# TECHNOLOGY DISSEMINATION AMONG SMALL-SCALE FARMERS IN MERU CENTRAL DISTRICT OF KENYA: IMPACT OF GROUP PARTICIPATION

By

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This dissertation is dedicated to my parents, Art and Mary Ellen Davis.

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The goal of this study was to examine the role of farmer groups in technology dissemination, and to assess what factors make groups effective in extending technologies among small-scale dairy-goat farmers in Meru Central District of Kenya. The theoretical framework for the study included insight from agricultural extension theory, farming systems research and extension, social capital, and group theory.

A mixed-methods, multiple-stage approach was used to obtain data. Research techniques included participant observation, documentary analysis, semi-structured interviews, social mapping, group timelines, and structured questionnaires. Dairy-goat farmer groups (n = 46) and individual farmers (n = 88) were interviewed during the study. Qualitative data provided baseline information, and helped in the formation of research questions. Quantitative data were entered into the Statistical Package for Social

Scientists (SPSS) and analyzed using contingency tables, descriptive statistics, correlations, tests of significance, and regression.

Most farmers in Meru Central District belonged to some type of farmer group. Factors for participation in different types of groups included household size, wealth level, age, gender, and membership in other groups. The dairy-goat groups were linked with an average of nine outside entities. Major linkages included government extension, chief *baraza* (public meeting), churches, and the non-governmental organization Food and Agricultural Research (FARM)-Africa. Dairy-goat groups had a variety of mechanisms for disseminating information and technology, including the *baraza,* the buck (breeding) station, through training others, and in other groups that members belonged to. Certain factors about the dairy-goat groups were associated with success in dissemination. These included type of group (those facilitated by the dairy-goat project versus those not), location, age of group, number of trainings, homogeneity of members, and number of linkages.

In the pluralistic extension milieu today, farmer groups play an increasingly important role in the technology-dissemination process. Most farmers in Meru were in groups, which were linked to other organizations and were disseminating the information and technologies that they had. Groups are a key way for farmers to receive information and training, and then to tell or train others. Some ingredients that might increase the success of such groups include increasing capacity in groups (and especially of key members), finding ways to link them with other extension providers, strengthening government administration in the form of *baraza,* and encouraging groups to form around common interests at the community level.

# CHAPTER 1
# INTRODUCTION

*A key feature distinguishing extension work from other forms of professional agriculture is that in the first instance extension deals with people rather than with their crops and animals.*
*(Moris, 1991, emphasis added)*

## Introduction

Government extension in Kenya today is unable to provide many small-scale farmers with pertinent technologies and information to meet their needs and thus help to bring about rural development, one of the acknowledged goals of the administration. Lack of proper extension services is partially to blame for poverty, according to participatory poverty assessments conducted in ten districts in Kenya in 2000 (Meru Central District Development Plan, 2002; Republic of Kenya, 2001). This is due to both reductions in government services in Kenya and ineffective and inappropriate extension approaches (Eponou, 1996; Gautam, 2000). These issues have led to gaps in extension of technologies to small-scale farmers, who play a major role in the Kenyan economy.

Technologies to address rural problems have been developed by research, development organizations and farmers working together in Kenya. A major issue now is how to extend, or scale up, these technologies to benefit more low-resource farmers despite the limited government extension resources. Many approaches to technology dissemination have been developed since the reduction of the state extension service, such as private extension services and those run by non-governmental organizations (NGOs). Recently, however, community-based extension has come to the fore as a

means of scaling up these technologies to have a wider impact in the rural economies (Franzel, Cooper & Denning, 2001; Misiko, 2000; Noordin, Niang, Jama & Nyasimi, 2001). Farmer groups are an important vehicle for such community-based extension.

## Background to the Problem

Sub-Saharan Africa is well known for its high poverty levels and other major obstacles to development. In addition to the limited resources, risk and complexity inherent in these African livelihood systems, small-scale farmers in Kenya today must also deal with population pressure, the effects of HIV/AIDS, environmental degradation and poor rural services and infrastructure. In contrast to other developing regions, the problems in this particular part of the world do not seem to be improving. Per capita agricultural production in sub-Saharan Africa has been in decline since the mid 1990s (Shapouri & Rosen, 2001). As a result, living standards have also declined in the region.

Kenya perhaps typifies the experience of sub-Saharan Africa. With 70% of Kenya's workforce involved in agriculture, and smallholders contributing to a significant portion of agricultural production, Kenya makes a good case for the examination of the government extension's relationship with the often-ignored smallholder farmers. Kenya's extension service, much like that of other countries in sub-Saharan Africa, has gone through many changes since its original inception through the colonial government, in response to the changing social, environmental, and political settings.

It has long been realized, in Kenya, that a strong agricultural sector is crucial to growth (Pearson et al., 1995). Agriculture contributes a significant proportion to its gross domestic product (Table 1-1). Because of this, the Kenyan government has taken a strong interest and role in agricultural services (Umali & Schwartz, 1994). Since the

early imposition of colonial rule, the government has thus made agricultural extension a major focus of its administration.

Table 1-1. Contribution of agriculture to gross domestic product (GDP)

| Year | % Share of GDP |
|---|---|
| 1964 | 40 |
| 1973 | 34 |
| 1978 | 37 |
| 1985 | 31 |
| 1996 | 25 |
| 2001 | 21 |
| 2002 | 16 |

*Note*: From Godfrey, 1986; Nyangito & Okello, 1998; World Bank, 2004

**Smallholder Agriculture**

In Africa, many of the farms—in fact, most of the rural population—are made up of smallholdings of less than two hectares (Moris, 1991). These smallholdings are for the most part diverse and characterized by limited resources. This brings particular problems to extension and other service providers, who have typically been geared to make blanket extension recommendations based on technologies designed for larger, more modern and uniform farms.

Perhaps no one has as adequately described smallholder farmers as Chambers (1997). Smallholder agriculture, in contrast with large-scale "modern" farming, is complex, diverse and risk-prone. To these farmers, farming is not a business but rather a means of achieving a livelihood. Although often ignored by government and other policy makers, these small-farm livelihood systems are home to perhaps half the world's population, contribute significantly to agricultural production and are an important source of rural employment. Furthermore, although the percentage of the rural population is decreasing in comparison to the overall and urban populations, in absolute numbers the amount of small-scale farmers is still on the increase (Table 1-2).

Table 1-2. Rural population in Kenya, 1980-2000

| | 1980 | 1990 | 2000 |
|---|---|---|---|
| Rural population (1000) | 13,738 | 17,914 | 20,435 |
| Total population (1000) | 16,368 | 23,574 | 30,669 |
| Percentage | 84 | 76 | 67 |

*Note*: From FAOSTAT Data, 2004

According to Moris (1991, p. 14), smallholder farming characteristics include

- Scattered clientele in remote areas;
- Varied crops in diverse agroecosystems;
- Resource constraints of farmers;
- Highly seasonal and risky agriculture; and
- Low reliability of services.

Of Kenya's population of about 30 million, 80% are located in rural areas and dependent on agriculture for a living—much of this on smallholdings less than two hectares (Muturi, 2001). These farmers, however, are key in the government's goal of reducing poverty. They contribute significantly to the country's agricultural production; smallholders produce 70% of Kenya's maize, 65% of the coffee, 50% of the tea, 80% of the milk, 70% of the beef, 100% of pyrethrum, and many of the food crops (Muturi, 2001). However, many (if not most) of these smallholders are not being adequately reached by extension services (Eponou, 1996; Gautam, 2000). Extension and other development organizations must find effective means of enabling these small-scale farmers to reach their full potential and thus contribute to the overall economy of Kenya.

Farming-systems philosophy gives a useful perspective on the smallholder livelihood systems. A hallmark of farming systems is concern for the small-scale farmer and the understanding of her or his situation. It also recognizes the diversity among smallholder farmers, their various systems of farming, and their livelihood strategies; and it attempts to understand that diversity. A farming-system livelihood strategy can be defined as the way that a farm family manages its resources to meet household objectives

within social, economic and physical systems (Franzel, 1984). As seen from livelihood analysis, resources or assets in small farm livelihood systems can be quite complex (Dorward, Anderson, Clark, Keane & Moguel, 2002). One such resource is known as social capital or collective action, and involves the networks and relationships that a farmer may call on to meet her or his objectives (de Haan, 1999; Narayan & Pritchett, 1999). One type of social capital is farmer groups (mentioned in the introduction as a vehicle for community-based extension).

**Extension's Approaches to Rural Development**

To meet the challenges faced in the rural sector (mentioned in the previous section), agricultural research and extension have been used for decades to improve the rural economy. Agricultural extension, according to the World Bank, is "the process of helping farmers to become aware of and adopt improved technology from any source to enhance their production efficiency, income and welfare" (Purcell & Anderson, 1997, p. 55). Agricultural extension has also been defined as the extending of relevant agricultural information to people (Swanson, Bentz & Sofranko, 1997). Moris (1991, p. 17) calls it "the promotion of agricultural technology to meet farmers' needs." This process first became known as extension in England in the 1850s (Jones & Garforth, 1997). Extension has long played a role in the development of rural economies. This "extending" of relevant agricultural information to people (Swanson et al., 1997) has gone through many evolutions in various countries of the world.

Although the state has typically provided agricultural services, the paradigm for research and extension has been changing extensively in Africa over the past 10 years. State extension once played a successful and key role in development in Kenya. The government service is now going through major changes and disintegration, however

(Kandie, 1997; Omolo, Sanders, McMillan & Georgis, 2001). Although extension has been used in Africa under many different models, many claim today that it fails to do its job of adequately reaching the majority of farmers and truly addressing the problems of rural poverty, environmental sustainability, and food security (Eponou, 1996; Gautam, 2000; Republic of Kenya, 2001). Agricultural research and extension services have not made the expected impact on small-scale farmers in Africa over the past few decades (Eponou, 1996). Since the late 1980s, the efficiency of these services in Kenya has dropped substantially (Government of Kenya, 1999; Kandie, 1997).

A wide range of factors has contributed to the current situation in Kenya. Its weakening economy combined with poor management and corruption played an important role. These internal problems coupled with the rapid expansion of the state extension service created a large inefficient employee base that could only be sustained with substantial outside support. At the same time, foreign donors (under pressure to show "results") were presented with a situation in which there was almost no evidence for successful technology diffusion through these bloated bureaucracies. One result was a major shift of foreign-donor support to technology research and the search for alternative non-state mechanisms for delivering the inputs and advice needed. The net result of these macro-policy shifts, combined with the stagnation of the state extension services, has been a rapid increase in the number of private sector and NGO actors that work side by side with state extension services in Kenya. Once totally state-run, extension in Kenya is now conspicuous by the heavy role and increasing diversity of non-governmental actors.

The extension service in Kenya has been unable to effectively reach farmers, even in the high potential areas (Venkatesan & Kampen, 1998). The failure of early extension models, and more recently the Training and Visit (T&V) model instituted by the World Bank, has left a shell of an extension structure in Kenya with only a limited ability to reach farmers in an effective way (Gautam, 2000; Sanders, Shapiro & Ramaswamy, 1996). The structural adjustment programs put in place in developing countries by the International Monetary Fund and the World Bank helped to contribute to this problem by reducing investment by the public sector.

The World Bank concluded in their assessment of extension in 2000 that a decentralized, demand-driven and pluralistic system was needed in Kenya (Gautam, 2000). Pluralism is being promoted worldwide in extension systems (Feder, Willet & Zijp, 1999). "Extension is not necessarily a government program, but rather a complex set of institutions whereby rural people obtain new knowledge and information" (Rivera & Alex, 2004, p. 339). The Kenyan government and donors agree on the need to focus more on clients and lessen government costs through outsourcing, using farmers' groups, and cost sharing (Gautam, 2000). The current Kenyan extension model, called National Agricultural and Livestock Extension Programme (NALEP), funded by the Swedish government, is focused on pluralism.

Pluralism came about as a result of the inability of state services to provide for farmers, and led to a search for other potential actors. The private sector emerged as one important provider of services. Privatization has only recently become an issue in extension. It entails the turning over of services typically provided by government to private organizations. A study by Swanson et al. (cited in Umali & Schwartz, 1994)

showed that 81% of extension was provided by the public sector in the 207 organizations surveyed in 113 countries. The private sector accounted for only 5% (Swanson et al., 1990 in Umali & Schwartz, 1994). However, budget deficits are forcing both developed and developing countries' governments to downsize, decentralize, and move toward a liberalized economy. Private extension is seen as one way of cutting down on the massive public sector that has for so long characterized countries such as Kenya.

Government extension has also been criticized for many weaknesses including inefficiencies through bureaucracy and top-down approaches where they are out of touch with the farmers. Public organizations are seen to be wasteful of resources because they do not have the same profit motivation as private companies. Umali and Schwartz (1994, p. xii) encapsulate this perspective:

> In view of the changing conditions facing agriculture today, coupled with the governmental and fiscal constraints faced by many developing countries, a structural transformation of the agricultural extension system is becoming increasingly essential. The public monopoly in agricultural extension provision in many countries is no longer feasible or sustainable, and a shift towards a multi-organization system consisting of the public, private, non-profit and non-governmental sectors will be vital for the effective performance of this complex task. Capitalizing on the comparative advantage of each of the different sectors will ensure the success of this endeavor.

The private sector's profit motive for services is thought to make it more efficient. However, this sector tends to ignore areas such as semiarid zones where there is little chance of profit. The public sector is therefore still needed to advocate and intervene in areas where the private sector has no interest. The key problem is that with the decrease in government spending, it is unlikely that public-sector extension will have the means to fully undertake the necessary support and services in the often-remote semiarid areas. Therefore there is greater focus now on non-governmental organizations and community-based organizations as important players in the extension scene.

Today in Kenya, many extension stakeholders and technology-dissemination approaches exist, with few studies to show their effectiveness. There are still numerous farmers who must be reached with effective technologies, however. One important need in the new pluralistic milieu is to determine how community-based mechanisms such as farmer-to-farmer extension works, and the role that community groups and farmers play in extending technologies to other farmers. Knowing these mechanisms will contribute to the effort in bringing about rural development.

With the food and environmental crisis throughout Africa, it is vital that all Kenyan farmers receive the necessary information and inputs to make a living off their land (Eponou, 1996). It is therefore crucial to explore all the avenues of rural development. This includes examining the role that farmer groups play in disseminating technologies, the mechanisms of farmer-to-farmer extension, what factors affect their success in extension, who participates in the groups and why, and the implications of farmer-group performance for extension policy.

If indeed farmer groups in the smallholder sector play an important role in dissemination of appropriate technologies in Kenya, the question then becomes what must extension and policy makers do to facilitate the smallholder sector—especially farmer groups who are organized and already providing services—in scaling up and therefore increasing production, addressing food security and fighting rural poverty? This study shows the implications of farmer-group technology dissemination for extension policy.

## Study-Area Background

Meru Central District is an important smallholder agriculture district in Kenya's Eastern Province, covering 2,982 square kilometers (Meru Central District Development

Plan, 2002) (Figure 1-1). It lies between 0°3'45" north and 0°2'30" south, and between 37° and 38° east. Administratively, within the district there are 10 divisions, 27 locations, and 75 sublocations.

Meru Central lies on the equator, and is bordered by Mount Kenya on the west and drier lowlands to the north and east. It ranges in altitude from 300 to 5199 m at the peak of Mt. Kenya. It has nearly all of the agroecological zones of Kenya (Teel, 1985; Were, 1988).

Farmers in Meru Central District practice mixed cropping methods with maize (*Zea mays*) and common beans (*Phaseolus vulgarii*) as the dominant farming system. Other food crops include bananas (*Musa spp.*), yams (*Dioscorea spp.*), potatoes (*Solanum tuberosum*), sweet potatoes (*Ipomea batatas*), sorghum (*Sorghum bicolor*), finger millet (*Eleucine coracana*), cassava (*Manihot esculenta*), arrowroot (*Maranta anindinacea*), pigeon pea (*Cajanus cajun*), lablab beans (*Dolichos lablab*), cowpeas (*Vigna sinensis*), groundnuts (*Arachis hypogaea*), kales ("sukuma wiki") (*Brassica spp.*), tomatoes (*Lycopersicum esculentum*), onions (*Allium spp.*), cabbage (*Brassica oleracea capitata*), pumpkins (*Cucurbita spp.*), sugar cane (*Saccharum officinarum*), avocados (*Persica americana*), mangos (*Mangifera indica*), citrus (*Citrus spp.*) and papaya (*Carica papaya*). Coffee (*Coffea arabica*), tea (*Camellia sinensis*), tobacco (*Nicotiana tabacum*), cotton (*Gossypium spp.*), sunflower (*Helianthus annuus*), macadamia (*Macadamia tetraphylla*) and pyrethrum (*Chrysanthemum cinerariaefolium*) are grown for cash.

*Catha edulis* (also called "miraa" or "khat") is a stimulant used mostly by Somalis, Swahili people, and in the Arab Gulf. It has been an important cash crop in wetter tea-growing areas, such as the Nyambeni Hills in the northeast of the greater Meru area. It is

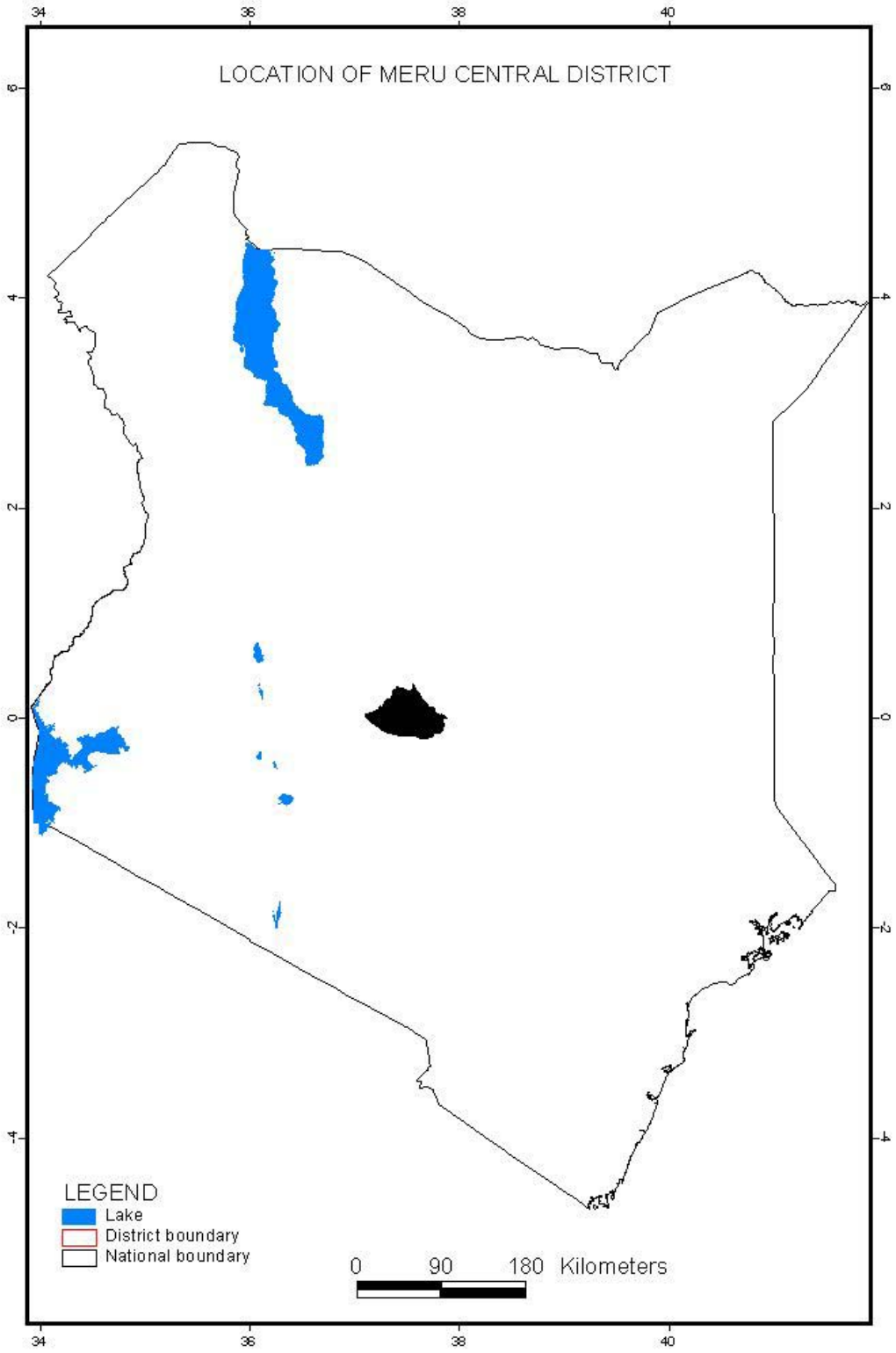


Figure 1-1. Meru Central District of Kenya

now being grown by many of the farmers in Meru Central District as well. Farmers in the coffee zones have recently started growing it for cash with the decline of the coffee industry.

A major feature of the farming landscape, especially in the middle and upper zones, is the Australian tree *Grevillea robusta*. Apparently it was promoted for many years for intercropping with coffee. It is very popular for all farmers, however, as a fast-growing tree that produces good lumber. Other introduced species include *Cassia* and *Leucaena* species, especially in the lower zones.

Livestock in the area include cattle, goats, sheep, pigs, rabbits, and chickens. Farmers also keep bees. Livestock goods such as dairy products, meat, and hides are also produced.

Rainfall is bimodal, falling between March and June (short rains) and October through December (long rains). The southeastern slopes of Mount Kenya, where many of the farms lie, receive between 1250 and 2500 mm of rainfall per year (Meru Central District Development Plan, 2002). The leeward side of the mountain and northern and eastern lowlands receive between 380 mm and 1000 mm annually.

Population within the district is 521,518. The growth rate is 1.48% (Meru Central District Development Plan, 2002). Population density is an average of 167 people per square mile. Farm size averages 1.1 hectares for smallholders. Although people are moving to urban areas, absolute numbers of farmers in the rural areas are growing, putting pressure on the natural resources of the district. Over 45% of the population is classified as poor (Meru Central District Development Plan, 2002).

Some of the causes of poverty in Meru Central are seen as inadequate and unreliable rainfall, unemployment, poor extension services, lack of land, collapse of the cotton and coffee sectors, low prices for farm products and poor marketing channels (Meru Central District Development Plan, 2002). The HIV/AIDS pandemic that is so rampant in Africa is especially so in this area. Although it has recently dropped, the Meru Central rate of infection was 38% a few years ago, well above Kenya's national average of 15%. At the Meru Central District consultative forum for the government's Poverty Reduction Strategy Paper, stakeholders listed inadequate extension services and lack of extension services as two of the main problems in the district.

Dairy farming is an important economic activity in Meru, especially with the decline of the coffee industry due to poor world market prices. Many farmers in the sub-humid highlands of Kenya own dairy cattle or goats, and keep them in zero-grazing units. This necessitates the growing of fodder or buying of feed for enhanced milk and meat production. Zero grazing is a system whereby animals are kept in a stall or enclosure and fodder is carried to them. Animals may also be managed through grazing and tethering. However, commercial dairy meal is too expensive for many farmers to purchase, and is perceived by farmers as unreliable in terms of quality (Daily Nation, Sunday, June 20, 2003).

Mineral fertilizers are also available, but too expensive for many farmers to afford at the recommended rates. Because Kenya is in the process of liberalizing its markets, there are now few subsidies on agricultural inputs. Farmers face low prices and poor marketing channels in most of the rural areas, making farm-generated income difficult to

obtain. Farmers must find ways to increase production without the use of expensive fertilizers and feeds.

**The World Agroforestry Centre (WAC)**

Especially for smallholders, agroforestry practices offer useful options and alternatives to improve their farming systems. Agroforesty is the deliberate use of trees on farms (in combination with crops, animals, or both) to meet multiple objectives of the farmer. It is a "dynamic, ecologically based natural resources management system that, through the integration of trees in farmland and rangeland, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels" (Huxley & van Houten, 1997). Many of the agricultural systems in the tropics are (by nature) agroforestry, because of the integration of trees, crops, and animals. However, scientists have recently begun paying attention to the benefits of agroforestry, and much research has been conducted on the practice since the 1970s.

Smallholders have always used trees on their farms, as noted above. However, since the introduction of structural adjustment programs in Kenya, intended by donors to bring about economic recovery of developing countries' economies, inputs such as fertilizers, chemicals, seed and feeds have been too expensive for many small-scale farmers to afford. Attention has turned to agroforestry as a means of restoring soil fertility and providing cash income. Agroforestry has also been shown to produce good feed for livestock. Low quality and quantity of animal feeds are a further constraint to production within the livestock sector (Winrock International, 1992).

As a result of current smallholder constraints, various organizations have been conducting research in agroforestry, as a possible solution to some of the problems faced by small-scale farmers. The World Agroforestry Centre (formerly known as the

International Centre for Research in Agroforesty, or ICRAF) was established as part of the Consultive Group on International Agricultural Research (CGIAR) centers in the 1980s. While the headquarters are in Nairobi, WAC also conducts research around the world in places such as West Africa, Asia, and Latin America. Other organizations working in agroforestry in Kenya include the International Livestock Research Institute (ILRI), the National Agroforesty Research Project (NAFRP) of the Kenya Agricultural Research Institute (KARI), and the Kenya Forestry Research Institute (KEFRI). Much of this research has been focused on central Kenya, where a high proportion of small-scale farmers reside.

Because of the need for quality feed for dairy animals, WAC and partner organizations have been conducting research since the 1990s on *Calliandra calothyrsus* Meissner (calliandra) and other agroforestry species for improving milk production on small farms. Studies have shown that calliandra is effective as a supplement or feed for dairy cattle (Paterson, Kiruiro & Arimi, 1999; Roothaert & Paterson, 1997), and farmers have begun to plant and use it on their farms. Over 2600 farmers in 150 groups in central Kenya are growing calliandra for feed (Wambugu, Franzel, Tuwei & Karanja, 2001).

**Food and Agricultural Research Management (FARM)-Africa**

Another introduced technology in central Kenya for small-scale farmers is the use of improved dairy-goat breeds. The NGO FARM-Africa has been working in the Meru area, targeting the poorest farmers in medium- and low-agricultural potential zones, by working with over 80 self-help dairy-goat groups. The Meru Dairy Goat and Animal Healthcare Project has been in the Meru area since 1996. The purpose of the project is to "improve the productivity of local goats through better management and access to sustainable healthcare and genetic improvement, and of local dairy cattle through better

access to sustainable healthcare systems" (Meru Dairy Goat and Animal Health Care Phase II April 1999-March 2002 Project Review, p. 8).

Activities of the project to achieve this goal include

- Community-based breeding of local goats with Toggenburg dairy goats;
- Formation and training of autonomous self-help groups to undertake breeding activities;
- Development of community animal health care workers and a privatized veterinary and drug supply service;
- Improvement of fodder supplies through community bulking and on-farm planting of suitable fodder; and
- Development of effective extension support service through the existing Ministry of Agriculture and Rural Development (MoARD) staff and extension system.

The Project works through both existing extension and the private sector to support small-scale farmers in the district. Through these linkages, FARM-Africa helps the dairy-goat groups obtain loans, training, and improved bucks for breeding. The project is estimated to benefit the welfare and income of 20,000 families in the area.

## Researchable Problem

There is much discussion among the government, NGOs, and international research centers of the increasing role that farmer groups and other community-based extension mechanisms are playing in the dissemination of technologies in Kenya today. Many are advocating community-based extension as a means of scaling up (Nyakuni, 2001; Raussen, Ebong, & Musiime, 2001; Wambugu et al., 2001). However, there is little research showing what factors make community-based groups effective, if at all, in disseminating technologies. The researchable problem is the need to examine farmer groups and the role that they play, and what factors make them effective in extending technologies. If the role of farmer groups in extension could be more clearly defined, and

evidence found for which factors could or do affect their effectiveness, it would facilitate technology dissemination to small-scale farmers. This information will be useful for organizations working with farmer groups, and to the groups themselves. It can provide a means to strengthen and guide the groups. Finally, it will provide valuable information to policy makers.

In view of this problem, the goal of this study then was to determine the role of farmer groups in technology dissemination, and to assess what factors make groups effective in extending technologies among small-scale dairy-goat farmers in Meru Central District of Kenya. The FARM-Africa Meru Dairy Goat and Animal Healthcare Project, working with dairy-goat farmer groups, provides a good case study in which to examine this research problem.

## Purpose and Objectives

The goal of this study was to examine the role of farmer groups in technology dissemination, and to assess what factors make groups effective in extending technologies among small-scale dairy-goat farmers in Meru Central District of Kenya. Specific objectives were as follows:

- Examine participation in groups and identify what factors, if any, affect participation in groups;
- Examine linkages and their outcomes, if any, between farmer groups and other extension stakeholders;
- Identify the mechanisms by which farmer groups and their members receive and disseminate information and new technologies, especially fodder shrubs and improved dairy-goat breeds;
- Identify the factors characteristic of groups successful in disseminating technology; and
- Propose policy recommendations to extension and development organizations regarding farmer groups' roles in extension.

## Research Questions

- Who participates in the groups, and what factors affect participation?
- What linkages, if any, exist among farmer groups and other extension players?
- What are the mechanisms, if any, within and outside of the groups for giving and/or receiving information and technology?
- What factors affect the success of farmer groups in disseminating technology?
- What are the implications of farmer-group dissemination for extension policy?

## Assumptions

Several assumptions were made in this study. One was that rural development (through means such as extension) was something that was desired by all of the stakeholders involved. Another assumption was that factors that affect the success of farmer groups in disseminating technology were measurable and valid. One way to assist with this was to state the operational definition of terms of the study (see below). Furthermore, it was assumed that respondents were forthright in their responses.

## Operational Definition of Terms

**Adoption.** Use of a new technology or technique by farmers, in any amount, and for any length of time[1].

**Agroforestry.** Deliberate use of trees on farms (in combination with crops, animals or both) to meet multiple objectives of the farmer.

**Dissemination.** The spread of information and technologies through various means of communication.

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[1] World Agroforestry Centre defines adoption of fodder shrubs as having expanded once and having over 100 trees, for dairy *cattle*. For this study, farmers, extension agents, and FARM-Africa personnel referred to "adoption" as the use of a technology without specifying quantity or time. Thus, the definition used in the study is operationalized for the study purposes and in line with the perspectives of study participants.

**Extension.** The process of sharing information and technologies among various development stakeholders.

**Group.** A local organization of people who have banded together to take advantage of social capital.

**Fodder tree.** A tree or shrub that is used to feed dairy animals. The fodder is often cut from the tree and carried to livestock.

**Leadership.** Role played by various people (within the group context) to provide guidance, motivation, and management.

**Linkage**. An entity (organization, person, group) that has some sort of connection or relationship with dairy-goat groups for any purpose.

**Location.** An administrative level below the district level, and above the village level. Used also as an adjective (locational).

**Scaling up.** Strategies that lead to an enlargement of program size.

**Small-scale farmer.** Rural person who makes a livelihood from less than two hectares of land.

**Social capital.** Norms and networks that enable collective action (the management of resources by groups).

**Success.** The determination by a group, individual or organization that a group has effectively disseminated information and/or technology. For this study, success was determined through variables such as self-ratings of the groups themselves and outside entities on perceived success in dissemination, number of neighbors adopting technologies, number of farmers and groups trained, and number of buck services.

**Technology.** An idea, practice, or object used and/or promoted to improve agricultural production (adapted from Rogers, 1995).

## Limitations of the Study

Several constraints may have limited the study. Factors such as geography, tribal identity, history, and gender may have affected both group performance and the role that groups play in disseminating technology.

Language, culture, and gender may have also biased or complicated the findings. This may have occurred not only with the North American researcher, but also with assistants and extension observers who were possibly different from the farmers through gender, culture, economic situation or education. Personal bias may have affected interviews. Finally, many of the questions on the questionnaires dealt with perceptions of farmers, and so have the possibility of bias on behalf of the respondents. The researcher attempted to avoid these issues through

- Awareness of and attentiveness to potential bias;
- Use of trained assistants to help with the interviews and to provide input and interpretations;
- Triangulation through research design and data sources, such as interviewing various extension players, including individual farmers, groups, and government and non-government extension personnel;
- Establishing of a record trail of data obtained;
- Use of local languages; and
- Attention to both who is being interviewed and who is not.

## Significance of the Study

Agriculture is the backbone of many African economies, yet many development obstacles prevent improved agricultural production from increasing the standards of

living and decreasing poverty in rural areas. Key to sustainable livelihoods is the opportunity for farmers to obtain and share useful information and technologies for their farming systems. For decades now, extension has been attempting to increase production through the provision of such information and technology. Only recently, however, has the focus been on the needs of the farmers themselves, and their empowerment through participatory methods of technology development and dissemination. If "farmers are the owners of development" (Barkland, 2001), then only by facilitating their methods and priorities can development organizations truly make a dent in the obstacles to their goals.

This study is important because it recognizes the crucial role that smallholders play in the technology development process, and attempts to portray the role that farmer groups play in disseminating technologies, what factors affect their success in doing so, who participates in the groups, reasons for participation and the mechanisms of farmer-led extension. Providing evidence on what role groups play and what factors affect their performance can help to strengthen groups and to guide outside organizations in facilitating and collaborating with groups (Place et al., 2002).

This study will be of significance to the many organizations working with small-scale farmers in Kenya. It can also assist groups in reaching their goals, and in becoming more effective. Finally, the study will have implications for extension systems in similar regions.

## Organization of Thesis

This chapter has given a brief introduction to the particular problems faced by smallholder farmers in Kenya, and to projects working in Meru with these farmers. Chapter 2 is a literature review of theories and studies related to agricultural extension, social capital and farmer groups. The third chapter presents the research design, methods

used and procedures followed to collect data. Chapter 4 presents the results of the study with regard to the first four objectives, and Chapter 5 contains the conclusions and recommendations of the study. Instruments used are included in the appendices.

# CHAPTER 2
# LITERATURE REVIEW

*Coming together is a beginning*
*Keeping together is progress*
*Working together is success*
*—Henry Ford*

It was shown in Chapter 1 that agricultural extension is an important component of rural development. A brief description of extension was given, along with an overview of extension's role in Kenya and its status today. Extension has evolved over the years to meet the changing needs of its clients, to become more effective, and in response to economic and environmental realities present in various countries. A description of this evolution in Kenya is presented in this chapter, detailing the move from the top-down, transfer of technology model to the so-called "farmer first" methods. The chapter goes on to discuss social capital and group theory, which are important factors in extension in Kenya today.

## Extension History and Models in Kenya

### Introduction

To meet the challenges of development, bring about rural improvement and address farm constraints such as those faced by farmers in Kenya, agricultural research and extension have been used for decades to advance the rural sector in nearly all countries. In the previous chapter, the World Bank defined extension as "the process of helping farmers to become aware of and adopt improved technology from any source to enhance

their production efficiency, income and welfare" (Purcell & Anderson, 1997, p. 55). It is important how extension is defined because that in turn affects how it is conducted.

Extension has traditionally been defined as the delivery of information and technologies to farmers (Moris, 1991). This leads to the technology transfer model of extension, seen by many as the main purpose of agricultural extension (Moris, 1991). This is based on the idea that "modern" knowledge and information is transferred through extension agents to recipient farmers.

The conventional provider of extension, the state, has typically used top-down, "transfer of technology" (TOT) methods for extending new technologies. Top down methods characterized the United States extension model, which was instituted by many colonial governments in Africa. In the TOT approach, technologies are generated at research stations and diffused to farmers using the extension service (Put, 1998). Not only technologies but also intangibles such as power, prestige and skills are located at these centralized stations (Put, 1998). Technologies are spread vertically in this top-down approach. The TOT approach is often biased toward better-endowed farmers whose fields and infrastructure are more like those of the research stations (Chambers & Ghildyal, 1984).

Early extension models in Kenya therefore followed a "cookbook" approach to new technology through state extension services (McMillan, Hussein & Sanders, 2001, p. 1). Technologies were developed at the Ministry of Agriculture and run through the extension pipeline via extension agents to farmers, with agricultural development being the desired product. Farmers were not much involved in the development or dissemination of technology. Research and extension were focused mainly on large-scale

farms or those smallholders living in high and medium-potential areas, and trials and demonstrations were mostly on research stations. This approach began during the colonial era and continued into the 1980s.

**Diffusion of Innovations Theory and Transfer of Technology**

Transfer of technology approaches are strongly linked to the diffusion of innovations philosophy. Diffusion of innovations theory says that technologies are communicated over time among the members of a social system, and adopted according to various characteristics of both the technology and the user (Rogers, 1995). The diffusion of innovations model was focused on a very linear process of technology development. Rogers' model has been critiqued for this and for other shortcomings, such as the pro-innovation bias, blame of farmers for "non-adoption" of technologies, lack of recognition of farmer innovations, and focus on the change agency/change agent instead of the ultimate end users of technology (the farmers).

More recent thinking has developed models that are more iterative, dynamic, and cyclical in nature (Figure 2-1). Rogers himself moves away from linear technology transfer with the convergent model in the latest version of his theory on the diffusion of innovations (Rogers, 1995).

The theory of innovations and related transfer-of-technology model has tended to work better in developed rather than developing nations, but even within developed nations, the perceived process has evolved into the more iterative model. The linear model originally proposed by Rogers works better when there are limited recommendation domains for the technology. Technologies can then be recommended in "blanket" form.

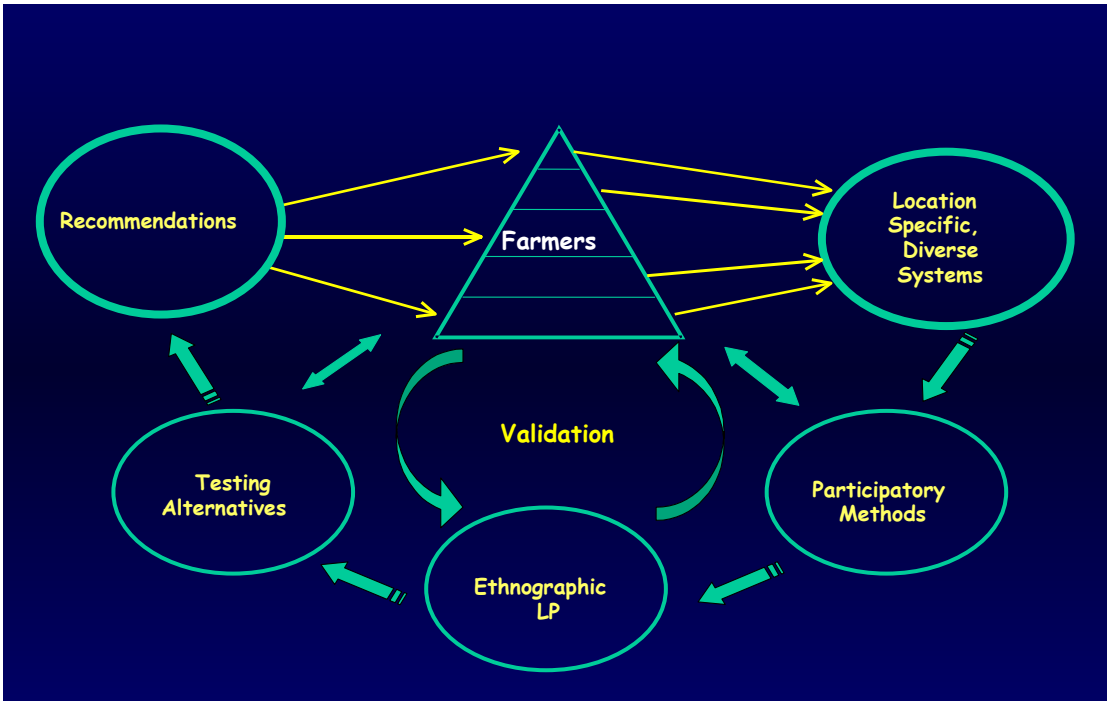


Figure 2-1. Farming systems emerging methodology on technology transfer

*Note*: Adapted from Bastidas, 2001

Researchers in developing nations first recognized the need to apply new thinking to the "problem" of slow or non-adoption (Dunn, Humphreys, Muirhead, Plunkett, Croker et al., 1996). Small-scale farmers living in risk-prone, complex environments are often unable to take advantage of many of the technologies developed on research stations for large-scale farms. Researchers working around the world noticed the unique problems of the small-scale farmer livelihood system, and developed strategies to solve these that are now known as the farming systems approach (Collinson, 2000; Escobar, 2000; Harwood, 2000; Hildebrand, 2000; Norman, 2000).

In the iterative model, much more focus is on the endogenous nature of innovations. Starting in 1982, development practitioners began emphasizing the notion that research activities should begin and end with farmers. Rhoades and Booth (1982)

coined the term "farmer-back-to-farmer." Chambers developed this into the "farmer-first" philosophy (Chambers, 1990, as cited in Dunn et al., 1996). Along with these were the "putting people first" (Cernea, 1985) and "farmer participatory research" models (Farrington & Martin, 1988, as cited in Dunn et al., 1996). The linear model does not show the many innovations that come from sources other than formal research. Roland Bunch (1985) and many others (described in Haverkort, Van de Kamp & Waters-Bayer, 1991) have shown that farmers are experimenters.

Current dissemination thinking takes a much more participatory, farmer-centered approach than the diffusion of innovations theory. Farmers are involved in every aspect of technology generation, from generation to testing to dissemination. However, it has not always been this way. Much of the history of extension in Kenya is beset with examples of top-down, transfer-of-technology models of technology dissemination, many following the theory of diffusion of innovations.

**The 1960s Top-Down Approach: State Transfer of Technology Model**

During the colonial period the state extension service developed into a major service provider for large-scale colonial farmers. After independence in Kenya, the state continued be the major actor in agricultural extension for the first twenty years (Schwartz & Kampen, 1992) (see Table. 2-1). The colonial extension had used a regulatory and commodity approach (Kandie, 1997). Following independence, the government instituted a more general approach, based on the U.S. extension system and with funding from the U.S. Agency for International Development (USAID). This approach assumes that agricultural ministries have useful information for farmers, and extension's job is to transfer this to farmers (Schwartz & Kampen, 1992). USAID promoted new technologies through demonstrations, technical packages and information.

At the same time, the commodity extension approach was still used for both small and large-scale farmers. The commodity approach has been one of the most enduring approaches used for extension in Kenya. It was successful in disseminating hybrid maize technology, which was developed in Kenya around 1955.

In the late 1960s, the Ministry of Agriculture adopted a farm management approach to extension (Gautam, 2000). This was initiated as part of a credit program for farmers. The Ministry started the Farm Management Division at the same time to run the credit program.

Table 2-1. Early extension approaches strengths and weaknesses

| Type of extension | When adopted | Strengths | Weaknesses |
|---|---|---|---|
| Regulatory, commodity | Colonial period, 1945-1963 | Good management, effective for resource-rich | Top-down, ignores smallholders, coercive |
| General | Early independence, 1963 | Focus on whole family, increased participation | Top-down, poor management and linkages |
| Farm management | Late 1960s | Provides inputs, management skills | Unsustainable, focused on credit |
| Integrated | 1976 | Provides inputs, holistic | Lack of training and linkages; top-down |

**The 1970s Holistic Approach: Integrated Rural Development Projects and Farming Systems Philosophy**

During the 1970s, donors began to place an increasing emphasis on the poverty of rural people, and the Integrated Rural Development Project (IRDP) was started in Kenya in 1976 with World Bank support, using an integrated extension approach. The IRDP's goal was to build institutional infrastructure and to provide inputs to farmers to increase production (Moris, 1991). These inputs included extension, research, irrigation, credit, roads, water, electricity, and sometimes schools and health centers (Venkatesan &

Kampen, 1998). The focus was mainly on technical aspects, however, and left out crucial issues such as training, linkages with research, and management. Integrated Rural Development Projects are seen to have failed mainly due to lack of sustainability, administrative problems, a top-down approach, and failure to build local capacity (Venkatesan & Kampen, 1998).

There was concern by donors during this period that developing countries were at risk of famine due to shortages of major staples. Many thought that agricultural research would help address this issue (Hansen & McMillan, 1986). The same time period coincided with the first activities of the Rockefeller and Ford-funded international centers in Africa, and the World Bank consultive groups on agriculture in individual countries. The international community decided to create an organization for international agricultural research, and the Consultative Group on International Agricultural Research (CGIAR) was launched in 1971 (CGIAR web site, available at http://www.cgiar.org/who/wwa_history.html). It established International Agricultural Research Centers (IARCs) around the globe, many of which provided research on food crops.

One of these CGIAR centers was the International Maize and Wheat Improvement Center, CIMMYT, which established a branch in Kenya. This was one of the organizations that, during the 1960s and 1970s, gave greater emphasis on smallholder farmers and their livelihood systems, as researchers realized that such people were not being reached effectively with the traditional extension approaches. They thus began to use what is known as the farming systems approach to research and extension. In Africa, this was initiated through the work of Michael Collinson with CIMMYT (Collinson,

2000). Farming systems is a holistic type of approach that looks at the entire farm as a system with various subsystems. It provides for greater dialog with and input from farmers, and for enhanced linkages between research, extension and farmers. This model was marked by participation at the farm level (through farmer input on research and on-farm trials) and by interdisciplinary linkages and a systems approach to extension.

The farming systems approach (Norman, 2002) was characterized by

- A holistic approach viewing the farm as a whole;
- Involvement of farmers and their priorities;
- Research reflecting the various subsystems' interactions and linkages and
- Reliance on informal surveys or "rapid rural appraisal" (RRA).

**The 1980s Training and Visit Approach: Expanding the State Extension Service**

During the 1980s, state extension systems in developing countries were further altered, due to recognition of the need to reach more farmers and to better train extension agents. The Training and Visit (T&V) system was a model that was instituted by the World Bank in Kenya in the early 1980s (Gautam, 2000). The National Extension Project (NEP I) of Kenya was the World Bank-funded T&V extension approach.

The T&V system was designed to address some of the weaknesses in the previous extension approaches, such as weak linkages with research and low training of field extension workers. It was introduced as a pilot project in two districts in Western Kenya in 1982, and expanded to cover 30 districts by 1983. The objective of NEP I was to have sustained increases in agricultural production in 30 of Kenya's 41 districts, all medium- and high-potential areas. National Extension Project I was also to promote institutional development within the extension service (Gautam, 2000).

As its name suggests, the basic premise of T&V was training (instilling professionalism in extension agents) and regular visitation of farmers by the agents.

Extension agents were to be trained in new technologies every two weeks. Under the T&V system, subject matter specialists advised extension agents, and also provided a link between extension and research. They provided monthly workshops where field extension workers are trained. The agents then took these techniques to the farmers for two weeks before returning for further training. Farm families were divided into groups, with five to ten contact farmers per group. These contact farmers were to provide a multiplier effect.

The second National Extension Project, NEP II, a continuation of NEP I, was started in 1991. The second project's objective was to increase smallholders' incomes. It sought to reach lower-potential areas and more marginalized farmers, and to further improve links with research. NEP II expanded extension coverage to 40 of the now 45 districts, including some of the previously ignored semi-arid zones.

There are conflicting reports on the effectiveness of T&V in Kenya, which give insight into the difficulties of measuring the impacts of extension. Bindlish and Evenson (1997) performed an econometric review of T&V extension in Kenya and Burkina Faso. Their study claimed high returns to extension through T&V. On the other hand, Gautam (2000) reported limited impact of T&V extension in Kenya in a review of NEP commissioned by the World Bank Operations Evaluation Department (OED). The OED concluded that NEP I had some beneficial aspects but several operational deficiencies, and was not financially sustainable (Gautam, 2000). Following discussions with the Africa Region of the World Bank, the final rating of the NEP outcome was "marginally satisfactory" (Gautam, 2000).

Whatever the arguments, there are indications that T&V had many shortfalls. Some feel that T&V focused so much on training that the system lost sight of the goals of meeting farmers' needs and improving their livelihood. It was essentially a supply-driven and top-down system, promoting agricultural messages that had been designed and developed by research scientists, with limited input by the ultimate users of the technologies (the farmers). The delivery method was perhaps efficient, but the messages often irrelevant, according to farmers surveyed (Gautam, 2000). At the end of NEP II in 1998, the extension service was characterized by weak management, a lack of strategy for the service, and general ineffectiveness (Gautam, 2000).

T&V, like the general extension approach, was characterized by limited feedback from farmers. The packages were somewhat mechanistic, and not flexible enough to meet the needs of Kenya's variety of farming systems. Training and Visit relied on contact farmers, and tended to neglect the larger rural population (Moris, 1991). In NEP I and NEP II, there were no real mechanisms for choosing contact farmers who truly represented many of the farming systems in the areas. The hierarchical structure set up by the Bank prevented innovation, partnering, and efficiency. Despite a supposedly improved system, farmers before and after NEP said they were not receiving advice from extension, or else not the advice that they needed (Gautam, 2000).

An important factor in agricultural technology development and dissemination during the 1980s and 1990s was structural adjustment programs (SAPs). The World Bank and the International Monetary Fund introduced SAPs to help address some of the economic crises that were facing Kenya and other developing nations. The 1980s had brought about economic hard times to many developing countries, when the high price of

oil coupled with drought led to growing foreign debt. Also contributing were the excessive growth of parastatals in African nations and declining prices of primary products (Sanders, Shapiro & Ramaswamy, 1996).

Constraints to development in African countries were seen to be in four main areas: budget deficits, over-centralized governments, recurrent personnel costs in bloated bureaucracies, and declining administrative capacity (Cohen, 1993). The highly centralized government led to much inefficiency and corruption. Over half of Kenya's employed population worked in the public sector. Government expenditures escalated mainly due to the large growth in the public sector and debt service. One of the main ways to cut down on expenditures was therefore to reduce government employment.

Donors instituted structural adjustment programs in Kenya to address budget deficits and kick start the ailing economy. These programs included reduction of the civil service, liberalization of markets and pricing policies, reforms of parastatal organizations and removal of foreign exchange controls (Cohen, 1993; Ikiara, Jama & Amadi, 1992; Sanders et al., 1996). The bloated civil service was to be reduced while privatization was encouraged. The hope was that these steps would bring about more economic growth by liberalizing marketing and pricing policies and reducing state control. The free market was seen by pundits to be the best way to efficiently allocate resources (Ikiara, et al., 1992).

Structural adjustment programs played a large role in technology dissemination and growth during that period. Although SAPs were expected to adversely affect the urban population, who would now have to pay more for food, the smallholders among the rural areas were affected negatively as well. In the long run, SAPs were meant to increase

incentives to farmers, expand private investment, improve economic efficiency, improve trade balances and develop appropriate energy sources (Sanders et al., 1996). They aimed to encourage the private sector by reducing the size of the civil service.

However, although product prices were increased, privatization of the input suppliers meant that smallholders no longer obtained subsidies on fertilizers and other inputs. With the cost of inputs dramatically increased, SAPs reduced the smallholder's ability to purchase inputs such as chemical fertilizers when the government stopped subsidizing them. Growth in the private sector has not made up for the SAP-induced reductions in the public sector (Sanders et al., 1996).

Extension funding was reduced more and more during the 1980s and into the 1990s due to the continuing economic crisis and the structural adjustment programs which encouraged state downsizing. As the Kenyan government failed to recover from the budget deficits so prevalent in the 1980s, it became obvious that they could no longer fund T&V and other expensive extension models. There were limited funds for operational costs, and most of the funding (80%) tended to go toward personnel. It was therefore difficult to reach their clientele since there were no funds to fix vehicles or pay for fuel to get to the field.

**The 1990s Pluralistic Approach: Community-Based Farmer-Led Extension**

Although state extension once played a major role in Kenya, the paradigm for research and extension has been changing extensively over the past decade. The state extension service has recently gone through major changes and disintegration (Kandie, 1997; Omolo, Sanders, McMillan & Georgis, 2001). Once totally state-run, extension in Kenya is now conspicuous by the heavy role and increasing diversity of non-governmental actors. The outcome of the economic crises and structural adjustment

programs in the 1980s was a search for other potential extension actors within the extension domain during the 1990s. Many stakeholders began calling for a pluralistic (multi-provider) extension model, in which the state takes on the role of facilitator for the many other actors involved in extension such as non-governmental organizations, farmers' groups and private extension (Gautam, 2000; McMillan, Hussain & Sanders, 2001; van den Ban, 2000).

Because farmers are already receiving information and technology from a range of sources from other farmers to private agro-business to the public government extension system, Zijp (2002) calls for the promotion of pluralistic extension approaches. The World Bank is now also promoting pluralism in extension in Kenya (Gautam, 2000). This pluralistic type of system is meant to contribute to flexibility and complementarity of extension systems, and meet the diverse needs of a wide range of farmers (Crowder, 1996).

## Farmer-Led Extension

Not only in Kenya, but in many countries today, extension is marked by partnerships between various agencies such as the state, private companies, non-governmental organizations, and farmers' groups. These partnerships and linkages are seen as necessary to both cut costs and to involve all of the stakeholders in the extension process. In such "coalition systems" of extension, the various stakeholders acknowledge the role and skills of other partners, and are strengthened by alternate perspectives and expertise (Anderson & Crowder, 2000). Multi-partner interaction promotes mutual learning and innovation. Coalition systems can be flexible and provide a system of checks and balances (Anderson & Crowder, 2000).

Extension systems today are characterized by approaches placing greater emphasis on farmers playing a central role in the technology development process. The new approaches collectively might be called farmer-led extension. The farmer-led model for extension in developing countries is designed to be participatory, demand-driven, and client-centered. This approach essentially evolved from the farming systems and similar approaches, with a greater emphasis on the needs of resource-poor farmers, gender, and the value of indigenous knowledge systems. Many researchers have described such farmer-centered extension systems, including Chambers (1997), Esman & Uphoff (1984) and Payson, Ganpat, Hartmann, Peters and Place (2004). Scarborough, Killough, Johnson and Farrington (1997) describe farmer-led extension as

> a multidirectional communication process between and among extension staff and farmers involving the sharing, sourcing and development of knowledge and skills in order to meet farming needs and develop innovative capacity among all actors, in which all farmers have a controlling interest; are "centre stage", are the protagonists and play a key role in technology development and delivery; and involving farmers in training other farmers and trainers, and in sharing, sourcing and transferring knowledge and skills. (p. 4)

The philosophy in farmer-led extension is very different in its view of farmers and scientists, when compared with the TOT model (Table 2-2). It is a "bottom-up" approach. It sees farmers as part of the entire process of technology generation, providing essential input and assisting in the design and evaluation of new technologies. These models both begin and end with the farming family and the livelihood system. The farm, not the research center, is the central location to the model. Scientists work closely with farmers in this type of extension. It is believed that a farmer-led approach will generate more appropriate technologies to farmers in low-resource areas.

Farmer-led extension models began showing up among non-governmental development agencies that sprang into action at the reduction of many government

services in the 1980s and 1990s. Non-governmental organizations and community-based organizations (farmers' groups) are playing a key role in extension around the world today. "Farmer-led approaches to extension are spreading . . . and farmers' associations . . . are contributing handsomely to the diffusion of modern technology" (Picciotto & Anderson, 1997, p. 6).

Table 2-2. Philosophy of transfer of technology (TOT) and farmer first

| | TOT | Farmer First |
|---|---|---|
| Diffusion of technology | Top down | Bottom up |
| Farmer's role | Beneficiary | Client; colleague |
| Scientist's role | Technology generator | Consultant; collaborator |
| Extensionist's role | Deliver technology and demonstrate | Facilitate and network |
| Determination of research priorities | Perceptions of scientists | Perceptions and needs of farmers |
| Main research location | Research station | Farmers' fields |
| Explanation of non-adoption | Failure of farmer to learn, farmer's constraints | Failure of technology and of scientists |

*Note*: Adapted from Chambers & Ghildyal, 1984; Scoones, 1996; Scoones & Cousins, 1996

Extension is being called upon to engage communities more and to work with them. Extension then is given a wider mandate than simply transfer of technology, one that includes farmer mobilization, education, and organization (Zijp, 2002). Involving the community in extension is one way for such engagement to occur.

By working through community groups, development agencies are more free to focus on training and provision of materials, while community groups can be more involved with planning, mobilization, and facilitation (Raussen, Ebong & Musiime, 2001). Such empowerment leads to a sense of ownership and contributes to more

effective programs. Community groups give development agencies entry points for understanding village problems (Noordin, Niang, Jama & Nyasimi, 2001). Such groups allow development agencies to build on existing social capital, therefore accelerating and enhancing impact. It is a way to reach many in the community, including the poor (Noordin et al., 2001).

Community-based extension mechanisms have both advantages and disadvantages. One obvious advantage of state extension, of course, is a source of funding for such outreach. Private extension players also have the funds for outreach. What options, if any, do farmer-led extension mechanisms have? One option is contracting out, where the public sector uses funds to contract NGOs, community-based or private extension providers (Anderson & Crowder, 2000). Also, farmers and their groups are willing to help shoulder the cost of extension, according to some studies. Gautam (2000) found in his survey of T&V extension in Kenya that farmers were willing to pay a certain amount for extension advice. In Nigeria, Apantaku, Fakoya and Sodiya (2002) found that many stakeholders, including farmer groups, were willing to help fund extension. This included community-based associations, religious organizations, non-governmental organizations and farmer groups. Research conducted by Bebbington, Merrill-Sands and Farrington (1994) and Ashby and Sperling (1994) corroborates this view.

Another concern with farmer-led extension is sources of information and new technologies. The sources of new information and technologies remain diverse in farmer-led extension. Previous TOT extension methods focused on the research station and scientists as the key source of knowledge. Farmer-led extension is better adapted to the newer thinking that embraces all sources of knowledge including farmers themselves.

The international research centers in Kenya today are focusing on participatory research where farmers are heavily involved in research, almost all of which is on farmers' fields.

Community-based extension does not stand on its own, but is yet one more opportunity in the basket of options for development practitioners and policy makers to use in bringing about rural development. Utilizing farmer groups or any other alternative vehicle for extension of technologies does not negate the need for the state to remain involved. Government extension is still needed (Rivera & Alex, 2004). However, with the new pluralistic approach, other actors such as community-based mechanisms are playing a larger role.

In conclusion, based upon both the farmer first approaches and the current government budget deficits, community-based extension mechanisms are one of the most promising means of scaling up, or extending, technologies. In order for effective dissemination to take place, development players now view approaches using extension by farmers and farmer groups as most appropriate to effectively and sustainably transfer technologies to smallholders (Cooper & Denning, 1999). This type of farmer-led extension looks to the communities to mobilize themselves to determine their own problems and priorities in development, and to form groups to address their community concerns. Because of the millions of small-scale farmers in the area, every farmer cannot be reached by formal extension services. Therefore one of the major ways to bring about development is to build capacity and empower communities to extend technologies.

## Social Capital

To better understand community-based extension mechanisms such as farmer-led approaches, it is necessary to examine social capital. Social capital is a construct that has been viewed recently by many development players as an overlooked yet important factor

in rural growth (Grootaert, 2001; Pretty & Ward, 2001). It joins other forms of capital that also play a role in development—natural, physical and human capital. Some claim that social capital has been a missing link in development, and that by paying attention to it development can better be achieved (Pretty & Ward, 2001; Robinson, Siles & Schmid, 2002).

There are many definitions of and theories about social capital. Grootaert (2001) defines social capital as the internal social and cultural coherence of society, or the norms and values that govern interactions among people and institutions. Robinson et al. (2002, p. 5) define it as "a person or group's sympathetic feelings for another person or group. Sympathetic feelings may include admiration, caring, concern, empathy, regard, respect, sense of obligation or trust for another person or group."

The World Bank has a program called the Social Capital Initiative. It defines social capital as "the norms and networks that enable collective action" (the management of resources by groups). According to the World Bank, "increasing evidence shows that social cohesion — social capital — is critical for poverty alleviation and sustainable human and economic development" (World Bank, 2003).

Both narrow and broad conceptions of social capital exist. The most narrow, put forth by Putnam (1993, in World Bank, 2003) sees it as the horizontal networks among people. His view of social capital is at the micro level. Coleman, on the other hand conceived of social capital as having both horizontal and vertical associations (1990, in World Bank, 2003). Vertical links are hierarchical and have power differentials. Social capital, in Coleman's view, is more of a meso-level view. The even more encompassing

macro level involves political aspects and formal institutions such as the court system in its view of social capital.

According to social capital theorists, there are two basic types of social capital: structural and cognitive. The structural type involves information sharing, and collective action through established roles and social networks (Uphoff & Wijayaratna, 2000). Structural capital is easier to observe and quantify. Cognitive social capital, on the other hand, is more related to shared norms, values, trust, attitudes, and beliefs (Uphoff & Wijayaratna, 2000). Cognitive social capital is more of a subjective concept and is harder to measure and quantify.

Although some argue that social capital has changed in Africa as a result of capitalism and structural adjustment, collective action is still important among farmers. Hoon[2] (2002) describes the transformation of labor arrangements in the Eastern Zambia from more egalitarian "horizontal" relationships such as collective labor arrangements to more vertical relationships determined by the labor market or patron-client relations. Traditional communal labor arrangements (*kalimalima*) have declined, while more individualized labor agreements (*ganyu*) have increased. This is a result of the increasingly monetized and individualistic relationships brought about through both the growth of capitalism and structural adjustment programs. In response, collective action among farmers has changed and adapted components of both the more traditional labor practices and more modern capitalist practices. Three new types of collective labor arrangement since the 1990s are known as "group *ganyu*," "*Kalimalima*-in-clubs," and

[2] Hoon, P. (2002). *Balancing labor market demands with solidarity networks: Changes in labor mobilization in eastern Zambia*. Paper presented for the Department of Political Science and Center for African Studies, University of Florida, Gainesville

"neo-*Kalimalima*." These types of institutions are known as syncretic, and "blend rules, habits, or norms of an earlier time with modern institutions" (Hoon, 2002, p. 22). Therefore social capital may have changed, but still exists strongly in African rural life.

There are many studies on social capital and its effects on people in rural areas. Does it really contribute to rural development? How can development agencies capitalize on social capital? Following are the findings of various studies on social capital.

One important finding on social capital was Krishna's 2001 study in India. He found that having a high level of social capital was not necessarily correlated with high development performance. However, once a capable agency was added to high social capital, high performance was achieved. This points to the value of linkages between local social capital such as community groups with outside agencies such as extension, NGOs and local research organizations.

Other researchers found a positive relationship between income and social capital. Narayan and Pritchett (1999) found that social capital was positively correlated with increased incomes. Because they were studying farmers who did not necessarily make a measurable income, they used expenditures as a proxy for income, and found that increased social capital led to increased expenditures. In fact, a one-standard deviation increase in social capital led to increases in incomes of all households by about 50% (Narayan & Pritchett, 1999). Furthermore, they found that adoption of improved practices was positively correlated with social capital. Narayan and Pritchett argue that social capital is just as important to households as many other factors such as schooling, distance to market and gender of household head. They believe that social capital is an important missing dimension of poverty analysis.

The World Bank Local Level Institutions (LLI) study on social capital was conducted in Bolivia, Burkina Faso and Indonesia (Grootaert, 2001). In line with Narayan and Pritchett's 2001 study, Grootaert found that social capital contributes to welfare. Because poor people do not necessarily have an income, both these studies examined expenditure as a proxy for income. They also examined asset accumulation. Increases in social capital led to increases in expenditure and other welfare indicators.

Gugerty and Kremer (2002) examined the question of whether development assistance helped to build social capital. They found that outside funding had no effect on social capital formation in a study of three development projects in western Kenya. Their paper suggests that social capital is not easily created, and that many organizations' goals of increasing social capital through funding may be limited. The paper does not discuss the historically strong role of social capital in rural Kenya.

There are also studies on the role of heterogeneity in social capital. Groups may be heterogeneous on many variables, such as age, gender, tribe and wealth level. Varughese and Ostrom (2001) found that heterogeneity was not an important predictor of outcomes in collective action such as farmers' groups.

## Farmer Groups

One of the most promising means of scaling up technologies in the new pluralistic extension environment is through social capital in the form of community-based extension mechanisms. Social capital in the form of groups is used in communities worldwide, especially in rural areas, as safety nets to cope with risks and for mutual assistance. Groups are valuable as a form of collective action to farmers, providing resources such as credit, labor and information. Groups allow farmers to obtain new technologies, benefit from economies of scale, enter into stable relationships with

suppliers, and set rules for natural resource management (Place et al., 2002; Stringfellow, Coulter, Lucey, McKone & Hussain, 1997). Donors are seeing the value of farmer groups, such that they are sometimes a prerequisite for various agricultural projects (Stringfellow et al., 1997).

**Role of Farmer Groups in Extension**

Farmer groups have played an important role both in the community and in extension, and now appear to be taking on an even larger role. It is known that farmers transfer knowledge and technologies to each other (Arbab & Prager; 1991, Gubbels, 1991; Maseko, Scoones & Wilson, 1991). Maize was spread throughout the African continent long before any formal extension was in place. Rhoades and Booth (1982) argue that farmers are beneficial sources of information and practices for other farmers. In Kenya, the major source of agroforestry germplasm was other farmers, according to a study in 1998 (Edouard, 1998). Farmers obtained germplasm from their own farms, relatives and neighbors. Over 39% of the farmers interviewed exchanged agroforestry germplasm with other farmers (Edouard, 1998).

Groups are considered by both the Kenyan government and donors to be vehicles and entry points for new technologies and training for farmers. Extension workers in Meru Central District find that their work is easier to handle when they deal with groups. Groups can be a powerful tool for extension, especially because they present an efficient way for extension staff to pass on information and technologies. The current Kenyan extension program, National Agriculture and Livestock Extension Programme (NALEP), encourages what are called “common interest groups.”

Within a group context, one resource person can be trained, who will then be empowered to pass on the information to the group. Groups are believed to extend

technologies faster than individual farmers. They have also been found to support fellow members in adoption (Phiri et al. 2004). In the FARM-Africa project, 78% of the project beneficiaries were said to be non-members of the FARM groups (Mutia, P., FARM-Africa Meru Tharaka Nithi Dairy Goat and Animal Healthcare Project Progress Report, January to June 1999). They were benefiting because of dissemination of information and technologies by the dairy-goat groups, especially at the buck stations.

Farmers have some comparative advantages over what are seen as the more conventional extension agents. Because they have similar circumstances, usually speak the same mother tongue and have comparable educational backgrounds, farmers can communicate well with and are trusted by fellow farmers. Farmer extensionists are able to reach more people in a more timely fashion than regular agents (Nyakuni, 2001). Farmers can be trained to lead community-based extension (Cooper & Denning, 1999), or farmer exchanges can be facilitated in order to share information. Farmer Trainers are already being educated in areas where the World Agroforestry Centre is working, since they can effectively pass technologies on to fellow farmers (Cooper & Denning, 1999). Farmer groups can be facilitated to network with other groups, forming strong farmers' associations and giving farmers a voice with which to educate other farmers and to demand services.

Along with advantages, farmers or community-based mechanisms of any kind have some obvious disadvantages as extension players. They do not have the power or authority to institute or regulate policy as governments do. They may lack capacity, resources and the infrastructure that government or private organizations have. The following issues come from Scarborough et al.'s 1997 book on farmer-led extension and

need to be addressed: The best way to choose farmer extensionists, defining their role, remuneration for farmer-extensionists, and personal issues and jealousies that may play a role at the community level.

Within Kenya, informal self-help groups have historically been an important tool of community development. The colonial government used these groups to help promote soil conservation, and formed the Department of Community Development to organize such groups in 1948 (Tiffen, 1992, as cited in Wellard and Copestake, 1993). Following independence, the *harambee* (let's all work together) movement brought about more group formation in order to obtain government assistance. Place et al. (2002) found in central Kenya that most adults belonged to groups. Women's groups especially are a ubiquitous part of rural Kenya (Saito, 1994); over 25,000 are registered with the Ministry of Culture and Social Services.

Due to the reasons discussed above, many are advocating community-based extension through farmer groups as a means of scaling up technologies (Nyakuni, 2001; Raussen, Ebong and Musiime, 2001; Wambugu, Franzel, Tuwei & Karanja, 2001). However, little is known about how farmer groups work in disseminating technologies and information. There is limited empirical evidence on the performance of groups (Pretty & Ward, 2001). This points to a need to examine farmer-to-farmer technology dissemination using farmer groups. The following studies show some of the research findings on the role of farmer groups in disseminating technology. Factors that play a role in farmer group success are also described.

Many studies on farmer groups attempt to find out why farmers join groups—what benefits do they gain from being in a group? In an analysis of farmer groups in cereal

growing systems in the United Kingdom, Wibberley (1997) rated farmers' perceptions of farmer group benefits in the categories of self-help, motivation, cohesion, and performance. Some of the highest ratings were with regard to cohesion; giving friendship, problem sharing and enjoyment received the highest marks. In Kenya, Alawy (1998) found that women feel that they benefit from being in the group through training, cash, financial assistance, knowledge gained, and food.

Farmer groups have proven to be a useful way to access a community and to extend knowledge to other farmers. In Australia, Andreata (2000) found in her study of farmer groups that they were an efficient way for farmers to share information and experience. Rouse found in 1996 that being part of a group contributed to knowledge, empowerment, confidence and ability to make decisions among members. Women's groups were shown in Malawi to reach more smallholders than customary extension practices, and to be an efficient way to reach women farmers (Sigman, Chibwana & Matenje, 1994). They are an important component of farmer-to-farmer extension, helping to coordinate research and extension. A study by Parkins in 1997 showed that 63% of farmers surveyed in Embu preferred to approach groups, rather than individual farmers, for information on tree planting.

Both public and private development partners can facilitate such groups to achieve their goals by linking them with other groups and service providers (Cooper & Denning, 1999). Geran found in her 1996 study in Zimbabwe that group formation led to increased links with service providers, as did Rouse in Zambia (1996). Such groups increase the efficiency, effectiveness and equity of service provision and also help to empower farmers (Esman & Uphoff, 1984; Geran, 1996).

However, being in a group does not guarantee equal access to services. There may be differences among groups that lead to inequitable service provision. Alawy (1998) conducted a study on the Kenyan coast where he examined factors influencing accessibility of women's groups to extension services. He found that extension tended to be biased toward male farmers, Christians and tribes from other areas. This was likely due to the fact that extension workers are mostly male, Christians working in a Moslem area, and from an "up-country" tribe.

Esman and Uphoff (1984) perhaps conducted the most comprehensive study on groups. They analyzed a cross-section of local organizations (LOs) from around the world. Data were gathered from various books, journals, and bibliographies on the subject of local organization. From this large set of case studies, data was gathered and analyzed.

The authors put forth the idea that LOs act as intermediaries in rural development; they intermediate between individuals and the state. Rather than being a part of the public or the private sector, local organizations rather make up a third sector. Local organizations, according to Esman and Uphoff, can extend the outreach of public services, increasing their efficiency. They can also aggregate the demands of rural people and assist them to solve problems in appropriate ways.

Their 1984 study was based off an earlier study conducted in 1974. The 1974 study indicated that local organizations were necessary for rural development. It also showed that the most efficient local organizations functioned at more than one level. Those organizations with links to political or administrative centers that provide information were also more effective. Esman and Uphoff believe that characteristics of

the poorer members of the community prevented them from taking part in local organizations. This is in contrast to Parkins' findings below.

Parkins (1997) conducted a study on the mechanisms of group extension of agroforestry technologies in central Kenya. He termed this "innovation networking" and found that networking varies by gender, attitude toward participation and recency of migration. He found that formal organizations tended to provide information to farmers, while informal organizations usually provided materials. Parkins expected to find that group participants were the middle class of small-scale farmers, because the poorer farmers might not be able to afford the financial and labor commitments. However, he found that the poorer farmers actually were participating in groups along with those of a more average wealth level. The wealthier farmers were not as heavily involved in groups.

Another hypothesis in Parkins' study was that group-to-farmer contacts would be more common than farmer-to-farmer contacts. Because 63% of farmers preferred groups to individuals for information, this hypothesis was retained. However, respondents also perceived that there were local experts available, and about half of them approached their neighbors for networking purposes.

**Factors for Group Success**

In addition to the reasons why farmers join groups and the role that groups play, effectiveness of groups is another important area of study. If groups are to be used to help scale up technology dissemination and to extend more conventional extension, it is important to know what factors make groups successful in group activities in general, and extension in particular. Therefore several researchers have examined group performance.

One aspect that must be addressed at this point is the question of what is meant by the term success. Presumably farmer groups have their own indicators of success. However, outside agencies working with such groups may also have their definition of success. From a project or donor viewpoint, adoption data, outputs or quantifiable benefits from being involved with a group may be indicators. In this study, success was examined in terms of dissemination of information and technology, not necessarily group performance on the whole. Success was determined through the groups' own perceptions of success in dissemination to other farmers, through variables such as number of other farmers and groups trained, and through external ratings of the groups by FARM and extension staff.

Stringfellow, Coulter, Lucey, McKone and Hussain conducted a broad study on the effectiveness of groups in sub-Saharan Africa in 1997. They found that cooperation among farmers was more successful with small cohesive groups, when conducting simple activities and by liaising with service providers such as agribusiness. They also found that groups need internal cohesion and a member-driven agenda. Cohesion was also assisted by small group size, homogeneity of members and member accountability.

De Haan (1999) studied group dissemination of dairy goats in Tanzania. Her research was a case study of Heifer Project International's goat group project. She found that social capital was important in gaining access to goats. Success of the groups was related to age of the group, spatial distance between members and group function. Older groups with multiple functions were more successful at dissemination of the technology.

Hambly (2000) examined longevity in women's tree planting groups. Her findings included the conclusion that unsuccessful groups were related to inequitable social structures.

Morton et al. (2001) conducted a study on self-help groups and cooperatives in the dairy industry in Kenya. They found that success of these groups was related to homogeneity, group size and activities undertaken. In analyzing the Kenyan dairy sector, both cooperatives and farmer groups were examined as to their success in Morton et al.'s study. The structural features that contributed most to success were member homogeneity and starting with a single activity. Group size was shown to have both positive and negative effects upon success. There was more cohesiveness and sense of ownership among small groups of farmers (8 to 25 members). However, larger groups were more likely to function successfully when working with outside agents such as agribusiness and banks. With relation to outside agents, a high degree of self-financing led to greater success. Also, heavy external training inputs led to greater success. Finally, having a member-driven agenda had a negative effect upon group success (Morton et al., 2001).

Place et al. (2002) studied group performance among small-scale farmers in Central Kenya. They examined 87 groups and 442 households, and using descriptive analysis and regression models, were able to gain better understanding of factors that affect group performance. In the empirical analysis, the authors focused on group structural variables as factors affecting performance. They found that performance was not correlated with any particular "easy-to-measure" group characteristic (Place et al., 2002).

They also found that groups were very dynamic and took on new activities. Many different types of groups were able to take on diverse activities and be successful in them. Significant factors in explaining the success of groups were purpose of the group and whether the group purpose had changed over time.

Place et al. found that in certain analyses, group size affected performance. However, it seemed like middle-sized groups were more successful than the large or smaller groups. Age of the group was not linked to performance in any of the analyses (Place et al., 2002).

## Conclusion

Many feel that there are currently good agroforestry practices and technologies for small-scale farmers, such as calliandra for fodder, that have been developed and are ready to be taken "off the shelf" (Cooper & Denning, 1999; Wambugu et al., 2001). There are many farmers, in Kenya and elsewhere, who could benefit from such technologies if they could obtain the necessary information and germplasm. What is lacking is the means of disseminating this technology to more farmers who could take advantage of it.

Government extension in Kenya today is unable to provide many of these small-scale farmers with appropriate technologies and information to meet their needs and thus help to bring about rural development. The issue then is how to extend, or scale up, these technologies to benefit more low-resource farmers in spite of the limited government extension. Many approaches have been developed since the reduction of government extension, such as private extension services and those run by NGOs. Recently, however, community-based extension has come to the foreground as a means of scaling up these technologies to have a wider impact in the rural economies (Franzel, Cooper &

Denning, 2001; Noordin, Niang, Jama & Nyasimi, 2001). Farmer groups are an important vehicle for community-based extension.

Today in Kenya, many technology dissemination approaches exist, with few studies to show their effectiveness. One important need in the new extension paradigm that includes community-based extension is to determine the role that community groups and farmers play in extending technologies, and how they go about disseminating the information to other farmers. Knowing these mechanisms will contribute to the effort in scaling up the impact of agroforestry and other research.

In this chapter we have examined extension history and models used in Kenya and theories of social capital with special emphasis on farmer groups. In Chapter 3 the methods used to gather the data and research design will be discussed.

# CHAPTER 3
# METHODS

*Dèyè mònn gen mònn.*
*(Haitian proverb meaning "Behind mountains, more mountains")*

In the previous chapter, theories of extension, social capital and farmer groups were discussed. This chapter describes the methods used to help understand and describe the role of groups in extending new technologies. It covers the research design, the population and subjects, sampling procedure, instruments, study variables, data analysis and means for ensuring validity and reliability.

The goal of this study was to examine the role of farmer groups in technology dissemination, and to assess what factors make groups effective in extending technologies among small-scale dairy-goat farmers in Meru Central District of Kenya. The specific objectives were to

- Examine participation in groups and identify what factors, if any, affect participation in groups;
- Examine linkages and their outcomes, if any, between farmer groups and with other extension stakeholders;
- Identify the mechanisms by which farmer groups and their members receive and disseminate information and new technologies, especially fodder shrubs and improved dairy-goat breeds;
- Identify the factors characteristic of groups successful in disseminating technology; and
- Propose policy recommendations to extension and development organizations regarding farmer groups' roles in extension.

## Research Design

A mixed-methods, multiple-stage approach was used to obtain data for the study. The study consisted of a preliminary phase (four months), survey research (four months) and a follow-up stage that included stakeholder feedback (two months). The approach used obtained both qualitative and quantitative information to answer research questions. Many researchers in social science studies use the mixed-methods approach, also known as triangulation (Jick, 1983). Triangulation not only allows for an enhanced description of phenomena, but also helps to validate findings (Hinds & Young, 1987, in Bowen, 1996).

A main component of the research was an in-depth case study of dairy-goat farmer groups in Meru. A case study is an in-depth look at one individual or social unit such as an organization or community (Ary, Jacobs & Razavieh, 1996). Case studies look for variables important to the phenomenon under study, and examine these variables and their relationships within the social unit. Case studies involve a prolonged time frame—for this study the researcher spent over 10 months in the field. The goal of case studies is to understand and describe a phenomenon. Data, both qualitative and quantitative, were collected through secondary documents and interviews, questionnaires and observations. Much of the quantitative data were collected from formal surveys and secondary sources.

In light of the goals of the study, a mixed-methods approach was appropriate, because in order to make associations, predictions, and inferences, one must first understand a phenomenon. Using both qualitative and quantitative techniques helped to strengthen and to add validity to the results of the study. Many researchers believe that qualitative and quantitative methods are not competing, but complimentary (Bowen,

1996; Casey & Kumar, 1993), and indeed, can strengthen the perceived weaknesses of both approaches.

## Population and Subjects

The population of interest to the study was small-scale farmers in Meru Central District in Kenya. According to FARM-Africa, small-scale farmers are those with landholdings between 0.25 and 1.5 hectares (Meru Dairy Goat and Animal Health Care Phase II April 1999-March 2002 Project Review, 2002). However, some of those interviewed owned larger pieces of land, especially in the lower zones where there were settlement schemes. The target population was those farmers who were involved in dairy-goat groups through the non-governmental organization FARM-Africa in the district, plus other similar farmers who were not members of the dairy-goat groups but had benefited in some way from the groups. FARM-Africa intentionally worked with those whom they consider to be the poorer farmers in the area, and with women. The project also targeted farmers in the medium- and low-potential areas of the districts (Meru Dairy Goat and Animal Health Care Phase II April 1999-March 2002 Project Review, 2002), although other groups belong to higher-potential areas.

From that population of small-scale farmers, a sampling frame of farmers and dairy-goat groups on FARM-Africa or government lists was put together. From the sampling frame both purposive and random samples (described in Ary et al., 1996) of individual households was drawn from FARM-Africa and government lists to elicit data for the study. Purposive sampling was used for key informant interviews (n = 24). Individual dairy-goat group members were chosen at random from a list of groups where possible (n = 44). Also of interest to the study were farmers who have benefited from the group (through group dissemination of information or technology). These non-dairy-goat

group farmers were sampled by asking the farmer groups for lists of people who had benefited from their group, and then randomly selecting farmers from that list (n = 44). Units of analysis thus included both farmers (dairy-goat members and non-members) and the dairy-goat groups. Instead of randomly selecting groups, all of the current dairy-goat farmer groups in the FARM-Africa project in the district were interviewed (n = 46). There were other dairy-goat groups in the district that had either just formed or were supported through another non-governmental organization (NGO) that were not interviewed.

**Sampling Procedure**

The dairy-goat groups in Meru Central District that were part of the FARM-Africa project were chosen for the study for several reasons. To reduce the number of variables, it was decided to focus on one type of group rather than a variety of farmer groups who may have had many different activities that they focused on. This also allowed for the comparison of success in dissemination across groups. The dairy-goat groups were all focused around the same activity, and there was an adequate number of them (46 in Meru Central District). They were also in the same geographic vicinity, and worked with the same organization (FARM-Africa).

Four other dairy-goat groups were also interviewed that were in the same area but were supported through another NGO, Meru Drylands Farming Project, to see if the project/NGO itself made any difference. However, their data was not included in the analysis with the 46 FARM-Africa groups.

The Meru area is quite homogeneous ethnically, which also helped to reduce variables in the study. The Meru tribe makes up most of the population, with its subtribes

the Tharaka, Imenti and Tigania. However, ethnicity was accounted for in the data collection to see if it had an effect on the variables studied.

Although FARM-Africa is working with over 83 groups in Meru Central and Meru South Districts of Kenya, it was decided to interview farmers and groups only in Meru Central. This was decided for several reasons. Based upon preliminary research and discussions with another research team that was covering both districts, it was decided that there were not major differences between farmers in Meru South and Meru Central. The Meru tribe was the majority in both districts. The districts were formed to cut across the various agroecological zones, and so both districts had farmers in all the zones. It was decided that there would be no major difference between the two districts. Furthermore, it was decided that better quality data could be obtained by focusing on a smaller yet similar area. The researcher could spend more time collecting data at each point and more easily return to groups or individuals for clarification. Concentrating solely on Meru Central would reduce expenses and increase efficiency of researcher time.

Therefore, all of the current FARM-Africa project dairy-goat groups in Meru Central District were surveyed. Because the project was growing so rapidly, not all the groups were interviewed. Therefore, there were dairy-goat groups that were not interviewed, either in Meru South District (and still part of the FARM-Africa dairy-goat project), or in Meru Central (with Meru Drylands Farming Project), or new groups that had just recently started and will not be associated with FARM because the project was ending.

Although FARM-Africa only had 20 dairy-goat groups in Meru Central, many new groups were associated with the project, albeit without FARM support. These were

known as “extension” groups. They had bought a breeding buck (while “FARM” groups were given one), and were trained by extension staff or other dairy-goat groups without the normal FARM-Africa support. There were 26 extension groups as compared to 20 FARM groups.

## Instruments

The study consisted of both qualitative and quantitative research methods. Interviews, non-structured observation and document analysis were the main means of collecting data that were used for descriptive purposes. A research journal was kept for daily entry of data and observations.

Topic guides were used for semi-structured interviews (Appendix B). These included general questions with probes. More formal questionnaires for both individual farmers and farmer groups were then developed based on this information and from document analysis (Appendices D and E). The individual instrument included 48 questions, while the group questionnaire had 66.

The researcher developed questionnaires based upon similar survey instruments from studies in Kenya. Advice and input from key informants and research colleagues was also sought. Questionnaire content was mainly guided by initial information elicited from farmers and farmer groups, however, during the preliminary phase of the study. The Institutional Review Board of the University of Florida approved the study design and instruments prior to data collection (Protocol #2003-U-371). The researcher developed questionnaires for both individual farmers and farmer groups.

Survey research includes issues of face and content validity. Face validity means that the questionnaire appears to be measuring what it purports to measure. Content validity means that the instrument contains a good representation of the range of meaning

of the construct being measured (Babbie, 1986). An instrument that does not have content validity will not give an adequate measure of a construct. Researchers conducting similar research in Meru and in Central Kenya and experts in the United States checked the instruments for face and content validity. This panel of experts consisted of four North American researchers and five Kenya-based researchers (three of whom were based in Meru).

A pilot test of the instruments helped to check for face, content, and criterion validity. This also helped to ascertain the amount of time needed to administer them. Five groups and seven individuals were used for pilot testing. Pilot testing was completed when the questions seemed to make sense to respondents and no additional questions or pre-coded answers were added. Unclear questions were removed or changed. Data from the pilot test instruments were used only when the question was not changed from the pilot tests to the final instrument.

Other threats to validity on study questionnaires included history, measuring instruments, differential selection of subjects, subject's attitudes, importance of the topic to respondents, and anonymity of respondents. Multiple indicators were used to measure constructs on the instruments. The researcher used local languages to ensure that respondents understood the questions. Indigenous categories and terms were used to ensure understanding, for instance, in describing wealth categories. The translator was trained and took part in the pre-test. All research objectives and methods were described to him and other participants to make sure that they understood what was being sought. Preliminary data collection ensured that the study was collecting information on matters important to the farmers being studied. Respondents were assured of anonymity to

increase internal validity. Having multiple members present (e.g., group interviews) also helps with validation, because the members present are validating each other. If someone says something wrong, another member can correct the statement during group interviews. Multiple methods of getting data (through groups, individuals, reports, records, timelines, and *chapati* diagrams) were used. Also, at times the same question was asked on surveys in different ways to make sure the results were valid. To limit the phenomena of people trying to give an answer that they thought the researcher was seeking, the researcher did not emphasize the connection with the World Agroforestry Centre or with FARM-Africa. It was made clear that the researcher was just that, a student, and not a possible funder, to limit bias in answers.

A further means of ensuring validity was through member checks. This was done by presenting research results to study participants for verification on the findings. The researcher followed Babbie's (1986) suggestion to enlist the assistance of others to confirm or validate researchers' finding. This was done through a stakeholders' workshop, where farmers, extension agents and NGO/international research center personnel were present. Findings were presented to stakeholders to obtain feedback and to ensure validity of results. This is known among anthropologists as "repatriation" of information, and is a way to return knowledge to community. Reports in the vernacular were also given to each group that had participated in the study. Reports were also left with all of the other stakeholders, including farmers, FARM-Africa staff and extension personnel.

## Data Collection

Collection of data occurred in both the greater Meru area and Nairobi, and was on-going throughout the study. As mentioned above, the study consisted of a preliminary phase, a survey phase and a follow-up phase.

In line with the qualitative inductive approach, the study began with preliminary data collection, which allows for the development of appropriate research questions. Content analysis, direct observation, and semi-structured interviews with key informants were used throughout the study, but especially during the preliminary phase to help guide the inquiry, identify hypotheses, and collect rich qualitative data.

The more informal preliminary phase began with *sondeo*-like semi-structured interviews. *Sondeos* (derived from "sounding out" in Spanish) are a type of rapid rural appraisal where researchers quickly gain information in an informal, non-threatening manner (Hildebrand, 1981). Topic guides were used which included basic questions and probe questions to elicit yet more responses (Appendix B). Questions were open-ended, and the interview followed the thought processes of the person being interviewed, rather than sticking to a set questionnaire (as described in Chambers, 1997). This allows issues to come out that perhaps the researcher missed during the literature review. However, because the guide is structured, it allows the researcher to obtain consistent and reliable data. Information obtained was mostly qualitative. These interviews were conducted with key informants who were well informed and recognized in the community. Farmers, farmer groups, extension workers and NGO personnel, and international research center personnel were all interviewed to obtain and triangulate data.

Content or document analysis was another important tool during the preliminary phase. This is the use of existing records and documents to obtain information on a

community or group of subjects. It allowed the researcher to assess the project prior to semi-structured interviews and survey research. In this study such records included FARM-Africa and World Agroforestry Centre (WAC) reports and government literature such as the District Development Plan.

Qualitative techniques were used during the formal survey research as well. Participatory techniques such as social mapping and timelines were used during the survey phase to examine variables, and to provide both qualitative and quantitative data.

Social mapping is the construction of a representation of the services and facilities that are available to a particular community. Venn (or *chapati*) diagrams were used during the survey phase to allow the groups to show the relative importance of various organizations or individuals within a community, and how they are interrelated. This was done by giving respondents circles of paper of three different sizes to show relative importance of the groups or individuals, and to show how they related to each other by their proximity to the group and to one another.

Group timelines were used to elicit information on the history of the farmer groups. This was done by using a piece of flip chart paper to write down group events while asking them questions such as, what have been the changes in membership over the years (has it increased, declined, stayed the same)? What have been your successes and/or failures? When did the group start, how did it start, what have your activities been, has gender composition changed and what events impacted your group? Has the group changed focus since it started?

These details helped to give a history of the group and the major events affecting them (AMREF, 1997). The timelines answered many of the questions on the instruments

using a relaxed way of story telling, rather than question-and-answer format with the researcher appearing to extract information from the informants. This method (used at the beginning) helped to put the group at ease, and assisted them to remember many details about their group that helped to jog their memories later on in the interview. The timelines also provided valuable information about the groups that helped to show where they have come from and why they were the way they were.

Following the preliminary qualitative data collection, questionnaires were developed and then administered via a translator to answer research questions, obtain quantitative data and to gather more qualitative information. This helped to further explore the themes that were brought out through the initial data.

A translator/research assistant was used to collect information from farmers using questionnaires due to the language barrier. An assistant was procured through FARM-Africa who was experienced in field data collection in the area and was of the same ethnic group as the respondents. The assistant spent several years working for a similar NGO and received training in participatory methods of working with communities. The assistant was further trained for this particular study, and tested for accuracy by having him ask the questions in *Kimeru*, the local language, to another person who then repeated what he said in English.

The formal questionnaires were written in English. However, the interview was conducted orally in *Kiswahili* and *Kimeru* with both groups and individuals. The researcher asked the questions in *Kiswahili* and the research assistant translated into *Kimeru*. Many of the farmers spoke *Kiswahili* but were more comfortable in *Kimeru*.

Answers were then recorded in English. Closed questions are typically used in survey research, but some open-ended ones were asked as well.

The survey research took place with both groups and individual respondents. Group interviewing is beneficial in that it is low-tech, rapid, and low-cost in comparison to individual interviews. Group interviews also capitalize on group dynamics and take advantage of the synergistic effect of people's conversations, where ideas can stimulate more and richer responses (AMREF, 1997; Debus, 1986). They are a means of validation as well; by having multiple members present, veracity of answers is better ensured.

For the group interviews in this study, typically four to six farmers from one dairy-goat group were interviewed together over a period of about two hours. The group questionnaire consisted of 66 questions and participatory activities. During the interviews, group timelines and Venn (*chapati*) diagrams were drawn up by the group members. The interviewer sought to allow everyone to be heard and to ensure that no one person would dominate. In addition to group members, the researcher, research assistant/translator and an extension staff member were present. Extension staff had worked with the group over a period of years training them, and thus were able to guide the researchers to the group and also to maintain the rural protocol regarding introductions of visitors to the groups. Although this was something that could contribute to bias on the respondents' part, it was a necessary part of protocol that could not be avoided. The research team attempted to avoid bias in having the agents present by plainly stating that although the agent was present, they wanted the groups to answer truthfully. The only role that the agent played was to introduce the group; he or she was

not to answer any questions. Finally, follow-up interviews with individuals were conducted with no extension agent present to obtain further information and to confirm or deny what the group had said.

Following the group interview, individuals were sought to both corroborate the group information and to obtain information at the household level. One group member and a non-member who had benefited in some way from the group were sought at each interview site. The individual questionnaire consisted of 48 questions, and took between 30 to 60 minutes to complete. Typically, group members were chosen randomly from a list obtained from FARM-Africa. Non-members were randomly selected from a list provided during the group interview.

## Data Analysis

Quantitative data from the questionnaires were entered into the Statistical Package for the Social Sciences (SPSS) software (George & Mallery, 2001) and analyzed. Descriptive analyses of the data were a major outcome. Correlational techniques and measures of association such as correlation coefficients (Pearson's product moment) and multiple linear regression were used to examine and predict relationships among the study variables. The logistic regression model was also used to deal with binary responses. Comparisons of groups were made using contingency tables and cross-tabulations, and tested for significance with tests such as chi-square.

Qualitative data was analyzed by hand by reducing them to workable categories. The researcher then sought to discover themes, patterns, associations, explanations and general statements about the relationships among categories of data (Marshall & Rossman, 1999).

Another tool that was used for data collection was GIS (geographic information systems). GIS is basically a software package that combines maps and database information in a single analytical tool. With GIS, the researcher was able to map the dairy-goat groups. Further information on Meru such as agroecological zone, altitude, markets, forests, rivers and roads were added to this information to determine how they were all related.

## Validity and Reliability of the Results

### Validity

Validity essentially means the closeness of a research finding to physical reality (Chambers, 1997). The validity or integrity of qualitative data is measured by trustworthiness, dependability and credibility. Threats to validity in the research study might come from lack of understanding by respondents or enumerators, from unclear questions, non-random sampling, failure to pay attention to the theoretical basis, and failure to record and describe the research process and study area. Threats to validity of the instrumentation process were discussed under the instruments section. Other threats to validity of the overall study are discussed below.

One possible threat to validity was through history. Perhaps respondents had certain attitudes toward FARM, government extension or even other farmers. Also, since the goat project originated in the United Kingdom where many people are white, seeing a white researcher may lead farmers to think that answering questions in a certain way would get them benefits. Issues of threats through history were avoided by carefully explaining the research project and the position of each person present with the research team. It was also stressed that the researcher was essentially a Kenyan, with a home and family in Kenya. Local languages were also used to stress this fact. It was also plainly

stated that there would be no benefits, except for information, from the research study. Respondents were assured that a report would be sent to them in the local language at the end of the study. All participatory materials developed by the farmers (such as *chapati* diagrams and timelines) were left with the group.

Internal validity is yet another type of measure of the study's trustworthiness. Internal validity mostly relates to experimental research, but can be a factor in non-experimental research designs as well (Ary et al, 1996). Internal validity of the research design was improved through triangulation of data sources and the merging of qualitative and quantitative methods. Furthermore, having multiple people validating the data also contributed to internal validity.

External validity refers to the extent that results of the study can be generalized (Ary et al., 1996). Population external validity, if high, means that results can be generalized to the larger population (Ary et al., 1996). In this study it would mean that results seen in a random sample of farmers in Meru could be inferred or generalized to the general population of farmers there. Generalizations or inferences can be made to the population only if a random sample was selected for the study. In qualitative research, generalizability is not always a goal, and the main purpose is more exploratory than explanatory. However, many social scientists do recognize the importance of designing studies so that findings may also help in understanding other situations.

From the study population, purposive and random samples were drawn to elicit data for the study. Survey data was collected from farmers chosen randomly where possible from a list of farmers from FARM-Africa and/or government lists. This allowed

for higher population validity. Purposive sampling was used for the more qualitative aspects of the study, especially to interview key informants.

High ecological external validity means that the same results would appear if the study was conducted in another location or setting (Ary et al., 1996). High ecological validity was ensured by carefully describing the study location, farming systems, and farmer groups. By understanding the location and also all of the methods used, the study should be able to be replicated elsewhere.

Finally, high external validity of operations means that if another researcher were to conduct the study, the results would be the same (Ary et al., 1996). This was ensured through the detailed description of the study daily in the research journal.

Validity in the qualitative portion of the research was handled overall through the field research. Because the researcher "is the data-gathering instrument" (Ary et al., 1996, p. 478), what she does is very important. A document trail of interviews, research processes and findings was kept in the form of a research journal. This record of events and observations, together with the raw data, can be audited and serves as a means of checking the legitimacy of the study. High validity of operations was ensured by the careful use of a research journal where all observations and details of the study are kept. Anyone reading this should then be able to replicate the study.

Validity was also verified by triangulation—the use of multiple sources of data, methods of collecting data (various people, times, and settings), multiple investigators and drawing upon multiple theoretical bases (Ary et al., 1996). Groups, individuals and organizations were interviewed to triangulate the data. Debriefing with peers, member checks and the use of expert consultants were other means of verification of validity (Ary

et al., 1996; Bottorff, 2000). Regular supervision while in Kenya was provided through the international research center World Agroforestry Centre, and debriefing also took place among fellow researchers in Meru who were working on a similar project at the same time. Using inductive analysis and grounded theory helped to increase credibility, because the researcher was basing her hypotheses or findings on what had been found in the field. Finally, a prolonged engagement in the research setting helps to establish more credibility or validity. The researcher spent over 10 months in the field collecting data.

In summary, validity was assured by

- Triangulation;
- Submitting questionnaires to a panel of experts;
- Pre-testing the instrument;
- Comparing observations to the literature;
- Training assistants;
- Assuring anonymity of respondents;
- Using random sampling where possible;
- Adequately describing the setting; and
- Keeping a complete record of design and methods.

**Reliability**

Reliability is the extent to which an instrument is consistent in measuring, or to which a particular technique will always yield the same result (Babbie, 1986). It can be compared to precision.

Error that affects reliability can come from various sources. The respondents may have been tired or ill, or not be in the mood to talk to the researcher. On the questionnaires, there may have been ambiguous questions or an enumerator may not have understood what information the researcher was attempting to obtain. The atmosphere in which the instrument was administered may also have affected reliability. Sometimes during the interviews, it began to rain, or other types of interruptions occurred during

interviews. In such cases the interruption was noted and the data collection continued. Finally, there may be errors in entering the data (Dedrick, 1997, *Foundations of educational research*, unpublished manuscript, University of South Florida).

Inter-observer or inter-rater reliability is also important for reliability of qualitative data. This can be increased by making sure that the enumerators are well trained by the researcher, which was done. Because the researcher used just one assistant, this also helped to reduce variability in observation. Also, following each interview, discussions were held among the researcher, assistant and local extension staff as to the findings. This helped to ensure that researcher observations were correct.

There is no true way to assure reliability in a purely qualitative study. In this study it has been established mostly through documentation. A document trail of interviews and findings was kept in the form of a research journal to ensure reliability. This record of events and observations, together with the raw data, is a means of checking the reliability of the study. For instance, during data analysis, if there is a question about the responses, the researcher can return to the field notes to see what other factors may have been coming into play. If there are any questions regarding the reliability of the findings, the researcher can return to the record trail to show what was done. Random samples can also be taken from the journal. The assumption is then made that the study is reliable overall if random samples of this information are determined to be reliable.

Reliability was further assured by having multiple indicators to measure the constructs on the questionnaires. The researcher also sought to only ask questions that respondents are likely to know the answer to (Babbie, 1986). This prevented them from making guesses or falsifying information to please the researcher.

An important consideration in research conducted in another language is the use of translators to collect data with farmers who do not speak the same language as the researcher. Ensuring that translators understand the questions and can translate them with the right degree of meaning is also important. This was ensured by having the translator ask the questions to another party in *Kimeru*, and the third party translated back into English so that the researcher could check that he was translating accurately. Reliability was further ensured by having the same translator in all except one of the interviews, where it was not possible for him to be there.

In administering a questionnaire, reliability is a function of the length of instrument, heterogeneity of the population, ability of the respondent, the nature of the variables, and the number of items (Ary et al., 1996). Longer tests are more reliable. If respondents are more heterogeneous, reliability will be higher. If respondents do not understand a question because of their ability, they may guess and so affect the reliability coefficient. Some variables are easier to measure and thus give higher reliability. Limited redundancy was built into the questionnaire to assess the consistency of responses to a particular question.

Reliability was ensured in the following manner:

- Pilot testing the instruments;
- Training the assistant;
- Maintaining a document trail of research findings;
- Utilizing triangulation; and
- Obtaining reliability coefficients from test constructs.[3]

This chapter has examined the research design and methods used, the qualitative and quantitative paradigms, the population sampled, instruments used, the procedures,

[3] Cronbach's alpha for the adoption index, a measure of dairy goat technology adoption by group neighbors, was 0.69.

data analysis and issues of validity and reliability. The next chapter will examine the results related to the objectives of the study.

# CHAPTER 4
# RESULTS

*Before we started we were doing nothing and now we're doing something.*
*—Farmer in Meru Central*

In Chapter 3 the methods used in the study were discussed. This chapter will discuss the research findings, presenting information on the FARM-Africa dairy-goat project and the groups that have been formed as a result of the project. It will also describe the subjects of the study. Finally, the first four study objective results will be presented, covering who participates in groups, group linkages, mechanisms of dissemination, and factors that make groups successful in extension.

## The Food and Agricultural Research Management (FARM)-Africa Project and Dairy-Goat Groups

FARM-Africa is a British non-governmental organization (NGO) that has been working with projects in eastern and southern Africa since 1985. FARM-Africa initiated a dairy-goat project in Meru Central and South Districts of Eastern Province of Kenya in 1996, targeting poorer farmers in the middle and low potential zones. The project was called the Dairy Goat and Animal Healthcare Project, and attempted to improve the productivity of farm animals in the area through breed improvement, better management and sustainable animal healthcare.

Following preliminary surveys in 1994 and 1995, the project was implemented in 1996. The poorest members of the communities in the greater Meru area were targeted for participation in the project. Such people were identified following awareness and sensitization meetings at the community level, which included FARM-Africa and

extension staff, local administration (chiefs), and community members. Criteria for poverty, based on the local communities' indicators, included an inability to send children to school, lack of regular income, temporary housing, having no cattle, and small land size relative to the area.

FARM-Africa chose to work with organized farmer groups to efficiently target communities. However, they did not use established groups, because they were targeting the poor people of the communities. Therefore, most of these groups were formed for the purpose of the project, resulting in about 44 groups that were created with assistance from the local communities, chief, and extension staff. These dairy-goat groups were then trained on group dynamics, goat management, housing, and breeding. Selected members from each group were trained as buck keepers and community animal health workers (CAHWs). Extension staff were also trained at this time using DELTA (Development, Education, Leadership, Training and Action), a community mobilization training program.

One of the main mechanisms for improving animal productivity was through the establishment of pure Toggenburg buck stations located within the communities for breeding with local goats. Genetic improvement of local goats was to occur through the breeding of local and $F_1$ crosses to the pure Toggenburg bucks. The project was unique in that the breeding was to be done at the local level instead of the typical government or private breeding stations. The bucks were given to the groups at no cost, with the understanding that they belonged to the project, and could be retrieved in cases of mismanagement.

These buck stations were thus owned and managed by groups of farmers. Group members were to bring their local goats to the buck station to be served for free or for a small fee. Community members could also obtain breeding services for a slightly higher fee. The resulting offspring ($F_1$s and $F_2$s) were known as "improved" goats. Each of the 44 dairy-goat groups received a buck for their buck station. The project also included breeding stations to breed more pure Toggenburg dairy goats. Breeding stations consisted of a pure buck and four pure does. They were given to certain groups on the condition that the pure goats were to be repaid to the project in kind from their offspring. These repayment goats were then used to start additional breeding stations. At the time of the research, there were 83 buck stations and 48 breeding stations within Meru Central and South Districts (the project area).

The project also established two umbrella organizations, the Meru Goat Breeders' Association (MGBA) and the Meru Animal Health Workers' Group (MAHWG). These were to provide a forum and support for the goat farmers, CAHWs, animal health assistants (AHAs), and veterinarians.

The activities of the MGBA included safeguarding the Toggenburg and its upgrades, buck rotation, training new groups, organizing shows and auctions, sourcing markets for members, and management of the seed bank. The MGBA also provided seed loans to member farmers due to drought in the area. Maize and bean seed was provided to the dairy-goat groups, which was then repaid in cash with 10% interest. The members' goats were used as collateral on the loan. Goats in the project were sold through the MGBA, which received a commission. The MGBA also assisted in agricultural shows. Groups and/or individual farmers were encouraged to formally register with the MGBA.

The Meru Animal Health Workers' Group was provided with a loan of Kenya shillings (Ksh.) 200,000 (USD 2,857) to start a credit scheme for its members to open drug shops, purchase drug supplies, and so forth. It also helped members by purchasing veterinary supplies in bulk. MAHWG was also meant to be a forum for experience sharing among members.

In 2004, FARM started phasing out the project. The MGBA was therefore being coached to take over many of its responsibilities such as extension activities and rotation of breeding bucks. At the time of the research, the MGBA was starting to charge a small fee for services such as training. The MGBA also began collaborating with private breeders and with other NGOs such as the Meru Drylands Farming Project (MDFP), part of another organization called SOS-Sahel.

Although 44 groups were formed and trained through FARM-Africa, there were over 100 dairy-goat groups in the greater Meru region at the time of the study. Through sensitization of communities and trainings held at agricultural shows, many more farmers became interested in joining the project, but they were not chosen due to the criteria mentioned above. Many farmers therefore formed their own groups, arranged to receive training, and purchased a buck themselves. Extension staff, the MGBA or the older FARM-Africa groups trained most of these newer groups. Because of this, the original 44 dairy-goat groups were called "FARM" groups and the new ones that were not officially supported by FARM were called "extension" groups. Both extension and FARM-Africa were involved with all of the groups; however, FARM groups were not exclusively working with FARM nor extension groups working with extension only. This terminology was used to distinguish the original project groups from the newer ones.

Ultimately, all of the groups were under the Meru Goat Breeders' Association, which was composed mostly of farmers, but had staff from FARM-Africa and from the Ministry of Livestock Development and Fisheries.

Groups were located throughout the old Meru and Tharaka-Nithi Districts, which, during the project, were subdivided into Meru North, Meru Central and Meru South Districts. This study surveyed only groups in Meru Central due to time and financial constraints. Staff from FARM, extension and the World Agroforestry Centre (WAC) felt that this was acceptable due to the fact that there were no major differences between Meru Central and Meru South Districts. Agroecological zones and tribal composition were much the same in Meru Central and South.

Therefore 50 groups were interviewed during the research. This included 20 FARM groups, 26 extension groups and four Meru Drylands Farming Project (MDFP) groups (Figure 4-1). The MDFP groups were interviewed to compare the 46 FARM-Africa groups with other groups that were in the same district but connected with another NGO. The MDFP groups are the four groups at the top of the map (Kamarete, Kamakambi, Mumiri and Karimene). These groups were not included in any of the data analysis in this chapter, but will be discussed in Chapter 5.

Groups were located in three divisions in the district (14 groups in Abothoguchi Central, 13 in Abothoguchi East and 19 in Miriga Mieru East). The four MDFP groups were in the nearby Buuri division. Average age of the groups was six years. Average size was 23 members. Fifty-nine percent of group members were female.

The groups were distributed across most of the agroecological zones of Meru Central District. Group locations ranged in altitude from 905 to 1795 m, with the average

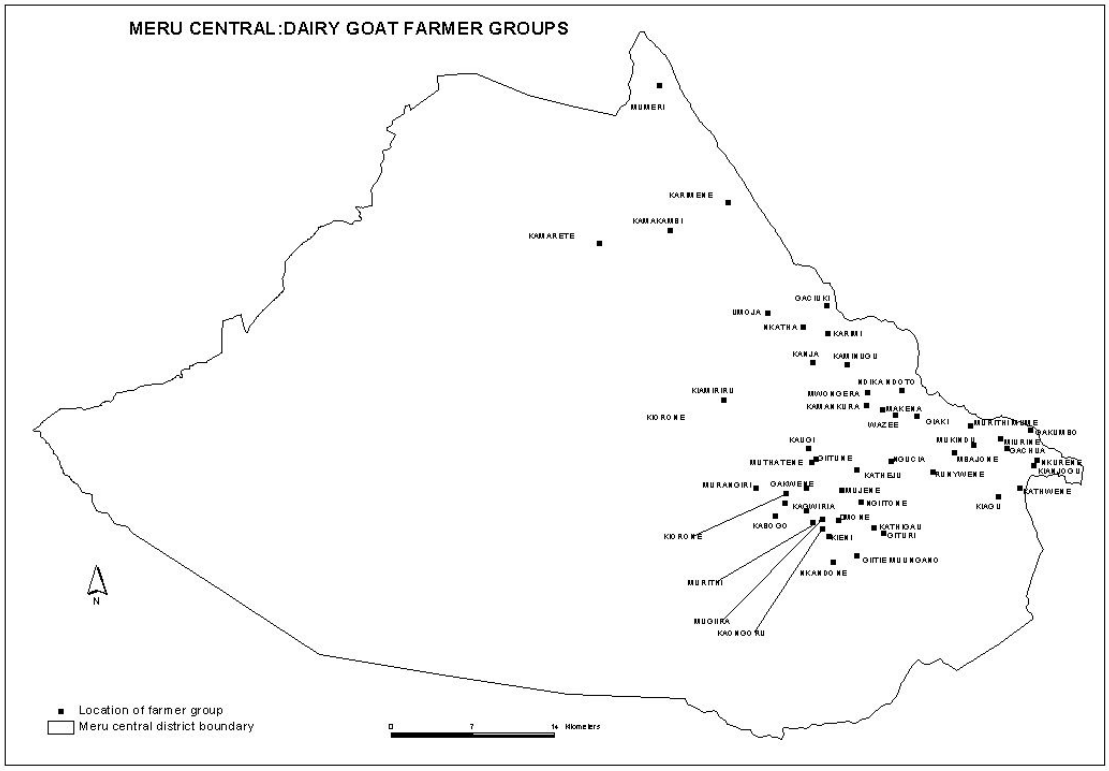


Figure 4-1. Dairy-goat group distribution within Meru Central District

being 1279 m. Many of them were concentrated in the coffee and marginal coffee zones, where there is a higher population density. On the slopes of Mount Kenya where tea and coffee were grown, land sizes were much smaller, while in the drier, lower zones, farmers tended to have larger pieces of land. Bonferroni post hoc procedures revealed significant differences in land sizes owned by individual farmers (both group members and non-members) between two of the three divisions studied in the district. Abothoguchi Central, on the mountain slopes, averaged 2.94 acres, while Miriga Mieru East averaged 5.55 acres ($p < .02$). Abothoguchi East division had an average land size of 4.13 acres. Altitude was also significantly different in the three divisions. Abothoguchi Central at 1431 m was significantly different from Miriga Mieru East at 1222 m ($p < .01$). Abothoguchi Central was also significantly different from Abothoguchi East at 1198 m (*p*

< .01). Miriga Mieru East and Abothoguchi East were not significantly different, according to Bonferroni analyses.

**Fodder Training and Dissemination in the Project**

Farmers were taught during the project to house their goats in zero grazing units. Water and fodder were brought to the goats, and manure could be collected below the unit. The units consisted of a raised wooden structure with a roof. Project stakeholders (farmers, extension officials, and FARM personnel) discovered that feed was a limiting factor for dairy-goat farmers, especially during the dry season. Because of these issues, fodder was an important component of the project.

Fodder training and germplasm dissemination in the project and district were a confusing issue because of the number of organizations involved. Players involved in fodder shrub technologies included FARM-Africa, the World Agroforestry Centre, Meru Drylands Farming Project, Kithima Tree Nursery, Kamutune Tree Nursery, Kenya Agricultural Research Institute (KARI), the KARI project ATIRI (Agricultural Technology and Information Response Initiative), and government extension; specifically the Ministry of Livestock Development and Fisheries. Also, the Meru Central Dairy Cooperative gave out fodder for dairy cattle in the district, and British American Tobacco (BAT) gave out leucaena for firewood to cure tobacco in the lower zones. (This may have turned some farmers against leucaena as a fodder shrub, since the species given out by BAT—probably *Leucaena leucocephala*—was weedy, and some farmers therefore were reluctant to plant any fodder.)

Germplasm was therefore provided to the dairy-goat groups by all of the above institutions. The main species disseminated and planted for fodder were *Calliandra calothyrsus, Leucaena trichandra* and *Sesbania sesban.* These species that were

developed and promoted especially for fodder for dairy animals were known as "improved" trees or shrubs. All germplasm in the project was provided free of charge.

Bulking plots were also developed at certain dairy-goat groups. A bulking plot was a site where cut fodder could be collected to use as animal feed. The bulking plots were also to supply germplasm for other farmers and to provide income to the groups through sale of fodder. The land for the sites was donated public land.

In 1997 and 1998 there was a little work done on fodder trees under the FARM-Africa project. The main distributions through FARM were in 2000 and 2002. During the rains (October through December) FARM distributed 30,000 seedlings to most dairy-goat groups through the ATIRI project. Between July and December 2002, 90 dairy-goat farmers were trained in nursery establishment and fodder conservation. During the same time 27 nurseries were established and 2,800 seedlings distributed, and 80 farmers went on a study tour to KARI-Embu, a nearby research center.

During the entire project, 200,000 seedlings were distributed, according to FARM-Africa (Ahuya, Okey, Kitalyi, Mutia & Oduo, 2003). Germplasm for the dairy-goat groups was obtained through Kithima Tree Nursery and Kamutune Farm in Meru Central District. The British Department for International Development (DFID) funded the seedling distribution through FARM. FARM reported that there were 500 people who had planted forage in their project area (Mutia, P., FARM-Africa Meru Tharaka-Nithi Dairy Goat and Animal Healthcare Project Progress Report, January to June 1999). World Agroforestry Centre reported about 665 farmers in the district using the fodder tree technology (Franzel & Wambugu, 2004).

World Agroforestry Centre's work also opened the way for ATIRI—Agricultural Technology Information Response Initiative, which was run through KARI. This initiative promoted training, cross-region tours, and on-farm field days. The ATIRI project then went to the same dairy-goat groups that the World Agroforestry Centre trained, making it difficult to differentiate between the different fodder trainers and suppliers. The ATIRI staff involved both extension and FARM staff for their trainings. With ATIRI the fodder training expanded to more divisions than what FARM/WAC had covered. Trees were given out in July of 2000; 70 to 100 trees per household. KARI-Embu conducted training of both group members and non-members at the chief *baraza* (public meeting) in both districts. Table 4-1 shows the different organizations that were involved in training the dairy-goat groups in fodder tree technologies.

Table 4-1. Source of fodder training for the dairy-goat groups (n = 46)

| Source of training | *f* | Percent of groups[a] |
|---|---|---|
| FARM-Africa | 21 | 46 |
| Government extension | 18 | 39 |
| KARI | 12 | 26 |
| Other | 5 | 11 |

[a]Percentages do not total 100 because more than one group could provide training

FARM-Africa was the main source of training, followed by government extension. KARI also played an important role. Other training sources included individual farmers and members of the MGBA.

Sixty percent of individuals interviewed (both dairy-goat group members and non-members) had planted improved fodder. It appeared, however, that the amount of improved planted fodder was quite limited except in a few cases. KARI and WAC recommended 150 to 200 trees per goat. However, the average number planted by individual farmers interviewed was only 34, with a range of 0 to 500 (Figure 4-2). On

the other hand, farmers interviewed (both members and non-members) had an average of three improved goats (Figure 4-3). Farmers seen during the fieldwork were almost always using local fodder for feed for their goats. Napier grass (*thara* or *Pennisetum purpureum*) was a popular feed. Many of the goats were fed banana leaves and local hedge shrubs such as *Tithonia diversifolia* and *Lantana camara*. Mulberry (*ntaratare* or *Morus rubra*) was also being used. Many farmers did not know what types of improved fodder trees they had planted nor how many trees they possessed.

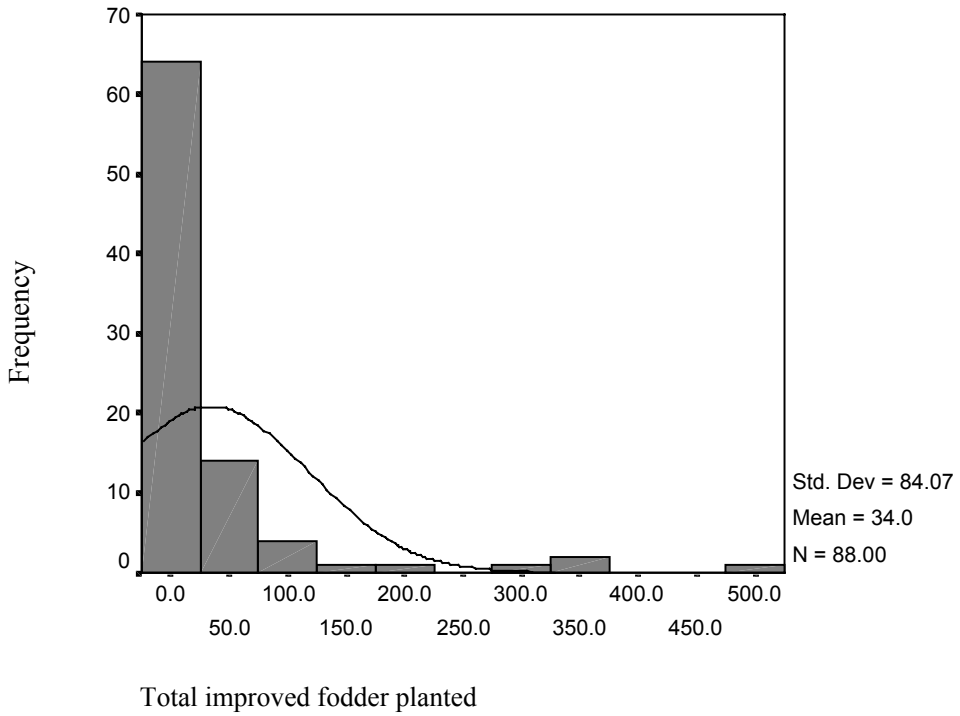


Figure 4-2. Distribution of fodder planted by individual farmers (n = 88)

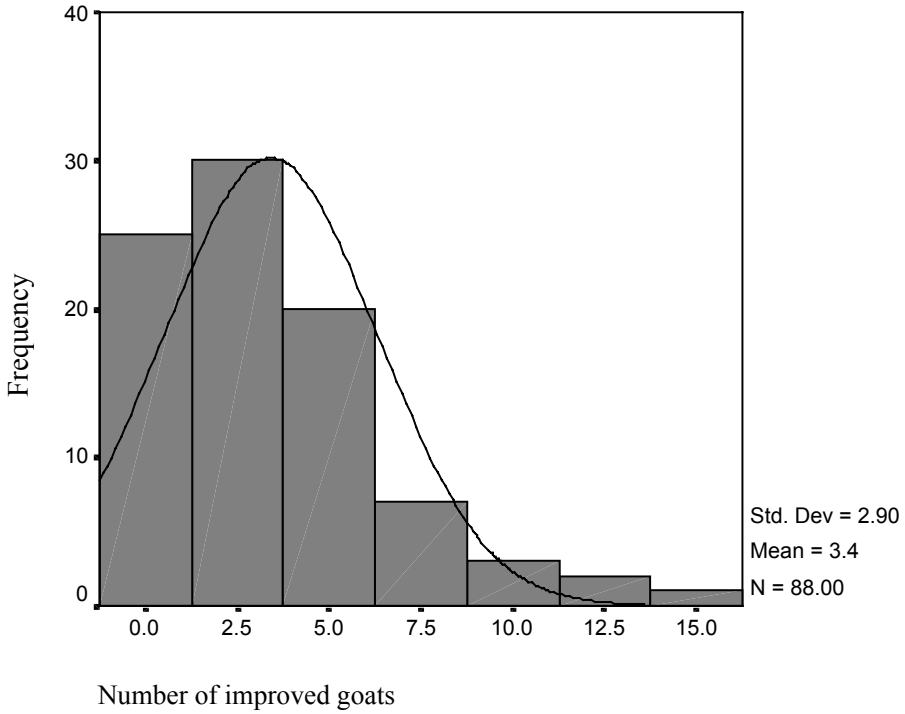


Figure 4-3. Distribution of improved goats owned by individual farmers (n = 88)

Seventy percent of the dairy-goat groups reported that all of their members had planted at least some amount of improved fodder. Forty-six percent of groups said "many" members had planted 1 to 50 trees. Fifty percent of groups said "some" members had planted between 51 and 100 trees. Thirty-nine percent of the groups said "some" members had planted over 100 trees.

Regarding their dissemination of fodder tree technologies, the dairy-goat groups replied as follows during the interviews: 60% of their non-member neighbors had planted "some" fodder shrubs, and 29% had planted "many." Although many of the group members had planted fodder trees, often it was just a few trees. Unfortunately, after one of the major seedling distributions there was a prolonged drought, and many farmers and groups reported that the trees they had planted died. Others were given seed that did not germinate (possibly due to lack of knowledge on germination techniques;

seed such as *Calliandra calothyrsus* requires soaking in water for 48 hours prior to germination).

**Description of Area and Subjects**

Individuals interviewed had an average of 4.9 persons per household (Table 4-2). In Meru the households were complex, as they are for small-scale farmers worldwide. Therefore, when households were discussed with individual farmers, informants were referring to those people who slept on the farm and were fed by the person or household being interviewed.

Most of those interviewed lived in a house with a permanent (usually tin or *mabati*) roof and timber walls (Table 4-3). Most respondents obtained water from a pipe, stream or borehole/well. The other 5% obtained water from other sources, usually piped water or a borehole at their neighbor's house.

Table 4-2. Descriptive data for individual farmers (n = 88)

| Variable | Minimum | Maximum | M | SD |
|---|---|---|---|---|
| Years of education | 0 | 14 | 6.68 | 3.55 |
| Total household members on-farm | 1 | 9 | 4.90 | 1.86 |
| No. improved cattle | 0 | 9 | 1.75 | 1.63 |
| No. local cattle | 0 | 10 | 0.49 | 1.52 |
| No. improved goats | 0 | 15 | 3.41 | 2.90 |
| No. local goats | 0 | 4 | 0.76 | 0.96 |
| Total no. cattle and goats owned | 0 | 20 | 6.39 | 3.77 |
| Total no. animals sold last year | 0 | 8 | 1.41 | 1.61 |

Individuals interviewed had an average of 6.7 years of education, varying from 0 to 14 (Figure 4-4). The Kenyan education system has eight years of primary school, four years of secondary and four years of university. There are also two-year technical colleges.

Farmers interviewed owned between 0 and 20 animals, with an average of 6.4 (Figure 4-5). This includes all cattle and goats. Averages for both local and improved types of cattle and goats are given in Table 4-2.

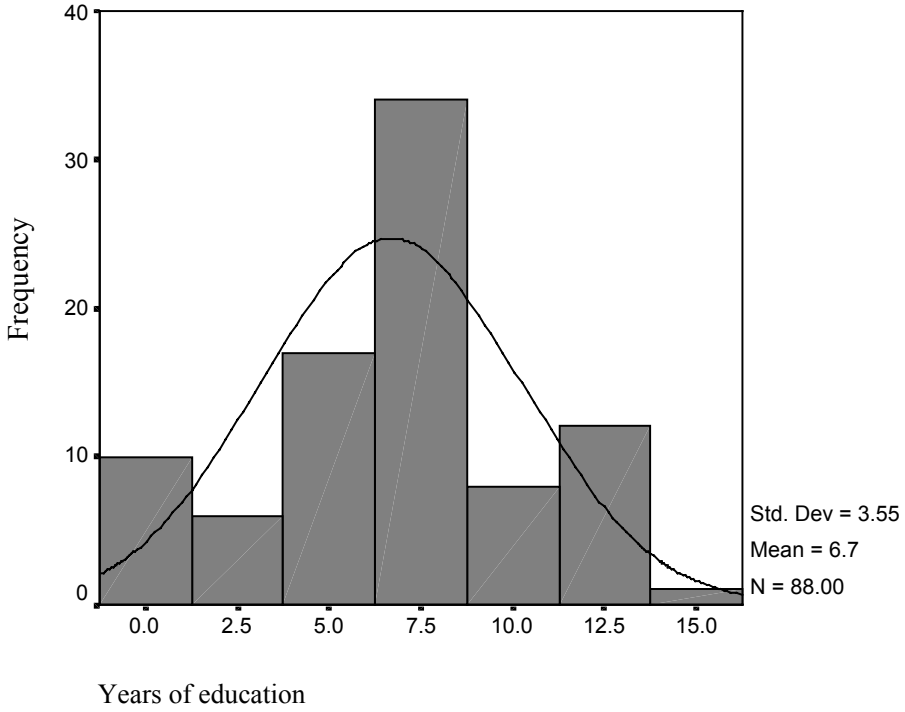


Figure 4-4. Distribution of years of education by individual farmers (n = 88)

The data in Table 4-3 are meant to give an overall picture of farmers and groups in Meru Central District in Kenya. However, as discussed in Chapter 1, the livelihood strategies of smallholders are diverse, complex and risk-prone. As a result, their farming systems and behavior are also complex and diverse, and at times difficult to categorize and measure. The variety of crops and animals in the area has been discussed in Chapter 1. In addition to a diversity of crops and livestock, there was also a myriad of activities that farmers engage in, to obtain a living. Below is a list of some of the ways farmers make a living or get cash in Meru (possible livelihood strategies), obtained through

observation, document review and discussions with informants. Taken together, these describe the livelihood system of those living in the area.

- Sale of produce at roadside or path side
- Sale of produce at market
- Formal sector job
- Informal (*jua kali*) sector job
- Casual labor during cultivation, weeding or harvest
- Rent coffee trees (upper zones)
- Rent land (lower zones)
- Sale of timber (*Grevillea robusta*, *Eucalyptus spp.* and indigenous trees)
- Cut blocks at the quarry
- Break rocks into *kagoto* (small stones for building)
- Sell porridge/*chai*/chips/*maandazi*
- Open a *duka* (shop or canteen)
- Sell livestock (especially for school fees, especially in January)
- Saw milling
- Sale of seedlings during the rains (Grevillea*, sukuma wiki*)
- Sale of firewood
- Sale of manure
- Sale of milk
- Sale of animal by-products such as hides, eggs and honey
- Butchering/sale of meat upon slaughtering an animal
- Sale of crop residue (bean stover, maize stover etc.)
- Sale of fodder, especially napier grass (*Pennisetum spp.*)
- Sale of charcoal
- Sale of *chang'aa* (local brew)
- Steal (goats to eat, *miraa* to chew, trees to sell lumber)
- Sale of sex
- Make and sell curios such as baskets, carvings
- Hawking (selling small carried items)
- Witchcraft; putting curses on people or praying for rain
- Circumcisers (mostly for males today)
- Midwifery (*wakunga*)
- Pastoring churches

This section discussed the FARM-Africa dairy-goat project and the farmer groups that are a major part of it. The next section, Objective One, will discuss who participates in groups in general and why.

Table 4-3. Descriptive data for individuals interviewed (n = 88)

| Variable | Sublevel | *f* | % |
|---|---|---|---|
| Administrative location | Abothoguchi Central | 25 | 28 |
| | Abothoguchi East | 24 | 27 |
| | Miriga Mieru East | 39 | 44 |
| Age | < 30 years | 10 | 11 |
| | 30-50 years | 38 | 43 |
| | > 50 years | 40 | 46 |
| Housing | Permanent roof & permanent walls | 14 | 16 |
| | Permanent roof & timber walls | 53 | 62 |
| | Permanent roof & mud walls | 16 | 19 |
| | Thatch roof & timber walls | 2 | 2 |
| Water source | Piped | 44 | 50 |
| | Borehole/well | 8 | 9 |
| | Stream/river | 32 | 36 |
| | Other | 4 | 5 |
| Type of household | Male with spouse | 65 | 74 |
| | Male—single | 2 | 2 |
| | Female—husband away | 10 | 11 |
| | Female—single | 11 | 13 |
| Wealth level for the area | Below average | 25 | 28 |
| | Average | 48 | 55 |
| | Above average | 15 | 17 |
| Other information | Receive remittances | 46 | 52 |
| | Own title deed to household land | 47 | 54 |
| | Maize is most important food crop | 67 | 76 |
| | Member of MGBA[a] | 23 | 26 |

[a] Meru Goat Breeders' Association

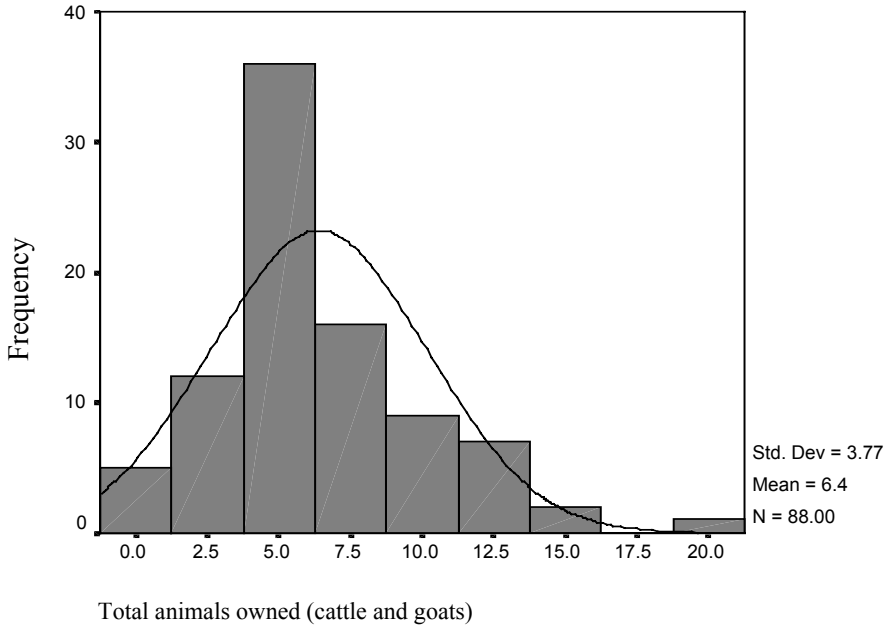


Figure 4-5. Distribution of number of animals owned by individual farmers (n = 88)

## Objective One: Examine Participation in Groups and Identify What Factors Affect Participation in Groups

### Introduction

In the previous section the FARM-Africa dairy-goat project was examined together with the dairy-goat groups that make up the project. In this section, participation in farmer groups in general (not just the dairy-goat groups) will be discussed. Are the groups only for certain people, such as the rich or the poor? Are there constraints to joining a farmer group, or benefits that farmers obtain from the groups?

### Groups in Meru Central District

There are many types of groups in rural Kenya. They are part of the social fabric of the country. Although groups have been a type of social capital used by farmers for generations in Africa, the *harambee* movement following Kenyan independence greatly increased the number of grassroots-level groups. *Harambee,* meaning "let's all work together," was a government initiative to get self-help groups to form to obtain

government assistance. Today, registration of groups with the government is usually required for farmers to receive government or other project assistance. Therefore, many groups have been formed at the community level in Kenya.

Almost every farmer in Meru was a member of some type of group. In addition to farmers' groups, some of the groups in Meru Central District included women's and men's groups, sports, church, school, cattle dip, political party, locational development committee, water, utensils, merry-go-rounds, clan, funeral and marketing. There were also many informal social groups; for instance, dart clubs. Groups provide an important venue for obtaining information and technology, as well as moral support. Individual farmers (n = 88) were in an average of 2.3 groups, with the majority being in one or two groups. Ninety-seven percent of the farmers in the dairy-goat groups were members of other groups. The main groups that individual farmers in the study belonged to were dairy-goat, church, clan, merry-go-round, water and women's groups (Table 4-4).

Table 4-4. Types of groups to which individual respondents belonged (n = 88)

| Type of group | *f* | % of individuals |
|---|---|---|
| Dairy goat | 44 | 50 |
| Church | 39 | 44 |
| Clan | 23 | 26 |
| Merry-go-round | 18 | 20 |
| Water | 18 | 20 |
| Women | 14 | 16 |

*Note*. Individuals could be in more than one group

Most farmers in Meru attended church. Within the churches, there were various types of groups that church members could belong to. Many of the church groups were for fellowship. Often they were divided by gender. Also the church group might have as an activity a merry-go-round (*kuriunganira*), where the members take turns contributing money, and each member receives it in turn.

Clan groups were comprised of all male, all female or mixed gender. They were mostly for emergencies or social help during weddings, funerals and illnesses. There are two main clans (Abothoguchi and Miriga Mieru) and many subclans in the Meru tribe. As with many groups, merry-go-rounds were often a component of clan groups.

Merry-go-rounds are very popular in Kenya. Many of the dairy-goat groups had at one time or still use merry-go-rounds, or *kuriunganira*. As mentioned above, many groups had *kuriunganira* as an activity in their group. They were also called *chai* (tea) groups because members sometimes made and sold tea to raise money. Members of the group contributed a certain amount of money or material items such as cupboards or blankets at every meeting. Every time the group met, one member would receive the money or the item. They usually met weekly or monthly. Organizations that helped with micro-enterprise, such as Faulu Kenya and Maendeleo ya Wanawake, helped out such groups with loans, so farmers must be in a group to benefit from these organizations.

Water groups were usually formed to bring piped water to a community. This was done by forming a group within that community, raising money, registering with the Department of Social Services, and getting permits from the water department. The groups then paid the water department for materials and to have the pipes installed.

Women's groups are found in most parts of Kenya. They are a large component of rural life, as many women are left to tend farms while their husbands seek work in the urban areas. Women also perform most of work on the farm. They do the tilling, planting, weeding and even harvesting of crops in Meru. Women will get together in groups for fellowship, work-sharing, merry-go-rounds or income generation. Often men are allowed to join women's groups.

Some informants believed that the biggest reason to be in groups was to market farm produce, although this did not appear as a reason during the interviews. Groups focused on marketing included those for milk, cotton, tobacco, mangos, honey, horticulture, and poultry products. Coffee cooperatives were very important for farmers in the coffee-growing areas (UM2 and UM3[4]). Twenty percent of individual respondents said that coffee was their most important cash crop. However, with the current low coffee prices, very few farmers considered coffee cooperatives to be their most important group.

Groups were also used as a sort of safety net. One such type of group was the Giitune Burial Scheme. Members contributed ten shillings a month. When a person in the group died, the scheme would pay for the coffin, transport and food for the funeral. This was perhaps a modified version of the traditional clan mechanism for helping others in times of emergency.

Some benefits from joining groups included unity and the social aspect. For instance, one dairy-goat group in Chuka in Meru South District met twice a week just for fellowship. Others joined to receive goats. Information was also a key benefit to being in groups, according to informants. Of individual farmers surveyed, 60% said that they joined a group to gain benefits. Benefits in this case referred to tangible benefits such as access to improved breeds of goats, or to money through structures like merry-go-rounds. One farmer stated, “Before the group, I had nothing.”

It appeared that nearly every Meru farmer was in one type of group or another. One informant stated that he would be very surprised to find one farmer who is not in a

[4] UM = Upper Midlands

group. Another said that people declare, "A woman who is not in a group is a chicken thief;" in other words, there is likely something wrong with a farmer who is not in a group.

Although groups appeared to be a valuable form of social capital, there were some people who did not or could not participate in groups for various reasons. During both the preliminary phase and the survey phase of the research, informants were asked about participation in groups. Why did they join? What people were not in groups? During the preliminary phase of data gathering, it became apparent that most farmers in the area were in one type of group or another, and that it would be quite difficult to find a number of people who were not any groups at all. This made it difficult to compare dairy-goat group members to those people not in any type of group at all. Because the study was concerned not only with participation, but also dissemination, the researcher decided to look for dairy group members and farmers who had benefited in some way from the group for the individual interviews, rather than members and non-members (of any group at all).

**Factors Affecting Participation in Any Groups in Meru Central District**

However, it is possible to compare people who either belong to or do not belong to particular types of groups. The major types of groups that farmers in the study belonged to were examined to see if there was a difference in group members and non-members with regard to various factors such as wealth and household composition. Part of household composition includes producers and consumers. "Consumers" in this study refers all people in the household who eat and sleep on the farm, while "producers" refers to males and females between the ages of 11 and 50. Because the data is so extensive, most of it is available in Appendix A. However, some information for the dairy-goat

groups is shown in Table 4-5, where means of various factors for members and non-members were tested using t-tests.

As seen in Table 4-5, there were significant differences between members and non-members of dairy-goat groups with regard to the number of males and total children under the age of 10, total number of household members, consumers and number of improved goats sold. This shows that individuals with more children under the age of 10, more consumers and larger households are more likely to be members of dairy-goat groups.

Table 4-5. Factors affecting participation in dairy-goat groups (n = 88)

| Response | Member (n = 44) | | Non-member (n = 44) | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | *t* | *p* |
| No. females under 10 years | 0.68 | 0.88 | 0.48 | 0.70 | 1.21 | 0.23 |
| No. females 11-20 | 0.48 | 0.76 | 0.61 | 0.84 | -0.80 | 0.43 |
| No. females 21-50 | 0.93 | 0.59 | 0.84 | 0.57 | 0.74 | 0.46 |
| No. females over 50 | 0.32 | 0.52 | 0.39 | 0.58 | -0.58 | 0.56 |
| No. males under 10 | 0.75 | 0.94 | 0.39 | 0.72 | 2.03 | 0.05** |
| No. males 11-20 | 0.86 | 0.93 | 0.73 | 0.82 | 0.73 | 0.47 |
| No. males 21-50 | 1.16 | 1.06 | 0.86 | 1.86 | 0.92 | 0.36 |
| No. males over 50 | 0.36 | 0.49 | 0.34 | 0.48 | 0.22 | 0.83 |
| Total household members | 5.41 | 1.63 | 4.39 | 1.96 | 2.66 | 0.01** |
| Total children $\leq$ 10 years | 1.43 | 1.30 | 0.86 | 0.93 | 2.36 | 0.02** |
| Total members age 11-21 | 1.34 | 1.12 | 1.34 | 1.18 | 0.00 | 1.00 |
| Total adults (>21) | 2.77 | 1.52 | 2.43 | 1.77 | 0.97 | 0.34 |
| Total number of consumers on-farm | 5.55 | 1.84 | 4.39 | 1.94 | 2.88 | 0.01** |
| Total number producers on-farm | 3.43 | 1.82 | 2.80 | 1.64 | 1.72 | 0.09* |
| Producer to consumer ratio | 0.63 | 0.24 | 0.63 | 0.24 | -0.12 | 0.91 |
| No. of groups farmer belongs to | 2.59 | 1.04 | 2.02 | 1.68 | 1.91 | 0.06* |
| Total number of livestock | 6.75 | 3.48 | 6.02 | 4.05 | 0.90 | 0.37 |
| No. of improved goats | 3.66 | 3.19 | 3.16 | 2.60 | 0.81 | 0.42 |
| No. of improved goats sold | 0.45 | 0.85 | 1.11 | 1.47 | -2.58 | 0.01** |
| Education of respondent (total years) | 6.65 | 3.66 | 6.71 | 3.48 | -0.08 | 0.94 |
| Land size of respondent (acres) | 4.66 | 3.59 | 4.19 | 4.02 | 0.58 | 0.56 |
| Type of housing[a] | 3.75 | 0.84 | 3.95 | 0.86 | -1.13 | 0.26 |
| Water source[b] | 1.95 | 0.99 | 2.14 | 1.07 | -0.83 | 0.41 |

[a]0 = other; 1 = thatch roof/mud walls; 2 = thatch roof/timber walls; 3 = permanent roof/mud walls; 4 = permanent roof/timber walls; 5 = permanent roof/stone walls
[b] 0 = other; 1 = stream/river; 2 = borehole/well; 3 = piped
*Approaches significance; **significant

Tests of significance, as shown in Table 4-5, plus contingency tables show important bivariate relationships and thus are used in these analyses. However, a stronger type of analysis is multivariate analysis such as model building, where there is more control over the variables with the degrees of freedom. For this analysis, various factors were regressed upon the dependent variable "group membership" in a binary logistic model. Such models are used when response variables are binary; that is, they have only two possible outcomes (Agresti & Finlay, 1997). The generic terms for the two possible outcomes are success and failure, and the "odds" equal the probability of success divided by the probability of failure. The odds of a particular outcome is obtained by the ratio ‖/(1-‖). The log of the odds is called the logistic transformation or logit. The logistic regression model is logit (‖) = © +®X (Agresti & Finlay, 1997). As the outcome (in this case, participation in a group) increases from 0 to 1, the odds increase from 0 to infinity. This model tests the probability that the independent variable X has no effect on the dependent variable Y (Agresti & Finlay, 1997). By using the backward type of model building with the Wald statistic, the researcher could examine which factors most significantly contributed to participation in the various groups. The Wald statistic is the square of the slope ß divided by the standard error, and has a chi-squared distribution with df = 1 (Agresti & Finlay, 1997). The regression model for dairy-goat group membership is shown in Table 4-6.

This binary logistic model is interpreted as follows. The model for participation in dairy-goat groups is logit(‖) = -0.56 (constant) +0.28 (consumers) +0.47 (groups) +1.15 (church group member). As with linear regression models, positive numbers mean that the probability of being a member of a dairy-goat group increases with higher levels of

consumers, with higher numbers of groups that the farmers are in, and with membership in a church group. Furthermore, the model can be interpreted looking at the effect of ® on the odds. Every unit increase in X leads to a multiplicative effect of $e^{®}$ on the odds. For instance, for number of consumers, $e^{®} = e^{.28}$ which equals 1.32. This means that when consumers increase by one unit, the odds of being a dairy-goat group member increase by 1.32.

Table 4-6. Binary logistic regression analysis showing factors associated with membership in dairy-goat groups

| | B | SE | Wald | df | *p* | Exp (B) |
|---|---|---|---|---|---|---|
| Total no. of consumers | 0.28 | 0.13 | 4.86 | 1 | 0.03** | 1.32 |
| No. of groups farmer is in | 0.47 | 0.23 | 5.52 | 1 | 0.03** | 1.61 |
| Church group member[a] | 1.15 | 0.53 | 4.50 | 1 | 0.03** | 3.14 |

[a] 0 = no; 1 = yes
**Significant
*Note*: ($X^2$ for model = 15.53; df = 3; $p < .00$)

The binary regression model was built by running the various factors against the outcome, participation in groups. The backward model-building that was used starts with all of the variables and then removes them one by one if they do not significantly contribute to the equation (George & Mallery, 2001). Because the model chooses the best possible explanatory variables, the model drops from the equation those factors that do not significantly affect the outcome. In Table 4-6, the wealth ranking of the individual and the total number of children in the household were variables that dropped out of the regression equation. This was because they did not contribute significantly to the equation, while the number of consumers, number of groups the individual was in, and church group membership did contribute significantly to the equation.

Using the data from Tables 4-5, 4-6 and 1 to 15 in Appendix A, the researcher obtained certain factors associated with being a member of the different groups. With all

of the groups, the odds of membership in the group were increased by an increase in the number of other groups a farmer belonged to.

Dairy-goat groups. There were certain factors that increased the odds of being a member of a dairy-goat group. These included the number of children under the age of 10 and membership in a church group. The total number of people on-farm was associated with participation in dairy-goat groups, with those with bigger families participating more. Also, members of dairy-goat groups had a higher percentage of males under the age of 10 (Table 4-6). Dairy-goat groups had a significantly higher percentage of consumers on-farm. Having a poorer water source did increase the odds of being a dairy-goat group member; however, it was not one of the best explanatory variables, and did not remain in the model once the variables shown in Table 4-6 were added. The variables that remained thus better explain the factors for participation in dairy-goat groups. These data appear to show that the dairy-goat group members were poorer, or at least more stressed with regards to household composition, than non-members.

Church groups. Church group members tended to be a lower age bracket than non-members. Being a member of a merry-go-round group increased the odds of being a church group member (Table A-2 in Appendix A). As the number of females under the age of 10 and age of the respondent decreased, the odds of church group membership increased (Table A-2 in Appendix A). The producer to consumer ratio was significantly larger for church group members; in other words, they had a higher number of producers and lower number of consumers than non-members (Table A-1 in Appendix A). These

data show that church group members had less stress, at least in terms of household composition.

Clan groups. Clan group members tended to be male (Table A-4 in Appendix A). They also had more males under the age of 10 with results approaching significance (Table A-3 in Appendix A). Being a member of a water group increased the odds of being in a clan group (Table A-5 in Appendix A). They received fewer remittances (off-farm income) than did non-members, although not at a statistically significant level. Clan group members thus likely had fewer resources in terms of remittances, and greater household stress than non-members.

Merry-go-rounds. Merry-go-round members had smaller land sizes and tended to be of lesser age, with results that approached significance (Table A-6 in Appendix A). Members also tended to be female (Table A-7 in Appendix A). Being a member of a church group and a women's group both increased the odds of being a member of a merry-go-round (Table A-8 in Appendix A). Merry-go-round members were thus likely to be female community members with fewer resources who were in multiple groups.

Water groups. Water group members were likely to be male (Table A-10 in Appendix A). They were more educated than non-members with results that approached significance (7.72 years for members; 6.41 for non-members). Having a title deed increased the odds of being a member of a water group, as did being a member of a clan group (Table A-13 in Appendix A). It appears that the overall wealth rating was associated with belonging to water groups (Table A-12 in Appendix A). (Enumerators gave wealth ratings based on various factors such as household composition, housing

type, size of land, crops grown and number of livestock.) Water group members thus appeared to be men who were wealthier than non-members.

Women's groups. Women's group members had significantly fewer children under the age of 10 (Table A-14 in Appendix A). Odds of being a member of a women's group increased with increased levels of producers, and with being a member of a church group (Table A-15 in Appendix A). Age, total number of children under 10, and a high producer to consumer ratio decreased the odds of being in women's groups. Of course, significantly more members were female. Women's group members appeared to be people in the community who had less stress with regard to household composition, were female, and were church group members.

For those individual respondents who were members of any type of group, various reasons for joining were discussed during the interview. Table 4-7 shows the main reasons that individual farmers gave for joining the group that they considered to be the most important. Others said that they joined to obtain services, development or "learning."

Table 4-7. Reasons given by individuals for joining most important group (n = 86)

| Reason | *f* | % |
|---|---|---|
| Gain benefits | 52 | 60 |
| Increase income | 11 | 13 |
| Fellowship | 10 | 12 |
| Help in emergency | 5 | 6 |

*Note*. Percent does not total 100 as there could be more than one answer.

Table 4-7 shows that the main reason farmers join groups in Meru Central was to obtain benefits. Although all of the reasons given above could be termed "benefits," farmers seemed to be indicating that they were seeking physical benefits, such as goats, water tanks, piped water, or cash loans. This was confirmed through qualitative data.

**Issues Regarding Participation in Dairy-Goat Groups**

One of the issues discussed with participants was criteria for membership in the dairy-goat groups. Because many of these dairy-goat groups were formed for the FARM-Africa project, the group members were put together by the local chief and extension officials. FARM-Africa also had a rule limiting the number of group members to 25. Therefore new members could join only if someone left the group. Because of this, during the group interviews, members were asked what the rules were for joining the group initially, rather than asking why new farmers joined their group. Table 4-8 shows criteria mentioned by the dairy-goat groups for becoming a member of their group. Other requirements mentioned were for the members to be "poor" or to own a goat.

Table 4-8. Criteria for being a member of dairy-goat groups (n = 46)

| Criterion | *f* | % of groups |
|---|---|---|
| Pay a fee | 37 | 84 |
| Be a community member | 10 | 22 |
| Be married | 8 | 18 |
| Be over 18 | 4 | 9 |

Table 4-8 is important, because it shows that farmers must have at least some amount of cash to join dairy-goat groups. This may be something that prevents the very poor in the community from joining groups with physical benefits such as the dairy-goat groups. Poor people were in dairy-goat groups, but within the category of "poor," perhaps there were those poverty was such that they could not take advantage of groups.

When asked why farmers in their area were not in any type of group, farmers responded in a number of ways. Table 4-9 shows the most frequently given answers. When the dairy-goat groups were asked if there was anyone in their village who could not or would not participate in groups, 67% of them said "yes." However, a significant amount of respondents did not believe there was anyone in their area that was not in any

group (25% of the time, individual respondents said there were no farmers in their area who were not in a group). Perhaps the dairy-goat group members had contact with more types of community members who were not in groups. Some of the factors that affect participation in groups in Meru Central District are explored below.

According to Table 4-9, lack of knowledge and lack of money appear to be the main limiting factors preventing farmers from taking part in groups. Farmers in communities who were physically or otherwise marginalized may have failed to obtain the information necessary to join groups. This marginalization may also have a financial aspect to it that prevents farmers from joining groups.

Table 4-9. Most frequent reasons given for why some farmers are not in any groups (%)

| | Individual responses (n = 87)[a] | Group responses (n = 46)[a] |
|---|---|---|
| Lack of knowledge/ information | 24 | 20 |
| Lack of money | 20 | 17 |
| Don't need to | 11 | 7 |
| Drunkenness | 8 | 13 |
| Waste of time | 3 | 11 |

[a]These percentages do not add up to 100 because there could be more than one answer

At the end of the study period, a stakeholders' meeting was held to present results to people who had been involved in the research, such as farmers and extension, FARM-Africa and World Agroforestry Centre personnel. During this discussion, the stakeholders listed the following reasons that people were not in any groups: poverty, ignorance/lack of information, politics, time, cultural reasons, age limits and social problems. These issues are discussed below.

With regard specifically to the dairy-goat groups, some people said that they were not members because there was no room for them. As mentioned above, FARM limited the membership in the groups to 25. However, many of the non-member neighbors of the

dairy-goat groups were receiving many benefits. Non-members sold a significantly larger amount of improved goats than members (1.11 versus 0.45; $t = -2.58$; $p < .01$; df = 86), indicating that a farmer did not need to be a member of a group to benefit from it. Non-members who benefited from dairy-goat technologies were likely people who were able to take advantage of the technology through their resources.

**Lack of knowledge/information**

Some informants felt that people were not in farmer groups because they lacked knowledge or information. In other words, if they only heard about an opportunity, they might join a group. They also may not have had all of the facts. For instance, in the dairy-goat project, perhaps people did not understand the purpose of the goat project and so did not join. Likewise, they may have felt that they lacked knowledge to participate; that is, they may not have understood how to care for the goats. This may have prevented them from joining a dairy-goat group.

This explanation then leads to the question of why they lacked such knowledge. Perhaps those who did not belong to any group whatsoever were socially marginalized people. They may not have attended church. Farmers who are remote from town centers and markets may not readily hear of opportunities and so miss out. Others may be too busy to attend the chief *baraza* and discover such opportunities.

**Wealth and poverty**

Many of the groups formed in Kenya are for the resource-poor, to bring about some benefit or "uplifting." Therefore the "poor" are the ones participating in many of the groups. One informant said, "The poor are mostly in groups." They naturally come together because they have needs. When FARM-Africa began their work in Meru, they held discussions with community members about who were the "poorest of the poor."

They categorized such people as having small farms and no cattle. They also had a lack of regular income and proper shelter and could not educate their children (Report on Project, 1999).

Although the FARM-Africa project specifically targeted poor people, it appeared that sometimes the very poor could not join groups. Lack of capital was the main reason. According to informants, they were the people lagging behind—they had nothing. They may not have had the resources to join groups, or were afraid that they would be exploited if they joined a group. One of the farmers interviewed who was not in any group said that it was due to lack of money. Money, of course, is not the only indicator of wealth. Many other factors were examined with regard to participation in groups—number of various types of livestock, housing type, household composition, gender, age, education, source of income off the farm (remittances) and amount of land (Table 4-10). Table 4-10 shows some interesting correlations between various indicators for wealth. For instance, the correlations between wealth level and number of improved cows (.523) and house construction (.475) are positive, showing that increases in wealth are associated with higher numbers of cows and better house construction. There is also a positive correlation between wealth level and size of land (.476). Wealth level was judged by an outsider rater and was based upon the land size related to the agroecological zone, type of housing, household composition, and number of animals. Finally, the negative correlation between age of respondents and amount of education (-.462) shows that higher ages are associated with lower levels of education.

Table 4-10. Pearson's product moment correlations between various indicators for wealth for individual farmers (n = 88)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Improved cows | -- | .156 | .323* | .523** | .371** | -.028 | .212 | .092 | .148 | .190 | .004 | .016 | .070 | -.078 |
| 2. Producer to consumer ratio | | -- | .062 | .156 | -.190 | -.013 | .590** | -.005 | -.006 | -.011 | -.113 | -.244 | .186 | -.040 |
| 3. Total animals | | | -- | .392* | .061 | .079 | .154 | .431* | .209 | .080 | .058 | .110 | -.011 | .752*** |
| 4. Wealth level[a] | | | | -- | .475* | .020 | .169 | .476* | .325* | .179 | -.099 | .239 | .115 | .042 |
| 5. House construction[b] | | | | | -- | -.143 | .062 | .212* | .163 | .156 | -.063 | -.131 | .346* | -.175 |
| 6. Consumers | | | | | | -- | .755*** | .264 | .259 | -.145 | .122 | .242 | -.260 | .143 |
| 7. Producers | | | | | | | -- | .139 | .224 | -.023 | .049 | -.096 | -.037 | .059 |
| 8. Total land | | | | | | | | -- | .424* | .117 | .006 | .407* | -.168 | .183 |
| 9. Title deed[c] | | | | | | | | | -- | -.014 | .078 | .369* | -.144 | .064 |
| 10. Remittances[c] | | | | | | | | | | -- | -.115 | -.057 | .120 | .001 |
| 11. Gender[d] | | | | | | | | | | | -- | .191 | .054 | .123 |
| 12. Age | | | | | | | | | | | | -- | -.462* | .110 |
| 13. Education | | | | | | | | | | | | | -- | -.012 |
| 14. Improved goats | | | | | | | | | | | | | | -- |

[a] 1 = below average; 2 = average; 3 = above average

[b] 1 = thatch roof and mud walls; 2 = thatch roof and permanent walls; 3 = permanent roof and mud walls; 4 = permanent roof & timber walls; 5 = permanent roof and walls

[c] 1 = yes; 0 = no

[d] 1 = male; 0 = female

*Moderate magnitude; **Substantial magnitude; ***Very high magnitude

Perhaps the poorest farmer interviewed during the study was a grandmother who lived in a tiny shack with her two grandchildren. She had to carry her water from a stream. She had no animals at all, which was unusual. (Average number of animals owned by individuals interviewed was 6.4 (SD = 8), with a range of 0 to 20.) She had 2.5 acres, but it was her brother's land. There was no source of income from off of the farm. She was a member of one group, a merry-go-round, and she said that she joined it to increase income and to gain benefits.

There were costs for being in groups that were formally registered with the government through the Department of Social Services. The advantage of being registered was that groups could then request help from the government or organizations that provide development assistance through groups. Even if the group did not charge individual farmers for being a member, there were costs for the group to register. It cost Ksh. 500 (100/- to the location (an administrative unit), 100/- to the division and 300/- to the district) to register a group for the first time. Annual renewal was Ksh. 200 (50/- to the location, 50/- to the division and 100/- to the district). A U.S. dollar bought about 75 shillings during the time of the research.

Within the dairy-goat groups, members had all contributed something to be a member of the group. Therefore if a new person wanted to join, the group wanted them to pay their fair share, so they might be asked to pay Ksh. 1000 (about USD 14) if they joined the group late. Group members might say, "Why should so-and-so enjoy new resources that we have worked for over the years?" Newcomers were made to pay something to put them at par with older members. If a person does not have this money,

it could prevent him or her from joining the dairy-goat groups. Therefore the poor may be kept out of such types of groups.

According to project documents and various informants, the FARM-Africa project was designed to target poorer farmers in the communities. However, there were no significant differences between dairy-goat group members and non-members with regard to wealth rating by outside enumerators ($X^2$ (2, n = 88) = 0.46; $p < .29$), number of livestock, or other factors that contribute to wealth level such as size of land, years of education, and remittances. Type of housing ($X^2$ (4, n = 88) = 4.67; $p < .32$) and source of water ($X^2$ (3, n = 88) = 3.44; $p < .33$) were not significantly different for members and non-members either. Table 4-11 shows the differences between members and non-members.

Table 4-11. Frequencies for wealth indicators of dairy-goat group members and non-members (%) (n = 88)

| Indicator | Sublevel | Dairy group member | Non-member | Total no. |
|---|---|---|---|---|
| Wealth level | *Nkia*—below average | 12 (14) | 13 (15) | 25 (28) |
| | *Gatonga*—average | 27 (31) | 21 (24) | 48 (55) |
| | *Gitonga*—above average | 5 (6) | 10 (11) | 15 (17) |
| House type | Permanent roof /stone walls | 5 (6) | 9 (10) | 14 (16) |
| | Permanent roof/timber walls | 27 (31) | 27 (31) | 54 (61) |
| | Permanent roof & mud walls | 10 (11) | 7 (8) | 17 (19) |
| | Thatch roof & mud walls | 0 (0) | 2 (2) | 2 (2) |
| | Other | 0 (0) | 1 (1) | 1 (1) |
| Water source | Piped | 19 (22) | 25 (28) | 44 (50) |
| | Borehole/well | 5 (6) | 3 (3) | 8 (9) |
| | Stream/river | 1 (1) | 3 (3) | 4 (5) |

Even within the dairy-goat groups, informants claimed that there were differences in wealth. Additional dairy-goat groups were formed after the start of the project ("extension groups") that were not necessarily the "poorest of the poor." Within the project, informants felt that the FARM dairy-goat groups were poorer than the extension

dairy-goat groups, because the FARM groups were specifically chosen to be in the project for their poverty. Extension group members, on the other hand, were people in the community who simply decided they wanted to join the project. However, there was no significant difference between wealth levels of FARM group members and extension group members (Table 4-12).

Table 4-12. Wealth levels of dairy-goat members (divided into type of member) and non-members

| | n | M | SD | *F* | *p* |
|---|---|---|---|---|---|
| FARM group member | 18 | 1.67 | 0.69 | 1.24 | 0.29 |
| Extension group member | 25 | 1.96 | 0.54 | | |
| Non-member | 45 | 1.93 | 0.72 | | |

*Note*: 1 = below average; 2 = average; 3 = above average

If there were differences in wealth between dairy-goat group members and non-members, or between FARM-Africa dairy-goat group members and non-members, the differences were not apparent at the time of the study (Tables 4-11 and 4-12). Also, the extension dairy-goat groups and the non-members of dairy-goat groups may have been poor as well, since wealthy farmers with large land and dairy cattle may not have been interested in dairy-goats.

It appeared that, as of the time of the study, most of dairy-goat group members owned livestock such as cattle and goats. During the interviews, dairy-goat groups were asked the number of members with no large livestock, those with goats only, or those with goats and cows (or cows only). Only 8% of all of the dairy-goat group members had no livestock, while 21% had goats only, and 71% had goats and cows (or cows only). There were very few dairy-goat group members with no livestock whatsoever. This may be due to the fact that the project was working; that is, it was designed to get dairy animals in the hands of poor farmers, and succeeded in doing so. By many accounts from

informants, this is exactly what has happened. Below are some quotes from farmers indicating this phenomenon:

- "A goat encourages someone to work hard; in homes with goats life is changing. With a goat you have milk and can sell [goats] at a higher price."
- "We see that through goats, people have taken kids to school, built timber houses, put in water. . ."
- "Goats have bought cows."
- "You can sell goats to solve the problem of school fees."
- "I've come from far; I congratulate FARM. *Nimeona mwanga* (I've seen the light). I'm competing with the rest of the world."
- "You can sell [goats] in an emergency and they are not a problem to feed because they don't eat like cows; they give more milk than cows and more nutritious [milk]."

**Wealth categories in Meru**

Wealth of farmers is still one important factor in discussing participation in groups in general. Are the poorer farmers not able to participate due to lack of money, time or resources? There were several categories of wealth in the *Kimeru* language. Many people assigned three levels of wealth: the rich (*gitonga*), the poor (*nkia*) and the very poor with nothing at all (*nkia mukeo*). Additional categories also used were *gatonga* (average)*, gakia* (very poor) and *tebe* (extremely poor). For this study, the main categories used were *nkia, gatonga* and *gitonga*, which will refer to below average, average and above average, respectively.

It is said that those in the *gitonga* category have improved or grade cows and *shambas* (gardens). In this study the *gitonga* had between one and five improved cows, with an average of three (Table 4-13).

Using Bonferroni post hoc analyses on the data in Table 4-13, it was determined that there was a significant difference between below average and average ($p < .00$),

between below average and above average ($p < .00$), and between average and above average ($p < .03$). Informants described *gitonga* as having water in their *shambas*. Their *shambas* were bigger than those in other wealth categories. Both the husband and wife might have regular salaries, permanent houses and cars[5]. They sometimes had a phone. They had coffee income and/or a business, were employed. They appeared to have no problem with money. They had more assets such as bicycles, solar panels or vehicles.

Table 4-13. Number of improved cattle owned by various wealth levels (n = 88)

| Wealth level | n | M | SD | *F* | *p* |
|---|---|---|---|---|---|
| *Nkia* (below average) | 25 | 0.56 | 0.82 | 16.16 | 0.00*** |
| *Gatonga* (average) | 48 | 1.96 | 1.17 | | |
| *Gitonga* (above average) | 15 | 3.07 | 2.49 | | |

***Highly significant

*Gatonga*, or average farmers, were below *gitonga* with regard to assets. They were not likely to hold formal jobs, but might do casual labor. They might own a cart but not a motor vehicle. Their land was smaller than *gitonga* farmers, and they had fewer cash crops. Their houses were likely to be timber, not cut stone or cement. They had fewer animals than the *gitonga.* However, they might still own an improved cow.

*Nkia* (below average) category farmers were poor but they had "something." A person called *nkia* had land and family, but no regular income. This farmer might rely on coffee and have a very small income in terms of dairy. Informants said *nkia* farmers had more children than *gitonga*. Depending on their location, they may or may not have owned large livestock. In the lower zones it was more common to have local cattle and goats, and so *nkia* farmers might own small number of these. They likely owned chickens.

[5] These are descriptions from people from all parts of the district, thus wealth levels are somewhat relative. Only a few farmers interviewed had vehicles or regular jobs; yet those without were still sometimes called *gitonga.*

The poor or *nkia mkue* people had no animals; they did not own anything. "They do not even own a chicken." They were the very poor, the poorest of poor. Their children could not depend on them for their needs. These people had no independence; they must depend on someone else. They needed to be facilitated and given resources. Relatives sometimes cared for these farmers in terms of providing them with housing, land to farm and occasionally cash. They would still be considered their own household even if they were being cared for, because they would be cooking their own meals and living in their own house.

Below are some of the variables that pointed to wealth categories, according to informants in the study.

- House structure—stone (permanent), timber (semi-permanent), huts (mud). Within huts, mud + thatch or mud + *mabati* (tin roofs) were sub-categories.
- Land size—small versus big and marginal versus productive. Ten acres in marginal land did not make one rich.
- Livestock—number of cows, goats, chickens, sheep; some had no animals
- Literacy level—illiterate; primary school, secondary (rich)
- Family education—number of children in school
- Family employment—if they had children working, they were richer
- Number of children. The poorest family had "so many kids." The wealthier had fewer children. Having many children used to be a sign of wealth if they were cared for. Now more kids equals more burdens.
- Piped water
- Assets—bikes, solar panels for power, vehicles
- Education of children. (Kids were cheap labor.)

Although informants stated that most of the poor (*nkia*) were members of various groups, many of the groups had fees that very poor (*nkia mkue*) farmers might not be able

to afford. Two people were invited to join a particular group and were asked to pay Ksh. 1000 (USD 14). They did not join because the fee was too high. Eighty-four percent of the dairy-goat groups had fees for joining the group. It appeared that there were more non-members of dairy-goat groups who were classified as "*gitonga*" farmers, although not statistically different (Table 4-11). The wealthier farmers may not have needed the benefits gained from being in groups.

When asked whether the poor of the community were present in groups, individual respondents ranged from "strongly agree" to "strongly disagree" on a Likert scale of 1-5, with the average being 1.76, between strongly agree and agree somewhat (Table 4-14). Regarding the rich, the average response for groups was 3.67 (Table 4-15).

Table 4-14. Individuals' responses to participation in groups

| | n | M | SD |
|---|---|---|---|
| The poorest are present in groups | 86 | 1.76 | 1.33 |
| The richest are present in groups | 85 | 2.28 | 1.58 |

*Note*. Mean based on Likert-scale items ranging from 1 = strongly agree to 5 = strongly disagree

Table 4-15. Dairy-goat groups' responses to participation in their group (n = 46)

| | M | SD |
|---|---|---|
| The poorest are present in our group | 1.54 | 1.31 |
| The richest are present in our group | 3.67 | 1.74 |
| Our group has people from all wealth levels today | 2.28 | 1.64 |

*Note*. Mean based on Likert-scale items ranging from 1 = strongly agree to 5 = strongly disagree

These answers seem to indicate that respondents felt the poor were more present in their groups more than the rich. Many of the dairy-goat groups felt that all wealth levels were represented in their groups, and a few were adamant that there were no rich people in their group. "There are no rich people here," stated one farmer.

**Movement between wealth categories**

During the interviews farmers were asked what factors make people move between the different wealth levels that were under discussion. The three typical wealth levels *gitonga* (above average), *gatonga* (average) and *nkia* (below average) were used. Below are some of their answers.

- "If you take a loan and can't repay it you might move from *gitonga* to *gatonga* or even *nkia"*
- "One has to work hard to get to *gatonga* [from *nkia*]"
- "Moving from *nkia* to *gitonga* [immediately] is not possible unless you steal"
- "If you have a goat and it dies, you go down"
- "Sickness, laziness and carelessness can take you down"
- "Minus is not the same as plus. If you keep on subtracting without adding, you will go down."
- "You have a red bag and a green bag. You put money in both but you don't touch the money in the red bag. If you don't touch that bag for a long time, you can move from *nkia* to *gitonga*."

**Social problems**

Social problems may also prevent people from joining groups. One frequently cited reason for why people were not in groups was drinking, or that "drunkards" were not in groups. One reason cited for the problem with drunkenness in certain areas was that people used to be busy with their coffee crop, but now that they cannot get a good price for it, they sit around and drink instead of tending their crop. Others said that people do not join groups because "they are criminals," "they don't fit in," "they are dishonest," or "they can't work with others." During the stakeholder meeting at the end of the research, some of the stakeholders said that social misfits, such as thieves, were not in groups.

**Time**

Time constraints were sometimes mentioned as a reason for not joining groups. During the stakeholder meeting, participants said that people felt groups were a waste of time, or they did not see any quick benefits. Both individuals and groups brought up time as a constraint. Household composition is an important factor in time and labor availability for farmers. For instance, if there are many young children or older people requiring care who do not perform much work on-farm or at the household, a farmer who is a producer will have less time for her or his own work. As children get older, they can take over some of the household responsibilities such as childcare, gathering firewood, cooking and weeding. Sickness will also take time away from the farm work. HIV/AIDS was prevalent in Kenya during the study. One informant stated that although it was not yet contributing directly to agriculture in his area, there were indirect effects. For instance, someone might have to go to the hospital, attend a funeral or have trouble finding labor because of friends' or neighbors' illness. However, some informants thought that those people not in groups perceived groups as a "waste of time." Some farmers believe that "they know where the market is." They do not need services and can market their products themselves. In other words, they have the resources and knowledge, so it would be a waste of time to be in a group.

**Gender**

The dairy-goat groups seemed participatory with regard to gender. FARM-Africa put strong emphasis on having women in the groups and in leadership positions. Women made up 59% of group membership in the dairy-goat groups. A few dairy-goat groups were entirely women. There were also many women in leadership positions in the dairy-

goat groups; 30% of the groups had female chairpersons, 44% had female secretaries and 76% had female treasurers.

There were cultural factors regarding the participation of women in groups, especially the dairy-goat groups. In Meru culture, men own many assets such as land and animals, while women usually do not. Although they may be encouraged to be in groups, some women could find difficulties finding time for the group. With the dairy-goat groups, the work added on by caring for the goats might be too much on top of the household duties that a woman already had. Often, if just one spouse joined a dairy-goat group, the other might get involved as well, although not necessarily officially. Since women often cared for people and animals around the household, the chore of caring for goats often fell on her, even if it was her husband who was in the group.

**Household composition**

Household composition also affected participation in groups. See Tables 4-5 and the tables in Appendix A for more information on disaggregated household composition and participation in groups. Although total number of household members does not show producers, consumers or gender, it does give an overall indication of amount of people that must be fed and clothed and cared for. Even if many more of the members were producers, a large household would still create a larger workload.

The most common type of household was a married couple, both living on the farm (74% of individual respondents). Other household types included single females (13%), females whose husbands were away (11%) and single males (2%). This helps but does not give a full picture of the stresses on the household; for instance, number, ages, and gender of children or other people who may live on the farm such as hired workers.

An attempt was made to disaggregate total household composition. Two categories were created, producers (age 11-50 years) and consumers (all of the household members). Gender was not considered at this point. The number of producers divided by the number of consumers made a producer to consumer ratio.

The producer to consumer ratio was then analyzed with regard to participation in groups. To do this, the variable was split by the mean (0.63) and divided into those with a low producer to consumer ratio and those with a high producer to consumer ratio. There was a significant difference with regard to the number of groups that farmers belonged between those households with low ratios and those with high ($t$ = -2.10; $p$ < .04; df = 86). Those with a low ratio were in an average of 2.07 groups while those with a high ratio were in an average of 2.72 groups. This shows that farmers with less household stress are in more groups; likely because they have more time and even resources.

**Other reasons**

According to individuals questioned, there were different reasons that people do not belong to any group. Significantly, the most common answer was "there are no such people." However, there were diverse reasons that people do not join groups in general. Some women were not allowed to by their husbands. The husbands might say that they "will only go to gossip." Some people see group conflict and feel that they do not want to get involved with a group because of these types of issues. Non-members might also be afraid to join groups, fearing that they may be taken advantage of. For instance, they might donate money toward buying something for the group, and the money is misused. They may not be ready to cooperate with others, or are simply uninterested in the group. Other informants believed that "laggards" and "lazy people" do not participate in groups.

Some informants believed that the very rich or new settlers who have just arrived to the area were the only people not in groups.

Many times young people, especially those who were unmarried, were not in farmer groups, although there were groups specifically for young people as well. Some groups would not allow young or unmarried people to join, because if they got married or got a job, they would leave the group. Some people mentioned "youth" as people who are not in groups, and others said the *cucu* (old people or grandparents) are not in groups.

There were some disadvantages to being in groups. Members must find time to attend the meetings. It requires self-discipline to abide by the rules and regulations, according to some informants. Almost all of the groups interviewed in the study had fines for coming late or missing a meeting.

There was also the issue of "*siasa,"* problems or politics within groups. Stakeholders felt that people did not join groups because of the hatred and conflict in them. Some people did not join groups to avoid dealing with such relational problems. People fear that their contributions may be mismanaged, especially after hearing such stories from other groups. One of the two individuals interviewed who were not in any group at all mentioned both *siasa* and fear of losing money. He said that one hears of people going to town with the group's money and using it for personal reasons instead of for group business. He said it was discouraging to contribute and then "have your money eaten," so he could not see any benefit to being in a group. Extension agents estimated that 20-30% of the dairy-goat groups had problems related to misappropriation of funds. Several groups mentioned that they had problems with missing funds. Group members and even outsiders might misuse group funds.

**Participation in leadership**

Group leadership was examined during the study for diversity. Gender, age level, and wealth level of leaders were examined to see if they had an effect on who participates in group leadership. This could also have an effect on group membership in general, because people may feel more comfortable in groups that are comprised of leaders of their same gender, age set or wealth level. Table 4-16 shows the group leaders and their gender, age and wealth level.

Table 4-16. Frequencies for group leaders' gender, age and wealth level (%) (n = 138)

| Variable | Sublevel | Chairperson | Secretary | Treasurer | Total |
|---|---|---|---|---|---|
| Gender | Male | 32 (70) | 26 (57) | 11 (24) | 69 (50) |
| | Female | 14 (30) | 20 (43) | 35 (76) | 69 (50) |
| Age | <30 | 4 (9) | 2 (4) | 4 (9) | 10 (7) |
| | 31-49 | 18 (39) | 41 (89) | 30 (65) | 89 (64) |
| | >50 | 24 (52) | 2 (4) | 11 (24) | 37 (27) |
| Wealth | Below avg. | 9 (20) | 10 (22) | 4 (9) | 23 (17) |
| | Average | 32 (70) | 32 (70) | 29 (63) | 93 (67) |
| | Above avg. | 5 (11) | 4 (9) | 13 (28) | 22 (16) |
| Total | | 138 | 137 | 137 | 412 |

It is apparent that there were more male chairpersons (70%). Although the groups were 59% female, males were over-represented in the chairperson position. The secretary position was more balanced between males and females. However, the treasurer position was skewed toward females (76%). These issues will be discussed in Chapter 5.

Specific ages were not used because of the difficulty in determining people's actual age. It is apparent that chairpersons were much more likely to be over 50, however. On the other hand, many more of the secretaries and treasurers were between 31 and 49 years of age.

Most of the leaders seemed to be in the average wealth level. Treasurers seemed more likely than secretaries or chairpersons to be above average.

### Withdrawal from groups

Sometimes a member will withdraw from a group. A person might withdraw because of the commitment, whether it be time, money, changes in household composition or some other factor. They may also be unable to afford the contributions. Other reasons for members leaving the group included expulsion, death, absenteeism, illness, migration, domestic problems, and non-compliance (Mutia, P., FARM-Africa Meru Tharaka-Nithi Dairy Goat and Animal Healthcare Project Progress Report, January to June 1999).

This section examined who participates in groups and why. The next section will examine the linkages of agricultural players in Meru Central District in general, and of the dairy-goat farmer groups in particular.

## Objective Two: Examine Linkages and Their Outcomes among Farmers and Other Extension Stakeholders

### Introduction

In the previous section, participation in groups was considered. This section examines the agricultural players and their links in Meru Central District, linkages that dairy-goat groups have with other organizations and people, and what the outcomes of those links were.

The goal of this study was to examine the role of farmer groups in technology dissemination, and to assess what factors make groups effective in extending technologies among small-scale dairy-goat farmers in Meru Central District of Kenya. One of the objectives to meet this goal was to examine the groups' linkages with outside

entities. Linkages are important both as possible mechanisms for dissemination (Objective Three) and as a factor for success (Objective Four). Linkages were drawn out from informants through informal interviewing, questionnaires, and Venn (*chapati*) diagrams. A broad overview of linkages between agricultural players in Meru Central District will be discussed, followed by the specific linkages that the dairy-goat groups had, and finally the outcomes of these linkages at the group and district level.

**Agricultural Players in Meru Central District**

Meru is a major farming area in Kenya. It has many of the agroecological zones found in the country, allowing for a wide variety of crops to be grown. Parts of the district have high potential in terms of natural resources and infrastructure, which allows farmers to both grow and market a number of crops. It is located about four hours by tarmac road from the country's capital city of Nairobi, and is along one of the main routes to northern and eastern Kenya. The town of Meru is also the government district headquarters.

Coffee was a major crop before world prices collapsed, and many farmers made small fortunes on the crops. One informant stated, "If I were a boy now, I could not [afford to] go to school." Coffee money paid for many things in the 1970s and 1980s such as school fees, vehicles, and houses. There are still a good number of well-off people in Meru town due to coffee. This results in a certain amount of capacity[6] in the area, such as educated people, a variety of businesses, vehicles, and cash.

As a result of the factors mentioned above and the important cash enterprises in the area (coffee, tea and dairy), there were a good number of agricultural players in the

[6] "Capacity" is a word used in development that basically refers to training, skills, and capabilities of people, groups and organizations.

district, many of whom were linked. They worked together in various ways. For instance, agribusinesses such as The Macadamia People and non-governmental organizations like FARM-Africa would use government extension officers in their training. They also preferred to work with community-based organizations such as the farmer groups. They often funneled their projects through the churches and used the chief *barazas* as venues.

There were agricultural players at the local, district, regional, national and international levels (Table 4-17). The information shown in the table is a result of data collected by the researcher.

Table 4-17. Agricultural players of Meru Central District

| Level | Organization | Type |
|---|---|---|
| International | International Centre for Research in the Semi-Arid Tropics | International research center |
| | International Fund for Agricultural Development | International fund |
| | International Livestock Research Institute | International research center |
| | World Agroforestry Centre | International research center |
| National | Agricultural Show of Kenya | Government |
| | Agricultural Technologies Information Response Initiative | National government initiative supported by World Bank |
| | British American Tobacco | Private company |
| | Horticultural Crops Development Authority | Private company |
| | Kenya Agricultural Research Institute | Government |
| | Kenya Tea Development Authority | Parastatal |
| | Ministry of Livestock Development & Fisheries | Government |
| | National Agriculture and Livestock Extension Programme | Government |
| | Radio/TV | Government/private |
| Provincial | Banks | Private |
| | EM Technology | NGO |
| | Kari Embu | Government |
| | Meru Animal Health Workers' Group | NGO/CBO[a] |
| | Meru Drylands Farming Project | NGO |
| | Meru Goat Breeders' Association | NGO/CBO |

(Table 4-17 continued)

| | Plan Mbeere | NGO |
|---|---|---|
| District | Catholic Church | Church |
| | European Committee for Agricultural Training | NGO |
| | Community Development Trust Fund | NGO |
| | Kenya Forestry Research Institute | Government |
| | Lewa Downs | Private |
| | Meru Central Cooperative | Parastatal/private |
| | Methodist Biointensive Centre | Church |
| | Veterinarians | Private |
| Locational | Agricultural Shows | Government |
| | Chief *baraza* | Government |
| | Christian Community Services | Church |
| | Drug shops | Private |
| | Homegrown | Private company |
| | Kaguru Farmer Training Centre | Government |
| | KARI Mariene | Government |
| | Kamutune Tree Nursery | Church |
| | The Macadamia People | Private |
| Village | Churches | Church |
| | Community Animal Health Workers | Individuals |
| | Dairy-goat Groups | CBO |
| | Savings and Credit Cooperatives | CBO |

[a] Community-based organization

There were approximately five international players, seven non-governmental organizations, 12 government institutions or parastatals, three church development projects, four community-based players, and eight private players in the district.

As mentioned in Chapter 2, social capital is high in Kenya as a result of many groups being formed at the village level since independence. There were therefore many community-based organizations (CBOs) in Meru District. Sometimes such organizations formed umbrella groups at a district or regional level. This was done through the FARM-Africa project. The dairy-goat farmers could belong to two umbrella groups, the Meru Goat Breeders' Association (MGBA) and the Meru Animal Health Workers' Group (MAHWG). These groups represented them at locational (an administrative unit above

village level), district and regional levels. MAHWG also assisted private players such as community animal health workers (CAHWs) to open rural drug shops.

Churches too were a major player in the Meru area. Nearly 100% of the farmers interviewed called themselves Christians, and attended church. The Methodist and Catholic churches were particularly strong, and both had agricultural programs. The Anglican Church had an arm known as Christian Community Services (CCS), which ran a training center for farmers in the district.

Non-governmental organizations were not quite as strong in Meru as in lower-resource districts, but they played a role as well. Major non-governmental organizations included FARM-Africa, SOS-Sahel, Effective Microorganisms (EM) Technology, and the Italian water NGO Central European Farmers' Association (CEFA). Food for the Hungry International (FHI) was moving to Meru in 2004. With the exception of EM, which conducted trainings throughout the district, FARM was the only NGO working in the areas where the farmer groups were located.

There were government players at all levels in Meru. At the locational level (an administrative level above the village) were the chiefs' camps where *barazas* were held. There were also different agricultural centers such as Kaguru Farmer Training Centre and the Kenya Agricultural Research Institute Mariene Research Centre. Sometimes government-run agricultural shows were held at the locational level.

Government players at the district level included the Ministry of Agriculture and Rural Development (MOARD) and Ministry of Livestock Development and Fisheries (MLDF). Parastatals were also present. The Kenya Tea Development Authority bought and processed tea leaves in the tea zones. Coffee societies were very strong in the higher

zones. The Meru Central Cooperative worked with farmers with milk, coffee and various other products. The two ministries MOARD and MLDF had international cooperation with the Swedish government and the International Fund for Agricultural Development (IFAD). The Swedes provided bilateral aid to government extension through the National Agricultural and Livestock Extension Programme (NALEP). Donor countries contribute 70% to the IFAD program and the national government 30%; at the time of the study, Italy was supporting IFAD in Meru, promoting traditional food crops and irrigation systems.

Other government organizations at a regional or national level in Meru Central District included the Kenya Agricultural Research Institute (KARI) and Kenya Forestry Research Institute (KEFRI). These often worked in collaboration with international research centers such as the World Agroforestry Centre (WAC), International Livestock Research Institute (ILRI) and the International Centre for Research in the Semi-Arid Tropics (ICRISAT).

Private organizations and companies also played a role in agriculture. Companies included The Macadamia People, Homegrown (for vegetables and fruit for export), Horticulture Production Company, British American Tobacco and Mastermind. There was also a cattle/wildlife ranch in the district with project that worked with farmers and CBOs (Lewa Downs). Banks also played a role, providing credit for certain types of farmers. Many of the community-based organizations such as the dairy-goat groups maintained bank accounts. (Sixty-one percent of the dairy-goat groups interviewed had bank accounts.)

**Dairy-Goat Group Linkages**

The information above shows the overall linkages within the area. This section will examine linkages with the FARM-Africa dairy-goat groups in Meru Central District. Every group had linkages with other players in the area, such as churches, the chief, extension staff, and markets. The number of linkages the groups had varied from six to sixteen, with the mode being ten linkages per group.

Dairy-goat group linkages were established using *chapati* or Venn diagrams. *Chapati* diagrams are a participatory way of mapping social networking by allowing respondents to show how one organization relates to other organizations (Figure 4-6). In this case linkages were mapped by putting circles of various sizes on a piece of flip chart paper. The dairy-goat group was placed in the middle of the paper. Informants were given three sizes of *chapatis* (Table 4-18). The size of the *chapati* corresponded to the amount of links the group had with the other organization. Position of the *chapatis* on the paper signified how often the linkages occurred (Table 4-19). Usually, local terms were used to make the farmers more comfortable.

The four major links that groups had in terms of importance (*chapati* size) were government extension ("agriculture"), FARM-Africa, the church and chief *baraza*. However, when they are ranked according to the total number of *chapatis* given, "other farmers" moves up in rank from position seven to position four. Also, *baraza* moves up to position two from position four, because it was mentioned more frequently by the groups, but not given the highest level of importance by all of them.

Again, *baraza* was a link that had many *chapatis* given, but they were placed all over the diagram, not just close to the group. Possible reasons for this are discussed in Chapter 5. For "other farmers," groups, and schools, the majority of the chapatis were


Figure 4-6. *Chapati* diagram by a dairy-goat group

Table 4-18. Sizes of c*hapatis* given to various links with the dairy-goat groups (n = 46)

| Source | Big | Medium | Small | Total |
|---|---|---|---|---|
| "Agriculture"[a] | 36 | 9 | 1 | 46 |
| FARM | 27 | 8 | 0 | 35 |
| Church | 24 | 8 | 8 | 40 |
| *Baraza*/ administration/chief | 18 | 15 | 10 | 43 |
| MGBA[b] | 10 | 3 | 7 | 20 |
| Indigenous knowledge | 9 | 3 | 0 | 12 |
| Other farmers | 7 | 23 | 6 | 36 |
| Groups | 6 | 13 | 8 | 27 |
| Schools | 4 | 9 | 6 | 19 |
| Radio/TV/mass media | 3 | 9 | 5 | 17 |
| Show | 2 | 5 | 7 | 14 |
| Market | 1 | 1 | 6 | 8 |
| Newspaper | 0 | 0 | 6 | 6 |

[a] "Agriculture" refers to government extension
[b] Meru Goat Breeders' Association

placed somewhat far away. Likely all of these linkages had somewhat variable rates of frequency of contact.

Table 4-19. Frequency of linkage with the dairy-goat groups as shown in c*hapati* diagrams (n = 46)

| Source | Touching | Farther away | Far away | Total # times mentioned |
|---|---|---|---|---|
| "Agriculture"[a] | 31 | 13 | 2 | 46 |
| *Baraza*/administration/chief | 13 | 12 | 11 | 36 |
| Church | 23 | 8 | 8 | 40 |
| Other farmers | 8 | 27 | 1 | 36 |
| FARM-Africa | 17 | 13 | 5 | 35 |
| Groups | 7 | 18 | 2 | 27 |
| Meru Goat Breeders' Assoc. | 7 | 9 | 4 | 20 |
| Schools | 5 | 14 | 0 | 19 |
| Radio/TV/mass media | 5 | 7 | 5 | 17 |
| Show | 0 | 5 | 9 | 14 |
| Indigenous knowledge | 7 | 5 | 0 | 12 |
| Coffee society/factory | 1 | 6 | 2 | 9 |
| Tours/visits | 2 | 5 | 2 | 9 |
| Visitors | 0 | 6 | 1 | 7 |
| Market | 0 | 4 | 4 | 8 |
| Newspapers | 0 | 1 | 5 | 6 |
| Companies | 1 | 0 | 4 | 5 |
| Green Belt Movement | 0 | 2 | 1 | 3 |
| Clan meetings | 1 | 2 | 0 | 3 |
| Dairy society | 0 | 3 | 0 | 3 |

[a] "Agriculture" refers to government extension

**Linkage Outcomes**

Linkages in Meru District in general and with farmer groups have been described. What was the outcome of these linkages? Associations between linkages that dairy-goat groups had with their success in dissemination are examined in Objective Four. This section describes some of the other major linkage outcomes.

Government extension, FARM-Africa, *baraza* and the church seemed to be some of the most important linkages. This was an interesting mix of government and non-government and of local and external links. During one interview, group members said,

"Extension, FARM and the church have made us to be here" (or "been our foundation"). Sometimes a group would not specify extension (or "agriculture," as they called it), but would say the name of a certain extension agent. One group said that they knew extension was an important link because if they call extension, "in a minute they are there [to help them]." Government extension always arranged the tours and visits that groups went on, said another group. Some groups relied on agricultural extension for advice. Others said, "[we] do not see [extension] on the farms."

Some groups explained that it was necessary to go through extension to get to FARM. This seemed to be a sort of protocol or standard operating procedure. In a similar vein, information flow sometimes seemed to move in the opposite direction. One group said the "church gets its information from the chief, but chief gets it from extension."

FARM-Africa was also seen as one of the foundational linkages of the farmer groups. One farmer said, "FARM *ako ndani kabisa*" (is completely inside) while working on the *chapati* diagram, meaning that it was very closely linked to the group.

On the other hand, some groups felt that FARM was not very frequently linked to them. One farmer stated," FARM should be given a big *chapati* but placed in America [very far]." Because FARM helped their original groups, but not the newer extension ones, there were some hard feelings against the organization. One informant said, "FARM gave goats to Igane and Ruiri [groups], but we had to buy them, so don't even give them a *chapati*." His group did not learn directly from FARM but from the Igane group where they bought the goats. It was common for the older FARM groups to train the newer extension groups, who were not supported by FARM. Although FARM-Africa

was perceived as being far away from some of the groups at their office in Meru town, they were an important source of information, training and technology. There were often FARM personnel out on motorcycles traveling to various groups on business, so they were frequently in the rural areas. Sometimes there were big arguments among group members over both the size of the FARM *chapati* and its placement because of this. All of this discussion seems to indicate that along with the successes of FARM, there were also areas where they may have failed to help in ways that the farmers expected them to.

Another source of contention was the fact that the farmers did not go directly to FARM, but had to use extension as an intermediary. However, sometimes the farmers said that if they went to FARM-Africa, they were then sent to extension. Also, some group members said that they did not know anyone from agricultural extension prior to the FARM project, so they "knew agriculture through FARM." They said that the extension staff only came to them because of the project. In the argument, one farmer said, "Remember your father—in all that we're doing, FARM helped us."

The chief *baraza* was also one of the most important links, according to many of the groups. The chief's office and the *baraza* were part of local government administration, and were referred to as "administration." One of the chief's jobs is to coordinate all of the development in the area. One group said that anyone who wants to do anything in a community must go through administration.

Because Kenya recently had a major change of government, this affected the local government administration as well. One group that gave administration a large *chapati* said that if it were still the old government, they would have given it a small one. They were very impressed with their chief and said, "If a problem arises even at night you go

to administration," implying that it was very helpful. However, this often depended on the individual chief. Some chiefs were very active while others were not. Again, there was a flow of information involving the chief's office. Extension or another entity gave information to the chief, who then passed it on at the community level to groups, churches and individuals.

The groups tended to link with churches more than NGOs. This was likely because nearly all the farmers were members of a church, they were at the churches at least once a week, and the churches were at the local level. A couple of the groups stated that the church was one of their most important linkages, even part of their "foundation." However, some groups stated that "the church mostly deals with God," and so either did not give churches *chapatis* or gave them very small ones. One farmer said that the church gets their information from the chief. Churches were mentioned as links in 40 of the 46 groups, and were given a large chapati 24 times, a medium one eight times and a small one eight times.

Although radio was not technically "linked" to the groups, it was often given a *chapati* nevertheless, showing that it was important to many of the groups as an information source. Radio (or the more general term mass media) was mentioned by 17 of the groups. In one case, farmers said that it was through radio that they were linked to others; "someone may come from as far as Uganda because he has heard there are goats in Meru." Radio was important because they could listen to it every day. "Even today it will tell us something," said one farmer. Sometimes they got information secondhand from the radio through other farmers.

There were different ways that the dairy-goat groups interacted with the various entities that they had links with. The groups visited the other dairy-goat groups. For instance, a group in Miriga Mieru might go on a study tour to Chuka (in another district) to borrow ideas from them. Genetic material was traded and sold between groups. Groups bought goats and obtained fodder germplasm from other groups.

Farmers from the Meru Goat Breeders' Association and Meru Animal Health Workers' Group (MAHWG) and CAHWs also trained other farmers and groups. These associations were important for linkages between the various farmers and groups, because they were aware of much that was happening on a broader level in the entire project area. Many of the older FARM-Africa groups had trained the newer extension groups. One FARM dairy-goat group had helped two other groups to register their groups and obtain goats. This group also trained the new groups.

One NGO in the area that also had dairy-goat groups, SOS-Sahel, tried to link farmers with research institutes such as KARI, WAC, ICRISAT and the Ministry of Agriculture and Rural Development. They also used field days. Extension informants said that when the farmers helped to organize field days or demonstrations, they were more powerful. Groups went to visit another sublocation for tours, to see what other sublocations were doing. Such "cross-visits" were used to share experiences. Workshops were a further means of disseminating information and technologies. SOS-Sahel used what they called "village information supermarkets." They showed videos and pictures of various technologies to their groups, and farmers could then say, "We want this."

In conclusion, dairy-goat groups had important linkages that provided them with information and services. It was difficult to say which ones exactly were the most important, because they were for various purposes, provided different services and were seen by the groups in varying degrees of frequency. However, the important linkages for the dairy-goat groups appeared to be government extension, *baraza*, churches, other farmers, FARM-Africa, and farmer groups. There was much interaction and cooperation between all of the various players in agriculture in Meru Central District. However, there was confusion among some of the farmers themselves as to which organizations the individuals training them belonged to.

In this section, the links that farmer groups had with other organizations were described. The next section examines the mechanisms that farmer groups use (many of them involving these linkages) to disseminate information.

## Objective Three: Identify the Mechanisms by Which Farmer Groups and Their Members Receive and Disseminate Information and New Technologies

The previous section discussed the linkages that dairy-goat groups have with other entities, and the results of these linkages. This section discusses issues relating to the third objective of the study, to identify the mechanisms by which dairy-goat groups both disseminate and receive information and technologies.

### How Dairy-Goat Groups Disseminate Information and Technology

All of the dairy-goat groups interviewed said that they told other farmers about new information and technology. The dairy-goat groups in the study each told an average of 141 other farmers about new information and technology in the past year (the number ranged from 0 to 3,000 farmers). The main methods that dairy-goat groups used to tell

other farmers about new technologies were through the chief *baraza*, in other farmer groups, at the buck station, through training others, and by calling meetings.

*Baraza* is the community meeting held periodically by the chief. It is the traditional method of informing villagers about various events, especially from the government. Much information was passed along to farmers at the community level through this forum. Extension agents often presented information at the *baraza*, as did the dairy-goat groups. The merry-go-round groups often met at the chief's camp, and so this was another mechanism used to reach farmers with extension or other types of messages. Trainings may also take place at the chief's camp where *baraza* are held. One dairy-goat group, for instance, had been asked by the assistant chief to teach farmers at the *baraza*. Many of the dairy-goat groups (39%) mentioned that they have trained other farmers at the *baraza*.

Most farmers in Meru District belonged to different types of groups, as was seen in Objective One. Among the dairy-goat groups interviewed, 97% of these dairy-goat farmers were in other groups. Individuals interviewed were in a number of groups ranging from 0 to 10, with the average being 2.4 groups. During the interviews, both dairy-goat members and non-members who had benefited from the group in some way were targeted. Therefore 50% of the respondents belonged to dairy-goat groups. Other types of groups that farmers belonged to are seen in Table 4-4.

Members of the dairy-goat groups also trained people in other groups that they belonged to, such as clan and women's groups. Through these groups, farmers from the dairy-goat group communicated the new information and technologies they had learned. One woman interviewed said that as they cleaned the church as a part of their women's

group, they presented any new knowledge to one another. Within the dairy-goat groups, most of the members were from different clans. This enabled a wide variety of people from the various clans to learn about new technologies.

Buck stations were another main means that dairy-goat groups used to disseminate information (Figure 4-7). The buck station was the center for breeding activities for a group. A pure Toggenburg buck was kept at the buck station, and local goats and $F_1$ crosses were brought here for breeding. The goats were usually kept in a zero-grazing unit, where fodder was cut and carried to the goats. There were various rules for bringing goats for service to the buck station. Often non-members were charged 50 shillings (about 67 US cents) per service, while members paid around 25 shillings (33 cents), or were allowed services for free. Most buck stations had pure Toggenburg bucks. There were also three-quarter buck stations for the stabilization of $F_2$ crosses (three-quarter Toggenburg goats).

Seventy-four percent of individuals interviewed said that they received information at the buck station when they took their goat there for service. At the buck stations, dairy-goat groups reported having provided an average of four services to members and nine to non-members in the past month. Seventeen percent of dairy-goat groups said "some" of their neighbors had crossbred goats, and 70% said "many" neighbors had them. These answers were crosschecked by asking the same question of external raters such as FARM and extension staff, and averaging their answers. External raters said that in 37% of the dairy-goat groups, "some" of the group's neighbors had adopted dairy-goat technologies, while they said that in 63% of the dairy-goat groups "many" had adopted them.

Adoption in this case referred to use of various practices such as owning crossbred goats, building an improved goat house, or the use of ear tags.

Figure 4-7. Buck station

The fourth way that dairy-goat groups extended information and technology was through formal training of other farmers and groups. The 46 dairy-goat groups had each trained an average of three other groups in the past year, with a range of 0 to 36. Farmers in the FARM-Africa-supported dairy-goat groups were often responsible for training the new dairy-goat groups, which were known as "extension" groups. Seventy percent of the dairy-goat groups said they had trained non-members specifically on fodder tree technology. The average number of non-members trained on fodder by the dairy-goat groups was 33. Dairy-goat groups also gave information to outside visitors such as the non-governmental organizations Plan, MAP and SOS-Sahel; groups from Tanzania, Ethiopia and South Africa; institutions; other farmers outside the catchment area; extension officers; researchers, and government officers. FARM-Africa farmers were used to train SOS-Sahel farmers in fodder in 2003.

Lastly, dairy-goat groups informed other farmers of new information and technologies by calling meetings. For instance, if an extension agent was coming to train the group, they may have invited their neighbors. When fodder was being distributed to the dairy-goat groups, they often involved the whole community in both the training and the distribution of fodder seedlings. Groups also held their own training sessions, or invited other farmers to their meetings.

In addition to these five major ways of information dissemination (*baraza*, groups, the buck station, training, and calling meetings), many other means were used to tell others. Other ways that dairy-goat groups used to disseminate information and technologies to other farmers included the breeding stations, community animal health workers (CAHWs), fodder tree nurseries, churches, and through neighbors and visitors.

The dairy-goat group breeding stations were similar to the buck station, but their purpose was to breed more pure Toggenburg goats. A breeding station consisted of a buck and four does, all purebreds. The breeding station buck was only to serve pure does and not local or $F_1$ goats. One group member stated that when visitors came to their breeding station [to learn about the project], she told non-group members to come and learn from the visitors. Although non-member farmers were less likely to have contact with a breeding station unless they were buying a pure goat, it was still a place that they knew they could go to in order to find out more information on the goats or on fodder. All of the breeding stations had fodder banks of improved trees, and several of the dairy-goat groups mentioned that they were letting certain trees go to seed to provide germplasm to others.

Informants mentioned that community animal health workers (CAHWs) were another method that the group used to disseminate information and technology. The CAHWs were trained in each of the FARM dairy-goat groups to provide basic animal care. CAHWs then trained other farmers, especially dairy-goat group members, in animal health. They were also certified to do basic treatment of animals in the local community, and thus had a chance to make contact with many farmers. Eighty-five percent of CAHW customers were non-members. Although there were CAHWs in each of the 20 FARM groups, not all of the 26 extension groups had CAHWs. This was because the groups were formed after the CAHW training had taken place for the older FARM groups, and the funding did not allow for further training sessions. These new groups therefore had to arrange for their own training and cover the expenses.

Tree nurseries also provided a dissemination spot. Many of the dairy-goat groups had nurseries for fodder and other trees, and some had "bulking sites" that were meant to provide germplasm to farmers, and provide income through the sale of fodder for feed. Nurseries were mentioned as a place for dissemination of information, and of course technology in the form of germplasm. Almost all of the dairy-goat groups (91%) had been trained on fodder technologies. Although quite a number of the dairy-goat groups had nurseries or bulking plots, none of the groups sold fodder seedlings or seeds to other farmers. However, 70% of dairy-goat groups said that they gave fodder seedlings or seeds to people outside the group (Table 4-20).

Table 4-20. Amount of fodder seedlings given by dairy-goat groups to non-members

| | n | Minimum | Maximum | M | SD |
|---|---|---|---|---|---|
| Amount of seedlings | 25 | 0 | 5000 | 292.96 | 995.08 |
| Number of people receiving fodder | 36 | 0 | 100 | 18.81 | 25.29 |

Churches were also focal points of the community and therefore for dissemination. Because churches were so prevalent in Meru, they were often targeted as a venue for information exchange. Many of the announcements made at chief *barazas* were also made at churches. Also, FARM-Africa farmer extension workers (FEWs) in Meru would request to be given 30 minutes after church services to talk about dairy-goat technologies. One extension agent stated, "We use the churches to promote [technology]." Nearly one hundred percent of farmers surveyed attended church. One farmer stated, "After seven days we go to church," which means that farmers were in church quite frequently. *Barazas* could be held monthly or less frequently, depending on the chief. Although churches were often used by extension and NGO projects mainly as a place to make announcements, some churches had seminars and trainings. Thirty-five percent of individual respondents listed churches in the top three places where they get agricultural information. Sixty-two percent stated that they get information from their churches. There was no significant difference in type of church attended and whether they obtained information from their church.

One of the key ways in which dairy-goat groups passed along information and technology was through people they casually came in contact with, such as neighbors and visitors. The breeding facilities of the dairy-goat groups were located within the local communities, in contrast to the traditional breeding stations at research sites. Once a farmer adopted a technology such as an improved dairy-goat or fodder trees, neighbors were able to see what he or she are doing and learn and copy from him or her. Dairy-goat groups passed on information this way to other groups and individuals. Many farmers learned things by copying their neighbors or seeing a technique on another farm.

Informants also mentioned that they told visitors about new technologies. Farmers interviewed also said that they obtained information through discussion with other farmers.

**How Dairy-Goat Groups and Individuals Receive Information and Technology**

It is also beneficial to look at where dairy-goat groups themselves get information to more clearly understand the ways that information and technologies are passed along at the community level. Despite the new pluralistic extension environment in Kenya, some of the traditional providers such as government extension and local administration (government *baraza*) came out as major sources.

**Sources of Information for Dairy-Goat Groups**

The most important sources of information for the dairy-goat groups were (a) extension, (b) *baraza*, (c) FARM-Africa, (d) other farmers and (e) churches. The percentages of times various sources were named are shown in Table 4-21.

Table 4-21. Most important sources of information listed by dairy-goat groups (n = 46)

| Source | *f* | % (of time in top 3) |
|---|---|---|
| Government extension | 39 | 85 |
| *Baraza* | 22 | 48 |
| FARM-Africa | 21 | 47 |
| Farmers | 13 | 28 |
| Church | 8 | 17 |

*Note*. These percentages do not add up to 100 because each row reflects the percent of times that the source appeared in the top three (for instance, 85% of the dairy-goat groups mentioned extension).

In 85% of the dairy-goat groups, government extension, known as "agriculture," was mentioned as one of the top three sources of information for their group. Sixty-three percent of dairy-goat groups mentioned it as the number one source. Government extension included extension agents at various levels from the Ministry of Agriculture and Ministry of Livestock Development and government veterinarians. It also included

government-sponsored field days and demonstrations and agricultural shows that were held at various administrative levels. This was a good opportunity for farmers not only to learn from "experts" but from fellow-farmers on various information and technology. Several dairy-goat groups mentioned that they trained others at shows.

Twenty percent of dairy-goat groups mentioned FARM as the number one source of information, and 47% of the groups mentioned it in the top three sources. When the data are examined after controlling for type of group (extension or FARM), 8% of extension groups mentioned FARM as a number one source, while 35% of FARM groups said FARM was the number one source of information. There was a significant difference between groups as to the number one source of information ($X^2$ (2, n = 38) = 11.83; $p < .00$) (Table 4-22).

Table 4-22. Number one source of information for dairy-goat groups by type of group (%)

| | Extension Source | FARM Source | Total |
|---|---|---|---|
| FARM groups (n = 20) | 12 (60) | 7 (35) | 19 (95)[a] |
| Extension groups (n = 26) | 17 (65) | 2 (8) | 19 (73)[a] |
| Total | 29 | 9 | 38 |

[a] The other groups listed a source besides extension or FARM

Although *baraza* was rarely mentioned as the number one choice, it appeared in the top three in 48% of the dairy-goat groups surveyed. The *baraza* and churches came out as important places for information and technology dissemination during the study. Both training and announcements took place at these venues. If there was a new project or technology in an area, government officials such as extension agents always used them along with other places such as schools and markets through which to make announcements. Many of the dairy-goat groups were invited to the *baraza* to share with

other farmers what they have learned. One group, which had trained 36 other groups in the past year, said, "Wherever there is a meeting we go and talk."

Churches were also a source of information. This was usually as a venue for trainings or announcements, however, rather than as providers of extension services. In extension, there are both extension providers and sources of information. For instance, the government and some churches and NGOs had specific people who trained farmers in different technologies. On the other hand, there were other sources of information that did not necessarily train, such as other farmers, churches, and *baraza.* However, as with the linkages, there were many gray areas where there was a crossover in extension providers. For instance, government extension people often trained at churches or *baraza.* This made it difficult to specify whether an agricultural player was an extension provider/trainer, or simply a source or a channel for information at times. However, most of the time, the information that the trainers had was supplied either by the government extension or by FARM-Africa.

**Sources of Information for Individual Farmers**

The sources of information for individual farmers were very diverse. The most important sources of information for individuals were (a) extension, (b) the church, (c) other farmers, (d) indigenous knowledge, (e) groups, (f) *baraza* and (g) FARM-Africa (Table 4-23). Other sources of information mentioned by key informants were mass media, study tours, NGOs, research centers, salespeople, seminars, visitors, cooperatives, coffee factories/societies, books, tobacco monitors, schoolchildren, hospitals, local leaders, the MGBA, forefathers (indigenous knowledge), training centers, agricultural students on attachment, agro vets, video shows and horticultural companies.

Table 4-23. Most important sources of information listed by individual farmers (n = 88)

| Source | *f* | % (of time in top 3)[a] |
|---|---|---|
| Government extension | 52 | 59 |
| Church | 31 | 35 |
| Farmers | 29 | 33 |
| Indigenous knowledge | 25 | 28 |
| Groups | 23 | 26 |
| *Baraza* | 18 | 20 |
| FARM-Africa | 17 | 19 |

[a] These percentages do not add up to 100 because each row is the percent of times mentioned the source appeared in the top three (for instance, 59% of the farmers mentioned extension).

Fifty-seven percent of individual respondents (n = 88) had attended at least one gathering where agricultural information was available in the past month. Such gatherings included *barazas*, church meetings, coffee society meetings, or field days. Individual farmers had received an average of 1.6 tours and/or trainings within the past five years.

Of individuals interviewed, 90% said that they received new information or technology from other farmers in the past five years. Neighbors provided 48% of this information. Farmers had trained or shared information with an average of 2.2 other farmers in the past five years, 57% of whom were their neighbors. Others included friends (17%), relatives (9%), and farmers from another administrative location (14%).

Thirty-two percent of respondents (n = 88) had given away improved fodder trees or seed. Sixty-eight percent of the fodder seeds/seedlings was given away to neighbors, 18% to friends, 6% to relatives and 15% to farmers from another administrative location. Individual farmers had provided improved fodder seeds or seedlings to an average of 5.8 people in the past year.

This section has examined the mechanisms used by dairy-goat groups to disseminate information and technology. It also considered the ways in which farmers

and dairy-goat groups at the community level access information and technology. The final section of Chapter 4 will discuss the factors characteristic of dairy-goat groups that are successful in disseminating information and technologies to other farmers.

### Objective Four: Identify the Factors Characteristic of Groups Successful in Disseminating Technology

In the previous section, the mechanisms used by dairy-goat groups in disseminating information and technology were discussed. This section will look at the factors that are associated with dairy-goat groups that are successful in extending information and technology.

In the review of literature in Chapter 2, several characteristics of groups that were successful in their performance were mentioned. This study looks specifically at one aspect of performance, the groups' function in disseminating information and technology to other farmers. Some of the factors mentioned in Chapter 2 were the size of groups, group age, cohesiveness, homogeneity of members, number of activities, training, group purpose, whether that purpose had changed, and linkages with service providers.

During the study, local informants in Meru also discussed various factors that they believed made the dairy-goat groups successful in dissemination or extension. According to key informants and a FARM-Africa document resulting from a stakeholder meeting on farmer-to-farmer dissemination, such factors included population density, agroecological zone, distance from information sources, type of group (FARM-Africa or extension assisted), group resources, poverty of members, leadership/leader commitment, gender balance, record keeping, member commitment, group unity, discipline and management (FARM-Africa minutes of the stakeholders meeting held on 15 May 2003).

The following factors will be discussed in this section: group location (including population density, administrative division, altitude and agroecological zone), size of the group, member participation, gender, age of the group, formality, leadership, number of activities, homogeneity of members, cohesiveness/unity, jealousy[7], number of trainings/tours, number of linkages, and type of group. These factors were the independent variables for this part of the study.

For the analysis, the dependent variable, success in dissemination, was measured using a variety of indicators. These were determined through the groups' own perceptions of success in dissemination to other farmers, through external ratings of the groups by extension and FARM staff, and through quantifiable variables such as number of other farmers and groups trained by the group. The groups gave their perceptions of their strength in dissemination to other farmers on a Likert scale of one to five. Three external raters from FARM-Africa and government extension also rated each group's dissemination success. Groups and raters were also asked to estimate the number of the group's neighbors that have adopted the improved dairy goats/dairy-goat technologies on a scale of one to four. Groups were asked to estimate figures such as number of fodder seedlings distributed, number of other groups trained and number of people receiving fodder seedlings from the group. Finally, the number of buck services provided by the groups was available from group records. These factors were the dependent variables in the analysis.

It is necessary to define what is meant by the term "adoption," since the term is used in identifying success factors. There are many ways of defining adoption. Due to

[7] In this study, jealousy (*roritho* in *Kimeru*) refers to the feelings of rivalry and envy between people or groups, and the state of being desirous of another's advantages.

the nature of the questionnaires and complexity of translating meanings into different languages, farmers were simply asked whether neighbors possessed improved goats and related technologies, without regard to number and length of time. Adoption here is not referring to any formal measures of the construct, such as length of time or number of goats or technologies used. (For example, with fodder shrubs for dairy goats, World Agroforestry Centre defines adoption as having expanded fodder planting at least once and possession of over 100 trees.) For the purposes of this study, however, adoption refers to the use by farmers of the various dairy-goat technologies.

To more easily examine the effects of the various factors on success indicators, an index was created. The "adoption index" is an average of the dairy-goat groups' ratings of number of neighbors adopting goats averaged together with the three external raters' scores on the numbers of neighbors who have adopted dairy-goat technologies. These scores could range from 1 to 4, where 1 = none, 2 = some, 3 = many, and 4 = all. Cronbach's alpha for this index was 0.69. This high alpha and the fact that the index comes from more than one source make it a useful measure of success, and so the adoption index was used the most for analysis. The other strong measure is number of buck services, because the results came not only from what the group told the researcher but also from the group records.

To better describe the data and in preparation for inferential analysis, correlations between variables were examined (Table 4-24). Substantial correlations were found between formality level of the group and perceived unity ($r = .512$), and member participation and type of group ($r = .686$). Moderate correlations were found between the adoption index and the age of the group ($r = .492$), between age of the group and number

of linkages (r = .416), and between the adoption index and participation by members (r = -.447).

**Group Location**

The groups were located within a variety of agroecological zones, ranging from the upper midlands (UM) where tea was grown (UM1) to the lower midlands (LM) where it was suitable for livestock and millet (LM4) (Figure 4-8). Over half of the dairy-goat groups were in the coffee and marginal coffee areas (UM3 and UM4).

There were three administrative divisions in Meru Central District that were part of the study. The smallest division, Abothoguchi (or Abo) Central, was located toward the middle of the district and on the eastern slopes of Mount Kenya. The main tarmac road ran through the division, and several major markets were located in Abothoguchi Central. Abothoguchi East stretched from Abo Central to the far eastern part of the district. Miriga Mieru East (or MME) lay to the north of Abothoguchi East and stretched from Meru Town to the far eastern part of the district.

Informants believed that farmers from the low potential areas such as the eastern parts of MME and Abo East would be more committed to the dairy-goat groups. This was explained by the fact that those living in higher potential areas could focus more on cash crops as a business, and do not need to be in a group. People from the higher zones were more individualistic, while those in the lower areas focus more on groups. It was therefore thought that groups in the lower zones would be stronger, and so disseminate more.

Table 4-24. Pearson's product moment correlations between variables affecting success (n = 46)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Homogeneity | -- | .147 | -.416* | -.030 | -.230 | -.283 | .051 | .123 | -.148 | .056 | .227 | .176 | -.246 | -.097 |
| 2. Leadership | | -- | -.193 | .320* | -.101 | .080 | .005 | -.178 | .208 | .242 | .065 | .316* | -.148 | -.038 |
| 3. No. activities | | | -- | .012 | .195 | .305* | .207 | .257 | .030 | .055 | -.210 | -.051 | .250 | .164 |
| 4. No. members in MGBA[a] | | | | -- | -.144 | .044 | .057 | -.076 | .048 | .209 | -.050 | .150 | .196 | -.071 |
| 5. No. linkages | | | | | -- | .195 | .416* | .118 | .311* | .082 | -.321* | -.061 | -.023 | .241 |
| 6. Formality | | | | | | -- | .339* | .512** | .253 | .286 | .142 | .280 | .096 | .170 |
| 7. Age of group | | | | | | | -- | .148 | .322* | .492* | .160 | .452* | -.139 | .210 |
| 8. Unity | | | | | | | | -- | -.039 | .084 | -.297 | -.081 | -.063 | .112 |
| 9. Jealousy | | | | | | | | | -- | .329* | -.167 | .347* | -.035 | .269 |
| 10. Adoption index | | | | | | | | | | -- | -.447** | .686** | -.231 | .347 |
| 11. Member participation | | | | | | | | | | | -- | .310* | -.287 | -.011 |
| 12. Type of group[b] | | | | | | | | | | | | -- | -.153 | .426 |
| 13. Group size | | | | | | | | | | | | | -- | -.117 |
| 14. Group capacity-trainings | | | | | | | | | | | | | | -- |

[a] Meru Goat Breeders' Association; [b] 0 = extension; 1 = FARM; *Moderate magnitude; **substantial magnitude

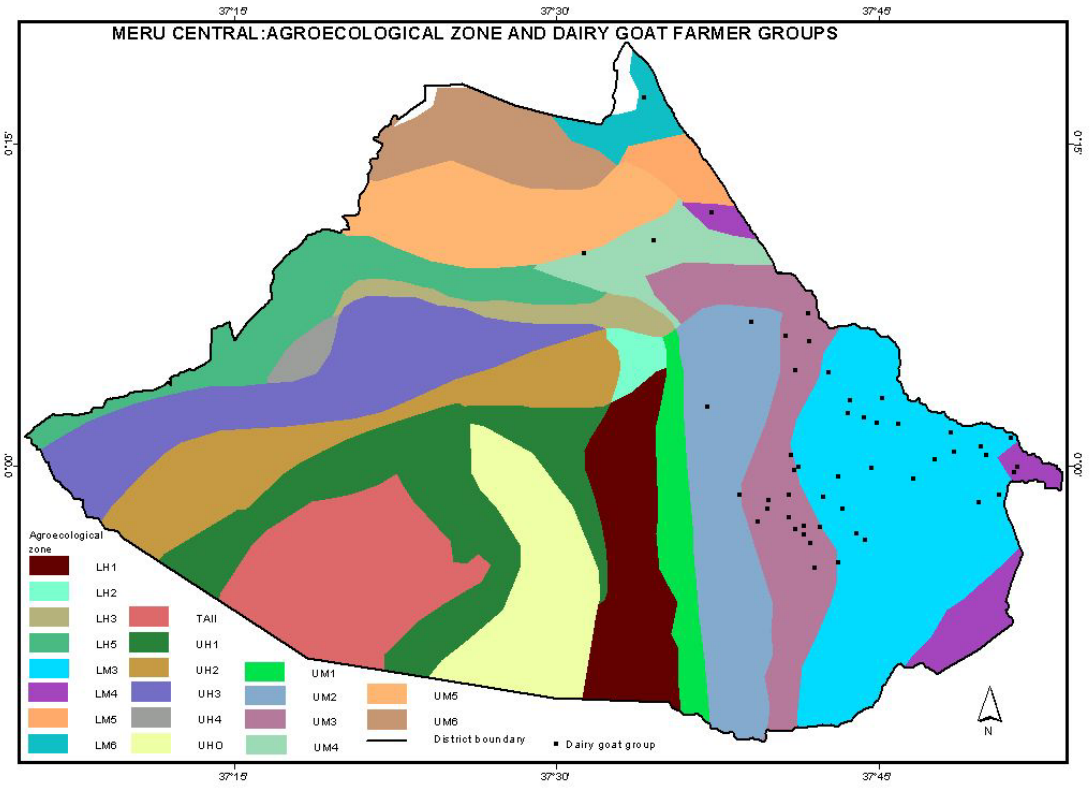


Figure 4-8. Agroecological zones in Meru Central District

On the other hand, it was expected by informants that dairy-goat groups in higher potential zones such as coffee and tea would possibly disseminate more because of the higher population density. This would include Abothoguchi Central and the western parts of MME and Abo East. It would also include high altitude areas. These groups should also be able to more easily access information. Population density was not measured in specific locations. However, according to the district records, the expected population density for 2004 for Abothoguchi Central was 552 persons per square kilometer, Abothoguchi East was 187 and Miriga Mieru East was 364 (Meru Central District Development Plan, 2002). Population density can also be projected from agroecological zone, because the higher agroecological zones have higher population

densities, and vice versa. See Table 4-25 for correlations between division, agroecological zone, altitude and indicators of success.

Table 4-25. Pearson's product moment correlation coefficients between location and success indicators (n = 46)

| Success Indicator | Division [a] | Agroecological zone [b] | Altitude |
|---|---|---|---|
| No. of farmers told | -.174 | .151 | .200 |
| No. of groups trained | -.215 | .303* | .253 |
| Amount of fodder given | -.301* | .059 | .129 |
| No. of people receiving fodder | -.395* | .273 | .319* |
| No. of neighbors planting fodder | -.311* | .177 | .264 |
| No. of neighbors adopting goats | -.131 | .238 | .181 |
| No. of buck services provided | -.098 | -.253 | -.170 |
| Index on adoption | -.039 | .106 | .083 |

[a] 1 = Abo Central; 2 = Abo East; 3 = Miriga Mieru East
[b] On a scale of 1-7 where 1 = Lower Midlands (LM) 5; 2 = LM4; 3 = LM3; 4 = Upper Midlands (UM) 4; 5 = UM 3; 6 = UM2; 7 = UM1
*Moderate magnitude

Correlations were negative for division because of the way administrative divisions were coded. Abothoguchi Central was given a "1"; Abothoguchi East "2"; and Miriga Mieru East "3." Therefore higher levels of success were associated with the lower numbers, or with Abo Central and Abo East Divisions. The number of people receiving fodder seedlings from groups was moderately associated with the administrative division (r = -.395). Adoption of improved fodder trees also appeared to be moderately correlated with division (r = -.311).

There were significant differences between the divisions as to number of neighbors planting fodder ($X^2$ (6, n = 46) = 13.76; $p < .03$), indicating that farmers in Abothoguchi Central (1) or Abothoguchi East (2) were disseminating more than farmers in Miriga Mieru East (3). Other success indicators, such as the number of neighbors adopting goats ($X^2$ (2, n = 46) = 4.27; $p < .37$) and group rating of success ($X^2$ (8, n = 46) = 8.78; $p <$

.36), were not significantly different by division. Possible reasons for this are discussed in Chapter 5.

Location of dairy-goat groups may also be affected by availability of natural resources such as rivers and forests (Figure 4-9). Judging natural resources in an area can be difficult, however. Although a group may be located near a river, other groups might have just as good water resources through a well or smaller stream. Although farmers could obtain many benefits from forests, during the study period the forests were officially closed to farmers and herders in Meru. Six dairy-goat groups were located in or near the edge of the forest.

Location may also be affected by proximity to roads and markets (Figure 4-10). Again, this map may not tell the full story. It shows major roads, but not the smaller ones. However, the roads shown on the map are the ones that are more likely to be passable during rains, since they are major roads that will be kept under better repair due to heavier traffic. Even major roads are at times impassible, however (Figure 4-11), and fares go up for passengers and luggage during rains. Major market towns include Meru and Nkubu. However, other important markets such as Kariene, Gatimbi, Mitunguu and Murika are not even shown. A few groups in Miriga Mieru East division and a good number of the groups in Abothoguchi Central were located close to roads and/or markets.

The distance of dairy-goat groups to market was moderately correlated with the number of buck services within groups ($r = .442$; $n = 42$). This gives an indication that groups in the lower zones at a greater distance from markets might have been disseminating more. It could also be due to the fact that there were more goats in the lower regions, further from market areas. There were more livestock in the lower areas

because the land sizes were bigger and there was grazing land available. No other success indicator had a high magnitude of covariance with this distance from market, however.

Finally, elevation was an important component of dairy-goat group location (Figure 4-12; see also Figure 4-8 for agroecological zones). Altitude can affect rainfall, temperature and other climatic conditions. There was a significant difference in success in dissemination between groups that were located in low elevations (up to 1278 m) with those in high (above 1278 m) (Table 4-26), such that it appeared that groups in higher altitudes were more successful in dissemination of technologies. However, altitude was not significantly different for the stronger success indicators "adoption index" and "number of buck services," the main success indicators discussed earlier in this section. Rather, the indicators that had more to do with fodder in general and not necessarily dairy-goat technologies per se. This is discussed further in Chapter 5.

Table 4-26. Effect of high and low group elevation on success indicators (n = 46)

| Success indicator | Low elevation (<1,278 m) | | | High elevation (>1,278 m) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | M | SD | n | M | SD | df | *t* | *p* |
| No. of groups trained | 20 | 1.60 | 2.21 | 21 | 5.19 | 7.73 | 39 | -2.00 | 0.05** |
| No. people receiving fodder | 17 | 5.71 | 12.05 | 19 | 30.53 | 28.42 | 34 | -3.34 | 0.00*** |
| No. of neighbors planting fodder | 17 | 2.06 | 0.66 | 21 | 2.52 | 0.68 | 36 | -2.13 | 0.04** |

**Significant; ***highly significant

**Group Size and Member Participation**

As discussed in Chapter 2, the size of the group has been shown to be associated with the success of farmer groups. There was a range of 10 to 50 members per dairy-goat group, with the average being 23. Number of members was substantially correlated with the number of neighbors planting fodder trees ($r = -.520$; $p < .00$; $n = 38$).

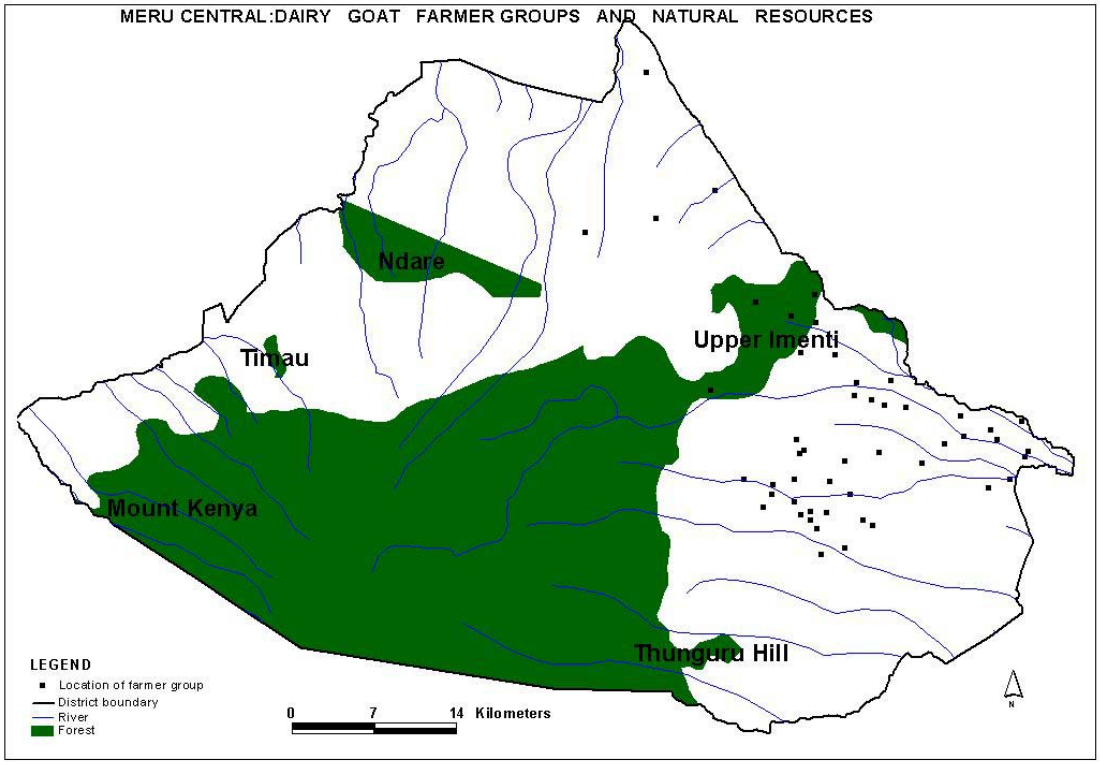


Figure 4-9. Natural resources in Meru

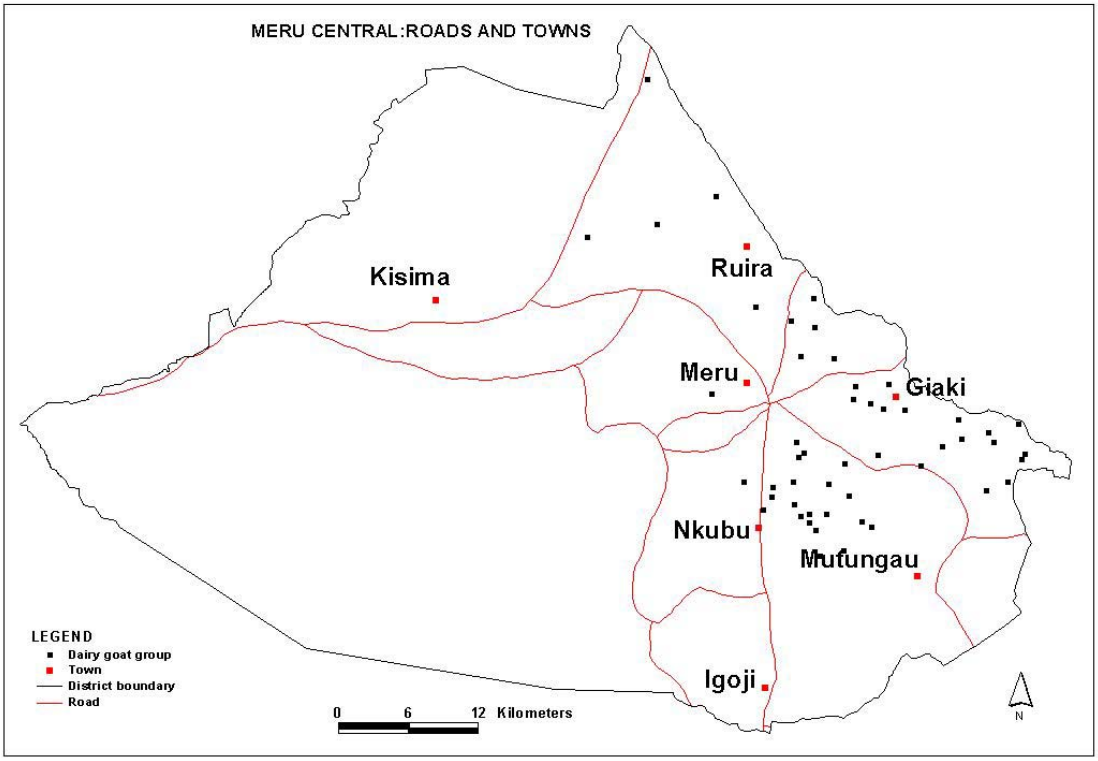


Figure 4-10. Roads and towns in Meru Central District

Figure 4-11. A main road leading out of Meru town with vehicles stuck in the mud

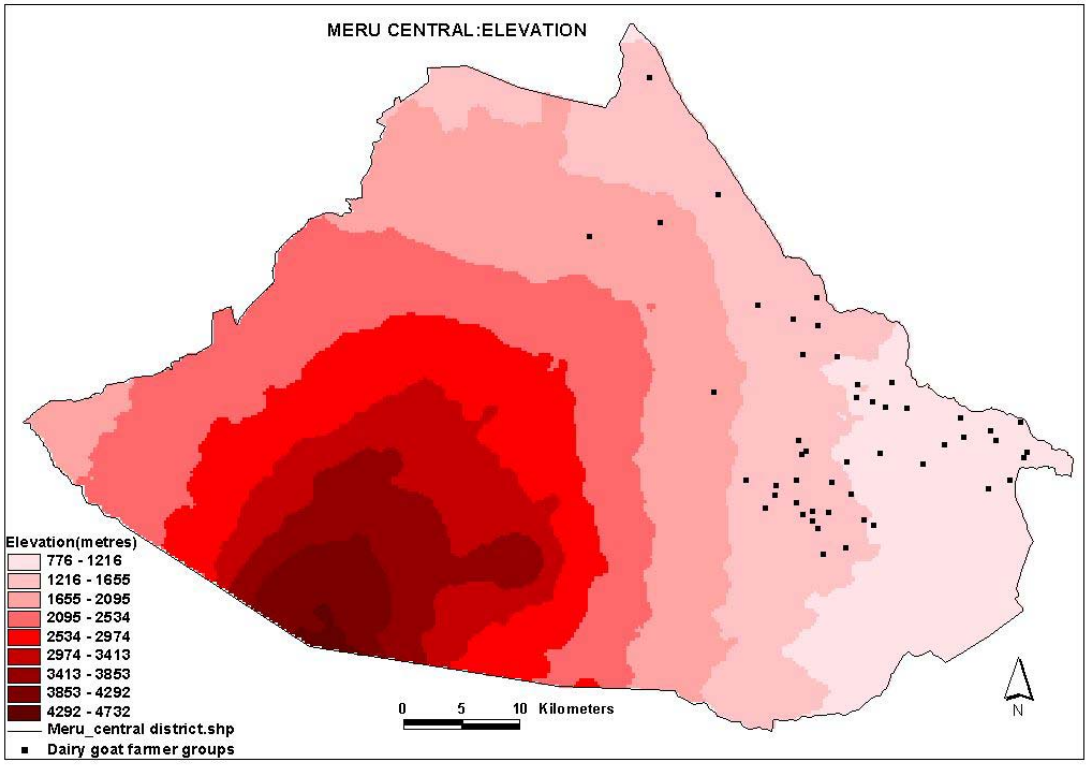


Figure 4-12. Elevation in Meru Central District

A mean split was performed on the number of members, and the variable grouped into high and low. However, a t-test revealed no significant differences between size of group and indicators for success.

Groups with high participation by members were thought by informants to be more successful in dissemination. Participation can also be a proxy for member commitment, one of the factors mentioned by informants contributing to success in dissemination. Member participation was moderately correlated with the index for adoption (r = -.447) (Table 4.25). Decreased participation in dairy-goat group activities was associated with an increase in the number of members adopting dairy-goat technologies. This may be due to the fact that groups with high participation were inwardly focused, and did not reach out to or spend much time with non-members and thus disseminate information.

Perceptions on group member participation were skewed (4.43 on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree that members participate). However, this variable did show up as an important contributor to group success in multivariate analysis (Table 4.33).

**Group Age**

The age of the dairy-goat groups ranged from two to twelve years. Average age for the groups was six years. There was a moderate correlation between age of the group and the index for adoption (r = .492; n = 46).

The variable was split by mean age into two groups, coded as high group age and low group age. A t-test was then performed on this variable with various indicators for success (Table 4-27). This table shows some important differences between groups with a low age (six years or less) with those of a high age (greater than six years).

Table 4-27. Effect of low and high group age on success indicators (n = 46)

| Success indicator | Low age (<6 years) | | | High age (>6 years) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | M | SD | n | M | SD | df | *t* | *p* |
| Adoption index | 23 | 2.55 | 0.29 | 23 | 2.87 | 0.31 | 44 | -3.56 | 0.00*** |
| No. of buck services | 21 | 10.57 | 10.65 | 21 | 16.33 | 9.11 | 40 | -1.88 | 0.07* |

*Approaches significance; **significant; ***highly significant

Table 4-27 appears to indicate that groups with higher ages have higher rates of dissemination. This issue is discussed further in Chapter 5.

**Formality and Management**

All of the dairy-goat groups but one were registered through the Department of Social Services and with the Meru Goat Breeders' Association (MGBA), showing a large degree of formality. Most of the dairy-goat groups were quite similar to each other with regard to degree of formality, because in order to register their group with the Department of Social Services, they were required to have a constitution and by-laws.

Nearly all the groups had penalties such as fines and expulsion for certain behavior within the group; therefore it is difficult to judge success through group discipline. An index of formality was developed using registration with the Department of Social Services and possession of a constitution, by-laws and a bank account. This index was then split by the mean into two groups, and the high formality group compared to the low formality group. There were no significant differences in level of success according to level of formality.

Most of the dairy-goat groups (67%) met biweekly or monthly. Informants believed that groups that met regularly and frequently (at least once a week) would be more successful in dissemination. However, there were no significant correlations between how often groups met and any indicators of success. After splitting the groups into those that met with low frequency to those that met with high frequency, a t-test revealed no significant differences for groups with high meeting frequency and those with low.

Informants also believed that groups with good record keeping would be better disseminators. Statistical analysis showed that record keeping was moderately associated with the adoption index ($r = -.323$; $n = 46$). However, Likert-scale responses to the statement "The group keeps good records on activities" were skewed toward strongly agree (with an average of 4.24 on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree). The negative correlation could be possibly due to dissatisfaction with one individual who did not affect overall group performance. Also, the low educational levels of the farmers in the study could affect record keeping negatively, while not affecting overall success.

**Leadership**

Leadership of the dairy-goat groups may have a certain effect on the success of groups in disseminating information and technologies. It was difficult to get varied responses on the leadership of the groups. During the testing phase of the questionnaires, groups were asked about how leaders were chosen and how decisions were made. All of the responses were the same, and so those specific questions were removed. Because of the FARM-Africa influence, the groups were supposed to hold regular elections, and most claimed that they did. The question was probed during the group timeline discussion to see if the elections were something only in name, or whether they actually changed leaders. In most cases, they did change leaders.

The questions that remained on the survey regarding leadership were on a Likert-scale-type question regarding whether members had a chance to participate in group decision making, if they felt the leadership was good, and if the leadership was participatory. All groups but one agreed strongly that they had the opportunity to participate in group decision making, and that the leadership was participatory and/or democratic. There was slightly more variation in responses to whether they felt that the leadership was good. However, the mean for the variable was 4.59 on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree, showing, a high skew toward the perception that leadership was good. Sixty-eight percent of dairy-goat groups agreed strongly that leadership was good, 14% agreed somewhat, 6% neither agreed nor disagreed, and 4% disagreed somewhat. No groups said that they disagreed strongly that their leadership was good.

One aspect of leadership that may have made a difference as to success of the group was gender of the chairperson. Gender of the chairperson made a difference in

group success with results that approached significance ($t$ = -1.96; $p$ < .06; df = 44). This t-test between groups that had female leaders and groups that had male leaders showed the groups with male leaders had higher success rates on the index of adoption, with the averages being 2.57 for females and 2.77 for males.

Informants felt that leadership affected the success in dissemination by groups. Leaders that were capable and honest and not lazy would encourage the groups to work well together, while dishonest or lazy leaders could cause the group to not work well together or even to fall apart. In this case, the group would likely not do a good job in dissemination. However, measurement and analysis of these constructs were beyond the scope of the study.

**Activities**

There were no significant correlations between the number of activities the dairy-goat groups conducted and indicators for success in dissemination. Mean number of activities was 2.5, but the range was between zero (for a group that had stopped its activities) and seven. Most groups took on one to three activities. Activities included dairy goats, merry-go-rounds, tree nurseries, and farming. A t-test revealed no major differences between groups with few activities and those with many.

**Gender, Poverty and Individuals in the Group**

The dairy-goat groups were mostly mixed male and female, with a few being only one gender. Overall, the groups were 59% female. There were no significant associations or differences in means between dairy-goat group success and the gender balance of the groups.

There were mixed results when correlating wealth indicators with success indicators (Table 4-28). There were negative correlations between the number of

members who have no livestock at all with the two success indicators, the adoption index and number of buck services. There was a positive moderate association between land size of group members and number of buck services (r = .311), while the association with the adoption index was negative (r = -.305). Number of buck services was negatively correlated with the average number of local cows per group (r = -.342).

These mixed associations point to the difficulty in assessing wealth levels of small-scale farmers. There were no indications upon regressing the same variables on various success indicators that they significantly contributed to predicting success in dissemination. No model adequately explained the effects, if any, of wealth indicators on success in dairy-goat group dissemination.

Informants felt that individual farmers might make a difference in dissemination for a group. Some individuals might travel and talk about dairy goats. Others were highly involved in MGBA, and were exposed to more farmers because of that. MGBA officials (who were all dairy-goat group members) were often involved in training farmers in dairy-goat technologies. Other dairy-goat group members became strong adopters and experimenters, and because of this, their farm became a sort of demonstration site where visitors were brought to learn. There were several groups where individuals played a major role in providing information to the group. In one group, they had a member who worked at a hospital, one who was an extension agent, and another who worked at a university. Because of these contacts, the group had many different activities, including putting in piped water, keeping chickens, planting grafted mangos, giving loans to members, dairy goats and planting tissue-cultured bananas.

Table 4-28. Pearson's product moment correlations between variables affecting success and wealth indicators for groups (n = 46)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. No. members with no livestock | -- | -.101 | -.112 | .143 | .055 | -.310* | -.449* | -.346* |
| 2. No. members with goats only | | -- | -.055 | -.404* | -.055 | -.077 | .111 | .404* |
| 3. Land size (average) | | | -- | -.126 | .608** | -.004 | -.305* | .311* |
| 4. No. improved cows (average) | | | | -- | .035 | .052 | -.258 | -.342* |
| 5. No. local goats (average) | | | | | -- | -.040 | -.628** | -.037 |
| 6. No. improved goats (average) | | | | | | -- | .364* | .096 |
| 7. Adoption index | | | | | | | -- | .309* |
| 8. No. buck services | | | | | | | | -- |

*Moderate magnitude; **substantial magnitude

**Homogeneity of Members**

The dairy-goat groups were homogeneous in many ways. Homogeneity within the group was examined in terms of village, ethnic group, clan, gender, age, religion and/or church, occupation and economic level. Almost all group members were from the same ethnic group, called Meru. Nearly 100% of farmers interviewed considered themselves to be Christians (the exception being Bahá'í). However, within the various categories such as tribe and church there were some differences. For instance, although nearly all group members were Meru, most were from different clans. While almost all were Christians, most attended different churches, such as Methodist, Catholic, and Full Gospel.

Amount of heterogeneity within the dairy-goat groups did not appear to have much effect on the success of the group in disseminating technology, at least with regard to the

strong success indicators (the adoption index and number of buck services). There was, however, a significant difference between groups with low homogeneity to those with high homogeneity on the number of neighbors planting fodder ($t$ = -2.47; $p$ < .018; df = 36).

**Group Cohesiveness**

Informants felt that group cohesiveness was another characteristic of dairy-goat groups good at extending technologies. Similarly, groups that had many conflicts were considered by informants to not be very successful. There was some correlation between perceived cohesiveness or unity of the group and some indicators of success (Table 4-29; see also Table 4-24).

Table 4-29. Pearson's product moment correlations between cohesiveness and success indicators

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Adoption index | -- | .309* | .084 | .329* | .102 | .167 | .043 |
| 2. No. buck services | | -- | .035 | .111 | .334* | .413* | .037 |
| 3. Group unity | | | -- | -.039 | .450* | .345* | -.542** |
| 4. Group jealousy | | | | -- | -.111 | -.046 | .059 |
| 5. Get on well | | | | | -- | .668** | -.222 |
| 6. Group cooperation | | | | | | -- | -.303* |
| 7. Group conflict | | | | | | | -- |

*Moderate magnitude; **substantial magnitude

Higher levels of group cooperation were associated with increased levels of buck services (r = .413). Also, the perception that people in the group "got on well" was moderately associated with the number of buck services (r = .334). Degree of group jealousy was moderately correlated with the adoption index (r = .329).

Most of the responses regarding group unity or jealousy were skewed. For instance, on a Likert scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree that the construct was present in the group, the average response for unity was 4.59; jealousy was 1.63; degree of getting along was 4.52, degree of cooperation was 4.48 and

group conflict was 1.40. Therefore it was not possible to divide the variables into groups of high and low in order to perform tests of significance, as was done on some other variables.

The concurrent farmer-to-farmer extension study taking place in Meru did reveal an important role for jealousy in dissemination. Because of the role that jealousy seemed to play among the farming community in Meru, it was discussed with informants. Jealousy might affect dissemination of information by farmers and groups, because groups might not want to share information and technology to keep ahead of their neighbors. Some informants even mentioned that there was something in the group by-laws preventing the sharing of information, although others discounted this idea. Some groups did agree to keep some of their knowledge secret, at least until the group itself had benefited from their knowledge. Informants said that this did not keep the more aggressive farmers from getting information, however. Many of the dairy-goat groups thought that jealousy was simply something that is a part of life, especially within groups, making statements such as, "If you put eggs in a bucket, they will knock each other."

**Capacity**

Capacity refers to training, skills and capabilities of farmers and groups. Informants also saw trainings as very important to success of dairy-goat groups in dissemination. They said that dairy-goat group members who received training were expected to train other farmers. The dairy-goat groups have trained both newer dairy-goat groups and farmers from outside the district and from other projects. Number of trainings each dairy-goat group received since the start of the project ranged from 0 to 11, with over 50% of groups having received 3 to 6 trainings. FARM-Africa, extension staff or the MGBA usually conducted trainings. Individual members of dairy-goat groups

received significantly more training than individual non-members ($t = 3.07$; $p < .00$; df = 86). Basic training for groups was on goat husbandry, animal health care, leadership and group dynamics. Further subjects included fodder management, nursery management, breeding, fodder preservation, goat management, ear tagging, tattooing, judging and inspection, hoof trimming, financial bookkeeping, and record keeping.

Both tours and trainings were types of capacity for groups. Trainings were the most common way for capacity building in the groups. The variable number of trainings was split into two by the mean of 5.37, to obtain a category of low-trained groups and one of highly trained groups. This allowed for a comparison of group means on success indicators (Table 4-30). The groups with a higher level of trainings had higher average scores for the adoption index and number of neighbors adopting goats.

Table 4-30. Effect of low and high group training on success indicators (n = 46)

| Response | Low training | | | High training | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | M | SD | n | M | SD | df | *t* | *p* |
| Adoption index[a] | 27 | 2.60 | 0.35 | 19 | 2.86 | 0.25 | 44 | -2.94 | 0.01 |

[a] Mean based on a scale of 1 (low adoption) to 4 (high adoption)
**Significant

The amount of schooling that group members had received also contributed to group capacity, and was hypothesized to make a difference in group performance in dissemination. However, there were no more than low magnitudes of association between the amount of total schooling received by group members and success indicators. Total schooling was estimated by asking the group members present how many of the entire group had completed primary or secondary school or higher. With one success indicator, number of neighbors planting improved fodder trees, there was a significant difference between groups with a high level of schooling and those with a low

level ($t = 2.81$; $p < .01$; df = 36). Groups with lower schooling had significantly more neighbors planting fodder.

**Linkages**

Every group had linkages with other players in the area, such as churches, the chief, extension staff and markets. The number of linkages a group had appeared to affect the amount of dissemination that took place within a group, with those having greater linkages disseminating more. Linkages were established through Venn or *chapati* diagrams, where the group illustrated its relationships with outside entities through placing various-sized *chapatis* on a piece of flip chart paper with their group at the center (Figure 4-6).

There was a significant difference between dairy-goat groups with low numbers of linkages (less than or equal to nine) and those with high linkages (greater than nine) with regard to number of buck services ($t = -2.31$; $p < .03$; df = 40). Average number of buck services for low linkage groups was 10.30 (SD = 6.56) while for high linkage groups it was 17.26 (SD = 12.53). Number of linkages was also an important contributor to overall group success (Table 4-33).

The Meru Goat Breeders' Association was an important link for the dairy-goat groups. As described earlier in this chapter, the MGBA was responsible for training farmers in dairy-goat technologies and for safeguarding the breed. All of the dairy-goat project records on sales and breeding were kept with the MGBA. Each of the dairy-goat groups could register with MGBA and then have representation at various levels (from administrative location up to the region). Most dairy-goat groups were registered with the MGBA.

Individual farmers could also register with MGBA, even if they were part of a dairy-goat group. Groups with many members registered with MGBA might therefore be more successful at disseminating technologies due to increased linkages and/or capacity. Although the number of members in MGBA was not significantly correlated with any factors for success, it did have an impact on success. For further details on this factor and how it affects success, see Table 4-33.

**Type of Group (Project-Facilitated versus Non-Facilitated)**

Type of dairy-goat group was a very important variable in the study. There were basically two types of groups in the dairy-goat project, those groups assisted by FARM-Africa and the other groups that formed after the project had begun, known within the project as extension groups. Although many farmers learned of the project through FARM-Africa coming to their areas to talk with the local chiefs, there were many others who learned through word of mouth from their neighbors. According to FARM records, there were more non-members than members benefiting from the buck services. There were also more extension groups than FARM groups in the project. As mentioned earlier in this chapter, *all* of the groups were working with both FARM-Africa and the Ministry of Livestock Development and Fisheries. However, the older groups that originally were formed under the FARM project were referred to as "FARM" groups, while the newer groups that started during the project were called "extension" groups. This is because they were assisted more by extension staff, the Meru Goat Breeders' Association, and farmers from FARM groups with regard to training and formation.

According to study informants, the FARM groups tended to be older, they had received more trainings and tours, and they were comprised of poorer members (Table 4-31). Project stakeholders also saw the extension groups as being demand-driven. The

FARM groups were chosen by outsiders, and were given a buck for community-based breed improvement during the start of the project, and to qualify for this, group members had to be classified as "poor." The criteria for being poor were described under Objective One. The extension groups, on the other hand, were formed on their own initiative and criteria, and had to purchase their buck, which cost in the region of Ksh. 8000 (USD 107). The older dairy-goat groups received more training as part of the FARM-Africa project. These old groups and extension staff trained many of the new extension dairy-goat groups; however, training was more sporadic than with FARM groups. Furthermore, the level of formality was significantly different, with the FARM groups having higher levels of formality.

Table 4-31. Differences in FARM- and extension-facilitated dairy-goat groups (n = 46)

| Response | FARM Group | | | Extension Group | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | M | SD | n | M | SD | df | *t* | *p* |
| Trainings | 20 | 6.75 | 2.69 | 26 | 4.31 | 2.67 | 44 | 3.07 | 0.00*** |
| Tours | 20 | 3.95 | 1.91 | 26 | 1.31 | 1.29 | 44 | 5.61 | 0.00*** |
| Age of group | 20 | 7.10 | 0.64 | 26 | 5.31 | 2.31 | 44 | 3.77 | 0.00*** |
| Average improved cows | 20 | 0.99 | 0.48 | 26 | 1.27 | 0.70 | 44 | -1.59 | 0.12 |
| Average land size (acres) | 20 | 2.73 | 1.30 | 26 | 4.78 | 4.41 | 44 | -2.25 | 0.03** |
| Formality index[a] | 20 | 3.75 | 0.44 | 26 | 3.35 | 0.85 | 44 | -1.94 | 0.06* |
| Percent of members with no livestock | 20 | 2 | 0.04 | 26 | 11 | 0.13 | 44 | 3.33 | 0.00*** |
| Percent of members with goats | 20 | 28 | 0.14 | 25 | 16 | 0.15 | 44 | -2.77 | .00** |
| Jealousy in group | 20 | 2.10 | 1.45 | 26 | 1.27 | 0.83 | 44 | 2.30 | 0.03** |
| Leadership is good | 20 | 4.30 | 0.92 | 26 | 4.81 | 0.63 | 44 | -2.11 | 0.04** |
| Member participation | 20 | 4.10 | 1.02 | 26 | 4.69 | 0.84 | 44 | -2.16 | 0.04** |

[a] On a scale of 0 – 4 with 0 = highly informal and 4 = highly formal
*Approaches significance; **significant; ***highly significant

Differences in FARM and extension groups were not just structural, or with regard to capacity and wealth indicators. There were also perceived relational or sociological differences. As seen in Table 4-31, FARM groups had higher levels of jealousy, less participation by members, and less of a perception that their leadership was good.

Because the FARM groups were in part chosen by outsiders, this may have contributed to greater feelings of jealousy within the group. Because these groups did not form on their own, it may be why there was less perceived participation by members and a feeling that their leaders are not as good.

The extension groups were more spread out over agroecological zones. Only extension groups were found in tea (UM1) and millet/livestock (LM5) zones. Many of the FARM groups appeared to be concentrated in the coffee and marginal coffee zones, while there were more extension groups in the more marginal areas.

Although type of group was an independent variable that was likely related to success in dissemination, the differences between FARM and extension groups might not be entirely due to support of these two organizations. Perhaps there was interaction or some chain relationships between type of group and other variables such as group age or capacity.

During the group interviews, members present were asked how many of their members had no livestock, goats only or goats and cows. The extension groups had higher percentages of members with no large livestock at all. FARM groups, on the other hand, had higher percentages than extension groups of members with goats only (no cows).

Because overall wealth of dairy-goat groups was not easily established, differences in groups were analyzed through the number of livestock owned by group members and average land size. These figures were obtained from the six group members present at the interview and then averaged, and do not necessarily represent the entire group. However, they provide useful measures to compare between groups.

Both extension and FARM-Africa staff mentioned that the newer "extension" groups were better motivated, worked harder and did not expect handouts. They were "more clever" and would go look for information on their own instead of waiting for it. Many informants thought it was due to the dependency issue and the fact that the extension groups had more resources. These groups might be expected to better extend technologies to other farmers. The FARM groups were deliberately chosen as the poorest of the community, and so they had a longer way to go, according to some informants.

There were moderate to substantial positive correlations between type of group (0 = extension; 1 = FARM) and various factors for success, including the number of buck services (r = .453; n = 42), groups' self- ratings of success (r = .383; n = 46) and the adoption index (r = .686; n = 46). There was a significant difference between the type of group and number of buck services provided, with FARM groups providing more (Table 4-32). FARM groups were more likely to have a buck station, although there was not a statistically significant difference in the number of buck stations between the types of groups. From the data, therefore, it appeared that the FARM groups were disseminating more. They had a higher percent of neighbors who had adopted goats, rated themselves higher on dissemination and provided more buck services.

Table 4-32. Effect of type of group on success indicators (n = 46)

| Success indicator | FARM | | | Extension | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | M | SD | n | M | SD | df | *t* | *p* |
| No. of buck services | 17 | 19.00 | 7.53 | 25 | 9.68 | 10.19 | 40 | 3.22 | 0.00*** |
| Success rating (by group)[a] | 20 | 4.10 | 0.91 | 26 | 3.31 | 1.01 | 44 | 2.75 | 0.01** |
| No. neighbors planting fodder | 17 | 2.47 | 0.62 | 21 | 2.19 | 0.75 | 36 | 1.23 | 0.23 |
| Index of adoption[b] | 20 | 2.97 | 0.14 | 26 | 2.51 | 0.31 | 44 | 6.82 | 0.00*** |

[a] Mean based on a scale of 1—5 where 1 = strongly disagree and 5 = strongly agree that group is strong
[b] Mean based on a scale of 1 (low adoption) to 4 (high adoption)
**Significant; ***highly significant

Type of group alone accounts for 47% of variation in the dependent variable index of adoption when regressing various factors on the adoption index. However, a model that more fully explains high adoption rates among dairy-goat farmers in Meru Central is detailed in Table 4-33. It includes type of group and the variables member participation in groups, individual membership in the MGBA, and number of linkages, and was developed using the backward method of model building, where all of the variables are put in, and then those that do not contribute significantly to the outcome are dropped out (George & Mallery, 2001). Variables that were dropped from the regression equation included the amount of schooling of individuals within the group, meeting frequency of the group, the number of activities, capacity level, location, size, age, level of formality, cohesiveness and homogeneity of members.

This table shows the most important predictors of group success. The r-square value of 0.61 means that the combination of these variables—type of group, member participation, membership in MGBA, and number of linkages—explained 61% of the variation in the adoption index, which was a measure of success of the group. Type of group, MGBA membership, and number of linkages were positive, meaning that increases in these variables lead to an increase in success of the group in dissemination. Because type of group was binary, it means that the type of group variables that were coded "1" (FARM) were contributing to group success.

Participation by members, however, is negative. This variable was a measure of the groups' perception of how much members participated, ranging from strongly disagree (1) to strongly agree (5). Because it was negative, it means that as groups tended to disagree that their member participation was high, groups tended to be more

successful in dissemination. Groups where members were perceived as participating less were providing more buck services and had more neighbors adopting dairy-goat technologies.

Table 4-33. Linear regression analysis of variables for prediction of success in dissemination (adoption index)

| Variable | Beta | Std. Error | *t* | *p* |
|---|---|---|---|---|
| Type of group[a] | 0.38 | 0.07 | 5.36 | 0.00*** |
| Participation by members | -0.13 | 0.04 | -3.33 | 0.00** |
| MGBA membership | 0.01 | 0.00 | 1.79 | 0.08* |
| Linkages | 0.04 | 0.02 | 2.47 | |

[a] 0 = extension-facilitated group; 1 = FARM- facilitated group
*Note*. $R^2$ = .61; * approaches significance; **significant; ***highly significant

The MGBA membership variable was the total number of dairy-goat group members who were in that organization. Another way of dealing with this variable would be to make it a percentage, so that one can see how many people out of the group were in the MGBA, rather than just total numbers. Converting MGBA members to a percentage rather than total numbers caused it to drop out of the regression equation. However, total numbers of members was also a valid variable because it then showed that greater linkages or connections with the MGBA led to greater success of the dairy-goat groups.

Although type of group was a crucial factor in determining success in dissemination, other factors played a role as well (Table 4-33). Member participation in the dairy-goat groups was determined through a five-point Likert-scale question where respondents were asked to (1) disagree strongly, (2) disagree somewhat, (3) neither agree nor disagree, (4) agree somewhat or (5) agree strongly to whether group members regularly participated in most group activities. MGBA membership was the number of

group members who are individually registered with MGBA. Linkages referred to the number of associations that a dairy-goat group had with outside entities.

In summary, there were many different factors that affected success of dairy-goat groups. Table 4-34 shows the effect of various factors, based on t-tests between high and low levels of the factors, on various success indicators. This table will be further discussed in Chapter 5.

Table 4-34. Effect of various group factors on success indicators based on t-tests

| | Dependent Variable | | | | |
|---|---|---|---|---|---|
| Independent Variable | Adoption Index | No. of buck services | No. neighbors planting fodder | No. of groups trained | Self-rating of success |
| Altitude | | | ++ | ++ | |
| Size of group | | | | | |
| Age of group | +++ | | | | + |
| Activities | | | | | |
| Homogeneity | | | ++ | | |
| Capacity | + | | | | |
| Linkages | | ++ | | | |
| Type of group | +++ | +++ | | | ++ |

+ Positive relationship approaching significance
++ Positive relationship significant at .05 level
+++Positive relationship significant at .01 level

**Groups' Own Indicators**

The dairy-goat groups had their own indicators of what made them stronger or weaker in dissemination. They were asked to rate themselves on their success in dissemination information and technologies (Figure 4-13). Responses were on a Likert scale of 1-5, with one being "very strong" and five being "very weak."

One group considered themselves weak in dissemination because they only had one person who was formally trained (the community animal health worker or CAHW). For the original FARM-supported groups, both the buck keepers and CAHWs received special training, and group members were more likely to have received training. In the

extension groups, there were very few CAHWs. Some groups and group members were not comfortable training because "there are some questions we cannot answer." They therefore rated themselves as "neutral" in terms of strength in technology dissemination.

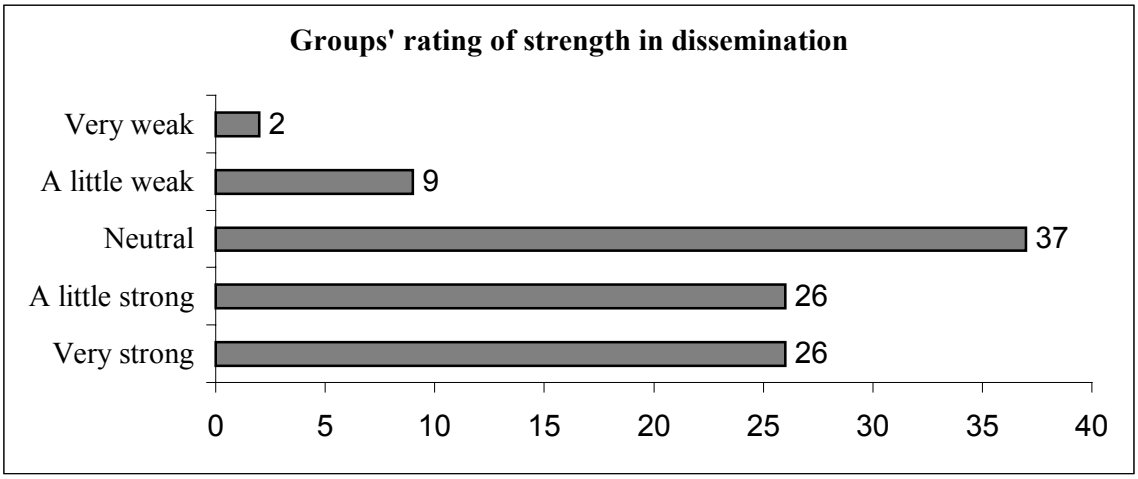


Figure 4-13. Groups' self-ratings on success in dissemination (%)

Others said it was difficult to train others because it was hard to send people to do so. Arrangements were complicated and took a lot of effort due to the lack of transportation and communication. There were almost no telephones, mail or email services available; messages were usually delivered by hand or word of mouth. Transportation was difficult to obtain or the price prohibitive, and going by foot was also challenging. The farmers were therefore not able to train as often as they would like. Others felt that they were neither strong nor weak in dissemination because they would go a long time in between training other groups. Also, when they do call a meeting, there might be lack of interest or enthusiasm among non-members. One group considered itself neutral because "[dissemination] is volunteer work." If some group members did not take the goat project seriously, the group also considered themselves weaker.

Some of the self-rated weaker groups in dissemination had run into problems, such as the buck dying. It was difficult to teach others about dairy-goat technology with

almost nothing to show for it! Having a crossbred goat, a buck station or goat housing to show people seemed to empower the farmers to tell others. One group was "very strong" because they said people could come and see in reality what they were being trained about.

One group said that the groups trained by FARM-Africa found it easy to train other groups, and this was what many of them had done. Another group seemed very strong in information dissemination. They had received seven trainings and four tours, had trained two of the new extension groups and provided over 20 buck services in a month. However, they rated themselves as neutral because they felt that they could do even better than they have done. Others rated themselves through adoption by their neighbors, and felt that if the farmers they had taught did not take action, that they were not very strong in dissemination. Therefore, if many non-members brought goats to the buck station, they were considered a strong group.

Another group rated themselves as only "a little strong" because "other groups are stronger than we are." A newer extension group was only "a little strong" because they had never been taken for tours or trainings, and therefore did not feel very comfortable in training others. One group rated themselves as very strong because they had helped four other groups to form.

This section has examined the various factors that appear to make dairy-goat groups more successful at disseminating information and technologies. The chapter discussed the results of the four objectives regarding participation in groups, linkages, mechanisms for dissemination and factors for success in dissemination. Chapter 5 will

discuss policy recommendations (the fifth study objective) and conclusions based upon this chapter.

# CHAPTER 5
# CONCLUSIONS AND RECOMMENDATIONS

*. . . agricultural improvement among small, traditional farmers is, and always will be, more an art than a science.*
*(Roland Bunch,* Two Ears of Corn*)*

In the previous chapter the various results of the research on farmer groups' roles in extension were described. This chapter discusses those results, dividing the discussion by the following study objectives: (a) examine participation in groups and identify what factors, if any, affect participation in groups; (b) examine linkages and their outcomes, if any, between farmer groups and other extension stakeholders; (c) identify the mechanisms by which farmer groups and their members receive and disseminate information and new technologies, especially fodder shrubs and improved dairy-goat breeds; and (d) identify the factors characteristic of groups successful in disseminating technology. Added to the discussion are results from a validation meeting that was held at the end of the research study to present the results to various stakeholders, including extension, farmers, and World Agroforestry Centre and Food and Agricultural Research Management (FARM)-Africa personnel. The chapter finishes with the fifth objective, to propose policy recommendations to extension and development policy makers and practitioners regarding farmer groups' roles in extension. Suggestions are also made for further research.

The researchable problem addressed in this study was that the role of farmer groups in extension was not known, nor were the factors (if any) that made them effective. The study goals were therefore to determine the role of farmer groups in technology

dissemination, and to assess what factors make groups effective in extending technologies among small-scale dairy-goat farmers in Meru Central District of Kenya. A mixed-methods, multiple-stage approach was used to obtain data for the study. The research techniques included participant observation, documentary analysis, semi-structured interviews, social mapping, group timelines, and structured questionnaires.

## Objective One: Examine Participation in Groups and Identify What Factors Affect Participation in Groups

The first study objective was to examine participation in groups and identify what factors, if any, affect participation. This section first examines how poverty affects participation in groups, and then other factors that play a role in participation.

### Are Poorer People Participating in Groups in Meru?

As mentioned in Chapter 2, Esman and Uphoff (1984) believe that characteristics of the poorer members of communities prevent them from taking part in local organizations. However, Parkins (1997) found that the poorer farmers actually were participating in groups along with those of a more average wealth level. The wealthier farmers were not as heavily involved in groups in both Parkin's study and in this study. This study finds that although the very poor may be kept out of groups, the poor can be enabled to join groups by working with them at the community level to provide skills necessary to participate in groups, and so obtain the benefits of social capital.

According to study informants and to various documents regarding the project, the original dairy-goat project-supported dairy-goat groups ("FARM" groups) were comprised of farmers from the community who were below average poverty. Informants

indicated that the FARM groups were poorer and had less capacity[8] than the extension groups. The original dairy-goat group members were chosen mainly because of their poverty. However, once the project started, other groups formed ("extension" groups) that were not based on poverty. These groups formed on their own initiative, and purchased a breeding buck instead of being given one, as the FARM groups were. It is important to note here that the dairy-goat project, known as the Meru Dairy Goat and Animal Healthcare Project, was a collaboration between the NGO (non-governmental organization) FARM-Africa and the Ministry of Livestock Development and Fisheries of the Government of Kenya. Although both FARM and government personnel worked with all of the groups, they were termed "FARM" and "extension" groups to differentiate between those groups formally supported by the project and those that came along later, working under the project but not receiving official assistance.

Although all of the farmers in the dairy-goat project, especially the FARM-Africa-supported groups, were supposed to be poorer than the rest of the community members, almost all of the data show no difference in wealth between farmers in the communities who were dairy-goat group members and those who were non-members. Nor were there significant differences between the FARM and extension types of dairy-goat groups (see Table 4-12).

Perhaps there was originally a difference in poverty levels between dairy-goat group members and non-members, or between the FARM and extension types of dairy-goat group members. However, the evidence seems to indicate that the dairy-goat group members had actually improved their standard of living during the course of the project.

[8] As stated in Chapter 4, "capacity" refers to training, skills and capabilities of people, groups and organizations.

Several informants did mention that the dairy-goat groups were much better off at the time of the study (2003-2004) than when they originally formed (1996-1997). However, because much of this evidence was based on informants' comments rather than baseline data, this finding needs to be treated with caution.

It appeared that having improved goats (crosses between local goats and Toggenburg dairy-goats) provided farmers with cash. Farmers felt that goats bred and grew more rapidly than cows, allowing farmers to more quickly make a sale. The improved goats also fetched a higher price than local goats. For instance, one farmer sold a one year-old goat to the Meru Goat Breeders' Association (MGBA) for Ksh. 6,250 (about USD 83). Full grown local goats, both bucks and does, fetch between 1,000/- and 1,500/- (USD 13-20). Farmers and other informants said that through the improved goats, farmers (both dairy-goat group members and non-members) have "sent kids to school, built timber houses and put in [piped] water."

Perhaps by breeding and then selling improved goats, farmers in the project were also able to purchase more and better animals. An interesting correlation in this regard is the number of livestock owned by individual farmers. Table 4-10 shows a substantial correlation between number of improved goats and the number of livestock in general ($r = .752$). Although this does not imply causation; that is, that the high numbers of improved goats caused high numbers of total livestock, informants did mention the fact that "goats have bought cows." Several farmers mentioned using money obtained from selling improved goats to purchase grade cows.

Finally, other evidence supporting the theory that the dairy-goat project has improved the wealth of farmers is the number of cattle owned by dairy-goat group

members. Having fewer cows than the rest of the community was one of the criteria for membership in the original FARM-supported dairy-goat groups. Nevertheless, at the time of the study, although the extension group members had greater numbers of improved and local cattle, there was no significant difference between FARM and extension dairy-goat groups. Tests of significance between numbers of cattle owned by individual farmers also revealed no significant differences between dairy-goat group members and non-members. Again, this evidence must be treated with caution, as the evidence regarding the number of cattle of dairy-goat members was anecdotal rather than from baseline data.

According to Table 4-31, extension group members had larger land sizes than FARM members. This cannot be used solely as a judge of wealth, however, because larger land size could have been due to physical location; that is, in the lower zones where land is poorer, rather than wealth. Land size is better used as a wealth indicator within the various agroecological zones.

Although no data actually showed that dairy-goat group members were poorer than those farmers not in dairy-goat groups, as claimed by many in the study, there were some indications that perhaps show that the dairy-goat group members were poorer (or had been at one time). Poverty and wealth are difficult constructs to define and measure; however, other variables can also be used to indicate wealth. None of the typical wealth measures such as type of housing, number of livestock, or remittances showed dairy-goat group members to be significantly poorer than their non-member neighbors. The only indications that dairy-goat group members may actually be (or were at one time) less well-off than their neighbors came from data showing that the dairy-goat members have a

more stressed household composition (Table 4-5). In a poverty assessment in Kenya in 1999, the poor farmers were shown to have larger households (6.4 people per household versus 4.6 for non-poor) (Government of Kenya, 1999). Larger households, and especially stressed ones, with a low ratio of producers to consumers, put severe limitations on time, money, and other assets. The fact that dairy-goat group members had more stressed households is especially interesting in light of the fact that other major groups that participants were in, such as women's groups, water groups, and church groups, seemed to be comprised of people who had less household stress.

Perhaps a difference in poverty between farmers who were in groups and those who were not may have been found if enough individuals had been surveyed who were not in any group whatsoever. However, from what the researcher saw, and according to informants and other researchers in the area, those individuals in no groups at all were very few and were not the norm. Most farmers in the area were in groups (K. Karanja, personal communication; 12 August 2003; Place et al., 2002).

Although many of the individual respondents were rated as average, there were dairy-goat members who ranked below average. The fact that poor people were in the dairy-goat groups does not mean that all poor people in a community are able to participate in groups, however. The fees that were part of the group structure would certainly keep out some community members. However, the FARM-Africa project specifically sought poorer people and worked with them through the local chiefs to enable them to take part in the groups and the project. The farmers were trained and given various types of support. These findings are positive, because they seem to indicate that even if poor people are unable to join groups by their own means, they can

be enabled to do so. Certain types of groups can actually help these farmers to improve their standard of living, so that a few years down the road it is hard to tell a difference between them and their "richer" neighbors. People seem to realize the value of groups and seek to join them. A study by the World Bank entitled "Voices of the Poor" showed that poor people identified the capacity to organize as the one thing that would make the greatest difference in their lives (Narayan, 2000 in Collion & Rondot, 2001).

Although no major wealth differences were found between dairy-goat group members and non-members, there were some differences in wealth/wealth indicators for other types of groups. Clan group members received fewer remittances than non-members with results approaching significance. Merry-go-round members had smaller land sizes with results that approached significance. Overall wealth rating of farmers (given by enumerators) was associated with belonging to water groups. This shows that some groups are more accessible to the poorest of the communities than others. Also, it is yet another indication that there are various reasons that people join groups, and different benefits that people receive.

In summary, wealth was a factor for participation in some groups. Wealthy people did not seem to be participating in certain groups. At the same time, poorer people were participating in the dairy-goat groups and other types of groups. Furthermore, careful attention must be paid to factors related to wealth, such as household composition, and especially changes in household composition, and how these affect participation in groups over time. Perhaps a longitudinal study of group participation, examining changes in income/expenditures, household composition, and other factors would be useful in this regard. Other factors besides wealth also affected participation in dairy-

goat groups and farmer groups in general in Meru Central District, some of which are discussed below.

**What Affects Participation in Groups of Any Kind?**

There were different reasons that people had for participating or not participating in groups. The data revealed certain differences between members and non-members of different types of groups such as dairy-goat groups, clan groups, church groups, water groups, and women's groups.

Clan group and dairy-goat group members appeared to have a more stressful household composition than non-members. These groups perhaps functioned as more of a safety net type of group. Clan groups were often designed to help people in emergencies. Perhaps these farmers joined clan groups for that very reason. Farmers with larger and more stressful households may have had more needs in terms of school fees, weddings, and funerals. As mentioned above, the dairy-goat project was designed to help poor farmers in Meru. The household composition was the main evidence pointing to dairy-goat groups' poverty; however, it appeared that these farmers had increased in wealth since the start of the project.

Church group and women's group members appeared to have a less stressful household composition. Church members had a higher ratio of producers to consumers. They had fewer total household members. Even though they were poorer, perhaps they had more time because of their household composition. Women's group members appeared to be wealthier than non-members, at least judging by land size. It appeared that women's group members might have had more time and resources as compared to other group members. Those belonging to women's groups had a lower number of females under 10 and a lower number of consumers than non-members. This makes it

appear that those farmers with less household stress were more likely to belong to church and women's groups. These findings seem different from Obonyo's findings in Western Kenya in 2000. She found that church group members tended to be poorer than the rest of the community. These differences between the two areas could be due to factors such as culture and geography, however.

Many times the reason why people appeared to join groups was to obtain physical benefits. In Kenya, Alawy (1998) found that women felt they benefited from being in the group through training, cash, financial assistance, knowledge gained, and food. Narayan and Pritchett (1999) found a link between social capital and wealth in Tanzania, in which an increase in social capital led to an increase in income. De Haan (1999) also found links between social capital and access to assets. She found that social capital was important in gaining access to goats. For this study, a one-way ANOVA obtained results approaching statistical differences among the farmers from the three wealth levels and the number of groups that farmers belonged to. Wealthier farmers tended to be in more groups (those with below average wealth belonged to 1.84 groups; average was 2.35 and above average was 2.93; $F = 2.98$; $p < .06$; df = 2). Bonferroni post hoc analysis revealed that the main differences were between the above average farmers and the below average farmers ($p < .05$).

Group politics (*siasa*) was apparently an issue in participation in groups. During the group interviews, groups were asked about fines and penalties that the group imposed on members. During this discussion, the issue of "backbiting," or gossiping about the group often came up, where members who did this were fined. These issues were also important in other groups in other parts of the country as well (de Haan, Valdivia, Njeru

& Sheikh, 1996). Both individual farmers and groups brought up *siasa* as a reason for avoiding groups. One group said that members who had left "*Wameshindwa kwa sababu ya sheria*," that is, they had been "defeated" because of the group's laws. Apparently this was a problem that groups faced with their members, and was something that people avoided by staying out of groups.

In summary, there were different reasons why people participated in groups. This study has revealed certain differences between members and non-members of various types of groups. The main factors affecting participation varied from group to group, but included aspects such as gender, age, household composition, and whether a farmer was a member of another group. Just as there is diversity within small-scale farm families and livelihoods, there is a diversity of groups that farmers join, and many different reasons for joining. Therefore when one looks at participation in groups in general, one cannot make a blanket statement about the characteristics of people who participate or do not participate in groups. One has to look at different kinds of groups and what the group purpose is. A farmer who joins a type of safety net group such as a clan group likely joins it for much different reasons than one who joins a coffee marketing group. Policy makers must pay attention to such factors when working with groups in the rural areas.

### Objective Two: Examine Linkages and Their Outcomes between Farmers and Other Extension Stakeholders

The second study objective was to examine linkages and their outcomes, if any, between farmer groups and other extension stakeholders. This section specifically examines the linkages that dairy-goat groups had with outside entities. The findings throw some light on the state of extension in Kenya today. One interesting observation with the dairy-goat groups' linkages was the number of extension/agriculture and *baraza*

linkages (Tables 4-18 and 4-19). Again, *baraza* is the public meeting held at the chief's camp, a local means of government administration. The government was apparently seen as a major source of information for these farmers and groups in Meru Central District. This is noteworthy in light of the trend today toward privatized and non-governmental sources of extension. It adds validity to Rivera and Alex's argument that the state needs to continue to play a role in extension (2004).

However, of the major links, *baraza* was the link placed furthest away from the groups in most of the cases (Table 4-19). This signified the infrequency of that linkage. Farmers at the stakeholder meeting, held to present research findings at the end of the study, said that they thought *barazas* were rare. Both extension and farmer stakeholders were surprised that *baraza* rated above FARM-Africa as an important linkage. This showed that *baraza* was an important contributor to agricultural extension that had a variable track record. Therefore one way of improving rural development in Kenya could be through strengthening the local government administration that occurs at the chief's camp. *Baraza* apparently can be very useful. However, when there was an ineffective chief, farmers did not see much value in *baraza*. Apparently, the new government has already recognized the importance of *baraza*. The chiefs were being retrained, and were required to pass a test and know a certain amount of English to retain their posts at the time of the study. However, in addition to retraining, the government needs to have a way to deal with ineffective chiefs.

The *chapati* (Venn) diagrams also revealed a mix of both local and external linkages. The dairy-goat groups were linked with other farmers, groups, churches, and *baraza* at the local level. However, they also had outside links with government, NGOs,

and sometimes private companies. A similar study in Kenya found comparable linkages with the public sector, the private sector, NGOs, community-based organizations (CBOs), and churches (Rees et al., 2000). The concurrent farmer-to-farmer research study by FARM-Africa in Meru also interviewed both dairy-goat group members and non-members. Rather than linkages in general, they looked at sources of information for the farmers. They also found both local and external links, with 35 sources of information in the village, 27 at the district, and 10 beyond the district (FARM-Africa stakeholder meeting held 29-30 October, 2003 at the Transit Hotel, Chogoria).

Both extension personnel and farmers were surprised when they learned at the stakeholder validation meeting that churches were rated above FARM-Africa as an important link for dairy-goat groups. However, this may be due to the fact that the point of the *chapati* diagrams was to show any sort of relationship the groups had, not just those that were related to agriculture/livestock and technical information. As mentioned in Chapter 4, nearly every farmer interviewed was a member of a church. The church thus played an important role in rural life in Meru Central District. Rees et al. (2000) also found that churches were significant sources of information in their study on agricultural knowledge and information systems. Farmers are regularly in church; at least once a week, and as such, churches provide an excellent channel for communication to people in rural areas. Linking service provision with churches would be a useful way to reach most in communities where churches are so prevalent.

Another interesting issue was the role that non-governmental organizations play in extension. Their role in extension in Kenya has been documented (Davis & Place, 2002, *Non-governmental organizations as an important actor in agricultural extension in*

*semiarid East Africa,* unpublished manuscript, University of Florida, Gainesville, FL; Omolo, Sanders, McMillan & Georgis, 2001). In this study, the role of NGOs was important in extension; however, there was not the plethora of them that there are in low potential zones. Rees et al. (2000) obtained similar findings in Kiambu, a district on the other side of Mount Kenya. In higher potential zones, therefore, it might be advisable to focus on private companies and government and international research organizations in extension, while in the low potential areas, NGOs should be targeted for extension purposes.

Another issue that this study brings up is with regard to linkages of farmer groups with projects or other sorts of outside assistance. De Haan et al. (1996) found that dairy-goat groups in Kenya that had the most face-to-face contact with the project had the most successful rates of dissemination of the goats. The fact that the number of dairy-goat group members who were in the Meru Goat Breeders' Association (MGBA) was an important contributor to overall group success validates her findings, and shows that linkages with supporting organizations are crucial (Table 4-33). The MGBA was important for groups as a source of information and germplasm and for marketing. Increasing links with the MGBA or similar organizations would likely increase success of groups in dissemination. Similarly, strengthening community-based organizations such as the MGBA is another way to improve extension in rural communities. By training farmers in organizations such as the MGBA, and then providing for them to train other farmers, dissemination can be more effective and less costly.

Dairy-goat groups that had more linkages were more successful in dissemination. In the FARM-Africa project described in this study, strong emphasis was put on linkages

between all of the players involved in the project, including the private sector, government extension, and various research players. Perhaps this was one of the reasons why project reviewers have seen the dairy-goat project as quite successful. Involving multiple players allowed FARM-Africa to use the strengths of each one and to cut costs for their project.

Group formation also appears to increase the number of linkages in rural areas. Geran found in her 1996 study in Zimbabwe that group formation led to increased links with service providers, as did Rouse in Zambia (1996). Obonyo (2000) also found that one of the benefits from being in a group in western Kenya was access to external agencies. Finally, Esman and Uphoff stated in 1984: "Those [local] organizations with links to political or administrative centers that provide information are also more effective."

Finally, location of the groups appeared to affect linkages. For instance, government extension was more prevalent in the higher potential areas. This was likely due to the fact that it was easier for farmers to get to government extension and vice versa in the high potential zones, which were closer to district and divisional headquarters where the government offices were. Private companies and international/national research centers were also more visible in the higher potential areas, and had more links with these groups.

Although some of the main markets were in the higher zones and close to the tarmac road, markets were also very important for certain groups in the lower zones. One market that seemed quite important to certain groups was called Murika. These groups were all located on the eastern edge of Miriga Mieru East or Abothoguchi East Divisions.

Across the border from these divisions was another district called South Tharaka, which was characterized by low potential land and problems achieving food security. Farmers in eastern Meru Central District thus found a good market in Murika, where buyers often purchased produce for sale in Tharaka.

Also in the lower zones, churches were found to be more important as a source of information for farmers and groups, according to FARM-Africa (stakeholder meeting held 29-30 October, 2003 at the Transit Hotel, Chogoria). Another issue regarding location was government administration. Some groups appeared to have an incompetent chief, while others rated chiefs as very high in terms of value of the link and frequency of contact. Therefore, when considering linkages for groups, it is crucial to pay attention to the location with regard to its administrative and physical characteristics.

In summary, dairy-goat groups had many different linkages with local and external and with government and private organizations. Based on this and other research studies, it appears that strengthening linkages will increase the success of groups in disseminating information.

### Objective Three: Identify the Mechanisms by Which Farmer Groups and Their Members Receive and Disseminate Information and New Technologies

The third objective of the study was to identify the mechanisms by which farmer groups and their members both received and disseminated information and technologies, especially fodder shrub seedlings and improved dairy-goat breeds. Results revealed a variety of both means and sources.

As detailed in Chapter 4, the main methods that dairy-goat groups used to tell other farmers about new technologies were through the chief *barazas*, in other farmer groups, at the buck station, through training others and by calling meetings at their group.

Further means included the breeding stations, community animal health workers (CAHWs), fodder tree nurseries, churches, and through neighbors and visitors.

The most important sources of information for the dairy-goat groups were (a) government extension, (b) *baraza*, (c) FARM-Africa, (d) other farmers, and (e) churches (Table 4-21). The most important sources of information for individuals were (a) government extension, (b) churches, (c) other farmers, (d) indigenous knowledge, (e) groups, (f) *baraza,* and (g) FARM-Africa (Table 4-22). During the preliminary phase, the researcher was able to take part in another study regarding farmer-to-farmer dissemination among the dairy-goat groups. That study revealed that there were about six main sources of information for groups and farmers regarding agriculture. They were (a) government extension, (b) *baraza*, (c) other farmers, (d) markets, (e) churches, and (f) radio (FARM-Africa stakeholder meeting held 29-30 October 2003 at the Transit Hotel, Chogoria).

Although there are some differences between the sources of information shown above, viewing these results together helps to draw some interesting conclusions. Government extension was viewed without doubt as the most important source of information for both individual farmers and dairy-goat groups in Meru Central District. Following extension, *baraza,* other farmers, and churches came out as some of the top sources of information for farmers.

In looking particularly at farmers as a source of information for other farmers, some details emerge. Individual farmers received information from and shared information with their neighbors more than any other type of farmer. Neighbors were perhaps a quick and easy source of information or place for dissemination. One issue of dissemination

that came up during the preliminary research and while talking to dairy-goat groups was the power of actually seeing technologies, or experiential learning. Although community breeding stations were harder to manage than research station breeding centers, there were definite benefits to having these stations at the local level. This gave ownership to the farmers and caused them to become the experts.

In terms of viewing farmers as an important source of information, it is interesting to look at their levels of training (not formal education but informal training). Individual farmers appeared to have very low training levels. Individual farmers (both dairy-goat group members and non-members) had received an average of 1.6 tours and/or trainings within the past five years. However, there was a significant difference in amount of training received by dairy-goat group members as compared to non-members. Members of dairy-goat groups received significantly more training than non-members (2.36 trainings per individuals in dairy-goat groups versus 0.84 for those not in dairy-goat groups; $t = 2.92$; $p < .00$; df = 86). None of the other types of groups (women's, water, clan, merry-go-round, and church) had a significant difference in trainings between members and non-members. Dairy-goat groups, on the other hand, had received an average of 7.8 tours and trainings in the past five years.

Apparently farmers in Meru Central District were sharing information, technology, and germplasm with each other; and with their neighbors more than anyone else. Neighbors were easily accessible. Farmers also valued interactive sources where they could ask questions and get feedback (FARM-Africa stakeholder meeting held 29-30 October, 2003 at the Transit Hotel, Chogoria). However, accessibility of information may conflict with reliability. For instance, neighbors were always available, but might

not have the right information. Farmers also valued expertise (FARM-Africa stakeholder meeting held 29-30 October, 2003 at the Transit Hotel, Chogoria). Therefore, a farmer who is in a group receiving agricultural/livestock training can have a tremendous impact on her or his neighbors. He or she is not only accessible, but through participation in the group, also possesses expertise.

Therefore there are key people who should be targeted within the groups for more effective dissemination. In the FARM-Africa project, the buck keeper was a key trainer since he or she was a main contact point for the groups' neighbors. Buck keepers usually give information to those bringing goats for service, such as information on the breeding cycle, goat housing, and medicine. The community animal health worker was another key person for extending information and technologies outside the group. According to one project reviewer, the project has given people initiative through training farmers. When they get a chance to share their knowledge, they are empowered.

Stakeholders did have issues with some of the dissemination mechanisms presented during the meeting at the end of the study. The farmer stakeholder subgroup wondered why churches were given a higher position than groups, which had "worked hard for a long time with individual farmers" (Table 4-23). They said that groups were being used a lot to teach. This may be due to the fact that churches rated higher than groups for individual respondents, who were not necessarily members of dairy-goat groups and so would not have those contacts that the dairy-goat group members would. However, it was also noted during the stakeholder meeting that the importance of churches for dissemination points was increasing, since farmer extension workers (FEWs), who were part of the dairy-goat project, had just started using churches to make presentations on

dairy-goat technologies. Finally, stakeholders noted that the church was not necessarily a source of agricultural information, but a channel for information.

The FARM-Africa subgroup of stakeholders noted that *barazas* were very useful during the initial stages of the project, but that FARM now had more contact with the farmers than *baraza* did. This shows that it is important to use different extension players at different points and for different reasons. For instance, *baraza* is good for social reasons such as introductions to the community and for announcements.

In summary, farmers and dairy-goat groups in Meru were both obtaining and disseminating information and technology through a variety of means. Individual farmers, especially neighbors, appeared to be a very important mechanism for dissemination. However, different mechanisms were valuable for different purposes. Some mechanisms were *sources* of information, such as extension, while others were *channels*, such as churches. These mechanisms should be further explored and capitalized on for those wishing to promote various technologies in the area. Groups and individuals have been disseminating, and should be empowered to conduct more farmer-to-farmer dissemination. Capacity building among farmer groups thus should be an important goal for practitioners and policy makers.

### Objective Four: Identify the Factors Characteristic of Groups Successful in Disseminating Technology

The fourth objective of the study was to identify the factors characteristic of groups successful in disseminating technology. There were certain factors that appeared to contribute to the dairy-goat groups' success in extension in Meru Central District. These included the group location, age of the group, homogeneity of members,

jealousy/cohesiveness of the group, capacity level, number of linkages, and type of group.

As mentioned in Chapter 4, defining and measuring success was a difficult task. Different indicators for success were used in this study (some are shown in Table 4-34). Interestingly, when groups talked about how strong and weak they were in dissemination, they spoke in terms of training others and of adoption of technologies by neighbors. Also, for dissemination, experiential learning was important. Farmers valued seeing something rather than just hearing it (FARM-Africa stakeholder meeting held 29-30 October, 2003 at the Transit Hotel, Chogoria). Even more, they valued learning about new technologies from other farmers in their fields. Franzel, Wambugu and Tuwei (2003) found that "seeing and discussing calliandra with experienced farmers was an effective means to promote calliandra planting and to provide a forum for farmers to learn about its growth, management and use" (p. 6). Therefore it is very important to have technologies "on the ground" with farmers and with farmer groups.

Table 4-34 shows that there were different factors affecting success at various levels of significance. As mentioned in Chapter 4, there were different variables that were used as indicators for success. The adoption index was an average of the group and three external rater responses to number of neighbors adopting technologies from the groups (Cronbach's alpha for the index was 0.69). Number of buck services referred to the number of goats brought to the buck station for breeding by both members and non-members over a one-month period. These numbers were obtained from the group and/or the group record book. Number of neighbors planting fodder was an estimate by the group of how many of their neighbors had planted fodder. Number of groups trained

refers to the number of other groups that a dairy-goat group had trained in the past year. Finally, self-rating of success was a perception measure where groups rated themselves on a scale of 1 to 5 from very weak to very strong in dissemination.

Table 4-34 reveals some phenomena that this study has in common with Place et al.'s 2002 study on farmer groups in Kenya. As noted by these researchers, and as seen in Table 4-34, there is no one formula or recipe for building a group that will be successful in dissemination. There are many factors that contribute to success. These explanatory factors do not follow any particular pattern in contributing to the various dependent variables, however. Different group factors significantly affect only one or two success indicators, according to Table 4-34. There is no one overall success indicator/index that can be used to compare the effects of various explanatory variables. This underscores the complexity of such social science studies, and the difficulty of reaching hard and fast conclusions when constructs are difficult to both define and measure. To help shed some light on these issues, however, some of the factors affecting success are discussed in greater detail below.

Altitude/location. The data show that groups in higher altitude areas were disseminating more information and technology to farmers than farmers from lower zones. This may be due to the fact that the upper zones had a higher population density and greater access to markets and sources of information. However, one aspect that may be important to note is that the technologies were not solely dairy-goat technologies (Table 4-26). Goats were much more common in the lower agroecological zones, while in the upper zones, dairy cattle were an important livelihood activity. Perhaps groups in high altitudes were successful more in *fodder* technology dissemination than *dairy-goat*

technology dissemination, because there were more grade cows in higher altitudes and less goats. This shows the importance of adapting extension messages to the various farming systems and recommendation domains. People may be adopting a technology, but not for the exact purpose for which it was designed. Farmers have also been adapting fodder technologies to meet their needs, or coming up with new innovations (Franzel et al., 2003). This is why it is necessary for research and extension to be flexible and to involve farmers in the technology generation and dissemination process.

Location also affected communication networks, marketing, extension services, and other development issues, according to project stakeholders. Infrastructure also played a role; for instance, roads may have been impassible in certain parts of the district. In the lower zones there might be greater distances between the groups. Place et al. (2002) found both positive and negative effects of geographical location on group performance.

Size of group. Morton et al. (2002) found both negative and positive effects from size. Stringfellow, Coulter, Lucey, McKone & Hussain (1997) found that small groups were more successful. Place et al. (2002) found that middle-sized groups were the best-performing groups. The only piece of data related to group size and success in this study was the substantial negative correlation between group size and the number of neighbors planting fodder. The groups that were smaller thus were associated with higher numbers of neighbors planting fodder. Perhaps in the smaller groups, members got more training, or they were more likely to invite neighbors to trainings. Size of group is a variable that has been examined over the years for its effects on group success, with varying results (see, for example, Olson, 1965, in Agrawal & Goyal, 2001; Agrawal & Goyal, 2001 and

the studies mentioned above). Further studies are necessary to show what, if any, effect size has upon success of groups.

Group age. This study found a positive relationship between group age and success. De Haan (1999) studied performance of dairy-goats groups in Tanzania and also found that older groups performed better. Place et al. (2002) found no effect of age on group performance.

Even if the older groups were more successful, as shown in Table 4-27, it is difficult to determine what it is about age that makes the older groups more successful. Perhaps some of the advantages of time include greater opportunities to improve group cohesiveness, and to learn and grow through trial and error. A similar study in a few years, when the younger groups have also had more opportunity to unify and learn together, and the project funding has ended, may increase understanding of the differences, if any, that age makes.

Formality/record-keeping. The data revealed no significant differences between groups with high levels of formality and those with low levels. Informants thought those groups that kept good records would be better disseminators. The negative correlation between the adoption index measure of success and record keeping may be due to the fact that those groups that were more successful were more focused on dissemination, and less on administrative tasks. Farmers in the study tended to have low levels of education, which may have affected record keeping and success in dissemination in different ways.

Leadership. Most of the questions regarding leadership had very little variation in response on both the group and individual questionnaires. Part of the reason for the lack of variation in responses regarding group leadership could be due to a cultural tendency

to say what the respondent feels will please the researcher, or to "save face," combined with the traditional respect for leaders. However, even with probing, respondents maintained their responses. Leaders were present during the interviews, and to maintain an open atmosphere they remained for the discussion on leadership, but did not take part. Again, this may have contributed to reticence on the part of members, but they were encouraged to speak freely and their responses were probed. When individual farmers were asked about the dairy-goat group leaders, the average response was 4.75 on a scale of 1 to 5 where 1 = "strongly disagree that leadership is good" and 5 = "strongly agree that leadership is good." This was even higher than the groups' average response of 4.59. In other words, even with no leaders present, farmers claimed that the dairy-goat group leadership was quite good.

Stakeholders at the meeting where research results were presented said that they thought that leadership did affect success in dissemination. Irresponsible leaders made information unavailable or distorted, according to the extension subgroup at the stakeholders' meeting. Stakeholders also thought that leaders were the ones to source (obtain) information. Fear of competition and jealousy caused leaders to hide information. Farmer stakeholders said that the extension groups were good because they had good leaders, and as a result, formed more groups (outnumbering the FARM groups). FARM-Africa stakeholders thought that acceptance and trust, which resulted from good leadership, encouraged success in dissemination. If the leaders were not good, stakeholders felt that non-members would not come to consult with the group. On the other hand, leaders who were good would have good public relations with outsiders and

provide them with welcoming gestures, thereby attracting more activities at the buck stations.

Leadership vis-à-vis gender, wealth and age. Farmers agreed at the stakeholders' meeting at the end of the fieldwork that the figures regarding leadership and gender seemed correct (Table 4-16). One of the results was the high number of male chairpersons. Issues discussed were the traditional role of men in the Meru society, and the fact that men might be able to more strongly represent the group before the chief, in government offices, and so forth. This may also be part of the reason why men were sometimes allowed into women's groups. The fact that groups with male leaders had a slightly higher adoption index score may add credence to these arguments.

Chairpersons tended to be higher in age (Table 4-16). Perhaps this was because the groups saw the chairperson position as one of respect, and in the Meru culture the *wazee* (old people) are respected. For the secretary and treasurer positions, perhaps age was not so important, or they needed someone with more energy and/or perhaps more schooling.

Another phenomenon discussed at the stakeholders' meeting was the high number of female treasurers. Most treasurers were female (76%). Stakeholders felt that this was because men were less trusted with money and were not transparent with accounts. Men "have a lot of movements outside the home," whereas women tended to stay around the farm and home. Also, there was a cultural issue at work; in Kenya, men tend to be owners while females are managers. Females may therefore have been viewed as more likely to properly manage the funds.

It was noted during the stakeholder meeting that many of the treasurers appeared to be in a higher wealth category than the other leaders (28% of treasurers were above

average, while 11% of chairpersons and 9% of secretaries were above average). According to the stakeholders present at the meeting, having treasurers who were wealthier perhaps provided a means for the group to get their money back if the treasurer misused it. The wealth of the treasurer thus provided a sort of collateral; if the need to take legal action against the treasurer arose, group members would have a better chance of getting their money back.

Wealth. There were mixed results for correlations of wealth indicators of the dairy-goat group members with success indicators. A study on individual dissemination by farmers in Central Kenya revealed no association between wealth level and dissemination (Franzel et al., 2003). Because it was so difficult to see the effects of wealth on participation in groups, perhaps further research with a different approach, using more qualitative tools or analyses such as path models would be useful to describe the effects of wealth on participation.

However, looking at wealth indicators of dairy-goat groups does help to explain some phenomena in the project. In the lower zones where land productivity was lower, land holdings were larger, and there were greater numbers of goats and *local* cattle. This may explain why larger *shambas* (farming plots; an indicator of wealth) were positively correlated with one success indicator, number of buck services. So while being an indicator of wealth, because of the differences in agricultural potential, land size is not an indicator that alone can show that groups were wealthy. Land size could be useful for comparisons within agroecological zones, however. This positive correlation between land size and buck services could also explain why higher numbers of *improved* cows

were associated with fewer buck services (r = -.342; n = 42). In the lower zones where there were bigger *shambas,* farmers had fewer improved cattle.

Activities. De Haan (1999) found that older groups with multiple functions were more successful at dissemination of the technology. This study found no relationship between number of activities and group success in dissemination. Groups that had many activities and those that had few showed no difference in dissemination performance. However, Place et al. (2002) found that groups that changed their purpose over time were more successful. The key here may be that groups that can conduct activities according to the felt needs of the group, even if it means changing their focus, are able to more successfully perform as a group.

Homogeneity. Homogeneity among members was significantly related to just one success indicator, the number of neighbors planting fodder, with more homogeneous groups having greater success. Stakeholders in the research study thought that groups with more homogeneity among their members were better disseminators for several reasons. They believed that homogeneity would increase understanding within the group. They thought that heterogeneity through variables such as wealth, ideology, and political stance would lead to undermining the group. Members who are similar have common interests, language, goals, history, culture and objectives. They also have unity.

Jealousy. Jealousy in this study was measured within the group itself, not between the group and outside members. As defined in Chapter 4, jealousy in this study referred to the state of being desirous of another's advantages. It is an important factor to consider in dissemination studies, because people may not want others to get ahead of them materially. They may even be afraid to get ahead of others because of fear of

jealousy by others. Moderate correlations were found between the dependent variable the adoption index and perceived jealousy among members (r = .329; n = 46) (Table 4-24). This is not a strong correlation, and the groups' responses to perceived jealousy in the groups were highly skewed toward low levels of it (1.63 on a scale of 1 to 5, with 5 being high jealousy). Perhaps the groups that were getting out and disseminating more had internal arguments regarding whether or not they should do this or keep the knowledge to themselves, and so were more likely to perceive their group as having more jealousy.

In the concurrent farmer-to-farmer study taking place in Meru in which the researcher participated, 54 primary causes of lack of information flow were discovered, 15 of them being socio-cultural. One of the main ones was jealousy. Jealousy was therefore seen as a barrier in farmer-to-farmer dissemination of information. According to the farmer-to-farmer study, jealousy was restricting the flow of knowledge and information in the greater Meru area (FARM-Africa stakeholder meeting held 29-30 October, 2003 at the Transit Hotel, Chogoria). However, the exact way that jealousy affects dissemination is not known, and should be a consideration for further research.

Cohesiveness. Unity was another variable with a skewed response (4.59 on a scale of 1 to 5, with 5 being high unity), and it had no significant relationships with indicators of success. However, de Haan et al. (1996) found problems in groups that had been established solely for the purpose of another dairy-goat project in Kenya. Such groups had problems of unity and working together. They therefore recommended working with existing groups that already have a social base established, rather than forming new and artificial groups.

Capacity. Morton et al. (2002) found that training led to greater success in self-help groups and dairy cooperatives in Kenya. This study revealed similar findings. Furthermore, this study shows that capacity can be built. The FARM groups were below the extension groups in terms of wealth and capacity to begin with, but have outperformed extension groups thus far in terms of dissemination of information and technology. Once again, this emphasizes the importance of building capacity for rural development.

Type of group. The dairy-goat groups consisted of two types of dairy-goat groups, FARM groups and extension groups. Although both types of groups worked with both FARM and extension staff, they were called by these terms to differentiate the FARM groups, which were officially part of the dairy-goat project (which was a collaboration between FARM and the Kenyan government), and the extension groups, which were formed later. The FARM groups had been chosen because of their poverty, and formed into groups with the project and chief's help. Extension groups were formed later, having decided to form in order to obtain dairy goats. They purchased a buck themselves, rather than being given the buck as the FARM groups were.

The extension groups were for the most part newer than the FARM groups, and therefore less likely to have a buck that was ready to serve (breed). The FARM groups had been around longer than most of the extension groups, and this may have been an important factor in the differences of dissemination success between the two groups. The older FARM groups' neighbors would have had a greater chance to obtain crossbred goats. Also, some of the extension buck stations were very new, and so it was unlikely that their neighbors would have had a chance to fully adopt dairy-goat technologies.

Even if they had bred their local goats, they may not have obtained kids or have been able to sell them. Because of this, it would be useful to conduct a similar study in a few years' time to see more clearly the differences between FARM and extension groups.

There was another type of group that was interviewed, but the results not included in the data analysis in Chapter 4. It was mentioned in Chapter 4 that four dairy-goat groups in the district, but not part of FARM-Africa, were interviewed during the study. They had been started by the NGO called Meru Drylands Farming Project (MDFP), which was part of a larger NGO called SOS-Sahel. Again, the results of these interviews were not included in any of the data analyses for Chapter 4. However, certain differences did stand out between the FARM-Africa groups and the MDFP groups. The agroecological zones were very different. While trees, especially grevillea, were a characteristic of the landscape in the rest of Meru, Buuri division where the MDFP groups were was devoid of trees except in hedgerows. The area appeared much drier, and wheat was an important crop. MDFP groups conducted more activities than FARM, had larger land size, more members, more member schooling, and more total livestock. Level of formality, homogeneity of members and number of linkages was similar for both types of groups. Government extension was not such a significant player in the MDFP area. There were different NGOs in the area than where FARM worked, and they were major sources of information for the group (MDFP was one and the European Committee for Agricultural Training, CEFA, another). Of course, the data for the MDFP groups is too limited to determine how significant these differences were, but it does show that the supporting organization and the location of the project make an important difference. These differences and the differences between groups from different areas in the FARM-

Africa project point to the need to increase flexibility in projects to deal with the diversity among people, farming systems, and agroecological zones.

In summary, the variables that appeared to affect success of dairy-goat groups in disseminating information and technologies included the location, age of the group, homogeneity, capacity, linkages, and type of group. Table 5-1 relates the study findings to what other researchers have found on the variables that affect group success. Only de Haan (1999) was specifically examining success in dissemination; however, it can be argued that dissemination can be one aspect of group performance that the other researchers were examining.

Table 5-1. Studies examining the effect of group factors on success

| | Stringfellow et al. (1997) | de Haan (1999) | Morton et al. (2002) | Place et al. (2002) | Davis (2004) |
|---|---|---|---|---|---|
| Altitude | | | | +/-? | + |
| Size of group | - | | +/- | +/- | -? |
| Age of group | | + | | 0 | + |
| Activities | - | + | - | | 0 |
| Homogeneity | + | | + | 0 | + |
| Capacity | | | + | | + |
| Linkages | + | | | | + |
| Type of group[a] | | | | | + |

[a] 0 = Extension-facilitated; 1 = FARM-facilitated
+ positive relationship
- negative relationship

## Summary

### Use of Groups in Extension

Groups play an important role in agricultural extension in Kenya today. The current extension program, National Agriculture and Livestock Programme (NALEP), encourages the use of "common interest groups," as do many other extension players such as non-governmental organizations and bilateral aid organizations. Some projects in Africa make group formation a prerequisite for assistance (Stringfellow et al., 1997).

Groups increase the efficiency, effectiveness and equity of service provision and also help to empower farmers (Esman & Uphoff, 1984; Geran, 1996). Franzel et al. (2003) found that using groups helped not only to economize on training skills, but ensured more farmer-to-farmer engagement and extension. Krishna (2001, p. 938) describes the importance of capable agencies such as farmer groups, and their role in development: "Capable agents help villagers overcome these obstacles [lack of information, poor communication networks etc.] to effective collective action and social capital is made more productive when such agents are available in the village." This study shows positive, significant linear relationships between the number of groups that farmers are in with the amount of tours/trainings they have received and the number of other farmers to whom they have disseminated information/technologies. Groups are thus an effective and efficient way to target extension.

Farmer groups in Meru Central District were targeted with information from churches, schools, government extension and chief *baraza* and told to "tell other [farmers]." Extension or other agricultural players often trained the dairy-goat groups, who would then act as consultants to other farmers. Many dairy-goat farmers became members of the MGBA, which was comprised of dairy-goat farmers from the project area. The MGBA conducted trainings for other farmers. For instance, in June 2003, farmers in Meru trained those in the Meru Drylands Farming Project on goat management and leadership. Farmers who have been trained are "very vocal" in telling others of new technologies, according to informants.

Farmer groups are key to practitioners and policy makers interested in improving rural livelihoods, reducing poverty, and stimulating growth of the agricultural sector. As

mentioned earlier, studies in Tanzania have shown that investing in social capital such as groups can have a far greater effect upon household income than investment in human capital such as education (Narayan & Pritchett, 1999).

Farmer groups and other forms of community-based services are a way of ensuring sustainability of extension and development programs. With NGOs, government and international research stations, funds can run out or be withdrawn according to donors' objectives. This does not mean that the national extension service or other extension partners are obsolete. The farmer, however, is the beginning and end of extension, and should play a large role in extension and therefore in up-scaling technologies. According to this study, community-level groups are a major way for farmers to obtain information and training and to be better extensionists to their neighbors.

In areas like Meru, where social capital is already high, farmer groups should be targeted as a vehicle for extension and other rural development initiatives. Mechanisms for working with farmer groups need to be improved. For instance, the Ministry of Culture, Gender and Social Services must be able to liaise with the government extension staff, with other development providers and with the local administration in the form of the chief's office. Some mechanism needs to be established in order to prevent replication of efforts and alienation of certain groups. The chief's camp would perhaps be a suitable clearinghouse for groups seeking assistance or development organizations seeking groups.

For groups to play an effective role in extension, an enabling environment is necessary. Groups need to be able to approach the government or other development players for assistance. The Kenyan government should facilitate the registration of

groups with the Department of Social Services. There should then be a standard operating procedure for groups to follow to obtain development assistance, or for the mechanism to work the opposite way: for development players to seek groups that they can then work with. It was mentioned above that local administration and the chief's office need to be strengthened, because they are an important player in agricultural extension. Another institution that needs strengthening is the District Development Committee. This committee is meant to oversee all of the development issues in the district. However, this does not always happen in all districts, and so there must be a way to improve this mechanism.

For areas where social capital is not so strong, or where poverty or other factors prevent people from joining groups, other steps must first be taken. Social capital must be built. It is not advisable that development agencies arbitrarily form groups at the community level. Where there is limited social capital, for whatever reason, it may be helpful to work through established community networks, such as churches or the local council of elders or tribal chief.

Formal registration of groups is something that is necessary to for the government to be able to help groups. However, this process also may prevent farmers from joining groups or from registering their group. Fees may keep some groups out, while illiteracy, physical distance, and fear of the government may keep others from registering (groups are required to develop by-laws and to elect officers, processes that some farmers may not fully understand). Where poverty and other factors inhibit the joining of groups, perhaps a limited form of providing subsidies for such groups would enable them to be able to register. There must be some way for groups to register, if not formally with the

Department of Social Services, at least informally at the chief's camp, which is much more accessible and approachable than district government offices for some farmers. Finally perhaps churches or other local organizations could work with farmer groups at the community level to assist them to approach the chief or other government officials or development players for help.

When forming groups, the NALEP model used in Kenya today may be good to follow. Under NALEP, extension staff focus on administrative locations for a year. During that time, experts come, and using the forum of the chief's *baraza*, they teach farmers in the area about different techniques. Depending on what the farmers are interested in, they then form common interest groups that receive training. A key goal here would be to train newly-formed groups on issues such as group dynamics, leadership, record-keeping and so forth.

**How Do Groups Fit in a Pluralistic Extension System?**

What is happening in Meru is a useful model of how farmers, community-based organizations, government extension, NGOs and international research centers can all work together to bring about rural development and to provide a pluralistic model of agricultural extension. The dairy-goat project's approach has been quite successful in disseminating new information and technology to other farmers using a variety of means, and thus extension policy makers and practitioners would do well to note what made it successful. The project greatly increased since its start in 1996, going from 44 to over 100 dairy-goat groups. Over 20,000 buck services have been recorded and milk yields have increased six-fold (FARM-Africa Progress Report, 2002). FARM established the Meru Goat Breeders' Association and the Meru Animal Health Workers' Group. Goats

have been sold in over 30 districts and three countries, and many farmers and NGOs have traveled to Meru to see the project.

A number of factors likely made the FARM-Africa project successful. The project focused heavily on training of both farmers and extension staff. FARM also emphasized linkages with the chief, government extension, the private sector, international research centers, and other NGOs. FARM-Africa provided transport for government extension personnel, whose salaries were being paid by the Kenyan government. Extension officers and farmers were used to train other farmers. The private sector was brought in to provide animal healthcare. The project established the Meru Goat Breeders' Association to carry on the work. Experience-sharing was written into the project—dairy-goat farmers from Meru traveled to other parts of Kenya and Tanzania, Uganda, and Ethiopia to meet with and train other farmers. FARM also focused heavily on monitoring, evaluation, and feedback from participants.

All of the actors in extension should be able to work together in such a way, concentrating on the strengths of each, so that by all means necessary the information and technologies spread. Such a pluralistic model must take advantage of the strengths of each of the players. For instance, Parkins (1997) found that formal organizations tended to provide information to farmers, while informal organizations usually provided materials. This study found that certain players were useful during the project start and others in the midst of the project. Some of the ingredients for success of such a pluralistic system, based upon the FARM-Africa/Government of Kenya project model, appear to be the facilitation of government extension workers, capacity building among

farmers and farmer groups, paying attention to the whole system (for instance, making sure that animal health care was available), and networking among the various players.

Now that the FARM project has shown that such linkages are workable, perhaps development players might want to consider other potential players or channels for information flow. For instance, the Ministry of Health often gets out to the rural areas on inoculation campaigns. Perhaps there might be some way to link government extension personnel with such a campaign, so that when people are gathered for inoculations they could also learn about new technologies, or how they can form into groups to obtain development assistance.

Government extension policy in Kenya today is to work with farmer groups. Policy makers should continue to incorporate an integrated or pluralistic approach to extension, in which grass-roots organizations play a key role. The emphasis today is on extension systems that are demand-driven, participatory, pluralistic/multi-stakeholder, decentralized, and privatized. This means involving *all* players. Groups are one important vehicle for extension; however, they are no "silver bullet." Groups should be used, but not solely focused on as a means of extension. It is unlikely that farmer groups in rural areas will be doing formal-type extension on their own. It is in conjunction with other players such as NGOs, government and private players that farmer groups will be most effective.

The role of groups needs to be examined not just from an extension standpoint, but an overall holistic approach to rural development. Farmer groups, community-based organizations, local organizations (Esman & Uphoff, 1984), and rural people organizations (RPOs) (Collion & Rondot, 2001) play an important role in rural

development today. Groups allow for federalization and lobbying, and give farmers a voice. Farmer groups have multiple roles to play. Extension is never a stand-alone activity for farmer organizations; it is one of many activities (P. Rondot, personal communication, 16 May 2003). Farmer groups are important in terms of access to various types of capital, such as social, physical, and natural. Furthermore, farmer groups are not only an important support system for rural people in developing countries. Wibberly (1997) studied "Farmer-Dominant Study Groups" (FDSG) in the United Kingdom and found that farmers not only shared knowledge with each other, but provided mutual support and friendship. Some of the highest ratings of the benefits of FDSGs were with regard to cohesion; giving friendship, problem sharing, and enjoyment received the highest marks.

Researchers, policy makers, and practitioners should better understand farmer groups' role in development, and their strengths and weaknesses. Farmers are an important source of information for other farmers. However, they need to be able to access information and technologies to be able to show, tell, and learn. A study on adoption and dissemination of fodder shrubs in central Kenya (Franzel et al., 2003) concluded with

> Extension approaches are needed to enable farmers groups, on their own, to access information on new practices. Governments and development partners should not see their role as simply transferring technology and information to farmers. Rather, they should focus on assisting farmers groups to mobilise their own resources and enhance their ability to obtain information on improved practices from outside their villages (p. i).

## Recommendations for Policymakers and Practitioners

In light of the summaries on each of the first four study objectives, recommendations are made below for policy makers, practitioners, and others who are

interested using groups in rural development, especially for dissemination of information and technologies. This was the fifth objective of the study.

1. Use the various players who are involved in any aspect of agricultural extension, capitalizing on their strengths.

2. Use farmer groups for dissemination purposes, however, not as a sole means of extending information and technologies.

3. Provide capacity building in the form of training, cross-visits, agricultural shows and other mechanisms to build the capacity of farmers and groups. At the same time empower groups to "go it on their own" eventually.

4. Focus on key individuals within groups for training; in the case of the dairy-goat groups, the buck keepers, breeders, and community animal health workers.

5. Increase linkages of groups with outside entities from whom they can learn and to whom they can disseminate information and technologies.

6. Use established groups that have built their level of cohesiveness, worked out issues of jealousy, and gained experience in various activities in development projects; in other words, build on the social capital that is already there.

7. If established groups are not available, focus on common interests of group members when forming groups to increase homogeneity. These new groups should then receive training in group dynamics and leadership.

8. Provide an enabling environment for groups to form by working with the Ministry of Gender, Culture and Social Services; the local chiefs and churches, to facilitate non-threatening ways for farmers to register groups through these institutions.

9. Provide mechanisms for coordination between development players and farmer groups that will prevent duplication of efforts and alienation of marginalized farmers.

10. Establish a clearinghouse and/or standard operating procedure whereby groups can obtain development assistance, and development players can identify established groups to take part in projects.

11. Pay attention to factors that *may* play a role in group success, such as leadership, group location, size, and number of activities, with a view toward making changes as needed to strengthen the group.

## Recommendations for Further Research

This study and others (de Haan, 1999; Morton et al., 2002; Place et al., 2002; Stringfellow et al., 1997) have shown some of the key factors affecting success of groups. Based upon the results of these studies, empirical analyses are now needed to rigorously examine specific factors affecting success. Also, since farmer groups play such a large and at times successful role in extension, it is imperative that researchers take a rigorous look at group participation, to see who is in the groups and who is not. Attempting to obtain a large sample size of groups would be helpful to future researchers to run more complex multivariate analyses. Longitudinal studies related to changes in wealth levels and relating them to factors such as activities and trainings would also help to pinpoint exactly how projects and groups help in rural development. Finally, it is recommended that organizations such as FARM-Africa and other extension players who are working with farmer groups at the grassroots level combine their knowledge, experience and resources with well-designed, rigorous studies to further the effects of their programs.

## Conclusion

Government extension in Kenya today is unable to provide many small-scale farmers with pertinent technologies and information to bring about rural development. Other providers do not have the resources or incentives to effectively reach such farmers. The issue then is how best to disseminate these technologies to benefit farmers despite limited extension coverage. One answer to this dilemma is to emphasize the use of local resources/capacity, such as farmer groups, to reach smallholders in an appropriate way.

Today in Kenya, many technology dissemination approaches exist, with few studies to show their effectiveness. One important need in the new extension paradigm, which includes community-based extension, has been to determine the role that

community groups play in extending technologies, and how they go about disseminating information to other farmers. Knowing these mechanisms will contribute to the effort in scaling up the impact of agricultural research. This study has addressed these issues, examining the role that farmer groups play in dissemination, who participates in the groups and why, what linkages the groups have, how groups disseminate information, and finally, what factors are the key to successful groups.

Using community-based mechanisms within the context of a pluralistic extension model will capitalize on the strengths of each player, increase benefits and cut costs. Farmer-led extension has been shown to be an important means of spreading technology (Chambers, 1997; Esman & Uphoff, 1984; Scarborough, Killough, Johnson & Farrington, 1997). Farmer groups are therefore an important actor in the extension scene and can be a major tool for community-based extension. As such, it would behoove policy makers to create an enabling environment to strengthen and empower farmer groups for this crucial role.

APPENDIX A
ADDITIONAL DATA ON GROUP PARTICIPATION

Table A-1. Factors affecting participation in church groups

| Response | Member (n=39) | | Non-member (n= 49) | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | *t* | *p* |
| Females under 10 years | 0.41 | 0.72 | 0.71 | 0.84 | -1.80 | 0.08* |
| Females 11-20 | 0.44 | 0.60 | 0.63 | 0.93 | -1.15 | 0.26 |
| Females 21-50 | 0.90 | 0.64 | 0.88 | 0.53 | 0.16 | 0.87 |
| Females over 50 | 0.31 | 0.52 | 0.39 | 0.57 | -0.68 | 0.50 |
| Males under 10 | 0.56 | 0.91 | 0.57 | 0.82 | -0.04 | 0.97 |
| Males 11-20 | 0.87 | 0.89 | 0.73 | 0.86 | 0.73 | 0.47 |
| Males 21-50 | 1.05 | 1.10 | 0.98 | 1.79 | 0.22 | 0.83 |
| Males over 50 | 0.28 | 0.46 | 0.41 | 0.50 | -1.24 | 0.22 |
| Total kids ≤ 10 years | 0.97 | 1.18 | 1.29 | 1.14 | -1.26 | 0.21 |
| Total members age 11-21 | 1.31 | 1.00 | 1.37 | 1.25 | -0.24 | 0.81 |
| Total adults (>21) | 2.54 | 1.33 | 2.65 | 1.88 | -0.32 | 0.75 |
| Total household members | 4.69 | 1.67 | 5.06 | 2.00 | -0.92 | 0.36 |
| Total number of consumers on-farm | 4.82 | 1.89 | 5.08 | 2.04 | -0.62 | 0.54 |
| Total number producers on-farm | 3.26 | 1.77 | 3.00 | 1.74 | 0.68 | 0.50 |
| Producer to consumer ratio | 0.68 | 0.24 | 0.58 | 0.23 | 1.97 | 0.05** |
| No. of groups farmer belongs to | 2.90 | 1.62 | 1.84 | 1.93 | 3.74 | 0.00*** |
| Total number of livestock | 6.92 | 3.66 | 5.96 | 3.84 | 1.19 | 0.23 |
| Number of improved goats | 3.64 | 2.82 | 3.22 | 2.98 | 0.67 | 0.51 |
| Number of improved goats sold | 0.79 | 1.17 | 0.78 | 1.30 | 0.07 | 0.94 |
| Education of respondent (total years) | 7.15 | 3.57 | 6.31 | 3.52 | 1.11 | 0.27 |
| Land size of respondent (acres) | 4.37 | 3.94 | 4.46 | 3.73 | -0.11 | 0.91 |

*Approaches significance; **significant; ***highly significant

Table A-2. Binary regression analysis for participation in church groups (n = 39)

| | B | SE | Wald | df | *p* | Exp (B) |
|---|---|---|---|---|---|---|
| No. of groups farmer is in | 1.17 | 0.30 | 15.08 | 1 | 0.00 | 3.23 |
| Member of merry-go-round | 2.33 | 0.83 | 7.86 | 1 | 0.01 | 10.30 |
| No. of females under 10 | -0.63 | 0.36 | 2.96 | 1 | 0.09 | 0.54 |
| Age[a] | -0.83 | 0.41 | 4.08 | 1 | 0.04 | 0.44 |

[a] 1 = ≤30; 2 = 31-49; 3 = ≥50

*Note*: $X^2$ (4, n = 39) = 29.91; $p < .00$

Table A-3. Factors affecting participation in clan groups

| Response | Member (n=23) | | Non-member (n=65) | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | *t* | *p* |
| Females under 10 years | 0.43 | 0.66 | 0.63 | 0.84 | -1.01 | 0.31 |
| Females 11-20 | 0.52 | 0.85 | 0.55 | 0.79 | -0.16 | 0.87 |
| Females 21-50 | 0.87 | 0.55 | 0.89 | 0.59 | -0.16 | 0.87 |
| Females over 50 | 0.39 | 0.58 | 0.34 | 0.54 | 0.40 | 0.69 |
| Males under 10 | 0.83 | 0.94 | 0.48 | 0.81 | 1.70 | 0.09* |
| Males 11-20 | 0.74 | 0.81 | 0.82 | 0.90 | -0.36 | 0.72 |
| Males 21-50 | 1.30 | 2.42 | 0.91 | 1.03 | 1.08 | 0.28 |
| Males over 50 | 0.39 | 0.50 | 0.34 | 0.48 | 0.45 | 0.65 |
| Total kids $\leq$ 10 years | 1.26 | 1.18 | 1.11 | 1.16 | 0.54 | 0.59 |
| Total members age 11-21 | 1.26 | 1.01 | 1.37 | 1.19 | -0.39 | 0.70 |
| Total adults (>21) | 2.96 | 2.23 | 2.48 | 1.39 | 1.20 | 0.23 |
| Total household members | 5.04 | 1.64 | 4.85 | 1.95 | 0.43 | 0.67 |
| Total number of consumers on-farm | 5.00 | 1.60 | 4.95 | 2.10 | 0.10 | 0.92 |
| Total number producers on-farm | 2.96 | 1.26 | 3.17 | 1.90 | -0.60 | 0.55 |
| Producer to consumer ratio | 0.63 | 0.23 | 0.63 | 0.24 | -0.05 | 0.96 |
| No. of groups farmer belongs to | 2.96 | 1.22 | 2.08 | 1.42 | 2.65 | 0.01** |
| Total number of livestock | 6.22 | 2.98 | 6.45 | 4.03 | -0.25 | 0.81 |
| Number of improved goats | 3.70 | 2.32 | 3.31 | 3.09 | 0.55 | 0.59 |
| Number of improved goats sold | 0.70 | 1.06 | 0.82 | 1.30 | -0.40 | 0.69 |
| Education of respondent (total years) | 6.13 | 2.87 | 6.88 | 3.76 | -0.87 | 0.39 |
| Land size of respondent (acres) | 4.28 | 3.92 | 4.47 | 3.79 | -0.21 | 0.84 |

*Approaches significance; **significant

Table A-4. Contingency table on gender and participation in clan groups

| Gender | Member | Non-member | Total |
|---|---|---|---|
| Female | 6 | 37 | 43 |
| Male | 17 | 28 | 45 |
| Total | 23 | 65 | 88 |

*Note*: $X^2$ (1, n = 88) = 6.47; $p < .01$

Table A-5. Binary regression analysis for participation in clan groups (n = 23)

| | B | SE | Wald | df | *p* | Exp (B) |
|---|---|---|---|---|---|---|
| No. of groups farmer is in | 0.84 | 0.28 | 9.34 | 1 | 0.00 | 2.32 |
| Member of water group | 2.17 | 0.87 | 6.27 | 1 | 0.01 | 8.74 |
| Gender[a] | -2.02 | 0.66 | 9.34 | 1 | 0.00 | 0.13 |

[a] 0 = female; 1 = male

*Note*: $X^2$ (3, n = 23) = 20.97; $p < .00$

Table A-6. Factors affecting participation in merry-go-rounds

| Response | Member (n=18) | | Non-member (n=70) | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | *t* | *p* |
| Females under 10 years | 0.61 | 0.78 | 0.57 | 0.81 | 0.19 | 0.85 |
| Females 11-20 | 0.61 | 0.70 | 0.53 | 0.83 | 0.39 | 0.70 |
| Females 21-50 | 0.94 | 0.54 | 0.87 | 0.59 | 0.49 | 0.63 |
| Females over 50 | 0.28 | 0.46 | 0.37 | 0.57 | -0.65 | 0.52 |
| Males under 10 | 0.78 | 1.06 | 0.51 | 0.79 | 1.17 | 0.25 |
| Males 11-20 | 0.61 | 0.70 | 0.84 | 0.91 | -1.00 | 0.32 |
| Males 21-50 | 1.06 | 1.00 | 1.00 | 1.62 | 0.14 | 0.89 |
| Males over 50 | 0.28 | 0.46 | 0.37 | 0.49 | -0.74 | 0.46 |
| Total kids ≤ 10 years | 1.39 | 1.20 | 1.09 | 1.15 | 0.99 | 0.33 |
| Total members age 11-21 | 1.22 | 0.88 | 1.37 | 1.21 | -0.49 | 0.62 |
| Total adults (>21) | 2.56 | 1.69 | 2.61 | 1.65 | -0.13 | 0.89 |
| Total household members | 5.11 | 1.97 | 4.84 | 1.85 | 0.54 | 0.59 |
| Total number of consumers on-farm | 5.17 | 2.07 | 4.91 | 1.95 | 0.48 | 0.63 |
| Total number producers on-farm | 3.22 | 1.93 | 3.09 | 1.72 | 0.29 | 0.77 |
| Producer to consumer ratio | 0.58 | 0.22 | 0.64 | 0.24 | -0.89 | 0.38 |
| No. of groups farmer belongs to | 3.39 | 2.03 | 2.03 | 1.06 | 3.92 | 0.01** |
| Total number of livestock | 6.94 | 2.98 | 6.24 | 3.95 | 0.70 | 0.49 |
| Number of improved goats | 0.67 | 1.03 | 0.81 | 1.29 | 1.15 | 0.25 |
| Number of improved goats sold | 0.67 | 1.03 | 0.81 | 1.29 | -0.45 | 0.65 |
| Education of respondent (total years) | 7.06 | 3.49 | 6.59 | 3.58 | 0.50 | 0.62 |
| Land size of respondent (acres) | 3.41 | 1.86 | 4.68 | 4.13 | -1.27 | 0.06* |

*Approaches significance; **significant

Table A-7. Contingency table on gender and participation in merry-go-rounds

| Gender | Member | Non-member | Total |
|---|---|---|---|
| Female | 14 | 29 | 43 |
| Male | 4 | 41 | 45 |
| Total | 18 | 70 | 88 |

*Note*: $X^2$ (1, n = 88) = 7.57; $p < 0.0$

Table A-8. Binary regression analysis for participation in merry-go-rounds (n = 18)

| | B | S.E. | Wald | df | *p* | Exp (B) |
|---|---|---|---|---|---|---|
| No. of groups farmer is in | 1.43 | 0.40 | 12.72 | 1 | 0.00 | 4.18 |
| Gender[a] | 2.92 | 0.88 | 10.97 | 1 | 0.00 | 18.49 |
| Women's group | 1.76 | 1.05 | 2.80 | 1 | 0.09 | 5.80 |
| Church group | 2.69 | 0.94 | 8.27 | 1 | 0.00 | 14.76 |

[a] 0 = female; 1 = male

*Note*: $X^2$ (4, n = 18) = 36.44; $p < .00$

Table A-9. Factors affecting participation in water groups

| Response | Member (n = 18) | | Non-member (n = 70) | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | *t* | *p* |
| Females under 10 years | 0.61 | 0.85 | 0.57 | 0.79 | 0.19 | 0.85 |
| Females 11-20 | 0.44 | 0.86 | 0.57 | 0.79 | -0.60 | 0.55 |
| Females 21-50 | 1.00 | 0.77 | 0.86 | 0.52 | 0.94 | 0.35 |
| Females over 50 | 0.39 | 0.50 | 0.34 | 0.56 | 0.32 | 0.75 |
| Males under 10 | 0.44 | 0.70 | 0.60 | 0.89 | -0.67 | 0.49 |
| Males 11-20 | 0.72 | 0.75 | 0.81 | 0.91 | -0.40 | 0.69 |
| Males 21-50 | 1.11 | 1.02 | 0.99 | 1.62 | 0.31 | 0.76 |
| Males over 50 | 0.44 | 0.51 | 0.33 | 0.47 | 0.91 | 0.36 |
| Total kids $\leq$ 10 years | 1.06 | 1.16 | 1.17 | 1.17 | -0.38 | 0.71 |
| Total members age 11-21 | 1.17 | 1.10 | 1.39 | 1.16 | -0.72 | 0.47 |
| Total adults (>21) | 2.94 | 1.30 | 2.51 | 1.73 | 0.99 | 0.32 |
| Total household members | 5.22 | 1.63 | 4.81 | 1.92 | 0.83 | 0.41 |
| Total number of consumers on-farm | 5.17 | 1.58 | 4.91 | 2.06 | 0.48 | 0.63 |
| Total number producers on-farm | 3.28 | 1.67 | 3.07 | 1.78 | 0.44 | 0.66 |
| Producer to consumer ratio | 0.61 | 0.29 | 0.63 | 0.23 | -0.31 | 0.76 |
| No. of groups farmer belongs to | 3.56 | 1.82 | 1.99 | 1.10 | 4.67 | 0.00*** |
| Total number of livestock | 6.72 | 4.93 | 6.30 | 3.45 | 0.42 | 0.67 |
| Number of improved goats | 3.28 | 2.74 | 3.44 | 2.96 | -0.21 | 0.83 |
| Number of improved goats sold | 0.72 | 1.02 | 0.80 | 1.29 | -0.24 | 0.81 |
| Education of respondent (total years) | 7.72 | 3.66 | 6.41 | 3.50 | 1.40 | 0.16 |
| Land size of respondent (acres) | 5.38 | 5.04 | 4.17 | 3.42 | 1.21 | 0.23 |

***Highly significant

Table A-10. Contingency table on gender and participation in water groups

| Gender | Member | Non-member | Total |
|---|---|---|---|
| Female | 4 | 39 | 43 |
| Male | 14 | 31 | 45 |
| Total | 18 | 70 | 88 |

*Note*: $X^2$ (1, n = 88) = 6.43; $p < .01$

Table A-11. Contingency table on water source and participation in water groups (n = 18)

| Water Source | Member | Non-member | Total |
|---|---|---|---|
| Piped | 11 | 33 | 44 |
| Borehole/well | 1 | 7 | 8 |
| Stream/river | 6 | 26 | 32 |
| Other | 0 | 4 | 4 |
| Total | 18 | 70 | 88 |

*Note*: $X^2$ (3, n = 88) = 1.96; $p < .58$

Table A-12. Contingency table on wealth level and participation in water groups (n = 18)

| Wealth Level | Member | Non-member | Total |
|---|---|---|---|
| Below average | 3 | 22 | 25 |
| Average | 9 | 39 | 48 |
| Above average | 6 | 9 | 15 |
| Total | 18 | 70 | 88 |

*Note*: $X^2$ (2, n = 88) = 4.71; $p < .10$

Table A-13. Binary regression analysis for participation in water groups (n = 18)

| | B | S.E. | Wald | df | *p* | Exp (B) |
|---|---|---|---|---|---|---|
| Gender[a] | -2.95 | 0.93 | 10.01 | 1 | 0.00 | 0.05 |
| No. of groups farmer is in | 1.85 | 0.46 | 15.93 | 1 | 0.00 | 6.34 |
| Clan group member | 2.77 | 0.99 | 7.81 | 1 | 0.01 | 16.03 |

[a] 0 = female; 1 = male

*Note*: $X^2$ (3, n = 18) = 37.68; $p < .00$

Table A-14. Factors affecting participation in women's groups

| Response | Member (n=39) | | Non-member (n=49) | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | *t* | *p* |
| Females under 10 years | 0.29 | 0.61 | 0.64 | 0.82 | -1.51 | 0.13 |
| Females 11-20 | 0.71 | 0.99 | 0.51 | 0.76 | 0.86 | 0.39 |
| Females 21-50 | 0.79 | 0.58 | 0.91 | 0.58 | -0.71 | 0.48 |
| Females over 50 | 0.57 | 0.76 | 0.31 | 0.49 | -1.18 | 0.23 |
| Males under 10 | 0.14 | 0.36 | 0.65 | 0.90 | -2.07 | 0.00*** |
| Males 11-20 | 0.71 | 0.83 | 0.81 | 0.89 | -0.38 | 0.71 |
| Males 21-50 | 1.00 | 1.18 | 1.01 | 1.57 | -0.03 | 0.98 |
| Males over 50 | 0.21 | 0.43 | 0.38 | 0.49 | -1.18 | 0.21 |
| Total kids ≤ 10 years | 0.43 | 0.65 | 1.28 | 1.19 | -3.87 | 0.00*** |
| Total members age 11-21 | 1.43 | 1.55 | 1.32 | 1.06 | 0.31 | 0.76 |
| Total adults (>21) | 2.57 | 1.45 | 2.61 | 1.69 | -0.08 | 0.94 |
| Total household members | 4.43 | 2.06 | 4.99 | 1.82 | -1.03 | 0.31 |
| Total number of consumers on-farm | 4.43 | 2.07 | 5.07 | 1.95 | -1.12 | 0.27 |
| Total number producers on-farm | 3.21 | 2.01 | 3.09 | 1.71 | 0.23 | 0.82 |
| Producer to consumer ratio | 0.67 | 0.28 | 0.62 | 0.23 | 0.78 | 0.44 |
| No. of groups farmer belongs to | 2.50 | 1.16 | 2.27 | 1.46 | 0.55 | 0.58 |
| Total number of livestock | 6.71 | 3.89 | 6.32 | 3.77 | 0.35 | 0.73 |
| Number of improved goats | 3.07 | 3.25 | 3.47 | 2.85 | -0.47 | 0.64 |
| Number of improved goats sold | 0.50 | 0.94 | 0.84 | 1.28 | -0.94 | 0.35 |
| Education of respondent (total years) | 7.07 | 4.16 | 6.61 | 3.45 | 0.45 | 0.66 |
| Land size of respondent (acres) | 5.81 | 5.14 | 4.16 | 3.48 | 1.50 | 0.14 |

***Highly significant

Table A-15. Binary regression analysis for participation in women's groups (n = 14)

| | B | S.E. | Wald | df | *p* | Exp (B) |
|---|---|---|---|---|---|---|
| No. of groups farmer is in | 0.74 | 0.37 | 3.92 | 1 | 0.05 | 2.09 |
| Age[a] | -2.60 | 0.95 | 7.49 | 1 | 0.01 | 0.07 |
| Total kids under 10 years | -3.47 | 1.11 | 9.88 | 1 | 0.00 | 0.03 |
| Church group member | 1.56 | 0.95 | 2.71 | 1 | 0.10 | 4.76 |
| Gender[b] | 3.36 | 1.25 | 7.26 | 1 | 0.01 | 28.86 |
| Total number of producers | 0.59 | 0.29 | 4.11 | 1 | 0.04 | 1.81 |
| Producer to consumer ratio | -9.46 | 3.78 | 6.27 | 1 | 0.01 | 0.00 |

[a] 1 = $\leq$30; 2 = 31-49; 3 = $\geq$50

b 0 = female; 1 = male

*Note*: $X^2$ (7, n =14) = 37.50; df = 7; $p < .00$

APPENDIX B
SEMI-STRUCTURED INTERVIEW TOPIC GUIDE

*Extending Technologies Among Small-Scale Farmers in Meru: Ingredients for Success in Farmer Groups*

---

Date: _____

Name: _____

Address:

_____

Gender: _____

Position: _____

Tell me about your group or organization or what you do in extension:

_____

_____

_____

What organizations or groups are providing agricultural services in your area?

_____

_____

_____

Where do farmers get agricultural information? What are the best/most reliable/most accessible/most frequent sources according to the farmers?

_____

Do groups and/or their members have a role to play in disseminating technologies and information to other farmers? If so how do they do so?

Has information on fodder trees or fodder germplasm for dairy animals been disseminated by you, your group or anyone else in your area? If so, to whom & how?

How do you define a successful farmer group in terms of extending information and technologies? How would you say ICRAF/FARM Africa/the farmers define them?

What makes farmer groups successful at disseminating information and technology?

How do you know that farmers have adopted a technology?

What percent of farmers in this area would you say are in groups? Why do they join?

Does everybody in a community participate in groups? How do they decide to participate? Who doesn't participate? Why not?

How do you define the poor/most vulnerable farmers in your area? What would characterize the poorest farmers in a community? Can you categorize by most vulnerable group, the least vulnerable and the average?

Do farmer groups work or link with other farmer groups? If so give examples.

Do farmer groups network or link with other service providers in the area? If so who?

How can farmers and farmer groups best be facilitated in disseminating information?

Do you have any other comments to add?

APPENDIX C
LETTER OF INVITATION TO INTERVIEW FOR GROUPS

8 December 2003

Ndika Ndoto Dairy Goat Group

Bwana/Madame Chairperson:

Group meeting on Monday 15 December 2003

Kristin Davis, together with FARM-Africa, World Agroforestry Centre (ICRAF) and the University of Florida is researching the role of farmer groups in the spread of technology and information in Meru Central District.

We are happy to inform you that your group has been chosen to take part in this study. Your contribution will be greatly appreciated and will help to provide all stakeholders with valuable information on the dissemination of technology among farmers, and the role that farmer groups play in this important aspect of rural development.

In order to get the information we need, as well as out of respect to the group members' schedules at this time of year, we would respectfully request that you only send six members to the meeting. Because we would like to have a balance of people, please send two leaders and four group members. Please also try to make a balance between male and female members (three of each if possible) as well as between wealthier and less wealthy farmers. However, remember we want no more than six group members in all.

The research team will arrive at your group at 10:00 am to begin the meeting promptly, and will leave by 12:00 pm. We thank you for your cooperation in this research project.

Sincerely,

Kristin Davis
PhD Researcher

APPENDIX D
INTERVIEW SCHEDULE FOR GROUPS

Schedule # _____ Date & Time: _____

Interviewer (translator): Observer(s) _____

_____

---

*1. Group Name:* _____ *8. Altitude* _____

*2. Village:* _____ *9. Latitude* _____

*3. Sub-location:* _____ *10. Longitude* _____

*4. Location:* _____ *11. Number of members in group:*___

*5. Division:* _____ *12. Number of men:* _____

*6. Agroecological zone (circle one)* *13. Number of women:* _____
*1 UM2 (high potential)*
*2 UM3 (medium potential)* 14. When group started: _____
*3 LM4 (low potential)*

7. Number Interviewed: _____ (See attached sheet for particulars)

**Participatory Activity: Timeline (Objective 2: Factors: Group history)**
Group History: Make a timeline: graph numbers, members, activities, successes, failures. Use a piece of flip chart paper to diagram the history of your group since you started the dairy goat project. When did it start, how did it start, what have your activities been, how many members in the various years (has it increased, declined, stayed the same), gender of members, what events impacted your group. Has group changed focus since it started?

**Objective 2: Factors: Group structure: (formality)**
*15. Is the group a FARM Africa-supported group? (Circle one: Yes / No)*

16. List group activities (List all from Box A): _____

17. What is the main purpose or objectives of the group or most important activity? (From Box A) _____

18. How good are you at this activity?
1 Not good at all
2 A little good
3 Very good

**A. Response codes (16 & 17)**
1 Dairy goats
2 Income generation
3 Merry-go-round
4 Fellowship
5 Women group
6 Other: _____

19. How many activities does the group undertake? (Circle appropriate answer)
1 One major activity
2 Two activities
3 Three activities
4 Four or more activities

20. Is the group registered with the Ministry of Culture & Social Services? (Circle one: Yes / No)
21. If no, does the group have a constitution? (Circle one: Yes / No)
22. If no, does the group have a bank account? (Circle one: Yes / No)
23. If no, does the group have written by-laws? (Circle one: Yes / No)

24. Is the group registered with MGBA? (Circle one: Yes / No)

25. How often does the group regularly meet? (Circle the closest answer)
1 Weekly or more frequently
2 Biweekly (every 2 weeks)
3 Monthly
4 Bimonthly (every 2 months)
5 Less than 6 times a year
6 Other: _____

**B. Response codes (26)**
1 None 5 Be a woman
2 Church member 6 Do group work
3 Pay a fee/contribute 7 Be "poor"
4 Community member 8 Other: _____

26. What are the requirements if any for being a member of this group? (From Box B-list all) _____

27. Do you have penalties for rule breaking or for certain behavior? If so, what (From Box C- list all)? _____

**C. Response codes (27)**
1 Fine
2 Ask to leave
3 Nothing
4 Other: _____

**Objective 2: Factors: Group Functioning**

28. How many buck stations does the group have? _____

29. How many breeding stations does the group have? _____

30. Number of individual farmers who have buck and/or breeding stations: _____

31. Number of individual members registered in MGBA :_____

32. Number of trainings group has received since start of group: _____

33. Number of tours group members have been on since start of group: _____

34. Where do group members market farm products? _____

**Objective 1: Mechanisms for Dissemination**

35. How many of your members are members of other groups such as co-ops, church groups or merry-go-rounds? _____

36. As a group, what are your most important sources of information and technology? (List and rank in order of importance from 1-3 from Box D)

1 _____
2 _____
3 _____

**D. Response codes (36)**
1 Government extension
2 Another farmer
3 Farmer group you belong to
4 FARM-Africa
5 Market
6 Radio
7 Church
8 Baraza
9 Other: _____

37a. Does your group tell other farmers about new information and technologies? (Circle one: Yes / No)

37b. If yes, to how many farmers in the past year? _____

37c. If yes, what ways has the group used to tell other farmers?

_____

38. How many buck services does your group provide to <u>group members</u> in the last month? _____

39. How many buck services does your group provide to <u>non-members</u> in the last month? _____

40. How many of your neighbours have cross-bred goats and/or improved goat housing? (From Box E) _____

**E. Response code (40)**
1 None
2 Some
3 Many
4 All

41a. Does your group train other farmer groups?
(Circle one: Yes / No)
41b. If yes, number of times the group did so in the last year ___

42. How do you rate your group as far as success in disseminating information and technologies?
*1 Very strong*
*2 A little strong*
3 Neutral
*4 A little weak*
*5 Very weak*

43a. Has the group received training on improved fodder for livestock?
(Circle one: Yes / No)
43b. If yes, who trained the group (Box F)? _____
43c. If yes, how many members were trained? _____
43d. If yes, did the group train other farmers outside the group?
(Circle one: Yes / No)
43e. If yes, how many non-members? _____

**F. Response code (43b)**
1 FARM
2 Extension
3 KARI
4 Other: _____

44. Estimate the number of members who have planted improved fodder trees on-farm specifically for dairy animals (From Box G):

| Amount of fodder trees | Number of members |
|---|---|
| 0 | a. |
| 1-50 | b. |
| 51-100 | c. |
| >100 | d. |

**G. Response code (44 & 45f)**
1 None
2 Some
3 Many
4 All

45a. Has your group sold improved fodder trees or seed? (Circle one: Yes / No)
45b. If yes, how much/many? _____
45c. Has your group given improved fodder trees or seed? (Circle one: Yes / No)
45d. If yes, how much/many? _____
45e. If yes to a) and c), to approximately how many people? _____sold;_____given
45f. How many of your neigbours have planted improved fodder (From Box G)? ___

46. List three names of people who've received breeding services from your group:
_____

**Objective 2: Factors: Leadership Quality (degree of democracy/participation)**
47. Group leaders: fill in chart

| Group leaders' names | Position | Age | Gender | Wealth level* |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

***Wealth levels**
1 Below average for the group
2 Average
3 Above average

How do you feel about the following statements: (write in appropriate number)
*1 Agree strongly*
*2 Agree somewhat*
*3 Neither agree nor disagree*
*4 Disagree somewhat*
*5 Disagree strongly*
48. We have the opportunity to participate in group decision making. _____
49. We feel that the group leadership is good. _____
50. Group leadership is participatory. _____

**Objectives 2 & 3: Factors: Group Heterogeneity; Participation**
51. When you think about the members of this group, are <u>most</u> of them of the *same* or *different*…(tick appropriate column)

| | Same | Different |
|---|---|---|
| A. Village or community | | |
| B. Ethnic group or tribe | | |
| C. Clan | | |
| D. Gender | | |
| E. Age | | |
| F. Religion/church | | |
| G. Occupation | | |
| H. Economic group or wealth ranking | | |

52a. How many members of your group finished secondary school? _____
52b. How many members of your group finished primary school? _____

How do you feel about the following statements: (write in appropriate number)
*1 Agree strongly*
*2 Agree somewhat*
*3 Neither agree nor disagree*
*4 Disagree somewhat*
*5 Disagree strongly*
53. The group keeps good records on activities. _____
54. Group members regularly participate in most group activities. _____
55. The benefits from the group are the same for every member. _____
56. This group is very unified. _____
57. There is much jealousy in this group. _____
58. People get along very well in this group. _____
59. There is a lot of cooperation in this group. _____
60. Our group has many conflicts. _____
61. The poorest farmers in the village are present in our group today. _____
62. The richest farmers in the village are present in our group today. _____
63. Our group has people from all wealth levels today. _____

64. In your group, how many members have…
a. No goats or cows: _____
b. Goats only: _____
c. Goats and cows, or cows only: _____

65. Compared to the non-group members who live in your same village, does your group have:
1 Less amounts of livestock than people in the village
2 About the same amount of livestock as people in the village
3 More livestock than people in the village

66a. Are there people that cannot or will not participate in groups in this village? (Circle one: Yes / No)
66b. If so why? (From Box H) _____

**H. Response codes (66b)**
1 Don't need to
2 Don't have enough money
3 Don't have time
4 Fear group set up/by-laws
5 Too much commitment
6 Not allowed to
7 Lack of knowledge/information
8 Other: _____

**Participatory Activity: Venn Diagram (Objectives 2 & 4; Linkages & Factors)**
Venn Diagram: Linkages/connectedness; important organizations in the area
Use these circles to represent various organizations, groups, people and service providers in your area—within the village and outside. Think of local, regional, national and international levels. They can be any organization that works in the area (NGOs, farmer groups, government, private). Use bigger circles to represent more important organizations. Then place them on the paper in a way that shows how they relate to each other and to your group. How frequently do you interact?

APPENDIX E
INTERVIEW SCHEDULE FOR INDIVIDUALS

Schedule # _____ Date & Time: _____

Interviewer (translator): Observer(s) _____

_____

---

**Basic Information**

1. Name of respondent:

_____

2. Name of household head: (if different): _____

3. Gender of respondent (circle):
   1 Female
   2 Male

4. Village _____

5. Sub-location _____

6. Location_____

7. Division _____

8. List and rank (From Box A):
Household's three most important food crops:
1 _____
2 _____
3 _____

9. List and rank (From Box A):
Household's three most important cash enterprises:
1 _____
2 _____
3 _____

**A. Response codes (8 & 9)**
1 Bananas
2 Beans
3 Coffee
4 Cotton
5 Dairy
6 Goats
7 Maize
8 Mango
9 Papaya
10 Potatoes
11 Sorghum
12 Sweet potatoes
13 Tobacco
14 Other: _____

10. Animals on farm and sales. Give numbers of:

| Description/Activity | Cows-improved | Cows-local | Goats-improved | Goats- local |
|---|---|---|---|---|
| Dairy animals | a. | b. | c. | d. |
| Animals sold last year | e. | f. | g. | h. |

**Objective 1: Mechanisms of Diffusion**

11. What are your most important sources of information and technology? (List from Box B and rank from 1-3 in order of importance)

1 _____
2 _____
3 _____

**B. Response codes (11)**
1 Government extension
2 Another farmer
3 Farmer group you belong to
4 FARM-Africa
5 Market
6 Radio
7 Church
8 Baraza
9 Other: _____

12a. Do you get information on agriculture and/or livestock through your church?
(Circle one: Yes / No)

12b. Which church do you attend? (Circle one)

1 None
2 Anglican
3 Catholic
4 Full Gospel
5 Methodist
6 Other: _____

13. In the past month, how many times if any did you attend meetings where agricultural information is available? (Circle closest answer)

1 Zero
2 Once
3 Twice
4 Three or more

14a. How many tours and/or trainings have you been on in the past 5 years? _____
14b. What were they for or about? _____

15a. Have you <u>received</u> anything new and/or information on agriculture and/or livestock *from other farmers* in the past 5 years? (Circle one: Yes / No)
15b. If yes, what was the last information/technology you received from other farmers? _____
15c. If yes, from whom? (From Box C-list all) _____
15d. If yes, have you used it? (Circle one: Yes / No)
15e. If yes, how useful was it? (Circle one)

1 Not very useful
2 Somewhat useful
3 Quite useful
4 Very useful

**C. Response codes (15c & 16c)**
1 Neighbour
2 Friend
3 Relative
4 Farmer from another location
5 Other: _____

16a. Have you trained and/or told other farmers about new technologies or information in the past 5 years? (Circle one: Yes / No)
16b. If yes, to whom? (From Box C-list all) _____

16c. If yes, approximate how many farmers (Box D)_____
16d. If yes, have they used it? (Circle one: Yes / No)

**D. Response code (16b)**
1 Few (1-5)
2 Some (6-10)
3 Many (>11)

17a. Have you purchased and/or been given an improved dairy goat or crossbred? (Circle one: Yes / No)
17b. If yes, did you also receive information with it? (Circle one: Yes / No)
17c. If so, from where? (From Box E-list all) _____
17d. If yes, how useful was it? (Circle one)
1 Not very useful 3 Quite useful
2 Somewhat useful 4 Very useful

**E. Response codes (17c)**
1 Buck keeper
2 Dairy goat group
3 Extension
4 FARM-Africa
5 Neighbour
6 Other:

18a. How long does it take to get to the closest buck station? _____(min)
18b. Have you taken your local goats for cross-breeding with improved dairy goats? (Circle one: Yes / No)
18c. If yes, how many cross-bred kids have you obtained? _____
18d. If yes, did you also receive information on the goats? (Circle one: Yes / No)
18e. What was it about? _____

18f. If yes, have you used the information? (Circle one: Yes / No)
18g. If yes, how useful was the information? (Circle one)
1 Not very useful 3 Quite useful
2 Somewhat useful 4 Very useful
18h. Will you continue to take local goats for breeding? (Circle one: Yes / No)
18i. Have you built or do you know how to build an improved goat house? (Circle one: Yes / No)

19a. Do you have <u>improved</u> fodder trees for goats planted on your farm? (Circle one: Yes / No)
19b. If so, where did you obtain the <u>improved</u> fodder plants? (Circle <u>all</u> that apply)
1 FARM-Africa 3 From another farmer
2 Government extension 4 KARI/ICRAF
3 Local nursery 5 Other: _____

1 Calliandra
2 Leucaena
3 Sesbania
4 Other:_____

19c. If so, give types and number (see codes):

| **Type** | **Number** |
|---|---|
| | |
| | |
| | |
| | |

20a. Have you given away or sold any <u>improved</u> fodder plants or seed? (Circle one: Yes / No)
20b. If yes, what kinds? _____

20c. If yes, to whom (From Box C)? _____
20d. If yes, how many seeds/seedlings? _____
20e. If yes, to about how many people in the past year? _____
20f. If yes, list some names of people you've given/sold to: _____

**Objective 2: Household Characteristics**

21. Household head: (put age code in the "age" box and write in years of schooling)

| A. Gender | B. Age* (years) <30 | 31-49 | >50 | C. Level of education |
|---|---|---|---|---|
| Male | | | | |
| Female | | | | |

***Age code**
1 <30 years
2 31-49
3 >50

22a. How many people live on the farm more than six months of the year? _____
22b. Of these people, place the number of household members in age category:

| **Gender** | **Age (years)** | | | |
|---|---|---|---|---|
| | Under 10 | 11-20 | 21-50 | Over 50 |
| Female | i. | ii. | iii. | iv. |
| Male | v. | vi. | vii. | viii. |

23. Type of household:
1 Male with spouse(s)
2 Male- single
3 Male- wife away
4 Female- husband away (she makes decisions)
5 Female- single
6 Other: _____

24. Total size of land at household, away from household, rented and owned
_____(acres)

25. Do you have a title deed to your land where you live? (Circle one: Yes / No)

26. Do you have any source of income off the farm? (Circle one: Yes / No)

Objectives 2 & 3: Leadership & Participation in Groups

27. How many groups are you a member of? (Circle appropriate number*)
0 1 2 3 or more groups
*If 0…… skip to question #47

28. Names/types of groups (Box F): _____

29a. Is one of them a dairy goat group? (Circle one: Yes / No)
29b. If yes, which one? _____
29c. If no, which is the most important group to which you belong (From Box F)?*_____
……..…* skip to question #35

30. Are you a member of MGBA and/or MAHWG? (Circle one: Yes / No)

31. Are you a community animal health worker (CAHW)? (Circle one: Yes / No)

32. Are you a buck keeper for the group? (Circle one: Yes / No)

33. Are you a breeder for the group? (Circle one: Yes / No)

34. Are you an individual buck keeper or breeder? (Circle one: Yes / No)

**F. Response codes (29c)**
1 Dairy goat group
2 Other farmer group
3 Women group
4 *Kuriunganira* (merry go round)
5 Church group
6 Water group
7 Other: _____

**G. Response codes (31)**

| | |
|---|---|
| 1 Member | 5 MGBA |
| 2 Chair | 6 CAHW |
| 3 Secretary | 7 Committee |
| 4 Treasurer | 8 Other: |

35. Position in dairy goat group or main group (From Box G): _____

36. How many hours in a month do you participate in this group's activities? _____

37. How many other groups in a year does your group fellowship with, share information with, visit and/or train? ___

38. Why did you join the group? (Select all from Box H) ____

39. What are the requirements for joining this group? (Select all from Box I)_____

**H. Response codes (38)**

| | |
|---|---|
| 1 Increase income | 4 Fellowship |
| 2 Gain benefits | 5 Labour/work |
| 3 Market products | 6 Access services |
| 4 Help in emergency | 7 Other: _____ |

**I. Response codes (39)**

| | |
|---|---|
| 1 None | 4 Be a woman |
| 2 Church member | 5 Do group work |
| 3 Community member | 6 Pay a fee |
| 4 Age | 7 Other:_____ |

**How do you feel about the following statements:**

| | |
|---|---|
| 1 Agree strongly | 4 Disagree somewhat |
| 2 Agree somewhat | 5 Disagree strongly |
| 3 Neither agree nor disagree | |

**J. Response code (44b)**
1 Few (1-5)
2 Some (6-10)
3 Many (>11)

40. I have the opportunity to regularly participate in group decision making. _____
41. I believe that the group leadership is good. _____
42. Our group has much unity (*uromwe*). _____
43. There is much jealousy (*roritho*) in this group. _____
44a. The group tells many others of new things in agriculture/livestock. _____
44b. How many farmers and/or groups have they told (From Box J)? _____
45. The poorest farmers in the community are present in farmer groups today. _____
46. The richest farmers in the community are present in groups today. _____

47. If there people who do not participate in groups in this area, why not? (From Box K) _____

48. If you are not a member of a group, why not? (From Box K) _____

----------*STOP HERE AND THANK FARMER*----------

*Wealth Level* (Enumerator)

*49. Is the farmer…(circle one)*

*1 Below average resources for the area*
*2 Average*
*3 Above average*

*50. Construction of main house is….(circle closest)*

*1 Permanent roof and walls*
*2 Semi-permanent (permanent roof &timber walls)*
*3 Permanent roof and mud walls*
*4 Thatch roof and permanent walls*
*5 Thatch roof and mud walls*
*6 Other:* _____

*51. Source of water (circle)*

*1 Piped*
*2 Borehole/ well*
*3 Stream/ river*
*Other:* _____

**K. Response Codes (47)**
1 Don't need to
2 Don't have enough money
3 Don't have time
4 Fear group set up/by-laws
5 Too much commitment
6 Not allowed to
7 Lack of knowledge/information
8 There are no such people
9 Other:

APPENDIX F
INFORMED CONSENT

**Protocol Title:**
**Increasing Fodder Tree Usage Among Small-Scale Farmers**
**Dissemination by Dairy Goat Farmers in Meru, Kenya**

My name is Kristin Davis. I am a student in agriculture from the University of Florida and am working with Steve Franzel of ICRAF, the International Centre for Research in Agroforestry. I would like to talk to you about your farm or organization and the agricultural extension providers in the area where you live or work. The purpose of this research study is to learn more about how groups promote technologies.

Thank you for agreeing to participate in this study. I would like to ask you some questions about your farming practices and the groups that you are a part of. By answering the questions you have agreed to take part in the study. Your participation is completely voluntary. You are free to answer only the questions you choose and to stop the interview at any time. The interview should take about one hour. Please let me know if you have any questions about the interview or study.

With your permission I might record the interview with an audiocassette. If so only I will have access to it and will destroy the tape after collecting the data and removing your name. All your answers will be confidential. Your answers will not be linked with your name in the study—when I compile the data I will remove all names. There is no penalty for not participating. There is no compensation for participating. There are no known benefits or risks.

The results of this study will be made available to the farmer groups involved and to ICRAF. If you'd like to learn more about this study, please contact me by email at mkulima@ufl.edu or by post via ICRAF (PO Box 30677, Nairobi; Tel. 524000/ email icraf@cgiar.org. If you have questions about your rights as a research participant, please contact the UFIRB Office, Box 112250, University of Florida, Gainesville, FL, 32611-2250, USA; tel. 352-392-0433.

**Agreement:**

By answering the questions, I voluntarily agree to participate in the procedure.

Participant_____ Date:_____

Principal Investigator_____ Date:_____

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## BIOGRAPHICAL SKETCH

Kristin Elizabeth Davis was born December 6, 1969 in Syracuse, New York. With her missionary parents, she moved to Kenya when she was two years old. She grew up in the Pokot tribal area of Baringo District, and attended Rift Valley Academy in Kenya. Upon graduation from high school, she returned to the United States for college, where she received a B.S. in biology at Messiah College near Harrisburg, Pennsylvania. Following her undergraduate degree, she interned at Educational Concerns for Hunger Organization (ECHO) where she learned about tropical agriculture and the particular problems facing small-scale farmers. This was followed by a stint in Kenya, working in agricultural development for three and a half years. During this time, she saw the need for further studies in order to be more effective in this field, and returned to Florida to pursue a degree in farming systems and international agricultural extension.