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<th>Description</th>
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<tbody>
<tr>
<td>AI</td>
<td>Artificial Insemination</td>
</tr>
<tr>
<td>bTB</td>
<td>Bovine Tuberculosis</td>
</tr>
<tr>
<td>CREMPA</td>
<td>Central Region Milk Producers Association</td>
</tr>
<tr>
<td>DADO</td>
<td>District Agricultural Development Officer</td>
</tr>
<tr>
<td>EADD</td>
<td>East Africa Dairy Development</td>
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<tr>
<td>FHH</td>
<td>Female Headed Household</td>
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<tr>
<td>HF</td>
<td>Holstein Friesian</td>
</tr>
<tr>
<td>LIC intro.</td>
<td>Low Income Country</td>
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<tr>
<td>MBG</td>
<td>Milk Bulking Group</td>
</tr>
<tr>
<td>MHH</td>
<td>Male Headed Household</td>
</tr>
<tr>
<td>MMPA</td>
<td>Malawi Milk Producers Association</td>
</tr>
<tr>
<td>MOSD</td>
<td>Market-Oriented Smallholder Dairying</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Government Organisation</td>
</tr>
<tr>
<td>PAR</td>
<td>Participatory Action Research</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>PV</td>
<td>Photovoice</td>
</tr>
<tr>
<td>SDG</td>
<td>Sustainable Development Goal</td>
</tr>
<tr>
<td>SHOWeD</td>
<td>The question format followed in individual interviews (Methodology: Figure 7)</td>
</tr>
<tr>
<td>SSLLP</td>
<td>Small Scale Livestock and Livelihoods Programme</td>
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<td>UN</td>
<td>United Nations</td>
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Abstract

**Introduction:** Dairy farming in Malawi is rife with complications at producer- and market-level that are preventing smallholders from being successful and productive. The roles and constraints of women in this sector are poorly understood. Surveys, macroeconomic evaluation and traditional interview techniques have been used to study constraints on dairy farmers in Malawi, however, participatory research methods have been under-utilised in this context. This study evaluates the use of Photovoice (PV - a participatory research method) to investigate the challenges facing women dairy farmers in Likuni area.

**Method:** 12 women dairy farmers were trained to use disposable cameras and photographed the “challenges” they face in their day-to-day farming activities over eight days. Photos were developed, and individual interviews based on the photographs were conducted with each participant giving a rich descriptive data set of ‘photostories’. A group discussion followed.

**Results:** Nine key challenges were identified: Feeding; Low Income; Affording appropriate Utensils, Materials and Equipment; Disease, Injury and Medication; Cattle Housing Cleanliness; Cattle Housing Maintenance; Water; Ticks; and, Labour Delegation and Time Constraints.

**Conclusion:** Feeding is the most important challenge, especially regarding the cost of supplementary concentrates. Low Income is a central theme relating to all others but also to milk value chain problems. The challenges related to the Farm Environment are inter-related and exacerbate one another leading to One Health concerns such as the spread of zoonoses. PV was shown to be a suitable and successful research method which participants enjoyed and which yielded interesting results not previously discovered using less participatory techniques, such as the women-specific experience of conflicts between farming and domestic responsibilities.
CHAPTER 1: INTRODUCTION

Socioeconomic profile of Malawi

Malawi is a landlocked, low-income (LIC) African country bordered by Tanzania, Mozambique and Zambia. The climate is tropical with a wet season between November and March (McSweeney et al. 2014).

The population is 17.2 million; 15% are urban-dwelling concentrated in Lilongwe, Blantyre, Zomba and Mzuzu with an urbanisation rate of 3.77%; it has a fragile economy and poor infrastructure; and 50.7% of the population lives in poverty (Malawi Government 2017). The most recent United Nations (UN) Human Development Report placed Malawi in the ‘Low Human Development’ category ranked at 170 out of 188 countries on the Human Development Index (UNDP 2016).

Agriculture represents 28% of GDP in Malawi, employing 64.1% of the workforce (Malawi Government 2017). Agriculture is crucial to national food security but has underdeveloped market systems and pressures of urbanisation and population growth. The Government of Malawi (2017) describes corruption as “a daunting challenge that too often derails social and economic development efforts.” (p.18). Corruption exists at national and producer level; individual farmers suffer from poor prices.

The Malawian dairy industry

The low demand for milk in Malawi compared to other African countries reflects low milk consumption (Revoredo-Giha & Renwick 2016). Urbanisation in Southern Malawi in the 1950s caused increased demand for milk and dairy products. This was followed by introduction of European breed cattle which now comprise most of the national herd as purebred or crossbred Holstein Friesians (HFs), Malawian Zebu, and Jersey cattle (Banda et al. 2011). In the 1960s Milk Bulking Groups (MBGs) were created - groups of smallholder farmers who travel up to five to ten kilometres once or twice a day to deposit their milk in a central bulk tank for chilling, storage and uplift by milk processors (Thomson et al 2013). This coincided with increased awareness of the importance of milk for human nutrition and the dangers of zoonoses (Sangani 2012). In 2017 there were 52 MBGs in the country (MMPA 2017). They are a focal point of contact with smallholder farmers for various extension workers (Sangani 2012).

There are an estimated 9,584 farmers distributed in the three milk shed areas: Blantyre (South), Lilongwe (Central), and Mzuzu (North): 61% of these located in the Southern Region (Revoredo-Giha et al 2013) (figure 1). The MBGs in each region are coordinated by Regional Milk Producers Associations whose role is to “Give farmers a voice” and provide training and extension services (MMPA 2017, Thomson et al 2013).
'Smallholders’ are farmers owning less than ten cattle, who milk by-hand and do not carry out on-farm milk chilling (Sangani 2012). They produce on average eight to fifteen litres of milk per day. Approximately 19% is retained for household consumption, and 81% sold (Banda et al 2011).
The milk market has formal and informal selling channels (figure 2). The formal market provides more reliable prices and encourages farmers to work together through the formation of cooperatives (Herbert Chagona, Central Region MMPA, personal communication).

There is potential in Malawi to provide dairy smallholders with secure livelihoods through links to markets (Lenjiso et al 2016). Milk sales generate income that can be used to purchase food; cereal supply can be increased through the use of manure as fertiliser. The transformation of smallholder dairy farming from subsistence agriculture to market-orientation would increase milk availability for household consumption and improve dietary quality. This is particularly important in Malawi where four in ten children under five years old are stunted – an indication of chronic malnutrition (Malawi Government 2016). The Malawian dairy industry is, however, plagued with complications both at entire sector- and producer-level (Banda et al 2012, Sangani 2012, Fon Tebug et al 2012). It has stagnated since the period of rapid growth in the 1960s. The Malawian Government considers it to be a key agricultural sub-sector for investment (MIPA 2011 cited: Revoredo-Giha & Renwick 2016 p.10).

In light of the UN, Sustainable Development Goal 2 (UN, SDG2): to achieve ‘Zero hunger’ by 2030, it is vitally important that agricultural sectors failing to meet their full potential are investigated and their problems addressed through investment (UNDP 2018). To meet SDG2, the UN Development Programme (UNDP) aims to “double the agricultural productivity and incomes of small-scale food producers, in particular women ... through secure and equal access to land [and] other productive resources and inputs”. This goal is important
in the Malawi context as women represent 32% of agricultural land holders (FAO 2011) but Female Headed Households (FHHs) own less land than Male Headed Households (MHHs) and women farmers experience difficulty growing cash crops which require purchased inputs as they struggle to obtain credit (Gilbert, Sakala and Benson 2002 cited: FAO 2011 p.11). 94% of rural women in Malawi are in the agricultural sector compared to 85% of rural men. They play a pivotal role in productivity yet face a greater burden of domestic and productive workloads (FAO 2011).

**Photovoice**

Photovoice (PV) is a Participatory Action Research (PAR) method with theoretical foundations in atypical documentary photography and feminist theory (Wang and Burris 1997). It allows people to “identify, represent and enhance their community through photography” (Wang 1999). After initial training, cameras are entrusted to participants who tell their own story, in line with a research goal, through taking photographs which are then used as catalysts for discussion and critical reflection between the participants and the researcher(s). The immediacy of the images allows for sharing expertise and knowledge, and developing trust and collaboration. PV is appropriate to use with marginalized groups because most individuals, regardless of social status or education, can use simple cameras; and it allows enhanced reach into communities and their needs which researchers might struggle to obtain through less participatory methods.

Raising the voices of marginalized groups through immersive, participatory research can enhance the effectiveness of development programmes as it makes community needs more visible. Illiterate participants can vivify their feedback about the policies and services offered to them which affect their day-to-day livelihoods and advocate for changes at individual, community, and policy level. (Wang 1999)

The key concepts of PV are shown in figure 3:

- **Images teach**
  - Visual images act as a learning site that influences people’s health and well-being by contributing to how we see ourselves and how we define and relate to our world

- **Pictures can influence policy**
  - Images influence our focus and world view and influence policymakers by bringing to light the visual insights of marginalized people

- **Community participation in policy creation**
  - Policies about women's health and creating safe and enabling environments for them should be based on what women need and want but often are not

*Figure 3 Key concepts of the PV technique (Wang 1999)*
Women farmers in Malawi experience difficulties accessing the productive inputs they require to be fully profitable. The primary aims of this study are to ascertain if PV is appropriate to identify the challenges that hinder the day-to-day activities of women dairy farmers in Likuni, Malawi and the productivity of their livestock; and to use PV in this context to make an initial assessment of these challenges.

The structure of this dissertation is outlined in figure 4:

**CHAPTER 1: INTRODUCTION**
- Introduction to Malawi, its Agricultural sector (with a focus on the dairy industry), the role of women within this sector, and the PV method
- My Dissertation: Aims, structure and rationale for the project visit

**CHAPTER 2: LITERATURE REVIEW**
- An analysis of the current literature about related topics to the study aims

**CHAPTER 3: METHODOLOGY**
- The Photovoice Methodology used as well as methods of data analysis

**CHAPTER 4: RESULTS**
- Results presented according to the phase of the study they came from

**CHAPTER 5: DISCUSSION**
- The use of PV, the main findings and their implications as well as comparison to the existent literature

**CHAPTER 6: CONCLUSION**
- Conclusions drawn from my findings and suggestions for future research

*Figure 4 Structure of this dissertation*

**Rationale for project visit**

This primary research, in accordance with a modified PV research method, was conducted over three weeks in Likuni, Central Malawi. I gained a good understanding of the study site and the participants and their lives, allowing a first-hand insight into the research question.
CHAPTER 2: LITERATURE REVIEW

‘PubMed’ and ‘Web of Science’ were reviewed together with citations of papers by the ‘snowballing method’ for potential usefulness. Papers not written in English, unavailable through University of Bristol Institutional access, or not relevant to the research aims were excluded.

The search terms ‘Photovoice AND Challenges AND women dairy farmers AND Malawi’ were used on both databases but yielded no results indicating a gap in the literature. The search terms were broadened and three separate reviews conducted (figure 5) to account for the scarcity of literature specific to this research.

<table>
<thead>
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<th>Search terms</th>
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<tr>
<td>1. ‘Challenges AND Dairy farming AND Malawi’</td>
</tr>
<tr>
<td>2. ‘Women AND Dairy farming AND Africa’</td>
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<tr>
<td>3. ‘Photovoice AND Women AND Africa’</td>
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*Figure 5 Search terms used for each of three literature searches*

The search was not date limited and the Boolean operator ‘AND’ was used for refinement. For reviews two and three the term ‘Malawi’ was originally used instead of ‘Africa’ but did not yield any relevant results hence this search term was broadened.

1. The challenges facing dairy farmers in Malawi

Four studies emerged which identified seven challenges facing dairy farmers in Malawi (Fon Tebug et al 2012; Banda et al 2011; Banda et al 2012 and Chagunda et al 2006). These used structured questionnaires on samples of smallholder farmers representing Northern, Central and Southern Malawi. While structured questionnaires allow for more targeted research, they do not allow deeper understanding of people and events or allow participants to fully represent their views because lines of enquiry outside the questionnaire cannot be investigated (Bowling 2009).

Challenges related to: herd health including the high cost of veterinary drugs; irregular use of prophylaxis against ectoparasites; inadequate knowledge of disease; and a lack of Body Condition Score monitoring (Banda et al 2011; Banda et al 2012). Regarding One Health aspects, Fon Tebug et al (2014) found that 77.1% of the dairy farmers in their study had heard of zoonotic diseases with two thirds correctly naming one route of transmission. Bovine Tuberculosis (bTB) was the most commonly mentioned zoonotic disease but despite knowledge of it, there was a suspected degree of under-reporting and under-diagnosis.

The challenge of adequately feeding cattle included inadequate knowledge of local feedstuffs; inadequate land for pasture improvement and year-round feeding; and grass growth seasonality (Fon Tebug et al 2012). Farmers also experience difficulties affording to feed concentrates with limited growth of legumes (an important source of protein) and the use of quality concentrates only economically viable to

Banda et al (2012) concluded that the combined effect of herd health and nutrition constraints result in an overall suppressed productivity and lower fertility therefore impacting cattle reproduction. Reproduction challenges highlighted in all papers were a lack of bulls to complement Artificial Insemination (AI) services; a lack of cold chain facilities for semen transportation; low conception rates per AI performed; and pregnancy diagnosis issues.

There is concern about the lack of availability of reliable extension services for dairy farmers with inadequate veterinary services resulting in high disease prevalence exacerbating existent herd health problems (Banda et al 2012).

Milk markets are poor, the most important concerns being unreliable milk prices; low demand for milk; lack of knowledge and skills in marketing; and farmers’ lack of influence over milk prices (Fon Tebug et al 2012).

Inadequate cattle housing is a prevalent issue particularly regarding inappropriate materials affordable for shed construction, and conflicting information provided by extension workers about best practice. Banda et al (2012) reported farmers highlighting poor drainage and roofing causing increased workload to clear slurry which accumulates during the rainy season.

Chagunda et al (2006) focussed on productivity and health recording. Mixed crop-livestock farmers were too preoccupied with other activities to carry out recording. They lacked sufficient knowledge of how to record; some perceived low milk yields, lack of recording materials and small herd sizes as barriers to recording. Willingness to record was determined by the person carrying out the recording and the equipment available. Women were prevented from recording because of their existing burden of domestic and family responsibilities.

### 2. The role of women in dairy farming in Africa

The East Africa Dairy Development project (EADD) highlights production level gender inequalities in the division of labour, responsibility and decision-making on dairy farms in East Africa (EADD 2009). This limits women’s access to, and control over resources such as land, financial capital, and improved technology. Historically, women have little autonomy in farm-related decision-making and gender inequalities in the division of manual labour have been found with women being the dominant operators in intensive, stall-fed systems in Kenya (Tangka et al. 1999). Market orientation has historically been found to have great potential to increase income and family well-being, however, this has often required women’s increased productive
inputs and physical workload (Tangka et al 1999; Mullins et al 1996). This evidence is dated and indicates a need for further research into the current status of women in dairy farming in Africa.

Market-oriented farms belonging to community groups facilitate commercialization and create efficient business institutions fostering rural development (Chagwiza et al 2016). A comparison of cooperative member, and non-member dairy farmers in Kenya found that milk production and herd size were greater on farms that had been members of a community-based group for more than three years compared to non-member farms (Walton et al 2012). The positive outcomes of cooperative membership were sustained with longer membership duration, and included higher family milk intake, greater dietary diversity and higher intake of micro- and macronutrients in women and children (Walton et al 2014).

3. Photovoice studies in Africa

Van Der Meer et al (2015) studied the animal health needs of Maasai cattle farmers in Tanzania using PV. This study showed that PV is an empowering, motivating tool for giving voice to disadvantaged groups: participants positively commented on the use of photos they had taken as catalysts for discussion. Ardrey et al (2016); Bisung et al (2015) and Simmance et al (2016) note that the power and control given to the communities to identify and discuss their own challenges develops trust between the community and the researchers as well as a sense of ownership, pride and collective action among participants. PV also allows researchers to gain insight into activities that are “naturalised” in everyday life (Ardrey et al 2016). In this way, roles and processes embedded within social and gender norms and the social realities of rural people can be captured. It is a flexible method: the research protocol can be modified and adapted to different cultures, research topics, budgets, timescales and geographical contexts (Simmance et al 2016).

The triangulation of different methods of data collection in PV (photography, interview and group discussion data) enables researchers to address cognitive and social aspects of community concerns and therefore more successfully elicit behavioural and policy changes to address these (Bisung et al 2015). ‘Triangulated methods’ approaches also minimise research bias and enhance the validity of results by drawing on the strengths of each method and testing the consistency of findings obtained by different methods (Bowling 2009).

Ardrey et al (2016) raise concern about the unethical nature of PAR: participants are heavily involved and engaged in data collection after which researchers withdraw from the community and move on. They emphasise the importance of acknowledging the input of participants and sharing the outcomes widely and strategically to elicit positive change from policy makers.

Conclusion

Current literature has highlighted some of the challenges facing dairy farmers in Malawi, however, the information has been yielded using traditional interview techniques as opposed to PAR.
Research into women in dairy farming in Kenya has pointed to unequal labour inputs with women performing the majority of physical tasks and animal handing. The positive effects of market-orientation and community group membership on household income and food security were shown. The context of women in dairy farming in Malawi remains unexplored.

Dairy farming and the challenges for women dairy farmers in Malawi have not been researched using PV – a gap addressed by this research. PV studies elsewhere in Africa and in health research in Malawi highlight the empowering nature of PV for participants, and the insights afforded into the everyday activities and challenges of marginalized groups, especially women.
CHAPTER 3: METHODOLOGY

Aims of the study

The primary aims of this study were to find out if the PV methodology is appropriate to identify challenges that hinder day-to-day activities for women dairy farmers in the Likuni area, Malawi and the productivity of their livestock; and to use PV in this context to make an initial assessment of these challenges.

Statement of ethical approval

Prior to undertaking this study ethical consent was gained from the University of Bristol Faculty of Health Sciences Student Research Ethics Committee (Appendix 1). The study was conducted with guidance and the services of a translator provided by the Small Scale Livestock and Livelihoods Programme (SSLLP) – a local Non-Government Organisation (NGO) based in Lilongwe whose mission is “[To empower] resource poor and vulnerable families, through interventions targeting poverty reduction, food and nutrition security, and environmental sustainability.” (SSLLP 2017).

The Study site

Likuni is in: a periurban region southwest of Lilongwe. The MBG from which the sample of participants was chosen is organised by the Central Region Milk Producers Association (CREMPA) (Thomson et al 2013). The most recent data from CREMPA states that in the Central Region there are currently 17 active MBGs, made up of approximately 5,500 smallholder dairy farmers (45% female) collecting approximately 15,000 litres of milk per day (Herbert Chagona, Central Region MMPA, personal communication).

The translator

A translator was engaged to facilitate all conversations and interactions between the researcher (English-speaking) and the participants (Chichewa-speaking). A female translator was chosen following recommendation by Van Der Meer et al (2016) to engage a translator of the same gender as the participants. It was felt that female participants would be more at-ease in an all-female environment reducing the possible effect of a male translator on the concealment of challenges and lack of honesty in disclosure of female-specific issues. The translator signed a confidentiality and consent form (Appendix 2) prior to the study commencing.
The key informant

One member of the participant group acted as a key informant. Her position as head of the bulking group qualified her well for the roles of recruiting participants, being a point of contact with the researcher, and arranging meetings. This was especially important given the scattered locations of participants.

Data handling

All conversations and discussions were recorded on an encrypted digital audio recording device (Tascam Dictaphone). Information about this was included on the consent form. The microphone was positioned close to the translator to minimise background noise which may have complicated transcription and analysis (Bailey 2008). At the end of each day recordings were uploaded to a secure server (the University of Bristol remote student desktop) which was password protected. The hard copies of audio files were then immediately removed from the Dictaphone SD card. Consent forms were scanned in and uploaded to the remote student desktop and the hard copies destroyed.

A summary flow chart of the method is shown in figure 6 (overpage).
• 12 women dairy farmers from Likuni area (close to Lilongwe in Malawi) were purposively sampled with the help of SSLLP and the key informant.

• An initial group meeting was held to introduce the project and the research team to the participants; explain what their participation would involve; outline the potential risks and benefits of taking part; discuss the meaning of a 'challenge' within the context of this study; and train them in the technical expertise of using disposable cameras.

• Participants gave informed consent and then a structured questionnaire was conducted with each participant to obtain information about them, their families and their dairy enterprise. Each participant was provided with a disposable camera in a waterproof bag at the end of this discussion.

• Participants were left with their camera for eight days to take photographs of challenges which they face in their day-to-day farming activities.

• Participants returned their cameras to the key informant and they were then collected and taken to Lilongwe to be developed into photo prints.

• Each participant had their respective photo prints returned to them and they were asked to select 4 photos which represented, according to them, the most important challenges they face in their dairy farming. Participants gave informed consent and an individual interview following the modified 'SHOWeD' format commenced using the four photos as a focus.

• Participants gave informed consent and then a group discussion with all participants followed. A poster containing their selected photos was used as a focus for the discussion to explore themes which had arisen during individual interviews and which were represented in the selected photos.

• Individual Interviews and the group discussion were transcribed and the data was thematically and statistically analysed.

Figure 6 Summary flow chart of method
Informed consent

Prior to each stage of the study (the household survey, the individual interview, and the group discussion), participants were presented with a Participant Information Sheet written in Chichewa (English example in Appendix 3) to enable fully informed consent. In cases of participant illiteracy, this information was delivered verbally by the translator. They were then asked to sign a consent form which was also written in Chichewa (Appendix 4). If they were unable to do so the translator related the contents of the consent form verbally and signed as a witness after they had given verbal consent.

Programme of events

Appendix 5 contains the schedule of events.

The study sample comprised twelve women smallholder dairy farmers from Likuni Area, Malawi. The SSLLP facilitated recruitment and purposive sampling of participants (through the key informant) because the researcher was unable to visit Malawi prior to commencing research. The recommended sample size for PV studies is seven to ten participants (Wang 1999). Twelve participants were chosen to allow the recommended maximum sample size to be retained if two people discontinued participation; and to obtain a rich but manageable qualitative data set for analysis. Men, children, the very elderly and women who were not smallholder dairy farmers or did not live in Likuni Area were excluded from the study sample.

An introductory courtesy call was paid by the researcher together with a representative of the SSLLP, to the District Agricultural Development Officer (DADO) responsible for Likuni Area. This was intended to allow the DADO to voice queries or concerns about the research; and the researcher to notify them about the anticipated length of the study; to reassure them of the confidentiality of any personal details or contacts accessed; and to seek permission for the research to be conducted. The head of the village in which the research took place was also consulted prior to commencing the study. The study began with an initial group meeting of participants at the key informant’s house: this was guided by the Group Meeting Training Transcript (Appendix 6). Participants were assigned a participant number and were trained in the technicalities of using disposable cameras. The meaning of a ‘challenge’ in the context of this study was discussed and participants generated their own examples. The meeting was organised by the key informant and facilitated by the translator and the researcher. At this first meeting, only eight participants were able to attend so the training was repeated the following day with the remaining four.
The household survey

The initial group meeting was followed by individual household surveys (Appendix 7) to gain insight into the daily lives and routines of participants and gather information about them, their families, their income, and their dairy farming. Prior to this, informed consent was gained. It was planned to visit each participant in their own homes to conduct this survey; due to time and accessibility restrictions this was only possible for four participants. The rest took place at the key informant’s house.

Following each household survey, the participant was left with their ‘project pack’: a waterproof drawstring bag containing one Fujifilm disposable camera containing a film of 27 photographs. The cameras were numbered using nail polish (for durability) to match their participant number. After the last set of household surveys was conducted on day three of the study, all participants had been given their cameras and sufficient instructions.
The photo taking and photo development

Participants were left for eight days to photograph the challenges they face in their farming. The key informant was left with 12 cameras (labelled 1-12) and three spare cameras (labelled S1, S2 and S3) to distribute to participants who used all the photos on the film of their first camera; or in the event of the first cameras being lost, stolen or broken.

On day eight of the photo taking period all cameras were returned to the key informant, collected and taken to Lilongwe for film development. Care was taken at this stage to ensure that the photographs from each film were grouped together and all photographs were coded with numbers to match their participant number. For example, the first 12 photos taken by Participant 3 were numbered 3.1, 3.2, 3.3...3.12.

Individual interviews

Participants were invited in groups of four over the next three days to the key informant’s house where their photos were returned to them and an individual semi-structured interview about the photographs was conducted. All participants returned their cameras for development of photographs but only 11 participants took part in individual interviews. Gathering informed consent preceded all individual interviews.

Participants were instructed to select four photographs which “represented [for them] the most important challenges [they] face as women dairy farmers”. The code of each photo selected was noted and each participant engaged in a 20-minute individual interview about their four selected photographs to obtain ‘photostories’ (Appendix 8). The interviews followed the modified format of ‘SHOWeD’ (figure 7) as recommended by (Wang and Redwood-Jones 2001).
The addition of question three made this question set specific to the research aims. These formed the ‘main questions’ to guide the semi-structured interview. One or two ‘follow-up’ questions allowed more information to be gained if particular issues were unclear or particularly relevant (Bowling 2009).

After initially listening to photostories when the individual interview stage was complete, patterns of meaning were noted and eight issues of potential interest to the research question which warranted further discussion were compiled into a poster (Appendix 9). This poster was displayed and used as a focus at the final group discussion. The poster was laid out to show Low Milk Output and Low Income in the centre (perceived to be a central issue) with the other seven key points of interest around the edge.

The Group discussion

Ten participants took part in the final group discussion organised by the key informant and facilitated by the researcher and the translator. This was preceded by each participant giving informed consent.

At this group discussion each point of interest was presented in turn for discussion using a series of questions that had been developed to fill gaps in the knowledge about each one. Discussion of each challenge ended with the open question “Does anyone have anything else they would like to add or comment about this?
challenge?” to invite participants to elaborate and offer more information. They were also given the chance to discuss challenges with one another to investigate similarities and differences in their opinions and find out what the concerns of their peers were.

At the end of the group discussion participants were provided with a set of their printed photographs as a token of gratitude for their participation.

Debrief and feedback

Following the group discussion, participants were verbally debriefed (Appendix 10). A few participants expressed concern about how their identity would be protected and they were reassured that they had been assigned a participant number at the start of the study which would be used when referring to them in any resulting public documentation.

A short feedback session about their PV experience was conducted to find out aspects which they enjoyed and those which they had found interesting or challenging.

Data analysis

Individual interviews/photostories were manually transcribed. It was felt that this was a task best suited to the researcher due to the need for repeated careful listening to ensure familiarity with the content (Bowling 2009, Bailey 2008). Transcription was verbatim for maximum accuracy of the rich qualitative data set so it could be coded and thematically analysed. Verbal features such as repetitions, interruptions and laughter were omitted to avoid cluttering the text (Bailey 2008). The group discussion was also transcribed. Extra information about each theme which arose in the group discussion has been included in Table 5 in Results (Pp. 37-39).
The full process of photostory thematic analysis is shown in figure 8:

1. Repeated reading of photostories allowed for familiarity with the content and generation of an initial list of ideas of interest.

2. Initial codes were manually produced from the data to break down photostories into basic segments of meaning. Coding was theory driven as the photostories were approached with specific questions in mind (based on the list of ideas of interest).

3. Codes were sorted into nine key themes. A ‘key’ theme was considered to “[capture] something important in relation to the overall research question” (Braun and Clarke 2006, p. 10). Each code was counted as a ‘sub-theme’ because it represented a theme-within-a-theme (Appendix 11).

4. Photostories were re-visited and the sub-themes present in each photostory were quantified.

5. The number of times each participant mentioned each theme was then quantified and the themes were ranked in order of importance according to methods 1 and 2 outlined in Results: ‘Quantifying and ranking themes’

*Figure 8 The process of photostory thematic analysis (informed by Braun and Clarke 2006)*
CHAPTER 4: RESULTS

The household survey

Twelve participants took part in the household survey. Appendix 12 contains their full profiles. Nine live in MHHs with an average of 6.11 members (two participants were widows living in FHHs, one expressed equal household leadership). Table 1 shows economic data of the participant group. Although the land ownership range is ten acres most participants did not own more than two and a half acres (figure 9). Most owned two cattle; all cattle were HF s predominantly kept for milking, although four participants mentioned gaining income from calf sales.

<table>
<thead>
<tr>
<th>Economic Data</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average amount of land owned (acres)</td>
<td>2.88</td>
</tr>
<tr>
<td>Range in amount of land owned (acres)</td>
<td>1-10</td>
</tr>
<tr>
<td>Average income from milk sales (MWK/month)</td>
<td>63,700</td>
</tr>
<tr>
<td>Range in income from milk sales (MWK/month)</td>
<td>20,000-120,000</td>
</tr>
<tr>
<td>Other sources of income</td>
<td></td>
</tr>
<tr>
<td>Crops</td>
<td>7</td>
</tr>
<tr>
<td>Other livestock</td>
<td>2</td>
</tr>
<tr>
<td>Grocery store</td>
<td>1</td>
</tr>
<tr>
<td>Rented properties</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
</tr>
<tr>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>Average number of cattle owned</td>
<td>2.33</td>
</tr>
<tr>
<td>Number of participants with an employed assistant</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 1 Economic data of the participants
Participants themselves were predominantly engaged in feeding cattle, milking and cleaning cattle housing (figure 10).

Nine participants reported feeding their cattle three times a day with the remainder feeding twice a day or whenever the cattle are hungry. A zero grazing, or ‘cut-and-carry’ feed system (harvesting grass from pasture to feed to penned cattle) was used by 11 participants. Maize residues which were homegrown or purchased
at market were the most common supplementary concentrate fed (figure 11). ‘Commercial feeds’ encompassed processed, dairy cattle-specific feed mixes such as dairy mash. For most participants these were reported to be an unaffordable luxury; only one participant used them.

Three participants reported that caring for their cattle prevented them from doing other activities (table 2). Two of these did not have an employed assistant. Participant 1, despite having an employed assistant, reported a conflict of activities saying that “[she has] to balance a busy schedule of running the shop, orchard farming, looking after the home, raising the livestock, and acting as a local leader for women’s cooperatives - going to meetings etc.” She was the only participant to be balancing so many activities and the demands on her time are not representative of all participants.

<table>
<thead>
<tr>
<th>Feed type</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize residues</td>
<td>12</td>
</tr>
<tr>
<td>Cut and Carry grasses</td>
<td>10</td>
</tr>
<tr>
<td>Grazing grasses</td>
<td>8</td>
</tr>
<tr>
<td>Soyabens</td>
<td>4</td>
</tr>
<tr>
<td>Vegetable residues</td>
<td>3</td>
</tr>
<tr>
<td>Groundnut residues</td>
<td>2</td>
</tr>
<tr>
<td>Commercial feeds</td>
<td>1</td>
</tr>
</tbody>
</table>

*Figure 11 Feed types utilised by participants*

<table>
<thead>
<tr>
<th>Number of participants unable to do other activities</th>
<th>Number of participants reporting able to do other activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Because family members help me</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

*Table 2 Conflicts of activities experienced by participants*

During the household survey it was noted that this MBG is currently experiencing electricity shortage problems at the bulking tank so milk chilling is not possible. All milk is currently sold through an informal channel directly to vendors.

Twelve participants took photographs in line with the study training given with a range of eight to fifty-four photos each, in total 282 photos. Participant 8 withdrew after the photo-taking stage, and individual interviews to obtain photostories (Appendix 8) were conducted with the remaining eleven participants. Each
interview discussed the content of four photos and lasted approximately twenty minutes. Ten participants took part in the final group discussion and feedback session which lasted one hour, forty minutes.

**Individual photostories**

From thematic analysis of individual photostories, nine key challenges/themes were identified (figure 12).

Appendix 11 contains a full list of all themes, sub-themes and their codes, and an example of thematic analysis.

![Table of Key Challenges](image)

*Figure 12 The nine key challenges identified from thematic analysis of photostories*

**Quantifying and ranking themes**

The numerical data obtained from the code-quantifying of the photostories allows the relative importance of the identified themes to be understood.

The number of times each participant mentioned each theme was quantified (Appendix 13). It was assumed that participants would more frequently mention themes which were more important to them.

Based on these values, each theme was ranked for each participant. The rankings from each participant were then aggregated to give an overall ranking for each theme (Appendix 13: Method 1 ranking, p. 84). Another method was trialled involving ranking themes according to the overall number of mentions and this yielded very similar results.
Table 3 shows the ranking of themes from most to least important based on method 1:

<table>
<thead>
<tr>
<th>Theme</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding</td>
<td>1</td>
</tr>
<tr>
<td>Low income</td>
<td>2</td>
</tr>
<tr>
<td>Utensils, materials and equipment</td>
<td>3</td>
</tr>
<tr>
<td>Disease, injury and medication</td>
<td>4</td>
</tr>
<tr>
<td>Cattle housing maintenance</td>
<td>5</td>
</tr>
<tr>
<td>Cattle housing cleanliness</td>
<td>6</td>
</tr>
<tr>
<td>Labour delegation and time constraints</td>
<td>6=</td>
</tr>
<tr>
<td>Water</td>
<td>8</td>
</tr>
<tr>
<td>Ticks</td>
<td>9</td>
</tr>
</tbody>
</table>

*Table 3 Ranking of themes in order of importance based on method 1*

In the following description of themes, ‘n’ is the total number of times the theme was mentioned; and ‘N’ is the number of participants who mentioned the theme.

**Feeding**

n = 36; N = 11

Affording supplementary concentrates was the most commonly mentioned sub-theme under Feeding making up one quarter of the total number of mentions of this theme. Participants reported that these are prohibitively expensive and therefore sometimes not fed. Despite this, they also recognised that they are necessary for high output of good quality milk. Participants one and five mentioned the challenge of extra expenditure on supplementary concentrates during the dry season when grass growth is low. Participant 9 suggested possible solutions to this problem: financial assistance to purchase extra feeds or advice about ways to grow extra feeds for better milk.

Issues raised with the zero grazing feed system were the lack of proximity of pasture and the lack of adequate land ownership for sufficient grass growth to feed cattle.

All eleven participants used bicycles for transporting grass from pasture to cattle but raised issues of:

- the limited amount of grass the bicycles can carry making feed transportation time-consuming as many trips to and from the pasture are needed each day;
- regular servicing of bicycles; and,
- travelling by foot when bicycles break down exacerbating time constraints
Figure 13 summarises the main sub-themes of Feeding:

**FEEDING**

- Zero grazing
- Cost of supplements
- Bicycle transport
- Land ownership
- Proximity of pasture

*Figure 13 The main sub-themes of Feeding*

**Utensils, Materials and Equipment**

\( n = 33; \ N = 7 \)

This theme was mentioned mostly in relation to the activities of Cleaning and Feeding. The utensils, materials and equipment which participants lacked (coded and quantified in their photostories) are shown in table 6:

<table>
<thead>
<tr>
<th>Utensil, material or equipment</th>
<th>Number of times mentioned in all photostories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building materials (wooden posts, iron roof sheets, cement and bricks)</td>
<td>12</td>
</tr>
<tr>
<td>Feed troughs (large, two-compartment trough made from cement)</td>
<td>10</td>
</tr>
<tr>
<td>Concrete for flooring</td>
<td>4</td>
</tr>
<tr>
<td>Feed preparation utensils (for grass chopping)</td>
<td>1</td>
</tr>
<tr>
<td>Milking parlour lighting</td>
<td>1</td>
</tr>
<tr>
<td>Cleaning utensils (shovels, wheelbarrows)</td>
<td>1</td>
</tr>
<tr>
<td>Personal Protective Equipment (PPE) (gloves, face masks, rubber boots)</td>
<td>1</td>
</tr>
</tbody>
</table>

*Table 4 Utensils, materials and equipment participants were lacking and the number of times they were mentioned*
Solutions mentioned to the absence of adequate feed troughs were manufacturing troughs from iron roof sheeting, and using household cooking pots (figures 14 and 15). Participants desired “ideal” two-compartment cement feed troughs (one side for feed, one for water).

In all photostories where the problem of inadequate Utensils, Materials and Equipment was mentioned, participants reported the reason this problem exists is because they cannot afford to buy appropriate materials.

**Low Income**

n = 31; N = 10

The direct causes of Low Income mentioned included poor milk prices and sales; low milk output (figure 16); poor quality milk production; and milk being the only source of income. Additionally, Participant 1 mentioned that during the cattle’s dry period (pregnancy) there is no income from milk sales. Five participants mentioned the effects of this challenge on the inability to afford supplementary concentrates feeding back to worsen the issue of Low income through poor cattle nutrition and low milk output: “I am milking the cow in order maybe to gain some money ... I am trying to gain money so that the cow is fed on a nutritious diet so that it is producing more [milk]” (Participant 5).
Poor milk prices and sales was the most common sub-theme of Low Income and also the second most frequently mentioned sub-theme throughout all photostories. Participants reported feeling “cheated” when selling their milk and every time they sell being told the milk has “gone bad” but “since they have nowhere else to sell they just have to go with the prices”. Five participants also mentioned a conflict of financial expenditures between the household and the dairy cattle.

**Cattle Housing Cleanliness**

n = 22; N = 8

Eight participants mentioned at least one sub-theme of Cattle Housing Cleanliness. The most frequently mentioned sub-theme was cleaning cattle housing to prevent disease in cattle. This was mentioned alongside concerns about the financial costs of disease and its effect on lowering milk quality.

Manure removal was mentioned by four participants and stated to be important for three reasons: to prevent disease in cattle; to keep shared living compounds clean; and to use manure as fertilizer for crops. For the seven participants who also grow crops (for household consumption or income) this is an essential way to ensure they do not waste valuable resources from their cattle:

“I can't afford fertiliser for my maize which I grow to eat. So I have to clean the cows regularly and process the manure for using to help grow the maize.” (Participant 5)

Concerns with manure removal were the inability to afford quality utensils and PPE; hygiene concerns; and the time taken to perform this task. Participant 5 was especially preoccupied with the issue of the time taken to perform manure removal and mentioned this four times in one photostory (figure 17).
Disease, Injury and Medication

n = 21; N = 10

This theme encompasses the sub-themes of diseases spreading from cattle to humans; diseases in cattle originating from their feed; the financial costs of vets and medication; and disease leading to low income.

The most commonly mentioned sub-theme was diseases spreading from cattle to humans. The reasons attributed to this by participants were sharing compounds with cattle; having unclean cattle housing; sharing cooking pots and household buckets with cattle to replace absent troughs and milking vessels; flies; sharing soap with cattle to replace absent acaricides; and the dual roles of cleaning cattle housing and then cooking for the family (both tasks performed by women).

There were two financial burdens of concern related to disease and injury in cattle: paying vets (mentioned by two participants) (figure 18) and paying for medication (mentioned by three participants). Further details about participants’ experiences with vets were gained in the group discussion.
Cattle Housing Maintenance

n = 21; N = 7

Seven participants mentioned Cattle Housing Maintenance as a challenge. The most frequently mentioned sub-theme was maintenance of roofs and walls (by six participants) (figure 19).

![Figure 19 A poor quality cattle house with a collapsed roof](image)

“There this roof has been there for a while so it has fallen on one side due to rains ... if the cow was in the collar it would have also injured the cow”

Participant 1

There were three points of concern arising from poor quality cattle housing: the frequency of maintenance; the cost of replacement; and the risk of injury and disease to cattle from exposure to weather. Participants attributed this challenge to wind and rain, poor quality materials, and the behaviour of cattle. The group discussion revealed more information about this theme and its relation to others.

Labour Delegation and Time Constraints

n = 17; N = 7

This challenge encompasses the issues of working alone; hiring an assistant; delegating labour to others; and time constraints between farming and domestic responsibilities. The most commonly mentioned sub-theme was time constraints.

This theme was found throughout many others in relation to transporting grasses by pushbike (small carrying-capacity resulting in multiple trips to pasture); feeding cattle; collecting water; and removing manure from the cattle housing using poor quality utensils which can only carry a small amount at once.

Another factor mentioned by three participants as a cause of time constraints was the inability to hire an assistant to help with animal husbandry tasks due to low income. Participants two and twelve mentioned that, in the absence of an assistant, their children are sometimes forced to work when they themselves are sick or when the amount of work is too much. They expressed that they felt as though they were “forcing the child to work” and that these tasks are a “burden” on their children (figure 20).
The relationship between this theme and others (based on photostories) is shown in figure 21:

Figure 20 A child working in the place of her mother who is unwell (Participant 2)

Figure 21 The interaction of labour delegation and time constraints with other themes. Photos courtesy of Participant 12 (L) and Participant 6 (R)
Water

n = 7; N = 4

This challenge encompassed the distance travelled to water sources and the time and labour constraint of this activity (figure 22).

![Figure 22 The challenge of travelling to far away water sources](image)

“I [carry] water from a long way, maybe from several kilometres ... it is time-consuming because I have to stop most of the household chores just to collect water and come back. Sometimes I have to make several rounds”

Participant 7

Two participants suggested that a solution to this problem is digging wells and one participant mentioned that the ideal solution would be installing taps at the trough. The group discussion revealed difficulties with these solutions.

Ticks

n = 10; N = 4

At thematic analysis, ‘Ticks’ had several sub-themes, and was therefore defined as a key theme rather than a sub-theme within Disease, Injury and Medication. Four participants mentioned the theme of ticks and displayed understanding of their origin stating that they are found in grass which is carried to penned cattle (Participant 1 mentioned this in relation to the cattle grazing outside). They also mentioned the risk of tick-borne diseases in cattle although they did not know the names of these diseases. The most frequently mentioned sub-theme of Ticks was ‘acaricides’ (mentioned five times in total). Participant 1 displayed sound understanding of how the acaricide medication works. For all participants the challenge of acaricides related to their cost which they reported to have two negative effects: missed administration (because they cannot afford to buy the medication) and being unable to buy in bulk leading to a need to travel to buy the acaricides more frequently:

“Medication costs 3,500 kwacha which is enough for dipping twice. The dip is administered every two weeks ... Due to financial problems sometimes I do not administer.” (Participant 4)
Participant 9 raised the issue of the lack of gloves that she has to wear during administration of acaricide (figure 23). It later transpired in this photostory that she was administering soap instead of acaricide because of financial constraints. She perceived this solution to be a danger to her own health:

![Figure 23 Administering soap to a cow in the place of acaricide](image)

“Participant 9
Figure 23 Administering soap to a cow in the place of acaricide

The group discussion

The group discussion yielded additional information about each of the themes from the individual photostories (table 5). A set of specific questions to expand on information gained from the photostories was presented to the group in relation to each theme, then participants were invited to freely add extra information they felt was relevant to that theme.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Information reported by participants during the group discussion</th>
</tr>
</thead>
</table>
| Feeding                    | • The zero grazing feed system is employed because they are “beneficiaries” of the cattle and were instructed upon receiving them not to let the cattle outside to prevent disease and in-breeding.  
                              • More money is spent on supplementary concentrates during the dry season than during the rainy season  
                              • If they borrow an Ox-Cart they can go once or twice a week to fetch and store grass for three or four days to save time cutting down grass  
                              • It’s expensive to borrow an ox-cart: “maybe four times as much as a bicycle”  
                              • The feed troughs are unsuitable and inadequate. They want to find “a way of building a better feeding area” |
| Low Income                 | • Participants feel “cheated” when they sell their milk but they have “nowhere else to sell so they just have to go with the prices.” |
| Utensils, Materials and Equipment | • Good quality utensils can help to “lessen the activities of the cattle housing”  
                              • There is a need for PPE when working with cattle: “When they are entering the collar they are supposed to have boots, they are supposed to have gloves, they are supposed to have a face mask so that they don’t get any diseases and so that the medicine don’t enter their bodies.” |
| Disease, Injury and Medication | • Ailments mentioned: fever, malaria, TB, worms  
• To protect from worms the cattle are given oral medication  
• Milk output decreases when the cattle are unwell  
• There is a risk of humans contracting diseases from the cattle, especially TB  
| Communicating with vets:  
• Concern that the cows die due to miscommunication between the vets and them: during emergencies they cannot get to the vet on time (one participant experienced death of one of her cattle because of this)  
• They cannot be assisted without paying so they have to “go around and search for money” before visiting the vet  
• They have to visit the vet in-person  
• The vets are sometimes rude: “with this money I cannot assist you” |
| Cattle Housing Maintenance | • The four areas of a good cattle house: the place where the cow sleeps with an extra compartment for the calf; the feeding area; the milking area; and the area for administering acaricide dip  
• Having a good cattle house “solves most of the problems because the tasks are minimised”. “If you have already built a good milking area ... there is no need for you to be there you just have to leave the cows for them to enjoy the space”  
• Maintenance of the housing depends on the behaviour of the cows – fighting and mating cause the housing to be broken and it needs to be replaced.  
• They started as a big group of women dairy farmers but the constant expenditure and labour constraint of housing maintenance has caused many women to stop dairy farming “because the activities in the housing are so much so most of the women gave up and there are just a few remaining” |
| Cattle Housing Cleanliness | • The vet instructed them that when the cow has urinated or defecated “immediately they should go and clean that up”.  
• There is concern about their inability to be around the cattle housing for cleaning all the time as they have to manage other activities  
• Only water is used to clean cattle housing – chemicals are too costly  
• Cattle can develop mastitis from unclean housing. This causes the milk quality to be very poor  
• The housing should have a sloped concrete floor for drainage but they do not have this so they have to clean it manually  
• The materials and utensils available for cleaning are of poor quality and “will break any time”  
• Manure is used for the farm and for the garden |
| Labour Delegation and Time Constraints | • When the women are sick, it places a burden on their children who have to work with the cattle.  
• Delegating labour to others means it takes longer because they have “no knowledge” of how to look after the cattle, as opposed to these women who “go frequently to the bulking groups and have more knowledge of the cow”  
• Help is needed to combat the conflict of activities (examples given: fetching water, feeding the animals, taking children to school, cooking) – the women experience difficulty managing all these activities  
• Assistance can be provided by anyone (husband or relative)  
• The husbands role is to “fix the cattle housing” and “keep it in shape” |
| Water | • Digging wells could work but as a group they are scattered so the wells will not be close to all of them  
• Rainwater harvesting can work but during the dry season it is still difficult to get to water sources. |
• Using taps would mean they have to pay a bill to the water board and the cow has to drink so much that this would add to the bill for household water which is difficult on their finances

| Ticks | • Record keeping is employed to ensure correct intervals between each acaricide administration  
• There is a need for PPE (see Utensils, materials and equipment) |

Table 5 Results from the group discussion

**Photovoice feedback from participants**

Participants reported that they were “really excited” to learn the technical know-how of the cameras. They enjoyed the photo taking and found the cameras easy to use. They said that this study has encouraged them to “still continue with the passion for their cows” and has made them realise that “organizations like SSLLP [are] concerned for their welfare”. They also expressed that they were looking forward to seeing changes and improvements to their situation.
CHAPTER 5: DISCUSSION

The primary aims of this study were to ascertain if the PV methodology is appropriate to identify challenges that hinder day-to-day activities for women dairy farmers in Likuni area, Malawi and the productivity of their livestock; and to use PV in this context to make an initial assessment of these challenges.

The PV methodology

With careful formulation of a thorough training plan, PV was an effective PAR method for this study. Despite the limited time-frame, it was surprisingly easy to implement. Participants understood camera-use well and engaged well in photo-taking. Van Der Meer et al (2015) comments on the high motivation of cattle farmers to participate in their PV study and states that this is because of the importance of livestock to them. As well as enjoying the PV experience, participants expressed gratitude at being chosen to take part. Given the difficulties these women face with the effectiveness of the milk value chain (Revoredo-Giha & Chitika 2014), and a perceived lack of support from various quarters, it is important that they feel listened to and assisted. Some of the themes which arose revealed aspects of women’s lives in dairy farming, which other methodologies, such as traditional interview techniques and macroeconomic studies, have not. Exploring women’s issues in farming in sub-Saharan Africa was the original motivator behind this study and the choice of the PV technique: it is therefore encouraging to see challenges specific to women such as conflicts between farming and domestic responsibilities, arising through this research. The focus of the PV technique on individual farmers and their lives highlights producer-level problems as opposed to those of the sector as a whole. Although a small sample size of 12 participants means these results cannot be generalised to the wider community of Malawian women dairy farmers, it was an adequate sample to gain a rich and informative insight into the daily challenges faced by these women through a manageable amount of data for analysis.

The rationale behind using disposable cameras was to protect the safety of participants and because of budgetary constraints. However, it emerged as a strength of this study enabling a set of good-quality printed photos to be obtained quickly and used as the focus for individual and group discussions allowing participants to point to details and explain deeper meanings. Discussing and viewing photographs on a screen may have distanced individuals from the discussion who were not familiar with technology. The participants enjoyed the novelty of the cameras which contributed to their high level of engagement. Previous studies have allowed participants to use their Smartphones or digital cameras (Van Der Meer et al 2015), however, not all participants in this study owned a mobile phone and not all participants would have felt comfortable or confident using more advanced technology. Use of disposable cameras enabled the entire group to work at the same level of photo-taking ability therefore reduced the effect of design bias (Bowling 2009). Furthermore, having cameras to take photos specifically dedicated to the PV task ensured their focus on
producing images in-line with the study aims. Using their own Smartphones may have blurred the boundary between photos taken specifically for the PV project, and photos taken for other reasons. Teaching participants to use the cameras added an engaging ‘hands-on’ aspect to the training helping to build a researcher-participant relationship of trust and collaboration. Providing the women with their cameras in a waterproof rucksack enabled easy transport of the cameras allowing for spontaneity in photo-taking in settings such as out at pasture.

**Limitations of the study**

Policy makers were not as involved in this study as desired by the researcher. Wang (1999) advises that “Planners [should] bring to the table from the outset policymakers and other influential people to serve as an audience for community people’s perspectives”. Previous PV studies (Kingerey et al 2016) have involved meetings with local MPs and policy makers generating more successful lobbying for change. Due to the time restrictions, access to policy makers during this study was limited. Further, given the small scope of this study the findings are perhaps not prominent enough to influence policy for the wider dairy farming community in Malawi. However, the initial courtesy call to the DADO responsible for Likuni area sparked interest and awareness of these women’s challenges at District office level, and with lobbying of appropriate organizations it is hoped that solutions can be investigated. Also, by adding weight to the existing body of research on the challenges facing dairy farmers in Malawi (Banda et al 2011; Banda et al 2012; Fon Tebug et al 2012; Chagunda et al 2006), the profile of the policy-level challenges identified (such as structural problems within the milk value chain) could be raised on the Agricultural Development agenda.

In previous PV studies, participants were allowed to code and rank their photographs themselves (Kingerey et al 2016). In this study, the researcher performed this task and presented the main themes to participants. The former method is arguably more empowering and will yield results more reflective of what the participants perceive to be their most important problems reducing the effect of investigator bias on the validity of the results (Bowling 2009). It also allows participants to seek opportunities for social change more easily and is therefore more consistent with the aims of PV (Wang 1999).

The reliability of the results is reduced because photostories were transcribed, coded, and analysed by one researcher due to budgetary and time restrictions. involving a team of investigators in this process allows categorisations to be compared and discrepancies discussed before agreeing final results therefore satisfying the criteria of reliability (Bowling 2009). At the point of theme-ranking, the assumption that a theme which was mentioned more frequently was more important could have resulted in misinterpretation of the data and therefore reduced validity of the results. It may be that a lower ranking theme (such as Water and Ticks) was very important to participants but was not mentioned very frequently because participants did not view it as rectifiable (as indicated by the problems attached to digging wells, rainwater harvesting, and installing taps in the Group discussion).
Managing participant expectations was challenging. In the feedback session it became clear that there were expectations of immediate solutions which this study is unlikely to deliver due to budgetary and time limitations. Included in the initial Group meeting training transcript (Appendix 6) was a clause about my limited ability to resolve the challenges that would arise. The findings and implications from this study are insightful and have brought to light the un-told story of challenges faced by women dairy farmers in Likuni area, however, this research alone does not have the policy-level power and influence, or financial resources behind it to solve the problems which arose. Nevertheless, this study has proved that the PV method can be successful in this context and if scaled up in the future through a larger study, similar methods could achieve impact through advocacy and greater involvement of policy makers.

Main findings

The nine key themes from this study can be summarised under three broader categories (figure 24). Low Income is closely related to all other themes therefore it is shown to be present throughout each category. The Farm Environment category encompasses both the farm, and the wider environment in which the farm is situated. There is a great degree of overlap between these categories such as aspects of Feeding (the proximity of pasture) and Labour Delegation and Time Constraints (the labour-intensity of cleaning cattle housing), which also encompass Farm Environment challenges.

![Figure 24: The nine key challenges divided into three broad categories](image-url)
The identification of these nine key themes reflects the findings of published literature on the key production constraints of smallholder dairy farmers in Malawi (Banda et al 2011; Banda et al 2012; Fon Tebug et al 2012). In the literature Cattle Reproduction and Genetics are also highlighted but these were not reported in this study. This could be because in-line with the aim of this study to “identify the challenges that women dairy farmers in Likuni (Malawi) face which hinder their day-to-day farming activities”, participants were asked to take photographs of “anything which inconveniences you, decreases your productivity or which you perceive to be a daily annoyance” (Appendix 6). Therefore, more emphasis was placed on the women’s individual challenges in their farming activities – perhaps also why Labour Delegation and Time Constraints arose as a key theme in this study – something which has not previously been identified in published literature. This raises the issue of bias within the PV methodology which reduces the validity of the results. Perhaps it favours challenges that ‘happen’ frequently and can therefore be photographed more easily (such as poorly constructed pens or unsuitable utensils) – if reproduction events such as AI don’t happen regularly or do not occur during the photo-taking period, they’re unlikely to be photographed.

Feeding is the most important challenge for these farmers (table 3: Results, p. 29), especially regarding the cost of supplementary concentrates. Given financial constraints are a reality for all participants and in many cases are substantial (as shown by the household survey and the frequency with which Low Income was mentioned in photostories), the importance attached to this issue is likely to be reflective of their inability to pay for concentrates which they are aware could potentially greatly improve productivity of the cattle and therefore their income. Furthermore, limited grass growth during the dry season means that many participants are more heavily reliant on purchased feeds during this time therefore seasonally increasing the importance of this challenge. This finding adds weight to literature which has previously identified cattle feed shortage as a ‘major’ production constraint for dairy farmers in Malawi; and that quality concentrates are only accessible to those with credit (Fon Tebug et al 2012; Banda et al 2012). The implications of this finding, as suggested by Participant 9 include the need to advise farmers how to acquire productivity-enhancing concentrates in other ways such as growing legumes; an important source of protein (Chindime 2008 cited: Banda et al 2012 p.716).

Zero grazing is employed by 11 women in this study. This system, although high-input, carries benefits for smallholder periurban dairy farmers including on-farm milk production (improving household nutrition); easy collection of manure for recycling on crops; disease and pest control; and controlled breeding (Kitalyi et al 2005). Despite these benefits, reliance on bicycle transport makes it labour-intensive, as described in the photostories. Coupled with the inability to afford quality housing materials, simply keeping cattle permanently penned incurs high labour and financial inputs for maintenance and cleanliness of cattle housing presenting a substantial time constraint for these farmers. There is a resultant tension between the benefits of zero grazing, and the difficulties this causes in terms of providing adequate nutrition. Financial assistance from donors for these farmers to purchase shared Ox-carts (currently too expensive to borrow) to transport
several days’ grass each time would reduce the labour-intensity of feeding allowing them to undertake other activities, or to diversify their income through other means. Current literature focuses on the difficulties farmers experience acquiring concentrates with very little focus on how grasses are fed. The enhanced reach that PV allows into the daily lives of participants for a period of time has possibly allowed the challenge of bicycle transport to stand out.

Despite being ranked as the least important challenge for these farmers, Ticks are an important cattle health consideration, primarily due to tick-borne diseases such as East Coast Fever (ECF), and other damaging health effects such as anaemia (Banda et al 2012). The inability of these farmers to afford acaricides, and the solutions they are resorting to (such as using human soap) cause conflicts of household finances as well as risks to human health. For the health of the national Malawian dairy cattle herd, it would be worth reviewing the cost of acaricides at public health policy level as this study clearly highlights that, unless prices are brought down, national schemes to control ECF and other tick-borne diseases will be crippled by the inability of producers to afford to participate in control programmes.

This study adds weight to the literature highlighting the challenge of Cattle Housing Maintenance (Banda et al 2012), and raises its profile as a potential point of producer-level intervention. Adequate cattle housing on these smallholder farms is undeniably lacking: a problem which is exacerbated by challenging weather conditions (as described in photostories) and which further increases the complications of zero grazing. These challenges cannot be resolved by simply supplying farmers with better quality tools to work with. Rather, they will be lessened by an injection of funds from donors to assist in building durable brick and cement cattle sheds requiring less maintenance and which can withstand rain and the strength of cattle; and by addressing, sustainably, the problem of Low Income and the many factors that feed into it.

There is a tension between the needs of livestock and those of the farmers and their households. This is evident from the coping mechanism of sharing resources (soap, household cooking pots and acaricides) with cattle to combat the financial inaccessibility of suitable utensils and equipment. While previous research has focussed on production constraints, PV has revealed the methods adopted by participants to address these shortfalls at household level; this is a finding not previously reported in the literature. This PV study did not assess awareness or prevalence of zoonotic diseases amongst these farmers, although sharing resources in this way presents a danger of transmission of zoonoses (notably bTB and Brucellosis) from cattle to humans (Fon Tebug et al 2014). Consequently, an important One Health implication of this study is the need for further research, into the bacterial load contamination of household environments to better understand the extent to which sharing resources causes zoonotic transmission.

The key theme, Labour Delegation and Time Constraints suggests that these women farmers experience difficulty balancing of domestic and farming responsibilities, however, the exact division of labour in farming activities is unclear. It appears from the group discussion and the photostories that the husbands are less
involved in time-consuming husbandry activities than their wives (only three participants reported husbands involvement in feeding in the household survey). This suggests a gender imbalance in labour input echoing existing literature (EADD 2009) which points to production level gender inequalities in the division of labour on farms in East Africa. In the Malawian setting, this theme warrants further research, for example, through a time-use study of these women to allow better understanding of their dairy farming and other household activities, and the implications for productivity and income. A particular aspect, given the relatively large average family sizes in the study (the household survey revealed an average of 5.25 children), is how or whether women farmers’ workloads change during pregnancy and with childbirth.

Low Income is undoubtedly a central theme (Figure 25). It both causes, and is caused by all the other challenges and results in a cycle of events preventing these women from lifting themselves and their families out of poverty, and improving dietary diversity and quality through more productive dairy enterprises (Lenjiso 2016).
Figure 25 Low income and its relationship to other challenges. The * indicates a factor which feeds back into Low income. The dashed line from 'Pregnant dry cattle...' indicates that this is not a factor that is constantly present but which fluctuates depending on the breeding cycle of the cattle.
Possible interventions to combat this challenge include provision by the Government or local Agricultural Development organizations of fairer veterinary extension services allowing for payment relief during emergencies; providing acaricides free of charge; or injecting funds to build safe, durable cattle housing, removing the costs of continual maintenance. An enhanced level of recognition by NGOs and the Government that for many smallholder dairy farmers their cattle are their sole (or a largest) source of income (as revealed in the household survey) would raise the profile of concerns which are out of the farmers’ control (such as expensive veterinary services) on development agendas. Additionally, diversification away from sole reliance on milk sales into other agricultural, or income-generating activities could also help to alleviate low incomes and allow more milk to be kept for household consumption, giving rise to benefits for household food security, human health and child nutrition (Walton et al 2014).

Importantly, in terms of Low Income, when selling their milk these women report feeling “cheated” on the price offered and frequently being told that their milk has “gone bad”. This suggests problems in the milk value chain preventing them from receiving the income they deserve and strengthens the argument that the Malawian dairy industry represents a “supply chain in disarray” (Revoredo-Giha & Renwick 2016). These women are least empowered to address this issue: it warrants further research and regulation. As revealed by the household survey, electricity problems at the bulking tank are preventing milk chilling, therefore milk temperature and quality cannot be controlled – perhaps explaining why quality decreases before sale. This finding is consistent with the literature (Sangani 2012) which highlights electricity rationing to rural areas at times of shortage as a challenge to smallholder dairy farmers in Malawi. The inability to store and chill milk also prevents these farmers from entering formal milk selling channels (figure 2: Introduction, p.9). The formal sector is advantageous for smallholder farmers as it encourages the formation of cooperatives and provides more reliable prices (Herbert Chagona, Central Region MMPA, personal communication). Governments can help to strengthen smallholders’ position in value chains through investments which incentivize greater productivity such as transport infrastructure, energy for chilling plants, education and training in marketing (Agriculture for impact 2018).

All the farmers in this study own purebred or crossbred HF cattle – European breeds with the genetic potential to produce up to 55 litres of milk per day at peak lactation on a large-scale, commercial European farm (Delgado et al 2008). A further question concerns the suitability of these cattle for the Malawian environment (Figure 25: “Poorly adapted HF cattle...”). In this study average milk output was 10.95 litres per day with farmers reporting yields as low as 8 litres. Given the high burden of parasite and disease challenge (especially from ticks), poor nutrition, and thermal stress faced by these cattle, it is possible that no matter how the identified challenges are addressed, their milk output may remain low. Further research is therefore needed into the suitability of HF cattle for the Malawian environment and the extent to which this breed limits income. Genetic improvement of these cattle through implementation of breeding programmes underpinned by modern genetics such as marker assisted selection will enable engineering of cattle which
are more suited to the Malawian environment and its challenges therefore increasing productivity and income (ILRI 2015). The ‘African Dairy Genetic Gains’ programme currently underway in Tanzania and Ethiopia might be suitable for Malawi. This programme involves thorough recording and sampling of cattle to develop a selection of the best performing individuals from the existing population to crossbreed through Artificial Insemination and natural mating for superior genetic merit (ILRI 2015).
CHAPTER 6: CONCLUSION

There are nine key challenges facing women dairy farmers in Likuni Area, Malawi. These are Feeding; Disease, Injury and Medication; Cattle Housing Maintenance; Cattle Housing Cleanliness; Labour Delegation and Time Constraints; Utensils, Materials and Equipment; Water; Ticks; and, Low Income. They can be categorised under three topics: the Role of Women; the Farm Environment; and, Cattle Health. The two most important themes are Feeding and Low Income. Low Income is common to all other challenges: these farmers are caught in a cycle of interacting problems from which they cannot lift themselves without an improvement to their financial situation. Under Feeding, the cost of supplementary concentrates is a prominent concern as they are prohibitively high resulting in inadequate nutrition of cattle and likely exacerbation of low milk outputs.

The use of the modified PV method in this context was shown to be successful with participants engaging well with photo-taking and enjoying the experience of being involved. It is thought to be the reason why some of the more individual challenges came to light such as using a pushbike to transport grass for zero grazing.

These findings support those identified in published literature and have also brought to light challenges such as the coping mechanism of sharing resources between the household and cattle (an important One Health concern), and the key challenge of Labour Delegation and Time Constraints which encompasses a conflict of domestic and farming activities (perhaps the most relevant to the role of women).

This study has limitations: policy makers were not as involved as in previous PV studies limiting its power to influence policy changes. Managing the expectations of participants was a point of concern; and the reliability and validity of the results have been reduced by potential investigator bias and the involvement of only one researcher in photostory analysis.

Future research

Notwithstanding its limitations, the success of PV in this context suggests that it is a suitable PAR method to bring to light some of the daily challenges faced by women farmers in Likuni which are negatively impacting their income and livelihoods. The PV method could be scaled-up to other sectors of farming in order to gain further reach into the agricultural community and investigate producer-level constraints. To follow-up on the challenges identified, it would be useful to have further evidence of the labour and time constraints experienced by these women, for example during pregnancy and childbirth. A time use study would assist in understanding the division of labour in various husbandry tasks. The suitability of the HF dairy cattle to the Malawian environment is uncertain and efforts to investigate genetic opportunities for improvement need
to be supported as this could be an important issue preventing the realisation of full productive potential. Problems in the milk value chain warrant further investigation as it is unclear how equitably those who buy their milk are treating these women. Without access to fair milk prices and consistently reliable extension services such as electricity, the cycle of challenges and low income highlighted in this study may be inescapable for these women farmers.


CHAPTER 8: APPENDICES

APPENDIX 1: Proof of ethical approval

From: Gayle Hanbury
Sent: 26 February 2018 09:56
To: Rosie Bartholomew
Cc: Liam McKervey
Subject: Re: 62381 - Full Ethics Application

Dear Rosie,

The chair of the Faculty of Health Science Student Research Ethics Committee (HSSREC) has reviewed your checklist ethics application for the above named study. I am pleased to confirm that the chair has granted a favourable ethical opinion for your research and you can now proceed. You should receive a confirmation e-mail from the online ethics tool shortly that a favourable opinion has been granted and you can begin your research.

Good luck with your research.

Best Wishes.

Gayle.

Gayle Hanbury
Senior Faculty Assistant
Faculty of Health Sciences
University of Bristol

Ethics Online Tool: application signed off

Research Governance and Ethics Officer <Liam.McKervey@bristol.ac.uk>
26/02/2018 12:27
To: rb17341@my.bristol.ac.uk

Your online ethics application for your research project "Using Photovoice to Investigate the challenges facing women dairy farmers in Likini District, Malawi" has been granted ethical approval. Please ensure that any additional required approvals are in place before you undertake data collection, for example NHS R&D Trust approval, Research Governance Registration or Site Approval.

For your reference, details of your online ethics application can be found online here:

http://www.bristol.ac.uk/red/ethics-online-tool/applications/62381
Using Photovoice to investigate the challenges facing women dairy farmers in Likuni district, Malawi

TRANSLATOR CONFIDENTIALITY AND CONSENT FORM

By signing this form, you are consenting to assist in this Photovoice research project investigating the challenges facing women dairy farmers in Likuni district, Malawi by translating conversations with participants from local dialect into English. Conversations will be recorded for use in a final report which will be shared within the University of Bristol and possibly published in a Scientific journal. Your identity will not be recorded at any stage to maintain anonymity. By signing this form, you are agreeing to keep confidential any personal information about participants and their identities that you gain as part of your involvement in this study as well as any information shared in interviews and group discussions.

Name (print):

Tel/Mobile:

I consent to the following (print initials):

<table>
<thead>
<tr>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>My assistance in this research project providing translation services</td>
</tr>
<tr>
<td>The recording of interviews and group discussions which I am a part of to be used in a report of the study</td>
</tr>
<tr>
<td>I agree not to share any information about the identity of participants involved in this study</td>
</tr>
<tr>
<td>I agree not to share any information I gain from conversations between the researcher and her participants in interviews or group discussion</td>
</tr>
</tbody>
</table>

I understand that should have any queries, concerns, or questions about this study at any time I can voice them to Rosie (the researcher)

Translator name (please print):

Date/Time:

Translator signature:

Researcher name (please print):

Date/Time:

Signed by researcher:
APPENDIX 3: Example Participant Information Sheet

Participant Information Sheet for Household survey

Study title: Using Photovoice to investigate the challenges facing women dairy farmers in Likuni District, Malawi: Household survey

Invitation paragraph
I would like to invite you to take part in my research study. Before you decide I would like you to understand why the research is being done and what it would involve for you. Talk to others about the study if you wish. Ask me if there is anything that is not clear.

What is the purpose of the study?
To understand the challenges facing you as a woman dairy farmer. We might also be able to discuss ways of reducing these challenges.

Why have I been invited?
You have been chosen to take part because you are a woman dairy farmer and you live in the Likuni district. There are 11 other people taking part in this study who are all also women dairy farmers.

Do I have to take part?
It is your choice to join the study. I will describe the study and go through this information sheet. If you agree to take part, I will then ask you to sign a consent form. You are free to leave the study at any time, without giving a reason. If you want to leave the study, tell me and your information will be removed.

What will happen to me if I take part and what will I have to do?
Have a chat with me and my translator about your family, household and living situation. The conversation will last half an hour.

What are the possible disadvantages and risks of taking part?
There are no risks associated with taking part in this study.

What are the possible benefits of taking part?
This aspect of the study is so that I can learn about you, your household and your dairy farming. I will look for links between this information and the results of the interview and group discussion which will happen later.

Will my taking part in the study be kept confidential?
All information about you will be handled in confidence.

What will happen if I don't want to carry on with the study?
You can leave the study at any time without giving a reason. If you feel uncomfortable and wish to leave, tell me and your information will be immediately removed.

Will my taking part in this study be kept confidential?
This conversation will be recorded on a digital device. The recording will be uploaded to a computer at the end of today and stored for 10 years where nobody can hear it without asking me first. The recording might be listened to by people from SSLLP and The University of Bristol. The recording will be transcribed by me. The recording on the digital device will then be destroyed. None of your
personal information (name, address etc.) will be noted so that you cannot be recognised, and you will be referred to according to your participant number in the report.

What will happen to the results of the research study?
The results of this conversation will be used to look for links between household data and information collected in other conversations. Things which you say might be used in a report about this study which may appear in a public scientific journal. Your name will not be used - your participant number will be used in the report. I will give the SSLLP a summary report which they can share with you.

Who is organising and funding the research?
The University of Bristol Faculty of Health Sciences. Funding is kindly being provided by the British Veterinary Association and The School of St Helen and St Katherine

Who has reviewed the study
The University of Bristol Faculty of Health Sciences Research Ethics Committee has reviewed this research

Contact details
[Named key informant]
Participant Identification Number:

CONSENT FORM FOR HOUSEHOLD SURVEY

Title of Project: Using photovoice to investigate the challenges facing women dairy farmers in Likuni District, Malawi: Household survey

Name of Researcher: Rosie Bartholomew

Please initial all boxes (interpreter to initial boxes as a witness in cases of verbal consent)

1. I have been told the information from the information form [19/02/2018] for this Photovoice study. I have had a chance to think about this information. I have asked questions if I needed to which have been answered.

2. I understand that I am taking part out of my own choice and that I can leave the study at any time without giving a reason.

3. I understand that this conversation will be recorded on a digital device. I know that the recording will be stored for 10 years where nobody except the research can hear it without asking first.

4. I understand that things I have said might be used in a report, but my name will not be used.

5. I understand that this recording might be listened to by people from SSLLP and The University of Bristol. I give permission for these individuals to listen to this recording.

6. I agree to take part in this Photovoice study.

_________________________  _______________________  _______________________
Name of Participant             Date                   Signature

_________________________  _______________________  _______________________
Name of Person taking consent  Date                   Signature
### APPENDIX 5: Schedule of events

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location</th>
<th>Who was involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>26/03/18 am</td>
<td>Courtesy call to the District Agricultural Development Officer for Likuni District</td>
<td>Lilongwe</td>
<td>Primary researcher, Senior representative of SSLLP, the DADO</td>
</tr>
<tr>
<td>27/03/18 am</td>
<td>Meeting with village leader and first initial group meeting and training session</td>
<td>House of the key informant, Likuni district</td>
<td>Primary researcher, translator, village leader, 8 participants including key informant</td>
</tr>
<tr>
<td>27/03/18 pm</td>
<td>4 Household surveys</td>
<td>Participants’ own homes, Likuni district</td>
<td>Primary researcher, translator, 4 participants</td>
</tr>
<tr>
<td>28/03/18 am</td>
<td>Second initial group meeting and training session</td>
<td>House of the key informant, Likuni district</td>
<td>Primary researcher, translator, 4 remaining participants (unable to attend on 27/03/18)</td>
</tr>
<tr>
<td>28/03/18 pm</td>
<td>5 Household surveys</td>
<td>House of the key informant, Likuni district</td>
<td>Primary researcher, translator, 4 participants, key informant</td>
</tr>
<tr>
<td>29/03/18 am</td>
<td>3 Household surveys</td>
<td>House of the key informant, Likuni district</td>
<td>Primary researcher, translator, 4 participants</td>
</tr>
<tr>
<td>29/03/18 – 06/04/18</td>
<td>Photo taking period, cameras returned to key informant on the last day</td>
<td>Likuni district</td>
<td>12 participants</td>
</tr>
<tr>
<td>06/04/18 am</td>
<td>Camera collection</td>
<td>House of the key informant, Likuni district</td>
<td>Primary researcher, Key informant</td>
</tr>
<tr>
<td>06/04/18 pm</td>
<td>Camera films developed</td>
<td>Lilongwe</td>
<td>Primary researcher</td>
</tr>
<tr>
<td>09/04/18 am</td>
<td>Photos returned and 3 individual interviews commence</td>
<td>House of the key informant, Likuni district</td>
<td>Primary researcher, translator, 3 participants, key informant</td>
</tr>
<tr>
<td>10/04/18</td>
<td>4 Individual interviews</td>
<td>House of the key informant, Likuni district</td>
<td>Primary researcher, translator, 4 participants</td>
</tr>
<tr>
<td>11/04/18</td>
<td>3 Individual interviews</td>
<td>House of the key informant, Likuni district</td>
<td>Primary researcher, translator, 3 participants</td>
</tr>
<tr>
<td>12/04/18</td>
<td>Last individual interview, group discussion, verbal debrief and feedback session</td>
<td>House of the key informant, Likuni district</td>
<td>Primary researcher, translator, 10 participants including key informant</td>
</tr>
</tbody>
</table>
APPENDIX 6: Group Meeting Training Transcript

Using Photovoice to investigate the challenges facing women dairy farmers in Likuni district, Malawi

GROUP MEETING TRAINING TRANSCRIPT

To be delivered verbally in the first meeting with all 12 participants. All content will be translated into local language by the translator:

“Thank you for attending this meeting today.

1. Introduce myself
   - My name is Rosie Bartholomew
   - This is my translator – Translator introduces herself
   - I am from Bristol University in England, UK where I am a student.
   - As well as studying at Bristol I am also studying to become a vet at Edinburgh University in Scotland.
   - I am interested in dairy farming in other countries
   - I have worked on dairy farms in the UK so I understand a little of the challenges facing dairy farmers where I come from
   - I understand very little of how dairy farming works in Malawi – how you collect milk, how look after your cows etc. so I’d be really interested to find out more about your farming practices here

2. Introduce my project
   - All over the world there are many challenges facing farmers of livestock and crops. I myself have seen the damage that animal disease, insects and failing equipment can present for farmers at home in the UK.
   - The aim of my research is broadly to understand the challenges facing you in your dairy farming
   - I’m sure there are many areas of your farming that you find challenging whether it be problems with milk collection vessels, problems with your animals and their care, problems maintaining a clean farm environment or the challenges of weather.
   - I want you to tell your own story which is where the photovoice method comes in – it allows you to use cameras to record the challenges that you face through photography.
   - I cannot promise that I will leave you after this project with clear interventions to tackle these problems as I do not have the means to do so, however, by publishing this research it is hoped that I can encourage others, such as NGOs and local governments to assist.
   - For me, having photos of your challenges is useful because it allows me to more easily understand them and get a better idea of your farm environments.

3. What your participation involves:
   - I will visit you in your homes to conduct a brief household survey and give you a project pack which contains a camera in a waterproof bag
   - There will then be 8 days of photo collection in which I will require you to use the cameras to take photographs of challenges you face in your day-to-day farming activities. We will discuss what I mean by a ‘challenge’ later on.
   - When the photos have been developed I will return yours to you and ask you to select of 3 or 4 photos which you feel represent the most important challenges you face.
I will then visit you in your homes again to have a chat with you for about half an hour to talk to you about your selection of photos.

We will then have a group discussion all together about the photos which you have selected as important and possible ways of approaching the challenges they show. We may need to have 2 group discussions about this.

I am anticipating the whole project taking about 17 days from today through to the last day of group discussions.

Your normal farming activities will of course continue during this time – I will simply need your time for a few hours over this whole period for a few hours to have a chat with me.

Should you have any problems throughout this study or should anything happen which concerns you you can keep in touch with me through [Named key informant]. She is also who you should approach if you need another camera in case the one I give you is lost, stolen, broken or has run out of photographs. I’ll show you how to tell if this is the case later on.

4. The photo taking

I don’t want you to view this photo taking as a specific task for you to do, or to think about this week as different from any other. Just carry the cameras with you and each time something crops up which inconveniences you or presents a challenge – take a photo of it.

It is important that you resume all farming activities as normal and just take pictures of challenges as you go so that I can get a representative idea of daily life for you.

I understand that the cameras are a bit of a novelty and it is tempting to use them to take pictures of anything (your kids etc.) but I urge you to please stick to the project aims and only take pictures of things which are challenges to your farming. If this project is successful it will be of benefit to you individually and as a community as I can feed the results back to SSLLP and your local department of agriculture so it’s really within your best interest to participate properly and take the project seriously.

5. What exactly is a ‘challenge’?

- Anything which inconveniences you, decreases your productivity or which you perceive to be a daily annoyance.

For example. Things which:

- Stops you farming well/slow you down in your day-to-day tasks
- Stops you getting a good price for your milk
- Makes you ill/sick
- Makes your animals ill/sick”

[Ask participants to generate their own examples]

6. “How to use the camera

- Talk through the different parts and what they each do
- Emphasise the importance of winding the photo dial round before taking a photo and not after
- All the pictures you take which are featured in the final report will be credited as your images but your name will not be used. You have each been assigned a participant number which will be used in all documents made after this project.

These cameras will break if they are crushed, sat on, dropped in water or get very wet from the rain. I have provided you with a waterproof bag which you can keep the camera in. Make sure you don’t…

• Leave it with your children – there are a limited number of photos and once they’ve run out the camera can’t be used any more
- Near your animals
- Outside in an exposed area where it could get wet

- If your camera gets broken, lost or stolen or the dial here read ‘zero’ it can’t be used any more. Keep it in a safe place because I will still need it at the end of your 8 days, and contact [Named key informant] for a second camera.
- Once you have taken all the photos on the camera keep it in the bag or somewhere safe in your home and I will come and collect it at the end of the 8 days.

7. What to do if you want to feature another person in a photo
- You might want to feature someone else in your photo to give scale or show how the challenge relates to a human activity
- It’s really important to ask for consent to feature someone else in your photos because all the photos taken and selected for discussion could be published in a journal and feature in my final report. The person appearing in the photo may not be happy to feature in the publication so it is important to gain their consent before you take the photo.
- Make sure you ask people before you take a photo with them in it.”

8. “How will your identity be protected?
- I am going to give each of you a number and in the report and any other written record of this project you will be referred to according to your number – not your name. This will ensure anonymity.
- Throughout the project I will keep a record of your assigned numbers and your names for the sake of being able to contact you if I have any more information to give you or need to inform you about any extra meetings or training sessions. However, these will be kept securely by me, destroyed at the end of the project, and not shared with any other parties to ensure your confidentiality.

9. Your main contacts
- If you have any questions about this project at any stage or you want to withdraw you can contact me via [Named key informant] and I will withdraw all of your data.

10. Your right to withdraw
- You have the right to withdraw from this study at any stage without giving any reason.
- Bear in mind that I only require you to take a maximum 3 photos a day (less or more if it suits you better) so don’t worry about using all the photos available on the camera if it’s too much.
- Before each stage of the study I will inform you of what it about to take place and ask you to sign a consent form. There is no obligation to do this if you wish to withdraw from the study.

11. How will the photos and voice recordings be used?
- I might use quotes from our conversations (which I will be recording) in my report about this project.
- Any quotes or photographs used in the report will be credited as yours according to your participant number. Your identity will be protected.

12. Participants will be given a camera each or one between two/three to practice taking photos of each other using the cameras. They will also be shown how to use the flash and the importance of winding the photo dial round before taking a photo and not after will be emphasised again.

13. Do you have any questions?”
APPENDIX 7: Household survey

Using Photovoice to investigate the challenges facing women dairy farmers in Likuni district, Malawi

HOUSEHOLD SURVEY

This survey will be preceded by: “You do not have to answer every question in this survey if you do not wish to. Just say that you don’t want to answer any questions you’re not happy answering.”

<table>
<thead>
<tr>
<th>Participant number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name (to be retained by the researcher only):</td>
</tr>
</tbody>
</table>

Demographic survey

<table>
<thead>
<tr>
<th>Age:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Location/Village (to be retained by the researcher only):</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Number of children and their ages:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Female or Male headed household:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Who lives here:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Do you own the land which you keep your cows on? / How much land do you have available? And do you own it?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>How much money do you get from the milk you sell?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Do you receive money in any other way? / What other source of income do you have?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>How many cattle do you have?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Type of cattle:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>What do you keep cows for?</th>
</tr>
</thead>
</table>

Questions about this dairy enterprise

<table>
<thead>
<tr>
<th>Who feeds the cows?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Why do they do it?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>When are the cows fed and what do you feed the cows?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Who cleans the area where the cows live?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Why do they do it?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Who looks after your cows when they’re sick?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Why do they do it?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Who buys medicine for the cows when they’re sick?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Where do you get medicine for the cows from?</td>
</tr>
<tr>
<td>Who milks the cows?</td>
</tr>
<tr>
<td>Why do they do it?</td>
</tr>
<tr>
<td>Are they milked by hand or using a machine?</td>
</tr>
<tr>
<td>How often are they milked?</td>
</tr>
<tr>
<td>How many litres of milk do your cows make each day?</td>
</tr>
<tr>
<td>Who takes milk to the bulk tank?</td>
</tr>
<tr>
<td>Why do they do it?</td>
</tr>
<tr>
<td>How much money do you get for your milk?</td>
</tr>
<tr>
<td>Who do you sell your milk to?</td>
</tr>
<tr>
<td>Do you have any help looking after your cows?</td>
</tr>
<tr>
<td>Who helps you?</td>
</tr>
<tr>
<td>Do you have any help looking after your children?</td>
</tr>
<tr>
<td>Who helps you?</td>
</tr>
<tr>
<td>Does looking after your cows stop you from doing other things/get in the way of other jobs?</td>
</tr>
</tbody>
</table>
APPENDIX 8: Photostories

Feeding

“This are different kinds of feed - maize residues ... soyabeans ... and there is also minerals. [I am] trying to mix them up”

“The feed is really expensive [and] the milk sale doesn’t even cater for the feed costs. [It is] 10-15,000MWK for the feed, but only 2-3,000MWK for the milk so it’s difficult to give this to the cow each and every day.”

Participant 4

“The distance [to] where I fetch the grasses ... is far. Plus the bike limits me on only being able to carry one bag of feed.”

“I am forcing the bicycle to carry more grass but when I am doing this the bicycle breaks down and when that happens I have to go on foot. So it conflicts with other activities ... Sometimes I go three times a day.”

“This problem exists because I have no bigger transport to use to carry the feed and ... I have no land where I can grow grasses.”

[The problem can be solved] by buying land to grow the grasses and ... by buying an ox-cart which I can use to collect the feed.”

Participant 6
“It's me cleaning the cow. After it’s cleaned with water then I administer the dip externally where it protects the cow from ticks.”

“The main cause for the ticks and the flies to come is that I collect the feed from the fields. When I carry the feed from the fields, I carry it together with the diseases”

“[The] medication costs 3,500MWK which is enough for dipping twice. The dip is administered every two weeks as the vet recommends. Due to financial problems sometimes I do not administer.”

“For this problem to be solved one needs money because the medication has to be bought consistently”

Participant 4

“It is me, I am trying to clean the animal with medication, the one I use externally. The cows need to be serviced each and every week whether they are sick, whether they are not sick. The medication needs to be there.”

“There are also diseases that develop on the cow when I don’t administer.”

“If I had money I would have bought each and every medication just to keep a trade so that whenever it is time to clean the animal I already have the medication so that I don’t have to go into town, come back, go into town again … maybe I could buy in bulk and store it somewhere.”

Participant 2
Disease, injury and medication

“I have no gloves on and I also have no brush”

“I am only using ordinary soap to bath the cow which is a major problem because I am not supposed to use ordinary soap for the cow. I am supposed to use medication, the ones we buy in containers, but I cannot afford. This is my soap ... so it’s a problem because I can’t use the soap to bath the cow and bath myself as well which is not healthy and even can attract diseases.”

“The milk sales are poor, I can’t even sell the milk at a good price to buy the medication for the cow.”

Participant 9

“This is the vet who comes to check on the animal. The vet is administering medication to my sick cow.”

“On the picture I am trying to describe 2 problems: The first problem we already mentioned, that the cow is sick. The second problem is that the medication the vet is administering to the cow is expensive so even for the vet to give the cow treatment that’s costing me money.”

“There are diseases that come from not cleaning the trough, the housing area, when it is being fed rotten food like the maize residues ... I am trying my best to ... feed the cow well and keep the collar clean”

Participant 2
“I have to wash the troughs once in a while because there are ... diseases which can attack the cow and accumulate when the troughs are not washed”

“It will ... cost me much when I am trying to buy other medication ... Once the animal eats the bacteria that means I have to call the vet people so that they view the animal and recommend the medication.”

Participant 1

Utensils, materials and equipment

“[This is] where I am placing the water for the cow. I used to have a bigger bucket for the cow but right now because I am also paying school fees for my children I can’t manage to afford a bigger bucket”

“I don’t have enough money to build a good water trough”

“I have to hold this bucket when the cow is drinking because the cow is strong”

“If I had funds I would have built a concrete trough where one side I would have been putting water and one side feed.”

Participant 11
“This depicts the problem of utensils used for cleaning. I can’t carry the dung with my bare hands because it’s just so much. We also have maybe no buckets to carry the dung and put it in a good area. My husband has an old shovel which we just use, but it has stayed for a long time so it is almost breaking down.”

“If I had money I would have bought a wheelbarrow and a shovel to carry the manure. Because if I was using a wheelbarrow and a shovel it would have just been one trip to carry the manure. Since we are carrying it little by little it’s time consuming.”

Participant 10

“This is my grandchild ... giving the water to the cow.”

“She is using a pot to feed the cow with water. That’s not recommended ... the cow is supposed to have a trough where there is one side water, and one side feed.”

“These are the utensils I bought for my household, I did not buy them for the cows.”

“This problem is here due to finances. Instead of servicing the trough I am using the household pot”

Participant 3
“This cattle house has been there for a while so it has fallen on one side due to rains”

“If the cow was in the house it would have also injured the cow which would have cost me more money to service the cattle house and again to service the animal”

“the main problem here is the finances because ... I am failing to maintain the cattle house so it’s a really big problem because like I said the cow can also be injured. It can also invite diseases because the animal will be exposed to rain and other things.”

“I need to service this cattle house with money”
Participant 1

“This is the outlook of the cattle house. What I am trying to describe here is the floor. I have tried to roof it with iron sheets but the floor is very poor and these posts that are supporting the whole house - they are really weak and they are very old, they are almost falling off.”

“When this floor is wet it gets muddy but maybe when I create a concrete floor down here it would be very good and suitable for the cows.”

“If I had money I would immediately have made a concrete floor. Without money it’s very difficult for me to address the problem of the floor.”
Participant 11
“I am cleaning the cattle house so all the dung ... [is] removed ... and carried outside to a far away place”

“For the animals to be healthy the house where the animals are kept needs to be clean each and every time so that I prevent diseases and other problems ... I am cleaning for both, for us [the humans] for our health and for the animal’s health as well”

“Because I am living in the same compound with the animal so there is a really great need to clean the place”

Participant 4

“I am cleaning the cattle house to prevent sickness to the animals.”

“This has to be cleaned three times a day since I am also feeding the animal inside the house. I have to clean before I feed the animal every time.”

“There is a danger that if I don’t clean the animal will catch diseases which will cost me more money than this.”

Participant 5
“On the picture I am trying to show that I get water from a far place. So I have carried water from a long way, maybe from several kilometres”

“It is time-consuming because I have to stop most of the household chores just to collect water and come back. Sometimes I have to make several rounds.”

“This problem can be solved by finding someone to make a well. Somewhere to get fresh water which is near the cow so I don’t have to travel for the water.”

Participant 7

“It's me, I am coming from a river where I have fetched some water for the cow. The river is far away.”

“I am forced to leave the water for the cow and then start again the journey to go and get another bucket of water. Once the cow finishes and it is not satisfied it will start again to make noise or it will start disturbing me”

“Because we are not near a source of water so I have to go all the way to where the water is and then fetch some water. I go 4 times a day with that bucket to get water”

“This problem can be solved by digging a well around or near the house so I don’t have to go that long distance.”

Participant 6
“These two children are the grandchildren. They were assisting me with the grasses which I have already fetched from the farm. They are carrying the grasses to here so they can chop them because the cows do not just eat directly. They have to chop them into smaller pieces so that the cow feeds on them.”

“It’s really difficult for me to find someone to assist plus it really collides with other activities. There is a conflict since I also sometimes have to cook, I also have to go and fetch the feeds for the cows.”

“At this point I can’t really hire an assistant because the output of milk is very low.”

Participant 12

“It is the assistant and one child, my sister’s child, the one I am living with.”

“The picture explains that I am sick because these two normally do not work.”

“That problem relates to my life in a way that ... it is like I am forcing the child to work when she is not even supposed to work and ... maybe the chores are too much for her.”

“[it] brings a burden on both of them.”

Participant 2
“Low output of milk. As we can see on the photo the milk is way down.”

“The problem exists because they can’t feed the cows very well. There is a product called Dairymash. Once the cow feeds on that it can maybe fill this bucket with milk.”

“For me to deal with this problem the cow needs to be fed a balanced diet ... includ[ing] the Dairymash, groundnut residues, minerals, maize residues ... the cow could produce more and better quality milk which can also maybe improve my finances as well.”

Participant 3

“On that photo I am showing that I am milking the cow in order maybe to gain some money and I am also trying to gain money so that the cow is fed on a nutritious diet so that it is producing more [milk]. Gaining income can help with several activities in the household.”

“The production of milk is really very low so there is a difficult problem there as the amount of money I get is very small so I have to buy nutritious feeds and educate the children from there and also have maybe to buy some food for the house ... It [the milk] is my only source of income.”

Participant 5
APPENDIX 9: Group Discussion focus poster
APPENDIX 10: Verbal debrief transcript

Using Photovoice to investigate the challenges facing women dairy farmers in Likuni district, Malawi

VERBAL DEBRIEF TRANSCRIPT
To be delivered verbally to participants at the end of the second group discussion. All content will be translated into local language by the translator.

- “Thank you very much for participating in this study. I am really grateful for the time you have given up taking photos and talking to me.
- This study was to find out the main challenges facing you as dairy farmers.
- Your participant number is what I will use when I use your photos or quotes from our conversations in my report.
- All photos and recordings of conversations will be stored by me on a computer where nobody else can see or hear them and they won’t be shared with anyone else.
- If you decide after now that you want me to take your information out of the study, or if you would like more information about the results of this study you can contact me via [Named key informant].
- If you have any questions about the study you can ask me now or later in private.

Thank you!”
APPENDIX 11: List of codes and example of thematic analysis

<table>
<thead>
<tr>
<th>Broad theme</th>
<th>Subtheme</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TICKS</strong></td>
<td>Disease</td>
<td>TD</td>
</tr>
<tr>
<td></td>
<td>Tick Acaricide</td>
<td>TA</td>
</tr>
<tr>
<td></td>
<td>Animal(s) grazed at risk of ticks</td>
<td>TG</td>
</tr>
<tr>
<td><strong>DISEASE, INJURY AND MEDICATION</strong></td>
<td>Diseases spread to humans from cattle</td>
<td>DH</td>
</tr>
<tr>
<td></td>
<td>Disease in cattle from bad/rotten food</td>
<td>DF</td>
</tr>
<tr>
<td></td>
<td>Cost of vets</td>
<td>DV</td>
</tr>
<tr>
<td></td>
<td>Cost of medication</td>
<td>DM</td>
</tr>
<tr>
<td></td>
<td>Disease leading to low income</td>
<td>DLI</td>
</tr>
<tr>
<td><strong>CATTLE HOUSING CLEANLINESS</strong></td>
<td>Cleaning troughs</td>
<td>CT</td>
</tr>
<tr>
<td></td>
<td>Cleaning the cattle housing to prevent cattle disease</td>
<td>CD</td>
</tr>
<tr>
<td></td>
<td>Humans sharing the compound with cattle</td>
<td>CS</td>
</tr>
<tr>
<td></td>
<td>Manure removal</td>
<td>CMR</td>
</tr>
<tr>
<td></td>
<td>Cleaning is time consuming</td>
<td>Ctime</td>
</tr>
<tr>
<td><strong>CATTLE HOUSING MAINTENANCE</strong></td>
<td>Maintaining roofs and walls</td>
<td>HMR/W</td>
</tr>
<tr>
<td></td>
<td>Weather leading to extra need for maintenance</td>
<td>HMW</td>
</tr>
<tr>
<td></td>
<td>Poor maintenance leading to disease and injury of cattle</td>
<td>HMD/I</td>
</tr>
<tr>
<td></td>
<td>Milking stall maintenance</td>
<td>HMMP</td>
</tr>
<tr>
<td></td>
<td>Maintaining posts of cattle housing</td>
<td>HMP</td>
</tr>
<tr>
<td><strong>FEEDING</strong></td>
<td>Costs</td>
<td>FC</td>
</tr>
<tr>
<td></td>
<td>Travelling to buy feeds</td>
<td>FTTB</td>
</tr>
<tr>
<td></td>
<td>Transporting feed (on a bicycle)</td>
<td>FT</td>
</tr>
<tr>
<td></td>
<td>Owning adequate land to grow enough grass to feed</td>
<td>FLS</td>
</tr>
<tr>
<td></td>
<td>Feeding a variety for quality milk</td>
<td>FVM</td>
</tr>
<tr>
<td></td>
<td>Seasonality of grass growth leading to extra costs of purchased feed in the dry season</td>
<td>FSG</td>
</tr>
<tr>
<td></td>
<td>Dirty feed bringing in disease</td>
<td>FD</td>
</tr>
<tr>
<td></td>
<td>Feed storage</td>
<td>FS</td>
</tr>
<tr>
<td></td>
<td>Travelling to collect grass from far away pasture</td>
<td>FPP</td>
</tr>
<tr>
<td></td>
<td>Ox-Cart to ease transportation of a large quantity of feed</td>
<td>OC</td>
</tr>
<tr>
<td><strong>UTENSILS, MATERIALS AND EQUIPMENT</strong></td>
<td>Owning a two-compartment trough</td>
<td>UT</td>
</tr>
<tr>
<td></td>
<td>Sharing utensils and equipment with the household</td>
<td>Ush</td>
</tr>
<tr>
<td></td>
<td>Having a concrete floor in cattle housing</td>
<td>UCF</td>
</tr>
<tr>
<td></td>
<td>Utensils for preparing feed (chopping grass)</td>
<td>UFP</td>
</tr>
<tr>
<td></td>
<td>Lighting in the milking stall</td>
<td>UMPL</td>
</tr>
<tr>
<td></td>
<td>Affording expensive building materials</td>
<td>UBM</td>
</tr>
</tbody>
</table>
Interview contents – Image 1.51

I: What do you see here, What is happening in this photo?

R: She is explaining that on this pic it is her, she is trying to wash the trough. There are two areas on the trough, the first one is where the cow drinks water, the second is where the cow feeds. So she has to wash the troughs once in a while because there are also diseases which can attack the cow and accumulate when the troughs are not washed and then it can be eaten by the cow together or on the skin.

I: What challenge does this represent?

R: Cleaning the trough to protect my cows from diseases which they can eat and drink

I: How does this relate to your life?

R: She is saying that it is affecting her life because when she does not clean the troughs that means that when the animal gets sick it is the only source of income that she is getting from the cow so when the cow gets sick there is nothing else to provide the income.

I: Why does this problem exist?
R: She is saying that she **cleans the trough** once in a while because there are bacteria in the water. When the bacteria **accumulate they are eaten with the animal**. So it will also cost her much when she is **trying to buy other medication** for the animal to drink. So for preventing that she is just cleaning the trough so that the animal gets clean water and clean food.

**I: What can we do about it?**

R: Dealing with the problem there are two kinds: Once the animal **eats the bacteria** that means she **has to call the vet** people so that they view the animal and recommend the medication. But another way to solve it is that she can continue **cleaning the trough** nice and neatly so that the animals are eating on a clean place and **do not develop diseases**

If a theme appeared twice in relation to one photograph, it was only counted once. Total themes from discussion of this photograph: CT, CD, MOI, DLI, FD, DM, DV
APPENDIX 12: Profile of participants from the household survey

Socioeconomic profile of participants

<table>
<thead>
<tr>
<th>Participant number</th>
<th>Age</th>
<th>Number of children</th>
<th>F/M headed household</th>
<th>Land owned (acres)</th>
<th>Income from milk (MWK/month)</th>
<th>Other sources of income</th>
<th>Number of cattle owned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>6</td>
<td>F (widow)</td>
<td>1.5</td>
<td>68,000</td>
<td>Grocery store, Fruit farming</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>49</td>
<td>5</td>
<td>Neither</td>
<td>1.5</td>
<td>20,000</td>
<td>Maize, Groundnut and soyabean farming</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>64</td>
<td>5</td>
<td>M</td>
<td>3.5</td>
<td>45,000</td>
<td>Renting property</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>60</td>
<td>6</td>
<td>F (widow)</td>
<td>2.5</td>
<td>37,000</td>
<td>Renting property</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>35</td>
<td>6</td>
<td>M</td>
<td>1</td>
<td>No data*</td>
<td>None</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>43</td>
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<td>M</td>
<td>2</td>
<td>60,000</td>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>45</td>
<td>5</td>
<td>M</td>
<td>10</td>
<td>120,000</td>
<td>Maize farming</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>45</td>
<td>4</td>
<td>M</td>
<td>3</td>
<td>52,000</td>
<td>House help</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>68</td>
<td>8</td>
<td>M</td>
<td>2</td>
<td>No data*</td>
<td>Maize farming</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
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* Participants 5 and 9 were unable to give an estimate for their monthly income from milk sales. The average has been calculated from available data from the remaining ten participants
The spread of the ages of participants

The number of children per participant
Monthly income from milk sales

![Bar chart showing income from milk sales]

Daily cattle husbandry activities

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<td>Methods of feeding grasses</td>
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<td>Pasture grazing</td>
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<td>Average amount of milk collected (l/day)</td>
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<td>Range in amount of milk collected (l/day)</td>
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APPENDIX 13: Theme quantification and ranking

The number of times each participant mentioned each theme

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<th>Cattle Housing Maintenance</th>
<th>Feeding</th>
<th>Utensils and Equipment</th>
<th>Low Income</th>
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Method 1 ranking

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