THE IMPACT OF DAIRY PRODUCTION ON RURAL LIVELIHOODS IN
HAI DISTRICT, TANZANIA

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN
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ABSTRACT

This study was conducted in Hai District, Kilimanjaro Region in order to determine the impact of milk production on rural livelihood. Specifically the study aimed to (i) determine levels of milk production among small scale dairy farmers (ii) explore market outlets of milk produced by dairy cattle keepers and (iii) assess impact of milk production on livelihoods. The study used both primary and secondary data. Primary data were collected from household survey in the study area using structured questionnaires. The collected secondary data included records of milk production, marketing and consumption. These were obtained from the District Livestock Development Office and from dairy cooperative office. Data were coded, entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 16 computer program. Descriptive statistics particularly frequencies and percentages were deployed in the analysis. Results of the study as per objective shows that, annual milk production ranged from a minimum of 600 litres per cow per year to a maximum of 3600 liters per cow per year. Furthermore, the result revealed that 37.1% of the respondents sold their milk to restaurant owners where 35.3% sold their milk to the dairy cooperative milk collection centers. Others sold their milk to milk vendor (19%), schools (6%) and 1.7% of them sold milk to other outlets including kiosk. Moreover, the study also showed that dairy production contributed directly to food security through consumption of milk and use of milk income to purchase food and household assets. It is therefore recommended that deliberate efforts should be made to promote small scale dairy cattle production. Furthermore, it is recommended that reliable market be provided to milk producer in order to encourage the smallholder farmers to increase milk production.
DECLARATION

I, ELIA NICODEMUS MACHANGE, do hereby declare to the Senate of Sokoine University of Agriculture, that this dissertation is my original work and that it has neither been submitted nor being concurrently submitted for degree award in any other institution.

ELIA NICODEMUS MACHANGE

(MSc Agricultural Education and Extension)

The above declaration is confirmed

Dr. D.L.MWASEBA

(Supervisor)
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DEDICATION

To my late father Nicodemus and my mother Elingikundisa Mariu who laid the foundation for my education.
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<tbody>
<tr>
<td>AI</td>
<td>Artificial Insemination</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>HIT</td>
<td>Heifer International Tanzania</td>
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<td>IFAD</td>
<td>International Fund for Agricultural Development</td>
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<td>ILRI</td>
<td>International Livestock Research Institute</td>
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<tr>
<td>MoAC</td>
<td>Ministry of Agriculture and Cooperatives</td>
</tr>
<tr>
<td>MWLD</td>
<td>Ministry of Water and Livestock Development</td>
</tr>
<tr>
<td>NGOs</td>
<td>Non Governmental Organizations</td>
</tr>
<tr>
<td>SACCOS</td>
<td>Savings and Credit Cooperative Societies</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>SUA</td>
<td>Sokoine University of Agriculture</td>
</tr>
<tr>
<td>TAS</td>
<td>Tanzanian Shillings</td>
</tr>
<tr>
<td>TDL</td>
<td>Tanzania Dairies Limited</td>
</tr>
<tr>
<td>UHT</td>
<td>Ultra High Temperature</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
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<td>URT</td>
<td>United Republic of Tanzania</td>
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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Cow milk is an important protein source that is universally accepted and consumed by majority of the world population wherever cattle are raised. World milk production from cattle is estimated at 502 325 000 metric tons per year (FAO, 2003a) with an average cow producing 5307 litres per lactation for top producing cows in the European Union (Morgan, 1999). Africa carries 16% of the world dairy livestock but produce less than 4% of global milk produce, with an average cow producing only 454 litres/year (Morgan 1999). Africa is estimated to produce 20 643 000 metric tons of milk annually.

Tanzania produced a total of 1.426 billion litres in 2006/07 from her herd of 18.8 million zebu and 560 000 crossbreed cattle. The production per cow is low, being 200 liters and 1800 litres/per annum for zebu and crossed breed respectively. An estimated 680 million liters of milk is consumed on-farm and about 210 million liters is marketed of which about 40 million liters is processed, thus contributing to household food (Urassa, 1999; Kurwijila and Boki, 2003). Currently, only a small proportion, (10% of marketable surplus of milk produced annually) is filtering through, into the urban markets and processing plants. Remoteness and poor infrastructures constitute the largest bottlenecks to collection and marketing of milk. Thus the milk produced is mostly consumed locally and quite often a significant amount is left for the calves (MWLD, 2006).

Furthermore, milk production in many parts of Tanzania is vital as it provides a major opportunity for poverty alleviation of smallholder farmers through sale of milk and it is sometimes the major source of animal protein in the human diet in rural areas.
Recommended milk consumption for the world stands at 105 litres/capita/year (URT, 2002). Milk consumption in Tanzania is estimated at 39 litres/capita/year, which is below the recommended consumption for Africa and far below that recommended for the world (URT, 2002). Kurwijila (2002a) reported that milk consumption has risen faster in urban and peri-urban areas of Tanzania than rural areas because of the growth in peri-urban dairy herds and the increased availability of milk and dairy products for urban consumer.

1.2 Dairy Production in Hai District

Livestock production is an integral part of the farming system in Hai District (Mdoe, 1993). Hai District dairying has been expanding, resulting in milk production above the amount that can be consumed locally in dairy producing villages. Low cash crop prices have made dairying an important income earner. However, development of smallholder dairy systems has been marked by declining farm size, upgrading to dairy breeds and an increasing reliance on purchased feeds both concentrates and forage. The dairy sub sector needs more inputs in terms of credit to farmers, feeds, pharmaceuticals and availability of milk processing plants to achieve optimal growth and good return to farmers. In late 1980 there were few research programmes conducted in Hai District on dairy cattle milk production. The study conducted by Urio and Mlay (1984) shows that dairy animal feeds are one of the major constraints facing small scale dairy cattle keepers. Grass carried on one head is not enough to feed dairy animal regardless of the quality and quantity. A survey of the marketing system for dairy products in Hai District suggests the absence of milk cooperative groups as marketing agents. The presence of a large number of small milk traders suggests that the market for dairy products in Hai District and nearby areas is competitive and not in the hands of few operators. In joining together to form more
cooperatives to undertake milk-marketing functions, dairy producers are setting up alternative marketing channels to those already available and thus raising the level of competition. These cooperatives are contributing effectively to market efficiency, by providing competition needed to prevent other market intermediaries from paying the farmers too little (Mdoe and Kurwijila, 1998).

1.3 Problem Statement

Small scale dairy production is important to the economy of Hai District as it contributes directly to the household economy and employment. Despite this, there are some constraints which hinder increased production. Such constraints include unavailability of credit, poor feeding due to lack of improved pasture and concentrates, low potential animal, land tenure, poor milk equipment and cooling facilities. Although many studies have been conducted in Hai District about dairy farming production, most of them concentrated on feeding, milk marketing, and fodder production (Urio and Mlay, 1984; Urio, 1985; Mdoe, 1998). However there is no up-to-date information about the impact of small scale dairy farming and the contribution of milk to the livelihood of rural households keeping dairy cattle. Thus this study will document and explore the impact of dairy production on rural livelihood in Hai District Tanzania.

1.4 Justification of the Study

In many parts of Tanzania milk production is vital as it provides a major opportunity for poverty alleviation of small scale dairy farmers through sale of milk, and is sometimes the major source of animal protein in the human diet in rural areas. Improving small scale dairy production is considered to be cost effective in increasing the availability of milk for public consumption and also improving the economic status of small scale dairy farmers. This research is important since it will generate information on the contribution of small scale dairy farming to poverty reduction through improvement of the small scale dairy
farmers, income and food. Such information could inform the design of relevant interventions aimed at improving the development of smallholder dairy production in Tanzania.

1.5 Objectives of the Study

1.5.1 General objective

To investigate the impact of dairy milk production on rural livelihoods in Hai District.

1.5.2 Specific objectives

1. To determine the level of milk production among dairy cattle keeping households.

2. To explore market outlets of milk produced by small scale dairy cattle keepers.

3. To assess the impact of small scale dairy milk production on livelihoods in terms of income, food and assets.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Concept of Livelihood
The “livelihood” concept has been extensively discussed among academics and development practitioners (Chambers and Conway, 1992; Bernstein et al., 1992; Ellis, 1998; Carney, 1998; Francis, 2000, 2002; Batterbury, 2001; Radoki, 2002). Generally, there is a consensus that livelihood is about the ways and means of ‘making a living’. However, different authors have defined and discussed livelihood in different ways. For example, according to Carney (1998) a livelihood comprises the capabilities, assets both material and social resources and activities required for a means of living.’ On the other hand, Ellis (2000) defined livelihood as ‘the activities, the assets, and the access that jointly determine the living gained by an individual or household’. Generally, these definitions and interpretations share common meaning that ‘livelihood’ deals with people, their resources and their utilization which has an impact on the livelihood.

2.2 Concept of Impact, Income, Food Security and Assets

2.2.1 Impact
According to FAO (2000a) impact refers to “the broad, long- term economic, social and environmental effects resulting from an intervention”. Furthermore, FAO(2000b) argues that impacts assess the process of identifying the actual impacts of a development intervention on those social, economic and environmental factors which the intervention is designed to affect. Like crop production, contribution of milk in livelihood is highly appreciated. Its impact on livelihood is not limited to income and food security alone; it goes beyond to acquisition of assets. Impact can be measured using intermediate goals and objectives of an intervention. In this study impact is simply measured in terms of income, food security and assets.
2.2.2 Income

The word income has been defined by several authors in various ways. Barr (2004) defined household income as the consumption and savings opportunity gained by an entity within a specified time frame, which is generally expressed in monetary terms. He concluded that households and individual’s income is the “sum of all the wages, salaries, profits, interest payments, rents and other forms of earnings received in a given period of time”.

On the other hand household income has been understood as consisting of all receipts whether monetary or in kind (goods and services) that are received by the household or by individual members of the household at annual or more frequent intervals, but excludes windfall gains and other such irregular and typically one time receipts (Case and Fair, 2007). They further comment that household income receipts are available for current consumption and do not reduce the net worth of the household through a reduction of its cash, the disposal of its other financial or non-financial assets or an increase in its liabilities. In the context of this study income is defined as total amount of money which small scale dairy cattle keepers get from selling of milk and its products, manure, live animal and hides.

2.2.3 Food security

Food security is defined as a situation whereby all people, at all time, have physical social and economic access to sufficient, safe and nutritious food which meet the dietary needs and food preferences for an active and health life (FAO, 2003b). It is further argued that food security is mostly concerned with food supply, usually in the form of grain stock and is applied at regional or district level. The definition is also supported by World Bank (2003:145) which defines food security as the access by all people at all times to enough
food for an active and healthy life. However, according to the World Bank, food security
encompasses many issues: It deals with production in relation to food availability,
distribution and consumption for the health of individuals. In the country which depends
on agriculture like Tanzania its food security can be attained mainly through improved crop
and livestock production.

2.2.4 Assets

Chimilila (2005) defined an asset as any item having economic value that is owned by an
institution or an individual. Furthermore reported that, assets are most commonly grouped
into current assets (items like cash, inventory, and accounts receivable that are currently
cash or expected to be turned into cash; fixed assets (items like land, buildings, and
equipment); and intangibles (items like copyrights, trademarks, brand names, and other
intellectual property which are not physical). According to Ellis (2000) assets are defined
as: human capital, physical capital, social capital, financial capital and natural capital.
Chimilila (2005) shows that, assets that people pursue depend heavily on the resources
they can access (by owning the resource, borrowing or renting) and use. All these forms of
assets by one way or another can be acquired through income from milk. Thus the impact
can be assessed in terms of household assets. The assets available to the household
represent the basic platform upon which the household livelihood may be built.

2.3 Milk Production

According to a report by FAO (2008) global milk production is estimated to expand by 2.2
% to 693 million tons in 2008 and by another 2.5 % to almost 710 million tons in 2009, a
far slower pace than in recent years. This growth prospects have been affected by a number
of factors as international markets have been responding to the historically high
international price levels of the past two years. Therefore on balance, prospects for the
world’s six major milk product exporters, which supply 77 percent of global trade, have improved somewhat in recent months. Their milk production is now expected to amount to 280 million tons (or 40 % of global production) and to grow 1.5 % in 2009.

Milk production in Africa is anticipated to advance by 1 % in 2008, consistently below world average growth, showing weaker supply response to the price spike according to FAO (2008). Most of the milk produced in Tanzania is reported in a study by Kyomo et al. (2006) is from northern regions of Tanzania (Kilimanjaro, Arusha, Mwanza, and Mara) with only small amounts of milk produced coming from eastern parts including Morogoro. According to Ministry of water and Livestock Development (MWLD) milk production in Tanzania is still low and does not meet the growing demand from the increasing human population (MWLD, 2003). Although MWLD reports that Tanzania produced a total of 1.426 billion litres of milk per annum this amount is still low and most are consumed at farm level.

However, there are cases where high quantity of milk production has been recorded for example Hai district in Kilimanjaro region have recorded high quantity of milk production beyond the amount that can be consumed locally in dairy producing villages (Mdoe and Nyange, 1995).

2.4 Milk Market Outlets

Milk marketing in Tanzania has been studied by several researchers including, Kurwijila et al. (2003), who found that most of the small scale dairy farmers sell their milk to the cooperatives and self help groups. As observed by Omore et al. (2004) raw milk is the primary product sold in most areas, although in some parts of Tanzania like Mwanza, cultured milk is important. The milk markets display a wide variety of interactions between
market agents and market channels. In some cases milk producers sell raw milk directly to consumers, with no other intermediaries while in other cases the trader also played the role of middlemen, by selling directly to the consumers (Omore et al., 2004).

A report by FAO (2008) describes an efficient milk marketing chain as one which enables farmers to receive at least 50% of the retail price of milk. In their observation the number of intermediaries involved will have a bearing on both producer and consumers milk price. The shorter the channel the more likely that the consumer price will be low and the producer will get a higher return. In general as observed by Mdoe and Nyange (1995), the overall picture of milk marketing system in Tanzania is characterized by multitude of channels and relatively long market chains, which tend to increase in complexity in larger urban areas where demand may be more differentiated.

Furthermore, Mdoe et al. (2002) reported that most development economists seem to believe that improvement in milk marketing systems is desirable for small dairy producers and traders, and more generally the poor in low income countries. Yet in allocating resources to promote dairy development in poor communities, the tendency has been to emphasize production and neglect investment in marketing. They argue that, relatively large investments are made in research, training and extension to promote milk production without similar investments designed to improve the milk marketing systems. Mdoe and Mnenwa (2004) point out that, constraints in milk marketing appear to exceed the advantages, despite the opportunities available for dairying in Tanzania. Also Mdoe (1993) reported that in Hai District, the opportunity of selling the surplus milk directly to consumers in the dairy producing villages has been declining over time due to increase in the number of households keeping dairy cattle.
2.5 Milk Consumption

Milk consumption and production are somehow related. In fact Mutagwaba (2005) reported that, consumption of milk has a catalytic effect in improving levels of milk production and processing. Thus the author calls for concerted efforts in cultivating a habit of taking milk as food/ drink especially by children hence the continued efforts in promoting milk consumption through annual milk consumption events such as annual milk week and school milk feeding programmes. Kurwijila and Boki (2003) reported that most of the milk produced in the country is consumed at farm level or sold to neighbors. Mwijarubi (2007) show that, volume of milk consumed in household per day remains too low and sometimes milk remain as food for children. The cause for such a low consumption rate in Tanzania, among others, is attributed to low production, cultural beliefs and traditional taboos making people refrain from consuming milk. The other important reason behind low milk consumption according to the author is that, most Tanzanians mainly from non cattle keeping communities do not have a milk drinking habit.

2.6 Impact of Milk Production on Livelihood

2.6.1 Impact of milk production on household income

For most farmers, the assurance of a daily income from milk sales is an important feature in their livelihood (Utiger et al., 2000). In a similar study conducted in Morogoro Municipality by Urassa and Raphael (2002) it was found that income or profit from the dairy enterprise is mainly used on the following activities: furnishing houses, house, construction/ rehabilitation, investing in other income generating activities, education and on other things (such food, health services). Thus, there are many advantages that small scale dairy farming brings to a community, but the most measurable is its impact on the income.
Furthermore a study conducted in southern highlands of Tanzania by Bayer and Kapunda (2006) observed that income from milk sales helped some smallholder families acquire additional land, improve their houses (and cattle sheds), finance small-scale businesses, send their children to secondary school, and expand their dairy business. Utiger (2000) established that, in two districts in Kenya, dairy cattle farming was cited as the most valued source of livelihood in terms of its profit, dependability and utility. The highest ranked advantage associated with dairy farming was milk for home consumption and income, followed in order of importance by manure production, direct income from the sale of livestock, meat, and self employment, resource for bride wealth and prestige, and bio-fuel. In essence, the advantages of dairy farming are tied to its dependability and reliability as a source of income.

2.6.2 Impact of milk production on household food security

It has been evident that, dairy cattle production contributes to household food security either directly through consumption of dairy cattle products or indirectly through use of income obtained from sales of dairy cattle products to purchase other food items (Minja, 2007). In Kagera Region Lwelamira et al. (2010) observed that apart from household income and values of durable assets, dairy farming households are better-off nutritionally compared to non-dairy farmers and hence relatively more food secure. The study indicates the potential role played by small scale dairy farming in reducing malnutrition whereby frequency of intake of milk as nutritious food stuffs, differed significantly between categories of dairy farmers and non-dairy farmers.

According to FAO (1996) livestock play an important role in food security by helping to alleviate seasonal food availability in many different ways. For example, liquid milk whose production is seasonally processed during periods of surplus into products such as butter,
curd, milk powder and cheese can be used throughout the year. Similarly, meat can be processed into various products such as dried, cured or smoked meat that can be used when other food sources are scarce. In a household, milk and other dairy products including manure, meat and live animals can be sold and the income obtained be used to purchase food and other household items. Increase in the ability to purchase food and consumption of milk at household level would improve the malnutrition that is contributed by lack of access to adequate calories, protein, vitamins and minerals.

Similarly, Mwakalobo and Shively (2001) noted that increase in income increases the ability to purchase food for the family to curb the food insecurity situation in more than 40% of the poor families in the tropics. Smallholder dairy cattle production is regarded as one of the best means of providing resource poor farmers with regular income to pay for children’s education and other family necessities such as food and health services.

2.6.3 Impact of milk production on household asset

Income obtained as a result of milk sales has significantly contributed to household assets. In a study conducted in Kagera Region by Lwelamira et al. (2010) showed that dairy farming households had significantly higher average annual income and were relatively better off in terms of value of assets owned compared to their counterparts. Furthermore, a study in southern highlands of Tanzania by Bayer and Kapunda (2006) reported that income from milk sales helped some smallholder families acquire assets like land and improve their house. Likewise Mwankemwa (2004) reported that household income, current value of durable assets and food security status of a household are among the measures of household welfare.

CHAPTER THREE
3.0 METHODOLOGY

In this chapter the following will be reviewed, the location of the study area, research design, sample procedure, population and sampling procedure, data collection method and data analysis.

3.1 Location of the Study Area

Hai District is located on the western part of Kilimanjaro Region. The District is bordered by Arumeru District to the west, Simanjiro District to the south, Moshi District to the east and Siha District to the north. Hai District has a population of 256,958 people. The number of household is 58,056 with an average of 4.5 people. The District, although classified as tropical savannah area, has considerable climatic variation due to influence of Kilimanjaro Mountain situated to the north eastern corner of the District. The rainfall ranges from 2000mm on the south slope of mountain Kilimanjaro to 400 mm in low land areas (URT, 2002).

3.2 Research Design

A cross-sectional design was used in collecting data. This allows collection of data at one point in time (Babbie, 1990). Because of limited time and resources for data collection, information on households status were obtained from a randomly selected sample of small scale dairy farmers; in this case the treatment/intervention was dairy farming.

3.3 Sampling Procedure

Two out of the three Divisions in Hai District were selected purposively because they are the ones with large number of dairy cattle. These are Machame and Masama Divisions. Two wards were selected randomly from each division, that is: Machame North, Machame West in Machame Division, and Masama East and Masama West in Masama Division.
3.4 Population and Sampling Procedure

The population for this study was composed of 69,410 small scale dairy farmers in Hai District. Proportionate sampling was used to obtain the actual number of respondents from each Ward in order to come up with appropriate sample size. Thus Machame North, Machame West, Masama West and Masama East with 22,464, 5,622, 20,574 and 20,750 dairy farmers respectively; contributed 39, 10, 35 and 36 respondents in that order making a sample size of 120 respondents.

3.5 Data Collection Method

Both primary and secondary data were collected as detailed below.

3.5.1 Primary data collection

Primary data were collected using an interview schedule at the respondents’ homesteads. To ensure validity the first draft of the interview schedule was pre-tested in the study area. Necessary changes were made to the schedule based on the pre-testing results before administering it.

3.5.2 Secondary data

Secondary data related to the records of milk production, marketing, consumption, achievement and problems were involved during reviewing of literature from books, journals, websites, thesis, and unpublished reports at SUA National Agricultural Library (SNAL). Furthermore, details of the amount of milk produced and sold were obtained from the dairy co-operative office and district livestock office. The data were useful to identify the trend and status of milk production in the study area.

3.6 Data Analysis
Data collected were sorted, coded and statistically analyzed using the Statistical Package for Social Sciences, (SPSS) version 16.0 computer software. Descriptive statistics, particularly frequency distribution, percentages, cross tabulation, and comparison of mean were done.
CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Overview

This chapter presents results from the study. It consists of five sections; the first section describes the socio-economic characteristics of the respondents. The second section describes small scale dairy cattle production which includes size of the land owned and how the land acquired. It also describes other types of livestock kept, duration of keeping dairy cattle, reasons of keeping dairy cattle, experience of keeping dairy cattle, and source of material to feed the animal, and the feed of concentrates and minerals. The third section presents the levels of milk production, number of cows milked and amount of milk produced and consumed at household level per day. The fourth section explains how milk is marketed and the problems faced in selling it. Lastly in section, the study presents the impact of milk production on income, food security and assets, by showing expenditure derived from milk, status of food security and the assets purchased by using income derived from milk.

4.2 Socio-economic Characteristics of the Respondents

4.2.1 Age

Table 1 presents the age distribution by respondents where it is shown that 55% of respondents fall within the 41-60 years age bracket, with about 21% and 24% falling in the 20-40 and 61-80 year age bracket respectively. Age can affect experience, wealth and decision making which in turn affects how one works and hence can influence individual productivity. Indeed the age of an individual has an influence on productivity as well as milk consumption (Singh et al., 2003). According to Basnayake and Gunaratne (2002), the age of a person is usually a factor that can explain the level of production and efficiency. A very old individual is likely to be less productive than one in the active age.
Table 1: Age distribution of respondents

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Respondents (N=120)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-40</td>
<td></td>
<td>25</td>
<td>20.8</td>
</tr>
<tr>
<td>41-60</td>
<td></td>
<td>66</td>
<td>55.0</td>
</tr>
<tr>
<td>61-80</td>
<td></td>
<td>29</td>
<td>24.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>120</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

4.2.2 Sex

In the present study both male and female small scale dairy farmers were interviewed. There were 58.3 % and 41.7 % male and female respondents respectively (Table 2). The higher population of male respondents shows that they are actively engaged in dairying than female respondents. In actual fact some women refused to be interviewed on the ground that their husbands were more conversant as they were the ones who did most of the management and supervisory work concerning dairy farming. Similar observations have been reported in Tanga region by Mulangila et al. (1997) and in Turiani by Mollel et al. (1999).

Table 2: Sex of respondents

<table>
<thead>
<tr>
<th>Sex</th>
<th>Respondents (N=120)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td></td>
<td>70</td>
<td>58.3</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>50</td>
<td>41.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>120</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

4.2.3 Marital status

Table 3 presents the marital status of the respondents. According to the table, majority (84.2%) of the respondents were married. On the other hand, 9.1% were widowed, 2.5 % were single, 1.7% were divorced, 1.7% separated and 0.8% live with partners. Novart (2005) asserts that married couples are likely to be more productive than single ones because married women or men provide extra labour in accomplishing farm and non-farm activities.
Table 3: Marital status of respondents

<table>
<thead>
<tr>
<th>Status</th>
<th>Respondents (N=120)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>101</td>
<td>84.2</td>
<td></td>
</tr>
<tr>
<td>Widow</td>
<td>11</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>3</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>2</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>2</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Live with partner</td>
<td>1</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

4.2.4 Level of education

Survey results, according to Table 4, show that 64.2% of the respondents had primary level of education, while 27.5% had ordinary level secondary education. Moreover, about 8% (7.5%) had college level education where respondents who had no formal education consist only 0.8% of the sample (Table 4). Level of education of farmers is very important as it influences their ability to utilize efficiently the advice and information offered by the extension services and development agents (Regnar et al., 2002).

Table 4: Level of education of the respondents

<table>
<thead>
<tr>
<th>Level</th>
<th>Respondents (N=120)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary school education</td>
<td>77</td>
<td>64.2</td>
<td></td>
</tr>
<tr>
<td>Secondary school education</td>
<td>33</td>
<td>27.5</td>
<td></td>
</tr>
<tr>
<td>College/ University</td>
<td>9</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>1</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

4.3 Dairy Cattle Milk Production

4.3.1 Experience in keeping dairy cattle

The results of the study shows that, 14.2% of the respondents have been keeping dairy cattle for a period between 16-20 years, 13.3% for a period of 11-15 years, 33.3% for a period of 6-10 years and finally 39.2% of the respondents had kept dairy cattle between 1-5 years.
Table 5: Experience in keeping dairy cattle

<table>
<thead>
<tr>
<th>Years</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5 years</td>
<td>46</td>
<td>39.2</td>
</tr>
<tr>
<td>6-10 years</td>
<td>40</td>
<td>33.3</td>
</tr>
<tr>
<td>11-15 years</td>
<td>16</td>
<td>13.3</td>
</tr>
<tr>
<td>16-20 years</td>
<td>17</td>
<td>14.2</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.3.2 Acquisition of dairy cattle

The acquisition of improved cattle was limited by supply and high prices of dairy animals. The survey shows that 70% of the respondents acquired improved dairy cattle through buying. Majority of the respondents used their own capital to start dairy farming. In poor economies like Tanzania, initial capital may be the most limiting entry barrier to dairy farming since individual savings may be inadequate to serve as a starting capital. Dairy farming requires large sums of money to buy expensive heifers, and extra money for operational cost before the cow start producing milk for sale (Banda et al., 2000; Bebe et al., 2003). According to Table 6, 14.2% of the respondents received dairy animal as a gift, 7.5% from neighbors and 8.3 % from the project (Heifer International Tanzania). According to the survey results most of the respondents started with 1-2 dairy animals. The small number of dairy cows owned is as a result of the fact that these animals are expensive and that owning them entails a number of risks including losing them due to bad management or diseases (Ngongoni et al., 2006).

Table 6: Acquisition of dairy cattle

<table>
<thead>
<tr>
<th>Acquisition</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buying</td>
<td>84</td>
<td>70.0</td>
</tr>
<tr>
<td>Gift</td>
<td>17</td>
<td>14.2</td>
</tr>
<tr>
<td>From the project</td>
<td>10</td>
<td>8.3</td>
</tr>
<tr>
<td>From neighbour</td>
<td>9</td>
<td>7.5</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
</tr>
</tbody>
</table>
4.3.3 Reasons for keeping dairy cattle

Table 7 shows the reasons for keeping dairy cattle among the respondents. The reasons for doing so were income (63.3%), food (34.2%) and manure (2.5%). Similar findings have been reported by (Banda et al., 2000; Bebe et al., 2003).

Table 7: Reasons for keeping dairy cattle

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Respondents (N=120)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>76</td>
<td>63.3</td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>41</td>
<td>34.2</td>
<td></td>
</tr>
<tr>
<td>Manure</td>
<td>3</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

4.3.4 Livestock feeding materials

Feeding is a very important aspect in keeping dairy animals as it gives energy and nutrients necessary for body maintenance and for milk production. Proper feeding when combined with other factors such as proper management will enable the farmer to optimize the genetic qualities of the dairy animals translating into optimum productivity (Ngongoni et al. 2006). Banana leaves and stem (50%) is the main source of animal feeds under the intensive (zero-grazing) dairy production in the surveyed area (Table 8). The table also shows that natural pasture (23.3%) is the second most important feeding material, followed by established pasture (15%) and lastly maize stovers and rice stovers (11.7%). Crop residue like banana peels and sweet potato vines are also fed to animals in a small quantity.

Table 8: Feeding materials

<table>
<thead>
<tr>
<th>Feed material</th>
<th>Respondents (N=120)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>Banana leaves and stem</td>
<td>60</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>Natural grass</td>
<td>28</td>
<td>23.3</td>
<td></td>
</tr>
<tr>
<td>Established pasture</td>
<td>18</td>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>Maize and rice Stover</td>
<td>14</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Despite the use of crop residue and pastures, supplementary feeds (concentrates) such as complete dairy meals and maize bran’s are given to the cows under zero-grazing. The survey shows that all (100%) the respondents give supplements to their cows. However, when asked about availability of concentrates about 92% (91.6%) said that concentrates are available but at high price, while only 8.4% said that concentrates are not readily available. Although dairy farmers know the importance of supplements to their dairy animals, cash and labour limit the amount and frequency of feeding supplementary feeds. According to the study these were mostly obtained from farm inputs shops. These were found to be important sources of dairy meals, salts, concentrates, milking buckets, and milk cans.

4.4 Levels of Milk Production

4.4.1 Milk production

Table 9 shows average annual milk production ranging from a minimum of 600 litres per cow per year to a maximum of 3600 litres per cow per year. Distribution of the respondents in the survey shows that, 33.9% of the respondents produced between 1801-3 600 litres; followed by 29.7% who produced 300-900 litres; 21.1% of the respondents produced between 901-1 800 litres, and 15.3% of the respondents records production above 3 600 litres per lactation period. However, the average milk production per cow reported in this study is much lower than that reported elsewhere in Tanzania (Sarwatt and Njau, 1990; Biwi, 1993; Aboud et al., 1995; Mulangila, 1997; Urassa, 1999).

Table 9: Average annual milk production per animal from July 2008 to June 2009

<table>
<thead>
<tr>
<th>Milk production (Litres)</th>
<th>Respondents (N=118)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
</tr>
<tr>
<td>300-900</td>
<td>35</td>
</tr>
<tr>
<td>901-1800</td>
<td>25</td>
</tr>
<tr>
<td>1801-3600</td>
<td>40</td>
</tr>
<tr>
<td>Above 3600</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
</tr>
</tbody>
</table>
4.4.2 Constraints affecting milk production

Table 10 presents the major constraints to dairy production as perceived by the sample farmers. The table show that 40% of the respondents indicated livestock diseases and parasites as the biggest problem while about 36% (35.7%) mentioned lack of enough pasture as the second most important constraint to dairy production. Other constraints faced were high price of concentrates (5.8%), veterinary costs including AI services (7.5%), low milk price (7.5%), unreliable milk markets (2.5%) and transport problems (0.8%). The mentioned constraints were similar to constraints faced by other smallholder dairy farmers in the country (Sarwatt and Njau, 1990; Urassa, 1999).

Table 10: Constraints on milk production

<table>
<thead>
<tr>
<th>Constraints</th>
<th>Respondents (N=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
</tr>
<tr>
<td>Diseases/ parasites</td>
<td>48</td>
</tr>
<tr>
<td>Lack of enough pasture</td>
<td>43</td>
</tr>
<tr>
<td>Lack of AI- services</td>
<td>9</td>
</tr>
<tr>
<td>Low milk price</td>
<td>9</td>
</tr>
<tr>
<td>High price of concentrates</td>
<td>7</td>
</tr>
<tr>
<td>Unreliable market</td>
<td>3</td>
</tr>
<tr>
<td>Transport problems</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

4.5 Milk Marketing Outlets

4.5.1 Milk marketing

Survey results in Table 11 reveal that 37.8% of the respondents sold their milk to restaurant owners and 36% sold their milk to the dairy cooperative milk collection centers. Other respondents sold their milk to milk vendor (19.3%), schools (6%) and .9% of them sold milk to other outlets including kiosks. Those who sell milk to the restaurants, cooperatives and schools are being paid monthly, while those who sell milk to the neighbors and milk venders are paid daily.
Table 11: Milk marketing outlets

<table>
<thead>
<tr>
<th>Market</th>
<th>Respondents (N=114)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restaurants</td>
<td>43</td>
<td>37.8</td>
<td></td>
</tr>
<tr>
<td>Milk collection centres</td>
<td>41</td>
<td>36.0</td>
<td></td>
</tr>
<tr>
<td>Milk vendors</td>
<td>22</td>
<td>19.3</td>
<td></td>
</tr>
<tr>
<td>Schools</td>
<td>7</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Others (e.g., Kiosk and individuals)</td>
<td>1</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>114</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

4.5.2 Problems encountered in selling milk

Regarding problems faced in selling milk, majority (75.5%) of the respondents indicated low milk price as the most important one. Other problems were distance from the market (12%), lack of buyers (8.3%), and lack of transport (4.2%). These findings partly support the study conducted in Mbeya by Bayer and Kapunda, (2006) which showed that, distance to markets in major towns, limited number of customers and impassable roads were identified as constraints in dairy production.

Table 12: Problems encountered in selling milk

<table>
<thead>
<tr>
<th>Problems</th>
<th>Respondents (N=117)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low milk price</td>
<td>88</td>
<td>75.5</td>
<td></td>
</tr>
<tr>
<td>Distance from the market</td>
<td>14</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>Lack of buyers</td>
<td>10</td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Lack of transport</td>
<td>5</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>117</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

4.6 Impact of Milk Production on Livelihood

The following sub section presents results and discussion on the impact of milk production on livelihood of the smallholder dairy farmer with specific reference to income, food security and assets.
4.6.1 Impact on income

4.6.1.1 Status of household income

Results in Table 13 indicate that majority (72.3%) of the respondents acknowledged that their income had increased as a result of keeping dairy cattle. On other hand 17.6% reported that their income had remained the same while 10.1% indicated that their income had decreased.

Table 13: Impact of milk production on household income

<table>
<thead>
<tr>
<th>Income status</th>
<th>Respondents (N=119)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td></td>
<td>Percentage</td>
</tr>
<tr>
<td>Increased</td>
<td>86</td>
<td></td>
<td>72.3</td>
</tr>
<tr>
<td>Remained the same</td>
<td>21</td>
<td></td>
<td>17.6</td>
</tr>
<tr>
<td>Decreased</td>
<td>12</td>
<td></td>
<td>10.1</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.6.1.2 Distribution of annual income from milk

Table 14 shows that 33.6% of the respondents obtained a minimum of TAS 100 000 to 360 000 income from the sale of milk per year and 14.7% obtained highest income of TAS 1 440 000 and above per year.

Table 14: Distribution of annual income from milk

<table>
<thead>
<tr>
<th>Income (TAS)</th>
<th>Respondents (N=116)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td></td>
<td>Percentage</td>
</tr>
<tr>
<td>100 000-360 000</td>
<td>39</td>
<td></td>
<td>33.6</td>
</tr>
<tr>
<td>361 000-720 000</td>
<td>29</td>
<td></td>
<td>25.0</td>
</tr>
<tr>
<td>721 000-1 440 000</td>
<td>31</td>
<td></td>
<td>26.7</td>
</tr>
<tr>
<td>Above 1 440 000</td>
<td>17</td>
<td></td>
<td>14.7</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.6.1.3 Expenditure of income derived from milk

Income obtained from milk was spent on different items/services by the respondents as shown in Table 15. The table shows that majority of the respondents spent their income from milk on meeting household expenses such as food, furniture and clothes. Other
Expenditures in order of importance were school fees (23.3%), animal feeds (15.0%), and treatment/vaccination of animals (12.5%), health services (5.0%) and building/rehabilitation of house (4.2%).

**Table 15: Expenditure of income derived from milk**

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Respondents (N=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
</tr>
<tr>
<td>Household expenses (eg. food, clothes)</td>
<td>48</td>
</tr>
<tr>
<td>School fees</td>
<td>28</td>
</tr>
<tr>
<td>Buying animal feed</td>
<td>18</td>
</tr>
<tr>
<td>Treatment/vaccination of animals</td>
<td>15</td>
</tr>
<tr>
<td>Health services</td>
<td>6</td>
</tr>
<tr>
<td>Building/rehabilitation of house</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120</td>
</tr>
</tbody>
</table>

### 4.6.2 Impact of milk production on household food security

The study revealed that 70% of the respondents reported that household food security had increased as a result of dairy keeping (Table 16). However, 18.7% of the respondents said that their household food security had remained the same while 11.3% claimed that household food security had actually decreased following their involvement in milk production. Generally these results indicate that milk production had greater impact on household food security. The findings support earlier findings from a study conducted in Kenya by Muriuki et al. (2001) which showed that dairy production had made a major contribution to food security and poverty alleviation among smallholder farmers.

**Table 16: Impact of milk production on household food security**

<table>
<thead>
<tr>
<th>Status</th>
<th>Respondents (N=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
</tr>
<tr>
<td>Increased</td>
<td>84</td>
</tr>
<tr>
<td>Remained the same</td>
<td>22</td>
</tr>
<tr>
<td>Decreased</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120</td>
</tr>
</tbody>
</table>
4.6.3 Household assets purchased using income derived from milk

Household assets were also used to assess whether dairy farming had any impact on livelihood or not. Table 17 shows selected household assets bought using income derived from selling milk. The result show that 30.8% of the respondents bought radio, 25.8% of the respondents purchased furniture, 23.3% bought television and 20.1% bought bicycles.

Table 17: Assets purchased using income derived from milk

<table>
<thead>
<tr>
<th>Assets</th>
<th>Respondents (N=120)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio</td>
<td></td>
<td>37</td>
<td>30.8</td>
</tr>
<tr>
<td>Furniture</td>
<td></td>
<td>31</td>
<td>25.8</td>
</tr>
<tr>
<td>TV</td>
<td></td>
<td>28</td>
<td>23.3</td>
</tr>
<tr>
<td>Bicycle</td>
<td></td>
<td>24</td>
<td>20.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>
5.0 CONCLUSIONS AND RECOMMENDATIONS

The general objective of this study was to investigate the impact of dairy milk production on rural livelihoods in Hai district. The specific objectives were (i) To determine the level of small scale milk production among dairy cattle keeping households (ii) To explore market outlets of milk produced by small scale dairy cattle keepers (iii) To assess the impact of small scale dairy milk production on livelihood in terms of income, food and assets. In this chapter the conclusions and recommendations are drawing based on the major findings of the study.

5.1 Conclusions

5.1.1 Level of milk production among dairy cattle keeping households

The major conclusion that can be drawn from the results of this study with regard to levels of milk production in surveyed area is that, milk production was observed to be higher (1801-3600) per annum compared to average production in the country which is estimated at 1800 liters per annum for cross breeds.

5.1.2 Market outlets of milk

Regarding milk marketing, conclusion that can be drawn from this study is that, milk market is available as farmers have wide chance to sell their milk to (restaurants, Milk collection centers, milk vendor, schools, kiosk and neighbors), regardless of low milk price.
5.1.3 Impact of milk production on livelihood in terms of income, food security and assets

In general it can be concluded that small-scale dairy farming in Hai District contributes a great deal to the household welfare in terms of food security, income generation, household assets and other social services.

5.2 Recommendations

The following recommendations are made from the major findings of this study.

(i) Government should facilitate to improve production by providing adequate extension services, training, short courses, study tours, attending farmers show and adequate inputs supply.

(ii) There is a need to have well organized market channels.

(iii) Dairy farmers have to be encouraged to form their own cooperatives that will contribute effectively to market efficiency.
REFERENCES


Kurwijila, L. R. and Boki, K. J. (2003). Assessment of dairy development in Tanzania/UN Food and Agriculture Organization (FAO), ROME.pp.47


APPENDICES

Appendix 1: Questionnaire for Small Scale Dairy Cattle Farmers

District……………… Divison……………………
Ward ……………… Village……………………

Interviewing schedule No……………… Date………………

A: BACKGROUND INFORMATION

Please tick or write the appropriate answer where applicable.

A1. Age of the respondent in complete years………………

A 2. Sex of respondents1 Female [       ] 2 Male [       ]

A 3. What is your marital status

1) Single [       ]
2) Married [       ]
3) Divorced [       ]
4) Widowed [       ]
5) Separated [       ]
6) Living with partner [       ]

A4. Level of education

1) No formal education [       ]
2) Primary education [       ] Number of years attended………
3) Secondary education [       ] Number of years attended………
4) College/University [       ] Number of years attended………

B: DAIRY CATTLE PRODUCTION

B1. How many plots of land do you have and how do you acquire them?

<table>
<thead>
<tr>
<th>Plot No</th>
<th>Area (acres)</th>
<th>Tenure status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

1. Inherit  2. Bought  3. Rent  4. Allocated by village
B2. Beside dairy cattle what other type of livestock do you keep? Indicate number of livestock kept as appropriate.

<table>
<thead>
<tr>
<th>No</th>
<th>Types of livestock</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B3. How long have you been keeping dairy cow... (Indicate Year/Month)

B4. How did you get your first dairy cattle?

1) Buying [   ]
2) From neighbor [   ]
3) Gift [   ]
4) From projects [   ]

B5. What is your three main sources of capital invested in dairy production?

1) .................................................................
2) .................................................................
3) .................................................................

B6. What are the main reasons for keeping dairy cattle in order of importance

1) Income [   ]
2) Food [   ]
3) Manure [   ]
4) Dowry [   ]
5) Other specify.........................

B7. Have you ever received any training in dairy husbandry? (1) YES [   ] (2) NO [   ]

B8. If YES; for how long did the training take place... *(Indicate number of days/month)*

B9. What are the main sources of feed materials for your livestock? *(Rank in order of importance)*

1) Banana leaves and steam [   ]
2) Maize stoves [   ]
3) Rice stoves [   ]
4) Natural grasses [
5) Established pasture [

B10. Do you feed concentrates to your animals (1) Yes [ ] (2) No [ ]
If YES what type of concentrate do you feed your animals?
1) …………………………………………………
2)…………………………………………………
3)…………………………………………………
4)…………………………………………………

B11. Are these concentrates readily available? 1. YES [ ] 2.NO [ ]
B12. Explain your answer……………………………………………………………………
…………………………………………………………………………………………

B13. Do you provide mineral supplement to your dairy cow? (1) YES [ ] (2) NO [ ]
B14. What type of mineral supplement do you feed your animals?
1) …………………………………………
2)…………………………………………
3)…………………………………………
4)…………………………………………
B15. Are this mineral supplement available? (1)YES [ ] (2) NO [ ]
B16. Explain your answer……………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………

C. LEVELS OF MILK PRODUCTION
C1. How many cows are being milked at present…………………..
C2. During the period 2008/2009 how many cows were milked ………….

Please provide the following information on milk production from July 2008 to June 2009

<table>
<thead>
<tr>
<th>Cow identification</th>
<th>Average production in Liters</th>
<th>Length/duration of milking period (days/month)</th>
<th>AVERAGE TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name/Number</td>
<td>Morning</td>
<td>Evening</td>
<td></td>
</tr>
</tbody>
</table>
C3. On average, how much milk is consumed at household level per day (1) Fresh milk……….liters (2) Sour milk……….liters

C4. What are the major constraints which affect milk production in order of importance.

1) .........................................................
2) .........................................................
3) .........................................................
4) .........................................................
5) .........................................................

D MILK MARKETING OUTLET PRODUCED BY DAIRY CATTLE KEEPERS

D1. Besides milk, do you sell any milk by-products? (1).YES [ ] (2) [ ]

D2. If YES what type of product?

1) .........................................................
2) .........................................................

D3. Where do you sell your milk?

1) Milk collection centre [ ]
2) Milk vendor [ ]
3) Neighbor [ ]
4) Restaurants [ ]
5) School [ ]
6) Others (Specify)………………………………………

D4. When do you get paid after selling your milk?

1) Daily [ ]
2) Weekly [ ]
3) Monthly [ ]

D5 Please provide information about milk sold during July 2008 to June 2009
<table>
<thead>
<tr>
<th>Period</th>
<th>Number of milking cow</th>
<th>Average milk produced per day/liter</th>
<th>Average milk sold per day/liter</th>
<th>Length of milking</th>
<th>Average price per liter</th>
<th>Average total income TAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet season</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry season</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D6. What problems do you face in selling your milk? (1) Lack of buyers [ ] (2) Lack of transport [ ] (3) Distance from the market [ ] (4) Low price [ ]

D7. Provide the following information on sources of income other than milk

<table>
<thead>
<tr>
<th>No</th>
<th>Source of income</th>
<th>Value in TAS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td></td>
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<td>4</td>
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<td>5</td>
<td></td>
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</tbody>
</table>

E. THE IMPACT OF MILK PRODUCTION ON INCOME, FOOD SECURITY AND ASSETS

E1. On average, would you say your income has increased, remained more or less the same or decreased after getting involved in dairy production?

1) Increased [ ]
2) Remain the same [ ]
3) Decreased [ ]

E2. What is the expenditure outlet for your income derived from milk? (Rank them according to their importance?)

1) .................................................................
2) .................................................................
3) .................................................................

E3. In order of importance what are the main source of food consumed at household level

1) Own produced [ ]
2) Purchased [ ]
3) Friends/relatives [ ]
4) Government support [ ]

E4. On average, how many months in a year can your household adequately feed its self. ............... (Months)
E5. On average, would say household food security has increased, remained more less the same, or decreased over the past 3-5 years?

1) Increased [ ]
2) Remain more the same [ ]
3) Decreased [ ]

E6. Please provide information on household assets

<table>
<thead>
<tr>
<th>No</th>
<th>Type of the assets</th>
<th>Number</th>
<th>Value (TAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Radio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>TV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Furniture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bicycle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

E7. Of the above assets which one did you purchase using income derived from milk?

<table>
<thead>
<tr>
<th>No</th>
<th>Type of assets</th>
<th>Number</th>
<th>Value (TAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

THANK YOU FOR YOUR COOPERATION
Appendix 2: Checklist Questions for Dairy Cooperative Society Managers

F. DAIRY MILK COOPERATIVE SOCIETY

F1. How many members do you have in your co-operative? [ ]

F2. How many people sell milk in your cooperative which are not member of the cooperative [ ]


F4. How many liters do you collect every day ………………………

F5. After collection, where do you sell your milk?
   (1) Kiosk [ ] (2) Hotel [ ] (3) School [ ] (4) Household [ ] (5) Restaurant [ ]
   (6) Processing industry [ ]

F6. Do you practice any Milk processing (1) YES [ ] (2) NO [ ]

F7. What type of milk processing?
   (1) Butter making [ ]
   (2) Sour making [ ]
   (3) Yoghurt making [ ]
   (4) Ghee making [ ]
   (5) Cheese making [ ]

F8. How many liters do you process per week ………………………

F9. Where do you sell the processed product? (1) Restaurant [ ] (2) Hotel [ ]
   (3) Retailers [ ] (4) School Children [ ] (5) Street passers-by [ ]

F10. How do you pay your customers money after selling their milk? (1) Every day [ ]
     (2) Every week [ ] (3) Every month [ ]

F11. What are the constraints that face your dairy cooperative?
     (1) …………………………………………………………………………
     (2) …………………………………………………………………………
     (3) …………………………………………………………………………
     (4) …………………………………………………………………………

F12. Do you offer any credit to your customers (1) YES [ ] (2) NO [ ]

THANK YOU FOR YOUR COOPERATION