

# **Animal Husbandry in Zambia – The Key to Success?**

*A Study of Small Scale Farmers, Dairy Farmers and Orphans in Zambia*

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## SUMMARY

Zambia is a developing African country with a large part of the inhabitants living in rural areas. Traditionally, farming and animal husbandry have been in small scale, and the knowledge about farming has been transferred between parents and children when working together. Since the 1980s, Zambia has had a devastating HIV/aids epidemic which has hit the society hard on all levels.

In this study, traditional small scale farmers, female members of small scale dairy cooperatives and orphans were interviewed about their animal husbandry routines and farm. The aims were to investigate if animal husbandry has been affected by the HIV/aids epidemic, if animal husbandry can be beneficial for HIV orphans and if animal related activities (dairy farming in this case) can have a positive impact on the living situation of women.



*Village chicken*

Conclusions drawn from this study is that the living situation does improve due to dairy cooperative membership, the orphans in this study have not benefited from keeping animals and more extensive studies are needed in order to understand the effects of HIV/aids on animal husbandry.

## SAMMANFATTNING

Zambia är ett utvecklingsland i Afrika där en stor del av invånarna lever på landsbygden. Jordbruket har traditionellt varit småskaligt och kunskaper om jordbruk och djurskötsel har erhållits genom att barn och vuxna arbetat tillsammans i jordbruket. Sedan 1980-talet har Zambia varit hårt drabbat av HIV/aids, vilket har påverkat samhället på alla nivåer.

I denna studie har småskaliga bönder, kvinnliga medlemmar i småskaliga mjölkkooperativ samt föräldralösa barn intervjuats angående deras gård och djurhållning. Syftet med studien var att undersöka om djurhållningen påverkats av HIV/aids-epidemin, om djurhållning kan vara till nytta för att förbättra föräldralösa barns situation och om djurskötselrelaterade kooperativ (mjölk i detta fall) kan påverka kvinnors livssituation i en positiv riktning.

Slutsatserna som drogs från denna studie är att kvinnorna i mjölkkooperativet har förbättrat sin livssituation tack vare medlemskap i kooperativet, de föräldralösa barn som intervjuats har inte förbättrat sin situation genom att hålla djur, och för att utröna hur HIV/aids har påverkat djurhållningens struktur behövs mer omfattande studier.

## BACKGROUND



*Map of Zambia.*

Zambia is a developing country in Southern Africa with a population of 11-12 million people (Nationsencyclopedia, 2008). The estimated livestock population was in 2001 2,600,000 cattle, 1,270,000 goats, 340,000 pigs and 150,000 sheep in the country of Zambia. 127,000 tons of meat was produced during 2001. A large part of the land area is potentially arable, but only five % of the land is cultivated at any time. The majority of Zambia's population is involved in subsistence farming.

Despite Zambia's potential in the agricultural sector, the country has not been able to register itself as a competitive market player locally, regionally and internationally (USAID, 2008). The main constraints to agricultural development and competitiveness on markets in the last decade have been poor market access and underdeveloped markets that limit production; low farm production and productivity due to inadequate provision of technical information; limited use of modern production and value-adding technologies, and absence of business management services.

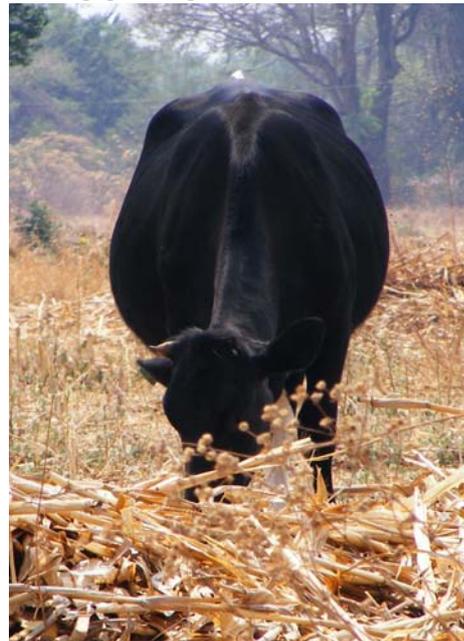
Animal farming has a huge potential and economical value in the fight against poverty (Guèye, 2000). For example, poultry keeping has been practiced by village communities all over the African continent for many generations. Rural family poultry are a valuable asset as they contribute significantly to food security, poverty alleviation and the promotion of gender equality. By keeping poultry, women in developing countries can increase their annual income with in average 10 %. However, the productivity is low, the sexual maturity is late among the hens, and chickens are small with slow growth rate. This indicates that the owners are not getting the best out of their animals.

In most African countries, the majority of the owners of chicken traditionally are women (Abubakar et al., 2007). Chicken play an important role in rural areas as

stated above, but they also take part in pest control and play a significant role in the national economy of developing countries by improving the nutritional status and income. Increased productivity among the village chickens is therefore desirable since it would assist in poverty alleviation, improve food security and, on long term basis, decrease the massive urban migration of youth. The problems of today's chicken husbandry are poor management practice, malnutrition, diseases and predation. Abubakar et al. suggests that in order to improve chicken productivity in rural areas, efforts should be made to reach the women in these areas through community based NGOs (Non Governmental Organizations) and teach them some new techniques.

According to FAOs "Livestock Sector Brief" from 2005, the annual production of milk has been rather constant since 1980, while the total meat production (beef, mutton, goat, pig and poultry) and egg production has increased. The per capita consumption of meat (totally), milk, beef, pig meat, poultry meat and eggs has decreased since 1980, while the per capita consumption of mutton and goat meat has increased.

The livestock sector in Zambia comprises a large traditional sector and a small commercial sector (Chilonda et al., 2000). The cattle production is important to the people since it provides employment, manure, draught power, food and money. It is estimated that Zambia could increase its cattle population three to five times from present levels, due to large remaining grazing resources. Cattle are mainly kept as a store of wealth, for draught power and milk production. In the study by Chilonda et al. (2000) it is shown that in order to improve the efficiency of small-scale cattle production in Eastern Province of Zambia, the calving rates need to increase and the mortality rates need to be reduced. According to Chilonda et al., this is best done by for example increasing the utilization of veterinary inputs. The farmers indicate in interviews that the most constraining factor in the cattle production is diseases. Chilonda et al. also states that development of small-scale farming is a very important component of rural development and transformation. Still the traditional agriculture is characterized by very simple farming technologies, e.g. ox-driven ploughs and hand tools.



*Dairy cow eating maize stalks*

The majority of the small-scale farms rely on family labor. Apart from grazing, the cattle are fed maize stalks, groundnuts and occasionally salt. Rivers, dams and boreholes are used as water sources. Castration is widely practiced for the purpose of obtaining work oxen, and not so much for control of breeding.

Chilonda et al. (2000) shows in their study an extremely low level of use of veterinary services and drugs to the cattle. They also show great differences in

efficiency and productivity among the small-scale farmers, possibly due to different animal husbandry routines and levels of knowledge among the farmers.

Since the mid 1980s, Zambia has had one of the world's most devastating HIV/aids epidemics (AVERT, 2008). One in every six adults is living with HIV, almost 100,000 people died of aids in 2005 in Zambia alone and about 710,000 children are aids orphans. Nearly half of Zambia's population is under 15 years old. The impact of the HIV/aids epidemic reaches all parts of society, the public sector, the economy and the national development of Zambia.

Chapoto and Jayne (2005) studied the impact of HIV/aids related deaths on rural farm households' welfare in Zambia. Most of the people who develop aids are the providers of money and food in the household. When adults fall ill or die, the children have to stay home from school in order to raise money for medical bills, food and funeral costs. When a parent dies, the remaining children can be left destitute and possibly with debts. Social exclusions, family structures falling apart (due to the great impact of the epidemic) and the inheritance tradition (where relatives of a dead male take his entire property and leave his wife and/or children with nothing, possibly except the chickens) contribute to the increased poverty that often follows the disease.

The majority of Zambians make their living from agriculture. The loss of workers at critical times like planting and harvest will greatly reduce the size of the harvest which will contribute to the lack of food and money. This in turn contributes to the negative spiraling of events that helps keeping the HIV/aids epidemic going. Poor nutrition will hasten the progression of aids and make infected people more susceptible to secondary infections, and lack of money may lead to prostitution or other drastic efforts to earn money to make a living.

HIV/aids has a great impact on the education level of children as they often are forced to raise money for their families instead of going to school. It is also due to lack of teachers, since many teachers die from aids and too few new teachers are educated every year. The normal way of learning practical skills, such as animal care and farming, is passing on knowledge from generation to generation. When a lot of adults die due to aids and aids-related diseases, there will be fewer people left to teach the next generation.

According to UNICEF's Executive Director, "the crisis of orphans and other children made vulnerable by HIV/AIDS is massive, growing and long-term. But two-thirds of countries hard-hit by the disease do not have strategies to ensure the children affected grow up with even the bare minimum of protection and care" (Siaens et al. 2003). The average African orphan lives in a poorer household than the non-orphans and is in the age group 7-15 years. Households that absorb orphans may develop poverty due to a larger number of people in the family sharing the available food for example. Most orphans are placed in extended families or fostering households, and with limited resources, the foster parents may favor their biological children economically, nutritionally and educationally.

Siaens et al. (2003) means that the ways children are affected when they become orphans is a strong possibility/risk of dropping out of school, possible engagement in child labor, declined nutritional status, loss of assets (including land) and

discrimination. Communities are affected due to a heavy “care-giving” load and weakening of informal coping capacity.

In many African countries, children left on their own on a property form a so called “child headed household” or become street children in the cities, stealing, begging and getting into prostitution. Ayieko (1997) shows in a study of child headed households in Kenya that 42 % of the 1108 households in the study are able to raise small animals (such as sheep, goats, rabbits and poultry) at home in the purpose of providing food and/or money. Only 1,5 % of the households in the study thought they needed information about raising animals. 79 % would like to be taught new agricultural techniques and 13 % wanted to have information about land preparation. According to Ayieko, this does not mean that the children know more about animal husbandry than other agricultural skills. Raising animals has always been taken for granted and most households do not use any kind of new technique to improve the productivity. The livestock are fairly hardy and sustain on marginal land and minimal forage, and that is the normal scene for most of the households.



*Zambian children*

In a study from 2003, Birchall describes poverty-reduction through cooperatives. A cooperative is defined by International Co-operative Alliance (ICA) as “An autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise”. According to the World Bank, (as cited by Birchall, 2003) a cooperative provides:

- Opportunities - for people to lift themselves out of poverty. This requests a capacity among the poor people to take advantage of the opportunities and achieve results through education, training and organization.
- Empowerment – meaning that the poor people should have as much control as possible over decision-making and resources. If the poor people do not own the solutions, the solutions and development will not be sustainable.
- Security – by reducing poor people’s vulnerability to social, political, health, environmental and natural risks. To cope with risks, poor people often chose to engage in safer, but low-return activities. When they are subject to a shock, they will not use/sell all their assets (e.g. livestock), but

instead be hungry or having to take their children out of school. Cooperatives help reduce the risks to individuals by taking the risks to the level of the enterprise. Whole communities can also reduce their risks through cooperatives by connecting the communities with wider markets and by diversifying the sources of income.

Birchall (2003) also states that women are more economically vulnerable than men due to gender inequality, which makes them a more socially insecure group. This would make them benefit even more from the cooperative model. One of the case studies by Birchall is from a dairy cooperative in Bangladesh, where he points out the good effects of dairying; daily income, a product that has a market both as milk and other processed dairy products, farm inputs that are inexpensive and manure is produced by the animals, which will create better growth of crops and grass. As an additional advantage with dairying, the farmers' family can consume the milk, which is nutritional and contributes to the health of the children. The disadvantages with milk are that it is perishable and difficult to transport. Milk in small quantities needs to be collected from a large number of farmers every day, often in remote areas with roads in bad condition, and distributed to urban areas, which can be expensive.

The farmers in the studied cooperative had increased their incomes ten-fold, which lifted the families well above the poverty line and enabled them to save money to cushion the household against e.g. flooding. The cooperative had also created over 2000 employment opportunities in urban areas. The conclusion Birchall draws from the Bangladesh experience is that cooperative development do help in poverty reduction.

## **Objectives**

The aims of this study were to

- investigate the role and importance of domestic animals among small scale farmers, small scale dairy farmers (which are members of cooperatives) and orphans in Zambia,
- to explore if dairy cooperative membership can contribute to improved living situation,
- find indications of how animal husbandry as a family resource has been affected by the HIV/aids-epidemic,
- find out if animal ownership has positive impact on orphans and their living situation.

The aim was also to discover if the farmers are aware of the potential of the animals as a possible untapped resource for people fighting poverty and what kind of efforts that are needed to help them get the most out of the animals.

The future and present role for domestic animals in developing countries, and the possibility for people to use animals as a way to get out of poverty, as well as effects of major changes in society, like the HIV/aids-epidemic, on the utilization of animal resources will be discussed.

## MATERIAL AND METHODS

Data were collected from two different areas in three different groups (see Table 1.) Basis for the selection of these areas was that there are several dairy cooperatives with small scale dairy farmers in the Southern Province. Some of them have existed for many years while others are relatively new. The Lundazi region in Eastern Province was selected because it is a rural area with traditional villages and farming which was suitable both for the “farmer-group” and the “orphan-group”.

The selection of interviewees was based on location of the farm geographically, if the farmers were home at the time of visit and other criteria that interpreters/guides may have had (such as e.g. friendship). Information was given to interpreters about the aim of the study so they could make a selection of farmers, since they are familiar with the areas where the study has taken place. The orphans were chosen strictly because they are orphans; one of them did not even have animals at home. The interviewed group of dairy farmers consists of only women, since women are a more vulnerable social group than men. The cooperatives consist of approximately 30 % women and 70 % men. The expected changes in living situation were thought to be more marked in a group with only women, which is why they were chosen. It was also interesting to find out if women can become more economically secure by being members of, for example, a dairy cooperative.

*Table 1; Facts about the interviewed persons in the different groups*

Interviewed	Area	No of farmers	Family (average no)	Changes < 5y*	Farm area (aver. + range) Hectares	Age (average and range)
Female farmers in 7 different villages	Dairy cooperatives, Southern province	18 (13 widows, some HIV+)	10 (range 2-25)	Decr.	29,1 (1-111)	55 (32-74)
Farmers 19 Male, 1 Female	Lundazi, Eastern province	20	11 (range 4-25)	Incr.	7,3 (1,5-15)	47,5 (30-82)
Orphans 10 Male, 8 Female	Kakoma and Picamalaza schools, Eastern province	18	Average unreliable			15,7 (11-20)

\* Changes in number of family members during the last five years

See figure A for details about the interviewed.

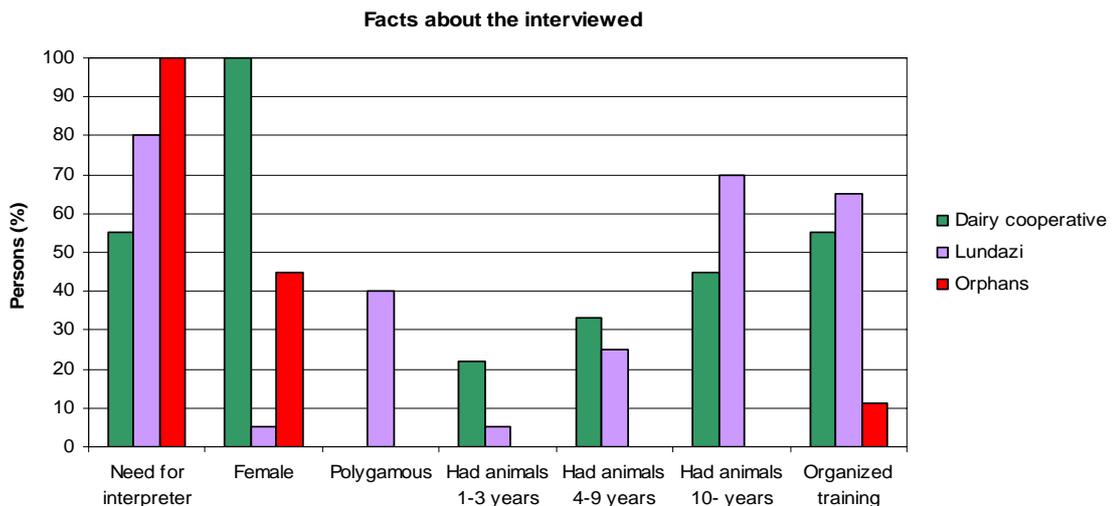
Data were obtained by help of a semi structured questionnaire divided into eight sections with questions about the:

- household,
- farm,
- animals,
- feeding,
- production,
- veterinary services,
- future, and
- income.

See the whole questionnaire in Appendix 1

The questionnaire was adapted to the dairy farmers by focusing on dairy related activities (e.g. milk yield, the cooperative), to the Lundazi farmers by removing some dairy questions and instead focus on all kinds of animals that belong to the farmer. For the orphans, the questionnaire was reduced regarding questions about farm size, when and where the animals were bought and veterinary services, since they did not know the answers to such questions. Instead of discussing future plans for the farm, they were asked about their own future plans.

The questionnaire was used and followed during the interviews, which often took place on the farm under a tree. After the interviews, the farmers showed the farm and their animals (if they were not out grazing), and it was possible to draw conclusions and ask more questions regarding the specific farm. All the interviews with the orphans took place in their schools, which gave no opportunity to any observations on their farms. The answers to the questions were written down by one person during the interviews.



*Figure A; Details about the interviewed in the different groups, comparative; dairy coop, n = 18; Lundazi farmers, n = 20; orphans, n = 18*

## Farmers at dairy cooperatives

The number of family members has decreased during the last five years due to, in most cases, children moving out. The women that have received training (see figure A) in farming have done it at GART (Golden Valley Agricultural Research Trust), Land’o lakes or Farmers Union, which are all NGOs. The length of the training has been between one to five days.

## Farmers in Lundazi

The increasing numbers of family members in these families are due to births in almost all households. The majority of these farmers have received training (see figure A) in farming from ZASP (Zambian Agricultural Small scale Project, NGO), and some from FTC (Farmers Training Centre, Lundazi, GO) and RD (Relief and Development, Lundazi, founded by the Christian church) and other ways. One farmer has learned about farming completely on his own by “trial and error”. The training is about general farming techniques and specific animal fields, such as pig production. Either the training is in study circle form, or in the form of one or more seminars.

## Orphans in Lundazi

One of the interviews was disrupted due to the answering person’s problems with answering the questions and talking. That interview is not counted among the 18 ones. The children interviewed became orphans at different stages of life; some of them as babies (they do not remember a life with their parents) and some as late as this year. Fifteen of the families have more children than the orphan. See figures B and C for details about living situation and grade in school.

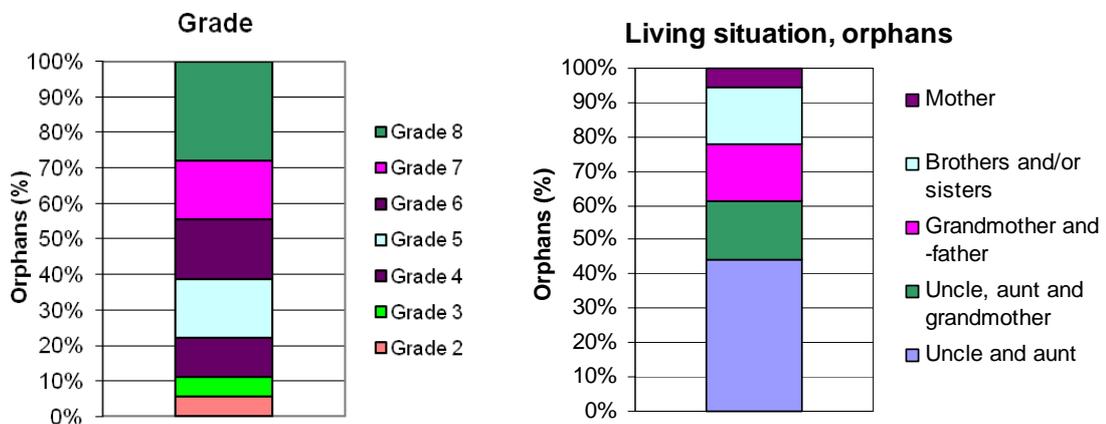


Figure B (left); Distribution of orphans (%) in the study in grades 2-8  
 Figure C (right); Orphans (%) in the study living in the different constellations stated  
 Total no of orphans interviewed = 18

The majority of the children have learned about agriculture and farming from parents, foster parents, grandparents and brothers and sisters. The ones that have received organized training have listened when agricultural officers from ZASP have visited the villages and described conservation farming. Two orphans states that they do not know anything about farming.

## Compliance

Things that make some of the obtained information unreliable are;

- Use of interpreter in a majority of the interviews
- Some of the answering persons have been drunk
- “The truth” does not mean the same thing in Zambia and in Sweden
- People tend to say “yes” even if they have not understood the question
- Very low education level among the answering persons in many cases
- In some cases very disturbing surroundings during the interviews (e.g. children playing and talking)
- It has been impossible to control on which criteria the answering persons have been selected (except for the orphan group; they were chosen because they are orphans, but not all orphans in the respective schools were interviewed) since they have been picked by others (see above).

The term “household” is difficult to define (probably the definition also varies to different persons); probably it is not always the correct amount of people in the household that the answering persons have told.

The term “veterinary” is also difficult to define for the Lundazi area; people may say that they are in contact with a vet when they have sick animals, when they in reality are in contact with an agricultural officer or veterinary assistant.

Age is not clearly defined in Zambia; many people have two ages, one “real” and one in the passport, which they are supposed to get at the age of 18 but some are older in reality when they get the passport. Many people in the rural villages do not know their real age either, so the information given about people’s ages is unreliable. The same applies to farm size since many people do not know that, they may be guessing and overestimating the actual size.



*Dairy cow, body score approximately 4*

## RESULTS

### General observations of animal care taking

In general, the domestic animals observed in the Lundazi area and in the Southern province looked very healthy. The cattle had shiny coats, they often appeared rather fat (in most cases body status 3,5 - 4, on a scale from 1-5), the condition of their feet was very good, and the manure was rather firm in consistence.

People generally treat dogs very bad though; hit them, kick them and throw things at them. Almost all families have at least one dog for security reasons. Reports were obtained about dogs that get very sick or injured which will not be euthanized; instead they will be brought into the bush, tied to a tree and left to die. No explanation was given to this way of acting. Many of the dogs observed were lame or showed disturbed movement patterns. They were generally very thin and their coats were matte.



*Puppy*

An example of general lack of ethical considerations regarding animal care was seen in Kakoma where a goat was lying flat on the side with the four legs tied tightly together; on the question why, the owner answered that it was going to be slaughtered the following day. After being questioned, the goat was released, but the common way seems to be that e.g. a goat can be tied for a very long time if it is bought for slaughter only.

Another example is transport of chicken by bus. Three live chickens were transported with their feet tied together, lying on top of each other, with a wooden box lying on top of the chickens, in a plastic container close to the front window of the bus, in direct sunlight for five hours. They appeared to be alive at the start of the journey but it was uncertain if they were still living upon arrival. Chickens are generally just supposed to “be around” in the village, the farmers do not feed them or care for them in any special way; they feed on larvae and husks that they find round the houses.

### Farmers in dairy cooperatives, Southern Province

#### *The cooperative*

Membership in the dairy cooperatives works quite similar in the different villages that have been visited. The farmer can get a micro loan to buy a pregnant cow and when the cow delivers and starts milking, a part of the money that the farmer gets from the milk is kept directly by the coop (before paying the farmer for the milk) to pay the cow. Alternatively, the farmer is given a pregnant cow but is obligated to give the calf (if it is a heifer, a bull will be sold and a heifer bought instead) on

to some other farmer candidate (“pass on”- system). The organizations giving “pass on” animals and micro loans are e.g. NGOs like Land’o lakes, HPI (Heifer Project International) and GART. Some farmers have bought their animals after selling crops, some have animals given to them by children or parents and some of the animals are offspring to the first ones. All cooperative members own their animals, and were not observed to help each other with the daily tasks.

The farmers are, as a part of the project, taught proper milking technique; wiping the udder before milking and dipping the teats after milking. Every day after milking (either once or twice per day) the milk is brought (often by bike) to a milk collection centre. At the center, the milk will be checked regarding sourness and cell count before it is allowed into the tank (which cools the milk to four degrees Celsius). The tank needs electricity, but all the collection centers have a diesel generator for back up, since electricity supply is often interrupted in Zambia. Every other day (in most cases, at some centers every day), a car will come and collect the milk and bring it to the dairy plant. The collection centers also sell milk, and in one cooperative, they make their own yoghurt which is for local sale.



*Dairy cow being milked*

The reasons for the farmers to be members of the cooperative are:

- other members are doing well and have a steady income,
- a steady monthly income,
- ability to pay school fees,
- facilitated transport and sale of milk,
- daily tasks from keeping dairy cows.
- learning about animal husbandry, and
- need of help with the animals after changes in the family.

All the women are satisfied with the way their cooperative works, due to that they;

- get their payment in time,
- can be given loans (for drugs, seeds, feed and animals) from some cooperatives,

- experience a good response from their cooperative when they give feedback, indicating a feeling of control and being part of the decision-making process, and
- find it easier to get access to animal feed by buying it through the cooperative.

### ***Living situation***

Approximately 30 % of the farmers in this group have workers employed that take care of their animals and 90 % of them grow maize, for own consumption and for selling surplus. Other common crops among these farmers are groundnuts, sunflower, beans, tomato, cabbage, rape, onions. Less common ones are soya beans, sweet potatoes, pumpkins, lentils, eggplant, cotton, carrots, sorghum and okra.

When asked about changes in their living situation during the last five years, some women (that have not been members in the cooperative for more than a few years) does not experience any difference, while most of the others think their life has improved.

Described improvements result from having more money, used for e.g. food every day, cell phone, school fees for children and for building new houses/improve the old ones. The farmers that have more than one cow gain in most cases milk for sale and a relatively stable income all year round, and not only during harvest season, which is the case for many other farmers (see discussion). However, some women think that their living situation is worse now, due to bad harvest and no access to fertilizers the previous years (fertilizers were not available for a long time, and when it was available, they could not afford it).

Individual examples of living conditions:

- One woman has a husband that got a stroke some years ago and is now in a wheelchair; therefore she has to do all the work on the farm and take care of their children, and she is not able to make any improvements on the farm.
- Another woman has taken care of all her grandchildren since 7 of her own children died, which has made things more difficult (to feed all of them, send them to school and provide them with clothes) in her life.
- One woman needed to start working after her husband fell ill; she did not work previously.

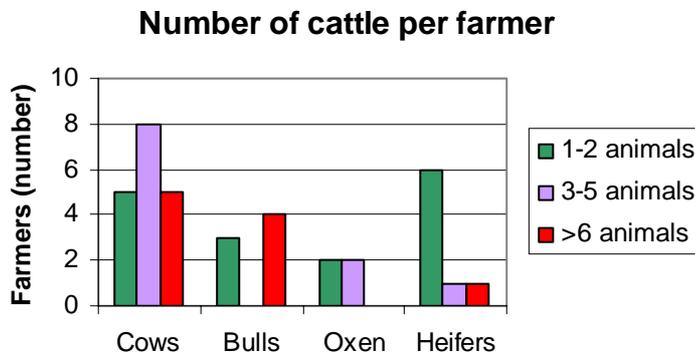
### ***Decision making and responsibility***

These women makes decisions about their animals (themselves or together with their family) in all cases except one where the husband makes all decisions. The workers are often responsible (at least partly) for the daily animal care and milking.

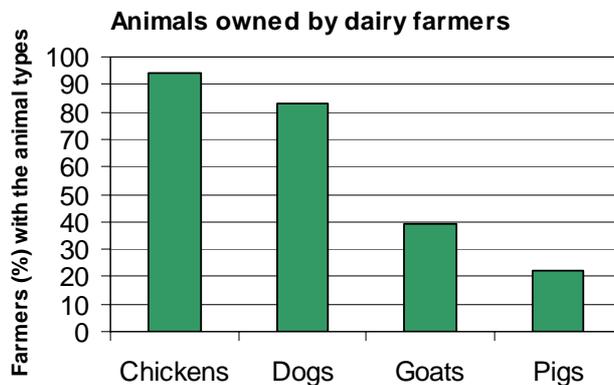
### ***Farm and animals***

All the farmers kept cattle of dairy breeds or dairy crosses, between one to 45 head of cattle per farmer (see figure D). In figure E, other species of animals are listed, that were kept by more than occasional farmers. In addition, among the

interviewed women some also kept guinea fowl, ducks, geese, turkeys, peacocks, pigeons, cats and sheep. One woman keeps some of her chickens for egg production, and one is milking her goats for home consumption.



*Figure D; Distribution of cattle of each type among the dairy farmers*



*Figure E; Distribution of the most common animal types among the dairy farmers (n = 18) apart from cattle*

The reasons for keeping animals according to these women are

- Food and drought power supply - Milk, beef pork, chicken meat, traction power
- Income generating - Selling of piglets, chickens, other animals, milk and eggs
- Social status - General animal ownership

### **Feeding**

See figure F. The fodder crops can be velvet beans, pigeon peas, sun hemp, soya, maize, sunflower, sorghum and groundnuts. The concentrate can be either the commercial “Dairy 19” (that is composed of cotton cakes, sunflower, salt, maize-or wheat bran) or homemade from maize bran, wheat bran, salt, cotton-/soya cakes, molasses and sunflowers. One farmer does not graze her animals; they are fed only crop residues and concentrate. The animals that do not have access to water 24 hours are brought to a water source (river or borehole) twice or three times per day. 80 % of the farmers take their own drinking water from the same

source as the animals (in most cases a well). The drinking water is not boiled, but that fact does not seem to cause the people any harm.

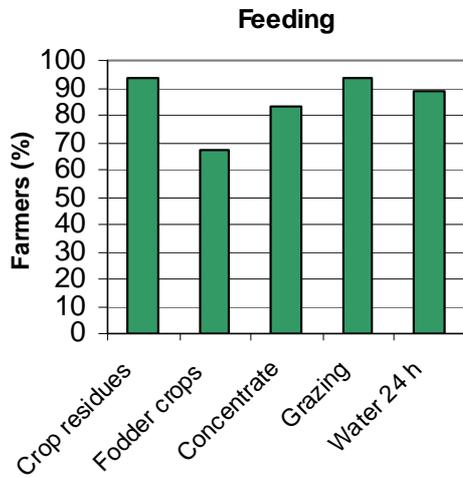


Figure F; Farmers (% , n = 18) using different sources of feed to their cattle, and giving their animals access to water 24 h

### Production and reproduction

These dairy cattle are in general not slaughtered unless they are injured, but some farmers sell young males or old dairy cows to the slaughterhouse. The farmers slaughter chickens when they need meat for family consumption and goats for special occasions, like when visitors come and by Christmas. The farmers only sell animals when they lack money.

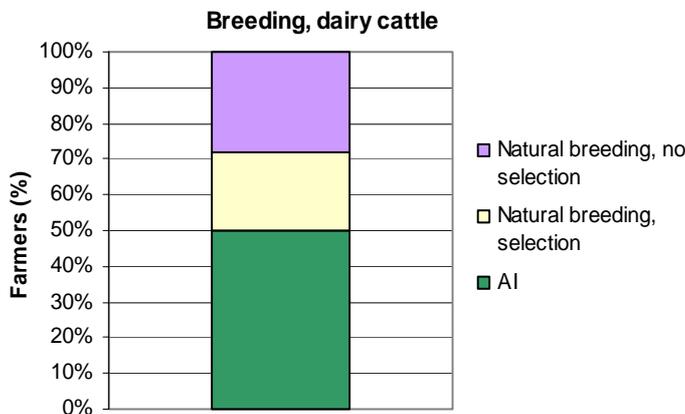
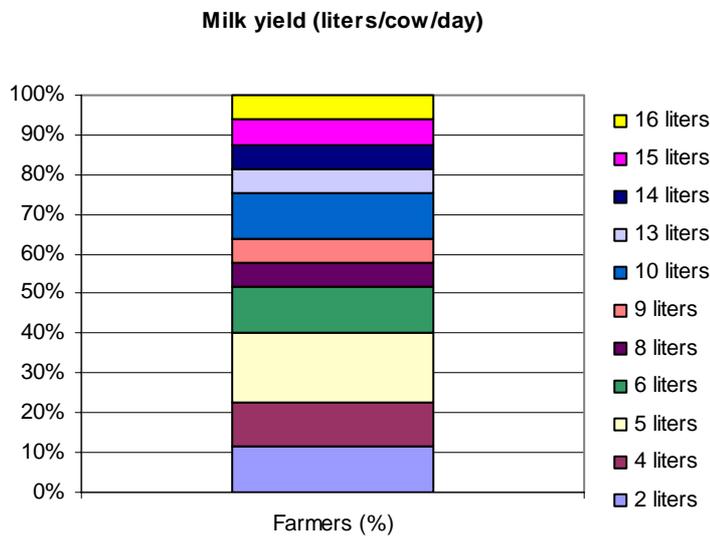


Figure G; Farmers (% , n = 18) practicing different types of breeding regimes, as reported by the farmers

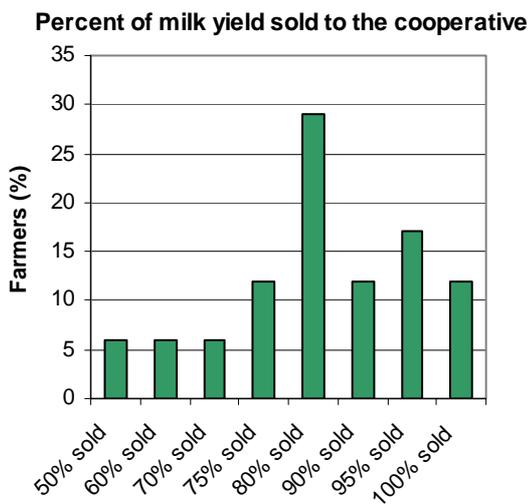
AI (Artificial Insemination) with dairy breed semen is used by half of the farmers (see Figure G). The cooperative provides Agricultural Officers whom will perform the inseminations. The farmers that practice selection when breeding their cows naturally are trying to improve the milk yield. One farmer pays 8 USD (Exchange rate November 2008) to a neighbor for the services of his bull. The farmers that do not use AI state the far distance for the vet to come in relation to the limited time that the cow is in heat, and that the pregnancy rate is lower with AI than with natural breeding. Some of the farmers that do not practice selection just wait for their cows in heat to attract males to the farm or in the bush.

In most cases, the interval between births among the cows is approximately one year, but sometimes it is prolonged due to lack of a bull on the farm/in the neighborhood. The mortality among the calves is usually very low, but one farmer reported that every other calf that has been born on her farm has died.

For milk yield per cow per day, see figure H. The data in figure H are from oral information by the farmers. Many farmers experience a relatively large difference in milk yield between dry season and rainy season. This difference can be up to five liters. The farmer who is milking goats gets 0,5 l milk per goat per day. Some of the farmers are milking once per day, others twice. Since the milk must satisfy the needs of the calf (that usually is suckling for some months), some farmers experience that they cannot milk the cows twice a day, since there will be too little milk for the calf left. As seen in figure I, it is most common to sell 80 % of the milk to the cooperative, but it varies between 50-100 %.



*Figure H; Distribution of milk yield (% , n = 18) as reported by the dairy farmers*



*Figure I; Farmers (% , n = 18) selling different percentage of the milk yield (as reported by the farmers)*

Most of the male calves and piglets, and some kids, are castrated, and the operation is either done by the farmer or by a vet. The farmers will either use a Burdizzo or a rubber band that is tied tightly around the scrotum. Some of the

farmers will exchange their male animals with others and keep them intact for breeding.

Most farmers (or their children or workers) will in most cases slaughter their animals themselves, especially chickens, goats and pigs. Regarding cattle, some are sold alive to the butcher instead. These farmers do not slaughter their cattle very often at all; for the family consumption of meat, a chicken or goat is more often used. If the farmers wish to buy or sell an animal, they will go to the market, neighbors, GART, cattle dealer that is passing through the village, or a large farm outside Lusaka (Lusaka East Farm).

Experienced production changes during the last five years among the farmers are that the milk production has increased among one third of them due to more knowledge about animal husbandry. For individual farmers, examples of changes are:

- decreased production (due to extremely bad harvest the last year),
- obtaining own animals,
- exchanging pigs with other farmers, and
- more expensive to keep workers.

### ***Animal healthcare***

Fifteen (80 %) of the farmers are regularly in contact with a veterinarian, and most of them think that the contact is sufficient, though one of them would like more help with AI. In general, the cooperative is responsible for the contacts between the vet and the farmers. However, in one cooperative, to which three of the farmers belong, they have had problems with the vet not doing his job.



*Calf, indigenous breed*

“Dipping” of the animals in chlorinated hydrocarbons is performed to prevent tick borne diseases (East coast fever, Eastern cold). Some farmers spray their animals with the chemical, but dipping is said to be more effective in reaching all body parts. The farmers pay a small fee for dipping, and the animals are generally brought to a dip tank once a week, where they are pushed into the water with chemicals. The optimal scenario is that the whole body of the animal gets under water, so the tank needs to be deep enough.

The farmers generally think that their animals are healthy. If there are any health issues, the most common is mastitis, and then less common ones such as

- eye irritation after dipping,
- interdigital dermatitis (during the rainy season),
- mange,
- Lumpy skin disease,
- Corridor disease (East Coast fever),
- worms,
- Black leg (Clostridium infection), and
- deterioration of cows and high calf mortality.

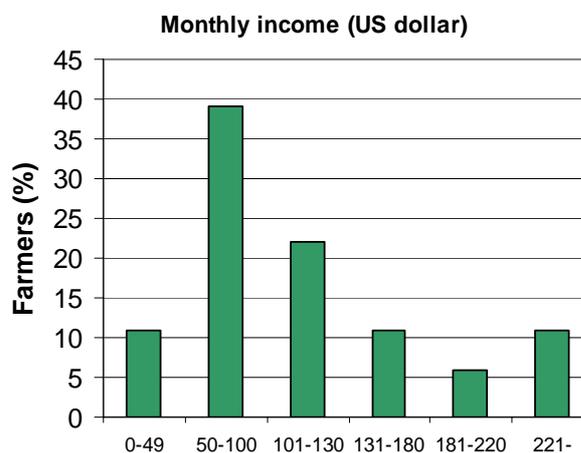
All the diseases listed are mentioned by one or two farmers each, apart from mastitis that is mentioned by five farmers (27%).

All farmers except two will contact the vet in case of sickness in an animal, and these two will do it if the children's (who is responsible for the animal care) attempts to cure the animal fail, or if a cow has problems giving birth, respectively. Only one farmer uses traditional medicine; leaves from the "Neemo tree" for deworming. The farmers that do not contact the vet will treat the sick animals with Tetracycline with long duration. Sometimes the vet will not come and look at the animals, but just tell the farmers on the phone what drug to buy and how to treat.

### **Income**

The monthly income from milk after deduction to the farmers vary throughout the year parallel with the seasonal variations in milk yield, but is on average 144 USD. The income varies between 4,5 – 660 USD (see figure J), and of course farmers with a higher number of lactating cows have a higher income. The money is used for buying animal feed, payment of loans, drugs and veterinary bills, school fees, electricity, salaries, food, transports, dipping, clothes and improvements on the house.

Figure J is based on statements by the farmers; when checking four of them against the data from the cooperative, two of them hugely overestimated their average monthly income, while the two other had given correct estimates. When interpreting these data, this is a fact one should be aware of.



*Figure J; Monthly income among the dairy farmers (% , N = 18), USD (exchange rate for 29 November 2008)*

## **Future**

When asked about their future plans and dreams, the farmers wishes to:

- have a larger number of dairy cattle (the majority),
- more pigs or oxen for plowing (some),
- larger area for crops, more varieties of crops and increased feed production on the farm,
- get more help with insemination and deworming, and
- abandon grazing in the bush as disease prevention (one).

Improvements that they need on their farms are

- renovation of the milking pallor and workers houses,
- some protection against the sun for the animals, fences to protect the feed storage from other animals,
- a house for the cows, roof on the cows' house,
- to have a borehole (and a pump to the borehole) and more water for irrigation,
- electricity,
- a storage place for the milk on the farm, and
- water and feed tubs made of concrete, dip tank for cows and one for goats.

## **Farmers in Lundazi**

### ***Living situation***

When the farmers were asked about changes in the household during the previous five years due to sickness/injury in their family, several of them were telling stories about lost harvests due to sickness during harvest time. In Zambia relatives need to take care of their family in hospital themselves; cook food for them and help them. If someone fall ill and goes to hospital, the family loses not only that person as worker in critical times, such as harvest, but also the ones that need to be at the hospital with the sick person. One person could not finish school since his parents died; then he had to take over their farm and care for his sisters and brothers instead. Malaria is also a big problem; one family has lost members in malaria because they do not have enough mosquito nets, and they still do not have enough. One farmer's grandfather died in malaria and left a child for that farmer to take care of. Since people regularly become sick in malaria, the farmers will often lack workers when family members are sick.

Funerals are also one reason to interruptions in the work on the farm; it is very rude and strange to not attend, therefore the families will attend, even if they lose important days for e.g. harvesting. When a family member dies during critical times such as harvest, the whole plan for the farm that year will be spoiled.

Most of the farmers think their living situation has become worse during the last five years, a lot of them mention that they cannot afford fertilizers now, and that in combination with a small amount of rain the previous years, has created bad harvests. People in this area have become used to having a hunger period (some months) every year, due to the clearly defined rainy and dry seasons. Some of

them also have children that have reached a higher grade in school and therefore have to pay school fees now. The farmers that experienced improvements mentioned that they now have

- animals to sell to get money, and animals to help with plowing,
- enough food all year and crops to sell,
- built a new house last year and bought tools for farming.

They all say that they have got more money through farming. The farmers that have experienced problems with diseases and the subsequent effects in their families are generally the ones thinking that their living situation has deteriorated.

### ***Decision making and responsibility***

Often the children in the family are responsible for the animal care. Alternatively, grown up brothers from the same family (living in the same village) is responsible one week each for all animals. Some of the farmers state that the wives are responsible for the animals, but in those cases, it is the husbands are the ones that make the decisions about the animals. In most cases, decisions are made by the whole family, sitting down and discussing.



*Cow and goat with their shepherd, grazing*

### ***Farm and animals***

Seventeen (85%) of the farmers interviewed in the Lundazi area have ruminants, and all of them graze their animals. The daily routine for these animals is roughly according to the following scenario: In the morning (between 6-8 hours) the animals will be brought to pasture in the bush by shepherds (often young boys). They will remain in the bush to approximately 16-17 hours, when they will be brought back to their pen. During the day they are also brought to water; river, dam or borehole on average twice a day. None of the farmers get their own drinking water from the same source as the animals.

The animals will spend the night in the pen without access to feed or water. The youngest calves will not go to the pasture; they will spend their days in a smaller pen and are allowed to suckle in the afternoon. The calves are in many cases kept apart from their mother during the night, so the shepherds can milk the cows in the morning. The calf is then allowed to suckle again before the herd goes out to the pasture. 50% of the farmers experience that it has become more difficult to graze animals since there are more gardens and fields that may tempt the animals and that occupy the land that was previously grazing area.

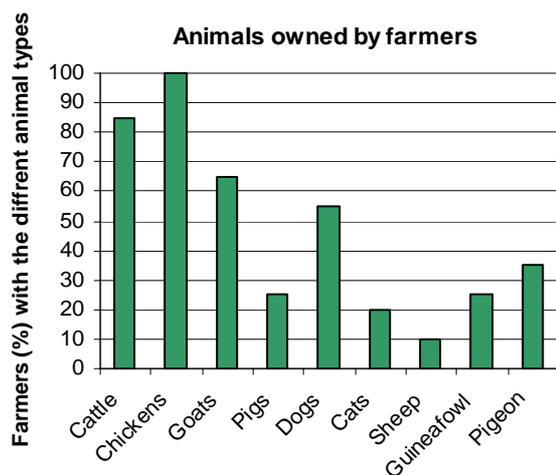


Figure K; Different species of domestic animals owned by farmers in Lundazi (% , n = 20)

All cattle in this group are of indigenous breed. The animals can be bought cash by the farmer or be offspring to previous animals. None of these farmers have taken loans to manage the purchase of animals. The farmers have obtained the animals in different ways. One farmer got his first pig from a friend, and in return he gave back two piglets from that pig's first litter to his friend. Some farmers have inherited the animals from their deceased parents, and others have received the animals as dowries when their daughters married.

Some of the farmers take care of animals that are not their own, because the owner live in a town or only have e.g. one head of cattle and not the possibility to graze one animal only.

None of these farmers have workers hired for animal care, and in most cases, approximately half of the household members take part in the work with the animals.

### Feeding

See figure L for details about the crops. Half of the farmers or less grow (in decreasing order) sweet potatoes, onions, soya beans, beans, potatoes, cabbage, cassava, finger millet, cotton, pumpkins, sugar canes, cow peas (for human consumption), tobacco, rice, papaya, oranges, mustard and guava. None of them grow specific fodder crops, but one wants to start growing cow peas for animal consumption. Less than 50 % keep crop residues for animal feed. The pigs are generally fed husks from maize and other leftovers from the kitchen, the dogs get left over *nshima* (porridge made of maize flour) if there is any, and chickens

generally eat whatever they can find in the villages.

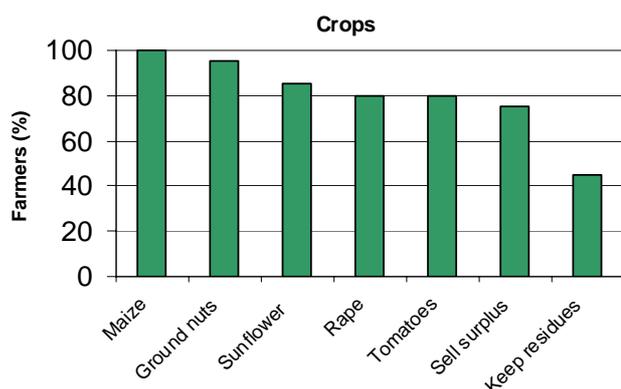


Figure L; Farmers (% , n =20) growing different kinds of crops, and the destination of the crops among these farmers

### ***Production and reproduction***

The purposes for keeping the animals are draught power, meat, eggs, milk, for sale (chickens and goats) to get an income when there is shortage of money (for e.g. school fees, fertilizers), dowries, manure (two farmers of 20 mention manure) and security (dogs).

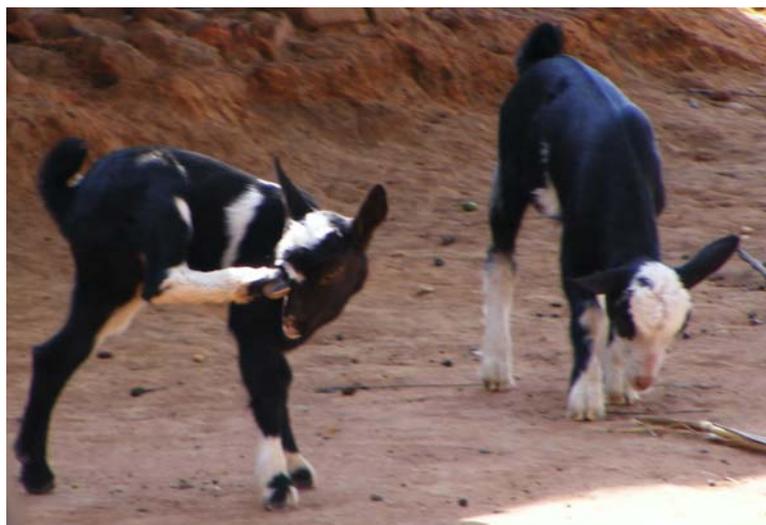
The chickens are slaughtered when the family need meat and goats are slaughtered when visitors come, on special occasions like Christmas, Independence Day and New Years Eve, and funerals. Cattle are seldom slaughtered unless they are sick; then the farmers in most cases slaughter and consume them, or wait for them to die before eating them.

One of the farmers in this group use selection when breeding his cows, by bringing the cow to the bull he has chosen based on breed (milk). He is also the only farmer that mentions AI as a tool to improve the indigenous cattle and increase their production. All the other farmers' animals, both males and females, are breeding uncontrolled in the bush.

The cows generally get a calf every year (in some cases every other year), and the mortality of young calves is low except among two farmers that thinks it is approximately 25 %. In general, a few of the newborn chicks die in every litter, but that is considered normal by the farmers.

55 % of the farmers milk their cows and the milk yield is between one to three liters per cow per day (on average 1,5 liters per day). Most of them consume the milk at home, but some sell the surplus, and some farmers pay salaries to their shepherds in milk.

The male calves (and in some cases kids) are castrated on eleven (55%) of the farms, and two of the farmers perform the operation themselves. The others ask "somebody" to come and do it. Almost all of the farmers (or their wives, especially when it comes to chickens) slaughter their animals themselves. One farmer bring a butcher when he is about to slaughter a cow, and another one asks a friend to slaughter all animals since he feels sorry for the animals. The meat is generally only for family consumption, but some of the farmers sell surplus.



*Kids*

Seven (35%) of the farmers will go to the market in Malawi to buy new animals, while the others just look around in the neighborhood for animals for sale.

### ***Animal healthcare***

The farmers generally consider their animals as healthy but some health issues that these farmers mention among their animals are:

- FMD (Foot and mouth disease)
- East coast fever (Corridor disease)
- Lumpy skin disease
- Black leg
- Calves with bilateral swollen retropharyngeal lymph nodes (can be lethal)
- Hook worms
- Gumboro disease
- “Eastern cold” / “Sweating sickness” – tick born disease caused by the toxin produced by the tick, the affected animal becomes paralyzed in the legs.

The farmers have a dip tank in the neighborhood, and problems with East coast fever (Corridor disease), but since they refused to pay for dipping, the tank is no longer in use.

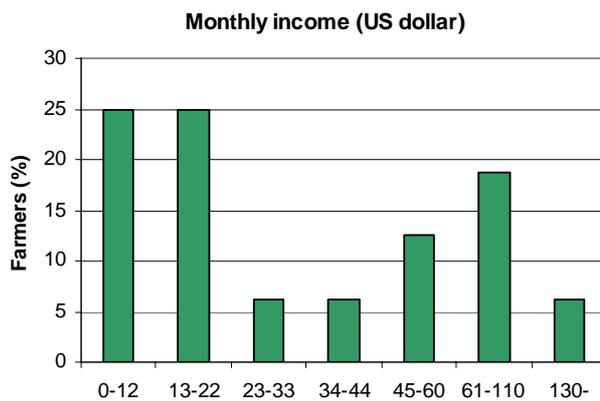
Fourteen (70%) of the farmers are in contact with a veterinary officer, and when they have a sick animal, the vet will advise them on phone how to treat it and what drugs to buy. Prescriptions are not needed in Zambia to buy drugs. Since the drugs are quite expensive, the farmers cannot easily afford them. On the question about what they will do with the sick animal if they do not contact a vet/buy drugs, the farmers answered:

- Wait, the animal may heal, otherwise it will die. As long as the animal is alive, there is a possibility that it may heal; therefore this farmer would never kill a sick animal. The animals that die on their own will be eaten.
- Ask someone to slaughter the sick animal and eat the meat or give it as payment to the workers. One farmer dries the meat from sick animals before it is eaten.
- Sell the sick animal or meat from it.
- Injuries, e.g. a broken leg, would most farmers try to fixate.
- Some farmers would use traditional medicine (particularly against snake bite).
- Some farmers treat all diseases with Tetracycline (Oxy-ject®) with long duration, and if the treatment is without effect, they will kill the animal and eat it. One farmer thinks that Oxy-ject® is vaccine and uses it once a year on all his animals.
- Another treatment commonly used is Samorine®, for treatment and prevention against trypanosomiasis

## Income

Twelve (60%) of the farmers have other sources of income apart from farming;

- one is a carpenter, two makes buckets and two brew beer,
- two buy and sell salt, one sugar, one goes to Malawi and purchase goods that he will sell in Zambia, and two of them have shops where they sell things.
- One of the farmers have many sources of income; he has a TV that people can pay him to watch, he has a little shop, he lends money to other people and let people borrow his oxen and cart and pay for it.



The farmers have a monthly income on average 77 USD [ranging from 4,5 – 660 USD (the man with two shops)]. The money is used for school fees, food, clothes, milling fee, salaries, beer, drugs and paraffin. See figure M for details.

*Figure M; Monthly income among the farmers (% , n = 20) in the Lundazi region, USD (exchange rate for 29 Nov 2008)*

## Future

Regarding future plans, these farmers reported:

- One wants to build a nest to the chickens to be able to find the eggs.
- Others want to start keeping new kind of animals; have oxen to get drought power, cows, pigs, goats, sheep or guinea fowl.
- To benefit more from the animals, some of the farmers wish they had their own plow and ridge. One farmer thinks he needs more knowledge to benefit more from the animals.
- Some of the farmers want to start growing crops that do not require fertilizers; cotton, sunflowers and soya.
- Other farmers want to start growing cassava and finger millet.
- Some of them want to expand the crop area if they can afford fertilizers; another one wants to start with conservation farming (growing with manure instead of industrial fertilizers). This is not common in Zambia at the moment, but farmers are trained to use this new technique instead of the old way of only using fertilizers.
- Some families would want to have a borehole/well and electricity and one says he wants to have a job.

## Orphans

### *Living situation*

The two children that experience an improved living situation (Figure N) were both first taken care of by relatives that had big problems with giving them food and clothes, now they have moved to other relatives and their lives are much better. The orphans that experience the opposite, mention that it has become harder to get food, clothes, soap and money to school fees. Some of those who can not see any changes in their situation now compared to the one they had when their parents were alive were very young by the time their parents passed away and do not remember a life with them.

In this area most children go to school, as it is mandatory in Zambia to go 9 years in school, but there is no chance that this can be checked. Some children that get married at early age (14 years is not uncommon, but this happens more often among the polygamous families daughters) drop out of school because of that, and probably some parents/care takers can not afford the school uniforms or material that the children need. All the farmers in the study stated that their children attended school.

The orphans are not benefiting from animal ownership in any perceivable way. They neither reported an improved living situation due to animal farming, nor could see a potential in it to improve their situation.

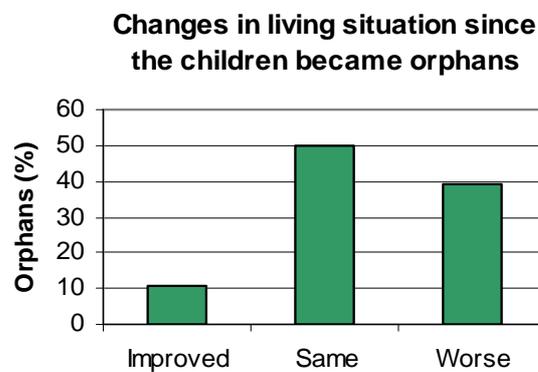


Figure N; Changes in living situation for the orphans (% , n =18) interviewed in Lundazi

### *Farm and animals*

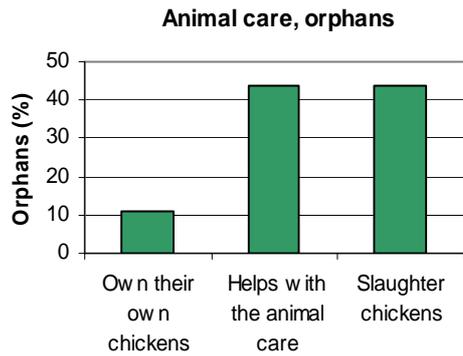
Some of the orphans' families only have some chickens while others have many cattle, goats, sheep and pigs. The children's families are growing the same kind of crops as the other farmers around Lundazi.

When the children are helping with the animal care (see Figure O), they for example

- graze the animals (on weekends since they are going to school),
- work with the oxen in the fields, and
- feed chickens and pigs.

Other duties they do on the farm is

- digging in the fields and work in the garden,
- bring water from the borehole/well,
- cut firewood,
- cleaning and washing up.



When the children are asked for what purposes the animals are kept, they answer power, meat, eggs, milk, for slaughter when relatives come and visit (or when the family wants to have meat), security and to sell and get money. One girl says that she does not know why the family has cattle; they do not get meat, milk or income from them.

Figure O; Orphans (% , n = 18) owning animals / helping with different duties regarding the animal care

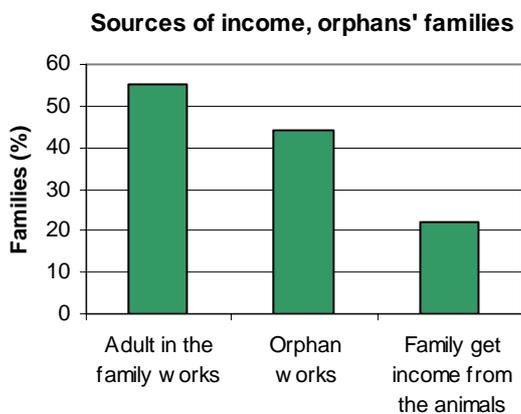
### Income

See Figure P for occupations represented among the adults in the orphans' families that work which are: teachers, shop keeper, nurse, office worker, cameraman, fence builder, firewood dealer, one prepares land for planting and one has an oil press that farmers can pay to use.

The children that generate their own income

- bake and sell cookies/buns,
- prepare land for planting,
- do piecework,
- cut firewood for sale, and
- graze other people's animals.

One of them helps his uncle in the fields and is given some rows of the garden, where rape is growing, as his own. He is responsible for the garden, and when it is time to harvest, he can sell the vegetables on his portion and get the money for himself. Approximately he can harvest and sell three times a month and get 3-4 USD (Exchange rate November 2008) for himself every time.



Income is generated from the animals by selling eggs (from chickens and guinea fowl), chickens and milk.

Figure P; Different sources of income in the families taking care of orphans (% , n =18)

### Healthcare

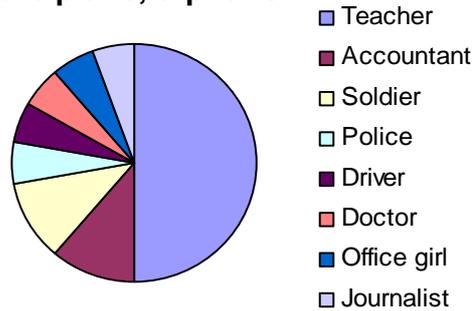
The orphans reported that if the animals get sick, most families do not do anything, but

- some will slaughter the sick animal and eat the meat,
- some will eat the meat from animals that have died on their own, and
- some will throw away chickens that die on their own.

Some of the children do not know what is done with the sick animals, and some families will use traditional medicine, especially against Gumboro disease.

### Future

**Future plans, orphans**



*Figure Q; Distribution of orphans (n = 18) with the different future plans*

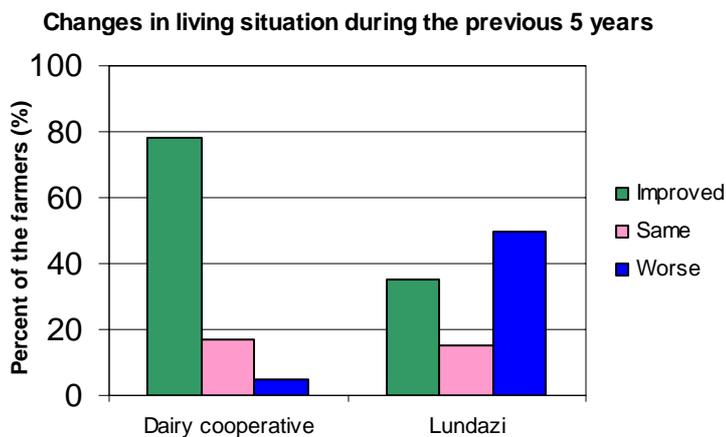
As seen in figure Q, nine (50 %) of the orphans want to become teachers when they grow up.

Three (17 %) of the children think they have sufficient knowledge about animal husbandry to have their own animals in the future, and 18 % (not necessarily the same children) want to have animals and/or a farm when they grow up.

## DISCUSSION

In this study, traditional small scale farmers, female members of small scale dairy cooperatives and orphans were interviewed about their animal husbandry routines and farm. Among the conclusions are that membership in dairy cooperatives brings improved living situation for the farmer and her/his family. Traditional farmers do not get the most out of their animal ownership, due to lack of selection through modern breeding and feeding regimes. The orphans participating in this study do not benefit from animal ownership, but more research on the subject is necessary due to the small material and the limited geographical distribution.

### Living situation



*Figure R; Changes in living situation among the farmers (%), comparative; dairy coop, n = 18; Lundazi farmers, n = 20*

As shown in figure R, the women in the dairy cooperatives experience an improved living situation while the farmers in Lundazi experience a worse one, compared to their respective situations five years ago. Since the women in the cooperatives say that the improvements are caused by the money they make on milk, it appears that the cooperatives are working well and are beneficial for the members. These women have shown that it is possible to get an improved living situation and get out of poverty through animal farming. That cooperatives can reduce poverty is also shown in a study by Birchall from 2003. Cooperatives provide opportunities for people to lift them out of poverty; empowerment and control over their own living situation, as well as security by reducing poor people's vulnerability to risks.



*Zambian girl*

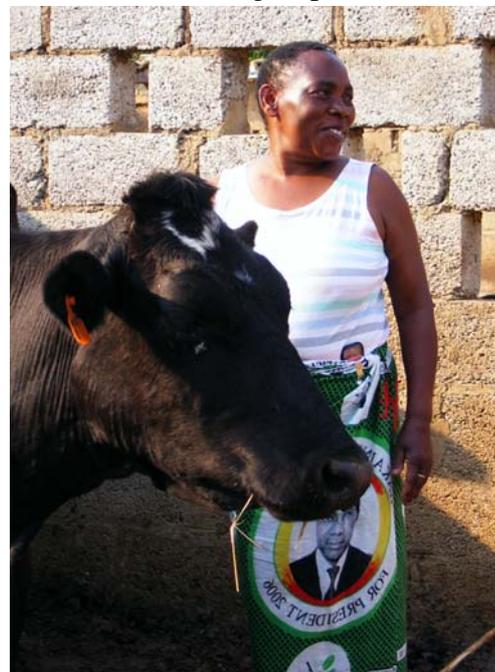
In the Lundazi region there have been some years with drought and no affordable fertilizers, which is partly the reason why things are not improving. Another thing that plays a considerable role is that the families are generally larger in the Lundazi region and more men are polygamous. Having a large family is considered status and normal, even if the assets are limited and it is costly. The animals (mostly cattle) are the farmers' "savings account" and people often refuse to sell them, even if the children are starving and the particular animal is not

producing anything. Potentially, the animal manure can be used as fertilizer when the farmers have been taught conservation farming. However, at present only one acknowledged the possible use of manure.

Sickness or injury of any kind among the family members affects the family's economy and harvest a lot; if someone in the family falls ill, they need to care for that person and will not have the same time to work in the fields, which will lead to reduced harvests, poorer economy, more starvation and increased susceptibility to diseases. This is also shown in a study from 2005 by Chapoto and Jayne. Funerals also affect the farming, since it is required that the families in the village and surrounding villages attend the funeral, even if they did not know the person well. Funerals are generally held one day after the death, and if farmers are planting or harvesting that time, it will be disrupted.

The living situation of the orphans has generally become worse since their parents died, but almost half of them are trying to improve their life on their own by making money on various occupations. Siaens et al. (2003) show in their report that the average orphan lives in a poorer household than non-orphans. These households may develop poverty due to various reasons; larger number of persons sharing the food for example. One aim with the study was to see if animal ownership has a positive impact on an orphan's living situation. This has not been proved by this study, since neither orphans nor farmers in the Lundazi area are aware of the potential in animal farming and ownership. The youth tend to look forward to other ways of life improvement than animal husbandry.

Another aim with the study was to explore if the orphans' living situation was improved in any way by keeping animals. In the interviewed group, none of the children is influencing their living situation by help of animals; the ones that are improving have found other ways. If this is due to lack of knowledge about animal husbandry (in some cases maybe because of loss of parents), lack of interest, lack of knowledge about the potential in keeping animals, or simply that it is not possible for children to have their own animals in this society, is hard to tell. Since no reference group with children that still have their parents, was included in the present study, it is difficult to know what of the above stated is due to parental loss. Not many of the orphans want to grow crops when they grow up, and it would also be interesting to, in future studies, compare to a group of children that still have their biological parents.



*Female dairy farmer and her cow*

Half of the orphans interviewed wanted to become teachers, probably foreseeing education in a city. Havnevik et al. (2007) have studied urban migration by young people. The youth often wants to get away from the traditional rural areas to try to

seize the economic opportunities they see in towns, secondary towns and settlements around e.g. mines. Though, many first-generation migrants keep farming in small scale for home consumption even in towns, to have a subsistence fallback in poorer times.

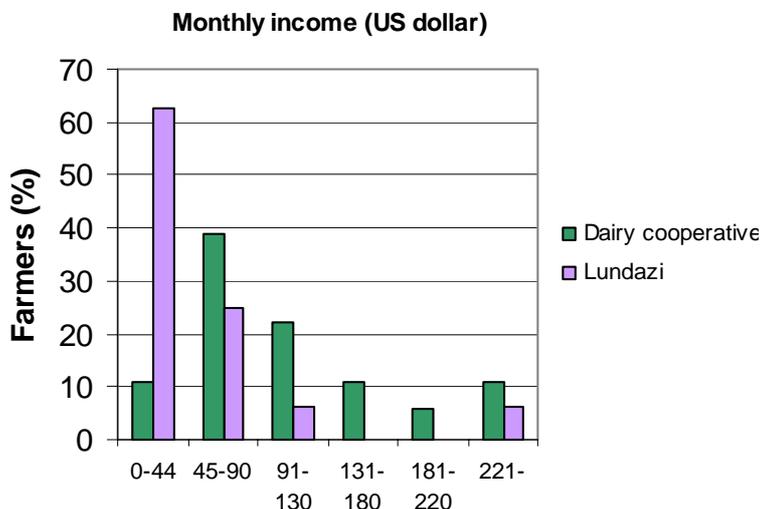
**Decision making and responsibility**

In the villages in Eastern Province, it seems like some of the families live life the traditional way; the women are doing most of the work and the men are making the decisions. However, most of the families in this region will sit down together and make decisions, which is an important step towards democracy and gender equality. The dairy farmers make all decisions with the family (or on their own if they are widows), and maybe that is an indicator of more equality among gender in these areas (maybe because they are closer to the capital Lusaka), or among these women. The women have become used to having control, being part of decision making and equal to men in the cooperative, which have had a positive effect on their role in the society. This pleasant effect on gender and democracy through cooperatives has earlier been shown by Birchall (2003) in a study regarding different developing countries.

If the husband in the family is the one that makes decisions about the family economy including the animals, and his alcohol consumption is high, that could be devastating for the whole family. Examples have been seen (personal observations) on husbands that are having high alcohol consumption while the children hardly have anything to eat or clothes to wear.

**Income**

There are large differences between the small scale farmers when it comes to income (see Figure S). Again, this is likely to be a benefit from membership in a cooperative, also shown by Birchall in a study from 2003. It seems like the problem is when the farmers have no source of income apart from their harvest, as the latter is unreliable and risky, and they will only get income certain periods of the year. The dairy farmers and the Lundazi farmers with an income apart from farming are coping much better than the ones that only rely on farming based on crops.



*Figure S; Comparison of incomes among Dairy (n = 18) and Lundazi farmers (n = 20)*

### ***Effects of HIV/aids on animal husbandry***

One of the aims of this study was to see if some correlation between HIV in the family and changes in animal husbandry exists. Conclusions about that cannot be made from this study alone. Since it was not possible to ask directly about the interviewees or their family members' HIV status, conclusions has to be made by indirect measurements. One can for example assume that a large percentage of the orphans parents have passed away due to HIV/aids, and if it is the case that the orphans e.g. lack knowledge due to parental loss (see above), that means HIV/aids does affect animal husbandry. In the study by Chapoto and Jayne from 2005, it is shown that HIV/aids have a negative effect on children leaning practical skills the traditional way, by working together with their parents. This could contribute to the decreased interest in farming and animal ownership, since these skills generally are learned the traditional way.

The Lundazi farmers' families have generally increased the number of family members the previous years. This is likely due to HIV/aids (at least in some cases), and the increased number of inhabitants is a factor that affects the family economy and living situation, and this in turn probably the animal care (a worsened situation may lead to farmers not being able to pay for veterinary services/drugs for example).

The interviewed members of the dairy cooperatives are in some cases HIV positive, but are using antiretroviral drugs. This has not affected their farming; it was impossible to tell which of the women was positive when interviewing them. It is possible that these HIV-positive women are doing better than other HIV-positive persons because they have the animals to work with, which gives them something to do during the days and a steady income.

### **Animals**

As seen in figure T, the most common animals are chickens, and there are no big differences between the three groups in the owning trend of chickens. The ones that own most cattle (large, expensive animals) are the dairy farmers, and here the orphan group is far behind – only one third of the orphan families keep cattle. Among the orphans' families, it is more common to keep pigs and sheep (smaller, cheaper animals) compared to the other groups, but still chickens are by far the most common animal species among the orphans' families. This could be due to other sources of income in the family (many different occupations were represented among the adults in these families), which decreases the need of livestock for food, income and status. The Lundazi farmers also have chickens in top, but they have in many cases both cattle and goats as well.

### Percentage of farmers in each group with the different kinds of animals

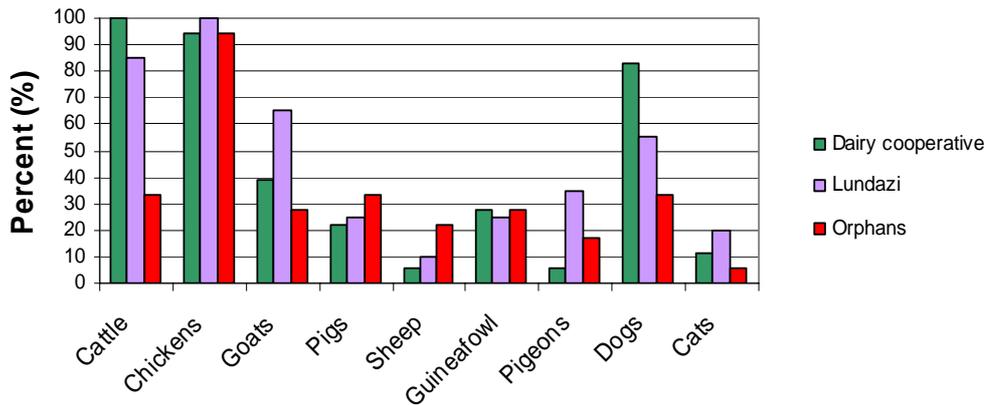


Figure T; Animal distribution among the interviewed persons (%), comparative; Dairy farmers, n = 18; Lundazi farmers, n = 20; Orphans, n = 18

### Feeding

Since there are an increased number of gardens and fields with crops in the Lundazi area, it has become harder to graze the animals. That leads to

- a higher density of animals in the parts where they are still allowed to graze,
- more exposure to diseases among the animals in the bush, and
- longer walks to the grazing areas; which in turn will lead to reduced effective eating time for the animals.

When the grass becomes limited, it can lead to animals grazing things they normally should not (and that is not good for them), or starvation and increased susceptibility to diseases if the feed is not enough.

The dairy farmers that are feeding their animals concentrate parallel with grazing get a better milk yield (which also is affected by the breed) but when comparing of the animal's body conditions in the different groups, no difference could be observed.

### Breeding

The dairy farmers that are using AI are all satisfied with that, they have good pregnancy results and have the opportunity to get semen from better bulls that do not live nearby, i.e. avoiding inbreeding. The difficult thing is that the semen needs to be stored in freezer or fridge, and that requires uninterrupted electricity supply, or a working generator as back up. The cows are also in heat for a limited time, and there are often long distances for the vet or agricultural officer, that performs the insemination, to travel. That limits the use of AI in many parts of the country, since the roads and electricity are very unreliable in Zambia.

The benefits with AI are the possibility to practice selection for various traits (e.g. better milk yield) and protection of the cow from diseases that are transmitted during breeding. However, it also costs money, and to achieve a satisfying

pregnancy result, the farmers need to be observant on when their cows are in heat and the agricultural officers need to be trained in the procedure.

### ***Purposes for keeping animals***

People in the Lundazi region and the orphans generally do not see the domestic animals as the resource they are. Almost none of the answering persons think that they need more knowledge about animal husbandry; it seems like people do not know that it is possible to benefit more from the animals.

The farmers in the Lundazi region have done things in the same ways for generations. On the question about what would be required for the farmers to benefit more from the animals, only two of the answering farmers said something concerning the animals. One of them says a plough and the other that he would like to improve the indigenous cattle breed by mixing with a milk breed. Many of the answering persons did not even understand that question.

Generally, these farmers do not seem to be aware of the possibilities with animal husbandry; that they could, used in the right way, be a way out of poverty and starvation. That seems to be a problem which could only be solved by education and “spreading the word”, i.e. farmers have to see other farmers that are doing well from having tried some new techniques. A problem in the Lundazi area is infrastructure; the roads are in bad condition and electricity is not common. This may limit the farmers’ dreams and aims, since they may not be reachable yet.

Chickens are not seen as animals when the people are to answer when they started keeping animals. However, they are traditionally very important; easy to slaughter when people need meat, easy to bring to the market or neighbors to sell for money, multiply fast, get many offspring at the same time and promote gender equality (Guèye, 2000, Abubakar et al., 2007). According to Guèye, women in developing countries can increase their income with approximately 10% by keeping poultry. Since many women belong to an economically vulnerable group (Birchall, 2003), they could benefit a lot from the food security and income that is generated from chicken ownership. In the event of death of the husband, the widow can keep the chickens, but the cows will be taken by the relatives to the dead husband. One woman lost over ten cattle to her husband’s family when he passed away, but by the time of the interview (personal observation), she had managed to recreate an even larger herd of cattle.



*Rooster*

### ***Milk yield***

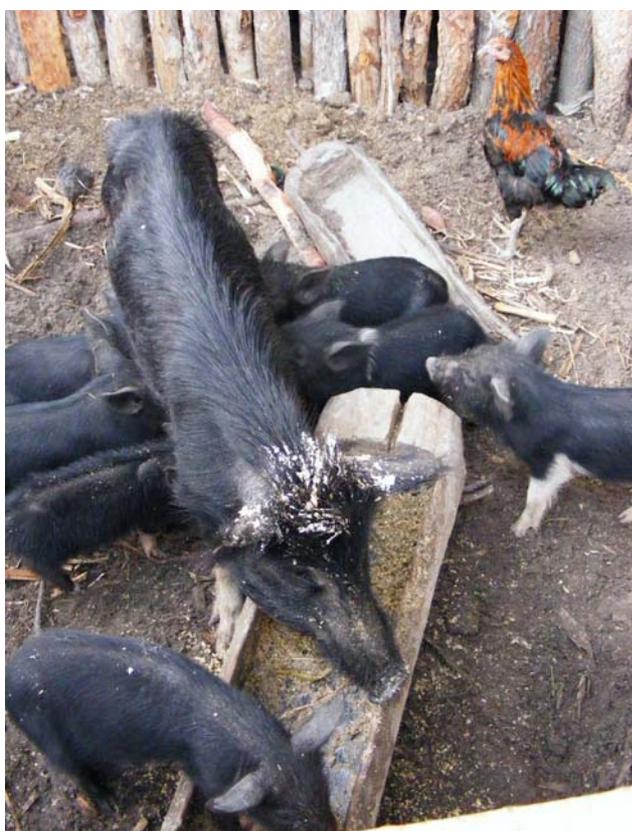
The productivity among the domestic animals in the Lundazi region is very low and nothing is made to improve it; they feed on grazing only, no selection regarding the male animals (almost all breeding occurs while grazing and when the cows happen to be in heat). The breeding may be difficult to improve at the moment (see Discussion, Breeding), unless a milk breed bull is brought to the area.

Since the calves also feed on the cows' milk, it may be hard to improve the milk yield very much, but since there are large differences in milk yield among the dairy farmers (between two to 18 liters/cow/day), improvements should be possible to make. The farmers could therefore benefit from extension services by an agricultural officer regarding their feeding regime and milking technique, in order to make the most of it.

### ***Healthcare***

When grazing in the bush it is very easy for diseases to spread among the domestic animals, and between the domestic animals and the wild animals. Recently, a lot of pigs died from a disease present on many of the farms in the Lundazi area (as reported by the farmers in the area). Since pigs are fed remnants from human food, it is possible that the cause was Swine fever, a highly contagious disease.

When pigs and chickens mix as they do in these rural areas, Avian influenza can possibly spread from wild birds to chickens, mutate in pigs and spread with birds that move extensively, to humans around the world (Quinn et al., 2002).



*Village pigs and chicken*

The way people buy and sell animals, and the use of them as payment, increases the movement of live animals, which possibly carries diseases to their new areas. Often they are also traded within market places, where the density of animals is high and the spread of disease is likely.

Regarding tick-borne diseases like East Coast Fever, it is necessary to perform dipping of the animals once a week if the farmers experience problems with the disease. However, the farmers in the Lundazi area have a dip tank but will not pay a small amount to use it (as reported by the farmers in the area). Therefore, the tank is no longer in use, and they have problems with the disease.

Some farmers that claimed buying drugs to their cows were difficult to believe when you saw the status of the children in the family.

### ***Antibiotics***

Tetracycline (Oxy-ject®) is used by the farmers against any disease, some use it as ‘vaccine’ (gives to all animals once a year) and some of them will ask the vet assistant for advices concerning treatment of sick animals. Since there are not so many drugs available, they often will end up with Tetracycline anyway. This misuse of antibiotics is very dangerous; it will increase the resistance among bacteria against antibiotics, and soon there will be no available antibiotics to treat infected humans or animals.

If the animal does not heal due to treatment, some people will kill it and eat the meat from the recently treated animal. This is also a dangerous routine; there is a certain withdrawal time on meat and milk for all treatments to prevent people from getting animals drugs in their system. It can be toxic, and the resistance among bacteria can increase if people are eating meat treated with antibiotics. However, it is not hard to understand the decision of eating one of those treated animals, if the alternative is starvation.

Some farmers never treat their animals with any drugs; if they have a sick animal they wait for recovery or if it gets worse, they will slaughter and consume it, or wait for it to die and then eat it. The habit of eating sick animals is very risky; the animals may have suffered from a zoonosis (a disease that spread between animals and humans) which will make the person sick.

### **Future**

#### ***Is a dairy cooperative the way to go for the Lundazi farmers?***

Right now it seems difficult to establish a dairy cooperative in Lundazi due to the conditions of the roads in the area (for transport of milk), and lack of knowledge among the farmers and the people that educate, as well as of good breeding models for increased production. Since the area often lack electricity, it seems hard to have a milk collection centre with a cooler tank running now. With this said, and after seeing all the improvements that have been made thanks to the cooperatives in the southern province, a dairy cooperative (for example) should definitely be an aim for the area.

#### ***How is it possible to make people aware of potential benefits from the animals with more knowledge?***

The key to this is education, like to so many other things. Animal husbandry is done in a very traditional way among the farmers with low educational level. Other life style patterns are also done in a more traditional way among these families than the more educated ones. Besides education, seeing good examples seem to be a good way to convince people about the benefits with new regimes. Among the dairy farmers, a lot of them started with dairy cows after they had seen friends and neighbors benefit from them.

### ***What are the consequences of the use and misuse of antibiotics?***

The misuse of antibiotics that have been observed during this study is a huge threat against future treatments of humans, and animals, with antibiotics. As said earlier, this way of using antibiotics will create bacteria resistant to all available antibiotics, and then there will be no treatment against bacterial infections, neither in animals nor humans. It is difficult to say that these farmers should not be allowed to use antibiotics, but the use should be more limited. This is difficult to achieve, since that would require a veterinarian coming to the farm and decide about the need of treatment in each case. For families that hardly can pay their own medical bills and food, that is not a possible demand. If the farmers do not have access to antibiotics, more animals will certainly die from diseases, and the farmers will lose valuable animals.

### ***What are the future prospects for rural areas if children are not interested in agriculture and keeping animals?***

If the migration of youth from rural areas to towns continues, the risk seems to be more crowded compounds around the towns, and less people performing small scale farming. For the youth to stay in farming there is probably a need for improved production techniques that brings better productivity, among the domestic animals and from crops, and an improved infra structure. The crucial thing is still the lack among the youth in seeing a future in farming right now; they are not aware that it is possible to be a farmer in any other ways than their parents/care takers are, and that it is possible to get a different life than the adults around them have. Still, this is a country where people in general are observed to be very fond of eating meat (which is considered status food). Since someone have to raise the animals to get the meat, the farming should have a good future; probably it will be performed in a different, more large-scale way than it is in most cases today. From a climate protection perspective, it should also be valuable with reduced numbers, but more productive animals.

The relatively huge interest in becoming teacher among the orphans is probably because that is a profession which is achievable and understandable even for people from poorer environment. A tragic fact is that the HIV-prevalence among teachers as a group is among the highest in Africa (Chapoto and Jayne, 2005). Maybe that could have something to do with the fact that it is possible for people from all social groups to become teachers.



*Zambian children riding ox cart*

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## **Appendix 1**

### **Questions for interviews**

\* = Asked only to members of dairy cooperatives

#### **A Household**

Name and age of farmer?

How many people live in your household?

What are their ages?

How many of them work with the animals?

Has the composition of the household changed during the last five years? In which way? Why?

#### **B Farm**

Size of farm (square meters, approximately)?

Do you grow any crops (if yes, what kinds)?

What is the destination of the crops (sell, eat, feed animals with)?

How long have you had animals?

How did you learn about agriculture and animal farming?

\*How long have you been a part of the cooperative? Why did you become a part of it?

\*How does the cooperative work?

\*Are you satisfied being a part of the cooperative?

Do you do other things than farming (e.g. school, work)?

Has your living- and/or farming situation changed due to e.g. sickness in your close or extended family, or in another family (e.g. neighbors)?

How was your living situation 5 years ago?

#### **C Animals**

What kind of animals do you have, and how many of each kind?

What age and sex are the animals?

Who is the owner of the animals?

Where did you get the animals?

For what purposes are the animals kept?

Who is responsible for the animal care?

Who makes decisions about them (e.g. selling, slaughter, breeding)?

When are they slaughtered (e.g. specific age, special occasion)?

When are they sold? Where? Why?

Does your animal mate, and do you practice selection among the animals when breeding? For what traits?

What male animal do you use – own or others?

How was the situation for the animals on your farm 5 years ago?

#### **D Feeding**

What do the animals eat?

Where does the feed come from?

May the animals graze (if yes, where)?

Do they get to graze all year round?

Was it easier to graze animals in the past?

Has the animals always been eating the same things (if no, what are the changes)?

Where do your animals drink? How often do they have access to water?

Do people and animals get their water from the same source?

### **E Production**

How long is the interval between births in your animals?

What is the mortality among the young of each species?

How much is the milk yield in liters per day from each cow/goat/sheep (approximately)?

What is the milk used for?

Do you give supplementary feed to pregnant/lactating animals? What?

Are the young born all year round or in any particular period?

Do you castrate the males? What species are castrated? Do you perform the operation yourself?

Do you slaughter your animals yourself? If no, who does it and where is it done?

Do you sell the meat or is it used in the family?

Where do you buy and sell animals?

Has anything about the production mentioned above changed in the past 5 years?

### **F Vet services**

Are you in contact with any Veterinary Health Officer? If yes, is the contact sufficient?

Do you have health problems with your animals? What are the common health issues among your animals?

Is it hard to get in contact with a vet when you need his/hers help?

Do you contact the vet or a local Veterinary Health Officer in case of sickness/injury in your animals?

If you don't contact a vet, what do you do with the sick animal?

Do you treat them with anything else than veterinary advised drugs, such as traditional medicine?

How was the situation 5 years ago regarding veterinary services for your animals?

What were the health issues among your animals 5 years ago?

Did you treat the sick animals in any other way back then?

### **G Future**

Do you have a plan for the future development of your farm – expand, reduce, begin with something new etc?

What do you wish for regarding your household, farm and animals?

What would be required for the animals to be a bigger resource for your family?

E.g. knowledge, drugs, markets for sale of products?

### **H Income**

\*How much is your monthly income?

\*What is the money used for?