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Exploring the Relationship between Infant and Young Child Feeding Practices and Level of Dairy Production among Smallholder Dairy Farmers in Rift Valley Province, Kenya

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Abstract

Exploring the Relationship between Infant and Young Child Feeding Practices and Level of Dairy Production among Smallholder Dairy Farmers in Rift Valley Province, Kenya

By Amanda Wyatt

Background: Livestock interventions have potential to reduce poverty by increasing productivity of existing assets and by providing animal-source foods that can improve nutrition. Yet, few studies have looked rigorously at how interventions can affect young children. Without understanding how increasing dairy productivity affects women's infant and young child feeding practices, interventions could be detrimental to child nutrition.

Objective: The study explores, within the context of rural dairy farming in Kenya, the relationship between level of household dairy production and selected infant and young child feeding practices using a mixed methods approach.

Methods: Focus group discussions (FGDs) (n=6) investigated the attitudes and perceptions of women involved in dairy farming toward breastfeeding, introduction of complementary foods, and child diets. Three different levels of dairy producing households who had at least one child under five years old participated in a household survey (n=92).

Results: Themes from the FGDs indicated that women introduce foods other than breast milk before the child reaches six months because certain foods are perceived to be better for the child than breast milk alone. Quantitative results indicated that higher levels of dairy production could have a harmful effect on exclusive breastfeeding practices (EBF). No association was found between level of dairy production and child dietary diversity, which was surprising considering dairy interventions are often promoted as a dietary diversification strategy.

Discussion: Community perceptions that cow's milk is nutritious for children appears to conflict with EBF practices. Women believe that cow's milk is important to give to children, regardless of the child's age. It appears that when more milk is available for household consumption, women from higher dairy producing households are more likely to introduce cow's milk to infants before they reach six months than women from households that are not producing any dairy. This study suggests that in order to maximize benefit and minimize harm, dairy interventions should tailor nutrition education to address age-appropriate introduction of cow's milk and optimal EBF practices. Evidence from this project can be used to inform the design of nutrition education targeted to farmers participating in dairy interventions in rural, low-income settings.

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1 Introduction

Adequate and appropriate nutrition during the first years of a child's life is critical to growth and development. Undernutrition contributes to at least 35% of deaths in children less than five years of age globally (World Health Organization, 2010). In addition to the increased mortality risk, poor nutrition in the first years of life can impair physical growth and cognitive development and increase the child's susceptibility to infectious diseases, such as malaria, meningitis, and pneumonia. Suboptimal breastfeeding and complementary feeding practices, in particular, hinder the nutritional status of infants and young children. A lack of knowledge about feeding practices and limited access to appropriate weaning foods can result in poor diet and nutrition among infants and young children. For the first six months of life, breast milk provides all the nutrient and energy requirements for infants. As children are weaned from breast milk, they need foods that are nutrient and energy dense. Animal-source foods are energy dense and an excellent source of protein; minerals, such as iron, zinc, and calcium; and vitamins, such as vitamin A, and riboflavin. Some nutrients, such as vitamin B-12, can only be found in animal-source foods.

In low-income settings, available income, preferences, and household decision-making are just a few of the barriers to the consumption of animal-source foods. Given the association of animal-source food consumption with the prevalence of multiple micronutrient deficiencies in low-income settings, it seems natural to design programs that address barriers to consumption. Livestock interventions are one such solution that aim to increase household production and consumption of animal-source foods.

Even so, the evidence for the nutritional benefits of livestock interventions is mixed (Berti, Krasevec, & FitzGerald, 2004; Leroy & Frongillo, 2007; Randolph et al., 2007; Sadler K, Kerven C, Calo M, Manske M, & Catley A, 2009). Although livestock interventions are often designed to reduce food security, improve nutrition, and generate household income, changes in food security and nutritional status are rarely measured. There are some key gaps in the literature on whether or not dairy intensification interventions, in particular, translate into positive nutritional benefits for all

members of the household, in particular for young children.[1] Even if households increase their income from dairy, it is not clear if the increased purchasing power results in an improvement in the household diet, or more specifically, the diets of young children. In addition, the draw of income from dairy may result in household decision-making that favors sales to consumption, leaving less for young children. Few, if any, studies have explored how increased dairy production may influence weaning patterns. If cow's milk is readily available in the household, some mothers may introduce cow's milk earlier than is appropriate, replacing breast milk in the infant's diet, and contributing to poorer growth and development outcomes.

In order to explore the influence that increased dairy production has on young child nutrition, a study was conducted in Rift Valley Province, Kenya, where most of Kenya's dairy production is concentrated. About 53% of Kenya's dairy cattle are found in Rift Valley and from there the milk is distributed to milk deficient areas or Nairobi and other urban centers (TechnoServe Kenya, 2008). Dairy has an important role in Kenya. In fact, the top food and agricultural commodity in Kenya in 2005 was cow's milk (whole and fresh) (Food and Agricultural Organization, 2010a). The nation has one of the largest dairy industries in East Africa and relies heavily on the smallholder sector which contributes between 75-80% of the national production and marketing of milk (Ngigi, 2005). Dairying is particularly important in the economies of the rural poor. It is estimated that the number of smallholder dairy farms is between 1 and 1.8 million households, or 35% of rural households and 26% of total households (TechnoServe Kenya, 2008).

Rift Valley Province is the largest in terms of size and population (Food and Agricultural Organization, 2010b). The study area of Buret and Kipkelion Districts contains relatively small (less than 10 hectares), smallholder family farms. The main system of agriculture is subsistence farming and mixed crop/livestock. English and Kiswahili are the national languages and Kalenjin is the predominant local language. The predominant ethnic group in this population is the Kalenjin. Today

[1] Dairy intensification is a term used to describe a particular strategy to increase smallholder dairy production. Typically, dairy intensification combines multiple technologies including but not limited to, investment in higher-yielding cows and improved cattle management, feeding systems, and feed production.

the Kalenjin in this area are a mixed farming community, focusing mainly on dairy and crops such as tea, maize, sorghum, and millet. Cattle remains highly valued, often as the household's most valuable resource, and as such, are symbols of wealth and status (Huss-Ashmore, 1996). Dairy cattle are common and dairy products are an integral part of the diet for children and adults (Kipng'eno, 2010).

The main purpose of this thesis was to explore within the context of rural dairy farming in three communities in Rift Valley Province, Kenya, the relationship between level of household dairy production and selected infant and young child feeding practices using a mixed methods approach. By comparing households not currently producing dairy to two other groups of households of increasing levels of dairy production, the author wishes to investigate how a household's level of dairy production may influence certain infant and young child feeding practices. The comparison may provide qualitative answers to questions about the influence intervening effects of dairy interventions may have on young child nutrition. The primary quantitative question of this research was to examine whether the household's level of dairy production was independently associated with five infant and young child feeding practices within the context of rural dairy farming communities in Kenya, namely (1) currently breastfeeding; (2) exclusive breastfeeding to six months; (3) introduction of water before six months; (4) introduction of cow's milk before six months; and (5) age-appropriate dietary diversity. A secondary question was to examine the association between demographic and household characteristics and any of the five infant and young child feeding practices. The key qualitative question of this research was to explore the attitudes and beliefs of women involved in dairy farming toward infant and young child feeding practices, including their perceptions about age-appropriate diets, breastfeeding practices, weaning, and introduction of complementary foods.

2 Literature Review

2.1 Introduction to the Literature Review

This review has several objectives. Given that the goal of dairy interventions is to increase the amount of milk produced by households with implicit expectations that the household, perhaps young children, will consume more milk, the first objective is to describe the nutritional importance of dairy in human nutrition and assess the influence animal-source foods have in the diets of undernourished children in low-income settings. Second, because cow's milk is one of the first foods introduced to young children, the appropriateness of this as a complementary food in the infant diet is described alongside current recommendations for breastfeeding and complementary feeding practices. Finally, a summary of studies focused on the nutritional impacts of dairy cow production and/or ownership will be summarized and evaluated. This review is intended to demonstrate the potential nutritional impact dairy intensification interventions can have on young children in low-income settings like Kenya. At the same time, the review identifies the existing gaps in the literature of studies that have explored the nutritional impact of dairy intensification interventions on infant and young child feeding practices.

Studies published in the last 20 years were collected for review through searches in Medline, Web of Science, AGRICOLA, WHOLIS, JSTOR, CABDirect, Google Scholar, organization specific web-sites, and recommendations from subject matter experts. For the dairy intensification portion of the review, all studies which looked at livestock ownership or production in relation to human nutrition were considered for inclusion, and special attention was given to studies which took place in low-income settings and studies that were specific to dairy cows.

2.2 Overview of Dairy for Nutrition

The role of dairy in the diets of infants and young children and its impact on nutrition has been well studied. Although whole cow's milk is mostly liquid (87% water), it contains more than 100 different components and provides a high concentration of nutrients relative to the amount of energy it contains (Miller, Jarvis, & McBean, 2007). Cow's milk is also a good source of high-quality

protein. Unfortified cow's milk is a good source of micronutrients such as vitamin A, vitamin B-12, riboflavin, and folate. Without consuming dairy, it can be difficult to meet recommended intakes for calcium. Despite being a rich source of key micro- and macronutrients, milk is a poor source of bioavailable iron and zinc.

2.3 Cow's Milk as an Appropriate Complementary Food

Even though cow's milk is considered to be an energy-dense, high-quality protein, the nutritional benefits do not necessarily apply to children less than 12 months of age. Breast milk alone provides all the nutrient needs for infants up to six months (Dewey, 2003).Physiologically, an infant's gastrointestinal, renal, and neurophysiological systems are not mature enough to process any foods or liquids other than breast milk before six months. Cow's milk contains excessive levels of protein, sodium, potassium, phosphorus, and calcium for infants compared to breast milk. Furthermore, the levels of iron, vitamin C, and linoleic acid are insufficient to meet infant needs. Therefore, in order to maximize the nutritional benefit of cow's milk and minimize any undue harm, some recommend that the introduction of cow's milk to the diet should be delayed until the infant reaches 12 months of age (Wijndaele, Lakshman, Landsbaugh, Ong, & Ogilvie, 2009). Alternatively, among populations whose traditional complementary foods are not nutrient-dense, like *uji*, the maize-based porridge common in Kenya, cow's milk is recommended as an additive to increase the nutrient quality and fill in the energy and nutrient gaps unmet by breast milk for children under 12 months (World Health Organization, 2000).

2.4 Links between Animal-Source Foods and Child Health

Following exclusive breastfeeding for six months, it is important that children receive a variety of complementary foods, including animal-source foods. Several studies have examined the link between animal-source foods and child health. Some of the most well-known are the Nutrition Collaborative Research Support Program's (NCRSP) longitudinal observational studies conducted in Egypt, Kenya, and Mexico (Allen, 1993). Even after controlling for multiple factors including SES, parental education, and social factors, the NCRSP found positive associations between children's

intake of animal-source foods and physical growth, cognitive development, social interactions, and school performance(Allen, 1993). Another well-known feeding intervention, the Kenya Child Nutrition Project, was conducted among rural schoolchildren in Kenya (Neumann et al., 2003). The study compared children randomized to three groups receiving three different snacks during the school year: ground beef added to *githeri*, a traditional meal of maize, beans, and greens; a glass of whole milk with *githeri*, and *githeri* with extra vegetable oil. The study found improved outcomes in the areas of weight gain, cognitive performance, and only one micronutrient, vitamin B-12, among the children consuming the meat or milk snack (Grillenberger et al., 2003; Siekmann et al., 2003; Whaley et al., 2003).

Although the benefits of dairy on child growth and nutrition have been demonstrated in observational studies and randomized controlled trials, it is difficult to replicate the results in dairy interventions. The link between dairy farming and child nutrition is sensitive to a collection of dynamic factors. Households participating in interventions may choose to sell more milk and keep less in the home for consumption in order to increase household income. Decision-making patterns in households may or may not result in allocation of the increased milk for young children. Land and labor devoted to intensifying dairy can take resources away from other food production or child care and feeding. Furthermore, particularly among smallholder farmers, the availability of milk in the household may depend on the season (the cows are producing more milk because they are well-fed) and the reproductive cycle of the small herd.

The primary objective of most livestock interventions has been to generate income through increased milk production and it is less common to find a project whose primary objective is to improve child nutrition. Even though there is evidence for how dairy intensification interventions can reduce poverty by increasing dairy production, it is less clear if increased household consumption results in any nutritional benefit, particularly for young children, or what effect increasing dairy production has on infant and young child feeding practices. Other authors have noted that of the few studies of livestock interventions that examine nutritional outcomes, it is challenging to find robust

studies that directly measure the nutritional impact of livestock interventions (Leroy & Frongillo, 2007).

2.5 Studies Examining the Effect of Dairy Cow Production and/or Ownership on Indicators of Child Nutrition

Four studies were identified that examined the impact of dairy cow ownership or production on indicators of child nutrition, including milk consumption (Leegwater, Ngolo, & Hoorweg, 1991; Nicholson, Mwangi, Staal, & Thornton, 2003; Nicholson, Thornton, & Muinga, 2004); household and child diets (Ahmed, Jabbar, & Ehui, 2000; Begum, 1994; Leegwater, et al., 1991); and child anthropometry(Leegwater, et al., 1991; Nicholson, et al., 2003; Nicholson, et al., 2004). The location of the studies included India, Ethiopia, and Kenya. Details of these studies are provided in Table 1. In reviewing the literature for this thesis, no studies were identified that looked specifically at the impact of dairy interventions on infant and young child feeding practices.

Of the four studies identified, two examined milk consumption and found that households with greater dairy production or ownership had higher milk intakes than comparison households, (Leegwater, et al., 1991; Nicholson, et al., 2003; Nicholson, et al., 2004). Though in the Nicholson et al., study (2003), differences were not observed consistently across study sites, and in the Leegwater et al., study (1991), consumption was higher in customer households than in the dairy producing households. Two studies reported on household diets. In both of these studies, increased production and/or ownership was associated with higher daily energy intakes (Leegwater, et al., 1991; (Ahmed, Jabbar, & Ehui, 2000), diet diversity (Leegwater, et al., 1991) and significantly higher intakes of protein, fat, carbohydrates, vitamin A, and iron (Ahmed, Jabbar, & Ehui, 2000). With respect to child diets, children living in the highest dairy producing households had more adequate diets, including higher energy and protein intakes (Begum, 1994). However, the author of this study hypothesized that the improvements in child diet were due to increased income and did not discuss how, or if,

Table 1. Summary of dairy cow production or ownership studies included in the literature review

Study	Location/ Intervention Name	Intervention Objectives	Comparison Groups	Study Design	Nutrition Indicators	Importance Rating by Berti et al[1]
(Leegwater, et al., 1991)	Coast Province, Kenya / National Dairy Development Programme (DDP)	1) To assess the importance of improved dairy farming for the economy and nutrition of the households concerned 2)To assess the importance of rural dairy production for the nutrition of the local community.	1)DDP farmers 2)DDP customers 3)Control (from general population – neither DDP farmers nor customers)	Cross-sectional	Household food consumption (24-hr dietary recall) • Kcal • Milk per member Anthropometrics of children (6-59 months) • Height-for-age • Weight-for-age • Weight-for-height	*Not included in review*
(Begum, 1994)	Bangalore District, India / Dairy Development Project	1) To reduce rural poverty by encouraging dairy farmers to join milk cooperatives. 2) To investigate whether children of families in the cooperatives were better nourished than those who were not members.	Cooperative members grouped by average daily production 1) Small (<2.5 liters) 2) Marginal (2.5-5 liters) 3) Large (>5 liters) 4) Control (non-members, not producing milk)	Cross-sectional	Children's food consumption (24-hr dietary recall) • Protein • Calories	Low
(Ahmed, et al., 2000)	Holetta (40 km from Addis), Ethiopia / Collaborative project between the Ethiopian Agricultural Research Organization (EARO) and the International Livestock Research Institute (ILRI)	1) To assess the impact of a combined intervention of improved feeding and management technologies and increased ownership of crossbred cows on household income, expenditures, and caloric intake.	1) Households who owned crossbed cows[2] 2) Control (households who owned the local Zebu cows)	Repeated cross-sectional	Series of previous day intake recalls for the household. Per capita average caloric content was calculated using standard measures and then averaged for three days (one per month) • Quarterly average caloric intake	Low
(Nicholson, et al., 2003; Nicholson, et al., 2004)	Coast and Highland Provinces, Kenya / No intervention	1) To determine if dairy cow ownership had positive, negative, or limited effects on child nutritional status.	1)Households who owned at least one crossbred (or dairy) cow[2] 2)Households who owned only local cattle 3)Control)households who owned no cattle)	Cross-sectional	Anthropometrics of children[3] • Height-for-age • Weight-for-height Household consumption of dairy products	*Not included in review*

[1]The rating by Berti et al (2003) was a part of a review of agricultural interventions and their effectiveness on improving nutrition. The authors created a score to reflect the relative importance of the studies, based on quality of reported work, sample size, methods used, and plausibility of achieved results. This was a subjective score.

[2]Crossbred cows typically produce higher yields of milk than local cattle. For studies that defined groups by types of cows owned, the crossbred cow groups would be considered the intervention or most advanced level of production group.

[3]In Coast Province, child was defined as <72 months due to small sample size; in Highland Province, child was defined as 6-59 months.

increased milk consumption contributed to these improvements. Two studies examined the effects of household dairy production or ownership on child anthropometry (Leegwater, et al., 1991; Nicholson, et al., 2003). In the study by Leegwater et al., (1991), children from the general population (control group) had poorer anthropometric indicators compared to those in the DDP farmer and DDP customer groups, including a greater prevalence of stunting, underweight, and wasting. Conversely Nicholson et al., (2003), using econometric models and adjusting for confounding (no *p*-values reported) observed that dairy cow ownership may have small positive effects on reducing stunting, but no effect on wasting.

Evaluation of the Dairy Studies Included in the Literature Review

While these studies suggest a potential role for dairy interventions to improve child nutrition, the findings must be interpreted with caution due to numerous study limitations. The most common indicators used to monitor nutritional status in the studies reviewed here were dietary intake (through 24-hour dietary recall) and anthropometrics. Most study designs were cross-sectional, and were limited by small sample sizes. Two studies did not report results from statistical tests or assess or adjust for potential confounding (Begum, 1994; Leegwater, et al., 1991).

There was also an absence of data on children in the households. For example, Leegwater et al., (1991) collected household milk consumption and then figured an average consumption per household member, which will not accurately reflect the consumption variances due to age and gender. Ahmed, Jabbar, and Ehui (2000) acknowledged that one limitation of their study was the absence of household member data. The authors noted that household member data would help them understand if the increased nutrient intake and diet quality for the household translated into better nutrition for all household members, particularly young children and females. The Nicolson et al., study (2004) collected data only on adult milk consumption. The reported results provide an indication of patterns, but without more in-depth analysis, do not explain much about relationships between dairy farming and the nutritional indicators. In addition, although anthropometrics were

collected for preschool children, their analysis does not help us understand the relationship of growth to other data collected like milk consumption and/or diet.

None of the studies followed the households over time. Multiple observations over time could have strengthened the results by accounting for seasonal variability, child growth instead of achieved growth, and the cumulative effects of dairy cow ownership in the variable context of farming households.

2.6 Conclusion

Evidence from the literature indicates dairy cow production can have small positive effects on household nutrition. Nevertheless, there is a need for more data on the effects on child nutrition or other nutritionally vulnerable household members, such as women of reproductive age. There is an absence of evidence from carefully designed studies that explore the changes to other aspects of child nutritional status, like infant and young child feeding practices. Several of the studies noted the need for more research on the effect of dairy promotion on maternal time and workload and its relationship to child nutrition. Yet, no studies were found that looked specifically at the relationship between household dairy production and breastfeeding or complementary feeding practices. Furthermore, no studies explored how promoting dairy production may influence the age cow's milk is introduced to infants, particularly in populations that are food insecure and whose mothers may perceive their own breast milk is of poor quality and/or low quantity. Additional research is needed to assess the impacts of promoting dairy production on infant and young child feeding practices.

3 Methodology

3.1 Objectives

The objective of this thesis is to examine the relationship between level of household dairy production and selected infant and young child feeding practices using a mixed methods approach. The primary quantitative question is whether the household's level of dairy production is independently associated with five infant and young child feeding practices within the context of rural dairy farming communities in Kenya. The five infant and young child feeding practices studied are (1) currently breastfeeding; (2) exclusive breastfeeding to six months; (3) introduction of water to child before six months; (4) introduction of cow's milk before six months; and (5) age-appropriate dietary diversity. A secondary question is whether there is an association between demographic and household characteristics and any of the five infant and young child feeding practices. Additionally, qualitative research explored the attitudes and beliefs of women involved in dairy farming toward infant and young child feeding practices, including their perceptions about age-appropriate diets, breastfeeding practices, weaning, and introduction of complementary foods.

3.2 Data Collection

Source of Data

Data for this thesis comes from primary data collected in June-July 2010 as part of a larger study conducted by a multidisciplinary team of Emory University students from the Rollins School of Public Health (thesis author), the Nell Hodgson Woodruff School of Nursing, and the Economics department in the Emory College of Arts and Sciences. The overall objective of the larger study was to conduct formative research to inform the efforts and future research of the International Livestock Research Institute (ILRI) in the design of livestock interventions that maximize benefits to nutrition and food security. In particular, the study was designed to inform a current intervention, the East Africa Dairy Development Project (EADD), being conducted in and around the study site in Kenya, and in Rwanda and Uganda. The study aims were to examine four hypothesized pathways of effect by exploring changes in (a) milk consumption and changes in diet and dietary diversity of

target groups including children; (b) time allocation of women or children's primary caregivers; (c) income, including women's control of income from dairy, and trade-offs between the sale and consumption of dairy; and (d) household expenditures (including health expenditures) and women's decision-making in these expenditures. The primary study combined qualitative and quantitative methods because project partners recognized the complex nature of the study topic and the need for identification of issues, constructs, and attitudes that exist in this particular population before moving forward with a survey. In this case, qualitative research was useful to help inform the development of quantitative instruments, and data from both methods were used to explain results (Ritchie & Lewis, 2003). This thesis presents the findings from analyses on a subset of these data.

Three sites were purposively selected for the study based on the presence of EADD activities. The focus groups and later the household survey were conducted in Cheborge Division in Buret District, and Kipkelion Division and Kebenet Division in Kipkelion District, in Rift Valley Province, Kenya. The area is characterized as a very productive agricultural area producing primarily maize, beans, Irish potatoes, finger millet, sorghum, wheat, and cash crops such as tea, coffee, sugarcane, pyrethrum, and pineapples. The area is mostly rural with poor infrastructure. There is limited access to services and markets. The estimated proportion of the population living in absolute poverty in the two districts is between 56-60% (Republic of Kenya Ministry of Finance and Planning, no date-a, no date-b).[2] The average distance to the nearest health facility is 15 km for persons living in Kipkelion and 8 km for persons in Buret District (Republic of Kenya Ministry of Finance and Planning, no date-a, no date-b).

It is important to note that following the 2007 Kenyan presidential election, violence erupted throughout Kenya with particularly harsh consequences in and around the study sites in Rift Valley Province. Commentators explained that the violence moved beyond a dispute over the election

[2] Absolute poverty was not defined in the reports. Poverty was evaluated through the Welfare Monitoring Surveys (WMS) in 1992, 1994, and 1997 in Kenya. A separate national report indicated "absolute poverty is defined in terms of the requirements considered adequate to satisfy minimum basic needs; the absolute poor have no means to meet these needs" (World Wildlife Fund Eastern and Southern Africa Office & BSI Ltd., 2006). The absolute poverty line for rural areas was estimated to be Ksh 1,239 per person per month by the WMSIII (World Wildlife Fund Eastern and Southern Africa Office & BSI Ltd., 2006).

outcome to ethnic and economic issues surrounding land access and ownership (Integrated Regional Information Networks, 2008). More than 1,000 people were killed and hundreds of thousands of people were internally displaced. The violence also disrupted the dairy industry and smallholder production, although losses are difficult to estimate. More than 2 ½ years had passed since the violence ended when this study was conducted. Data on the effects of the post-election violence were not collected, but it would be an oversight not to mention that this was part of the social and historical context in which the study was conducted.

Focus Group Discussion Recruitment and Methodology

Focus groups were used to explore community attitudes and experiences regarding the four hypothesized pathways of effect of dairy intensification on child nutrition. EADD staff, EADD interns, and community gatekeepers recruited participants for the focus group discussions (FGDs) based on residence in or around the study sites, self-identification as farmers, and self-reported current level of dairy production. Interested farmers gathered in one location and study coordinators introduced them to the partner organizations, the purpose of the day's discussion, overall study objectives, and invited them to participate in the study. If they were willing to participate, the researchers obtained informed consent verbally and requested permission to tape record. Male farmers, female farmers, and female farmers with at least one child less than five years old participated in separate focus groups. These groups were further subdivided into three subgroups based on the level of dairy production. Level of dairy production was based on current, total daily milk production of the highest-yielding cow in the herd. Three levels of production were created: (1) no milk, defined as not currently milking any cows; (2) emerging, defined as best cow producing up to 6 liters/day; and (3) advanced, defined as best cow producing more than 6 liters/day. Although efforts were made to assign farmers into subgroups based on the above definitions, once in the focus groups the range of milk production reported by farmers varied (Table 2).

Table 2. Classification of dairy production groups for focus group discussions

Name of group	Level of dairy production	Range of milk production reported by group participants, across sites		
		Cheborge	**Kipkelion**	**Kebenet**
No milk	Not currently milking any cows	0	0	0
Emerging	Producing up to 6 liters/day	1-10	1-9	1-9
Advanced	Producing more than 6 liters/day	>11	>10	>10

Once in the smaller groups, each group decided which language – Kalenjin, Kiswhaili, or English – they felt most comfortable using for the discussion. Participants were encouraged to respond in the language they felt most comfortable using to explain themselves. Most groups were conducted in a mix of all three languages. Three Kenyan researchers – two university professors and one PhD student – facilitated the focus groups. Three field assistants fluent in the predominant local language assisted with translation, notetaking, and facilitation of the discussion when participants preferred to discuss in Kalenjin. An additional field assistant assisted with translation, notetaking, and facilitation of the discussion in Kiswahili. At the end of the discussion, the researchers provided a small stipend (150 ksh) to each participant to cover travel costs and a light snack was provided. Discussions lasted on average about 3.5 hours, including an introduction – purpose of study, confidentiality, and informed consent – the discussion, and a de-briefing with all participants to answer questions on zoonoses and summarize what each of the small groups had discussed. Discussions were held in a mix of settings including churches, an office adjacent to the local chilling plant, a health clinic, a school, and outdoors. A total of 27 FGDs were conducted with on average of 12 people in each group, for a total participation of about 324 people. Twenty-two discussions were audiotaped. Five different research study assistants transcribed the audiotapes verbatim, and then translated the tapes in English. A member of the study team, fluent in Kiswahili and English, checked the accuracy of the transcriptions and English translations.

Survey Sampling Strategy and Data Collection Methodology

The survey was conducted in the same three sites where the FGDs were held. The basic sampling units for the survey were households with children less than five years of age residing in the three study sites. As this was an exploratory study, no sample size calculations were made. Instead, the aim was to survey 30 households in each site, with 10 households from each level of dairy production group. Using OSI Explorer, ILRI randomly generated 15 GPS points within a five kilometer radius from the selected EADD site hub in each village. Field assistants used GPS devices to locate households at or near the GPS coordinates. Once the household was located, the field assistants determined if the household met the eligibility criteria (at least one child less than five years old lives in the household and dairy production based on the defined production categories). If the household was not eligible and/or the quota had been met for the specific production level, the household member was asked to identify other nearby households who met the selection criteria, and field researchers proceeded to those households. Due to time constraints, if no one was home at the household near the GPS coordinates, field researchers went to the next nearest household. If the 15 GPS points were exhausted and the 10 household quota per production level was not met, ILRI randomly generated five additional GPS points and the field tem following this procedure until sample size had been reached. Ninety-four households were surveyed across all three sites. Two questionnaires were excluded because 1) the respondent did not meet the selection criteria and 2) the respondent was unable to answer the majority of the questions concerning the index child, leaving a sample size of 92 (Table 3).

Table 3. Description of sample stratified by level of dairy production and across site, n=92

Site	No milk	Emerging	Advanced	Total
Cheborge	10	10	10	30
Kebenet	10	10	9	29
Kipkelion	10	11	12	33
Total	30	31	31	92

The questionnaire consisted of two parts (Appendix). Part A was administered to the head of household or primary caretaker of the index child if he or she could answer questions related to

household income and farm activities and inputs. Part B was administered to the primary caretaker of the index child. The questionnaire included the following modules: demographics; household income and investments; milk production, milk sales, and dairy inputs; dairy consumption with a focus on the index child; dietary diversity and food security; time allocation of the primary caregiver; syndromic surveillance of zoonotic disease in animals as well as humans; and household health-seeking behavior and practices. Specific sections of the questionnaire focused on assessing dietary patterns of the index child in order to capture intra-household effects and allocation, data that has been missing in previous studies. All modules relied on self-report. The same local field assistants used for the qualitative portion of the study were used for the quantitative portion. On average, each questionnaire took 1 ½ hours to complete. Questionnaires were written in English and administered by the Kenyan field assistants in the language preferred by the respondent. Answers were recorded in English. American field team members accompanied their Kenyan counterparts during household identification and questionnaire administration. All questionnaires were reviewed twice by separate members of the study team. Data were entered into Access and then imported in Excel. Systematic data cleaning was conducted and discrepancies were corrected by referencing the original questionnaire.

3.3 Ethics

The study protocol was reviewed by the Institutional Review Board (IRB) of Emory University and met the criteria for exemption under 46.101(b)(2) and was exempt from further Emory IRB review. Kenyan IRB approval was not necessary to obtain because of a standing agreement between the research partner, the ILRI, and the Kenyan IRB. All study participants gave their verbal consent to participate after the study objectives, the intended use of the results, and confidentiality were read and explained to them. Participants in the FGDs were provided a light snack and compensation for transport costs incurred to attend the FGDs. Survey respondents were not provided any compensation because the questionnaires were administered at the respondent's home and therefore participation costs were deemed minimal.

3.4 Analytical Methodology

Quantitative Analysis

The demographic characteristics examined as potentially associated with the five outcomes of interest included characteristics of the household head, the primary caretaker, and the index child. The household head characteristics examined included age, ethnicity, years of education, literacy (whether or not respondent was literate in English and/or Kiswahili), and whether or not the household was headed by a female. A variable was created to indicate whether or not the household head's primary work activity was in agriculture. The primary caretaker characteristics examined included age, years of education, and whether or not the primary caretaker's primary work activity was in agriculture. The index child characteristics included age and sex.

The sociodemographic characteristics examined included survey site (village), household size (number of household members), number of children under 16 years old, and primary water source. A household asset score was created based on the number of items owned from a list of six household items – cooker/gas stove, radio, television, mobile phone, motorcycle, and bicycle. An agricultural asset score was created based on the number of items owned from a list of four agricultural tools – hoe, spade, plough, and sprayer pump. Initially, cart and water pump were included in the possession score, but no one in the sample owned either of these items so they were eliminated from the score.

To analyze household dietary diversity, a food consumption score (FCS) was constructed from the data collected on the number of times individual food items were consumed in the household in the past seven days. The FCS is a method used by the World Food Programme (WFP) to describe food consumption patterns and assess household food security (Wiesmann, Bassett, Benson, & Hoddinott, 2008). The score was created by grouping the individual food items into seven food groups as defined by the WFP methodology: 1) main staples, 2) pulses, 3) vegetables, 4) fruit, 5) meat and fish, 6) milk, and 7) oil. The consumption frequencies of the food items within the same group in the past seven-day period were summed. Any consumption frequencies greater than seven

for the group were re-coded as seven. The food group scores were summed to create the FCS. In addition, the animal-source food consumption score was based on the household's score for the 'meat and fish' food group, excluding the 'milk' food group given the context of the study population's relatively high consumption of dairy products.

Individual dietary diversity for the index child was based on a recall of foods consumed by the index child in the previous 24 hours based on a 13-item list, administered to the primary caretaker of the child. Briefly, the primary caretaker was asked to respond yes or not to a set list of 13 questions about types of foods the child consumed the previous day and at night developed by the Food and Nutrition Technical Assistance Project (FANTA) (Swindale & Bilinksy, 2006). The list of food items were grouped into eight food groups for analysis: (1) grains; (2) dairy; (3) vitamin-A rich fruits and vegetables; (4) other fruits and vegetables; (5) flesh foods; (6) eggs; (7) legumes and nuts; and (8) foods prepared with fat. The dietary diversity score was calculated based on the number of different food groups consumed out of eight. The animal-source food consumption score for the index child was based on the sum of two food groups 'flesh' and 'eggs' and excluded 'dairy' given the context of the study population's relatively high consumption of dairy products. The individual dietary diversity score (IDDS) can be used as a proxy measure for the nutritional quality of an individual's diet, food access, and food consumption (Food and Agricultural Organization, 2008; Swindale & Bilinksy, 2006). It is important to note that the dietary diversity score cannot be used to assess quantity of food consumed and a one-time administration of the questionnaire does not capture the variation in diets that exist across seasons (Food and Agricultural Organization, 2008). Many studies have shown a positive correlation between dietary diversity score and nutrient adequacy in the diet (Food and Agricultural Organization, 2008).

Level of dairy production was a three-level ordinal variable. The three levels were based on the respondent's total daily amount of milk produced by the best cow in the herd. Other characteristics related to level of dairy production among the emerging and advanced production level households examined included: total household milk production (a sum of the number of liters

of milk sold in the morning and evening and the number of liters of milk consumed in the morning and evening), total household milk sales (a sum of the number of liters of milk sold in the morning and evening), total household milk consumption (a sum of the number of liters of milk consumed in the morning and evening), and the proportion of milk produced that was sold (total household milk sales divided by total household milk production). As would be expected, milk production, sales, and consumption increased with level of dairy production groups.

In Section A of the questionnaire written instructions indicated to the enumerators that they were to skip subsections A8 to A11 for the households that were not currently milking any cattle (Appendix: Household Questionnaire p.6-13). These subsections included questions related to milk production and sales, dairy cooperative membership, decision-making related to milk consumption and sales, and zoonoses. In the initial days of fieldwork, some enumerators did not follow the skip pattern and administered that part of the survey to a few no milk households. Data that was collected from these households was set to missing for analysis.

Infant and Young Child Feeding Outcomes

The outcomes of interest in this study were five infant and young child feeding practices. All the practices were dichotomous outcomes: currently breastfed, exclusively breastfed to six months (created by assessing introduction of any foods or drinks before six months), introduction of water before six months, introduction of cow's milk before six months, and age-appropriate dietary diversity. Age-appropriate dietary diversity was based on current child feeding recommendations, which is a minimum of four food groups out of seven (excluding foods prepared with fats) for children six months or older (World Health Organization, 2010). These five outcomes were selected because they align with current, age-specific feeding recommendations for young children (World Health Organization, 2010). Following the recommendations is not only important for child growth and development, but evidence from observational studies points to the reality that suboptimal infant and young children feeding practices can increase the risk of morbidity and mortality in young children (Black et al., 2008).

The dataset was checked for any missing and implausible values. Missing values were excluded from analysis. The one implausible value was set to missing (12-month old child whose cessation of breastfeeding was >12 months). SAS 9.2 for Windows was used for all statistical analyses (SAS Institute, Cary, NC).

Statistical Analysis

Statistical analysis was performed by describing sociodemographic, agricultural, and nutritional characteristics of the households overall and across levels of dairy production and site. Means and SD were reported for continuous variables and frequency distributions for categorical variables. Differences between the level of production groups and between sites were tested for significance ($p<0.05$). Univariate analysis was used to evaluate the association between the independent variable (level of dairy production) and the five outcomes of interest for the index child (currently breastfeeding; exclusive breastfeeding to six months; introduction of water before six months; introduction of cow's milk before six months; and age-appropriate dietary diversity).

Multiple logistic regression was used to assess the independent association between level of dairy production and each of the five infant and young child feeding outcomes adjusting for potential confounding. Variables shown to be significant in previous studies and of significance to the research question were assessed for inclusion in the multivariate models. The variables assessed were: site, age of primary caretaker, years of education of primary caretaker, age of index child, sex of index child, total number of household members, household assets score, acres of farm land owned, and the household food consumption score. These independent variables were all continuous, except study site, which had three levels (Cheborge, Kebenet, and Kipkelion); sex of the index child (dichotomous); and acres of farm land owned (dichotomized by >2 acres and ≤2 acres).

In logistic regression, adjusted odds ratios and the 95% confidence intervals were calculated as measures of association for the infant and young child feeding practice for each variable in the model. Confounding was assessed for each of the variables and the feeding practice by comparing the crude odds ratios with the adjusted odds ratios in full models. If the difference was greater than

10%, confounding was suspected to be present and the variable was left in the model. Additionally other variables that may not have satisfied the 10% rule were included if previous research suggested confounding by that variable. Interactions between the independent variables with level of dairy production were tested by creating an interaction term of level of dairy production and the risk factor and including it in each of the regression models and checking for significance (95% Wald CL that does not include the null). Interaction was not present in any of the models. Collinearity was assessed by fitting a multivariate regression model for each feeding outcome and checking the variance inflation factor for the variables in the model. Collinearity was not an issue as none were greater than 10. For each outcome of interest, the final models contained the following variables: level of dairy production, site, age of primary caretaker, years of education of primary caretaker, age of index child, sex of index child, total number of household members, household assets score, acres of farm land owned, and the household food consumption score

Qualitative Data

For this study, the qualitative research questions were related to community attitudes of women towards infant feeding practices. Therefore three transcripts from the focus groups with female farmers representing the three levels of dairy production and three transcripts from the focus groups with female farmers with young children representing the three levels of dairy production were analyzed. Transcripts from the focus groups with male farmers were not analyzed for this study. A total of six transcripts were thus analyzed. The particular transcripts were selected based on representation of all the levels of production and types of women. Because there was little variation in the themes discussed across groups, the author is confident that saturation was reached with these six transcripts.

There are a wide variety of approaches that can be taken to analyze qualitative data, the most common one in health and social sciences being grounded theory, which is described as a process of discovering theory from textual data through a systematic, circular process of analysis by Corbin and Strauss (Corbin & Strauss, 2008). The level of analysis depends on how the research will be used and

the study design of the project. For the purposes of this study, the author focused on the identification of key themes, concepts, and categories in the data. These themes, concepts, and categories were used to organize the data through the process of reading the data and labeling sections by theme using codes. Codes were developed inductively from the data and deductively from the research questions and focus group discussion guide. Data on a particular theme could then be easily retrieved by code in order to draw conclusions. This process is described more fully in Ritchie and Lewis (2003). MAXQDA 10, qualitative data analysis software, was used to aid in the analytical process (VERBI Software, Marburg, Germany).

4 Results

The demographic characteristics of household members across levels of dairy production are summarized in Table 4. Households were demographically similar across levels of production in terms of characteristics of the household head, primary caretaker, and index child. Overall, the sample was ethnically homogenous with more than 90% (n=83) of the surveyed households identified as Kalenjin, but the difference in ethnic diversity was statistically significant across production levels (p=0.0007). The mean age of primary caretakers was 31.4 years and the mean number of years of education was 8.6 years. Both increased with levels of production, although the differences were not statistically significant. The mean age of index children was 22.3 months and 46.74% of the children were male (n=43). Demographic differences across site also were assessed and there were no statistically significant differences.

Table 4. Demographic characteristics of household members, by level of production (n=92)

	Overall (n=92)	**No milk (n=30)**	**Emerging (n=31)**	**Advanced (n=31)**	*p*
Household head					
Age (mean ± sd)	40.7 ± 11.7	40.8 ± 13.8	40.0 ± 11.0	41.5 ± 10.5	0.8991
Female-headed households (%, n)	9.8% (9)	13.3% (4)	12.9% (4)	3.2% (1)	0.3272
Ethnicity					
Kalenjin (%, n)	90.2% (83)	73.3% (22)	96.8% (30)	100% (31)	0.0007
Kisii (%, n)	4.4% (4)	10% (3)	3.2% (1)	0	
Luhya (%, n)	1.1% (1)	3.3% (1)	0% (0)	0	
Kikuyu (%, n)	4.4% (4)	13.3% (4)	0% (0)	0	
Years of education (mean ± sd)	10.0 ± 4.5	9.4 ± 4.4	9.7 ± 4.8	10.8 ± 4.4	0.4648
Primary activity is not agriculture (%, n)	36.7% (33)	35.7% (10)	41.9% (13)	32.3% (10)	0.7328
Literate (%, n)	90.0% (80)	83.3% (25)	87.1% (27)	90.3% (28)	0.7268
Primary caretaker					
Age (mean ± sd)	31.41 ± 9.3	28.76±10.1	33.35±10.1	31.97±7.3	0.1507
Years of education (mean ± sd)	8.57±3.7	7.67±2.8	8.38±3.6	9.67±4.5	0.1085
Primary activity is not agriculture (%, n)	9±9.8	3±10	2±6.5	4±12.9	0.7004
Index child					
Age, in months (mean ± sd)	22.31±15.6	20.06±15.5	20.1±13.2	26.7±17.5	0.1582
Male children (%, n)	46.7% (43)	46.7% (14)	38.7% (12)	54.8% (17)	0.4536

Sociodemographic characteristics of the households are summarized in Table 5. The characteristics that were positively and statistically significantly associated with level of production were: the household assets score, an indicator of wealth (p=0.024); the amount of farm land owned (p=0.0207); and the agriculture assets score, an indicator of wealth and involvement in agriculture

(p=0.0002). A significantly greater proportion of households in the advanced production group owned a gas stove and television compared to the emerging and no milk production groups. A significantly greater proportion of households in the advanced production group owned a sprayer pump compared to emerging and no milk production groups. Sociodemograhic characteristics of the households were tested for differences across site and none were found to be statistically significantly different. Due to the sampling strategy employed (around 10 households from each level of dairy production per site were surveyed), differences in level of dairy production across the sites could not be assessed.

Table 5. Sociodemographic characteristics of households, by level of production (n=92)

	Overall (n=92)	**No milk (n=30)**	**Emerging (n=31)**	**Advanced (n=31)**	*p*
Household size (mean ± sd)	6.0±2.1	5.3±2.1	6.3±2.2	6.3±1.9	0.1308
Number of children, under age 16 (mean ± sd)	3.2±1.6	2.9±1.7	3.3±1.7	3.6±1.5	0.2677
Household assets score, out of 6 (mean ± sd)	2.2±1.1	1.9±1.4	2.0±0.9	2.6±1.0	0.0240
Area of land owned, in acres (mean ± sd)	3.3±6.1	1.22±1.59	3.1±3.35	5.5±9.6	0.0207
Agricultural assets score, out of 4 (mean ± sd)	2.0±1	1.4±0.7	2.1±1.1	2.4±0.9	0.0002
Primary water source					
Rivers/streams (%, n)	59.8% (55)	66.7% (20)	61.3% (19)	51.6% (16)	0.0776
Unprotected dug well/springs (%, n)	16.3% (15)	16.5% (5)	25.8% (8)	6.5% (2)	
Protected dug well (%, n)	7.6% (7)	3.3% (1)	6.5% (2)	12.9% (4)	
Piped into homestead (%, n)	6.5% (6)	0% (0)	3.2% (1)	16.1% (5)	
Public tap (%, n)	3.3% (3)	10% (3)	0% (0)	0% (0)	
Other sources (%, n)	6.5% (6)	3.3% (1)	3.2% (1)	12.9% (4)	

In terms of the nutritional context of the households, the mean food consumption score (FCS) for households increased with level of dairy production and was significant (p=0.0007) (Table 6). As was expected based on what was reported in the FGDs, all households reported consuming staple foods every day in the past seven days. The next most commonly consumed food group was vegetables (6.0 times), followed by milk (5.5 times), and fruits (4.6 times). The meat food group included all flesh foods and eggs. Households reported consuming the meat food group an average of 2.7 times in the past seven days, and the frequency of meat food group consumption increased significantly across levels of production (p=0.0287). Households in the advanced production group appear to be consuming a greater variety of foods and reported less concern about going without food and milk, in particular. For example, no households in the advanced production group reported

the index child went without milk because of lack of availability in the past month and only one household reported an adult went without milk. The differences between groups for these two "milk security" questions were statistically significantly different (for index child: p=0.0047; for adults: p=0.0018).

Table 6. Household food consumption characteristics and food and milk security, by level of production (n=92)

	Overall (n=92)	No Milk (n=30)	Emerging (n=31)	Advanced (n=31)	*p*
Food Consumption Score (mean ± sd)	36.0±5.8	32.8±6.7	36.9±4.8	38.1±4.5	0.0007
Food Consumption by Food Groups					
Staples (mean ± sd)	7±0	7±0	7±0	7±0	
Pulses (mean ± sd)	3.7±2.2	4.1±2.5	4.2±2.3	2.9±1.5	0.0415
Veggies (mean ± sd)	6.0±1.7	5.9±1.6	5.8±2.0	6.3±1.5	0.5512
Fruits (mean ± sd)	4.6±2.8	4.4±2.8	4.2±3.1	5.0±2.5	0.4832
Meats (mean ± sd)	2.7±2.2	1.7±0.85	2.7±2.3	3.5±2.2	0.0287
Milk (mean ± sd)	5.5±2.6	3.7±3.2	6.0±2.1	6.8±0.9	<0.0001
Oil (mean ± sd)	6.4±1.7	5.6±2.4	7±0	6.6±1.5	0.0037
ASF Score, excluding milk (mean ± sd)	2.7±2.2	1.7±0.85	2.7±2.3	3.5±2.2	0.0287
Food insecure in past 12 months (%, n)	28.3%(26)	33.3%(10)	32.3% (10)	19.4% (6)	0.4074
Adults went without milk in past 30 days (%, n)	22.8% (21)	43.3%(13)	22.6% (7)	3.2% (1)	0.0018
Youngest child went without milk in past 30 days (%, n)	13.2% (12)	31.0%(9)	10% (3)	0% (0)	0.0047

Sites did not differ in terms of FCS or for particular food groups, except for pulses (p=0.0195). Households in Cheborge reported a less frequent mean consumption of pulses in the past seven days (2.8±1.9) than households in Kebenet (4.3±2.3) and in Kipkelion (4.1±2.1). In terms of food security and concerns about having enough milk for young children, households in Cheborge reported less food insecurity and less concern about children going without milk than the other two sites. A greater proportion of households in Kipkelion reported food insecurity in the past 12 months than households in the other two sites and this difference was statistically significant (p=0.0145). Furthermore, although the difference between sites was not as great, a greater proportion of households in Kipkelion reported concern about young children going without milk in the past 30 days than the other two sites and this difference was statistically significant (p=0.0322).

No significant differences were observed in the diets of index children six months and older by levels of milk production (Table 7). The mean dietary diversity score for children six months and older was 5.1 food groups, which is slightly higher than what has been reported in other studies of

dietary diversity among preschool children in neighboring Western Kenya (Ekesa, Walingo, & Abukutsa-Onyano, 2008). All children six months and older consumed milk in the previous 24 hours. The next most popular food groups consumed for the entire sample were grains, vitamin-A rich foods, and legumes. Neither individual dietary diversity scores nor the individual animal source food score differed significantly across sites.

Table 7. Dietary diversity characteristics of index children six months and older, by level of production (n=80)

	Overall (n=80)	No Milk (n=25)	Emerging (n=28)	Advanced (n=27)	*p*
Dietary Diversity Score (mean ± sd)	5.1±1.2	5.0±1.2	4.7±1.2	5.6±0.9	0.2147
Food Consumption by Food Groups					
Grains (%, n)	98.8% (79)	100% (25)	96.4% (27)	100% (27)	0.9988
Dairy (%, n)	100% (80)	100% (25)	100% (28)	100% (27)	
Vitamin A-rich foods (%, n)	77.5% (62)	76% (19)	67.9% (19)	88.9% (24)	0.3460
Fruits and Vegetables (%, n)	55% (44)	52% (13)	42.9% (12)	70.4% (19)	0.1756
Flesh (%, n)	15% (12)	24% (6)	7.1% (2)	14.8% (4)	0.2982
Eggs (%, n)	22.5% (18)	16% (4)	25% (7)	25.9% (7)	0.5859
Legumes (%, n)	57.5% (46)	56% (14)	46.4% (13)	70.4% (19)	0.2905
Fats (%, n)	82.5% (66)	72% (18)	82.1% (23)	92.6% (25)	0.1925
ASF Score, excluding milk (mean ± sd)	0.4±0.6	0.4±0.6	0.3±0.5	0.4±0.6	0.8926
ASF consumed, excluding milk (%, n)	33.8% (27)	10.0% (8)	11.3% (9)	12.5% (10)	0.8237

Eighty percent of the sample of children six months and older consumed at least four food groups in the previous 24 hour period, which is in line with the WHO recommendations for age-appropriate dietary diversity (Table 8). Of some concern is that almost half (41.7%) of children less than six months consumed at least one food group in the previous 24 hours, indicating a large proportion of infants are not being exclusively breastfed. Age-appropriate dietary diversity was also assessed across site. No significant differences were found for children six months or older. For children less than six months, there were slightly significant differences across site, an indication that exclusive breastfeeding practices varied across site (p=0.0502). For example, every infant less than six months in households surveyed in Kebenet had consumed cow's milk in the past 24 hours (n=3). The proportion of infants less than six months who had not consumed any food groups in the past 24 hours in Cheborge and Kipkelion was higher (83.3% and 66.7%, respectively).

Table 8. Age-appropriate dietary diversity for all index children based on 24-hour recall, by level of production (n=92)

	Overall (n=92)	No Milk (n=25)	Emerging (n=28)	Advanced (n=27)	*p*
Children <6 months who consumed the recommended zero food groups in the past 24 hours (%, n), (n=12)	58.3% (7)	25.0% (3)	16.7% (2)	16.7% (2)	0.9251
Children ≥6 months who consumed the recommended four or more food groups in the past 24 hours (%, n), (n=80)	80.0% (64)	26.25% (21)	23.75% (19)	30.0% (24)	0.1277

The FGD data provided rich information about the diets of adults and children in this community. *Ugali*, a stiff porridge made from maize flour or mixed with sorghum and millet, was a staple in the daily diet. It was regularly consumed with vegetables like *sukuma wiki* (kale), and other green leafy vegetables, which were referred to as traditional vegetables like *mchicha* (amaranth leaves) and *managu*. Women said that these vegetables were found growing in the wild, were grown on farms, and were purchased at the market. *Githeri*, a mixture of maize and beans, was another dish that was consumed regularly. Although many of the farmers were growing fruits on their farms like pineapples and avocadoes, many of them did not mention them as part of their diets unless probed. Children began following the same diet as the parents soon after weaning, around two or three years old. The main difference between adult and child diets is the consumption of *uji*, which is a soft porridge containing similar ingredients as *ugali*, but often with milk added. Some mentioned that *uji* was consumed by adults, but mostly it was mentioned in the context of a complementary food and a portable food that nursery school-age and younger school-age children could carry with them to school. Fresh milk was a regular part of the diet for all household members and across levels of production. Many farmers reported children and adults consuming fresh milk with or after meals. The cream of the milk was also added to vegetables. Another use of milk was *mursik*, a fermented milk drink.

As was expected, differences in milk consumption appeared to differ across levels of production. For example, women in the advanced production group frequently mentioned daily consumption of fresh milk. Women in the no milk production groups frequently mentioned not having enough milk for themselves or for the children. One woman from the no milk production group explained, *"We have porridge made of millet flour, sometimes we don't mix the flour with omena (small fish),*

and other times we don't make the porridge with milk. [Facilitator: Why is it so?]This is because sometimes we do not have money to buy milk." Quantity of milk consumption was not collected in survey data for the no milk production groups, but for the other two levels of production, median household milk consumption among the advanced production households was four liters more per day than among the emerging production households (Table 9). Median household milk consumption was about three liters across all three sites.

Table 9. Comparison of daily household milk consumption patterns of emerging and advanced levels of production

	Overall (n=62)	Emerging (n=31)	Advanced (n=31)
Household milk consumption, in liters (median, IQR)	3 (1.5, 5.0)	1.0 (1.5, 2.5)	5.0 (3.0, 6.0)

An interesting theme that emerged from the FGDs was child preference in distributing milk within the household. As will be discussed later, the women in the discussions explained there were several health and development benefits of giving milk to young children, so making sure young children had milk was a priority for them. This had an effect on sales decisions and distribution within the household. A farmer from the emerging level of production group explained, *"I cook tea with some of the morning milk, but what remains is for my children since I have many children. I divide it and use it the whole day."* In the no milk production group, one woman explained how she uses the little milk she has in a typical day. She explains, *"For the milk, for example, if it is three cups and there is a small child. You can give the child half the cup and the other half you use to cook tea at 4:00. You are left with two cups. Let's say I have already used one, so those two cups are now used in the morning. Sometimes the child may need some milk in the morning."* Even women in the higher production groups rationed milk throughout the day to ensure children had enough. One woman from the advanced level of production group explained it this way. *"[Facilitator: We have lunch and you told me that you eat ugali, milk, and vegetables. What amount of milk do you use for lunch?] It will depend if the milk is there, if it is not there, you only give to two kids."*

Although this theme was heard across levels of production, the actual quantities consumed by the index children differed across levels of production (Table 10). Respondents were asked to report the index child's fresh milk consumption, in cups. A greater proportion of children in the no milk production group had consumed no fresh milk compared to the children in the emerging and

advanced production groups. Furthermore, the proportion of children consuming at least one cup of fresh milk increased with increasing level of dairy production. The index child's fresh milk consumption varied across site (Table 10). Children in Kebenet appeared to be consuming less milk, even no milk at all, compared to children in Cheborge and Kipkelion.

Table 10. Daily fresh milk consumption of index children over six months, by level of production and by site

	Overall (n=80)	**No Milk (n=25)**	**Emerging (n=28)**	**Advanced (n=27)**
Fresh milk consumption, in cups (median, IQR)	1.0 (0.5, 1.5)	0.5 (0, 1.0)	0.5 (0.5, 1.0)	1.0 (0.5, 2.0)
Children consuming no fresh milk (%, n)	17.5% (14)	12.5% (10)	3.8% (3)	1.3% (1)
Children consuming 0.5 cups (%, n)	30.0% (24)	6.3% (5)	15% (12)	8.8% (7)
Children consuming more than 1 cups (%, n)	52.5% (42)	12.5% (10)	16.3% (13)	23.8% (19)
	Overall (n=80)	**Cheborge (n=24)**	**Kebenet (n=26)**	**Kipkelion (n=30)**
Fresh milk consumption, in cups (median, IQR)	1.0 (0.5, 1.5)	1.0 (0.5, 2)	0.,5 (0, 1.0)	1.0 (0.5, 1.5)
Children consuming no fresh milk (%, n)	17.5% (14)	1.3% (1)	10.0% (8)	6.3% (5)
Children consuming 0.5 cups (%, n)	30.0% (24)	11.3% (9)	8.8% (7)	10.0% (8)
Children consuming more than 1 cups (%, n)	52.5% (42)	17.5% (14)	13.8% (11)	21.3% (17)

Due to small sample sizes, it was not feasible to compare feeding practices of each child age group across levels of production. Instead descriptive statistics were generated for feeding practices by three age groups – less than six months, 6-11 months, and 12-23 months – and stratified by level of production. All children in the sample up to 12 months of age were still being breastfed (Table 11). Seventy-two percent of children up to 24 months (n=18) were still being breastfed and about 12 percent (n=5) of children 24 months or older were still breastfed (Table 11). Less than half of the children in the sample were exclusively breastfed through the first six months of life. Only 39 children (44.3%) had not received any complementary foods before six months. A little less than half of the infants (0 to 6 months) in the study had already been introduced something other than breast milk. Feeding practices were stratified across site. Households in Kebenet had the poorest exclusive breastfeeding practices; no children up to 23 months in the sample were exclusively breastfed for the first six months.

Table 11. Breastfeeding and exclusive breastfeeding practices, by child age and by level of production

Practices	Overall (n=92)	No milk (n=30)	Emerging (n=31)	Advanced (n=31)
Current breastfeeding status (%, n)				
Children less than or equal to 11 months (n=23)	100% (12)	100% (5)	100% (3)	100% (4)
Children 12-23 months (n=25)	72% (18)	20% (5)	32% (8)	20% (5)
Exclusively breastfed for first 6 months (%, n)				
Children less than 6 months (n=12)	58.3% (7)	42.9% (3)	28.6% (2)	28.6% (2)
Children 6-11 months (n=11)	18.2% (2)	18.2% (2)	0% (0)	0% (0)
Children 12-23 months (n=24)	20.8% (5)	8.3% (2)	4.2% (1)	8.3% (2)

Overall, data on the median age of introduction of non-breast milk substances indicated that mothers were giving their child water first, followed by cow's milk and porridge, and then mashed or semi-solid foods (Table 12). The range for age of introduction of water was quite large from 0.25 months (one week) to 18 months. Twenty-one percent (n=16) of respondents reported giving the child water before their first month, while 12% (n=9) reported giving the child water for the first time starting at nine months. The overall median age of introduction of cow's milk was four months, but the actual age of introduction of cow's milk may be closer to one month, as data from the FGDs indicated that when milk was available in the household, it was added to the child's *uji* even at a young age. One woman from the emerging production level group explained: *"At three months, I gave her uji. [Facilitator: What did you put in the uji? Milk?] "Yes, I would put milk."* There is a noticeable trend towards a younger age of introduction of non breast milk foods and liquids with increasing level of production, particularly for cow's milk.

Table 12. Median age of introduction, in months, of complementary foods, by level of production

	Overall (n=92)	No milk (n=30)	Emerging (n=31)	Advanced (n=31)
Water (median, IQR), (n=77)	3 (1, 6)	4 (1, 6)	3 (1, 7)	2 (1, 6)
Cow's milk (median, IQR), (n=80)	4 (2, 6)	6 (2, 6)	4 (3, 6)	3.5 (1.5, 5.5)
Porridge (median, IQR), (n=81)	4 (2, 6)	6 (2, 6)	3.5 (2, 6)	4 (3, 6)
Mashed or semi-solid foods (median, IQR), (n=76)	6 (6, 8)	7 (6, 9)	6 (6, 8)	6 (5, 8)

The majority of women in the FGDs reported being taught to exclusively breastfeed their infants up to six months, but when probed many acknowledged that they gave their children water, milk, or *uji* before six months. A number of reasons for this practice were provided. Some mothers

seemed to think breast milk was inadequate for the child and so they needed additional foods. One woman from the emerging production level said, *"So, when I wake up at 6:30, I won't breastfeed her because it would fill her stomach to the extent that she will refuse to drink uji."* Another woman from that same production level said when asked about frequency of breastfeeding, *"It all depends on the children. If you feed them well, he will not breastfeed all the time. The child forgets to breastfeed at times when you give him enough uji."* Interpretation of these views can only be accurately made if the age of the woman's child is known and unfortunately, the data do not provide the age. If these children are less than six months and mothers are encouraging *uji* instead of breast milk, then this is a concern. Many of the women expressed a preference for feeding *uji* to their young children. A female farmer from the no milk production group explained, *"From one month to six months, we prefer for them to either breastfeed or drink maize flour porridge."* On the other hand, if the child is over six months, then the promotion of *uji* as a complementary food could be viewed as appropriate. One mother from the emerging level of production group said, *"If you don't have enough milk, it is wise to give him uji…That's why we do it."* When asked about what other food should be given to the child if the breast milk was insufficient, women in the advanced production group said to give the children cow's milk or add cow's milk to porridge. Another woman in the emerging production level group explained, *"But if you have sufficient milk…you cannot introduce them before six months."*

Reasons reported by the mothers for insufficient milk were because the mothers were working too hard, the mother was sick, or the mother was not eating enough foods or not enough healthy foods. Women from the no milk production level group explained that some of the healthy foods that a breastfeeding mother should eat were: traditional vegetables and milk, a lot of fruits, millet flour with milk, and beans. Other reasons provided in other focus groups for cessation of breastfeeding were if the child was ill and lost interest in breast milk, the mothers were ill and taking medications and told not to breastfeed, and in order to return to studies or work. One woman in the advanced production group explained, *"If the mother has given birth without plan and she is still pursuing some course, then she will stop breastfeeding."* The mother's work activity appeared to influence breastfeeding

practices. One woman from the no milk production group said, *"But you know, we who do casual labor sometimes start to give them porridge early."* Unfortunately, no data were collected for the reasons as to why this happened, but based on other discussions it could be because of the workload of casual labor makes the women think their breast milk is insufficient. Women who are doing casual labor are paid by the amount of work accomplished (i.e. weight of tea leaves picked), so it could be that they do not want to stop work in order to breastfeed and so are bringing porridge with them to the farms so the child can feed himself. One woman in the no milk production group said, *"Sometimes you try to give them porridge, but they refuse, so what do you do except breastfeed them so that they can let you continue working."* Another possibility is that some women, instead of carrying the infants on their backs to the farms, are leaving them with a relative or neighbor. In these cases, the women may be leaving porridge or other foods for the child to eat while she is away.

The important role of dairy in the community and in the diets of children suggested that the relationship between milk consumption and breastfeeding frequency be examined. Due to small samples sizes, associations could not be calculated, but Table 13 provides descriptive statistics for children above six months old. Feeding frequency appears to be unaffected by the amount of cow's milk the child consumes, but it does not necessarily mean that cow's milk is not displacing breast milk. From qualitative data of women's daily activities, including child feeding occasions, it appeared that women were breastfeeding young children on demand, but that the duration of breastfeeding was very brief.

Table 13. Frequency of breastfeeding in past 24 hours for differing levels of daily fresh milk consumption, by age of index child (n=80)

	6 to 9 months n=6 Times BF Median, IQR	**n**	**9 to 12 months n=6 Times BF Median, IQR**	**n**	**12-23 months n=18 Times BF Median, IQR**	**n**	**>24 months n=43 Times BF Median, IQR**	**n**
<0.5 cup	7	1	6 (3, 9)	3	8	1	5 (2, 8)	3
0.5 cup	6.5 (6, 7)	2	9	1	6.5 (3, 11)	8		0
≥ 1 cup	8.0 (4, 15)	3	7.5 (5, 10)	2	9 (4, 16)	9	5 (4, 6)	2
Overall	7.0 (4, 15)	6	7.5 (3, 10)	6	7.0 (3, 16)	18	5 (2, 8)	5

Associations between Currently Breastfeeding, Exclusive Breastfeeding to Six Months, and Age-Appropriate Dietary Diversity

In univariate analysis, advanced level of dairy production, increasing age of the index child, increasing age and years of education of the caretaker, and a higher household assets score were each associated with reduced odds that the child was currently breastfed (Table 14). Advanced and emerging levels of production were each associated with reduced odds of exclusive breastfeeding to six months compared to the no milk production group. No additional variables were associated with odds of exclusive breastfeeding and no variables were associated with age-appropriate dietary diversity.

Table 14. Unadjusted associations between three infant and young child feeding practices and other characteristics

	Currently Breastfed		Exclusively Breastfed to Six Months		Age-Appropriate Dietary Diversity	
Variables	**cOR**	**95% Wald CL**	**cOR**	**95% Wald CL**	**cOR**	**95% Wald CL**
Production level						
No milk (REF)						
Emerging	0.53	(0.19 1.50)	0.26	(0.08, 0.81)*	0.53	(0.16, 1.69)
Advanced	0.28	(0.10, 0.79)*	0.27	(0.09, 0.85)*	1.30	(0.35, 4.82)
Site						
Cheborge (REF)						
Kebenet	0.94	(0.34, 2.61)	0.29	(0.08, 1.07)	0.38	(0.11, 1.30)
Kipkelion	0.31	(0.31, 2.22)	1.03	(0.36, 2.94)	0.90	(0.24, 3.32)
Sex of index child						
Male (REF)						
Female	1.18	(0.52, 2.69)	1.20	(0.48, 3.02)	1.34	(0.51, 3.56)
Age of index child, in months	0.77	(0.69, 0.86)*	0.99	(0.96, 1.02)	1.03	(0.99, 1.07)
Age of primary caretaker, in years	0.94	(0.89, 0.99)*	0.97	(0.92, 1.03)	0.97	(0.93, 1.03)
Years of education, primary caretaker	0.82	(0.71, 0.94)*	1.05	(0.92, 1.19)	1.06	(0.92, 1.21)
Household size	0.92	(0.75, 1.12)	0.95	(0.76, 1.19)	0.94	(0.74, 1.18)
Household asset score	0.67	(0.45, 0.99)*	1.25	(0.82, 1.90)	1.42	(0.88, 2.27)
Food consumption score	0.95	(0.89, 1.03)	0.96	(0.89, 1.04)	1.05	(0.97, 1.14)
Total area of farm owned, in acres						
≤ 2 acres (REF)						
> 2 acres	0.59	(0.25, 1.37)	1.91	(0.76, 4.82)	1.94	(0.67, 5.57)

***An asterisk (*) indicates that the 95% CL does not contain 1.**

With respect to age of introduction of non breast milk substances, households in Kebenet had significantly greater odds of introducing water while those households with advanced milk production had significantly greater odds of introducing cow's milk before the child was six months old compared to their respective reference groups (Table 15). No additional factors were associated with early introduction of water or cow's milk.

Table 15. Unadjusted associations between two infant and young child feeding practices and other characteristics

	Gave water before six months		Gave cow's milk before six months	
Variables	**cOR**	**95% Wald CL**	**cOR**	**95% Wald CL**
Production level				
No milk (REF)	1		1	
Emerging	1.74	(0.62, 4.93)	1.99	(0.71, 5.57)
Advanced	2.13	(0.75, 6.03)	3.82	(1.29, 11.28)*
Site				
Cheborge (REF)	1		1	
Kebenet	5.03	(1.58, 16.06)*	1.07	(0.38, 3.03)
Kipkelion	1.70	(0.60, 4.83)	1.04	(0.38, 2.86)
Sex of index child				
Male (REF)	1		1	
Female	0.97	(0.42, 2.25)	2.20	(0.94, 5.13)
Age of index child, in months	1.00	(0.98, 1.03)	1.02	(0.99, 1.05)
Age of primary caretaker, in years	1.00	(0.95, 1.05)	1.02	(0.97, 1.07)
Years of education, primary caretaker	0.94	(0.83, 1.06)	1.02	(0.91, 1.15)
Household size	1.05	(0.86, 1.29)	1.05	(0.86, 1.28)
Household asset score	0.68	(0.45, 1.03)	1.00	(0.68, 1.47)
Food consumption score	1.04	(0.96, 1.12)	1.04	(0.97, 1.12)
Total area of farm land owned, in acres				
≤ 2 acres (REF)	1		1	
> 2 acres	0.75	(0.32, 1.77)	0.56	(0.24, 1.32)

***An asterisk (*) indicates that the 95% CL does not contain 1.**

Only a few statistically significant associations were discovered, but because these associations were likely to be confounded by other characteristics, multivariate models were used to confirm the findings. The models included all maternal and household characteristics hypothesized to be potential influences on feeding practices; the results are reported in Table 16. Increasing age of the index child was the only characteristic significantly associated with reduced odds of being currently breastfed, controlling for all other factors (OR=0.59; 95% CL: 0.41, 0.84). Site was significantly associated with reduced odds of being exclusively breastfed to six months after adjusting for potential confounding. The odds of exclusive breastfeeding for a child from an emerging dairy production household were 95% lower than the odds for children in the reference group (OR=0.05; 95% CL: 0.01, 0.33). The odds for a child from an advanced dairy production household were 97% lower than the odds for children in the reference group (OR=0.03; 95% CL: 0.003, 0.28). Additionally, in adjusted models, site and farm size were each independently and significantly associated with odds of exclusive breastfeeding to six months. Infants in Kebenet had reduced odds of being exclusively breastfed to six months, controlling for all other factors in the model, when

compared to the reference group (OR=0.14; 95% CL: 0.02, 0.87). Children from households who owned more than two acres of farm land had nine times the odds of being exclusively breastfed to six months, controlling for all other variables in the model. However, the confidence intervals for these estimates were large and should be interpreted with caution. No characteristics were statistically significantly associated with the odds of having age-appropriate dietary diversity in adjusted models (Table 16).

Table 16. Adjusted associations between three infant and young child feeding practices and other characteristics

	Currently Breastfed		Exclusively Breastfed to Six Months		Age-Appropriate Dietary Diversity	
Variables	**cOR**	**95% Wald CL**	**cOR**	**95% Wald CL**	**cOR**	**95% Wald CL**
Production level						
No milk (REF)	1		1		1	
Emerging	0.01	(<0.001, 0.94)	0.05	(0.01, 0.33)*	0.51	(0.12, 2.21)
Advanced	0.04	(<0.001, 2.35)	0.03	(0.003, 0.28)*	0.85	(0.14, 5.15)
Site						
Cheborge (REF)	1		1		1	
Kebenet	1.37	(0.07, 27.00)	0.14	(0.02, 0.87)*	0.38	(0.09, 1.70)
Kipkelion	4.12	(0.20, 86.87)	1.50	(0.40, 5.66)	0.82	(0.17, 3.90)
Sex of index child						
Male (REF)	1		1		1	
Female	5.80	(0.47, 71.50)	1.04	(0.30, 3.66)	1.33	(0.40, 4.46)
Age of index child, in months	0.59	(0.41, 0.84)*	0.99	(0.95, 1.03)	1.05	(1.00, 1.11)+
Age of primary caretaker, in years	1.28	(0.95, 1.74)	1.00	(0.92, 1.09)	0.93	(0.85, 1.01)
Years of education, primary caretaker	0.76	(0.52, 1.12)	1.12	(0.91, 1.37)	0.92	(0.76, 1.10)
Household size	0.69	(0.35, 1.36)	1.05	(0.72, 1.53)	1.06	(0.75, 1.50)
Household asset score	0.62	(0.26, 1.51)	1.53	(0.84, 2.77)	1.48	(0.76, 2.87)
Food consumption score	1.11	(0.92, 1.34)	1.00	(0.89, 1.11)	1.02	(0.92, 1.14)
Total area of farm owned, in acres						
≤ 2 acres (REF)	1		1		1	
> 2 acres	0.56	(0.05, 5.67)	9.05	(1.76, 46.64)*	2.78	(0.67, 11.59)

***An asterisk (*) indicates that the 95% CL does not contain 1.**
+ 95% CL included 1 after rounding; therefore, it was not considered significant.

The results from the two adjusted models for introduction of water and introduction of cow's milk before six months are reported in Table 17. Controlling for all other factors, children in Kebenet, had five times the odds of being given water before six months compared to children in Cheborge (OR=5.0; 95% CL: 1.58, 16.06), although the confidence interval was large and should be interpreted with caution. Level of dairy production was not associated with the introduction of water. However, advanced level of dairy production was significantly associated with increased odds the child was given cow's milk before six months, controlling for all other factors in the model (OR=3.8;

95% CL: 1.29, 11.28). However as seen with the other infant feeding outcomes, the confidence intervals around these estimates are large and should be interpreted with caution. No other variables were associated with early introduction of non breast milk substances.

Table 17. Adjusted associations between two infant and young child feeding practices and other characteristics

	Gave water before six months		Gave cow's milk before six months	
Variables	**cOR**	**95% Wald CL**	**cOR**	**95% Wald CL**
Production level				
No milk (REF)	1		1	
Emerging	1.7	(0.62, 4.93)	2.0	(0.71, 5.57)
Advanced	2.1	(0.75, 6.03)	3.8	(1.29, 11.28)*
Site				
Cheborge (REF)	1		1	
Kebenet	5.0	(1.58, 16.06)*	1.1	(0.38, 3.03)
Kipkelion	1.7	(0.60, 4.83)	1.0	(0.40, 2.86)
Sex of index child				
Male (REF)	1		1	
Female	1.0	(0.42, 2.25)	2.2	(0.94, 5.13)
Age of index child, in months	1.0	(0.98, 1.03)	1.0	(0.99, 1.05)
Age of primary caretaker, in years	1.0	(0.95, 1.05)	1.0	(0.97, 1.07)
Years of education, primary caretaker	0.9	(0.83, 1.06)	1.0	(0.91, 1.15)
Household size	1.1	(0.86, 1.29)	1.0	(0.86, 1.28)
Household asset score	0.7	(0.45, 1.03)	1.0	(0.68, 1.47)
Food consumption score	1.0	(0.96, 1.12)	1.0	(0.97, 1.12)
Total area of farm owned, in acres				
≤ 2 acres (REF)	1		1	
> 2 acres	0.8	(0.32, 1.77)	0.6	(0.24, 1.32)

***An asterisk (*) indicates that the 95% CL does not contain 1.**

5 Discussion

5.1 Main Findings

Overall, a low proportion of children in this study were exclusively breastfed through their first six months of life. Results from this study indicated that engaging in higher levels of dairy production reduced the odds that children in those households would be exclusively breastfed to six months. In particular, mothers from households in advanced levels of dairy production were more likely to introduce cow's milk into their child's diet at an earlier age than mothers from households in lower or no dairy production households. It was expected that positive infant and young child feeding practices would decrease with increasing levels of dairy production, and results from this study indicate that could be true for exclusive breastfeeding and introduction of cow's milk, but it does not appear to be the case for other child feeding practices such as being currently breastfed, age-appropriate dietary diversity, or the timing of introduction of water (Table 18).

Table 18. Characteristics associated with infant and young child feeding practices in multivariable regression and their effects

Outcome	Associated characteristics	Effect on feeding practice
Currently breastfed	Age of child	Harmful
Exclusively breastfed to six months	Site – Kebenet	Harmful
	Production level – Emerging	Harmful
	Production level – Advanced	Harmful
	Owned > 2 acres of farm land	Protective
Delayed introduction of water to after six months	Site – Kebenet	Harmful
Delayed introduction of cow's milk to after six months	Production level – Advanced	Harmful

Suboptimal breastfeeding practices, such as non-exclusive breastfeeding, before the infant reaches six months of age increase the risk of death and incidence of pneumonia and diarrhea (Black, et al., 2008). Infants from emerging and advanced levels of dairy producing household were 95% and 97%, respectively, less likely to be exclusively breastfed to six months of age than the infants from households who were currently not producing dairy. The proportion of infants in Kenya who are exclusively breastfed through the first month was 51.8% according to the most recent research from the Demographic and Health Surveys (Kenya National Bureau of Statistics & ICF Macros, 2010).

Only 32% of children under six months were exclusively breastfed (Kenya National Bureau of Statistics & ICF Macros, 2010). Exclusive breastfeeding practices are low in Kenya, overall, so any factors that may reduce the odds in an already suboptimal situation are of concern.

We can posit several reasons why women are not breastfeeding exclusively that relate to level of dairy production. It is possible that women in the advanced level of dairy production may have more cow's milk available in the home and are therefore more likely to give cow's milk as a substitute for breast milk because it's accessible and perceived to be a healthy alternative. Women in the emerging level of production may be facing increased demands on their time and energy because they have responsibilities related to their growing dairy farm, but do not yet have the resources to hire a laborer to help. These women may be particularly vulnerable to resorting to poor child feeding practices. Other members of the study team are investigating the relationship between feeding practices and women's time. Analysis of that data is ongoing.

Any discussion of poor exclusive breastfeeding practices leads to discussions surrounding complementary foods. Introduction to complementary foods begins early in Kenya and it was not any different in this study population. The types of complementary foods introduced to infants in this study appeared to follow a trend beginning with water, followed by cow's milk, and *uji*. By four months, most of the infants in this study had been introduced to one or all three. The relationship between exclusive breastfeeding and level of dairy production needs to be explored further, but some conclusions can be drawn from qualitative data collected. The reasons provided for early introduction of complementary foods included perceptions that breast milk was inadequate to satiate the child, perceptions that *uji* was a better option for children than breast milk, and the demands of returning to work or studies made exclusive breastfeeding too difficult to maintain. The discussion will focus on the first two points.

Based on interpretations of the women's accounts of their daily activities they may be breastfeeding young children on demand, but the duration of breastfeeding is very brief. This is cause for some concern because the nutritional composition of breast milk is variable throughout

the day and even throughout a single feed (Institute of Medicine, 1991). The fat content of breast milk is the most variable nutrient over the course of a day and within a single feeding episode, the fat content of breast milk increases over the duration of the feed (Institute of Medicine, 1991). If mothers are stopping their work only briefly to breastfeed their children, then this could be contributing to insufficient fat intakes on the part of the infant. This may explain why mothers in the FGDs said they were introducing cow's milk and *uji* before six months. It is likely that the problem is not with the composition or volume of their breast milk, but rather the infant was not being fed for long enough periods of time. Unfortunately, short feedings also contribute to insufficient emptying of the breast, a process necessary to promote adequate breast milk production. These events could contribute to a phenomenon whereby perceived milk insufficiency contributes to physiological insufficiency and could explain women's perceptions that breast milk is not enough to satisfy their children.

The belief that *uji* was a superior complementary food and may even be better for children than breast milk is of some concern. It is hard to draw strong conclusions about this community attitude because the qualitative data do not always make it clear what age of children the women were referring to when they discussed providing *uji* to young children. Nevertheless, the survey data indicate that the median age infants were given *uji* was four months. Infants not only do not need *uji* before six months, in terms of nutritional demands, but their bodies are not ready, either. The soft, semi-liquid consistency of *uji* is not difficult for infants to swallow, but the starchy nature of *uji* can be harmful to the infant's digestive tract and lead to diarrhea (Akre, 1989). A second concern related to early introduction of *uji* is that it is likely to not supplement breast milk, but rather replace it. *Uji* is not a nutrient-dense food. It is composed mainly of maize flour or a combination of maize flour and millet, and water. Even if cow's milk is added, the nutritional quality of this food is inferior to breast milk. Other studies have reported that cereals can interfere with the ability of the infant's body to absorb iron, contributing to iron deficiency(Akre, 1989). In addition, by consuming less breast milk, the infant will not be maximizing the amount of immune antibodies available in breast milk (World

Health Organization, 2000). Finally, the risk for illness is increased because complementary foods may not be hygienically prepared (World Health Organization, 2000)

Women in the FGDs indicated that consumption of milk for all household members was directly related to the amount of milk that was available. Even women from the advanced level of production households indicated that when households had more milk, more milk was given to young children. Women cited the health benefits of giving milk to young children, but none of the data collected indicated that cow's milk should *not* be given to infants.

No Differences in Dietary Diversity

An unexpected finding in this study was the lack of relationship between level of dairy production and age-appropriate dietary diversity. For children six months or older in this sample, 80% consumed at least four different food groups, the recommended minimum, in the previous day. It is likely that no relationship was observed because overall, most of the children in this sample had relatively high quality diets. Results from the Kenyan DHS indicated that 55.9% of children 6-23 months in Rift Valley Province had met the minimum requirements in the past 24 hours (Kenya National Bureau of Statistics & ICF Macros, 2010).[3] A study in Western Kenya, used a seven-day recall period and counted food items, instead of food groups, to assess dietary diversity among preschool children (Ekesa, et al., 2008). The authors found that 45% of the children had very low dietary diversity. The most common food groups consumed were cereals and vegetables. Milk consumption patterns were different than what was observed in this study; 30.6% of the children had not consumed any milk or milk products in the past seven days (Ekesa, et al., 2008). The authors did not speculate on reasons why milk consumption was so low, but it could be explained by regional and cultural differences. The availability and preference for milk in this study population appears to be a contributing factor to dietary quality.

[3] Minimum requirements were based on 3+ food groups for breastfed children and 4+ food groups for non-breastfed children. Food groups included: a. infant formula, milk other than breast milk, cheese or yogurt or other milk products; b. foods made from grains, roots, and tubers, including porridge, fortified baby food from grains; c. vitamin A-rich fruits and vegetables (and red palm oil); d. other fruits and vegetables; e. eggs; f. meat, poultry, fish, and shellfish (and organ meats); g. legumes and nuts; h. foods made with oil, fat, butter.

Furthermore, although this study was not comparing households involved in a dairy intervention, the results could be used to make hypothesis about potential effects of dairy interventions on households. Dairy interventions are often promoted as a dietary diversification strategy, so it is interesting to note that in this study which compared different levels of dairy production, there was no association between age-appropriate dietary diversity and level of dairy production. Results are consistent with assessments that have found the evidence of effectiveness of livestock interventions to be insufficient or variable for improving infant and child nutrition (Bhutta et al., 2008).

Influence of Site Differences

Differences across site was not a primary research question for this study, but interesting relationships between site and exclusive breastfeeding to six months emerged in analysis. Although statistical differences could be not assessed due to small sample sizes, none of the children in Kebenet had been exclusively breastfed for the first six months (Table 19). In logistic regression, Kebenet was statistically significantly associated with increased odds that water was given to the infant before six months, although the confidence interval was relatively large (OR=5.0; 95% CL: 1.58, 16.06). Furthermore, all the infants in Kebenet (n=3) had been fed cow's milk in the previous 24 hours. This study site was the most remote compared to the other two sites. Data are not available, but anecdotal evidence from the author can be used to explain that homesteads were farther apart than in the other two study sites, there were no paved roads, and dirt roads were sometimes impassable. It is possible that infant and young child feeding messages are not reaching these women through typical means such as clinics.

Table 19. Breastfeeding and exclusive breastfeeding practices by site

Practices	Overall (n=80)	Cheborge (n=24)	Kebenet (n=26)	Kipkelion (n=30)
Current breastfeeding status (%, n)				
Children less than or equal to 11 months (n=23)	100% (12)	100% (5)	100% (3)	100% (4)
Children 12-23 months (n=25)	72% (18)	20% (5)	32% (8)	20% (5)
Exclusively breastfed for first 6 months (%, n)				
Children less than 6 months (n=12)	58.3% (7)	41.7% (5)	0% (0)	16.7% (2)
Children 6-11 months (n=11)	18.2% (2)	0% (0)	0% (0)	18.2% (2)
Children 12-23 months (n=24)	20.8% (5)	12.5% (3)	0% (0)	8.3% (0)

The sites differed in terms of food and milk security in an interesting way. A greater proportion of households surveyed in Kipkelion reported food insecurity in the past 12 months and milk insecurity for their youngest child in the past 30 days; these differences were both statistically significant. These findings are puzzling considering that Kipkelion was the only site among the three with a fully operational EADD chilling plant. Conclusions about what is the cause of these differences cannot be drawn from this analysis, but future analysis by members of the study team may provide answers.

5.2 Strengths and Weaknesses

This study is one of the first studies to the author's knowledge to look at the relationship between level of dairy production and infant and young child feeding practices. The collection of child-level data, instead of household data, provide important information about the influence dairy intensification could have on the nutrition of young members of dairy households. Unlike other studies looking specifically at dairy cow ownership and production, this study adjusted for other factors related to dairy production in the examination of the association between level of dairy production and infant and young child feeding practices.

There were several limitations to the study. One was the small sample size, particularly for infants and children under two years old. A larger sample of young children would allow us to draw more conclusions about variations in practices across age groups. Furthermore, the first two years of the child's life are the most critical to growth and development and it is well established that poor nutrition during this time is not reversible. More data on children in this critical window would have

strengthened the study. The small sample size likely contributed to the large confidence limits observed around some of the point estimates in the models. Even though significance was observed, the large confidence limits reduce some of the confidence in those results. The nature of the data provided some limitations to the possibilities for different types of analysis. For example the absence of certain feeding practice questions in the original questionnaire (i.e. use of prelactal feeds, bottle feeding, feeding frequency) prevented the author from being able to develop a feeding practice index which could have been modeled with other characteristics to examine associations as has been done in previous studies (Arimond & Ruel, 2002; Armar-Klemesu, Ruel, Maxwell, Levin, & Morris, 2000; Moursi, Treche, Martin-Prevel, Maire, & Delpeuch, 2009). Another limitation was the recall period for the feeding practice questions. Some random error could have been introduced because caretakers of children two years or older may have had trouble recalling information about the child's first six to 12 months. The qualitative portion of the study would have been strengthened by spending more time in the community prior to data collection in order to build rapport with the study participants. Finally, this was a small study conducted in a particular area of Kenya where dairying is common and dairy is part of the traditional diet, so results may not be generalizable beyond the study population.

Future research on the relationship between dairy production and infant and young child nutrition will have to take a multidisciplinary approach involving animal science, the social sciences, public health, and nutrition in order to adequately explore the pathways and measure effects. To the author's knowledge, there is little qualitative research on the effects of dairy production on child nutrition and infant and young child feeding practices, in particular. The qualitative portion of this study provided insight into household dynamics as they relate to food allocation, food preferences for different age groups, and barriers to optimal infant and young child feeding practices. More mixed methods studies would strengthen research in this area and provide information that can be used to guide the development of projects and appropriate monitoring indicators that can assess progress and areas of improvement.

5.3 Implications for Public Health

As evidenced by themes identified in FGDs, this population recognizes that milk is an important part of a nutritious diet and is helpful to child nutrition and growth. There appeared to be a preferential allocation of milk to preschool-age children, indicating that milk may be providing a significant portion of essential energy and nutrients in the children's diets. The addition of milk to *uji* is a positive practice that appears to be widespread in the communities studied. Nevertheless, the introduction of cow's milk or milk added to *uji* before six months is not beneficial for infants. The community view that cow's milk is healthy and nutritious for children could possibly be conflicting with messages surrounding exclusive breastfeeding practices. Some women in the FGDs seemed to think that it was better for children to have cow's milk than breast milk, although as it has been explained earlier, it is not always evident what age of children the women are referring to in the transcripts. In order to promote optimal breastfeeding practices, exclusive breastfeeding messages to this particular population should be tailored with information regarding the infant's inability to process cow's milk and emphasis on the additional benefits of breast milk for promoting infant immunity. Another possible strategy that could be employed is to encourage breastfeeding mothers to consume more milk themselves and emphasize how this directly benefits the mother and the infant, more so than giving milk to the infant.

It appears that efforts to promote breastfeeding exclusivity and duration have been effective in raising awareness, but have not produced the desired improvements in optimal breastfeeding practices. Messages need to be targeted to this population to promote exclusive breastfeeding. Strategies and/or education that address the mother's perception that breast milk is inadequate at times for the infant and stress the importance of appropriate duration of breastfeeding occasions would likely be effective.

Most studies of agricultural interventions suggest that in order for interventions to effectively improve nutrition, the intervention has to be delivered with a nutritional education component (Berti, et al., 2004; Leroy & Frongillo, 2007; Randolph, et al., 2007). Leroy and

Frongillo's (2007) review led them to conclude that including women in the interventions was one component that led to demonstrated improvements in nutrition. In this area of Kenya, women appear to play an active role in dairy farming, so any attempts to intensify production will directly impact their workload and indirectly impact infant and young child feeding practices. For this reason, interventions should involve women in planning and leadership and interventions should be designed after household dynamics related to distribution of labor, income, and expenditures are well understood in that context. Interventions that are targeted towards women, such as FARM Africa's dairy goat project, help to ensure that women maintain control over the financial benefits from the intervention (Ayele & Peacock, 2003). Other potential solutions that may mitigate any negative impacts on women and children address women's role on the farm and education. As the dairy enterprise grows, households could be encouraged to invest the revenues into hiring labor, reducing the burden on the women in the household. Some have proposed that female agricultural extension workers could be mobilized to advise women on dairy farming and serve as links to other child nutrition and health services (United States Agency for International Development, 2011). In this study's context, there is a need for more targeted nutrition education that discourages feeding cow's milk to children less than six months and promotes exclusive breastfeeding. Education programs should focus on striking a balance between promoting milk as a good source of nutrition for young children and emphasizing the potential adverse health consequences of introducing milk at too young an age. Given the important role of dairy in the traditional diet, education should be culturally appropriate and sensitive to cultural beliefs regarding the importance of milk in children's diets. Such advice delivered alongside the intervention has potential to improve infant and young child feeding practices among female dairy farmers.

There is potential for dairy intensification to reduce poverty and improve the nutritional status of children in these communities in Rift Valley Province. Nevertheless, there could be unintended negative impacts on infants and young children if infant and young child feeding practices are modified in accordance with the time-constraints and increased milk availability

associated with increasing levels of dairy production. In order to maximize long-term benefit and minimize harm, dairy interventions should incorporate women and infant and young child nutrition education.

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Appendix

Dairy Intensification and Child Nutrition
Focus Group Discussion Guide: General for Men and Women

Welcome and Introduction: Good morning/afternoon. Thank you all for coming today. My name is _____ and my assistant is _____. Over the next few weeks, our research team from the International Livestock Research Institute and Emory University in the United States will be conducting group discussions with men and women in the community as part of a project on dairying and child nutrition. We want to talk with you today because we feel that projects that help people take up dairying like EADD can do a better job of improving the lives of people in your community and other communities if we talk to men and women about their opinions and experiences about dairying; if you help us understand better, we can then explain it to the people who do projects like EADD to make the projects better for your communities. We want to learn especially about how keeping dairy cows can improve family health and how well children grow. This relates to nutrition through the direct consumption of milk, changes in income, and the health of people and their cows.

You are being asked to be in a research study. It is entirely your choice. If you decide to take part, you can change your mind later on and withdraw from the research study. The decision to join or not to talk with us today will not cause you to lose any benefits. Your participation in the group discussion is completely voluntary, so if at any time you no longer want to participate, you are free to leave.

There are no foreseeable risks or discomforts associated with this study; we don't expect anything that we discuss here to be controversial. The research team promises to respect your privacy and confidentiality. We will not tell anyone that you participated in this group discussion and your identity will not be linked back to what you said. However, we cannot guarantee other people in the discussion will not repeat what is said outside of this room. Everyone here must agree not to talk to other people about any specific person in the group or what they said during our discussion today. Also, we will only use first names during the discussion. This information we talk about will be shared with the research team, but we will remove all names so they will not be able to tell who said what in the discussion.

What questions do you have about confidentiality?

A study number rather than your name will be used on study records. Your name and other facts that might point to you will not appear when we tell other people what we talked about today.

Certain offices and people other than the researchers may look at your study records. Government agencies and Emory employees overseeing proper study conduct may look at your study records. These offices include Emory Institutional Review Board and the Emory Office of Research Compliance. Emory will keep any research records we produce private to the extent we are required to do so by law.

Our assistant, _____, will be taking some notes, but he/she will not be able to write down every word that is said, so we would like to tape-record our conversation so we can listen to it later and make sure we understand everything you told us. The recording will be stored in a secure location and will not be accessible to anyone outside of the research team. Is it alright with everyone if we use a tape-recorder?

Thank you for your willingness to be recorded.

We will now take a short break. If you decide you would not like to participate, you are free to go now. If, after the break, you have decided to stay, we will infer that means you give your informed consent.

Now that we have discussed confidentiality, participation and consent, I would like to explain a bit more about how we will conduct the discussion today. We will talk with community members about their opinions and experiences in dairy livestock systems. The discussions will take place in groups of 6-12 community members that will be facilitated by a member of our research team. We expect the conversation to last 3 hours.

We are very interested in hearing from everyone in the group, so please join in when you have something to add or if you want to comment on something else said. At the same time, we will not be able to understand what is being said if everyone talks at the same time, so let's please allow one person to speak at a time. There are no right or wrong answers, so if someone says something and you do not agree, please share what you think without being disrespectful to other group members. If you experience has been different than someone else's in the group, please speak up and tell us about it.

Are there any other ground rules you would like to mention before we begin?

[*Hand out contact information if participants have further questions.]*

Before we begin, are there any other questions?

Facilitator: We want to divide the group into smaller groups based on the amount of milk your best cow produces so we can have a better discussion. (Direct participants to move into separate areas of the room or space based on dairy intensification levels – none, 0.5 – 2 liters, 2 – 6 liters, more than 6 liters/per day. Begin focus group discussions)

Facilitator: Let's start by going around the room and introducing ourselves by first name. As I said earlier, my name is _____.

[Note to facilitator: Define what we mean by household for today's discussion.]

1. **[hhMC]** At the moment, how many milking cows does your household have?

2. **[hhMCprod]** At the moment, how much total milk does your best cow produce per day, including morning and evening milk?

Based on what was said in this group, it sounds like you have about this many cows and they produce about this much milk, so it sounds like most people produce x amount of milk per day. [*Lead the group through the calculation.]* For our discussion today, think about yourself and other households who produce a similar amount of milk.

[*Confirm with individuals that group placement is appropriate once participants have been divided]*

Activity: Household milk distribution

Facilitator: Earlier you indicated that x liters is a typical amount of total milk produced per day for this group. To help us understand how you use the milk, we have divided x liters between these cups.

a) **[hhMDcons]** How much of the milk is kept for the household to consume?
Probes: what happens to morning milk, what happens to evening milk

b) **[hhMDot]** What do you do with the other milk that you do not consume?
Probes: amount sold, amount given away to friends and family, amount for other purposes; seasonal variation

Follow-up: How much of the milk is consumed by the person who is milking and is not included in the total amount for distribution?

c) **[hhMDdec]** Who in your household decides how the milk is divided up in these ways?
Probes: how does this vary depending on the season, time of milking (morning vs. evening)

d) **[hhMDuse]** Of the milk that is kept in the household, how is it used in the household? Please use the cups to group the milk into the different ways it is used. For example, of the amount that is kept for household use, how much of the milk is used for tea?
Probes: other uses - mixed in with vegetables and ugali, raw milk, mala, yogurt; preparation – boiled, raw, fermented

e) **[hhMDwho]** Of all the ways milk is consumed in the household, who consumes milk in those ways? For example, who consumes tea with milk – children under 3 years, children 3 – 5 years, school-going, or adults?

Probes: what influences the decision, seasonal variations

f) **[hhMDdiv]** Who makes the decision about how to divide the milk within the household?

Probes: how is the decision made, is the decision based on age or gender

g) **[hhMDspec1]** Are there special situations when an individual would be given more milk or milk would be withheld?
Probes: illnesses, seasonal variations, age or gender of person. If milk is withheld what are the alternatives?

h) **[hhMDspec2]** Are there special situations when you might keep more milk in the household or sell more milk reserved for household use than what you usually do?
Probes: household changes, shocks, seasonal variations (including in price). Who makes the decision?

Facilitator: We would like to understand where people in this group sell their milk. In this activity you indicated that you sell X amount of milk. Now we would like to know more about whom you sold the milk to.

ACTIVITY: Proportional Piling for Milk Sales **[hhMS]**
Ask one participant to volunteer to complete the activity in front of the other group members and have the group discuss and comment.

(All of the questions have to be answered with regards to the buyer categories. For a visual, a chart is to be made with responses to b, c, d, e, f, and g each categorized under the buyer categories.)

Facilitator: Here is the milk you indicated that you sell. For this next part of the discussion, we want to learn about the different places you sell your milk. [Ask the group to make a list of the buyer categories.] Please divide the milk between the different buyer categories.

(Example) Buyer Categories: **Chilling Plant, Co-operative, Direct to Processor, Private Trader, Direct to Consumer**

a)**[hhMSv]** How much of your milk sales go to the buyers in the categories you mentioned?
[Have the portion of cups that the group members allocated to sales divided amongst the buyer categories they listed.]

b) **[hhMSdec]** Who in the family makes the decision to sell the milk to the buyers in the different categories?

c) **[hhMSbrank]** How would you rank the buyers by the prices they offer (which offer the best, the worst)?
Probes: reasons for ranking; price differences by season

d) **[hhMSearn]** Who in your household typically receives the earnings from dairy from each of these buyers?

Follow up: Under what conditions would another person receive it?

e) **[hhMSuse]** How does the person receiving the income use these earnings?
Probes: is it used for specific purposes (e.g. dairy inputs, food, etc.); is it pooled with the rest of income? If so, how do you allocate this income in your household?

f) **[hhMSfreq]** Next, we would like to ask you how often you sell your milk to the buyers above. Do you sell to them:
Probes: frequency – everyday, how many days a week, monthly, etc.

g) **[hhMSpay]** How do your buyers make those payments and how frequently?

Facilitator: Thank you very much, that was very informative. Now we would like to ask you about the types of food that are bought in your community.

3. **[hhFPl]** What foods or drinks do you buy in your household?
   [Note: this list can be used to probe, but let the group create a list of purchased foods and drinks.]

- Rice
- Wheat Flour
- Maize Flour (Unga/Posho) (purchased or milled?)
- Processed Foods
- Fruit Juices/ Soda
- Beer
- Muratina, Buzaa, Chang'aa
- Bread
- Tomatoes
- Sugar
- Beef
- Goat
- Sweets
- Biscuits
- Spaghetti/Pasta
- Food prepared away from home (restaurants, vendors, cafés etc.)
- Milk
- Tinned Products
- Cooking Oil

4. **[hhFPf]**Of the items you mentioned, how often do you buy them – daily, weekly, monthly?

   Follow-up: **[hhFPd]** Who make the decisions about what items to buy?

5. **[hhFPdiff]** In what situations would what you buy be any different?

Transition: Thank you. Now we want to talk about what families in this group typically eat. Think about yesterday…

6. **[hhMm]** How many meals do men typically eat in a day?

   Follow-up: How many times a day do men take tea? Take milk?

7. **[hhMm]** For men, what is a typical breakfast? Lunch? Supper?
   Probes: milk consumption, is the food purchased or produced, how foods are prepared

   Follow-up: What sorts of foods and drinks do men have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do men have? Between lunch and supper? After supper?

8. **[hhMw]** How many meals do women typically eat in a day?

Follow-up: How many times a day do women take tea? Take milk?

9. **[hhMw]** For women, what is a typical breakfast? Lunch? Supper?
Probes: milk consumption, is the food purchased or produced, how foods are prepared

Follow-up: What sorts of foods and drinks do women have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do women have? Between lunch and supper? After supper?

10. **[hhMc]** How many meals do your children typically eat in a day?
    a. Children under 3 years?
    Follow-up: How many times a day do children under 3 take tea? Take milk?

    b. Children 3 to 5 years?
    Follow-up: How many times a day do children under 3 take tea? Take milk?

    c. School-going children?
    Follow-up: How many times a day do children under 3 take tea? Take milk?

11. **[hhMc]** For children, what is a typical breakfast? Lunch? Supper?
Probes: milk consumption, is the food purchased or produced, how foods are prepared
    a. Children under 3 years?
    b. Children 3 to 5 years?
    c. School-going children?

    Follow-up: What sorts of foods and drinks do children have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do children have? Between lunch and supper? After supper?
    a. Children under 3 years?
    b. Children 3 to 5 years?
    c. School-going children?

12. **[hhMCinfo]** How do you learn about what foods are good for young children?
Probes: classes, health workers, family, sources of info on the nutritional benefits of milk

Facilitator: Thank you very much, that was very informative. Now, we are very interested in understanding what you do to keep your family healthy.

13. **[hhFHd]** What do people in this group do when their child has diarrhea?

14. Do you ever find malaria here?

    Follow-up: How do you know if it is malaria?

15. **[hhFHm]**What do people in this group do when children have malaria?

16. **[hhFHsb]** What other options are there for people in this group if they fall ill?
Probes: preferred options and why

[Note: Approach question #10 differently for the men's group and ask the question appropriately, i.e. What advice would you give a woman?]

17. **[hhFHpw]** Once a woman knows she is pregnant, what are the options she has for:
- Prenatal Care?
- Birthing (Where)?
- Child Vaccinations?

18. **[hhFHws]** What is your source of water in your household?
Probes: is surface water from stream or river, shallow well, bore well, pipe rainwater collection

19. **[hhFHsto]** How is water stored in the house?

Follow-up: What do people do to the water before drinking it?

20. **[hhFHhr]** What do you think are the problems associated with keeping dairy cattle?
Probes: illness, injury, smells, flies, rodents, chemical exposure

Transition: We would like to learn more about health problems in cattle and in people that you have experienced or seen in your community.

21. **[hhFHzo]** Do you think it is possible for humans to get illnesses from cattle?

Follow-up: What are some of the illnesses you can get? (Give names and symptoms.)

Follow-up: Have you seen or heard about any of these in your community?

Probes: common/rare, types of people where it is common (children, males/females, age)

Facilitator: We would like to learn more about particular health problems in cattle and in people. We would like to show you some pictures of some diseases you may have seen in your herd or heard about in your community.

22. [Show pictures] This is a picture of a heifer that has aborted a fetus late in gestation. The calf is mummified (leathery? dried up?) and is brownish in color. This is a bull that has swollen testicles. This is a picture of a cow with a swollen knee. If you cut the swelling it is full of clear water.
    a. **[hhFHzbru]** What do you know about this?
    Probes: causes; what else do you see, i.e. aborted fetuses but not mummified, timing of abortion?
    [Note: Probe on each of the pictures and take notes on responses to each one.]

23. [Show picture] This is a picture of a cow that has diarrhea.

    a. **[hhFHzdia]** What do you know about this?
    Probes: causes; what else do you see, i.e. seen in calves or cows, types of diarrhea?

24. [Show picture] This is a picture of a thin cow that has a cough.
    a. **[hhFHztb]** What do you know about this?
    Probes: causes; what else do you see?

Facilitator: Now we would like to talk about the people in your community.

25. **[hhFHfev]** Have you ever noticed a fever which is accompanied with body aches in a community member that lasted for several months and wasn't cured by anti-malarials? And if it was tested for, it was not malaria or typhoid?

Probes: causes for these kinds of symptoms; common or rare

Facilitator: These counters represent all the households in your community.

26. **[hhFHfprop]** Indicate with the counters the proportion of the community that has suffered from a fever like the one we described and body aches in the past month. [Ask about past six months; ask about past year.]

Facilitator: Another sickness is stomach problems, like diarrhea, nausea, vomiting, or stomach pain.

27. **[hhFHgi]** How common would you say this is in:
    a. Children?
    b. Adults?

28. **[hhFHgiprop]** Indicate with the counters the proportion of the community that suffers from stomach problems like diarrhea, nausea, vomiting, or stomach pain in the past month? [Ask about past six months; ask about past year.]

29. **[hhFHrel]** Have you noticed any relationship between diarrhea in animals and in humans? *Probes: is it common?*

[At this point, all the subgroups will return to one large group and the facilitators will summarize the discussions the different group had. The facilitators will lead the large group into the discussion about how dairy intensification affects milk consumption, expenditures on health and foodstuffs, and the relationship between animal and human health]

Facilitator: The different groups seem to identify certain trends in milk consumption among children and dairying activities.

[Briefly identify and summarize what groups said about milk consumption.]

1. What do you think about what was said in these groups?

2. How do you think these trends will continue?

   Follow-up: What sort of factors might cause them to change?

Facilitator: The different groups seem to identify certain trends in income and expenditures as they relate to dairying, particularly what kinds of foods people buy.

[Briefly identify and summarize what groups said about income and expenditures.]

3. What do you think about what was said in these groups?

4. How do you think these trends will continue?

   Follow-up: What sort of factors might cause them to change?

Facilitator: The different groups seem to identify certain trends in the relationship between animal health and human health as it relates to dairying.

[Briefly identify and summarize what groups said about animal and human health.]

5. What do you think about what was said in these groups?

6. How do you think these trends will continue?

   Follow-up: What sort of factors might cause them to change?

Dairy Intensification and Child Nutrition
Focus Group Discussion Guide: Women with Young Children

Welcome and Introduction: Good morning/afternoon. Thank you all for coming today. My name is _____ and my assistant is _____. Over the next few weeks, our research team from the International Livestock Research Institute and Emory University in the United States will be conducting group discussions with men and women in the community as part of a project on dairying and child nutrition. We want to talk with you today because we feel that projects that help people take up dairying like EADD can do a better job of improving the lives of people in your community and other communities if we talk to men and women about their opinions and experiences about dairying; if you help us understand better, we can then explain it to the people who do projects like EADD to make the projects better for your communities. We especially want to learn about how keeping dairy cows can improve family health and how well children grow. This relates to nutrition through the direct consumption of milk, the types of food bought for children, how time is used during the day, and the health of people and their cows.

We have invited you to this discussion today because mothers are especially important to our understanding of the effect dairying has on children's health and nutrition.

You are being asked to be in a research study. It is entirely your choice. If you decide to take part, you can change your mind later on and withdraw from the research study. The decision to join or not to talk with us today will not cause you to lose any benefits. Your participation in the group discussion is completely voluntary, so if at any time you no longer want to participate, you are free to leave.

There are no foreseeable risks or discomforts associated with this study; we don't expect anything that we discuss here to be controversial. The research team promises to respect your privacy and confidentiality. We will not tell anyone that you participated in this group discussion and your identity will not be linked back to what you said. However, we cannot guarantee other people in the discussion will not repeat what is said outside of this room. Everyone here must agree not to talk to other people about any specific person in the group or what they said during our discussion today. Also, we will only use first names during the discussion. This information we talk about will be shared with the research team, but we will remove all names so they will not be able to tell who said what in the discussion.

What questions do you have about confidentiality?

A study number rather than your name will be used on study records. Your name and other facts that might point to you will not appear when we tell other people what we talked about today.

Certain offices and people other than the researchers may look at your study records. Government agencies and Emory employees overseeing proper study conduct may look at your study records. These offices include Emory Institutional Review Board and the Emory Office of Research Compliance. Emory will keep any research records we produce private to the extent we are required to do so by law.

Our assistant, _____, will be taking some notes, but he/she will not be able to write down every word that is said, so we would like to tape-record our conversation so we can listen to it later and make sure we understand everything you told us. The recording will be stored in a secure location and will not be accessible to anyone outside of the research team. Is it alright with everyone if we use a tape-recorder?

Thank you for your willingness to be recorded.

We will now take a short break. If you decide you would not like to participate, you are free to go now. If, after the break, you have decided to stay, we will infer that means you give your informed consent.

Now that we have discussed confidentiality, participation and consent, I would like to explain a bit more about how we will conduct the discussion today. We will talk with community members about their opinions and experiences in dairy livestock systems. The discussions will take place in groups of 6-12 community members that will be facilitated by a member of our research team. We expect the conversation to last 3 hours.

We are very interested in hearing from everyone in the group, so please join in when you have something to add or if you want to comment on something else said. At the same time, we will not be able to understand what is being said if everyone talks at the same time, so let's please allow one person to speak at a time. There are no right or wrong answers, so if someone says something and you do not agree, please share what you think without being disrespectful to other group members. If you experience has been different than someone else's in the group, please speak up and tell us about it.

Are there any other ground rules you would like to mention before we begin?

[*Hand out contact information if participants have further questions.]*

Before we begin, are there any other questions?

Facilitator: We want to divide the group into smaller groups based on the amount of milk your best cow produces so we can have a better discussion. (Direct participants to move into separate areas of the room or space based on dairy intensification levels – none, 0.5 – 2 liters, 2 – 6 liters, more than 6 liters/per day. Begin focus group discussions)

For our discussion today, think of yourself and other households that produce a similar amount of milk.

Let's start by going around the room and introducing ourselves by first name and telling how many children you have and the age of your youngest child. As I said earlier, my name is _____.

[Note to facilitator: Define what we mean by household for today's discussion.]

1. **[hhMC]**How many cows does your household have?

2. **[hhMCprod]** At the moment, how much total milk does your best cow produce per day, include morning and evening milk?

Based on what was said in this group, it sounds like you have about this many cows and they produce about this much milk, so it sounds like most people produce x amount of milk per day. [*Lead the group through the calculation.]*

[*Confirm with individuals that group placement is appropriate once participants have been divided.]*

ACTIVITY: THE 24-HOUR TIME CLOCK [HHTC]

Facilitator: Using this clock that represents a full day and night, we would like to better understand what your activities are everyday.

[*On the clock, the day will be represented by pictures of the sun (nighttime, dawn, noon, dusk, etc). In order to capture the data, the linear clock can be photographed and later translated into an Excel graph. Walk through the clock with the group.]*

a. What time do you usually get up?

b. What is the first thing you do when you get up?
Probe on all activities to avoid clumping. If the respondents say they water the cattle, what does that entail? Do they have to fetch water first, etc?

c. For about how long did you do this?
For each activity as it is listed: Would you be doing anything else at the same time?

d. And after that what would you do? Repeat until they indicate when they go to bed.

e. Throughout the night, do you wake up with your child to do anything?
[*Probe for child feeding activities]*

[*When filling out the time clock, probe: dairying activities, milk marketing tasks, childcare activities, home healthcare activities.]*

Facilitator: I want to go back over your daily activities and ask you questions about each one. *[Go back to each activity and ask the following questions. Record on a parallel linear clock.]*

f. Where are you when you are doing this activity?
Probes: at home or away from home?
[To be done later: Does this activity entail women's contact with cattle/manure]

g. Where is your child(ren) when you are doing this activity?
Probe: how would this change depending on the age of the child. Specifically, exclusive breastfed, weaning, toddlers, etc.
[To be done later: Does this activity expose the child to contact with cattle/manure]

h. If your child is not with you, who is watching your child?

Follow up: Does this person decide what to feed your child or do you?

Follow up: What does this person feed your child?

Facilitator: Now I am going to ask you a few general questions about your activities. *[Open conversation]*

3. **[hhDAsea]** How would your daily activities change when it is not raining?
Proves: dairy and childcare activities

4. **[hhDAch]** Under what circumstances, would these daily activities change?
Probes: child illnesses

5. **[hhDAo]** Who else works on dairy activities?
Probes: family labor, if children are mentioned – ask for age; hired labor – ask for gender of hired laborer

Follow-up: What activities are they mainly responsible for?

Facilitator: I am interested in learning about when during the day you feed your young children, and what they eat at those times.

6. **[hhCFr]** What are some of the reasons women in this group decide to stop breastfeeding?

7. **[hhCFi]** For women in this group, other than breast milk, what foods are first introduced into an infant's diet?
Probes: first fluids introduced
Follow-up: At what age does this occur (month)?

8. **[hhCFfreq]** After introduction of the first foods, how many times a day are children fed?

Follow-up: While giving these foods to young children, about how many times a day are they breastfed? How many times at night?

9. **[hhCFfc]** How did the frequency of feeding change as your child grew older?
   Probe: list changes and probe at what age they occur – by 9-12 months and by 2 years

10. **[hhCFwc]** How did what you feed your child change as they grew older?
    Probe: list changes and probe when they occur – by 9-12 months and by 2 years; consistency and types of foods

Activity: Household milk distribution

Facilitator: Earlier you indicated that x liters is a typical amount of milk produced per day for this group. To help us understand how you use the milk, we have divided x liters between these cups.

i) **[hhMDcons]** How much of the milk is kept for the household to consume?
   Probes: what happens to morning milk, what happens to evening milk

j) **[hhMDothers]** What do you do with the other milk that you do not consume?
   Probes: amount sold, amount given away to friends and family, amount for other purposes; seasonal variation

Follow-up: How much of the milk is consumed by the person who is milking and is not included in the total amount for distribution?

k) **[hhMDdec]** Who in your household decides how the milk is divided up in these ways?
   Probes: how does this vary depending on the season, time of milking (morning vs. evening)

l) **[hhMDuse]** Of the milk that is kept in the household, how is it used in the household? Please use the cups to group the milk into the different ways it is used. For example, of the amount that is kept for household use, how much of the milk is used for tea?
   Probes: other uses - mixed in with vegetables and ugali, raw milk, mala, yogurt; preparation – boiled, raw, fermented

m) **[hhMDwho]** Of all the ways milk is consumed in the household, who consumes milk in those ways? For example, who consumes tea with milk – children under 3 years, children 3 – 5 years, school-going, or adults?
Probes: what influences the decision, seasonal variations

n) **[hhMDdiv]** Who makes the decision about how to divide the milk within the household?
Probes: how is the decision made, is the decision based on age or gender

o) **[hhMDspec1]** Are there special situations when an individual would be given more milk or milk would be withheld?
Probes: illnesses, seasonal variations, age or gender of person. If milk is withheld what are the alternatives?

p) **[hhMDspec2]** Are there special situations when you might keep more milk in the household or sell more milk reserved for household use than what you usually do?
Probes: household changes, shocks, seasonal variations (including in price). Who makes the decision?

Transition: Thank you. Now we want to talk about what families like yours typically eat . Think about yesterday…

11. **[hhMm]** How many meals do men typically eat in a day?

Follow-up: How many times a day do men take tea? Take milk?

12. **[hhMm-b, l, s]** For men, what is a typical breakfast? Lunch? Supper?
Probes: milk consumption, is the food purchased or produced, how foods are prepared

    Follow-up: What sorts of foods and drinks do men have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do men have? Between lunch and supper? After supper?

13. **[hhMw]** How many meals do women typically eat in a day?

    Follow-up: How many times a day do women take tea? Take milk?

14. **[hhMw-b, l, s]** For women, what is a typical breakfast? Lunch? Supper?
Probes: milk consumption, is the food purchased or produced, how foods are prepared

    Follow-up: What sorts of foods and drinks do women have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do women have? Between lunch and supper? After supper?

15. **[hhMc]** How many meals do your children typically eat in a day?
    a. Children under 3 years?
    Follow-up: How many times a day do children under 3 take tea? Take milk?

    b. Children 3 to 5 years?
    Follow-up: How many times a day do children under 3 take tea? Take milk?

    c. School-going children?
    Follow-up: How many times a day do children under 3 take tea? Take milk?

16. **[hhMc-b, l, s]** For children, what is a typical breakfast? Lunch? Supper?
Probes: milk consumption, is the food purchased or produced, how foods are prepared
    a. Children under 3 years?
    b. Children 3 to 5 years?
    c. School-going children?

    Follow-up: What sorts of foods and drinks do children have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do children have? Between lunch and supper? After supper?
    d. Children under 3 years?
    e. Children 3 to 5 years?
    f. School-going children?

17. **[hhMcinfo]** How do you learn about what foods are good for young children?
Probes: classes, health workers, family, sources of info on the nutritional benefits of milk

Facilitator: Thank you very much, that was very informative. Now we would like to ask you about the types of food that are bought in households like yours.

18. **[hhFPlchild]** What foods or drinks do you buy for your children?
    [Note: this list can be used to probe, but let the group create a list of purchased foods and drinks.]

- Prepared/ weaning foods (eg. Wimbi, Cerelac)
- Fruit
- Fruit Juices/ Soda
- Meat
- Eggs
- Sweets
- Bread
- Biscuits
- Processed Foods
- Chocolate
- Bananas
- Milk
- Other dairy products (yogurt, mala, etc.)

19. **[hhFPf]** Of the items you mentioned, how often do you buy them – daily, weekly, monthly?

    [hhFPd] Follow-up: Who make the decisions about what items to buy?

    Follow up: In households like yours, what is the main source of income with which you buy the above foods?

20. **[hhFPdiff]** In what situations would what you buy be any different?

Facilitator: Thank you very much, that was very informative. Now, we would like to talk about health. We are very interested in understanding what you do to keep your family healthy.

21. **[hhFHd]** What do people in this group do when their child has diarrhea?

22. **[hhFHm]** Do you ever find malaria here?

    Follow-up: How do you know if it is malaria?

23. **[hhFHm]** What do mothers in this group do when children have malaria?

24. **[hhFHsb]** What other options are there for people in this group if they fall ill?
    Probes: preferred options and why

25. **[hhFHpw]** Once a woman in a household like yours knows she is pregnant, what are the options she has for:
    - Prenatal care?
    - Birthing (Where)?
    - Child vaccinations?

26. **[hhFHpw]** What is your source of water in your household?
    Probes: is surface water from stream or river, shallow well, bore well, pipe rainwater collection

27. **[hhFHwsto]** How is water stored in the house?

    Follow-up: What do people do to the water before drinking it?

28. **[hhFHhr]** What do you think are the problems associated with keeping dairy cattle?
    Probes: illness, injury, smells, flies, rodents, chemical exposure

[At this point, all the subgroups will return to one large group and the facilitators will summarize the discussions the different group had. The facilitators will lead the large group into the discussion about how dairy intensification affects milk consumption, expenditures on health and foodstuffs, and the relationship between animal and human health]

Facilitator: The different groups seem to identify certain trends in milk consumption among children and dairying activities.

[Briefly identify and summarize what groups said about milk consumption.]

1. What do you think about what was said in these groups?
2. How do you think these trends will continue?

   Follow-up: What sort of factors might cause them to change?

Facilitator: The different groups seem to identify certain trends in income and expenditures as they relate to dairying, particularly what kinds of foods people buy.

[Briefly identify and summarize what groups said about income and expenditures.]

3. What do you think about what was said in these groups?
4. How do you think these trends will continue?

   Follow-up: What sort of factors might cause them to change?

Facilitator: The different groups seem to identify certain trends in the relationship between animal health and human health as it relates to dairying.

[Briefly identify and summarize what groups said about animal and human health.]

5. What do you think about what was said in these groups?
6. How do you think these trends will continue?

   Follow-up: What sort of factors might cause them to change?

Dairy Intensification and Child Nutrition
Focus Group Discussion Guide: General – No Milk Production

Welcome and Introduction: Good morning/afternoon. Thank you all for coming today. My name is _____ and my assistant is _____. Over the next few weeks, our research team from the International Livestock Research Institute and Emory University in the United States will be conducting group discussions with men and women in the community as part of a project on dairying and child nutrition. We want to talk with you today because we feel that projects that help people take up dairying like EADD can do a better job of improving the lives of people in your community and other communities if we talk to men and women about their opinions and experiences about dairying; if you help us understand better, we can then explain it to the people who do projects like EADD to make the projects better for your communities. We want to learn especially about how EADD can improve family health and how well children grow. This relates to nutrition through the direct consumption of milk, changes in income, and the health of people and their cows.

You are being asked to be in a research study. It is entirely your choice. If you decide to take part, you can change your mind later on and withdraw from the research study. The decision to join or not to talk with us today will not cause you to lose any benefits. Your participation in the group discussion is completely voluntary, so if at any time you no longer want to participate, you are free to leave.

There are no foreseeable risks or discomforts associated with this study; we don't expect anything that we discuss here to be controversial. The research team promises to respect your privacy and confidentiality. We will not tell anyone that you participated in this group discussion and your identity will not be linked back to what you said. However, we cannot guarantee other people in the discussion will not repeat what is said outside of this room. Everyone here must agree not to talk to other people about any specific person in the group or what they said during our discussion today. Also, we will only use first names during the discussion. This information we talk about will be shared with the research team, but we will remove all names so they will not be able to tell who said what in the discussion.

What questions do you have about confidentiality?

A study number rather than your name will be used on study records. Your name and other facts that might point to you will not appear when we tell other people what we talked about today.

Certain offices and people other than the researchers may look at your study records. Government agencies and Emory employees overseeing proper study conduct may look at your study records. These offices include Emory Institutional Review Board and the Emory Office of Research Compliance. Emory will keep any research records we produce private to the extent we are required to do so by law.

Our assistant, _____, will be taking some notes, but he/she will not be able to write down every word that is said, so we would like to tape-record our conversation so we can listen to it later and make sure we understand everything you told us. The recording will be stored in a secure location and will not be accessible to anyone outside of the research team. Is it alright with everyone if we use a tape-recorder?

Thank you for your willingness to be recorded.

We will now take a short break. If you decide you would not like to participate, you are free to go now. If, after the break, you have decided to stay, we will infer that means you give your informed consent.

Now that we have discussed confidentiality, participation and consent, I would like to explain a bit more about how we will conduct the discussion today. We will talk with community members about their opinions and experiences in the community. The discussions will take place in groups of 6-12 community members that will be facilitated by a member of our research team. We expect the conversation to last 3 hours.

We are very interested in hearing from everyone in the group, so please join in when you have something to add or if you want to comment on something else said. At the same time, we will not be able to understand what is being said if everyone talks at the same time, so let's please allow one person to speak at a time. There are no right or wrong answers, so if someone says something and you do not agree, please share what you think without being disrespectful to other group members. If you experience has been different than someone else's in the group, please speak up and tell us about it.

Are there any other ground rules you would like to mention before we begin?

[*Hand out contact information if participants have further questions.]*

Before we begin, are there any other questions?

Facilitator: Let's start by going around the room and introducing ourselves by name. As I said earlier, my name is _____.

[Note to facilitator: Define what we mean by household for today's discussion.]

Activity: Household milk distribution

1. **[hhMDcons]**How much milk is typically consumed in your household every day?

Facilitator: To help us understand how you use the milk, this container has the x liters and we will divide using these cups.

q) **[hhMDuse]** Of the milk in the household, how is it used in the household? Please use the cups to divide the milk into the different ways it is used. For example, how much of the milk is used for tea?

[Let the group discuss the other uses for milk. Probe on items listed below that are not mentioned and probe for how milk is prepared.]

Probes: other uses - mixed in with vegetables and ugali, raw milk, mala, yogurt; preparation – boiled, raw, fermented

r) **[hhMDwho]** Of all the ways milk is consumed in the household, who consumes milk in those ways? For example, who consumes tea with milk – children under 3 years, children 3 – 5 years, school-going, or adults?

Probes: what influences the decision, seasonal variations

s) **[hhMDdiv]** Who makes the decision about how to divide the milk within the household?

Probes: how is the decision made, is the decision based on age or gender

t) **[hhMDspec]** Are there special situations when an individual would be given more milk or milk would be withheld?

Probes: illnesses, seasonal variations, age or gender of person. If milk is withheld what are the alternatives?

Facilitator: Thank you very much, that was very informative. Now we would like to ask you about the types of food that are bought in your group.

1. **[hhFPl]** What foods or drinks do you buy in your household?

[Note: this list can be used to probe, but let the group create a list of purchased foods and drinks.]

- Rice
- Wheat Flour
- Maize Flour (Unga/Posho) (milled or purchased?)
- Bread
- Processed Foods
- Fruit Juices/ Soda
- Beer
- Muratina, Buzaa, Chang'aa
- Beef
- Goat meat
- Tomatoes
- Sugar
- Sweets

- Biscuits
- Spaghetti/Pasta
- Food prepared away from home (restaurants, vendors, cafés etc.)
- Milk
- Tinned Products
- Cooking Oil

2. **[hhFPf]** Of the items you mentioned, how often do you buy them – daily, weekly, monthly?

   Follow-up: **[hhFPd]** Who make the decisions about what items to buy?

3. **[hhFPdiff]** In what situations would what you buy be any different?

Transition: Thank you. Now we want to talk about what different people in your household eat. Think about yesterday.

4. **[hhMm]**How many meals do men typically eat in a day?

   Follow-up: How many times a day do men take tea? Take milk?

5. For men, what is a typical breakfast? Lunch? Supper?
   Probes: milk consumption, is the food purchased or produced, how foods are prepared

   Follow-up: What sorts of foods and drinks do men have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do men have? Between lunch and supper? After supper?

6. **[hhMw]** How many meals do women typically eat in a day?

Follow-up: How many times a day do women take tea? Take milk?

7. For women, what is a typical breakfast? Lunch? Supper?
   Probes: milk consumption, is the food purchased or produced, how foods are prepared

   Follow-up: What sorts of foods and drinks do women have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do women have? Between lunch and supper? After supper?

8. **[hhMc]** How many meals do your children typically eat in a day?
   a. Children under 3 years?

Follow-up: How many times a day do children under 3 take tea? Take milk?

   b. Children 3 to 5 years?

Follow-up: How many times a day do children under 3 take tea? Take milk?

   c. School-going children?

Follow-up: How many times a day do children under 3 take tea? Take milk?

9. For children, what is a typical breakfast? Lunch? Supper?
   Probes: milk consumption, is the food purchased or produced, how foods are prepared
   a. Children under 3 years?
   b. Children 3 to 5 years?
   c. School-going children?

Follow-up: What sorts of foods and drinks do children have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do children have? Between lunch and supper? After supper?

g. Children under 3 years?
h. Children 3 to 5 years?
i. School-going children?

10. **[hhMCinfo]** How do you learn about what foods are good for young children?
Probes: classes, health workers, family, sources of info on the nutritional benefits of milk

Facilitator: Thank you very much, that was very informative. Now, we are very interested in understanding what you do to keep your family healthy.

11. **[hhFHd]** What do people in this group do when their child has diarrhea?

12. Do you ever find malaria here?

Follow-up: How do you know if it is malaria?

13. **[hhFHm]** What do people in this group do when children have malaria?

14. **[hhFHsb]** What other options are there for people in this group if they fall ill?
Probes: preferred options and why

[Note: Approach question #10 differently for the men's group and ask the question appropriately, i.e. What advice would you give a woman?]

15. **[hhFHpw]** Once a woman knows she is pregnant, what are the options she has for:
- Prenatal care?
- Birthing (where)?
- Child vaccinations?

16. **[hhFHws]** What is your source of water in your household?
Probes: is surface water from stream or river, shallow well, bore well, pipe rainwater collection

17. **[hhFHsto]** How is water stored in the house?

Follow-up: What do people do to the water before drinking it?

18. **[hhFHhr]** What do you think are the problems associated with keeping dairy cattle?
Probes: illness, injury, smells, flies, rodents, chemical exposure
[Note: For any problems mentioned, probe to see who it affects and if any problems are specific to children.]

Transition: We would like to learn more about health problems in cattle and in people that you have experienced or seen in your community.

19. **[hhFHzo]** Do you think it is possible for humans to get illnesses from cattle?
Follow-up: What are some of the illnesses you can get? (Ask for names and symptoms.)

Follow-up: Have you seen or heard about any of these in your community?
Probes: common/rare, types of people where it is common- children, males/females, age

Dairy Intensification and Child Nutrition
Focus Group Discussion Guide: Women with Young Children – No Milk Production

Welcome and Introduction: Good morning/afternoon. Thank you all for coming today. My name is _____ and my assistant is _____. Over the next few weeks, our research team from the International Livestock Research Institute and Emory University in the United States will be conducting group discussions with men and women in the community as part of a project on dairying and child nutrition. We want to talk with you today because we feel that projects that help people take up dairying like EADD can do a better job of improving the lives of people in your community and other communities if we talk to men and women about their opinions and experiences about dairying; if you help us understand better, we can then explain it to the people who do projects like EADD to make the projects better for your communities. We especially want to learn about how keeping dairy cows can improve family health and how well children grow. This relates to nutrition through the direct consumption of milk, the types of food bought for children, how time is used during the day, and the health of people and their cows.

We have invited you to this discussion today because mothers are especially important to our understanding children's health and nutrition.

You are being asked to be in a research study. It is entirely your choice. If you decide to take part, you can change your mind later on and withdraw from the research study. The decision to join or not to talk with us today will not cause you to lose any benefits. Your participation in the group discussion is completely voluntary, so if at any time you no longer want to participate, you are free to leave.

There are no foreseeable risks or discomforts associated with this study; we don't expect anything that we discuss here to be controversial. The research team promises to respect your privacy and confidentiality. We will not tell anyone that you participated in this group discussion and your identity will not be linked back to what you said. However, we cannot guarantee other people in the discussion will not repeat what is said outside of this room. Everyone here must agree not to talk to other people about any specific person in the group or what they said during our discussion today. Also, we will only use first names during the discussion. This information we talk about will be shared with the research team, but we will remove all names so they will not be able to tell who said what in the discussion.

What questions do you have about confidentiality?

A study number rather than your name will be used on study records. Your name and other facts that might point to you will not appear when we tell other people what we talked about today.

Certain offices and people other than the researchers may look at your study records. Government agencies and Emory employees overseeing proper study conduct may look at your study records. These offices include Emory Institutional Review Board and the Emory Office of Research Compliance. Emory will keep any research records we produce private to the extent we are required to do so by law.

Our assistant, _____, will be taking some notes, but he/she will not be able to write down every word that is said, so we would like to tape-record our conversation so we can listen to it later and make sure we understand everything you told us. The recording will be stored in a secure location and will not be accessible to anyone outside of the research team. Is it alright with everyone if we use a tape-recorder?

Thank you for your willingness to be recorded.

We will now take a short break. If you decide you would not like to participate, you are free to go now. If, after the break, you have decided to stay, we will infer that means you give your informed consent.

Now that we have discussed confidentiality, participation and consent, I would like to explain a bit more about how we will conduct the discussion today. We will talk with community members about their opinions and experiences in dairy livestock systems. The discussions will take place in groups of 6-12 community members that will be facilitated by a member of our research team. We expect the conversation to last 3 hours.

We are very interested in hearing from everyone in the group, so please join in when you have something to add or if you want to comment on something else said. At the same time, we will not be able to understand what is being said if everyone talks at the same time, so let's please allow one person to speak at a time. There are no right or wrong answers, so if someone says something and you do not agree, please share what you think without being disrespectful to other group members. If you experience has been different than someone else's in the group, please speak up and tell us about it.

Are there any other ground rules you would like to mention before we begin?

[*Hand out contact information if participants have further questions.]*

Before we begin, are there any other questions?

Facilitator: We want to divide the group into smaller groups based on the amount of milk your best cow produces so we can have a better discussion. (Direct participants to move into separate areas of the room or space based on dairy intensification levels – none, 0.5 – 2 liters, 2 – 6 liters, more than 6 liters/per day. Begin focus group discussions)

For our discussion today, think of yourself and other households that produce a similar amount of milk.

Let's start by going around the room and introducing ourselves by first name and telling how many children you have and the age of your youngest child. As I said earlier, my name is _____.

ACTIVITY: THE 24-HOUR TIME CLOCK [HHTC]

Facilitator: Using this clock that represents a full day and night, we would like to better understand what your activities are everyday.

[*On the clock, the day will be represented by pictures of the sun (nighttime, dawn, noon, dusk, etc). In order to capture the data, the linear clock can be photographed and later translated into an Excel graph. Walk through the clock with the group.]*

i. What time do you usually get up?

j. What is the first thing you do when you get up?
Probe on all activities to avoid clumping. If the respondents say they water the cattle, what does that entail? Do they have to fetch water first, etc?

k. For about how long did you do this?

For each activity as it is listed: Would you be doing anything else at the same time?

l. And after that what would you do? Repeat until they indicate when they go to bed.

m. Throughout the night, do you wake up with your child to do anything?
[*Probe for child feeding activities]*

[*When filling out the time clock, probe: dairying activities, milk marketing tasks, childcare activities, home healthcare activities.]*

Facilitator: I want to go back over your daily activities and ask you questions about each one. *[Go back to each activity and ask the following questions. Record on a parallel linear clock.]*

n. Where are you when you are doing this activity?

Probes: at home or away from home?

[To be done later: Does this activity entail women's contact with cattle/manure]

o. Where is your child when you are doing this activity?

Probe: how would this change depending on the age of the child. Specifically, exclusive breastfed, weaning, toddlers, etc.

[To be done later: Does this activity expose the child to contact with cattle/manure]

p. If your child is not with you, who is watching your child?
Follow up: Does this person decide what to feed your child or do you?

Follow up: What does this person feed your child?

Facilitator: Now I am going to ask you a few general questions about your activities. *[Open conversation]*

3. **[hhDAsea]** How would your daily activities change when it is not raining?

Probes: dairy and childcare activities

4. **[HHDAch]** Under what circumstances, would these daily activities change?

Probes: child illnesses, dry season

Facilitator: I am interested in learning about when during the day you feed your young children, and what they eat at those times.

5. **[hhCFr]** What are some of the reasons women in this group decide to stop breastfeeding?

6. **[hhCFi]** For women in this group, other than breast milk, what foods are first introduced into an infant's diet?

Probes: first fluids introduced

Follow-up: At what age does this occur (month)?

7. **[hhCFfreq]** After introduction of the first foods, how many times a day are children fed?

Follow-up: While giving these foods to young children, about how many times a day are they breastfed? How many times at night?

8. **[hhCFc]** How did the frequency of feeding change as your child grew older?

Probe: list changes and probe at what age they occur – by 9-12 months and by 2 years

9. **[hhCFwc]** How did what you feed your child change as they grew older?

Probe: list changes and probe when they occur – by 9-12 months and by 2 years; consistency and types of foods

[Note to facilitator: Define what we mean by household for today's discussion.]

Activity: Household milk distribution

a. **[hhMDcons]** How much milk is typically consumed in your household every day?

Facilitator: To help us understand how you use the milk, this container has the x liters and we will divide using these cups.

u) **[hhMDuse]** Of the milk in the household, how is it used in the household? Please use the cups to divide the milk into the different ways it is used. For example, how much of the milk is used for tea?

[Let the group discuss the other uses for milk. Probe on items listed below that are not mentioned and probe for how milk is prepared.]

Probes: other uses - mixed in with vegetables and ugali, raw milk, mala, yogurt; preparation – boiled, raw, fermented

v) **[hhMDwho]** Of all the ways milk is consumed in the household, who consumes milk in those ways? For example, who consumes tea with milk – children under 3 years, children 3 – 5 years, school-going, or adults?

Probes: what influences the decision, seasonal variations

w) **[hhMDdiv]** Who makes the decision about how to divide the milk within the household?

Probes: how is the decision made, is the decision based on age or gender

x) **[hhMDspec]** Are there special situations when an individual would be given more milk or milk would be withheld?

Probes: illnesses, seasonal variations, age or gender of person. If milk is withheld what are the alternatives?

Transition: Thank you. Now we want to talk about what families like yours typically eat . Think about yesterday…

10. **[hhMm]** How many meals do men typically eat in a day?

    Follow-up: How many times a day do men take tea? Take milk?

11. **[hhMm-b, l, s]** For men, what is a typical breakfast? Lunch? Supper?
    Probes: milk consumption, is the food purchased or produced, how foods are prepared

    Follow-up: What sorts of foods and drinks do men have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do men have? Between lunch and supper? After supper?

12. **[hhMw]** How many meals do women typically eat in a day?

Follow-up: How many times a day do women take tea? Take milk?

13. **[hhMw-B, L, S]** For women, what is a typical breakfast? Lunch? Supper?
Probes: milk consumption, is the food purchased or produced, how foods are prepared

Follow-up: What sorts of foods and drinks do women have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do women have? Between lunch and supper? After supper?

14. **[hhMchild]** How many meals do your children typically eat in a day?
    a. Children under 3 years?

Follow-up: How many times a day do children under 3 take tea? Take milk?

    b. Children 3 to 5 years?

Follow-up: How many times a day do children under 3 take tea? Take milk?

    c. School-going children?

Follow-up: How many times a day do children under 3 take tea? Take milk?

15. **[hhMchild-B, L, S]** For children, what is a typical breakfast? Lunch? Dinner?
Probes: milk consumption, is the food purchased or produced, how foods are prepared
    a. Children under 3 years?
    b. Children 3 to 5 years?
    c. School-going children?

Follow-up: What sorts of foods and drinks do children have between meals? Let's start for the time between breakfast and lunch, what sorts of foods and drinks do children have? Between lunch and supper? After supper?
    j. Children under 3 years?
    k. Children 3 to 5 years?
    l. School-going children?

16. **[hhMinfo]** How do you learn about what foods are good for young children?
Probes: classes, health workers, family, sources of info on the nutritional benefits of milk

Facilitator: Thank you very much, that was very informative. Now we would like to ask you about the types of food that are bought in households like yours.

17. **[hhFPl-child]** What foods or drinks do you buy for your children?

[Note: this list can be used to probe, but let the group create a list of purchased foods and drinks.]

- Prepared/ weaning foods (eg. Wimbi, Cerelac)
- Fruit
- Fruit Juices/ Soda
- Meat
- Eggs
- Sweets
- Bread
- Biscuits

- Processed Foods
- Chocolate
- Bananas
- Milk
- Other dairy products (yogurt, mala, etc.)

18. **[hhFPf]** Of the items you mentioned, how often do you buy them – daily, weekly, monthly?

    Follow-up: Who make the decisions about what items to buy?

    Follow up: In households like yours, what is the main source of income with which you buy the above foods?

19. **[hhFPdiff]** In what situations would what you buy be any different?

Facilitator: Thank you very much, that was very informative. Now, we would like to talk about health. We are very interested in understanding what you do to keep your family healthy.

20. **[hhFHd]** What do people in this group do when their child has diarrhea?

21. **[hhFHm]** Do you ever find malaria here?

Follow-up: How do you know if it is malaria?

22. **[hhFHm]** What do mothers in this group do when children have malaria?

23. **[hhFHsb]** What other options are there for people in this group if they fall ill?
Probes: preferred options and why

24. **[hhFHpw]** Once a woman in a household like yours knows she is pregnant, what are the options she has for:
- Prenatal Care?
- Birthing (Where)?
- Child Vaccinations?

25. **[hhFHws]** What is your source of water in your household?
Probes: is surface water from stream or river, shallow well, bore well, pipe rainwater collection

26. **[hhFHwsto]** How is water stored in the house?

Follow-up: What do people do to the water before drinking it?

27. **[hhFHhr]**What do you think are the problems associated with keeping dairy cattle?
    Probes: illness, injury, smells, flies, rodents, chemical exposure

[At this point, all the subgroups will return to one large group and the facilitators will summarize the discussions the different group had. The facilitators will lead the large group into the discussion

about how dairy intensification affects milk consumption, expenditures on health and foodstuffs, and the relationship between animal and human health]

Facilitator: The different groups seem to identify certain trends in milk consumption among children and dairying activities.

[Briefly identify and summarize what groups said about milk consumption.]

28. What do you think about what was said in these groups?

29. How do you think these trends will continue?

    Follow-up: What sort of factors might cause them to change?

Facilitator: The different groups seem to identify certain trends in income and expenditures as they relate to dairying, particularly what kinds of foods people buy.

[Briefly identify and summarize what groups said about income and expenditures.]

30. What do you think about what was said in these groups?

31. How do you think these trends will continue?

    Follow-up: What sort of factors might cause them to change?

Facilitator: The different groups seem to identify certain trends in the relationship between animal health and human health as it relates to dairying.

[Briefly identify and summarize what groups said about animal and human health.]

32. What do you think about what was said in these groups?

33. How do you think these trends will continue?

    Follow-up: What sort of factors might cause them to change?

EAST AFRICA DAIRY DEVELOPMENT PROJECT
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE
Household Survey: Dairy Intensification and Child Nutrition JULY 2010

ENUMERATOR NAME _____ ENUMERATOR CODE _____

DATE OF INTERVIEW (DD/MM /YYYY) /___/___/2010

	NAME	CODE
DISTRICT		
SITE		
HOUSEHOLD ID		
GPS COORDINATES	X Y	

SCREENING QUESTIONS

S1. Is there a child under 5 years old living in this household?

[___] = YES [___] = NO→ THANK RESPONDENT AND MOVE ON TO NEXT HOUSEHOLD.

S2. What is the current total milk production per day (in liters) of your best milking cow, including morning and evening milk? [_____] liters

IF NOT CURRENTLY MILKING, INDICATE AVERAGE PRODUCTION FROM LAST MILKING (IF LESS THAN ONE MONTH AGO)

NOTE FOR ENUMERATOR: Select the intensification level for the household.

[___] = NO MILKING COW FOR PAST MONTH
[___] = BEST COW PRODUCES UP TO 6 LITERS/DAY
[___] = BEST COW PRODUCES MORE THAN6 LITERS/DAY

Confirm with site coordinator that this household's intensification level is required before proceeding with questionnaire. If this intensification level is not needed, thank respondent and move on to next household. If this intensification level is needed, proceed with questionnaire.

Hello. My name is X and I come from Egerton University. Over the next few months, our research team from Emory University, the International Livestock Research Institute, and the East Africa Dairy Development project will be conducting surveys with men and women in the community to ask you a few questions regarding dairy production and your family milk consumption. This work is for research purposes, and the figures you will give me are confidential. This means that we will not publish the data with your name, or give out this information to someone else. Only average data for your village, for example, average milk production or herd size, will be reported without reference to your particular household. Note that you won't get any direct benefit from participating in this project but your inputs are needed so that we can better understand your situation and what needs to be done- in relation to dairy and nutrition. If you have any questions, don't hesitate to ask. If not, let's start. We would like for you to complete a survey today because we feel like projects that EADD does in your community and other communities could be better if we have information about dairying practices from men and women in Kipkelion and Bureti districts. There are no anticipated costs to you from being in this study. You will not be offered payment for being in this study. Certain offices and people other than the researchers may look at your study records. Government agencies and Emory employees overseeing proper study conduct may look at your study records. These offices include Emory Institutional Review Board and the Emory Office of Research Compliance. Emory will keep any research records we produce private to the extent we are required to do so by law. Contact ILRI, 20 422 3000, if you have any questions later about this study or your part in it or if you have questions, concerns or complaints about the research. If you have questions about your rights as a research subject or if you have questions, concerns or complaints about the research, you may contact the Emory Institutional Review Board at +001 404-712-0720. By completing this survey, it means you give your informed consent for us to use the information you give us in our research.

SECTION A: TO BE ANSWERED BY THE HEAD OF HOUSEHOLD

NAME OF THE OWNER OF THE FARM (ask for all three names):

_____

RESPONDENT'S NAME _____

A.1 RESPONDENT'S POSITION IN THE HOUSEHOLD [_____] (code)

1 = Head	**5** = Son-in-law	**9** =Mother- in-law
2 = Spouse	**6** =Daughter-in-law	**10** = Father-in-law
3 = Daughter	**7** = Father of head	**11**= Other
4 = Son	**8** = Mother of head	(specify)_____

A.2 HOUSEHOLD COMPOSITION

Provide the following details about the **household head.**

Sex (1 = MALE, 2 = FEMALE)	
Age (years)	
Years of farming experience (years)	
Ethnic affiliation (code)	
Religion (code)	
Can read and write in an official language? 1=Yes, 2=No	

RELIGION (code)		**ETHNICITY (code)**	
1=Catholic	4=Protestant (all except for SDA)	1=Kalenjin	3=Luo
2=Muslim	5=Traditional African Religion	2=Kisii	4=Kikuyu
3=Seventh Day Adventist (SDA)	6=Other (specify)_____	3=Luhya	5=Other (specify)

A.3 Give **details of all household members** (**including the household head)** living permanently on the compound and their primary activities and/or occupations (on and off farm):
INCLUDE ALL CHILDREN AND INFANTS

Name (first name only)	Age (yrs)	Sex 1 = M 2 = F	Primary Activity Occupations (code)	Secondary activity (if applicable) (code)	Number of years of schooling (years)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

ACTIVITIES (code)

0 = None
1 = Farm management/farmer
2 = Civil servant
3 = Employee in private enterprise
4 = Businessman
5 = Laborer on farm
6 = Laborer off farm
7 = Retired with pension
8 = Retired w/o pension
9 = Religious leader
10 = In school/college
11 = Pre-school age
12 = Other(specify) _____

A.4 Water

Ranking	Currently, what are your primary water sources? (Code)	During the dry season, what were your primary water sources? (Code)	Distance from house (in minutes, if in house enter 0)	Is this water used for drinking? **1**=YES **2**=NO	How do you store your water at home? (Code)	Do you regularly treat this water? 1=YES 2=NO	If yes, how do you treat your water? (code)
1st							
2nd							
3rd							

WATER SOURCE code		**WATER STORAGE code**	**WATER TREATMENT code**
1=Piped into house 2=Piped into homestead 3=Public tap 4=Borehole with pump 5=Protected dug well 6=Protected spring	7=Rainwater collection 8=Unprotected dug well/springs 9=River/streams 10=Tankers-truck/vendor 11=Other (specify)_____	**1**=Do not **2**=Bucket/Jerry Cans **3**=Water Tank **4**=Traditional pots **5**=Other (specify) _____	**1**=Boil **2**=Chemical treatment **3**=Solar **4**=Do not treat **5**=Other (specify)_____

A.5 HOUSEHOLD ASSETS

Does the household or farm have**?**

Name of Asset	Total Number Owned	Relative/ Average Age (how many are in this age group)			Number Owned by Male	Number Owned by Female	Number Owned Jointly
		Less than 3 years	3-7 yrs	Over 7 yrs			
Domestic							
Cooker/ Gas Stove							
Radio							
Television							
Mobile phone							
Sofa set							
Sewing Machine							
Mosquito nets							
Transport							
Motorcycle							
Bicycle							
Cart (animal drawn							
Farm							
Hoes							
Spades							
Ploughs							
Sprayer pump							
Water pump							
Other, specify							

A.6 LAND TENURE/ LAND USE

6.1 What is the total area of your farm (including grazing area, but excluding public or community land)?

[_____] acres

6.2 How much of this land area do you **own**? [___ ___.___] acres
6.3 Do you use any **community/ public land** for grazing? [___] = YES [___] = NO

6.4 For each plot you cultivated in the last year, indicate what you grew (crop/ fodder/ tree). Indicate the MAIN crop.

Plot number	**Size (in acres)**	**Crops (code)**	**Season 1=dry 2=wet 3=throughout**	**Land Tenure System**	**If not rented in, who owns the parcel**
1					
2					
3					
4					
5					
6					
7					
8					

FOOD CROPS CODES		**CASH CROPS CODES**	**PASTURES and FORAGES**
0=Homestead and other farm structures	12= carrots	24 = coffee	33= Napier grass
1= maize	13= bananas	25 = tea	34= desmodium
2= sorghum/ millet	14= arrow roots	26 = cut flowers	35= lucerne
3 = cassava	15 = soya beans	27 =fruit trees	36= oats
4= beans	16 = cucumber	28= pyrethrum	37 = fodder beet
5= Irish potatoes	17 = green pepper	29 = sugarcane	38 = vetch
6= sweet potatoes	18 = pawpaw	30 = simsim	39 = fodder trees
7=cabbage	19 = green peas	31 = groundnuts	40= fallow
8= kale	20 = cow peas	32=wood lot	41=planted pasture
9= tomatoes	21=spinach		42= Pasture grass
10 = onions	22=pumpkin		43= other (specify)
11=eggplant	23=indigenous vegetables		

LAND TENURE (codes)	**OWNERSHIP (codes)**
1= Title deed	1 = Head
2= Owned but not titled	2 = Spouse
3= public land	3 = Joint ownership (head and spouse)
4= Rented-in/ sharecropped	4 = Other male
5=Other (specify)	5 = Other female
	6 =Other (specify)

A.7 Income and Expenditures

7.1 Estimate your total monthly household income from cash sources only for the last 30 days. Rank the different sources of income to the household and provide an estimate of the amount of MONTHLY income by source.
For ranking: 1=Main source of income, 2=2nd source, 3= 3 rd source, etc.

Sources of income	In the last 30 days, did you receive income from this source? 1=Yes 2=No	RANK	Ksh/month	Who manages income? (code)	Top 3 priority items for which income was used (rank 1-3)		
Income from milk sales (*skip to next row if a non-dairy household*)							
Income from cattle sales							
Income from all crop sales							
Income from wages/salaries/non-farm, pension and business activities							
Income from remittances from absent family members and other external income							
Income from other sources, specify: _____							

PRIORITY ITEM codes		**WHO codes**
1=school fees 2=food items for the household 3=equipment for household (e.g. furniture) 4=dairy inputs 5=all other investments	6= spend on leisure activities, men 7= spend on leisure activities, women 8=school uniforms 9=stationary/school books 10= other (specify)	1 = Head 2 = Spouse 3 = Joint decision (head and spouse) 4 = Other male 5 = Other female 6 =Other (specify) _____

7.2 Estimate your yearly income from crop sales: Ksh _____

IF A NON-DAIRY HOUSEHOLD, SKIP TO SECTION B (TO BE ADMINISTERED TO THE MOTHER/CARETAKER OF THE INDEX CHILD)

A.8 LIVESTOCK INVENTORY

8.1 How many cattle are you currently keeping in the household (both owned and kept)? [_____]

8.2 Indicate the **number of cattle** for the different species kept on the farm.

Livestock	Number owned by male	Number owned by female	Number owned jointly	Total owned by the household (total)	Total not owned but kept in the household
1=Local					
2=Cross					
3=Exotic/Pure					

8.3 Have you **purchased** or obtained **any cattle** in the last 12 months? [___]=YES [___]=NO (tick)

8.4 If **yes**, give **individual details** on all **cattle that were purchased OR obtained**

Breed **1**=Local **2**=Cross **3**=Exotic/pure	**Type (code)**	**Reasons for purchase (code)**	**Whose decision was it to purchase (code)**	**From whom (code)**

Type Codes	**Reason for purchase codes**	**Whose decision codes**	**From whom codes**
1=Adult males 2=Immature males (<3 years) 3=Cows (calved at least once) 4=Heifers 5=Pre-weaning males 6=Pre-weaning females	1 = Replacement of old animal 2 = Obtain more manure 3 = Increase social prestige 4 = Increased milk production 5 = Replace animal that died 6 = For animal draft 7 = Other (specify)_____	1 = Head 2 = Spouse 3 = Joint decision (head and spouse) 4 = Other male 5 = Other female 6 =Other (specify) _____	1 = Bought from smallholder farm 2 = Bought from individual trader/broker 3 = Loan from project 4 = Gift from relatives/ others 5 = Obtained as dowry 6 = Other (specify)_____

8.5 Have you **sold any cattle** in the last 12 months? [___]=YES [___]=NO (tick)

8.6 If **yes**, indicate, for the last 12 months, **individual details** on all **cattle that were sold**

Breed **1**=Local **2**=Cross **3**=Exotic/pure	**Type (code)**	**Reasons for sale (code)**	**Whose decision was it to sell (code)**	**Price Received (Ksh)**

Type Codes	**Reason for sale codes**	**Whose decision codes**
1=Adult males 2=Immature males (<3 years) 3=Cows (calved at least once) 4=Heifers 5=Pre-weaning males 6=Pre-weaning females	1 = For cash or income 2 = Old age 3 = Disease 4 = Poor performance 5 = Unwanted (e.g. bull calves) 6 = Ritual/ ceremony 7 = Investment 8 =Other (specify)_____	1 = Head 2 = Spouse 3 = Joint decision (head and spouse) 4 = Other male 5 = Other female 6 =Other (specify) _____

A.9 Dairy Inputs

9.1 The next few questions ask about some of the expenditures you make on your dairy inputs.

Type of Product/ Service	Yes= 1 No=2	Amount spent per purchase	How many purchases in the last 12 months?	Total cost for last 12 months
Green fodder including Napier grass				
Hay or other preserved feed				
Other feed (specify)				
Dairy meal				
Bran				
Pollard				
Other concentrates(specify): _____				
Salt Licks				
Vaccinations				
Cattle Dip				
Acaricides				
Deworming				
Curative veterinary services 1				
Curative veterinary services 2				
Natural service (bull)				
Artificial Insemination				

9.2 Do you hire any laborers to help with your dairying activities? [___]=YES [___]=NO

9.3 If yes:

Name (first name only)	Employment duration		Wage/unit (Ksh)	% time spent on dairy	If milk as form of payment, how many liters of milk (per unit of employment)
	Unit (code)	Duration			

EMPLOYMENT DURATION CODES 1=week **2=**month **3=**other (specify) _____	

A.10 MILK PRODUCTION, CONSUMPTION, AND SALES

10.1 Select up to 3 cows that are being milked currently. For each of these cows, fill a column.

		cow 1	**cow 2**	**cow 3**
Breed (1= local, 2= cross and 3= exotic)				
Last calving date MM/YY				
Lactation length (Number of months cow is milked)				
TOTAL DAILY MILK PRODUCTION (Morning plus evening milk) in liter	At Calving (initial milk production)			
	Yesterday			
Number of cows being milked of that breed*				

* Only fill first column if only 1 breed

10.2 Indicate **how much of fresh milk** you consume and **sell now** to different **types of buyers in liters.** Specify average amount to each **type (for example, on an average day during the last week).** Probe for all the milk buyer and consumed codes.

NOTE TO ENUMERATOR: Subtract the milk given to the calf from the total production. Check that milk given away, consumed, sold, and lost due to spoilage adds up to what was reported for total production For price, make sure to deduct transport costs.

Morning Milk

Fresh milk usage		Buyer (code)	Quantity per DAY (Liters) 3 cups=1 liter	Price/ Liter (Ksh)	Who receives the money? (code)	Who manages the money received? (code)	Top 3 priority items for which income was used (rank 1-3)		
Milk sold	**1**								
	2								
Morning milk consumed per DAY (Liters)									
Morning milk loss due to spoilage per day (liters)									

Evening milk

Fresh milk usage		Buyer (code)	Quantity per DAY (Liters) 3 cups=1 liter	Price/ Unit (Ksh)	Who receives the money? (code)	Who manages the money received	Top 3 priority items for which income was used (rank 1-3)		
Milk sold	**1**								
	2								
Evening milk consumed per DAY (Liters)									
Evening milk loss due to spoilage per day (liters)									

Milk buyer codes	**Milk consumed codes**	**Who receives money/ makes the decision to sell/Manages the money codes**	
1=Individual customers 2=Private milk-traders 3=Dairy co-op. collection center 4=Chilling plants 5 =Processors 6=Other (specify)_____	1=Consumed by own household 2=Given to relatives 3=Given to laborers 4=Given to other _____ 5=Other (specify)_____	1 = Head 2 = Spouse 3 = Joint decision (head and spouse)	4 = Other male 5 = Other female 6 =Other (specify) _____

Priority items codes

1=school fees 2=food items for the household 3=equipment for household (e.g. furniture)	4=dairy inputs 5=all other investments 6= spend on leisure activities, men 7= spend on leisure activities, women	8=school uniforms 9=stationary/school books 10= other (specify)

During the **previous season** (dry):

10.3 How **many liters of milk** did you **sell** on an average day? [_____] (liters/ day)

10.4 What was the average **price** you received per liter of milk? [_____] (Currency units per liter)

10.5 Do you ever have **difficulties selling your milk?** [___] =YES [___]=NO (tick)

10.6 In the last 12 months, have you **searched for new** milk buyers? [___] =YES [___]=NO (tick)

10.7 If **Yes**, why? [_____] [_____] [_____] (code)

1 = Find a better price 2 = Find a single buyer of larger quantity 3 = Want more buyers	4 = Find a more reliable buyer 5 = Buyers stopped buying	6= Ease of access to buyer 7=Frequency of payment 8 = Other (specify) _____

10.8 Do you have any member of the household registered as a member of a **dairy co-op**, **association** or **self-help group** that collects milk? [___]=Dairy co-op [___]=Not member (tick)

10.9 If **Yes**, since when? [___ ___ ___ __] (year) **→If no, go to Q 10.12**

Name of dairy co-op, association, or self-help group [_____]

10.10 And who is registered as a member? [_____] (code)

1 = Head	4 = Other male
2 = Spouse	5 = Other female
3 = Joint decision (head and spouse)	6 =Other (specify) _____

10.11 If there is a member of a **dairy co-op** or **association** in the household**,** what **services** of the dairy co-op/association **did you use in the last 12 months?** Indicate with ticks.

Services	**Milk collection**	**Veterinary services**	**Selling of Inputs**	**Provider of AI**	**Credit for feeds**	**Credit for AI**	**Monetary Advance / saving**	**Banking**	**Other (specify)**
Dairy co-op or association									

10.12 Indicate who makes the decision for the following categories:

	Who makes the decision Use same codes as 10.10 above
Allocation of land to crops or to animal feeds	
For the morning milk, who decides how much milk to sell versus how much to keep for home consumption	
Where to sell the morning milk	
For the evening milk, who decides how much milk to sell versus how much to keep for home consumption	
Where to sell evening milk	

A. 11 ZOONOSES AND PUBLIC HEALTH

11.1 Give a rating for each syndrome in your herd. Indicate the five you consider most important (1= most, 2=second, 3 =third, etc)

Syndrome (in the past 5 years, how many times have you seen….)	**Rating** **1=**Rare **2**=Occurs some years **3**=Occurs most years **4**=Occurs all years **5**=Never	**Rank** (Which impacts your herd the most?)
Late abortion (last 3 months) and calf was very dry		
Abortion mainly in young cattle		
Swelling of the knees		
Testicular swelling (use picture)		
Dry chronic cough		
Wasting		
Diarrhea in cattle		
Tuberculosis in cattle		
Brucellosis in cattle		
Respiratory problems		
Other (specify)		
Other (specify)		

11.2 Have your cattle experienced:

	In the last 2 weeks? 1=Yes, 2=No	In the last year? 1=Yes , 2=No
Abortion		
Diarrheal disease		
Respiratory Illness		
Other		

[END OF SECTION A. THANK THE FARMER AND BEGIN INTERVIEW WITH NEXT RESPONDENT.]

SECTION B: TO BE ANSWERED BY MOTHER/CARETAKER OF A CHILD UNDER 5 YEARS

RESPONDENT'S NAME _____

RESPONDENT'S RELATIONSHIP TO THE HEAD OF HOUSEHOLD [_____]
(code)

1 = Head **2** = Spouse **3 =** Daughter **4 =** Son	**5** = Son-in-law **6** =Daughter-in-law **7** = Father of head **8** = Mother of head	**9** =Mother-in-law **10** = Father-in-law **11**= Other (specify)_____

RESPONDENT'S RELATIONSHIP TO INDEX CHILD [_____]
(code)

1 = Mother **2** = Maternal grandmother **3 =** Paternal grandmother **4 =** Aunt	**5** = Sibling 6=Non-relative 7=Other (specify) _____

B.1. Topic: Milk Consumption

1.1 How much milk is usually added when you make tea for your household? [_____] cups

1.2 Please give details of milk consumption for each individual household member (including the household head). If no milk or tea is consumed, indicate on table below. BE SURE THAT ALL CHILDREN AND INFANTS ARE INCLUDED

Name (first name only)	Fresh milk consumed	Tea consumed
	Total amount per day (cups)	Total amount per day (cups)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

1.3 The next few questions are about milk consumption for [NAME of youngest child] in your household.
In the past 24 hours:

Did [NAME] consume milk…	Number of times consumed	Total amount consumed (cups)	How was the milk prepared prior to serving it to the child? 1 = boiled, diluted, sugar added 2 = boiled, diluted 3 = boiled 4 = raw, not boiled 5 = fermented 6 = other, specify
In porridge			
Fresh			
Fermented			
In ugali			
In tea			
Other (specify)			

B.2 TOPIC: DIETARY DIVERSITY

2.1 Now I would like to ask you about the types of foods that [NAME] ate <u>yesterday</u> during the day and at night.

Any ugali, uji, chapatti, bread, biscuits or any other foods made from millet, sorghum, maize, rice, or wheat?	[___] Yes=1 [___] No=2
Any pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside?	[___] Yes=1 [___] No=2
Any white potatoes, white yams, manioc, cassava or any other foods made from roots or tubers?	[___] Yes=1 [___] No=2
Any dark, green, leafy vegetables such as kale, spinach, or pumpkin leaves?	[___] Yes=1 [___] No=2
Any other vegetables?	[___] Yes=1 [___] No=2
Any ripe mangoes or ripe papayas?	[___] Yes=1 [___] No=2
Any other fruits?	[___] Yes=1 [___] No=2
Any beef, pork, lamb, goat, rabbit wild game, chicken, or other birds, liver, kidney, heart, or other organ meats?	[___] Yes=1 [___] No=2
Any eggs?	[___] Yes=1 [___] No=2
Any fresh or dried fish like omena?	[___] Yes=1 [___] No=2
Any foods made from beans, peas, or lentils?	[___] Yes=1 [___] No=2
Any foods made with oil, fat, or butter?	[___] Yes=1 [___] No=2

B.3 TOPIC: MILK PURCHASES

3. 1 Do you purchase milk or dairy products? [___] = YES [___] = NO (tick)

3.2 If **Yes,** what is the **average** amount of these products purchased? (Consider average purchases during the last month.)

	Number of times bought	**Units 1=day 2=week 3=month**	**Quantity**	**Unit 1=cup 2=liter**	**Number of months during the year**
Raw milk (unpasteurized milk)					
Pasteurized milk					
Fermented milk					
Other (specify) _____					

B.4 TOPIC: HOUSEHOLD DIETARY DIVERSITY, PURCHASED FOODS, DECISION-MAKING

The next few questions about the types of foods you eat in your household.

Food Items	In the last 7 days, how many times were these items consumed in your household?	How was the item obtained? 1=Produced 2=Purchased 3=Gift 4=Combination 5=Other (specify)	If purchased, who makes the decision? 1 = Head 2 = Spouse 3 = Joint decision (head & spouse) 4 = Other male 5 = Other female 6 =Other (specify)
Maize			
Maize flour (ugali)			
Millet (wimbi)			
Animal milk, other than in tea			
Other milk products (yogurt, mursik, etc.)			
Sweet potatoes			
Carrots			
Fruits			
Vegetables (kales and cabbages)			
Indigenous vegetables			
Onions			
Tomatoes			
Tea			
Cooking oil			
Beans, pulses, nuts			
Eggs			
Rice			
Chapati			
Mandazi			
Potato or other staple-based foods			
Beef or goat meat			
Poultry			
Other meat (specify)			
Fish or dried fish, like omena			
Other (specify)			
Other (specify)			

B.5 TOPIC: FOOD SECURITY

5.1 In the last 12 months, were there months in which you did not have enough food to meet your family's needs? Yes [__] No [__] →IF NO, SKIP TO Q5.3

5.2 If yes, which were the months in the last 12 months that you did not have enough food to meet your family's needs?

[__] [__] [__] [__] [__] [__] [__] [__] [__] [__] [__] [__]

DO NOT READ THE LIST OF MONTHS. WORKING BACKWARD FROM THE CURRENT MONTH, INDICATE MONTHS WHEN THE HOUSEHOLD DID NOT HAVE ENOUGH FOOD TO MEET THEIR NEEDS. 1=Jan, 2=Feb, 3=March, 4=Apr, 5=May, 6=June, 7=July, 8=Aug, 9=Sept, 10=Oct, 11=Nov, 12=Dec

5.3 In the last 30 days, how often did adults in your household go without milk, even in tea, because no milk was produced or you could not afford to buy milk?	[ ] 1=Never 2=Rarely (1-2 times in the last 30 days) 3=Sometimes (3-10 times in the last 30 days) 4=Often (>10 times in the past 30 days)
5.4 In the last 30 days, how often did your youngest child go without milk, even in tea, because no milk was produced or you could not afford to buy milk?	[ ] 1=Never 2=Rarely (1-2 times in the last 30 days) 3=Sometimes (3-10 times in the last 30 days) 4=Often (>10 times in the past 30 days)

B.6 TOPIC: BREASTFEEDING AND YOUNG CHILD FEEDING PRACTICES

Name of youngest child	
Did you ever breastfeed (NAME OF CHILD)?	Yes [__] No [__]
Are you still breastfeeding (if no, proceed to Q6.3)?	Yes [__] No [__]
6.1 How many times did you breastfeed yesterday during the daylight hours from sunrise to sunset?	
6.2 How many times did you breastfeed last night between sunset and sunrise?	
6.3 How old was (NAME) when you completely stopped breastfeeding him/her (in months)?	
6.4 At what age (in months) did you first begin giving any liquids or food other than breastmilk to (NAME)? (enter 99 if child has not been introduced to any liquids or foods)	
6.5 At what age (in months) did you first begin giving water to (NAME)? (enter 99 if child has not been introduced to water)	
6.6 At what age (in months) did you first begin giving animal milks to (NAME) (enter 99 if child has not been introduced to animal milks)	
6.7 When you first introduced animal milks, how many times a day was (NAME) given animal milks?	
6.8 When you first introduced animal milks, how much animal milk was (NAME) consuming in a day (in cups)?	
6.9 At what age (in months) did you first begin giving porridge to (NAME) (enter 99 if child has not been introduced to porridge)?	
At what age (in months) did you first begin giving mashed or semi-solid foods to (NAME) (enter 99 if child has not been introduced to foods)?	

B.7 TOPIC: NUTRITION EDUCATION

7.1 In the past year, have you or your child participated in community nutrition	Yes [__] No [__]

programs?	
Who provided /sponsored these programs?	
7.2 Before, during, or after your last pregnancy, did you receive any information about breastfeeding?	Yes [__] No [__]
What was the source of that information?	
7.3 Before, during, or after your last pregnancy did you receive any information about what foods are good to feed to infants and young children?	Yes [__] No [__]
What was the source of that information?	

B.8 TOPIC: DAILY ACTIVITIES/WORKLOAD

The next few questions are about your daily activities and the care of your youngest child.

8.1 For how many hours of the day are you usually away from (NAME) **on most days**?
_____ hours (Use 0 if never or hardly ever away)

8.2 At what age did you first leave (NAME) with someone else to take care of him/her?
_____ months 99=Mother has never left child with someone else

8.3 When you leave (NAME) with other caretakers, do you usually leave them food or drink to give to the child? [___] code

1= Mother never leaves child with others.
2=Yes, always 3=Yes, Sometimes 4=No

8.4 Who usually cares for (NAME) when he/she is ill? [_____] code

1=mother
2=grandmother 3=sibling/relative < 13 years old 4=sibling/relative > 13 years old 5=other adult female not related 6=father 7=other (specify)

8.5 I would now like to ask you about specific activities you do on a typical day from the time you got up in the morning until the time you went to bed.

Activity	On a typical day, how much time do you spend on this activity (in **minutes**)? If 0, go to next row	Where does this activity typically occur? **1**=at the homestead **2**=away from the homestead	Where is your youngest child at this time? **1**=carried by respondent **2**=With respondent, not carried *If 1,2 →skip next two columns* **3**=at the homestead **4**=at someone else's house **5**=at school **6**=performing chores (specify) **7**=other (specify)	Who usually watches your child at this time? **1=**mother **2**=grandmother **3**=sibling/ relative < 13 years old **4**=sibling/ relative > 13 years old **5**=other adult female not related **6**=father 7= other adult male **8**=other (specify)	Does this person decide what to feed your child? **1**=yes **2**=no
Food preparation (including tea)					
Working in the family garden					
Working in the shamba					
Picking tea					
Cleaning house					
Washing dishes					
Washing children's clothes					
Bathing children					
Collecting water					
Other: specify					
Other: specify					
Other: specify					
If a non dairy HH, skip to QXX					
Watering cattle					
Feeding cattle					
Milking cattle					
Grazing cattle					
Gathering and preparing fodder/animal feed					
Selling milk					
Other: specify					

8.6 [*For dairy households only*] Do your dairying activities ever conflict with your child caring and child feeding responsibilities? Yes [__] No [__]

B.9 TOPIC: Vaccinations

9.1 Is a child health card available for all children under 5? Yes [__] No [__] → **If no, skip to**

B.10
(Record information from all the cards for children under 5 years old.)

Child's first name only (For all children under 5)	Has child been fully vaccinated (for their age)? 1=Yes 2=No	BCG (at birth) 1=Yes 2=No	Polio (four part series until 14 weeks) 1=Yes 2=No	Measles (once at 9 months) 1=Yes 2=No	DPT (three part series until 14 weeks) 1=Yes 2=No
1					
2					
3					
4					

B.10 TOPIC: Birthing and Childcare for all children

Name of Child	Where was the child born? 1=hospital 2=health centre/clinic/dispensary 3=at home 4=other(specify) 5=doesn't know	Who assisted in the birth of the child? 1=doctor 2=midwife/nurse 3=TBA 4=TTBA 5=self 6=other (specify) 7=doesn't know
1		
2		
3		
4		
5		
6		
7		

B.11 TOPIC: HEALTH

[*intro: explain why we are looking for this information]*

What sort of illness has anyone in your household suffered from in the past 2 weeks?

ILLNESS	Who in the household? Use HH ID/First name only	HOW WAS IT TREATED? Indicate all that apply in the order the care was sought 1=medical worker (doctor, nurse, clinical officer) at public hospital 2=mission hospital 3=medical worker at private hospital 4=pharmacy/chemist 5=herbalist 6=traditional healer 7=other healthcare facility (specify) 8=other (specify)			
		Rank the options in chronological order of receipt			
		1st	2nd	3rd	4th
FEVER, MALARIA					
STOMACH ACHE					
VOMITING					
FLU					
ASTHMA					
HEADACHE					
SKIN PROBLEM					
DENTAL PROBLEM					
BACKACHE					
EAR/NOSE/THROAT					
PAIN WHEN PASSING URINE					
RESPIR ATORY PROBLEMS					
BURN					
FRACTURE					
WOUND					
POISONING					
TYPHOID					

11.1 Has anyone in your household had brucellosis? [ ]YES [ ]NO

11.2 Did the household member seek treatment? [ ]YES [ ]NO

B.12 Topic: Diarrhea

The next few questions are about the last time your youngest child had diarrhea.

12.1 When was the last time (NAME) had diarrhea (number of months ago)? [ ] months
[If never, skip to B.13]

Now I would like to know how much (NAME) was given to drink during the diarrhoea (including breastmilk). Was he/she given less than usual to drink, about the same amount, or more than usual to drink? IF LESS, PROBE: Was he/she given much less than usual to drink or somewhat less?	[ ] 1=much less 2=somewhat less 3=about the same 4=more 5=nothing to drink		
When (NAME) had diarrhoea, was he/she given less than usual to eat, about the same amount, more than usual, or nothing to eat? IF LESS, PROBE: Was he/she given much less than usual to eat or somewhat less?	[ ] 1=much less 2=somewhat less 3=about the same 4=more 5=stopped food 6=not on solid foods		
Where did you seek advice or treatment?	[ ] 1=did not seek treatment 2=medical worker (doctor, nurse, clinical officer) at public hospital 3=mission hospital 4=medical worker at private hospital 5=pharmacy/chemist 6=herbalist 7=traditional healer 8=other healthcare facility (specify) 9=other (specify)		
How many days after the diarrhoea began did you first seek advice or treatment for (NAME)?	Days _ _		
Was he/she given any of the following to drink at any time since he/she started having the diarrhoea:	YES	NO	DK
A fluid made from a special packet called Oralite or ORS?			
A home-made sugar-salt solution?			
Another home-made solution? (Such as porridge, soup, mala or mursik, coconut water, fresh fruit juice, tea, milk?) Specify_____			
What else was given to treat diarrhoea? (Record all the treatment given)	[ ] 1=Nothing 2=Pill 3=Syrup 4=Injection 5=(IV) Intravenous 6=Home Remedy/Herbal Medicine 7=Other_____(specify)		

B.13 MILK PRODUCTION, CONSUMPTION AND SALES (*if a non-dairy household, skip to END)*

During the **previous season** (dry season):
13.1 How **many liters of milk** did you **sell** on an average day? [_____] (Liters/ day)

13.2 What was the average **price** you received per liter of cow milk? [_____] (Ksh per liter)

13.3 Do you ever have **difficulties selling your milk?** [___] =YES [___]=NO (tick)

13.4 Indicate who makes the decision for the following categories:

	Who makes the decision 0= not a dairy household 1 = Head 2 = Spouse 3 = Joint decision (head and spouse) 4 = Other male 5 = Other female 6 =Other (specify) _____
Allocation of land to crops or to animal feeds	
For the morning milk, who decides how much milk to sell versus how much to keep for home consumption	
Where to sell the morning milk	
Who manages the income received from the sale of morning milk	
Top 3 priority items for which income morning milk is used (rank 1-3)	
For the evening milk, who decides how much milk to sell versus how much to keep for home consumption	
Where to sell evening milk	
Who manages the income received from the sale of evening milk	
Top 3 priority items for which income evening milk is used (rank 1-3)	

Priority items codes		
1=school fees	4=dairy inputs	8=school uniforms
2=food items for the household	5=all other investments	9=stationary/school books
3=equipment for household (e.g. furniture)	6= spend on leisure activities, men	10= other (specify)
	7= spend on leisure activities, women	

[END]

(Please DO NOT forget to thank the farmer genuinely!)

To be answered privately by the enumerator immediately following the interview.

Respondent A	**Respondent B**
In your opinion, how did you establish rapport with this respondent? [____]	In your opinion, how did you establish rapport with this respondent? [____]
1 = with ease	1 = with ease
2 = with some persuasion	2 = with some persuasion
3 = with difficulty	3 = with difficulty
4 = it was impossible	4 = it was impossible
Overall, how did the respondent give answers to your questions? [____]	Overall, how did the respondent give answers to your questions? [____]
1 = willingly	1 = willingly
2 = reluctantly	2 = reluctantly
3 = with persuasion	3 = with persuasion
4 = it was hard to get answers	4 = it was hard to get answers
How often do you think the respondent was telling the truth? [____]	How often do you think the respondent was telling the truth? [____]
1 = rarely	1 = rarely
2 = sometimes	2 = sometimes
3 = most of the times	3 = most of the times
4 = all the time	4 = all the time

I certify that I have checked the questionnaire two times to be sure that all the questions have been answered, and that the answers are legible.

Signed:_____ Date ____/____/____