Income From Milk Sales



On average, cattle farmers who had attended a FFS sought veterinary care almost five times in the past year while those who did not sought care only three and a half times. The FFS group estimated spending an average of 32,944 shillings on this veterinary care, while the non-FFS group estimated an average of 25,789 shillings. Perhaps because of a lack of veterinary care, the non-FFS group had lost an average of 1.9 cows in the past five years, while the FFS group's average was 1.3 cows. Only nine of the 51 farmers (17 percent) reported veterinary services as 'too expensive,' and four marked it as 'not available.' These views were split across the two groups. It is important to note that the farmers included in the FFS group did not necessarily attend a FFS devoted to cattle—in fact, the majority of them attended a chicken FFS. In the survey, farmers were also asked to state the diseases from which their cattle had suffered or died; the results for the group as a whole are presented below.

Table 3 – Disease Prevelance and Cause of Death in Cattle

	% of Farmers Seeking Vet Care for each Disease	% of Farmers with Cattle Lost to Disease
Sample Size	*51*	*34*
Helminthiasis	*68%*	*0*
East Coast Fever	*57%*	*50%*

Mastitis	*27%*	*9%*
Skin Infections	*23%*	*9%*
Heartwater	*4%*	*12%*
Blackleg	*2%*	*9%*
Babesiosis	*2%*	*6%*
Other Disease	*10%*	*0%*
Don't Know Which Disease	*6%*	*18%*

While 69 percent of the farmers surveyed sought veterinary care for their cattle because of helminthiasis (worms), East Coast Fever (ECF) is by far the most common killer of Zanzibar's cattle—half of the farmers reported losing cattle to this disease. Along with helminthiasis and ECF, mastitis, an infetion of the udders, and skin infections were the most common diseases for which farmers sought veterinary care—they have high morbidity. Diseases such as heartwater, blackleg, and babesiosis are less prevalent but have a higher mortality when they occur. Disease prevelance and importance was similar between the two groups—FFS and non-FFS, although the majority of mastitis cases were found in the FFS group. Dairy cattle are susceptible to infction, especially if kept in unsanitary stable conditions. All but three farmers reported using acaricides to keep disease-carrying ticks off of their cows. The recommended dosage in one time per week, but the majority of farmers use it once every other week. Fourteen percent of farmers reported that they found acaricides prohibitively expensive, and these views were concentrated in the non-FFS group.

The survey also included a few questions about farmer use of traditional treatments and medicines. Fourteen percent of the total group admitted to branding the lymph nodes of cattle infected with ECF to try to kill the disease. This treatment was only slightly more likely in the non-FFS group (16 percent). Haba soda, the local name for black caraway seed oil, has been a popular remedy in the Muslim world since it was promoted by the Phrophet Mohammad (Turn to Islam). It is used to treat a multitude of human ailments in Zanzibar, and 21 percent of the farmers surveyed reported using it to treat mastitis in their cattle. Ten out of the 11 farmers who answered positively to this question were part of the FFS group. Only two

farmers, both in an FFS in Ukunjwi, Pemba, have used muarubaini leaves from local neem trees to treat their cows for mastitis, skin infections, or insects. When asked to rate the overall health of their cows, 30 farmers felt it was good, 19 felt it was very good, and only one felt it was poor. Opinions were similar across the FFS and non-FFS groups.

III. Chickens

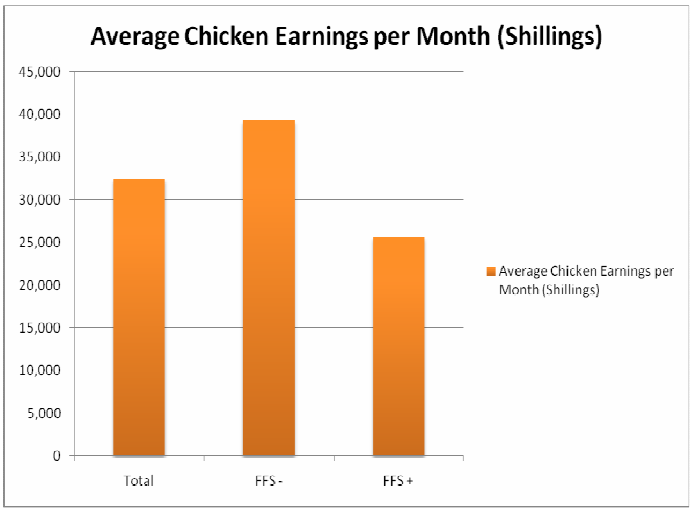
Table 4 – Chicken Raising Demographics and Practices

	Total	Without Farmer Field Schools	With Farmer Field Schools
Sample Size-Chicken Farmers	*64*	*24*	*40*
With Mixed-Breed Chickens	*13*	*4*	*9*
% Farmers Selling Chicken Products	*75%*	*69%*	*80%*
Avg. Monthly Chicken Earnings (Tsh)	*32,501*	*39,272*	*25,645*
Avg. Vet. Visits in Past Year	*4.2*	*1.8*	*5.7*
Avg. Cost of Vet. Care in Past Year	*11,314*	*11,769*	*11,128*
Avg. Cost of Immunizations in Past Year	*9,250*	*14,962*	*7,128*
% of Farmers Using Aloe Vera to Treat Newcastle/Coryza	*23%*	*17%*	*27.5%*
% of Farmers Using Other Traditional Medicines	*47%*	*33%*	*70%*
Num. Chickens Lost in Past Year	*35.7*	*49.3*	*27.8*

While the bulk of livestock farmers surveyed kept at least a few local chickens, the sample size does not reflect this because many of the farmers chose not to fill out the chicken section. Especially in Jadida, where the farmers surveyed were part of a dairy cow FFS, the

farmers seemed to find their chicken keeping insignificant. As the survey process progressed, farmers were encouraged to fill out the section even if they just had a few local chickens and did not provide much care for them. While the vast majority of chickens were kept free range, almost all farmers fed them kitchen waste, and 82 percent also bought supplementary food, such as minerals or rice meal. Supplementary food was more common among the FFS group (88 percent) than among the non-FFS group (62 percent), and 60 percent of the total sample group found supplementary feed prohibitively expensive. None marked it as 'not available.' A majority (75 percent) of farmers surveyed sell eggs or meat from their chickens. Interestingly, the non-FFS group reported earning an average of 39,272 shillings per month from their chickens, while the FFS group, many of whom have been given poultry business skills, reported earning only 25,645 shillings per month. The non-FFS group had a much smaller sample size of farmers who estimated their monthly incomes, however—many did not respond, and a few who did answer reported earnings of 100,000 per month, bringing the average up. These farmers were likely making an accurate estimation, as they were the four farmers with large flocks of exotic animals, but the average probably does not reflect the income reality for the non-FFS group as a whole.

Figure 5 – Monthly Income from Egg and Meat Sales



Those farmers who had participated in a FFS sought three times as much veterinary care for their chickens—the non-FFS group had an average of 1.8 visits in the past year while the FFS group had an average of 5.7 visits. Yet the two groups estimated spending essentially the same amount on this care. In fact, the non-FFS group costs were higher. Because record-keeping is rare, these estimations were probably very rough, but the FFS group, at least encouraged to keep records, perhaps had a more accurate idea of their veterinary costs. About 40 percent of the total sample group felt that veterinary care was too expensive. This view was heavily concentrated in the FFS group, even though they estimated spending much less. The view was also over twice as high and that for cows. Perhaps because of the perceived value of cows, farmers are more willing to pay for their care. Sixteen percent of the farmers indicated veterinary services as 'unavailable,' and this view was spread between the two groups.

The non-FFS group also estimated spending over twice as much on immunizations as the FFS group. This discrepancy probably reflects some truth, as the ASSP provides a minimal Newcastle vaccine program for farmers in FFSs. The vaccine needs to be repeated every two months to be fully effective, however, so the burden will be on the farmers to keep their chickens protected. Seventy two percent (37) of the farmers reported vaccinating their chickens against Newcastle at least occasionally, but vaccination against fowlpox, avian influenza, and gumboro disease were much less common. Twelve farmers had immunized their chickens

against fowlpox, 10 against gumboro, 2 against avian influenza, and 5 farmers thought their chickens were immunized but did not know against which diseases. Thirty two percent (21) of farmers felt immunizations were prohibitively expensive, while four marked 'not available,' three marked 'not needed,' and four didn't know about immunizations. These views were also concentrated in the FFS sample group.

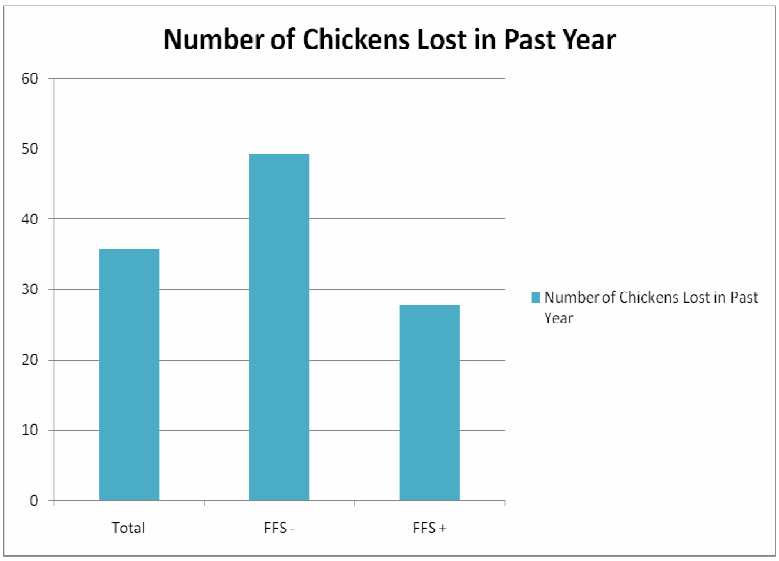
Table 5 – Disease Prevalence and Cause of Death in Chickens

	% of Farmers Seeking Vet Care for each Disease	Cause of Chicken Death—Farmer Reports (%)
Sample Size	*54*	*57*
Newcaste Disease	*54%*	*51%*
Helmenthiasis	*76%*	*42%*
Fowlpox	*42%*	*32%*
Influenza (general)	*43%*	*54%*
Gumboro	*30%*	*9%*
Diarrhea	*37%*	*26%*
Theft	-	*62%*
Predation	-	*4%*
Don't Know Which Disease	*6%*	*15%*

As with cattle, helminthiasis was the most common reason for which chickens required veterinary care. Newcastle disease and fowlpox were frequently selected, and over half of the chicken farmers surveyed reported 'influenza' as a cause of death. These reported flu-like diseases are most likely caused by Newcastle, infectious coryza, or less commonly avian influenza. Newcastle disease causes the highest mortality in Zanzibar, as local chickens are very susceptible to it, and there is frequently co-infection with infectious coryza. Gumboro, a necrotizing viral infection, affects young birds, both local and exotic. Diarrhea is a symptom of many infections, but is often a result of coccidiosis, a parasitic disease caused by protozoa of the Eimeriidae family, or typhoid, caused by salmonelloses bacteria. While these results point to a high disease burden in Zanzibar's chickens, it is difficult to gauge how accurate farmers' disease estimations were. Many of the farmers marked all or most of the options. The average chicken loss was much higher for the non-FFS group (50 in the past year) than the FFS (28 in

the past year). Sixty-two percent of farmers reported losing chickens to theft, while only four percent of farmers reported predation as a problem. In one-on-one conversations with farmers, however, many complained of predation by the invasive Indian house crow.

Figure 6 – Average Chicken Loss in Past Year



When asked about traditional medicines, the FFS group was markedly more likely to use them. Seventy percent of FFS farmers reported using traditional medicines on their chickens, while only one third of non-FFS farmers used them. Along with using aloe vera to treat flu-like ailments such as Newcastle or infectious coryza, some farmers indicated cures such as pilipili (pepper) for Newcastle and lemon for worms. Compared with cows, farmers were more likely to rate overall chicken health as poor (15 percent), but the majority still selected 'good' or 'very good' as their ratings. Furthermore, the 'poor' ratings were evenly distributed between the two groups.

IV. Goats

Because none of the FFSs surveyed dealt with goat production, and so few of the farmers kept goats, the results for this section were not compared between the FFS and non-FFS groups; they were treated as a whole. It is perhaps relevant to point out that 75 percent of the goat farmers surveyed were part of the non-FFS group, but this is not a reflection on the reality of the FFS population—a number of FFS group goat farmers did not fill out the goat section when time was limited. In all likelihood, just as many FFS participants kept goats as non-FFS participants. Goats are typically used for meat—goat milk is not popular in Zanzibar, so there is little demand for exotic or mixed-breed goats. Only three of the 21 goat farmers surveyed kept exotic dairy goats. The majority of goats were given farm and kitchen waste to supplement their grazing, but only five of the 21 farmers bought their goats rice, corn, or wheat meal. Sixty two percent of the farmers indicated supplementary food as prohibitively expensive. Goats are often kept as a form of security, and are not necessarily a source of income. The nine farmers who did report selling milk or meat earned an average of 77,000 shillings per month, although the estimated incomes ranged from 3000 to 300,000. In one-on-one conversations, the farmers reported earning 40,000 per goat sold for slaughter, and because the average number of goats kept is less than seven, only a few goats are likely sold per year. Thus, the actual monthly income for goat farmers in Zanzibar is probably far less than 77,000 shillings.

Table 6 – Goat Raising Demographics and Practices

Sample Size-Goat Farmers	*21*
# With Mixed-Breed/Exotic Goats	*3*
% Selling Goat Products	*43%*
Ave. Monthly Income	*77,000*
Ave. Number of Vet Visits in Past Year	*2.3*
Ave. Cost of Vet Visits in Past Year	*13,875*
% Using Muarubaini to Treat Infections	*24%*
% Using Other Traditional Medicines	*19%*
Ave. # Goats Lost in Past Year	*2.8*

The average number of veterinary visits for goats in the past year was lower than that for both cows and chickens—only 2.3. This is not necessarily an indication of lower disease burden, however. The 2002 NSCA census found that the prevalence of worms was much higher in goats than in cows, but that fewer farmers treated their goats. Goats suffer from many of the same ailments as cows, namely mastitis, skin infections, lumpy skin disease, and worms. Of the 16 farmers who indicated the diseases for which they sought veterinary care, 50 percent marked worms, 37 percent marked diarrhea, 31 percent marked pneumonia, and 25 percent marked skin infections. Half of the farmers did not know the reason for their goats' deaths, but pneumonia is considered the most common killer. Diarrhea was also a common cause of death, indicated in one quarter of goat deaths.

Table 7 – Disease Prevalence and Cause of Death in Goats

	% of Farmers Seeking Vet Care for each Disease	Cause of Chicken Death—Farmer Reports (%)
Total Sample Size	*16*	*16*
Pneumonia	*31%*	*19%*
Worms	*50%*	*19%*
Skin Infections	*25%*	*6%*
Diarrhea	*37%*	*25%*
Don't Know	*6%*	*50%*

While veterinary visits were scarce, the estimated cost of these visits was higher than that for chickens, at 13,875 shillings. The range for these estimations was also large, from 1,500 to 50,000 shillings, and as stated above, a lack of record keeping probably results in very rough estimations. Almost 40 percent of these farmers felt veterinary care was too expensive, and 20 percent indicated that it was not available. These rates are comparable to those for chickens. Less than one quarter of farmers used muarubaini leaves or other traditional medicines to treat their goats, although a few farmers said they dipped their goats in saltwater to help with skin infections and insects. Average goat deaths in the past year were almost twice as high as cow deaths, possibly the effect of less veterinary care. Once again though, the vast majority indicated that their goats were in good or very good health. Only one farmer chose 'poor.'

V. Mixed-Breed versus Local Animals

In addition to considering the difference between FFS and non-FFS groups, the results can also be analyzed in terms of local and mixed-breed or exotic animals. The majority of exotic animals in Zanzibar are bred with local animals for practical and economic reasons, but in this section, for the sake of comparison, these mixed-breed animals will be labeled 'exotic.' Many of the farmers with exotic animals also keep local ones, and the two are lumped together in the survey, so the 'exotic' group results should be interpreted as those averages of farmers owning at least a few exotic animals.

Table 8 – Exotic and Local Animals

	Local Animals	**Exotic Animals**
Sample Size (Cows)	*24*	*26*
Ave. Number of Cows	*4.64*	*4*
Ave. Monthly Income (Tsh)	*26,460*	*195,423*
Ave. Cost of Vet. Care (Tsh)	*24,723*	*34,060*
Sample Size (Chickens)	*43*	*12*
Ave. Number of Chickens	*24*	*99*
Ave. Monthly Income (Tsh)	*21,705*	*62,709*
Ave. Cost of Vet. Care (Tsh)	*8,101*	*25,333*

Those farmers raising exotic animals have a clear income advantage—farmers with dairy cows earned almost eight times that of farmers with only zebu, and farmers with exotic chickens earned over three times as much as those with local chickens. In the case of chickens, however, this margin of difference is probably accounted for by the higher number of chickens (99 on average) kept by exotic chicken farmers. In fact, although local chicken farmers kept one quarter of that (24), on average, they made one third of the income. Exotic chicken farmers spent over three times as much on veterinary care, but this could also be accounted for by their larger flocks. Dairy farmers, on the other hand, kept fewer cows on average and only spent 40 percent more on veterinary care.

Figure 7 – Local versus Dairy Cows—Monthly Income and Veterinary Costs

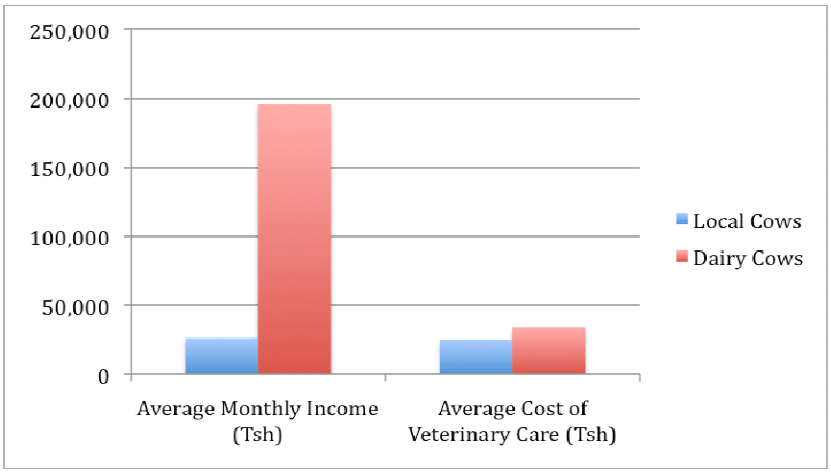
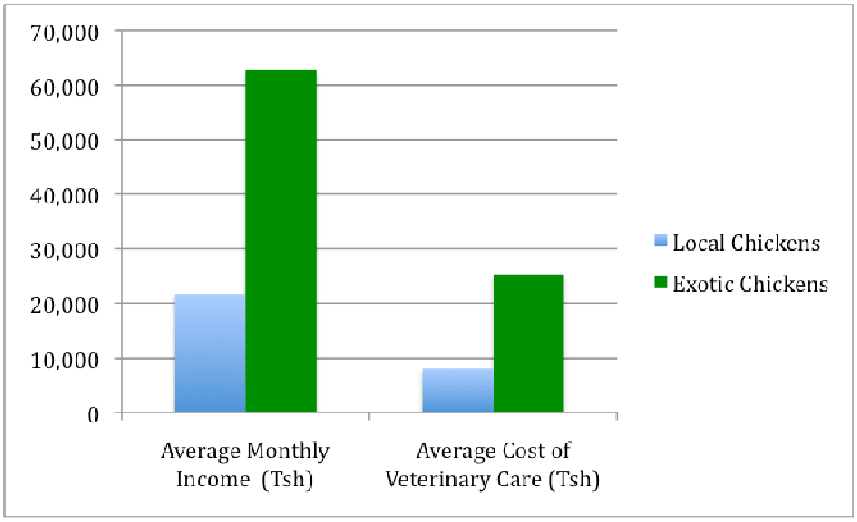


Figure 8 – Local versus Exotic Chickens—Monthly Income and Veterinary Costs



It is impossible to draw conclusions from such a small sample size, but these results indicate that dairy farming can produce a substantial monthly income for farmers, without prohibitively inflated veterinary costs. Chicken keeping can also provide a valuable supplementary income for families, but exotic chickens do not generate a substantially increased profit, at least compared with local chickens. In order to better compare the benefits of exotic chickens, a sample of farmers with similar flock sizes is needed. In the last section of the survey, farmers were asked if they would prefer to raise local or exotic animals. Even though 'both' was not an option, almost half of the farmers marked both boxes. Thirty percent of the farmers preferred local breeds, and only 20 percent desired exotic animals. Perhaps farmers were hesitant about exotic breeds because they understood the costs and difficulties

associated with raising them in Zanzibar's environmental and economic climate. The results of the surveys suggest that while dairy cows are certainly worth the trouble, exotic chickens are not much more profitable than local chickens.

VI. Farmer Attitudes and Education

The final section of the survey focused on farmer attitudes towards livestock education and veterinary services. As described above, 62 of the farmers surveyed had participated in FFS, while 51 had not. The FFS group was almost twice as likely to have received additional livestock education as the non-FFS group—48 percent versus 25 percent. These results could be a reflection of a number of factors, from individual motivation to inequitable distribution. The non-FFS Shehias were not significantly more remote or inaccessible, so it is curious that other educational opportunities would also be concentrated in the FFS Shehias, but it is certainly a possibility. Alternatively, farmers now participating in FFSs could have had educational opportunities in the past that made them more likely to pursue further education. Whatever the case, only four farmers felt that their educational opportunities had not been beneficial to the well-being and productivity of their animals.

Table 8 – Farmer Views on Education and Veterinary Services

	Total	**Without Farmer Field Schools**	**With Farmer Field Schools**
% Receiving Livestock Education other than FFS	*45%*	*25%*	*48%*
% of Farmers Pleased with Vet Services	*88%*	*78%*	*100%*
% of Farmers who can Afford Medicines for Animals	*39%*	*34%*	*50%*
Overall Attitude Towards Livestock Services	*Very Good-32%* *Good-48%* *Poor-11%* *None-10%*	*Very Good-13%* *Good-42%* *Poor-21%* *None-24%*	*Very Good-44%* *Good-52%* *Poor-5%* *None-0%*

Every FFS participant marked 'yes' when asked if they thought having a CAHW in their community was beneficial. The question was supposed to be focused solely on CAHWs, but the meaning was probably taken to be veterinary extension officers in general, because 78 percent of the non-FFS, many of whom did not live in Shehias with CAHWs, also indicated 'yes.' On a less positive note, only 50 percent of FFS participants and 34 percent of non-FFS participants felt they could afford the medicines provided by veterinary workers. While about half of the total participants were satisfied with the overall livestock development and veterinary services in their area, the non-FFS group was four times as likely to mark 'poor' in their assessment of these services, and 24 percent of the non-FFS group indicated that there were no services available.

Figure 9 – Livestock Education

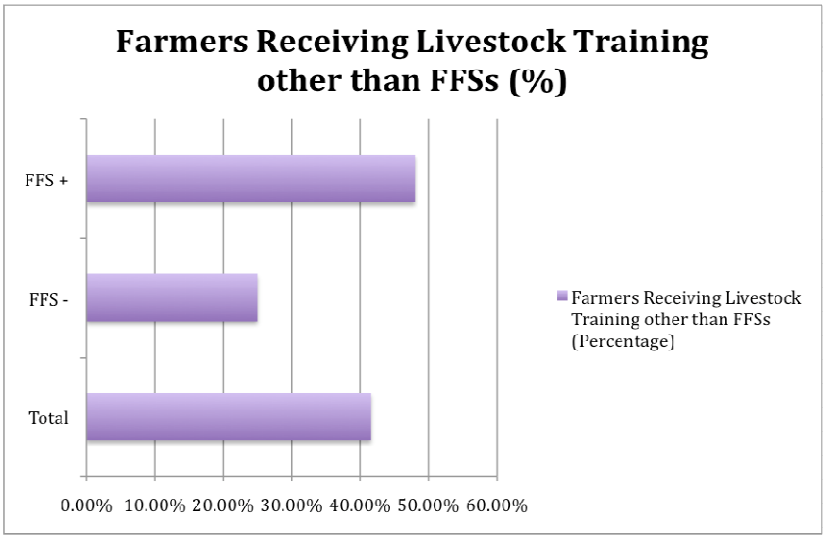
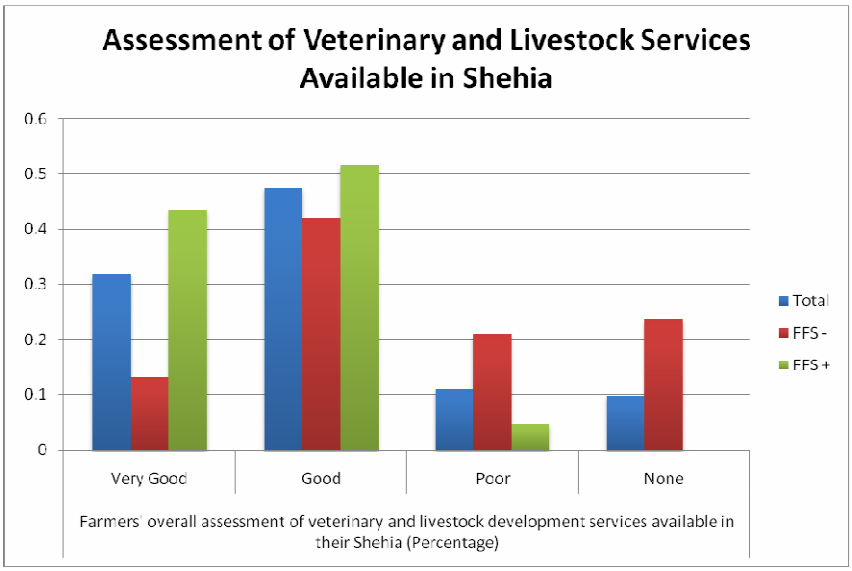


Figure 10 – Farmer Assesment of Livestock Development and Veterinary Services in Shehia



VII. Community Animal Health Workers

Zuhura Abdallah has been a CAHW in Kangani Shehia for three years. She works two days a week visiting sick animals, and three days at the human health clinic. Although her only training for the CAHW position was a three month course in Chake Chake, she feels confident because of her previous Red Cross training on human health. She buys medicines in Chake Chake for the farmers in Kangani, but many are not able to afford them or her services. Still, she says, she helps them. When asked about the introduction of mixed-breed livestock, she said the environment in Pemba is not good for them, but they are still increasing. While East Coast Fever is a common problem in her Shehia, she said there are fewer deaths now because of good medicine. As in other areas, she indicated Newcaste disease and pneumonia as the most common infections in chickens and goats, respectively. Zuhura felt that the biggest limitation to livestock development in Zanzibar is lack of space. She said the farmers are unable to find land to graze cows and goats. With 531 people per square kilometer in south Pemba, space is certainly a challenge (Zanzibar Statistics).

Assaa has also been a CAHW for three years. He is responsible for two remote Shehias north of Wete, each with seven villages. He stressed the problem of getting medicine to farmers. He buys medicines in Wete, but then farmers are unable to afford them. If he gives them to the farmers, he goes into debt with the pharmacy in town. He said transportation is

expensive—the roads into Ukunjwi and the villages are poor. When pressed, however, he admitted that over the course of the year, enough farmers are able to pay for his services and medicines that he remains out of debt, and can continue his work. CAHWs provide a source of advice and support from someone already established in the community, a system that bolsters trust and mutual respect. Furthermore, transportation into rural areas is expensive for veterinary officers, increasing the price of veterinary care. A CAHW is always available in the area, and after applying first aid treatment and making diagnosis when possible, they can help the farmer decide if a veterinary officer needs to be called.

VII. Wete District-Interview with Makame Nyange and Abbass Hassad, Veterinary Officers

Fertile, hilly, and heavily farmed, Wete district supports only five veterinary officers with a diploma, and 20 CAHWs. Makame and Abbass, veterinary officers in Wete District, felt that Pemba was making progress in livestock development—twenty years ago there were no dairy cows, and cattle disease control is good. Still, about one quarter of cattle die from ECF, both local and dairy. There is now a milk processing plant in Chake Chake, and about 30 percent of milk is processed there, while the rest is sold directly in local markets. One liter of milk goes for about 700 shillings at the farm level, and 1,000 shillings at the market. Goat and chicken disease control is struggling—they said that some farmers claim that of every 20 chicks born, 17 die from disease and theft. Nevertheless, eggs are only imported during the festival after Ramadhan; the rest of the year all eggs consumed are produced locally. Makame and Abbass spoke highly of past programs such as PADEP and SHLDP (Small-Holder Livestock Development Project), funded by Ireland in the 1980s, which helped provide farmers with animals. They noted the weaknesses of ASSP and its FFS program—mostly that it provides education without capitol. Even with knowledge and better management techniques, the majority of farmers lack the investment capacity to buy animals and implement their knowledge. Most farmers make so little money, because the output of local animals is low, that they cannot care for their livestock and they die of disease. This creates a cycle of poverty where livestock can even become a drain on farmers. Where farmers have been provided with

dairy cows and other animals, through programs such as PADEP, they are able to turn a profit and care for their animals, pulling themselves out of the cycle. They said that this has occurred mostly near urban areas, such as Jadida, and that exotic animals are extremely rare in rural areas.

VIII. Farmer Field Schools

In addition to the four FFSs that were surveyed, two classes were attended—in Pandani and Hindi. The Pandani class was discussing different ways to keep chickens, and the costs of each situation. In Hindi, the class was learning about fowlpox, worms, infectious coryza, coccidiosis, Newcastle disease, and other chicken diseases. The Hindi class was entirely female, and two young girls were taking notes. In Pandani, 10 women and three men attended, most accompanied by children. The classes took place in simple community buildings, and the participants took down the notes that were written on the wall by an instructor. Each class had begun by building a handsome chicken coop and yard. The walls were made of small trees and the roofs of coconut leaves. In Pandani, the group had put their money together to invest in mixed-breed chicks, imported from the mainland. Only a few chicks had survived, however, because there was no money to buy feed. The participants had similar concerns with ASSP as Makame and Abbass. They pointed out that although they wanted to raise livestock the way FFS taught them too, they had no money to buy chicks, feed, and medicines. They needed supplies as well as education, a period of financial support before their chickens grew up and started producing eggs. After six or so months, they knew they would be able to support themselves. The Hindi group had not yet purchased animals. Perhaps they will have better success, and can eventually establish a group business.

IX. Poultry Farmers Development Organization (POFADEO)

Omari Hammad is the executive secretary of POFADEO, a decade old non-governmental organization devoted to providing poultry farmers with management and marketing information. Associated with the international Community Animal Health Network (CAHNET), there are 55 members in the organization, each of whom contributes 500 shillings

a month. This, along with donor funding, finances the organization's outreach services. These services include vaccinations, hygiene and disease training, and livestock policy and marketing education. In addition, they work with over 50 poultry farming groups that keep between 100 and 300 exotic chickens. An egg brings in 250 shillings, and a chicken sold for slaughter between 3,000 and 15,000, depending upon its size. According to Omari, the organization promotes the use of local chickens for most farmers, because they are easier to raise and most Zanzibaris prefer local eggs and meat. This policy rings true with the results of the survey.

X. Sources of Error

Because of the nature of this study, one based on interviews and surveys, there are an abundance of possible sources of error. The majority of facts presented throughout this paper are based on informal interviews with veterinary personnel and others working in livestock development in Zanzibar. Transcripts were not taken of the interviews, so this information could not be formally cited. Even more importantly, the majority of farmers surveyed had difficulty reading, and required assistance from the surveyors. Because the farmers filled out the survey simultaneously, there was substantial discussion about the questions, none of which the researcher could understand. The sample size was small, and each section had a different sample size, depending upon which animals the farmers kept. Many of the questions were difficult to answer, especially those asking farmers to estimate incomes and expenditures. They were given very rough estimates by farmers and may not represent the reality of farming in Zanzibar. Furthermore, most of the surveys were administered by a veterinary officer, certainly not an unbiased observer when farmers were asked to express their attitudes towards veterinary and livestock services. The atmosphere was far from adversarial, however—on the other hand, the farmers seemed to view the livestock personnel helping them as a voice for their concerns.

Conclusion

The aim of this study was to gain an understanding of livestock development and veterinary issues in Zanzibar, from both a policy and field-based perspective. Zanzibar is a developing country whose rural residents are largely dependent upon agricultural production for both subsistence and income. The market for a larger livestock production sector exists, but most Zanzibaris lack the investment capacity to increase production. Indigenous animals are low producing, and many farmers are stuck in a cycle of livestock death and profit loss because they are unable to properly care for their animals. Livestock development programs such as Farmer Field Schools are working to empower farmers through education, but the survey results indicate that while FFS participants take better care of their animals through increased veterinary care, traditional treatments, supplementary feeds, they are not necessarily more successful farmers. Furthermore, the FFS participants and non-FFS participants surveyed had very similar attitudes towards the expense of these supplementary feeds and livestock services. The establishment of CAHWs in some Shehias has been a positive source of advice and resources for rural farmers, and most farmers were pleased overall with the livestock development services offered in their area, although these views were concentrated amongst the FFS participants. Despite this apparent satisfaction, the majority of farmers felt they were unable to afford medicines for their animals. In interviews, farmers, CAHWs, and livestock extension officers all stressed the poverty of farmers in Zanzibar, and emphasized the importance of capital aid along with education.

Education is a huge hurdle Tanzania. The majority of farmers surveyed struggled to read, and only a few knew any English, even though secondary school in Zanzibar is taught in English. With such low literacy rates, farmers have limited access to information and opportunities which may be intended to educate and empower them. High disease burden, limited professionals, and a lack of research and technology further impede development. The government does not have the resources or efficiency to provide farmers with the financial support they need to expand their livestock keeping into profitable enterprises. During the course of this study, many government workers agreed that funding needs to come from

abroad. It already is, of course, and many of the dairy farmers surveyed owe their success to past programs such as PADEP. This program was repeatedly spoken well of, because it worked to provide farmers with animals as well as education.

Certainly, the FFS program is beneficial to farmers, inspiring them to manage their livestock as efficiently as possible. But it is most relevant to farmers who are already raising mixed-breed animals. Many of the differences between the two sample groups were likely a result of the FFS selection process, which attracted farmers already owning exotic animals, and not an outcome of the field schools themselves. Livestock production has the potential to significantly bolster farmers' incomes, and it is already benefiting many of the families surveyed in this study, but more farmers need financial support to expand and sustain production, until their animals become profitable. Future livestock development programs should focus on micro-finance and other such systems of financial or resource support.

Recommendations

In its attempt to create a comprehensive picture of the state and challenges of livestock development and veterinary issues in Zanzibar, this study only scratched the surface. There are many, many more extension programs, both governmental and non-governmental, than are highlighted in this study, and there is a plethora of farmers and providers willing to share their wisdom. Overall, the major obstacle during this study was the language barrier. Because the researcher could not understand the hours of discussion that took place as the farmers filled out the survey, only tiny fraction of information was gained—that limited to what was expressed in the survey. A fluent translator is essential, and while the veterinary officers who helped administer the surveys were wonderful and wonderful, the reality is that farmers were answering question about their attitudes toward veterinary services while a veterinarian was reading them the questions. If possible, a non-biased translator should be used.

In the future, a trial run of the survey should be administered, so that changes can be made. Especially as a researcher working in a culture for the first time, this is very important! It is hard to know which questions will work and which will be irrelevant or difficult for those

surveyed to answer. Also, in order to more accurately depict the situation, a much larger sample size is needed. This study has a very wide scope, covering many angles. For depth, future studies should focus on just one animal, issue, or location. Research could also focus on finding small solutions to the issues of livestock development and its relationship to poverty in rural Zanzibar. For instance, a plan for micro-financing livestock farmers could be developed and even executed. The complexity of the poverty in places like Zanzibar can seem overwhelming, but Zanzibar is small enough that whole systems are relatively easy to pick out. And once the system is understood, the senseless cycles of poverty inherent in it can begin to be eradicated.

Works Consulted

Ahmed, S. 2011. *Interview on Veterinary Services in Pemba.* Interviewed by Shauna Milne-Price. [in person]. Chake Chake, Pemba.

Ame, K.S. 2011. *Interview on Veterinary Services in Pemba.* Interviewed by Shauna Milne-Price. [in person]. Chake Chake, Pemba.

Biwi, K.M., Development of smallholder dairying in Zanzibar in: Kategile, J.A., and Mubi, S., eds. 1993. *Future of Livestock Industries in Eastern and Southern Africa: proceedings of the workshop held at Kadoma Ranch Hotel, Zimbabwe, 20-23 July, 1992*. Addis Ababa, Ethiopia: International Livestock Centre for Africa. pp 173-176.

Biwi, K.M., Rabia, A.R., and Dolan, T.T. Immunization of cattle against East Coast Fever: Experiences in Zanzibar in: Kategile, J.A., and Mubi, S., eds. 1993. *Future of Livestock Industries in Eastern and Southern Africa: proceedings of the workshop held at Kadoma Ranch Hotel, Zimbabwe, 20-23 July, 1992*. Addis Ababa, Ethiopia: International Livestock Centre for Africa.

Black Caraway Seeds (Haba Soda). *Turn to Islam.*[online] Available at:< http://www.turntoislam .com/forum/showthread.php?t=20793>. [Accessed April 29, 2011].

Gitau, G.K., Waridi, M., Makame, H.A., Saleh, M. M., Muhamed, R.A., Mkola, A.P., Haji, M.A. Occurrence of High Udder Infection Rates in Dairy Cows in Unguja Island of Zanzibar, Tanzania. *The International Journal of Applied Research in Veterinary Medicine.* [online] Available at<http://jarvm.com/articles/Vol1Iss1/GITAUJVM.htm> [Accessed 03 March 2011].

Hammad, O. 2011. *Interview on Poultry Farmers Development Organization in Pemba.* Interviewed by Shauna Milne-Price. [in person]. Chake Chake, Pemba.

Hassan, A., and Nyange, M., 2011. *Interview on Veterinary Services in Wete District.* Interviewed by Shauna Milne-Price. [in person]. Wete, Pemba.

Household Incomes. *Zanzibar HBS.* [online] Available at:<http://www.ocgs.go.tz/documents/ CHAPTER%209.pdf>. [Accessed 26 April 2011].

Juma, K.G., Mudwana, P., Ali, K.O., Kassim, O.B., and Lewis, B. The status of East Coast fever immunization on Pemba Island. *Ministry of Agriculture, Livestock and Natural Resources: Livestock Subcommission* [online] Available at:<http://www.ilri.org /InfoServ/Webpub/fulldocs/Dolanm/pamba2.htm>[Accessed 08 March 2011].

(MANRZ) Ministry of Agriculture and Natural Resources Zanzibar. *The Revolutionary Government of Zanzibar*. 2010. [online] Available at:< http://www.kilimoznz.or.tz/assp-a-asdp-l.html>. [Accessed 26 April 2011].

(NSCA) National Sample Census of Agriculture-2002/2003: Smallholder Agriculture. Volume VIII: Livestock Sector-Zanzibar Report. *Executed Jointly by the Office of the Chief Government Statisticians, National Bureau of Statistics, and the Ministry of Agriculture, Natural Resources, and Environment and Cooperatives in Zanzibar*. August 2006. Government Publication.

Ramadhan, R.J. 2011. *Interview on Veterinary Services in Zanzibar.* Interviewed by Shauna Milne-Price. [in person]. Maruhubi, Zanzibar.

Saleh, K.M. 2011. *Interview on Agricultural Services Support Program in Zanzibar.* Interviewed by Shauna Milne-Price. [in person]. Maruhubi, Zanzibar.

Talibii, S. 2011. *Interview on Agricultural Services Support Program in Zanzibar.* Interviewed by Shauna Milne-Price. [in person]. Maruhubi, Zanzibar.

Simpson, B., and Owens, M. Farmer Field Schools and the Future of Agricultural Extension in Africa. *Sustainable Development Department (SD), Food and Agriculture Organization of the United Nations (FAO).* July 2002. [online] Available at:<http://www.fao.org/sd/2002/KN0702a_ en.htm>. [Accessed 26 April 2011].

The Merck Veterinary Manual. Sixth Edition. 1986. Rahway New Jersey: Merck & Co., Inc.

Tsetse fly eradicated on the Island of Zanzibar. Food and Agriculture Organization of the United Nations. [online] Available at:<http://www.fao.org/english/news room/highlights/1998980505-e.htm> [Accessed 09 March 2011].

(ZFSNP) Zanzibar Food Security and Nutrition Policy. The Revolutionary Government of Zanzibar. April, 2008. Government Publication. [online] Available at:< http://www. kilimoznz.or.tz/images/policies/zfsnpolicy.pdf> [Accessed 26 April 2011].\

Zanzibar Statistics. Zanziabar *Forum: Where Zanzibaris Meet.* [online] Available at:<http://www. zanzinet.org/zanzibar/stats/takwimu.html>. [Accessed 26 April 2011].

Appendix A: Acronyms

ASDP-L-Agricultural Sector Development Program-Livestock

ASSP-Agricultural Services Support Program

CAHW-Community Animal Health Worker

ECF-East Coast Fever

FFS-Farmer Field School

IFAD-International Fund for Agricultrual Development

NSCA-National Sample Census of Agriculture

PADEP-Participatory Agriculture Development Program

POFADEO-Poultry Farmers Development Organization

SHLDP-Small-Holder Livestock Development Project

TBD-Tick-Borne Diseases

WSPA-World Society for the Protection fo Animals

Appendix B: List of Interviewees

Dr. Salim Ahmed, Veterinarian, Wete District, Pemba—February 2011

Dr. Kassim Shaali Ame, Veterinarian, Chake Chake District, Pemba—February 2011

Dr. Ramadhan Juma Ramadhan, Veterinarian, Maruhubi Clinic, Unguja—March and April 2011

Dr. Talibii Saleid, ASSP Director—March 2011

Khalfan M. Saleh, ASSP Assistant Program Coordinator—March 2011

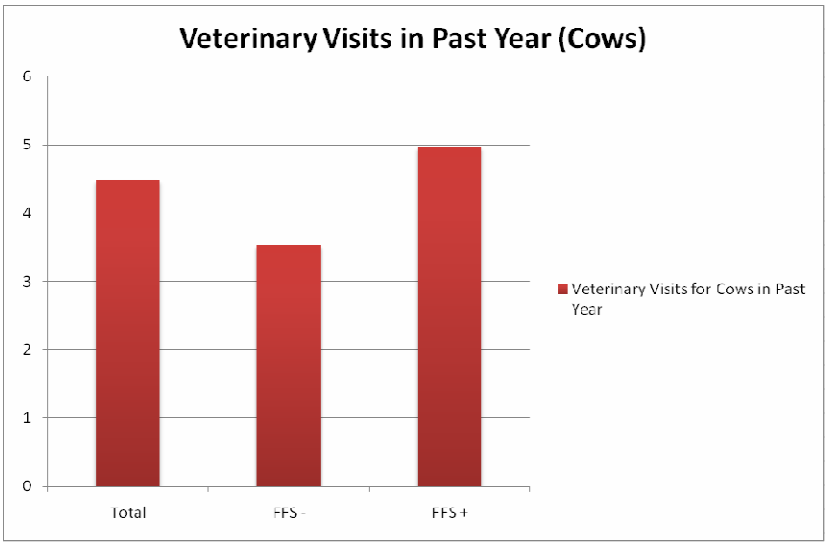
Omari Hammad, POFADEO Executive Secretary, Chake Chake, Pemba—April 2011

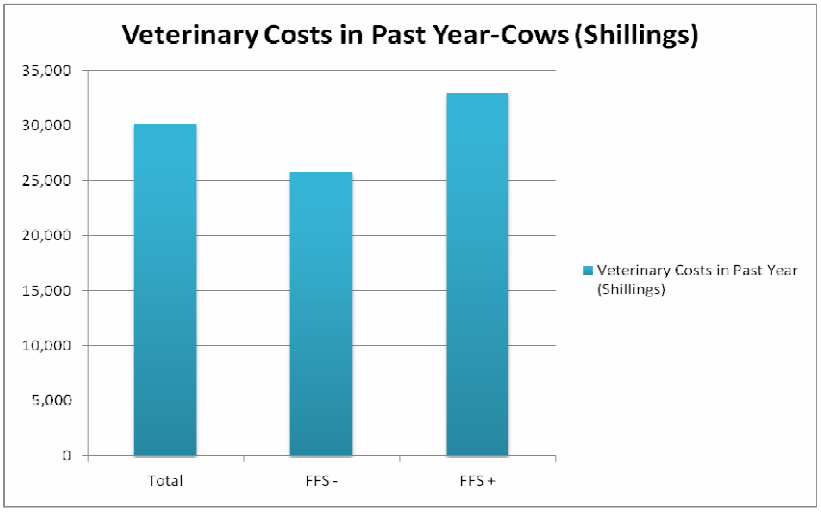
Makame Nyange, Veterinary Extension Officer, Wete District, Pemba—April 2011

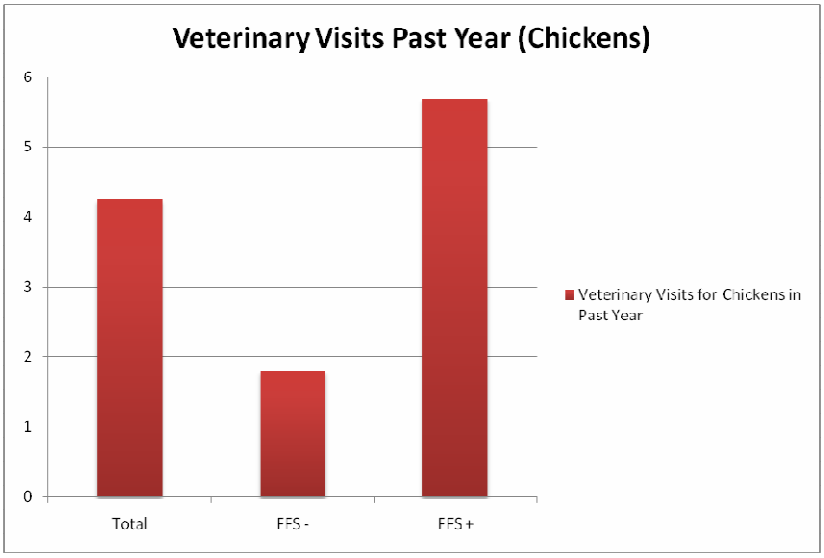
Abbass Hassan, Veterinary Extension Officer, Wete District, Pemba—April 2011

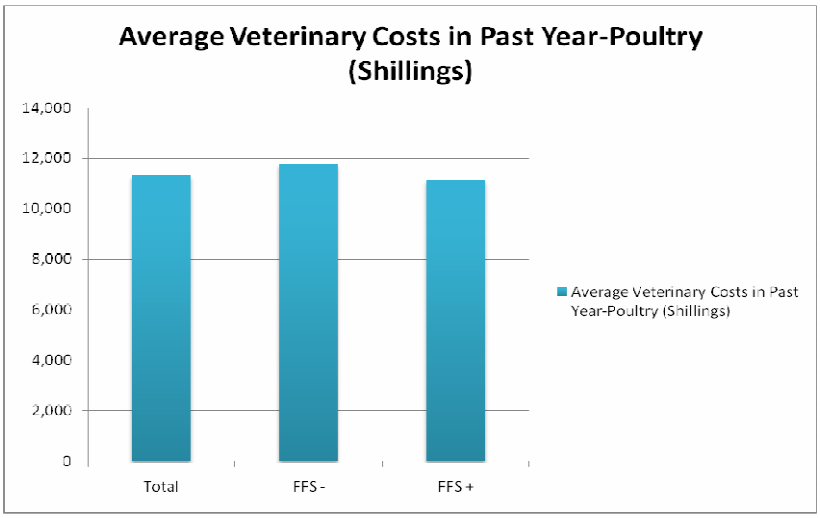
Bizume M. Kombo, District Veterinary Officer, Maruhubi Clinic, Unguja—April 2011

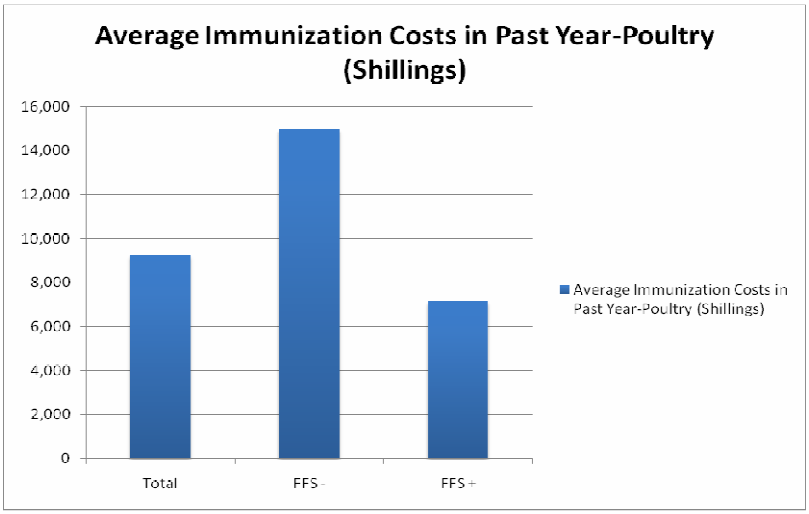
Appendix C: Graphs

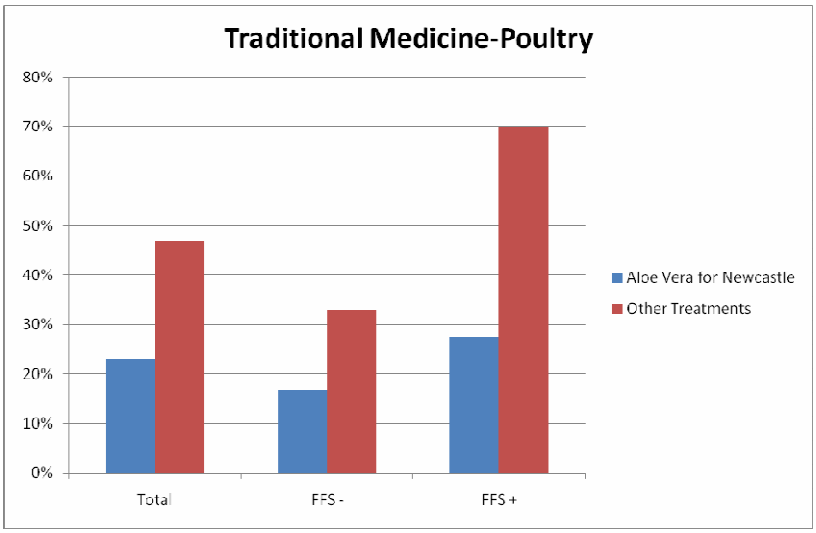

Veterinary Visits in Past Year (Cows)
6
5
4
3
2
1
0
Total
FFS -
FFS +
Veterinary Visits for Cows in Past Year


Veterinary Costs in Past Year-Cows (Shillings)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Total
FFS -
FFS +
Veterinary Costs in Past Year (Shillings)


Veterinary Visits Past Year (Chickens)
6
5
4
3
2
1
0
Total
FFS -
FFS +
Veterinary Visits for Chickens in Past Year


Average Veterinary Costs in Past Year-Poultry (Shillings)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Total
FFS -
FFS +
Average Veterinary Costs in Past Year-Poultry (Shillings)


Average Immunization Costs in Past Year-Poultry (Shillings)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Total
FFS -
FFS +
Average Immunization Costs in Past Year-Poultry (Shillings)


Traditional Medicine-Poultry
80%
70%
60%
50%
40%
30%
20%
10%
0%
Total
FFS -
FFS +
Aloe Vera for Newcastle
Other Treatments

Appendix D: Swahili Survey

Maswali kwa Wafugaji **Shehia_____**

A. Maelezo Binafsi:

1. Unaitwa nani?_____
2. Unamiaka mingapi?_____
3. Mwanamme_____ Mwanamke_____
4. Umefuga kwa miaka mingapi?
5. Wazazi wako walikuwa wafugaji?
6. Je una ekari ngapi za malisho?
7. Wanyama gani unafuga? Ng'ombe_____ Idadi_____
   Mbuzi_____ Idadi_____
   Kuku_____ Idadi_____

B. Ng'ombe (ikiwa huna ng'ombe, acha sehemu hii)

1. Una ng'ombe wa aina gani?
   Zebu_____ Idadi_____
   Ng'ombe wa maziwa wa kigeni_____Idadi_____
2. Unatumia ng'ombe kwa matumizi gani? (eka alama ya vema kwa majibu sahihi)
   Usafiri_____ Nyama_____
   Maziwa_____ Kuuza_____
3. Ng'ombe wako wanawekwa wapi?
   Bandani_____
   Wanaachiliwa nje_____
   Wanafungwa kamba_____
4. Je unawapa ng'ombe wako chakula cha ziada?
   Ndiyo_____ Hapana_____
5. Kama ni hivyo, aina gani?
   Pumba za mahindi_____ Pumba za mpunga_____
   Pumba za gano_____ Pumba za pollard_____
6. Ikiwa huwapi chakula cha ziada, kwa nini?
   Huhitaji_____ Ghali_____
   Hawapatikani_____ Nyengi nezo_____
7. Lita ngapi za maziwa ng'ombe wako wanatowa kwa siku?
   Idadi lita_____
8. Unauza maziwa ya ng'ombe wako?
   Ndiyo_____ Hapana_____

   Kama ni hivyo, unapata kiasi gani kwa mauzo ya maziwa kwa mwezi?

_____ Tsh

9. Mara ngapi katika mwaka uliopita ulipata daktari wa wanyama?_____

Kwa sababu gani daktari wa wanyama alikuja mwaka uliopita? (eka alama ya vema kwa majibu sahihi) Minyoo_____ Homa ya matuku (ECF)_____

Chambavu_____ Kizungu zungu (Heart wáter)_____

Maradhi ya ngozi____Maradhi ya kiwele_____

Babesiosis_____ Mengineyo_____

Hujui maradhi gani_____

10. Ulilipa kiasi gani kwa daktari wa wanyama mwaka uliopita?

_____ Tsh

11. Ikiwa huku pata daktari wa wanyama katika mwaka uliopita, kwa nini?

Huhitaji_____ Ghali_____

Hawapatikani_____ Nyengi nezo_____

12. Unatumia kupe dawa ya kuulia kupe kwa ng'ombe wako?

Ndiyo_____ Hapana_____

Kama ni hivyo, mara ngapi?

Kwa wiki_____ Mara mbili kwa wiki_____

Kwa mwezi_____

Kama si hivyo, kwa nini?

Huhitaji_____ Ghali_____

Hawapatikani_____ Hujui kuhusu dawa ya kuulia kupe_____

13. Ulishawahi kuchoma tezi za ng'ombe kwa moto kwa kutibu homa ya matuku?

Ndiyo_____ Hapana_____

Ng'ombe wangu hawajawahi kupata homa ya matukwi (ECF)_____

Kama ni hivyo, unafikiri matibabu yalikuwa mazuri?

Ndiyo_____ Hapana_____

14. Ulishiwahi kutumia haba soda kutibu maradhi ya kiwele kwa ng'ombe wako?

Ndiyo_____ Hapana_____

Kama ni hivyo, unafikiri matibabu yalikuwa mazuri?

Ndiyo_____ Hapana_____

15. Ulishiwahi kutumia majani ya muarubaini kutibu ng'ombe wako kwa maradhi ya ngozi au wadudu?

Ndiyo_____ Hapana_____

Kama ni hivyo, unafikiri matibabu yalikuwa mazuri?

Ndiyo_____ Hapana_____

16. Ng'ombe wa ngapi walikufa katika miaka mitano iliopita?_____

Walikufa kwa maridhi gani? (eka alama ya vema kwa majibu sahihi)

Homa ya matuku_____Chambavu_____

Maradhi ya ngozi_____Maradhi ya kiwele_____

Babesiosis_____ Kizungu zungu (Heart wáter)_____
Mengineyo_____ Hujui maradhi gani_____

17. Je unatathmini vipi afya ya ng'ombe wako?
Nzuri sana_____
Nzuri_____
Mbaya_____

C. Kuku (ikiwa huna kuku, acha sehemu hii)

1. Una kuku wa aina gani? Kuku wa kienyeji_____Idadi_____
Kuku wa kigeni:
a. Kuku wa mayai_____Idadi_____
b. Kuku wa nyama_____Idadi_____
2. Unauza mayai au nyama kuku wako?
Ndiyo_____ Hapana_____
Kama ni hivyo, unapata kiasi gani kwa kuku kwa mwezi?
_____ Tsh
3. Je unawapa kuku wako chakula cha aina gani?
Mabaki ya jikoni_____Pumba za mpunga_____
Pumba za gano_____ Pumba za pollard_____
Chakula chenye madini_____
Siwapi chakula, kwa sababu kuku wa kienyeji wanaoachiwa____
5. Ikiwa huwapi chakula cha ziada au chakula chenye madini, kwa nini?
Huhitaji_____ Ghali_____
Hawapatikani_____ Nyengi nezo_____
6. Mara ngapi katika mwaka uliopita ulipata daktari wa wanyama?_____
7. Kwa sababu gani daktari wa wanyama alikuja mwaka uliopita? (eka alama ya vema kwa majibu sahihi)
Minyoo_____ Kuharisha_____
Mahepe_____ Gumboro_____
Ndui_____ Mafua_____
Mengineyo_____ Hujui maradhi gani_____
8. Ulilipa kiasi gani kwa daktari wa wanyama mwaka uliopita?
_____ Tsh
9. Ikiwa huku pata daktari wa wanyama katika mwaka uliopita, kwa nini?
Huhitaji_____ Ghali_____
Hazipatikani_____ Nyengi nezo_____
10. Je kuku wako wanapata chanjo zidi ya: (eka alama ya vema kwa majibu sahihi)
Mahepe_____ Gomboro_____
Ndui_____ Hawapati chanjo_____
Kuku walipata chanjo lakini hujui maradhi gani_____

11. Ulitumia kiasi gani kwa chanjo ya kuku wako mwaka uliopita?
_____ Tsh
12. Ikiwa kuku wako hawapati chanjo, kwa nini?
Huhitaji_____ Ghali_____
Hawapatikani_____ Hujui kuhusu chanjo_____
13. Ulishawahi kutumia mshubiri mwitu kutibu kuku wako kwa maradhi ya Newcastle?
Ndiyo_____ Hapana_____
Kama ni hivyo, unafikiri matibabu yalikuwa mazuri?
Ndiyo_____ Hapana_____
14. Unatumia dawa za kienyeji nyingine kwa kutibu kuku?
Ndiyo:_____ Maradhi gani?_____
Matibabu gani?_____
Hapana_____
15. Kuku wa ngapi walikufa katika mwaka mmoja iliopita?_____
16. Sababu kuu zilizifanya kuku kufa au kupungua?
Minyoo_____ Kuharisha_____
Mahepe_____ Gumboro_____
Ndui_____ Mafua_____
Mengineyo_____ Hujui maradhi gani_____
Kuliwa na wanyama kama kunguru, mwewe, paka, na ka thalika__
Wizi_____
17. Je unatathmini vipi afya ya kuku wako?
Nzuri sana____ Nzuri_____ Mbaya_____

D. Mbuzi (ikiwa huna mbunzi, acha sehemu hii)

1. Una mbuzi wa aina gani? Mbuzi wa kienyeji_____Idadi_____
Mbuzi wa kigeni (mbuzi wa maziwa)_____Idadi_____

2. Unauza maziwa au nyama mbuzi wako? (eka alama ya vema kwa majibu sahihi)
Maziwa_____ Nyama_____
Hapana_____
Kama ni hivyo, unapata kiasi gani kwa mbuzi kwa mwala?
_____ Tsh
3. Je unawapa mbuzi zako chakula cha ziada?
Ndiyo_____ Hapana_____
4. Kama ni hivyo, aina gani?
Mabaki ya jikoni_____Mabaki ya shambani_____
Pumba za mbunga____Pumba za gano_____
Pumba za pollard_____Chakula chenye madini____
5. Ikiwa huwapi chakula cha ziada, kwa nini?

Huhitaji_____ Ghali_____
Hawapatikani_____ Nyengi nezo_____

6. Mara ngapi katika mwaka uliopita ulipata daktari wa wanyama?_____

7. Kwa sababu gani daktari wa wanyama alikuja mwaka uliopita? (eka alama ya vema kwa majibu sahihi)

Minyoo_____ Homa ya mapafu_____
Maradhi ya ngozi____Kuhara_____
Mengineyo_____ Hujui maradhi gani_____

8. Ulilipa kiasi gani kwa daktari wa wanyama mwaka uliopita?

_____ Tsh

9. Ikiwa huku pata daktari wa wanyama katika mwaka uliopita, kwa nini?

Huhitaji_____ Ghali_____
Hawapatikani_____ Nyengi nezo_____

10. Ulishawahi kutumia majani ya muarubaini kutibu mbunzi wako kwa maradhi ya ngozi au wadudu?

Ndiyo_____ Hapana_____

Kama ni hivyo, unafikiri matibabu yalikuwa mazuri?

Ndiyo_____ Hapana_____

11. Unatumia dawa za kienyeji nyingine kwa kutibu mbuzi?

Ndiyo: Maradhi gani?_____
Matibabu gani?_____
Hapana_____

12. Mbuzi wa ngapi walikufa katika miezi sita iliopita?_____

13. Sababu kuu zilizifanya mbuzi kufa au kupungua?

Minyoo_____ Homa ya mapafu_____
Maradhi ya ngozi____Kuhara_____
Mengineyo_____ Hujui maradhi gani_____

14. Je unatathmini vipi afya ya mbuzi wako?

Nzuri sana_____ Nzuri_____ Mbaya_____

E. Huduma za Daktari wa Wanyama na Elimu

1. Je, ulishawahi kushiriki katika skuli ya kilimo (Farmer Field Schools)?

Ndiyo_____ Hapana_____

Elimu za wanyama gani? (eka alama ya vema kwa majibu sahihi)

Ng'ombe_____ Kuku_____ Mbuzi_____

2. Ulishawahi kupata mafunzo mengine yoyote kuhusu wanyama?

Ndiyo_____ Hapana_____

Kama ni hivyo, kwa mudu gani?

Mwaka iliopita_____ Miaka mitatu iliopita_____
Hukumbuki_____

Elimu za wanyama gani? (eka alama ya vema kwa majibu sahihi)

Ng'ombe_____ Kuku_____ Mbuzi_____

3. Unafikiri mafunzo uliyopata yalisaidia kuboresha afya na uzalishaji wa wanyama wako?

Ndiyo_____ Hapana_____

4. Je, wafanya kazi wa afya ya wanyama (Daktari wa wanyama) wana msaada wowote katika Shehia yenu?

Ndiyo_____ Hapana_____

5. Mnaweza kumudu kulipia dawa za wanyama kutoka kwa wafanya kazi wa afya wa wanyama?

Ndiyo_____ Hapana_____

6. Kilomita ngapi mnasafiri kwenda katika clinic ya wanyama?

_____ kilomita

7. Unapenda kufuga wanyama wa kienyeji au wanyama wa kigeni?

Wanayma wa kienyeji_____ Wanyama wa kigeni_____

Sijui_____

8. Una faidika vipi na huduma za maendeleo ya wanyama zinazotolewa katika eneo lako?

Vizuri sana_____ Vizuri_____ Si vizuri sana_____

Hakuna huduma za maendeleo ya wanyama katika eneo langu_____

Asante sana kwa kutumia muda wako! Nimefurahi kwakupata msaada wako.

Appendix E: English Survey

Livestock Development and Veterinary Care Survey (English)

A. Demographics

1. Name:
2. Age:
3. Gender: Male_____ Female_____
4. Years of keeping livestock:
5. Family history of livestock raising? Yes_____ No_____
6. Hectares of pasture:
7. Animals kept (check all that apply): Cows_____ Number_____

Chickens____ Number_____
Goats_____ Number_____

B.Cattle (if no cows skip this section)

1. Which types of cows do you own? (check all that apply)
   Zebu_____ Number_____
   Exotic mixes (Jersey, Friesian, Ayreshire)_____ Number_____
2. For which purposes do you keep cows? (check all that apply)
   Milk_____ Labor_____
   Meat_____ Sale or Auction_____
3. Where are your cows kept?
   Stable_____ Outside Un-tethered_____ Outside Tethered_____
4. Do you give your cows any supplemental feed?
   Yes_____ No_____
5. If so, which type?
   Corn meal_____ Rice meal_____
   Wheat meal_____ Pollard_____
6. If not, why?
   Not needed_____ Too expensive_____
   Not accessible_____ Other_____
7. How many liters of milk do your cows produce a day?
   _____ L
8. Do you sell any of this milk? Yes_____No_____

If so, what are your monthly earnings from milk sales?
_____ Tsh

9. How many times in the past year have you sought veterinary care for your cows?
   _____ times
10. Conditions for which you have sought veterinary care in the past year: (check all that apply)
   Worms_____ East Coast Fever_____
   Black leg_____ Heart water_____
   Skin infections_____ Mastitis_____
   Babesiosis_____ Other_____ Don't know_____
11. About how much have you spent on veterinary care in the past year?
   _____ Tsh
12. If you have not sought veterinary care in the past year, why not?
   Not needed_____ Too expensive_____
   Not accessibly_____Other_____
13. Do you apply acaricides to your cows?
   Yes_____ No_____

If so, how often?

Every week_____ Twice a week_____
Once a month_____

If not, why?

Not needed_____ Too expensive_____
Not accessible_____ Other_____

14.Have you every used branding of the lymph nodes to treat ECF?

Yes_____ No_____

If so, do you think it worked?

Yes_____ No_____

15. Have you ever used muarubiaini leaves to treat your cows for skin infections, mastitis, or insects?

Yes_____ No_____

If so, do you think it worked?

Yes_____ No_____

16.How many cows have you lost in the past five years?_____

Diseases from which they have died: (check all that apply)

East Coast Fever_____ Black leg_____
Heart water_____ Mastitis_____
Babesiosis_____ Other_____ Don't know_____

17.How would you rate the health of your cows?

Very good_____ Ok_____ Poor_____

C. Chickens (if no chickens skip this section)

1. Which types of chickens do you own? (check all that apply)

Local_____
Exotic_____

2. Do you sell eggs or meat from your chickens?

Eggs_____ Meat_____ Neither_____

3.If so, how much do you earn per month from your chickens?

_____ Tsh

4.Do you give any supplemental feed to your chickens?

Yes_____ No_____

5.If so, which type?

Kitchen waste_____
Corn meal_____ Rice meal_____
Wheat meal_____ Pollard_____

6.If not, why?

Not needed_____ Too expensive_____
Not accessible_____ Other_____

10.How many times in the past year have you sought veterinary care for your cows?

_____ times

11.Conditions for which you have sought veterinary care in the past year: (check all that apply)

Worms_____ Diarrhea_____

Newcastle_____ Skin Infections_____

Fowlpox_____ Infectious Coryza_____

Other_____ Don't know_____

11.How much have you spent on veterinary care in the past year?

_____ Tsh

12.If you have not sought veterinary care for your chickens in the past year, why not?

Not needed_____ Too expensive_____

Not accessibly_____Other_____

13.Are your chickens immunized against: (check all that apply)

Newcastle_____ Gumboro_____

Fowlpox_____ Immunized but don't know against what_____

Not immunized_____

14.How much have you spent of immunizations in the past year?

_____ Tsh

15. If not immunized, why?

Not needed_____ Too expensive_____

Not accessibly_____Other_____

14.Have you ever used aloe vera plants to treat Newcastle?

Yes_____ No_____

If so, do you think it worked?

Yes_____ No_____

15. Have you ever used any other types of traditional medicine to treat your chickens?

Describe:

16.How many chickens have you lost in the past year?_____

Reasons for which they have died: (check all that apply)

Newcastle_____ Diarrhea_____

Fowlpox_____ Gumboro_____

Worms_____ Infectious Coryza_____

Skin infections_____ Other_____

Predation_____ Don't know_____

17.How would you rate the health of your chickens?

Very good_____ Ok_____ Poor_____

D. Goats (if no goats skip this section)

1. Do you sell milk or meat from your chickens?

Milk_____ Meat_____ Neither_____

3.If so, how much do you earn per month from your goats?

_____ Tsh

4.Do you give any supplemental feed to your goats?

Yes_____ No_____

5.If so, which type?

Kitchen waste_____ Farm waste_____

Corn meal_____ Rice meal_____

Wheat meal_____ Pollard_____

6.If not, why?

Not needed_____ Too expensive_____

Not accessible_____ Other_____

10.How many times in the past year have you sought veterinary care for your goats?

_____ times

11.Conditions for which you have sought veterinary care in the past year: (check all that apply)

Worms_____ Pneumonia_____

Skin Infections_____ Diarrhea_____

Other_____ Don't know_____

11.How much have you spent on veterinary care in the past year?

_____ Tsh

12.If you have not sought veterinary care for your goats in the past year, why not?

Not needed_____ Too expensive_____

Not accessibly_____Other_____

14.Have you ever used muarubaini leaves to treat skin infections or insects?

Yes_____ No_____

If so, do you think it worked?

Yes_____ No_____

15. Have you ever used any other types of traditional medicine to treat your chickens?

Describe:

16.How many goats have you lost in the past five years?_____

Diseases from which they have died: (check all that apply)

Worms_____ Pneumonia_____

Skin Infections_____ Diarrhea_____

Other_____ Don't know_____

17.How would you rate the health of your goats?

Very good_____ Ok_____ Poor____

D. Veterinary Services and Livestock Education

1. Have you ever participated in a Farmer Field School course?

Yes_____ No_____

If so, how long ago?

In the past year_____ In the past five years_____
Can't remember_____

Which animals did you receive education about?
Cows_____ Chickens_____ Goats_____

2. Have you ever received any other training about livestock keeping and management?
Yes_____ No_____

If so, how long ago?
In the past year_____ In the past five years_____
Can't remember_____

Which animals did you receive education about?
Cows_____ Chickens_____ Goats_____

3. Do you think any of the above training has benefited the health, well-being, and productivity of your animals?
Yes_____ No_____

4. Do you find having a community animal health worker in your Shehia beneficial?
Yes_____ No_____

5. Can you afford the animal medications offered by your CAHWs or veterinary clinic?
Yes_____ No_____

6. How far do you have to travel to the nearest veterinary clinic?
_____ km

7. Would you prefer to own local or exotic livestock?
Local_____ Exotic_____

8. Overall, how much do you benefit from the animal services provided in your area?
Very much_____ Some_____ Not at all_____
There are no veterinary or livestock education services available in my area_____

Appendix F: Surveys Done by Shehia

Rural/Urban	Shehia	# Long	# Short	FFS?	# Male	# Female
Rural	Kangani (Pemba)	6	0	2	6	0
Rural	Msuka Masharibi (Pemba)	0	4	0	4	0
Rural	Mzambarauni Takao (Pemba)	13	0	1	13	0
Urban	Jadida (Pemba)	13		13	12	1

Rural	Bopwe (Pemba)	0	1	1	1	0
Rural	Unknown (Pemba)	0	1	1	1	0
Peri Urban	Weni (Pemba)	1	0	1	1	0
Rural	Ukunjwi (Pemba)	13	5	6	5	13
Rural	Kangagani (Pemba)	7	0	1	4	3
Rural	Kidimni (Unguja)	13	0	12	2	11
Rural	Kibuyi Muembe (Unguja)	12	2	14	2	12
Rural	Chwaka (Unguja)	22	3	0	22	3