Smallholder dairy farmers participation in milk markets in Sri Lanka: A livelihood analysis

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Thenuwara Acharige Nadeesha Jayasena

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Abstract

Commercial dairy farming is regarded as a promising mechanism through which rural poverty can be alleviated in Sri Lanka, and in many other developing countries around the world. The Sri Lankan Government has implemented and supported multiple dairy development programmes since 2010 aimed at strengthening smallholder dairy farmers and enhancing their participation in the formal milk market. Previous research has examined different aspects of smallholder dairying, including production practices, milk market participation and the impact of commercial dairying on livelihoods. So far, smallholder market participation studies have shown mixed results with the benefits of market participation seeming to favour some smallholder farmers over others. Little research, in either Sri Lanka or other developing countries, has explored in-depth smallholders' dairy commercial activities in relation to the multiple livelihood activities farmers pursue and their overall asset portfolio. Using a livelihoods lens and the concept of livelihood pathways, this study extends knowledge of how smallholders engage in both formal and informal commercial dairying and why they engage in the way they do. Uniquely this is explored both at one point in time and over smallholders dairying history. In addition, this study adds to knowledge on the significance of commercial dairying in smallholders' livelihoods.

Smallholders' milk selling varied in terms of regularity of selling throughout the year, consistency of volume sold, and type of market participated in the most. Differences across informal and formal milk markets, diversity of smallholders' circumstances and livelihood factors shaped three distinct patterns of milk production and selling. Smallholders endowed with a high level of all five assets, with diversified income activities including multiple stable income sources and a weak adherence to traditional social norms, participated in milk markets regularly, delivering relatively large, consistent volumes of milk. These smallholders dominated both formal and informal markets and their overall commercial dairy trajectories were relatively stable over time. In contrast, resource-constrained smallholders had the least diversified portfolio with seasonal livelihood activities and a strong adherence to social norms, sold milk irregularly in the market. The volumes they delivered to the market were low and variable, and they relied heavily on informal selling. These smallholders' dairy trajectories were vulnerable, they were locked-in to low production and low-volume selling and were characterised by a lack of resilience in the face of unexpected shocks. Those smallholders falling in between the well off and poorly endowed smallholders showed a higher level of diversity in milk-market participation when their selling pattern was examined within a year.

Half of middle smallholders delivered the majority of milk to the formal market regularly, in large and consistent volumes, while the other half sold milk seasonally, in low and variable volumes, mostly to the informal market. Moderately resource-endowed smallholders had fluctuating commercial dairy trajectories which are relatively more dynamic than the stable and vulnerable trajectories in terms of production and selling. They are the smallholders who frequently move between the formal and informal markets. In general, fluctuating trajectories are marked by a moderate amount of formal market participation, as well as a moderate level of regularity and consistency in selling volumes. The comprehension of moderately endowed smallholders cannot be grasped by examining a static form of their commercial dairying, as this study has demonstrated.

This research highlights that synergy across five asset types, and complementarity between livelihood activities, increases livelihood resilience and facilitates smallholder milk-market participation. In Sri Lanka social norms influence market participation by shaping how smallholders use dairy-related assets and the priority they place on the selling of milk relative to other social and cultural functions.

This research showed that resource-endowed smallholders were less dependent on milk-selling as they had other stable income sources for living. However, milk-selling was highly significant for resource-constrained smallholders due to the uncertainty of their income sources. Based on key findings, this research argues that development policies related to dairy commercialization need to account for the diversity of smallholder dairy farmers. Likewise, linking smallholders to the formal market may require different interventions aimed at changing the individual farmer's attitudes and values related to dairying and making them capable of dealing with formal institutions in the formal market by supporting the enhancement of their overall asset portfolio. Finally, this study emphasises the importance of taking into account context-specific factors such as dairying cultural embeddedness, the availability of multiple markets, and smallholder dairy trajectories when developing policies and development interventions aimed at reducing poverty through increased milk market participation.

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List of Acronyms

DAPH	Department of Animal Production and Health
DCS	Department of Census and Statistics
DFID	Department for International Development
DS	Divisional secretariat
FAO	Food and Agriculture Organization
GND	Grama Niladhari Divisions
LKR	Sri Lankan Rupees
NGO	Non-governmental organization
SLF	Sustainable livelihoods framework
SNF	Solid Non Fat
USD	US Dollars

1. INTRODUCTION

1.1 Introduction

Dairying is emerging as an important component of the Sri Lankan agriculture sector. The Government and other development agencies in the country are interested in the development and commercialization of smallholder dairying as a pathway to alleviate smallholder poverty in rural areas. Despite many initiatives having been implemented, there remains a lack of knowledge about how smallholders engage in commercial dairying and why they engage as they do. This research focuses on Sri Lankan smallholder commercial dairying and aims ultimately to inform enhanced efforts to assist smallholders out of poverty through market-based development initiatives.

The research was completed using a qualitative case study design based on data collected primarily through semi-structured interviews with a diversity of smallholders and key informants. Theoretically, the research is framed by a livelihoods approach with focus on the practices of smallholders at the point of data collection and the trajectories through which they have moved over their dairying history. The research captures both the diversity and interconnected richness of the smallholders' livelihoods which include dairying and selling milk, and also the consistent patterns of smallholders' livelihoods, circumstances, social and cultural relationships, and their engagement in the milk markets which exist in their area.

The thesis comprises seven chapters. This chapter introduces the study by first describing the research context including the status of rural poverty in Sri Lanka. A brief overview of dairy farming and dairy development and commercialization initiatives in Sri Lanka is then presented highlighting the research gap this research sought to fill. Next, the aim of the study, research questions and objectives of the research are presented, and the chapter concludes with a description of the thesis structure.

1.2 Research context: Sri Lanka

Sri Lanka is a South Asian country located between 5^{o} 55' and 9^{o} 50' north latitude and between 79^{o} 31' and 81^{o} 53' east longitude with a total area of 65,610 Km^2 (Central Bank, 2018) (Figure 1.1). Sri Lanka is divided into five administrative levels: national (country), provincial, district, divisional secretariate and Grama Niladhari Divisions (GNDs), which function under a centralized system (Ramasamy, 2020). At the second and third levels of

administration, the country is divided into nine provinces and 25 districts, and then districts are further divided into several divisional secretariats which comprise a number of GNDs.

Being an island surrounded by the Indian Ocean, Sri Lanka experiences a tropical climate characterised by year-round hot temperatures. In terms of topography, the country is characterised by a flat coastal belt and a mountainous range in the southern central part (Central highlands). The country has clearly distinguishable dry and wet seasons resulting from a pattern of monsoon rains. However, depending on the geographical location, different parts of the country show diverse climatic conditions.

Many parts of Sri Lanka have favourable agro-climatic conditions to carry out different agricultural activities including dairying. The country is divided into three climatic zones as wet, intermediate and dry based on differences in rainfall, soil type, agricultural land use and vegetation type (Department of Agriculture, 2021b). The wet zone covers the southwestern region including the western slope of the central hills and receives more than 2500mm of average annual rainfall. Northern and eastern parts of the country fall in the dry zone which experiences a predominant dry season from May to September. Annual rainfall of the dry zone is recorded as less than 1750mm. The intermediate zone lies between wet and dry zones. This means annual rainfall ranges from 1750mm to 2500mm. The average annual temperature of Sri Lanka ranges from 27^{o}C in the low land to 16^{o}C in the central highlands (Department of Meteorology, 2021). Three climatic zones in the country are further sub-divided into 46 agro-ecological zones based on uniformity of terrain, predominant soil type, rainfall regime, land-use pattern, vegetation and expected dryness for the convenience of agricultural activities (Department of Agriculture, 2021a).

Sri Lanka is a culturally diverse country with a total population of 21, 444 million (Central Bank, 2018). The population density of the country was reported as 342 persons per square kilometre (Central Bank, 2018). The last census of population and housing survey carried out by the Department of Census and Statistics (DCS) in Sri Lanka reported approximately 77% of the total population resides in rural areas (Department of Census and Statistics, 2012). Major ethnic groups in Sri Lanka consist of Sinhalese, Tamil (Indian and Sri Lankan Tamils) and Moor. The majority of the population is Sinhalese. Buddhism is the religion with which most Sinhalese are affiliated. The religion of minorities includes Hinduism, Islam and Christianity.

Figure 1.1: Map of Sri Lanka.
Sources: (OnTheWorldMap, 2021) and (WorldAtlas, 2021)

Rural poverty in Sri Lanka

Sri Lanka's development is challenged by poverty, as it is in many other developing countries around the world. Poverty status in the country is expressed based on monetary poverty and multidimensional poverty. In terms of monetary poverty, a person whose per capita monthly real expenditure is less than the official poverty line is considered poor[1]. Data from the last household income and expenditure survey in 2016 revealed rural areas contributed to more than 80% of the total poverty (monetary) in the country. Complementing monetary poverty measures, the multidimensional poverty index (MPI) provides comprehensive information on the poverty status. According to the DSC, MPI reflects the deprivations experienced by a person with respect to education, health and living standards. As the latest statistics show, one out of every six people in Sri Lanka were multidimensionally poor. Among the rural population, it was estimated that more than eight out of every ten people are multidimensionally poor. It is apparent that rural areas are home to the majority of the poor population in the country.

[1] Official poverty line is defined as "real per capita expenditure per month for a person fixed at a specific welfare level with the expenditure of consumption of food and non-food items" (Department of Census and Statistics, 2016a, p. 1)

Agriculture is an important sector in rural livelihoods in Sri Lanka. Smallholder farmers who dominate the Sri Lankan agriculture sector are mainly concentrated in rural areas. However, according to the Sri Lanka Labour Force Survey, the contribution of agriculture to total employment in the country is nearly 27% (Department of Census and Statistics, 2016b). In the majority of administrative districts (16 out of 25), its contribution to employment exceeds the national average. For example, the share of agriculture employment in Galle district is approximately 32%, in Nuwara Eliya district 66% and, in Anuradhapura, is nearly 48% (Department of Census and Statistics, 2016b).

According to the Department of Census and Statistics (2009), rural areas generally have higher levels of poverty in the agriculture sector than in the non-agricultural sector. The World Bank report on poverty and welfare in Sri Lanka also mentioned that "among those poor and near-poor that are employed, a large proportion is engaged in agriculture" (Newhouse, Suarez-Becerra, & Doan, 2017, p. 43). Like many other developing countries (e.g. Vietnam, Indonesia), the Government of Sri Lanka sees agriculture as a promising pathway to rural poverty eradication, and dairying is a priority agricultural sector for poverty alleviation endeavours due to its anticipated potential to generate income and provide nutrition for the rural poor. The following section provides a brief description of the dairy sub-sector in Sri Lanka.

1.3 Overview of dairy sub-sector in Sri Lanka

Dairy is the main livestock sub-sector in Sri Lanka. Both cattle and buffalo are reared as dairy animals. In 2019, it was reported that there were 322,395 registered dairy farms operating island-wide. As reported by the Department of Animal Production and Health (2019b), the total cattle and buffalo population, including male animals and calves in the country, was reported as 1,521,060 and 472,192 respectively. The cattle population is made up of Indian crosses, European breeds and crosses and local breeds (DAPH). Local buffalo, Nili-Ravi, Murrah, Surthi and crosses are the main buffalo breeds found in Sri Lanka (Priyashantha, Ranadheera, Rasika, & Vidanarachchi, 2021).

The Sri Lankan dairy sector is dominated by smallholder farmers (Department of Animal Production and Health, 2013; Ranaweera, 2008) who mostly rear less than ten animals. Many smallholder farmers keep dairy animals in crop-livestock integrated farms where by-products of crop farming are used as inputs for livestock farming and vice versa.

In Sri Lanka, dairy management systems are categorized as extensive, semi-intensive and intensive management systems (Vidanarachchi et al., 2019). An extensive system is

characterised by free grazing, low input use, and low milk production. The intensive system mainly relies on stall-feeding, animals are provided shelter and produce relatively high average milk volume from animals (15 to 20 litres per animal per cow per day). Semi-intensive systems provide shade for animals and practice both free-grazing and stall-feeding which are the most common in the country. According to the Department of Animal Production and Health (2017), nearly 51% of farms in the country are managed as semi-intensive systems. Nearly 15% of farms in Sri Lanka use intensive management practices and 34% of farms are maintained under extensive management practices (Department of Animal Production and Health, 2017).

Sri Lanka's annual milk production in the year 2019 is reported as 447,582,303 litres. It comprised 374,015,943 litres of cow milk and 73,566,360 litres of buffalo milk (Department of Census and Statistics, 2021a). Even though the country has undertaken efforts to develop the dairy sector, current annual milk production is not sufficient for domestic requirements Ministry of Rural Economic Affairs (2015) and 61% of milk and dairy product requirements are fulfilled through imports (Department of Animal Production and Health, 2019a).

Part of the milk production in the country is used for subsistence consumption and the rest is channelled through different market channels. The milk market in Sri Lanka is categorised into formal and informal markets. This categorisation has mainly been based on the actors who operate in the markets. Accordingly, the formal market is operated by large-scale dairy processors and dairy cooperatives (e.g. Milco (Pvt) Ltd, Nestle Lanka PLC, Fonterra Brands Lanka (Pvt) Ltd, Kotmale Holdings PLC) while the informal market consists of individual customers, hotels, restaurants, small-scale private milk collectors and small-scale entrepreneurs (Hitihamu & Epasinghe, 2015; Subasinghe & Abegunawardena, 2013).

Although accurate statistics are not available, it is roughly estimated that nearly 57% of the total milk production in Sri Lanka is sold through formal marketing channels (Department of Animal Production and Health, 2019b). The rest of the milk (nearly 43%) is sold in the informal market. Quality of milk is important in formal selling, although the standards are not consistent with international standards (Vyas et al., 2020). The formal milk market generally follows a set price which is determined by the Government based on milk fat and solid non-fat content. At the time of data collection in 2018, one litre of milk was valued at Sri Lankan Rupees (LKR) 70-75 (nearly 0.4 USD) by Milco based on fat and solid non-fat content[2].

[2] The average US Dollar (USD) to Sri Lankan Rupee exchange rate in year 2018 was 162.5 (Central Bank, 2018).

In the informal market, farmers directly sell their milk to customers, small-scale dairy processors, middlemen, hotels and restaurants (Ibrahim, Staal, Daniel, & Thorpe, 1999; Vidanarachchi et al., 2019). Milk quality in the informal market is limited to determining water content based on a lactometer reading. However, milk quality is not a factor influencing the direct informal selling of milk to local consumers (neighbours). As reported by other scholars, the informal market is characterised by a comparatively high unit price paid to farmers Vidanarachchi et al. (2019) and milk price varies from district to district. In 2018, the average cow milk price in the Galle district, where the study area was located, ranged from LKR 100 to 120 per 750ml (nearly USD 0.6 to 0.7 per 750ml) in the informal market. In the same year, a pot of buffalo curd costed LKR 150 to 200 (nearly USD 0.9 to 1).

This study is interested in exploring smallholder commercial dairying activities and how and why the patterns of milk-selling has changed over time. Dairy development initiatives implemented at the macro and local levels are likely to have had an impact on the way smallholders participate in milk markets. The next section presents a summary of key dairy development and commercialization initiatives in Sri Lanka.

1.3.1 Dairy development and commercialization initiatives in Sri Lanka

According to FAO (2018), smallholder dairy development is a route out of poverty in developing countries. As in other developing countries (India, Kenya, Tanzania, Bangladesh), the Government of Sri Lanka is interested in poverty alleviation endeavours through dairy development. The most important dairy policies in Sri Lanka are set out in the development policy framework launched in 2010, the Mahinda Chinthana Vision for the Future. This dairy policy states that the dairy sector was “the priority sector for public investment” (Ministry of Finance and Planning, 2010, p. 29). One of the policy targets was to improve dairying as an economic activity to generate employment opportunities and increase family income. Some of the national strategies that are being implemented to develop the dairy sector are: genetic improvement of dairy animals; improvement of milk marketing, processing and value addition; improvement of service delivery systems; and promotion of liquid milk consumption (Ministry of Rural Economic Affairs, 2018).

The Government sector actors involved in dairy development activities include: the Department of Animal Production and Health (DAPH); the National Livestock Development Board; and Milco (Pvt) Ltd and Mahaweli Livestock Enterprise Limited. These institutions are operating under the purview and supervision of the Ministry of Rural Economic Affairs. The Government has introduced several development projects and programmes to implement the

stated policy strategies. Sri Lanka dairy development project was an initiative taken by the Government (Phase 1 in 2013, Phase 2 in 2015) to enhance the breeding programme, by importing high-yielding European crosses from Australia (Vidanarachchi et al., 2019). In parallel to animal importations, a medium-scale breeder farm was established to distribute superior quality animals to smallholder farmers. During the period of 2005 to 2013, the Government engaged in establishing 1000 dairy villages island-wide to increase smallholder dairy production and farmers' incomes (Ministry of Rural Economic Affairs, 2013). In each veterinary division[3], a quality of milk production improvement programme was carried out for smallholder farmers, with the expectation of increasing the income gained by farmers by selling milk (Ministry of Rural Economic Affairs, 2018).

The commercial-scale dairy development loan scheme was initiated in 2013 for financing dairy-related activities (e.g. purchase of farm equipment, and cows). The aim of this loan scheme was to facilitate establishing at least 1000 commercial farms with a minimum of 25 cows (Vidanarachchi et al., 2019).

Similarly, a number of non-governmental organisations, international aid agencies, and relief and development agencies are working in Sri Lanka to assist smallholder dairying. In 2017, the country received funds from the United States Department of Agriculture to implement a five-year Market Oriented Dairy Project to enhance the production of high quality milk and link farmers to formal markets. The Wanni Dairy Regeneration Initiative commenced in 2012 and provided benefits to smallholder farmers in 15 war-affected villages in northern Sri Lanka. This programme was implemented through a partnership between the national dairy company (Milco Pvt. Ltd) and international bodies (TEAR Fund, Patton Ltd, QPod Systems Ltd, New Zealand Foreign Affairs and Trade Aid Programme and World Concern Development Organization) (New Zealand Foreign Affairs and Trade, 2016). The aim of this initiative was to ensure food security by assisting smallholders to gain a sustainable income through dairying.

The Dairy Enhancement in the Eastern Province Project funded by United States Agency for International Development was implemented in selected districts within Sri Lanka. It aimed "to connect Eastern Province dairy farmers to the dairy value chain and increase economic opportunities for participating dairy farmers" (Jaufer & Baber, 2012, p. 4). Similarly, a sub-component of the dry-zone livelihood support and partnership programme, funded by the

[3] Each district in Sri Lanka has been subdivided into veterinary divisions (e.g. Galle district has 17 veterinary divisions, Kandy district has 18 veterinary divisions. Divisional veterinary offices are the main functional units of the Department of Animal Production and Health.

International Fund for Agricultural Development and implemented through the Ministry of Agriculture, aimed to develop dairying in the dry-zone area by establishing dairy farmer field schools. This project aimed to improve smallholders' income by introducing a 'stall-fed' cattle management system (Samantha, 2014).

Large-scale private sector dairy processors in Sri Lanka: Nestle Lanka PLC, Fonterra Brands Lanka (Pvt) Ltd, Kotmale Holdings PLC (Cargills), CIC dairies, are also creating opportunities for smallholders to actively participate in the milk market. Most recently, in 2011 and again in 2016, Nestle Lanka PLC launched two large dairy development programmes to boost milk production and increase the volume of milk collected from smallholders. Firstly, in 2011, the improvement of the dairy industry in the Northern and Eastern provinces was targeted by implementing a milk district model. This model created a partnership between smallholders and Nestle and generated more opportunities for smallholders to sell their milk. Following this programme, the "Kiri Govi Diriya " dairy development programme was launched by Nestle in 2016 to provide benefits to 3000 dairy farmers in terms of training and development in new technologies and management practices (Nestle Lanka PLC, 2016). Similarly, two dairy farms owned by CIC Dairies were converted to model farms where farmers can observe and learn dairy management practices to help develop their own farms as businesses (CIC Dairies, 2016).

Dairy development programmes in the country support and encourage smallholders to boost milk production for sale, rather than for their own consumption. In a context where both formal and informal milk markets exist, farmers are encouraged to participate more in formal milk selling. However, these dairy development interventions are operated in an environment where limited knowledge existed in relation to how and why smallholders participate in different milk markets and the role of dairying in their livelihoods.

In contexts like this, scholars have argued the importance of understanding the actual circumstances of smallholders to facilitate their commercial activities (Zhou, Minde, & Mtigwe, 2013). Further, it is argued that this understanding needs to acknowledge the local context where smallholders operate and give attention to smallholders' values and attitudes (Poole, Chitundu, & Msoni, 2013). Smallholder farmers are heterogeneous with different interests, capabilities and goals. This study argues that smallholders' dairy commercialization activities at a local level will be strongly affected by the way in which these farmers seek to make a living. In order to understand this, dairying needs to be situated within the multitude of livelihood activities of smallholder farmers, as dairying is only one of the ways they make a living. To date, comprehensive and in-depth analysis of Sri Lankan smallholders' commercial

dairy activities is lacking. This study has set out to understand and describe how and why smallholders engage in commercial dairying and analyse how commercial dairying contributes to their livelihood using a livelihoods approach.

1.4 Aim of the study and research question

This study aims to inform development initiatives directed at using dairying as a vehicle for alleviating poverty and livelihood vulnerability among rural smallholders in Sri Lanka. The question that frames this PhD thesis is 'how do smallholder farmers engage in commercial dairy activities in Sri Lanka, and why? The study findings will be the basis for recommendations to policymakers, relevant government institutes, NGOs and other international funding agencies to promote and facilitate market participation of smallholder dairy farmers, in order to provide pathways out of poverty.

Research Objectives

1. To explore and describe how smallholder dairy farmers engage in milk selling in the formal and informal markets in Sri Lanka and why.
2. To analyse and describe how commercial dairying contributes to the livelihoods of smallholder farmers in Sri Lanka.

1.5 Structure of the thesis

This thesis consists of seven chapters. Chapter one presents the background to the study and outlines the research question answered in this research. Chapter two presents the theoretical framework of the study and empirical literature related to smallholder commercialization is reviewed then, with particular focus given to commercial dairying. Chapter three presents the research design describing the philosophical underpinning of the study, the process of case selection, data collection, data analysis and ethical considerations. Chapter four is the case description chapter and describes the case study site and characteristics of smallholder farmers who participated in this study. Chapter five presents the results of the study relating to how smallholders engage in commercial dairy activities and the role of dairying in their livelihoods. In chapter six, the discussion chapter, key findings are discussed and the contribution to the existing literature is highlighted and explored. Chapter seven provides conclusions to the research study, future research and recommendations as to the implications of this study for development policy for smallholders in Sri Lanka.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

Commercialization of smallholder dairying is one of Sri Lanka's development strategies for rural development and poverty alleviation. In this context, the purpose of this research is to gain a better understanding of how and why smallholders engage in commercial dairying. This chapter outlines the theoretical framework used in this thesis and reviews the empirical findings that relate to the topic under investigation. This chapter is divided into ten sections. Following the introduction, in section 2.2 a critical review of literature related to the livelihoods approach is presented. Literature related to asset functions and attributes is then presented in section 2.3. Following this, in section 2.4, mainstream livelihoods studies are critiqued. As this study analyses smallholder commercial dairying both in its static and dynamic form, the concept of livelihood pathways was used in addition to the more general livelihoods approach to explore dairy trajectories. Section 2.5 thus reviews the concept of livelihood pathways and related empirical literature. Additionally, social capital emerged as important in this study facilitating understanding of the changes in smallholders' milk-selling and production activities, so this concept is reviewed in section 2.6. The section on empirical literature begins with section 2.7 reviewing how the literature has defined smallholder farmers and considers different views related to their diversity. Section 2.8 reviews research on commercialization and the definitions given for market participation and, finally, section 2.9 presents empirical literature which focuses on three specific aspects of what smallholders do: (1) the drivers of smallholders' market participation, (2) their use of different sorts of market channels, and (3) the impact of agricultural commercialization on their livelihoods. The chapter concludes with a summary of the theoretical and empirical literature.

2.2 Critical review of literature related to the livelihoods approach

In this section, the history and evolution of the livelihoods approach are summarised and then a critical review of literature related to the livelihoods approach and its relevant concept is presented.

2.2.1 History and Evolution of the Livelihoods Approach

Themes and approaches that influence rural development thinking are evolving. In the 1980s, rural development thinking was governed by the structural approach (De Haan & Zoomers, 2005; Small, 2007). This approach claims that people's actions are guided and shaped by social structures: social norms, rules and obligations (Lane, 2001). Likewise, its view on poverty is mostly concentrated on structural factors, focusing on the macro level, and paying little attention to local level individuals and families (Scoones, 2009). The practical effect of this approach on poverty alleviation has been criticised as ineffective (De Haan & Zoomers, 2005; Geiser, Müller-Böker, & Babar Shahbaz, 2011; Sakdapolrak, 2014; Scoones, 2009). This criticism brought forward the need for a more micro, actor-oriented perspective on poverty alleviation (De Haan & Zoomers, 2005; Prowse, 2010; Scoones, 2009). Therefore, taking its shape in the 1980s, the livelihoods approach emerged in the rural development arena to provide a new direction to poverty alleviation (De Haan & Zoomers, 2005; Sakdapolrak, 2014). As argued by Ellis (2000, p. 1) the livelihoods approach became a promising alternative to address rural poverty because it "potentially permits the cross-sectoral and multi-occupational character of contemporary rural livelihoods in low-income countries to be placed centre stage in efforts to reduce rural poverty". The livelihoods approach, as we know it today, became mainstream in development policies and literature in the 1990s.

Robert Chambers' (1995) work on 'poverty and livelihood' exemplifies the livelihoods approach (De Haan & Zoomers, 2005; Sakdapolrak, 2014). According to Chambers (1995), poverty needs to be viewed in relation to a whole set of deprivations without merely focusing only on low income or low consumption. Adding to this, he explains 'deprivations' as "what is needed for well-being", which includes social, spiritual, economic and political dimensions (Chambers, 1995, p. 175). Similarly, Sen's (1981) work on poverty and entitlement shaped the livelihood approach by providing insights into people's capability to access resources.

2.2.2 The Livelihoods Approach

The livelihoods approach primarily focuses on understanding complex and dynamic rural development problems from local perspectives, rather than employing a top-down approach to address the issues of rural people. Key principles of the livelihoods approach have made it a widely used analytical tool in development research. One of the prominent principles of the livelihoods approach is it focuses on people. Situating people at the centre, it emphasizes the active role of people and insists on their participation in development endeavours. This view

is further explained by Krantz (2001), stating that even the 'poorest of poors' play an active role in making their living rather than being 'passive victims'. As explained by De Haan and Zoomers (2005), the livelihoods approach does not merely focus on the livelihood outcomes people achieve. It focuses on how people draw on resources to develop their own livelihood strategies by combining a diverse set of capitals which they have at their disposal. At the same time, the livelihoods approach emphasises the value of both material (economic) and non-material livelihood outcomes for rural people (De Haan & Zoomers, 2005).

Another key feature of the livelihoods approach is it recognises heterogeneity among poor people. The approach stresses that poor people are not homogeneous, but have numerous differences, including significant disparities in their asset portfolios and power relations (De Haan & Zoomers, 2005). Identifying heterogeneity, it provides a more "decentralised and locally-responsive" approach to understanding the livelihoods of poor people and to guide the implementation of development policies (DFID, 1999b, Country-level strategies 6.2). Curry, Koczberski, Omuru, and Nailina (2007) explain how the livelihoods approach facilitates the capture of heterogeneity by acknowledging that farmers engage in diverse livelihood strategies, that they have different asset endowments and experience a variety of livelihood constraints and opportunities.

The livelihoods approach attempts to realistically understand the complex and dynamic nature of people's livelihoods and the factors which shape livelihoods. Thus, the approach stresses a holistic perspective in analysing rural livelihoods. Being holistic, the livelihoods approach views poverty as a multifaceted phenomenon which includes several aspects: low income, access to health, powerlessness, lack of social services and illiteracy and different dimensions (e.g. political, social, cultural and economic) (De la Martiniere, 2012; Krantz, 2001). It facilitates researchers to identify multiple influences on livelihoods and interrelationships between factors. Moreover, a holistic approach identifies multiple actors with whom rural people deal (e.g. private sector, government sector, people in the community), multiple livelihood strategies they pursue, and multiple livelihood outcomes they gain (DFID, 1999b). Further, a holistic perspective facilitates the application of the livelihoods approach across social groups and geographic areas (Ashley & Carney, 1999).

As explained by (De Haan & Zoomers, 2005; Prowse, 2010; Scoones, 2009) the livelihoods approach concentrates on the micro-level. However, it highlights the important relationship between the macro-level policy, institutions and rural livelihoods (DFID, 1999b; Farrington, Carney, Ashley, & Turton, 1999). Farrington et al. (1999) provide examples to explain this

point. Incidences at the micro-level (e.g. natural disasters like flooding) influence policy designs and implementation at the macro level. Likewise, policies at the macro-level impact people's access to financial and natural resources.

Notions of agency are central to the livelihoods approach. Agency refers to people's "capacity to integrate experience into their livelihood strategies and to look for outlets of aspirations, ambition and solutions to problems" (De Haan, 2012, p. 347). Agency is embodied in actors or people, "but embedded in social relations through which it can become effective" (De Haan, 2000, p. 349). Actors can influence and change the social and economic structure through their agency (De Haan, 2000, 2012). Individuals' or households' agency depends on their personal, environmental and social conditions (B. Anderson, 2012).

2.2.3 Concepts of Sustainable Livelihoods

The concept of sustainable livelihoods became a key policy concern in poverty eradication endeavours in the early 1990s (Scoones, 2009). The concept first appeared in the report of *Food 2000: Global Policies for Sustainable Agriculture*, a publication issued by the World Commission on Environment and Development (WCED, 1987), "as a way of linking socioeconomic and ecological considerations in a cohesive, policy-relevant structure" (Krantz, 2001, p. 6). As Chambers and Conway (1992, p. 5) explain "capabilities, equity and sustainability combine in the concept of sustainable livelihoods". Capabilities are defined as the ''ability to perform certain basic functions" (Chambers & Conway, 1992, p. 4). For example, some livelihood capabilities include finding livelihood opportunities and coping with stress and shocks. Equity refers to the equal distribution of assets, resources and opportunities to improve the living standards of deprived people and then eliminate discrimination against vulnerable groups (e.g. women, and minorities). Sustainability thus included environmental and social aspects. Social sustainability is when people have the "internal capacity of a livelihood to withstand outside pressure, that is, to cope with stress and shocks and retain its ability to continue and improve over time" (Krantz, 2001, p. 7). Environmental sustainability is described as the utilization of natural resources while enhancing and preserving them for the future. Accordingly, any definition of sustainable livelihoods must reflect all three aspects (Chambers & Conway, 1992).

Further expanding the Chamber's and Conway's livelihood definition, the Institute of Development Studies (IDS) presented the currently used definition for sustainable livelihoods in 1998 (Scoones, 1998, p. 5) as following;

“a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base".

2.2.4 The Sustainable Livelihoods Framework (SLF)

The White Paper on international development published by the UK Government in 1997, centred its interest on sustainable livelihoods and poverty alleviation in developing countries (Ashley & Carney, 1999; DFID, 1999b; Solesbury, 2003). As argued by Solesbury (2003) and, De Haan (2012, p. 346) the "pro-active and self-help image" of the poor created by the livelihoods approach matched well with the UK Government policy interest. This paved the way for the livelihoods approach to become the key theme in the UK development policies (De Haan & Zoomers, 2005; Sakdapolrak, 2014).

Discussions aimed at operationalizing the livelihoods approach by developing the Sustainable Livelihoods Framework (SLF) in 1998 (DFID, 1999b; Scoones, 2009). Introducing a set of new terminologies (e.g. assets, vulnerability context) to the livelihood debate, this framework provided a checklist of areas and their interrelationships which facilitate understanding of the complexities in rural livelihood and poverty (Ashley & Carney, 1999; Farrington et al., 1999; Liu & Liu, 2016). As such, the SLF focuses on access to assets, people's livelihood activities and the context where people live rather than their needs (Farrington et al., 1999; Farrington, Ramasut, & Walker, 2002). As argued by De Haan (2012), the SLF’s attention to context, vulnerability, structures and processes is fundamental for policies as it aims to identify exact areas where interventions are needed to alleviate poverty.

The DFID framework is only one of the analytical tools which facilitates the application of the livelihoods approach in practice (Carney, 2003). Other than that, different development agencies such as CARE, Oxfam and United Nations Development Programme (UNDP) have developed their own frameworks to operationalize the livelihood approach. As mentioned by Carney (2003), most of the development agencies have developed their frameworks based on the definition of livelihood given by Chambers and Conway (1992), while DFID has adopted the definition given by the IDS.

The SLF consists of five livelihood elements as vulnerability context, livelihood assets, transforming structures and processes, livelihood strategies and livelihood outcomes (DFID, 1999b; Farrington et al., 1999). The following subsections describe each element in the SLF.

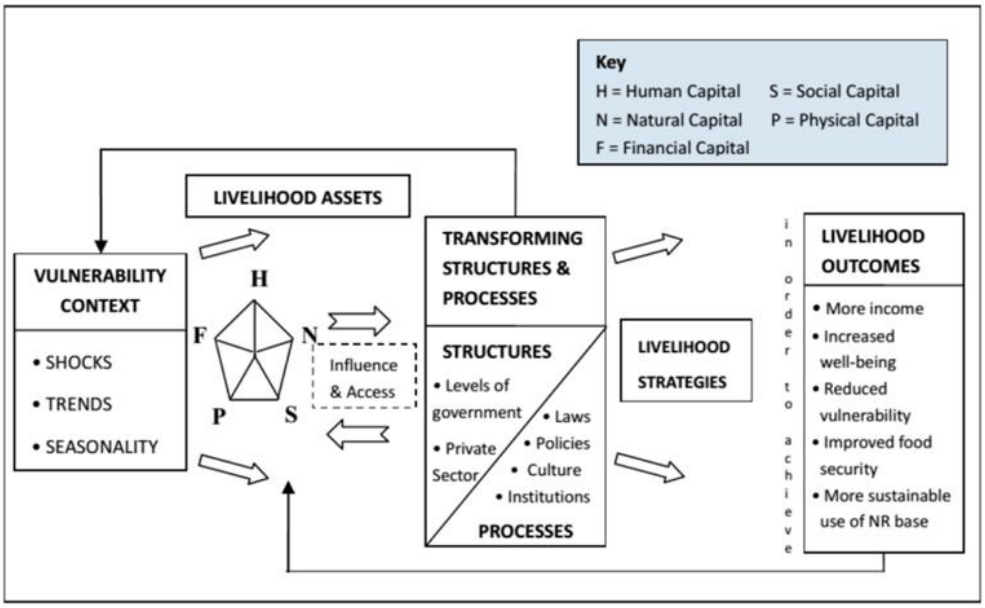

Figure 2.1: Sustainable livelihoods framework. Source: DFID (1999c)

Vulnerability context

Vulnerability context in the SLF refers to trends, shocks and seasonality in the external environment where people carry out their livelihood activities. People have little or limited control over vulnerability factors and these factors influence their asset status and the options available for them to pursue livelihood activities (DFID, 1999b). According to Serrat (2017, p. 23), "vulnerability is characterized as insecurity in the well-being of individuals, households, and communities in the face of changes in their external environment". He further explains two facets of vulnerability: external and internal. External vulnerability is created by three factors that are presented in the SLF (trends, shocks and seasonality). Internal vulnerability is when people lack the ability to cope with these external vulnerability factors (Serrat, 2017).

In the vulnerability context, trends refer to changes underway (technological, economic, demographic, environmental and governance) that could positively or negatively impact livelihoods. Shocks are unexpected and sudden burdens which impact livelihoods. People experience shocks in the form of drought, flood or diseases and so on (DFID, 1999b; Morse & McNamara, 2013). Seasonality refers to seasonal variations in prices, agricultural productions and employment opportunities.

Assets

The livelihoods approach strongly emphasises that people need five assets - human, natural, financial, physical and social capital - to make their living. Assets shape the way they engage in livelihood strategies and what livelihood outcomes they achieve (DFID, 1999b). Placing the

five assets in the core of the SLF highlights their combined significance. First, one asset on its own cannot create livelihood outcomes; people need combinations of assets to achieve their livelihood outcomes. Second, one asset can serve multiple functions for people. For example, a farmer can use land to produce agricultural products as well as pledging it to get a bank loan to address financial hardships. Third, people's assets exist in a vulnerability context and under the influence of transforming structures and processes. Their ownership and access to assets change frequently. Fourth, having more access and ownership of assets provide people with more options for different livelihood strategies and the ability to switch between them (DFID, 1999b).

The five assets or capitals that serve people's consumption and production requirements are defined as follows:

- Human capital is defined as "skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives" (DFID, 1999b, Human capital 2.3.1). Human capital available for a smallholder household is synonymous with the quantity and quality of labour.
- Natural capitals are described as "natural resource stocks from which resource flows and services (e.g. nutrient cycling, erosion protection) useful for livelihoods are derived" (DFID, 1999b, Natural capital 2.3.3). Both intangible (e.g. atmosphere) and tangible natural capital (e.g. soil, forest, water) exist.
- Physical capitals are manufactured or man-made assets which facilitate livelihood activities and comprise two components: infrastructure and producer goods. Infrastructure is created by changing the physical environment (DFID, 1999b). Examples of infrastructure are access to markets, access to information, affordable transport, water supply and sanitation, shelter and houses and affordable energy. Producer goods that are important for livelihood consist of tools and machinery.
- Financial capital exists in two forms: available stocks and regular inflow of money. People keep stocks in the form of cash savings or liquidate assets (e.g. jewellery, livestock). For example, sources of financial inflows are regular income that comes from an occupation, remittances and or pension (DFID, 1999b)
- Social capital in the SLF is described as "social resources upon which people draw in pursuit of their livelihood objectives" (DFID, 1999b, Social capital 2.3.2). As explained in the DFID guidance sheets (1999), people build up or enhance social capital through three avenues: networks and connectedness, membership in formalized groups, and relationships of trust, reciprocity and exchanges. Networks and connectedness are

referred to as “either vertical (patron/client) or horizontal (between individuals with shared interests) that increase people’s trust and ability to work together and expand their access to wider institutions, such as political or civic bodies” (DFID, 1999b, Social capital 2.3.2). Being a member of a formal group, people agree to adhere to commonly accepted norms, rules and sanctions. Relationships of trust, reciprocity and exchanges enable people to work together and assist each other and it is the foundation of informal safety nets.

As well as the terms used by DFID, the literature presents diverse definitions for each capital. For instance, Mogaka et al. (2014) pointed out that natural capital has multiple definitions. Based on the definition given by Daly (1994) for natural capital, Mogaka et al. (2014, p. 10) described it as “stock of materials that exist in the natural environment and are economically useful in production or consumption, either in their raw state or after minimal processing”. On the other hand, Wackernagel and Rees (1997, p. 4), defined natural capital as “a stock of natural assets that is capable of producing a sustainable flow” which consists of both renewable (e.g. forest, fish stock and non-renewable (e.g. minerals, fossil fuel) natural capital. Likewise, there is a lack of consensus regarding how the other livelihood assets are defined or categorized. Some scholars define livestock as a physical capital (e.g. Randolph et al., 2007) while others defined it as natural capital (e.g. Mogaka et al., 2014). The context in which a particular asset exists also influences the way people define it. As Campbell and Knowles (2011) pointed out, people in developed countries treat livestock as financial capital, whereas, for many developing countries, livestock is much more than just a financial capital as highlighted in this research.

Transforming structures and processes

Transforming structures and processes determine people’s access to capitals, livelihood opportunities, their vulnerability context, and how they achieve intended livelihood outcomes (DFID, 1999b; Farrington et al., 1999; Liu & Liu, 2016). Structures are public and private organisations that “set and implement policy and legislation, deliver services, purchase, trade and perform all manner of other functions that affect livelihoods” (DFID, 1999b, Transforming structures and processes 2.4). Processes comprise policies, legislations, institutions, culture and power relations that determine the behaviour and interactions of structures and people.

Livelihoods strategies

Livelihood strategies are the combination of activities and choices that people make to achieve livelihood outcomes. Livelihood strategies are reliant on the availability of assets, vulnerability context and structures and processes (DFID, 1999d; Diniz, Hoogstra-Klein, Kok, & Arts, 2013). The livelihoods approach emphasises that rural households engage in a multitude of livelihood strategies other than agriculture. The combination of all the livelihood activities pursued by a household are called their "livelihood portfolio" (Scoones, 1998, p. 10). Similarly, Niehof (2004, p. 323) described livelihood portfolio as "the bundle of activities households engage in to generate a livelihood and achieve a certain level of livelihood security". Portfolios are made up of both commercial and non-commercial (e.g. subsistence farming, sharing agricultural products) livelihood strategies (Adriansen, 2006; Ellis, 1998).

As many scholars have emphasised, understanding the livelihood strategies pursued by people is a key activity in rural poverty analysis aimed at enhancing livelihoods. To facilitate poverty and policy analysis and participatory work with rural people, Dorward et al. (2009, p. 241) presented a simple schema to classify livelihood strategies of rural poor "based on a holistic, dynamic, and multi-dimensional conceptualization of poverty". This schema explains how different assets and activities contribute to peoples' livelihood and variable aspirations they held in pursuing different strategies (Dorward et al., 2009). It also captures both the dynamic nature and diversity of strategies people use to achieve livelihood outcomes. Although diverse, some scholars have argued distinctive types of strategy can be discerned. Dorward et al. (2009) identify three general livelihood strategies: hanging in, stepping up, and stepping out.

- Hanging in, whereby assets are held, and activities are engaged in to maintain livelihood levels, often in the face of adverse socio-economic circumstances.
- Stepping up, whereby current activities are engaged in, with investments in assets to expand these activities, in order to increase production and income to improve livelihoods.
- Stepping out - whereby existing activities are engaged in to accumulate assets which in time can then provide a base or 'launch pad' for moving into different activities that have initial investment requirements leading to higher and/or more stable returns

  (Dorward et al., 2009, pp. 243-244)

Additionally, in a separate article Dorward (2009), acknowledges that as this framework is based on livelihood aspirations "very large number of people fail in these strategies, and 'falling down and/ or out' is all too common" (Dorward, 2009, p. 136). A number of empirical scholarly works have made additions to Dorward's schema to better explain peoples' livelihood strategies. Based on empirical findings gained from a study of livelihood change in Southern Zimbabwe from 1986 to 2006, Mushongah and Scoones (2012) added "dropping out" to describe destitute households which were characterised by a few, or no assets, that lacked social relations and were reliant on external support. Dubb (2015) added a "creeping back" category that refers to households who exited or ran through severe reductions in a particular livelihood activity and then resumed and attempted to expand the livelihood activity.

Livelihood outcomes

The SLF describes livelihood outcomes under five categories: more income, increased well-being, reduced vulnerability, improved food security and more sustainable use of the natural resource base. These livelihood outcomes are determined by the vulnerability context, the availability and access to assets, as well as the structures and processes that shape the livelihood activities people pursue (DFID, 1999b). According to the SLF, it is obvious that people's livelihood goals go beyond achieving an increased income. As argued by Carney (1998), through livelihood outcomes, the SLF aims to properly represent the actual livelihood priorities of poor people.

As the research undertaken in this thesis aims to understand how and why smallholders engage in commercial dairying as one of their livelihood activities, it is important to take into account what roles or functions their asset portfolios fulfil, how they prioritize those functions and actually use assets (e.g. cows, milk, land) in dairying. Understanding how assets function in rural livelihoods facilitates understanding the contribution these assets could make for changing livelihood strategies and reducing poverty (Kent & Dorward, 2015). It also supports policies and development interventions that aim to enhance poor people's access to assets (Dorward, Anderson, Clark, Keane, & Moguel, 2001). Therefore, the literature on asset functions and attributes is reviewed in the following section.

2.3 Asset functions and attributes

The livelihoods approach identifies assets as a key component of peoples' livelihood and its multifunctionality is well acknowledged. However, the approach has paid little attention to a detailed conceptualization of the functions and attributes of these assets (Dorward et al., 2001; Kent & Dorward, 2015). As Dorward et al. (2001, para.4) argue, a lack of sound understanding of functions and attributes limits the opportunities available to draw maximum benefits from a particular asset, given that "assets will differ in relative effectiveness with regard to each function".

Furthermore, the role of one particular asset in the same livelihood activity varies when it is undertaken by different individuals (S. Anderson, 2003; Dorward et al., 2001). Thus, mere identification of assets held by the rural poor is not enough to understand how rural livelihoods operate and how to best develop poverty alleviation interventions. To date, only a relatively small amount of scholarly work (S. Anderson, 2003; Dorward et al., 2001; Kent & Dorward, 2015; Kusakabe & Prak, 2019) has concentrated on conceptualizing and understanding the functions and attributes of assets.

An early attempt by Dorward et al. (2001), presented an initial framework conceptualizing asset functions and attributes. Taking livestock as an asset example, he identified its consumption and its productive and convertible roles. A more developed conceptual framework has been presented by Kent and Dorward (2015). This framework defines eight functions and nine attributes for tangible assets; see Tables 2.1 and 2.2. As explained by Kent and Dorward (2015), asset attributes are dependent on conditions in the environment and on what other assets are in the portfolio. Moreover, changes in attributes can influence the functions of a particular asset. The research undertaken by this thesis makes use of Kent and Dorward's framework to understand the roles of assets used in smallholders' commercial dairying.

Table 2.1: Asset functions (Kent & Dorward, 2015, p. 354)

Function	**Assets which …**
Consumption	Have a direct use value, for example direct consumption (foods) or assets used for fuel, or shelter
Exchange	Fulfil an exchange function, generating exchange value, and serving as convertible income or savings
Production	Produce new resource flows
Protection	Provide protection or insurance against shock, including spreading risks through diversification or providing a buffering function
Saving	Allow accumulation or storage of value over time
Social	Have a religious or spiritual role, or a social function, e.g. important for gift giving, or symbolic of social status

Table 2.2: Asset attributes (Kent & Dorward, 2015, p. 355)

Attributes	**Explanation**
Complementarity	Does use of this asset require other assets to achieve value? Does the use of this asset preclude the use of other assets/livelihood activities?
Convertibility	Exchange costs. How easy is it to convert this asset into cash or other investment or consumption resources?
Use costs	The costs of accessing and utilising a resource
Productivity	'Normal' productivity; sensitivity to and resilience under different conditions
Rules of access	Rights and responsibilities for access
Security	Risks to asset, future availability of resource
Risk	Risks to user. Can this asset be accessed/used without risk of harm?
Social value	Does the holding/use of this asset confer/reduce social status or other social capital? Does it contribute to identity, group belonging, heritage?
Substitutability	Can the services provided by this asset be substituted by another?

2.4 Critiques of mainstream livelihoods studies

Despite the wide application of the livelihoods approach in development research, mainstream livelihood studies have received a number of significant criticisms. One of the key criticisms focuses on the extent of people-centredness in the livelihoods approach. As argued by Kaag (2004) and Prowse (2010), overly focusing on the people themselves means that livelihood analysis over-emphasizes the actors' ability to select and strategize their livelihood activities (agency), while paying less attention to structural constraints (e.g. power relations).

Some critics have argued that people-centeredness has been undertaken too narrowly, with analyses focusing merely on how people use assets to attain economic outcomes regardless of their values, norms, attitudes and ideas (Kaag, 2004). Another criticism made by Prowse (2010) and Sakdapolrak (2014) is that the people-centeredness of livelihood studies means that households are often taken as the unit of analysis and that these tend to characterise households as overly 'unitary entities'. As such, little attention is given to intra-household

dynamics and conflicts. However, some studies have used the livelihood perspective to study gender relations and political ecology, and so have given attention to power relations and intra-household relationships (e.g. Sumner, Christie, & Boulakia, 2017). Recent livelihood studies have also shown the importance of personal perceptions and attitudes in making livelihood-related decisions such as to engage in off-farm or on-farm activities (e.g. Liu & Liu, 2016), as is explored in this research related to smallholder farmers' commercial dairy activities.

Assets are the main analytical tool used in livelihood studies to explore how people make their living. Those studies have been criticised for holding an economistic and materialistic concentration on assets (De Haan, 2012; Sakdapolrak, 2014), an approach that downplays the value of non-material aspects such as social relations and culture. Bebbington (1999), for example, points out that assets are not merely material things which people use to make a living. Assets give people the capability to act, to challenge rules governing asset usage and to generate a sense of power in society.

Some scholars have criticised the absence of a micro-macro linkage in livelihood studies (De Haan, 2000; Scoones, 2009). In reality, " livelihoods are deeply embedded in intensified local-global networks of interaction, and … global processes increasingly have ramifications that affect local livelihoods" (Sakdapolrak, 2014, p. 21). Though the livelihoods approach acknowledges the link between global processes with local livelihoods (DFID, 1999b), this link has been ignored in many studies. Most of the studies have concentrated on understanding only local level realities and wider global processes and their impact on micro-level livelihoods still needs more attention in livelihood studies (Challies & Murray, 2011; Sakdapolrak, 2014; Scoones, 2009).

Similar to spatial dynamics (micro-macro linkage), livelihood literature emphasised the need for analysing the temporal dynamics (e.g. long-term social change, role of history) of rural livelihoods as livelihood studies have paid little attention to revealing how long-term transformations occur in people's livelihoods (Sakdapolrak, 2014; Scoones, 2009; Thanh, Tschakert, & Hipsey, 2021). This claim is explained by Sakdapolrak (2014), stating that livelihood analysis has often been too 'static and ahistoric', focusing on understanding how people live at a particular point of time. A number of longitudinal studies have been published recently that explore temporal dynamics in livelihoods (e.g.Liu & Liu, 2016; Mellado, Blanco-Wells, Nahuelhual, & Saavedra, 2019; Valbuena, Groot, Mukalama, Gérard, & Tittonell, 2015).

However, there is still a call for future studies to track changes in rural livelihoods and understand related dynamics.

This thesis aims to understand smallholder commercial dairying in its static form as well as its dynamic changes over time. Special attention is given to describing and exploring the pattern of milk selling and the determinants of change. Owing to the critiques outlined above, it became important to link the livelihood perspective with the concept of livelihood pathways. The idea of pathways points analysis to an investigation of the impact of life histories, power relations and institutions in shaping the temporal dynamics of significant livelihood transitions.

2.5 The Concept of Livelihood Pathways

As explained by de Bruijn and van Dijk (2004), livelihood pathways are the result of iterative processes made by actors in response to high risk and unstable conditions. Pathways are different from strategies because a "pathway is not designed to attain a pre-set goal after a process of conscious and rational weighing-up of the actor's preferences" (de Bruijn & van Dijk, 2004, p. 346). The concept of such pathways is now widely used in the livelihood literature. According to De Haan and Zoomers (2005, p. 43), livelihood pathways are the "patterns of livelihood activities which arise from a co-ordination process among actors. This co-ordination emerges from individual strategic behaviour embedded both in a historical repertoire and in social differentiation, including power relations and institutional processes, both of which pre-structure subsequent decision-making". As further argued by De Haan and Zoomers (2005, p. 43), "pathways show that people do make their own livelihoods, but not necessarily under conditions of their own choosing". In addition, De Haan and Zoomers (2005, p. 43) propose to use the pathways' concept to understand patterns in livelihoods among particular social groups, in order to analyse individual strategic behaviour "embedded both in a historical repertoire and in social differentiation".

In an effort to understand the dynamic nature and drivers of livelihood changes, scholars have applied the pathways concept in developing country contexts (e.g. Belton, Asseldonk, & Bush, 2017; Roden, Bergmann, Ulrich, & Nüsser, 2016; Vicol, 2019). Empirical studies focused on livelihood pathways show how people develop divergent patterns of livelihoods under different circumstances and that they are shaped by multiple factors, including political factors (e.g. development interventions and policies), environmental factors (e.g. drought), norms and access to assets. For example, work by Müller-Mahn, Rettberg, and Getachew (2010) has identified two pathways developed by pastoralists. The study showed how these

pathways were rooted in historical changes in environmental and political factors. The results indicated, for example, that pastoralists' livelihood pathways were impacted by the reduction in dry-season grazing areas due to a number of development schemes implemented by the Government over time, including the establishment of irrigation schemes, commercial farms and national parks and the introduction of drought resistant plants which, later on, became a problem as they invaded wetland and indigenous grazing areas (Müller-Mahn et al., 2010).

A recent study conducted by Rietveld, van der Burg, and Groot (2020) analysed the livelihood pathways of rural-born, young men and women in order to assess whether the youth see a career in farming. This study showed how women's livelihood pathways were impacted by gender norms related to commercial farming. According to these norms, commercial farming is more a male livelihood activity than women's, due to the latters' lack of necessary physical strength. The normative expectation of the community saw women farming being subsistence agriculture and not commercial. Additionally, customary law in the community, related to rights of land and access to lands, were linked with women's livelihood pathways as it limited their access to lands important for farming.

A study carried out by Wu, Li, and Hou (2017) used mixed methods to examine the livelihood patterns of a farming community in rural China. As this study found out, under conditions of rapid urbanization and industrialization, people transformed their livelihoods from a "single and fixed farm-pastoral pattern" to "more diversified and flexible patterns" (e.g. planting oriented livelihoods, non-agriculture oriented livelihoods) (Wu et al., 2017, p. 364). Their transition was impacted by access to assets, more specifically natural, physical and human capital, and by national policies which encouraged agricultural production (Wu et al., 2017).

Overall, a comprehensive review of the livelihood literature reveals that there are a relatively small number of studies which use the concept of pathways to analyse the livelihood changes associated with smallholders' commercial agricultural activities (e.g. Belton et al., 2017; Vicol, 2019) . For example, Belton et al. (2017) use the concept of pathways to unpack the process of livelihood transition associated with commercial aquaculture production of pangasius fish in Bangladesh. According to the findings of this study, farmers developed a variety of livelihood pathways under the impact of a pangasius crop boom which was driven by increased demand in domestic markets. Belton et al. (2017) report that the pangasius crop boom led to the emergence of class differences between labourers, small-scale commercial farmers and capitalist farmers in the studied villages, reflecting, for example, including changes in land value and land-use patterns and increasing opportunities for labouring jobs in

aquaculture farms. Similarly, a study carried out by Vicol (2019) explored the implications of potato contract farming for farmers' future livelihood pathways in India. Vicol (2019) reports that the livelihood pathways associated with contract farming were conditioned by historical patterns of class differentiation and their associated differences in access to and ownership of livelihood assets.

2.6 Concept of Social capital

In this research, the concept of social capital emerged as an important factor which facilitates an understanding of changes in smallholders' milk selling and production activities. There are limitations in applying the livelihoods approach to understand the non-material aspects of peoples' livelihood. For example, as argued by Prowse (2010, p. 220) "social capital is of no analytical value as it is conceptualised in the SRL approach". Though the SLF included social capital as one of the five assets that people draw upon for living, it does not provide a comprehensive understanding of the concept as an analytical tool which can be used to understand the nuances of how people use this sort of asset in their livelihoods (e.g. see the criticisms made by Geiser et al., 2011; Prowse, 2010; Sakdapolrak, 2014; Thieme, 2006).

The concept of social capital emerged in social science through seminal work by a number of scholars, notable including Bourdieu (1986), Coleman (1988) and Putnam (Putnam, 2000; Putnam, Leonardi, & Nanetti, 1993). The widely used definition for social capital gained currency in the early 1990s with Robert Putnam's research on the arcane topic of local government in Italy (Putnam, 1995). Putnam (1995, pp. 664-665) defines social capital as those "features of social life such as networks, norms and trust that enable participants to act together more effectively to pursue shared objectives". Putnam et al. (1993, p. 173) argue that any society is "characterised by networks of interpersonal communication and exchange, both formal and informal". As such, Putnam's view on social capital mainly highlighted it as a feature of social structure (Rostila, 2011).

Networks are simply social connections among individuals (Putnam, 2000). According to Bourdieu (1986), individuals' social networks are the result of their investment strategies, which can be used either long or short term. Individuals maintain and reproduce the connections in networks through the "symbolic constitution produced by social institution" (formal and informal rules, religion) and exchanges (e.g. words, gifts) (Bourdieu, 1986, p. 250). Similarly, Coleman (1988) and Putnam (2000) also point to the benefits of networks in terms of exchanging information, sharing labour and resolving complex problems through collective

action. Networks are both horizontal and vertical structures (Putnam et al., 1993). Horizontal networks are made between individuals who have equivalent status and power. Vertical networks connect "unequal agents in asymmetric relations of hierarchy and dependence" (Putnam et al., 1993, p. 173). As Putnam observes, in reality, individuals are part of both horizontal and vertical networks.

Trust is the second main component of social capital, with powerful implications for social integration (Newton, 2001). The concept of trust has multiple definitions as it has been studied in a number of different disciplinary perspectives (Sutherland et al., 2013). For instance, "the sociological literature conceptualizes trust as either the property of individuals, the property of social relationships or the property of the social system explained with attention to behaviour based on actions and orientations at the individual level" (Misztal, 1996, p. 14). Another definition presented by Newton (2001, p. 202) defines trust as "the actor's belief that, at worst, others will not knowingly or willingly do him harm, and at best, they will act in his interest". Trustworthiness in individuals is an important determinant of obligations for reciprocity; as trust implies an obligation that should be repaid (Coleman, 1988). As Coleman (1988) further explained, trust is much more important for societies where people are highly dependent on each other to fulfil resource requirements, making every individual have a certain level of obligation to reciprocate.

The third component of social capital is norms. Norms emerge in societies as attempts are taken to minimize any negative impacts or to enhance the positive impacts of a particular course of action or behaviour (Coleman, 1988). Scholars define norms in different ways. According to Coleman (1994, p. 242), norms specify "what actions are regarded by a set of persons as proper or correct, or improper or incorrect". Norms are enforced and maintained over time through sanctions which can either be rewards and punishments (Coleman, 1994) and through modelling and socialization (Putnam et al., 1993). Similarly to Coleman, Young (2007) defines norms as customary rules of behaviour that coordinate our interactions with others. Young (2007) argues that norms shape people's obligations to close ones, determine meanings attached to words and define property rights. Other scholars have also pointed out the importance of social networks in developing and fostering social norms (Coleman, 1988; Putnam, 2000). As such, it is commonly accepted that norms emerge as a result of collective understandings reached by closely connected people in a society.

In Putnam's (1993) social capital theory, reciprocity is described as the most important norm. Reciprocity norms exist in societies in two forms, either as balanced, specific reciprocity or as

generalized, diffused reciprocity. Balanced reciprocity means the "simultaneous exchange of items of equivalent value" (Putnam et al., 1993, p. 172). Gift exchanges between office mates is a good example of balanced reciprocity. Generalized reciprocity is defined as "continuing relationships of exchange that is at any given time unrequested or imbalanced, but that involves a mutual expectation that a benefit granted now should be repaid in the future" (Putnam et al., 1993, p. 172). Reciprocity practised in friendship relationships comes under this generalized reciprocity. Comparing the two forms of reciprocity, Putnam et al. (1993) argue that generalized reciprocity which is associated with highly dense social networks is the most productive element of social capital.

Forms of Social capital

Social capital has been further categorized as structural and cognitive (Uphoff & Wijayaratna, 2000). Structural social capital comprises social networks and related rules, roles, procedures and precedents which facilitate ongoing patterns of social interactions (Uphoff & Wijayaratna, 2000). Cognitive social capital is defined as norms, attitudes, beliefs and values that enable solidarity and unity among people (Uphoff & Wijayaratna, 2000). Both categories of social capitals offer benefits for actors in terms of accessing information, finding livelihood activities and undertaking mutually beneficial collective actions (Bhandari & Yasunobu, 2009; Uphoff & Wijayaratna, 2000).

Structural social capital is conceptualized as consisting of three forms: bonding, bridging and linking (Gómez-Limón, Vera-Toscano, & Garrido-Fernández, 2014). Bonding social capital involves ties between members of a network who have similar socio-demographic characteristics (e.g. race, religion, education, age, gender). People in bonding relationships have close and firm ties and their relationships are characterised by trustworthiness and long term reciprocity (Bhandari & Yasunobu, 2009; Cofré-Bravo, Klerkx, & Engler, 2019; Thieme, 2006). Bonding social capital is described as inward-looking, protective and demanding exclusive membership (Bhandari & Yasunobu, 2009; Putnam, 2000). Bonding social capital is common among family, close friends, peers and kin.

Bridging social capital consists of "links between separated dense networks for collaboration and coordination, characterized by larger and looser networks with weaker ties" (Cofré-Bravo et al., 2019, p. 55). Bridging social capital represents relationships that are more formalised than bonding links and that have less dependence on the strong trust provided by densely cross-cutting ties (Cofré-Bravo et al., 2019; Thieme, 2006). Farmers' relationships with

frequently contacted advisory service providers (extension agents, veterinarians), close acquaintances and youth service groups are some examples of bridging social capital. This form of social capital reinforces open network membership and is outward-looking (Bhandari & Yasunobu, 2009).

Putnam's social capital theory included only the first two forms of social capital, bonding and bridging. Therefore, some scholars (e.g. Woolcock, 2001) criticised his theory as it omitted the third form, linking social capital which describes the hierarchical relationships of people. The third form, linking social capital, is defined as "norms of respect and networks of trusting relationships between people who are interacting across explicit, formal, or institutionalised power or authority gradients in society" (Cofré-Bravo et al., 2019, p. 55). Examples of linking social capital include farmers' relationships with financial institutions, agriculture research institutions and political authorities.

2.7 Smallholder farmers and their diversity

Smallholder farmers are defined context specifically based on diverse criteria (e.g. size of agriculture holding, use of household labour). In general, "smallholders are farmers operating under structural constraints such as access to sub-optimal amounts of resources, technology and markets" (Khalil, Conforti, Ergin, & Gennari, 2017, p. 7). In the literature, the size of agricultural land holdings is a commonly used criterion to define smallholders. Smallholders are farmers who operate with a limited extent of agricultural land, usually defined as one or less than two hectares (Bosc et al., 2013; Vignola et al., 2015). There are definitions found in the literature that use different dimensions to define smallholder farmers (Lowder, Skoet, & Raney, 2016; Morton, 2007). For example, referring to the definition given by Cornish in 1998, Morton (2007, p. 19680) specified that smallholders are "rural producers, predominantly in developing countries, who farm using mainly family labour and for whom the farm provides the principal source of income". While these definitions are useful, they are highly generalised. Such definitions focus on the commonalities of smallholders, thus, in effect defining them as a homogenous group.

As argued by Cousins (2010), the term 'smallholder' is problematic as it focuses only on similarity and so ignores significant differences and inequalities. Moreover, some scholars use 'family farms', or 'resource-poor farmers' interchangeably for smallholders. These terms do not give enough weight to the inequalities that divide smallholders, such as gender or income and asset endowments. Overly stressing what smallholders have in common directs attention

away from important differences in the resource usage of farming systems and the very diverse intentions of smallholders engaging in agricultural production, such as subsistence, semi-commercial or commercial undertakings. (Cousins, 2010).

Numerous approaches and theories have assumed smallholder homogeneity. For example, the transfer of technology approach commonly used in agricultural extension to diffuse agricultural technologies and knowledge has been well documented for treating smallholders as homogeneous, for failing to appreciate the complexity and diversity of individual factors (Koutsouris, 2018). Similarly, economics theory typically focuses on profit maximization, assuming that the resource and production conditions in smallholder farms are alike (Umar, 2014).

However, some scholars have criticised the conceptualization of smallholders as a homogeneous group (e.g. El Ouaamari & Cochet, 2014; Ncube, 2018; Poole et al., 2013). For example, Ncube (2018) and Poole et al. (2013) have described the great diversity of smallholders across numerous different aspects, including livelihood strategies, asset-holding, aspirations, livelihood trajectories, income, level of subsistence and market participation. As argued by these scholars, a lack of concern about smallholders' heterogeneity emphasises that they require similar support to improve their agricultural and livelihood activities (Ncube, 2018). It is also often assumed that smallholders will respond to development interventions in a similar way (El Ouaamari & Cochet, 2014; Poole et al., 2013). However, understanding smallholder livelihood activities (e.g. commercial dairying) requires paying attention to their diversity (Kamau, Stellmacher, Biber-Freudenberger, & Borgemeister, 2018). Each smallholder is unique and studying their diversity is complex (Olofsson, 2020). Scholars have often developed smallholder typologies to deal with this complexity as it both identifies smallholder diversity and organises these differences into similar sets of attributes (Kuivanen et al., 2016; Olofsson, 2020).

A number of empirical studies have explored smallholder diversity by developing typologies. For example, a study done by Kamau et al. (2018) developed a farm typology to understand the diversity of smallholders in order to facilitate the development of interventions that aim at transforming farmers from conventional into organic agriculture. The farm typology was based on a number of criteria including resource endowment, cropping practice (organic or conventional agriculture), social networks and information, and dietary diversity (Kamau et al., 2018). Similarly, in an effort to identify farm-specific constraints and opportunities, Dunjana, Zengeni, Muchaonyerwa, and Wuta (2018) developed three types of farms as

resource-endowed, commercial-oriented farms, medium resourced farms and resource constrained farms practicing subsistence and income-oriented production.

As this review of the empirical literature suggests, the sort of smallholder typology developed in research largely depends on the chosen unit of analysis (e.g. farmer, farm household, farm business) and the analytical purpose (e.g. to identify class relations, development interventions, support needs). The empirical classification criteria differ accordingly (including such attributes as landholding, livelihood strategies, type of agricultural practices, asset/resource endowment and the extent of livelihood diversification). The usefulness of typologies for the empirical analysis is well-established, and it is also clear that the classification systems used must be grounded in analytical purpose. This thesis explores the livelihood significance of commercialised smallholder dairying. This means that research on agricultural commercialization and smallholder market participation requires review.

2.8 Researching agricultural commercialization

Agricultural commercialization is a process of transformation in which farmers shift away from self-consumption-oriented subsistence food production systems to commercial systems (Pingali & Rosegrant, 1995; Zhou et al., 2013). The extensive body of literature related to agriculture commercialization has defined it in numerous ways. A commonly used definition emphasises the economics of profit maximisation. On these terms, “agricultural commercialization means more than the marketing of agricultural output, it means the product choice and input use decisions are based on the principles of profit maximization” (Pingali & Rosegrant, 1995, p. 171). Similarly, Gebremedhin and Jaleta (2012) define agricultural commercialization as an interwoven activity made up of market orientation and market participation. Market orientation is a production decision related to resource allocation, what to produce, when to produce and where to sell; this orientation is influenced by market signals and access to resources (Gebremedhin & Jaleta, 2012). Market participation denotes smallholders’ involvement in markets, both as sellers and buyers (C. B. Barrett, 2008; Musah, Bonsu, & Seini, 2014).

This thesis focuses primarily on smallholders' participation in an output market (milk) as sellers. As argued by scholars (e.g. Gebremedhin & Jaleta, 2012; Pingali & Rosegrant, 1995), market participation is a subset of agriculture commercialization. It is commonly defined, based on what fraction of agricultural output is sold in markets (Abafita, Atkinson, & Kim, 2016; Sebatta, Mugisha, Katungi, Kasharu, & Kyomugisha, 2014) Some scholars have criticised a lack of clarity in the definitions of agricultural commercialization and market participation,

with the two terms often used interchangeably as if they meant the same thing. For example, several scholars (e.g. Cazzuffi, McKay, & Perge, 2020; Omiti, Otieno, Nyanamba, & McCullough, 2009; Regasa, Negash, Eneyew, & Bane, 2019) simply conceptualized market participation on the basis of the proportion of output sold in the market and treated this proportion as synonymous with commercialization. This confusion between agricultural commercialization and market participation is partly due to the dominance of simple economic generalisations which highlight the farmers' aim of selling their production for a profit or for the accumulation of wealth. However, as argued by other scholars (Dzanku, Tsikata, & Ankrah, 2021; Leavy & Poulton, 2007) smallholder farmers' participation in output markets is typically driven more by necessity than in order to make profits. Farmers may sell part of their agricultural production to fulfil immediate cash requirements or short-term survival needs, engaging in what have been called "distress sales" (Leavy & Poulton, 2007). This research clearly suggests that smallholder market participation is a complex activity rather than a straightforward economic calculation.

2.9 Empirical literature on smallholder market participation

The empirical literature related to smallholder commercialization has extensively revolved around market participation, aiming to provide insights for development policies which uplift rural livelihoods by increasing the poor's involvement in commercial markets (Abafita et al., 2016). A review of this literature suggests scholars have studied smallholder market participation in terms of three broad aspects. One strand of the literature identifies determinants or factors that influence market participation related to diverse agricultural commodities (e.g. rice, vegetables, maize, potatoes), notably including milk in a range of different geographic regions (e.g. India, Ethiopia, Kenya, Bangladesh). A second strand of the literature identified factors that influence smallholders' decisions to participate in different market channels. A final strand of the literature analysed the impact of agricultural commercial activities on smallholders' livelihood outcomes. These three aspects are considered in more detail below.

2.9.1 Drivers of smallholders' market participation

An extensive review of the empirical literature has identified four key factors which researchers have found to determine smallholder market participation: livelihood assets, transaction costs, norms and socio-economic factors. A common and important finding shows the existence of a significant relationship between smallholder asset holdings and market

participation. High asset endowments are strongly associated with high market participation (e.g. when measured by the quantity of agricultural products sold) (da Silva Cavalcante, da Silva Medina, & Cruz, 2021; Hagos, Dibaba, Bekele, & Alemu, 2020). Low asset endowment has been shown to be a significant barrier or limitation to market participation (Birachi et al., 2011; Boughton et al., 2007). This is a fact highlighted by C. B. Barrett (2008) in his well-cited review article on smallholders' staple food grain market participation in Eastern and Southern Africa. Based on an empirical literature review of this study, the point C. B. Barrett (2008) made appears to be still relevant.

Scholars have presented a number of different arguments regarding how asset endowment facilitates market participation. First, adequate assets are needed if smallholders are to have surplus production available for the market. If farmers are constrained with assets needed for production, they will show a low level of market participation, even in the contexts where market access is good (Olwande, Smale, Mathenge, Place, & Mithöfer, 2015). Assets are pivotal, not only to improved production, but they also reduce the transaction costs related to market participation (Mmbando, Wale, & Baiyegunhi, 2015). From the resilience point of view, assets function as a buffer and facilitate farmers to mitigate and cope with the risks associated with production and selling (Hagos et al., 2020; Njeri & Kim, 2016). Having sufficient assets to cope with such risks enables smallholders to participate in markets.

Some of the market participation studies focus on the impact of selected assets (e.g. land, access to financial capital), while others considered the influence of all five types of assets identified in the sustainable livelihood framework (physical, financial, natural, social and human). For example, an econometric study carried out by da Silva Cavalcante et al. (2021) identified a significantly positive impact of human, social, financial and natural capital on the commercialization of family farms in Brazil. They argue that human and social capital are more significant for commercialization than are the other two types of assets. Similarly, applying the SLF to identify factors affecting smallholders' cattle market participation, Ndoro, Mudhara, and Chimonyo (2014) revealed that low participation in the market was explained by lack of financial, social and natural capital. Drawing on such empirical findings, some scholars recommend that improving market participation requires policies aimed at increasing smallholders' asset endowment (Boughton et al., 2007; Olwande et al., 2015). Although these studies identified the need for a variety of assets to transition from subsistence to commercial cattle farming, they do not provide an in-depth understanding of how all five types of assets interact and work together to facilitate smallholder market participation.

Social capital and its role in smallholder farmers' market participation have received attention in the literature. Many of these studies examine social capital and market participation association/ relationships related to farmers' collective action, rather than social capital at the individual farmer level (e.g. Kaganzi et al., 2009; Kibirige, 2016; Sedana, Ambarawati, & Windia, 2014). These studies found, for example, Kaganzi et al. (2009), that bonding and bridging relationships built through collective activities/groups supported farmers to access resources required for commercial activities and enabled them to access markets by meeting quantity and quality requirements. A recent study by Murugani and Thamaga-Chitja (2018) in Limpopo highlighted the pivotal role of social capital describing how farmers missed opportunities to access markets as they were reluctant to join marketing groups for reasons including wanting to retain their individual autonomy. In addition, some scholars identified high levels of trust in buyers' enhanced smallholders' market participation. For example, a study examined drivers of smallholders' participation in the Zambian dairy market through interlocked contractual agreements. The authors, Kiwanuka and Machethe (2016), identified trust in buyer-led households to deliver a larger proportion of their milk through contractual agreements with this buyer. A recent study carried out in Ethiopia also revealed similar findings in relation to trust and smallholders' participation in dairy cooperatives (Belay, 2020).

Moving beyond social capital, research suggests that smallholder asset endowment is not only a determinant of their market participation but also a factor that influences the benefits they can derive from markets. For instance, analysing smallholders' capabilities to exploit linkages to a certified coffee market, Donovan and Poole (2014) found that it was the better-endowed farmers who benefited through market participation in terms of income gain and asset accumulation. Smallholders who were least endowed with assets derived relatively fewer benefits in expanding their assets portfolio, and they struggled to make effective use of gains to enhance their livelihoods.

As well as assets, the transaction costs associated with market participation have been identified as a factor which significantly affects smallholder commercial activities. As with household assets, differences in transaction costs have been used to explain the diverse levels of smallholder market participation (C. B. Barrett, 2008; Otekunrin, Momoh, & Ayinde, 2019). Transaction costs, the observable and hidden costs of market exchanges, have been shown to act as a barrier to smallholders' market participation (Alene et al., 2008; Ismail, Srinivas, & Tundui, 2015). In simple terms, high transaction costs deter market participation and vice versa (Key, Sadoulet, & Janvry, 2000). It has been found that farmers either do not participate or reduce participation if the cost associated with transactions outweighs the value of market

participation (Osebeyo & Aye, 2014). Some of the common transaction cost factors that adversely influence market participation are the cost of transport, waiting time in the market, distance to market and the cost of sorting and processing products for sale (Macharia, Mshenga, Ngigi, Gido, & Kiprop, 2014; Musah et al., 2014). These findings have led some scholars to suggest developing infrastructure, markets and household assets in ways that reduce the impact of such transaction costs.

Research has shown that social norms are another important determinant of smallholders' market participation, though to date, this finding is not discussed widely in the market participation literature more generally. Most of the studies undertaken in this area depict norms as barriers which deter smallholders' commercial activities and limit their ability to strategically use markets for livelihood improvement (Balayar & Mazur, 2021; Laney & Turner, 2015; Tessema, Ingenbleek, & van Trijp, 2019). This viewpoint is supported by examples of various types of norms related to various aspects of livelihoods. A study conducted in Madagascar by Laney and Turner (2015) identified cultural norms related to subsistence rice production as a barrier that limits coffee and vanilla growing and prevents smallholders' transformation into fully commercial farmers. As the smallholders value subsistence farming, they devoted a considerable area of their land to rice production rather than commercial crops (Laney & Turner, 2015). Similarly, Gwiriri, Bennett, Mapiye, Marandure, and Burbi (2019) report that norms related to the cultural value and use of cattle in South African communities act as a constraint on smallholder farmers' cattle-selling. Owing to the use of young cattle in ceremonial activities, farmers delivered old animals to the market, despite the market demand for well-grown, young animals.

A small number of studies have identified and described the role of social norms in facilitating smallholders' commercial activities. According to these studies, norms sometimes reduce risk at the production phase through shared inputs such as labour (Buechler, 2009) and act as effective tools for reducing market-related costs (Priyanath, Jayasinghe, & Premaratne, 2016). For instance, a study of smallholder vegetable farmers in Sri Lanka revealed the supporting role of relational norms (norms that regulate how farmers and buyers value their relationships) in reducing transaction costs (Priyanath et al., 2016). A norm of solidarity (of treating each other fairly, committed to maintaining relationships, solving problems together by mutual assistance), for example, meant that farmers received assistance from buyers during financial hardships, something that led them to stay with a particular buyer. This norm saved the time and labour involved in searching for other possible buyers (Priyanath et al., 2016).

The review of the literature above outlines three main determinants of smallholder market participation: assets, transaction costs and norms. In addition to these major findings, a myriad of other determinants have been identified as influencing market participation, many of them focusing on the significance of farmer characteristics such as their age, gender, level of education, or marital status (e.g. Kibona & Yuejie, 2021; Musah et al., 2014). The impact of these farmer characteristics seems to be context-specific, as the available empirical evidence lacks consistency and tends to assume simple correlations between characteristics and market participation. For instance, a study carried out by Regasa et al. (2019) in Ethiopia identified age of farmers negatively influence their fruit-market participation. When farmers' age increased, their participation in the market decreased by reducing sales of fruits (Regasa et al., 2019). Different from this finding Adeoye and Adegbite (2018) found a positive and significant relationship between plantain farmers age and their market participation.

2.9.2 Smallholders' participation in different market channels

A substantial body of research focuses on understanding how and why smallholders participate in different types of markets. A number of important points have emerged from this work. First, it has been found that smallholders' participation in a particular type of market is shaped by a combination of factors, including transaction costs, farmer characteristics (e.g. age, level of education), household assets, total agricultural production and market attributes (e.g. price offered, quality standards, payment procedure, incentives). The influence of these factors on market channel choices are not consistently identified across all these studies, rather, the findings were context-specific. For example, a study of smallholder milk market participation in Kenya, Mutura, Nyairo, Mwangi, and Wambugu (2015) identified that increased land size (natural capital) and transaction costs caused reduced participation in milk cooperatives relative to farm-gate selling. On the other hand, elsewhere, increased herd size, high production volumes and the level of farmers' education have been identified as influencing the sale of milk to cooperatives (Mutura et al., 2015). Another study done by Bardhan, Sharma, and Saxena (2012) revealed that farmers with relatively large land holdings are more likely to sell to cooperatives, while those who produced higher volumes of milk sold to informal buyers as the price was attractive.

Second, a substantial amount of empirical literature highlights economic aspects (such as price, transaction cost, input supply, and incentives) as the key determinants of smallholders' participation in a specific market channel (e.g. Arinloye et al., 2015; Umberger, Reardon, Stringer, & Mueller Loose, 2015). This literature tends to assume that smallholder farmers'

market participation decisions are made on the basis of maximizing their utility. If the benefits derived by farmers are greater than the cost associated with participating in a particular market, they will select that market. This sort of research fails to capture the role of non-economic factors in shaping smallholders' participation in particular market channels. To date, only a limited number of studies highlight the significance of such non-economic factors (Fischer & Wollni, 2018; Gelaw, Speelman, & Van Huylenbroeck, 2016; Ola & Menapace, 2020). For example, Gelaw et al. (2016) identified that trustworthiness and dependability (whether the trader is willing to help farmers in social or economic crises of traders) are important factors that encourage farmers to sell their coffee in local markets, irrespective of the price differentials in offer.

2.9.3 Impact of agricultural commercialization on smallholders' livelihoods

A significant number of studies have analysed how the commercialization of a variety of agricultural commodities (e.g. maize, milk, cash crops) affects smallholders' livelihood outcomes (e.g. household income, dietary diversity). The empirical results are mixed. There is some evidence supporting the strong argument often made by development authorities that commercialization is a pathway to improve rural livelihoods and alleviate poverty. For example, studies analysing the impact of crop commercialization on farm income have found that commercialized households achieved higher income than did non-commercialized households (Ochieng, Knerr, Owuor, & Ouma, 2020; Opondo & Owuor, 2018). Similarly, Ogutu and Qaim (2019) found that selling agricultural production (crop and livestock) contributed to a reduction in income poverty and in multidimensional poverty (i.e. in terms of education, nutrition and health). However, these studies of commercialization's positive impact tend to concentrate on single commodities and have paid little attention to understanding the dependency of smallholders on a particular commercial activity in relation to their other diverse income activities, a critical factor in terms of their livelihoods as a whole.

Contrary to the more positive accounts outlined above, the empirical findings reported by some studies suggest that there is little evidence to prove that commercialization significantly reduces rural poverty (e.g. Carletto, Corral, & Guelfi, 2017; Mitiku & Bely, 2014). Indeed, some scholars, such as Poole et al. (2013) and von Braun (1995), have strongly criticised the impact of smallholder commercialization. They argue that commercialization increases the risk of smallholder farming through increased market exposure. Supporting this argument, Gwiriri, Bennett, Mapiye, and Burbi (2021) present empirical evidence showing how smallholder cattle farmers became vulnerable in the process of their transition to becoming the

commercial farmers favoured by agrarian reforms. The investment of large amounts of financial capital (savings and loans) in commercial activities made some smallholders vulnerable to market failure and price volatility (Gwiriri et al., 2021).

Rather than uniformly beneficial, the impacts of commercialization vary depending on the policy environment and local context (Cazzuffi, McKay, & Perge, 2018; von Braun, 1995). Commercialization has been shown to increase inequalities among smallholders (Poole et al., 2013). For instance, in a study of the commercialization of smallholder crop farmers and multidimensional poverty, Ogutu and Qaim (2019) found significant inequalities in the income gained by rich and poor farmers selling their agricultural products. Rich farmers' absolute income gain from commercial activities was higher than that of poor farmers, intensifying already existing inequalities rather than alleviating the situation of the poor. Similarly, an empirical study of the commercialization of Acacia timber by Tham, Darr, and Pretzsch (2020) revealed that better-off farmers received more benefits from timber production than did poor farmers. However, as also argued by Zhou et al. (2013), debates on the validity and importance of smallholder commercialization is inclined to stress more the positive impacts and many governments including the Sri Lankan Government, development agencies and NGOs seek to strengthen commercialization to uplift rural livelihood and alleviate poverty.

2.10 Positioning this Research Theoretically

The study of livelihoods is both well-advanced and ongoing in development literature. This study uses a livelihood lens to investigate how and why smallholder dairy farmers in Sri Lanka engage in commercial dairying in the way they do. The livelihoods approach enables the researcher to view smallholders' livelihood portfolios holistically and explore commercial dairy activities taking into account how smallholders draw on all five assets and the inter-relationships dairying has with other livelihood activities. As this research aims to explore commercial dairying both in its static and dynamic forms, the livelihood perspective is linked with the concept of livelihood pathways. This enables an exploration of the existing pattern of commercial dairying activities in relation to historical changes associated with smallholders' livelihoods (e.g. changes in informal institutions, and social relationships). Mainstream livelihood research has received criticism, including the lack of attention given to values, norms and attitudes and downplaying the role of social capital in analysing livelihood activities. Additionally, also limited are studies that investigate livelihood changes and related dynamics. Although recent studies attempt to fill these research gaps, there remains a call for

research that explores peoples' livelihoods to expand the understanding of the importance of norms, social capital and temporal dynamics, as will be considered in this research.

As the empirical literature reviewed in this chapter illustrates, the analysis of commercialization is dominated by a narrowly economic approach, one that typically relies on broad-brush quantitative statistics and pays relatively little attention to an in-depth analysis of how and why smallholders engage in commercial activities. Most of these studies rely on a simple, static comparison of before and after scenarios. As some scholars have argued, however, a realistic understanding of commercialization requires the detailed investigation of changes in production and selling patterns that occur more continuously and episodically over time (Jaleta, Gebremedhin, & Hoekstra, 2009; Olwande et al., 2015). As previous research indicates the extent of inter-relationships between assets, smallholders' ability to use them and individual social capital and norms shape market participation. However, these areas have received little attention in previous research on smallholder commercialization but are a focus of this study.

The following chapter turns to the method used to undertake this research.

3 METHODOLOGY

3.1 Introduction

This chapter presents the research design used for this study of how and why smallholders engage in commercial dairying in Sri Lanka. While the previous two chapters have considered relevant theoretical and empirical literature, here, attention turns directly to the methods used to answer the research question. The chapter begins with an account of the study's general philosophical underpinning, and then turns to outline the research strategy, case selection, data collection process and data analysis methods respectively.

3.2 Philosophical underpinning of the study

A philosophical orientation, or research paradigm, reflects a set of beliefs a researcher holds about the world in which he or she lives. The paradigm guides the research process, including how the research questions are framed, selecting a methodology and how the results are interpreted (Kivunja & Kuyini, 2017). Khatri (2020, p. 1438) describes a research paradigm as the "philosophical base of research dealing with the nature of reality, whether it is external or internal (i.e. ontology); the nature, type and sources of knowledge generation (i.e. epistemology); a disciplined approach to generate that knowledge (i.e. methodology); and the ethical issues that need to be considered in research (i.e. axiology)".

The literature has identified a number of different research paradigms: positivist (and postpositivist), constructivist, interpretivist, transformative, emancipatory, critical pragmatism and deconstructivism. Each paradigm stands on different sets of beliefs. This study is underpinned by the constructivist-interpretivist paradigm as it has been judged the most appropriate for the research question. This paradigm focuses attention on how smallholder farmers actively construct their world, including the role played by commercial dairying activities.

A researcher working in a constructivist-interpretivist paradigm believes that people construct the social world in which they live together and this means these worlds are plural - reality exists in multiple forms (Kivunja & Kuyini, 2017). The paradigm attaches great importance to the local context and demands close interpersonal interaction between the researcher and participants in order to construct a pattern of meaning for the collected data (Levers, 2013; Mackenzie & Knipe, 2006). These general principles offer useful guidelines for this study, which focuses on how and why smallholders practice and make sense of commercial dairying.

The answers to these questions are the interpretations of the researcher which are based on the farmers' own understandings within their local context. Although constructivist research follows relevant theoretical guidelines, it does not start with a specific theory and set of hypotheses (Kivunja & Kuyini, 2017). Typically, the approach relies on qualitative methodologies though, in some cases, researchers use both qualitative and quantitative methodologies (Mackenzie & Knipe, 2006). The open-ended character of constructivism makes it well suited for the research question and the strategies to be used to answer it.

3.2.1 Researcher Positionality

I come from a small coastal town in the Southern part of Sri Lanka. My background is in agriculture with a specialization in agricultural extension. My interest in smallholder farming began when I was going through a six month practical training programme in the third year of my university degree. During that period, I lived in a rural farming community in Mahailluppallama in Anuradhapura district and closely work with farmers in the field. This was an invaluable opportunity I received to learn and explore the tropical agricultural activities of smallholder farmers including dairy farmers. After completing my Bachelor's degree, I joined the University of Peradeniya as an assistant lecturer and got the opportunity to work in its sub-campus located in the Mahailluppallama and continued working with rural farming communities. In 2011, I began my professional career in one of the private sector consultancy firms in Sri Lanka and worked as a consultant for five years before I started my PhD. It was a rewarding opportunity which allowed me to collaborate with development experts and contribute to a variety of development research that covered diverse areas including rural development and poverty. When I was working on development projects I realised that the livelihoods of Sri Lankan rural farming communities had received limited attention and were therefore not truly reflected or recognised in development initiatives. This and my interest in smallholder farming inspired me to research and explore rural farming and livelihoods.

3.3 Research strategy

Following a constructivist-interpretivist paradigm, this study used a qualitative case study strategy. Qualitative methodologies facilitate researchers to study a particular phenomenon in its natural setting and interpret the phenomenon in question through the meanings people attribute to it (Denzin & Lincoln, 2011). Four general characteristics of qualitative research have been described in the literature "the focus is on process, understanding, and meaning; the researcher is the primary instrument of data collection and analysis; the process is

inductive; and the product is richly descriptive (Merriam & Tisdell, 2015, p. 15). Qualitative researchers focus on how people make their livings, how they interpret their experiences and what meanings they attach to them. The researcher's role is to act as an observer and data collector, capturing details from respondents regarding the phenomena of interest. Being the primary instrument of data collection and analysis, a qualitative researcher uses "his or her eyes and ears and filters" Lichtman (2012, p. 21) to collect, analyse and interpret the data. The researcher's knowledge, cultural understanding, perspective and subjectivity are pivotal in all aspects (J. R. Barrett, 2007; Merriam & Tisdell, 2015). Qualitative research is characterised by an inductive process in which the data gathered are used to build concepts, theories or hypothesis (Merriam & Tisdell, 2015). The aim is to produce "rich descriptions" and this means that qualitative studies place relatively little emphasis on numbers and causal statistical analysis (Merriam & Tisdell, 2015).

A case study approach was selected as the most appropriate research strategy for this study because the researcher aimed to get an in-depth, rather than highly generalised, understanding of what smallholders do and think. A case study method is preferred when the form of research questions are explanatory (how or why something happened) (Yin, 2011), as in this study. An in-depth understanding of smallholder commercial dairying needs to be gained by examining their current activities as well as changes over time. On these terms, the case study method is fit for purpose: the researcher cannot manipulate smallholders' behaviours in commercial dairying and so aims to study a contemporary set of events which cover the present situation and recent past (Yin, 2017). A case study approach facilitates the understanding of complexities through intensive examination (Petty, Thomson, & Stew, 2012; Ritchie, Lewis, Nicholls, & Ormston, 2013; Stake, 1995). It is an empirical method "that investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident" (Yin, 2017, p. 15). Smallholders' livelihoods and dairy-related activities are complex and influenced by diverse factors which include their asset portfolios, personal history and the culture in which they live. In order to answer how and why they do commercial dairying, the problem needs to be closely examined from the farmers' points of view, with special attention to the context.

3.4 Case Selection

The case or unit of analysis is "a phenomenon of some sort occurring in a bounded context" (Miles & Huberman, 1994, p. 25). As explained by Baxter and Jack (2008) and Merriam and

Tisdell (2015), the boundaries of a case clarify what objectives are covered in the study and set the research scope. Researchers can establish boundaries of selected phenomena by time, place, context and by a definition that reflects the "breadth and depth of the study" (Baxter & Jack, 2008, p. 547). The selected case could be a single person, a group of people, a community, or a programme or activity that exemplify the phenomenon of interest.

Once the researcher has identified the case, it is important to decide on what type of case study design is to be conducted (Baxter & Jack, 2008; Gustafsson, 2017). The single holistic case method was selected for this research as it concentrates on a complex context in order to gain a detailed understanding of smallholder farmers' engagement in commercial dairying. The single holistic case enables rigorous analysis of smallholders' livelihoods and their interactions with milk markets, paying particular attention to their past experiences and relevant structural factors.

This case study was conducted in the Galle district of Sri Lanka. The district belongs to the Southern Province, which is well known for its historical milk production and traditional dairy products. Another reason for selecting this case was that, recently, a number of development initiatives (dairy village development project, FAO-funded project promoting appropriate feeding techniques to exploit productivity in dairy cattle, programme for quality improvement of small-scale milk processors) aimed at promoting smallholder dairy commercialization have been carried out in this district. It is believed that these development projects also influenced smallholder commercial dairying in terms of providing assistance (e.g. funds, machinery) for milk production and expanding selling opportunities. Another central consideration driving case selection was the ease of researcher access to dairy farmers and key informants, given the researcher's limited resources. The researcher's hometown is located in the Galle district and she already had a good initial understanding of dairy farming systems in the area.

The selection of the exact study location within the district was based on a number of criteria. First, smallholders who produce milk for selling needed to be present. As the study aimed to get an in-depth understanding of pattern of smallholder commercial dairy activities giving attention to a range of historical trajectories in dairying, an established dairy area was chosen under the assumption there would be a mix of established smallholder dairy farmers, new entrants and smallholders who had exited from commercial dairying. Second, different buyers representing both formal and informal milk markets needed to be operating in the area, as smallholders' selling activities may differ across the two markets. Based on these selection criteria, the Gonapinuwala Divisional Secretariat was selected as the study location.

The researcher had existing rapport with government officers in the Gonapinuwala veterinary office and farming community in the area through previous field work she had carried out in 2017 as a member of a project which collected data to identify the dairy extension needs of smallholder milk producers. This was assumed as an advantage in selecting key informants and smallholder farmers for data collection.

3.5 Selecting respondents

Data collection in this study was done in two phases. The first phase involved key informant interviews, and, in the second phase, data were collected by interviewing smallholder dairy farmers. Prior to the selection of respondents, the researcher met the Divisional Secretary in Gonapinuwala and obtained approval to carry out field work. The following sections present how the key informants and smallholder dairy farmers were selected.

Selecting key informants

According to Marshall (1996, p. 92), key informants were identified "as a result of their personal skills, or position within a society, are able to provide more information and a deeper insight into what is going on around them". In this study, eight key informants were selected who had a sound knowledge and understanding of smallholder dairying in the study location. Purposive snowball sampling was used to select these informants. As such, key informants were selected based on their extensive relationships with smallholders and involvement in dairy farming in the study area. Given that such informants were both limited in number and they were widely dispersed geographically, snowball sampling was useful for identifying and approaching them within a relatively short period of time.

The researcher conducted key informant interviews prior to data collection from smallholder dairy farmers for several reasons. These included:

- to use the informants to gain a more detailed understanding of the study context. This included the geographic distribution of dairying in the study area, the available formal and informal marketing channels, the historical background of local dairying and the current level of smallholder commercial dairying. This information was used to trace the evolution of commercial dairy activities and to identify key moments that may have influenced smallholder activities. It was also used to identify existing patterns of dairy commercialization in the study location.

- The key informants were used to add and refine pertinent questions for the in-depth interview guide used with smallholders in the second phase of the research, as well as to fine-tune the interview guide.
- The key informants provided information about smallholder dairy farmers who were engaged in different sorts and levels of commercial dairy activities, enabling the researcher to identify farmers for the second phase of data collection.

The key informant interviews were also important for helping the researcher to become familiar with the vocabularies that are unique to the dairy farming community in the study area. These include, for example, *pattiya* (herd), *patti dameema* (natural breeding), *Nambi* (heifer cow), *Mandale* (Milco collection centre), *Kudu* (rice polish), *beheth widinawa* (artificial insemination). Learning this dairy farming-specific vocabulary enabled the researcher to communicate effectively with farmers and to avoid the feeling that they were conversing with a stranger or a layman to the dairying community.

A total of nine key informant interviews were conducted in this study (Table 3.1). Initially, two key informants, a Government veterinary surgeon and a livestock development instructor (LDI), were interviewed, as both worked closely with dairy farmers in the study location. At the conclusion of each interview, they were asked to identify other key informants and their answers were used to identify further informants. Table 3.1 details the occupations of the nine key informants interviewed. After completing these nine interviews, little new information was gained, so the researcher moved on to phase two of data collection.

Table 3.1: Details of key informants

Key informant	**Institute/Location**	**Number**
Veterinary Surgeon	Veterinary office, Gonapinuwala	1
Livestock Development Instructor (LDI)	Veterinary office, Gonapinuwala	1
Private Artificial Insemination Technician	Freelance worker (Former LDI attached to the veterinary office, Gonapinuwala)	1
President of farmers' society	Farmers society, Gonapinuwala	1
Centre Manager	Main milk collection centre, Milco (Pvt) Ltd, Arachchikanda	1
Secretary of FMS	Farmer Managed Society of Miclo (Pvt) Ltd, Arachchikanda	1
Secretary of FMS	Farmer Managed Society of Miclo (Pvt) Ltd, Bulugaha Junction	1
Grama Niladhari/Village Administrator	Henagoda Grama Niladhari Office	1
Economic Development Officer	Henagoda Grama Niladhari Office	1

Selecting smallholder dairy farmers

The study used purposive and snowball sampling to select smallholder dairy farmers for the second phase of data collection. In the first phase, the researcher's discussions with key informants purposively identified four smallholders who could be approached to start the second phase of data collection. In addition, a farmer database was obtained from the Gonapinuwala veterinary office that contained contact details, production and selling data of all the smallholder dairy farmers in the study area. During the first few in-depth interviews, farmers were requested to propose or identify other smallholders suitable for the interview. When smallholders provided names and the location of suitable respondents, their contact details were obtained from the farmer database collected from the veterinary office. In total, 34 smallholder dairy farmers were selected for the second phase of the data collection (Table 3.2). This included six who had exited from dairy farming at the time of data collection.

The number of female smallholder dairy farmers were relatively less in the study area. According to the farmer database obtained from the Gonapinuwala veterinary office, out of 98 dairy farmers, only 12 were female. In the process of selecting interviewees for the research, both male and female farmers were equally considered and invited to participate in the research.

Table 3.2: List of interviewed farmers in Gonapinuwala DS

Smallholder Farmer (SF) No	Name	Smallholder gender	Type of Dairy	Herd size at the time of data collection	Experience in dairy farming
1	Mr Cyril Manawadu	Male	Cattle	19	Nearly 40 years
2	Mr Wijesena and wife	Male	Cattle	11	Nearly 40 years
3	Mr Gunasiri	Male	Cattle	2	More than 40 years
4	Miss Karuna and Mrs Deepika (Farmer and her cousin)	Female	Cattle and Buffalo	Cattle 3 Buffalo 12	Nearly 36 years
5	Mrs Somawathi	Female	Cattle	4	Nearly 25 years
6	Mr Chandrasiri And Mrs Chandani (Husband and wife)	Male	Cattle and Buffalo	Cattle 25 Buffalo 9	23 years
7	Mr Vimalasena (exited)	Male	Cattle	16	Nearly 38 years. Exited dairying in 2015
8	Mr Ranasiri and hisdaughter	Male	Cattle	7	Nearly 35 years
9	Mr Neel and his wife	Male	Buffalo	11	11 years
10	Mr Dhanapala and his wife	Male	Cattle and Buffalo	Cattle 2 Buffalo 2	20 years
11	Mr Piyadasa and wife	Male	Cattle	2	Nearly 40
12	Mr Premadasa and Miss Kanthi (brother and sister)	Male	Cattle	3	32 years
13	Mr and Mrs Jayasena (exited)	Male	Cattle	5	More than 15 years. Exited dairying in 2015
14	Mr Hemasiri and wife (exited)	Male	Cattle	6	Nearly 45 years. Exited dairying in 2015
15	Mr Dharmasiri	Male	Cattle	12	Nearly 45 years
16	Mr Adihetti and Mrs Kanthi (Husband and wife)	Male	Cattle	50	More than 10 years
17	Mrs Sumanawathi and Mr Milton (wife and husband)	Female	Cattle	2	More than 10 years
18	Mr Upali and Mrs Pathma (Husband and wife)	Male	Buffalo	6	More than 15 years
19	Mr Rohana and Mrs Namali (Husband and wife)	Male	Buffalo	3	More than 10 years
20	Miss Manel	Female	Cattle	2	Nearly 10 years
21	Mr Deepal and Mrs Achini (Husband and wife)	Male	Cattle	7	More than 20 years
22	Mr Amunugama and Mrs Nandani (Husband and wife)	Male	Cattle	2	Nearly 10 years
23	Mr Kumarasiri (exited)	Male	Cattle and Buffalo		
24	Mr Lakruwan and Mr Kularathna (Son and father)	Male	Cattle	2	More than 30 years
25	Mr Amarawansha (exited)	Male	Cattle and Buffalo	Cattle 6 Buffalo 3	More than 10 years. Exited dairying in 2010
26	Mr Dilum	Male	Cattle	11	Nearly 5 years
27	Mr Dinesh	Male	Cattle	5	More than 10 years
28	Mr Karunarathna and wife	Male	Cattle	4	More than 10 years

29	Mr Laurance and Mrs Lakshmi (Husband and wife)	Male	Cattle	7	Nearly 40 years
30	Mrs Lili and Mrs Nandaseela (Wife and Husband)	Female	Cattle	9	Nearly 10 years
31	Mr Ramya Kumara and Mrs Deepika (Husband and wife)	Male	Cattle	7	More than 15 years
32	Mrs Rani (exited)	Female	Cattle	7	Nearly 25 years. Exited dairying in 2017
33	Mr Upul	Male	Buffalo and cattle	Cattle 3 Buffalo 5	More than 20 years
34	Mr Victor and Mrs Kusuma (Husband and wife)	Male	Buffalo	2	Nearly 40 years

3.6 Data collection

The following sections describe the process of data collection of this research under three subsections. Following the description of data sources, it presents details on how the farmer interview guidelines/protocol were designed and, finally, the process of in-depth interviews.

3.6.1 Data sources

This study used multiple sources to collect data. In a case study, the use of different data sources "ensures that the issue is not explored through one lens, but rather a variety of lenses which allows for multiple facets of the phenomenon to be revealed and understood" (Baxter & Jack, 2008, p. 544). Direct observations, in-depth interviews, participant observation, documentation and archival records and physical artefacts are among the potential data sources (Onwuegbuzie, Leech, & Collins, 2010). Semi-structured interviews with smallholders were the main source of data collection in this study. In-depth interviews provided access to smallholders' interpretations and descriptions of personal and social matters (Granot, Brashear, & Cesar Motta, 2012; Ritchie et al., 2013), They are a useful interactive method to collect qualitative data, providing opportunities for the researcher to use follow-up questions or probes to get rich data to best answer the research question (Alshenqeeti, 2014; Ritchie et al., 2013).

Additionally, this study conducted unstructured field observations to explore relevant details about milk production, dairy management practices and traditional milk-processing activities, milk selling, farmers' social interactions related to commercial dairying (with buyers, family members and peer farmers' input suppliers), resource usage and other livelihood strategies. Unstructured observations were an important source of information in this study, as argued

by Mulhall (2003, p. 306). These observations inspired the researcher to pose certain questions and gather additional information about the smallholder farmers and their dairying.

This study used a collection of both printed and web-based documents to obtain information and data about the research context and to describe the case description. These included Government reports, statistical databases (published and unpublished) and policy documents.

3.6.2 Designing the farmer interview guidelines/protocol

Semi-structured, in-depth interviews demand a great deal of planning on how questions are asked (Qu & Dumay, 2011). Thus researchers are recommended to use a checklist or guide for such interviews (Alshenqeeti, 2014). The structure of this checklist is flexible, thereby allowing the researcher to cover all the required topics in an order which is most appropriate for the participant.

The researcher developed two interview guidelines: a key informant interview guideline and another for smallholder dairy farmers, based on the research question and prior knowledge of smallholder commercial dairy farming and the study context. These guides consisted of key questions which were related to the research question and potential follow-ups. The key informants' guide had slight differences for each interview as the information shared and topics addressed differed in each case due to differences in the role they played in dairy-related activities. After conducting key informant interviews, the researcher made some changes to the drafted smallholder farmers' interview guide. These guidelines served as a useful memory aid and ensured that no important data was missed. Copies are provided in Appendix C.

3.6.3 The process of interviews

The process of interviewing all respondents (key informants and smallholder farmers) was quite similar. All interviews were conducted in places selected by respondents (e.g. at farms, grazing areas, respondents' homes). After selecting respondents, the researcher contacted them individually over the phone to invite their participation and to arrange the date, time and location of the interviews. Although all the in-depth interviews with smallholders could be scheduled by contacting them over the phone, all of the key informants preferred to meet the researcher in person to learn more about the nature and purpose of the research before agreeing to make appointments. Accordingly, the researcher pre-visited each key informant to brief them about herself and the research in order to arrange their interviews. The researcher also managed to pre-visit some of the smallholder farmers and had an informal

chat with them before conducting the interviews. As explained by Ortiz (2015), such pre-visits assist in building rapport with respondents and familiarising with the local context.

All the interviews were started with greetings and a general conversation about the day-to-day activities of the respondents. Following the general interview procedure, the researcher introduced herself at the beginning of the interview and then respondents were given a description of the research and its aims. The respondents were informed that their participation in the research was voluntary, and the researcher outlined their rights to ask any questions about the study during the interview, to decline to answer any question, to end the interview at any time and to withdraw from the study, as well as to get access to a summary of the findings when it is concluded. Following these introductions, the respondents signed an informed consent form (see Appendix A), which included the agreement to record the interviews and for the researcher to take photographs and make scanned copies of relevant documents if available.

Once informed consent was obtained, the researcher started the interviews by asking for general information about the respondents such as their age, the number of family members, their main occupation and who the head of the household was. As suggested by Broom (2005), answers given for general questions were used as a platform to ask the key questions that are more relevant to exploring the research question. Then the researcher collected detailed information about all the livelihood activities smallholders pursue for living including dairying. This enabled a broader understanding of smallholders' multiple livelihood activities and how dairying has been situated within the overall livelihood portfolio to be gained before gathering in-depth data about their milk production and selling.

Data related to milk production that was collected is: dairy management practices, resources used, interactions maintained with peer farmers, services and input providers, social and cultural factors that shape dairying. Then how farmers sell their milk through both formal and non-formal marketing channels was investigated. This entailed asking a range of questions about the buyers farmers deal with, the selection of particular buyers, social relationships they maintain in milk selling and strategies they use to achieve buyers' requirements in terms of quality and quantity. During these in-depth interviews, the researcher paid special attention to capture the dynamics of commercial dairy activities of each interviewed smallholder. This was achieved by specifically asking about the farmer's history in dairy farming from when they first entered dairying and how their production and selling had changed over time up to the current production and selling patterns. All smallholders interviewed were encouraged to

describe key time periods marked by significant events related to milk production and selling. Also, they were asked to explain why they considered it was significant. In addition, data on the dynamics of each smallholder's overall livelihood portfolio over time was also collected. There were situations where respondents did not answer the question with details that enabled the researcher to get a clear understanding. In such situations, the researcher used follow-up questions to further develop the respondents' answers, as recommended by Turner and Daniel (2010).

All the interviewed smallholders highly relied on family labour for commercial dairying. As they had multiple livelihood activities, different dairy related tasks (e.g. transporting milk to the collection centre, tethering animals) were allocated to family members. After conducting the interviews with the main smallholder dairy farmers, other household members involved in dairying were also interviewed (e.g. spouse, children, cousins). On five occasions, other family members who supported interviewed smallholders in dairying were not willing to participate in the research. Most of the time, the researcher could conduct those interviews with other family members on the same day she interviewed the smallholders, although sometimes a second visit was required. The key informant and smallholder interviews lasted around 1.5 to 2 hours, while interviews with other household members were short and limited to around 15-30 minutes. All interviews were ended by thanking respondents for their time and the information provided. Their consent was requested to re-contact them to verify or obtain any additional information if required.

3.7 Data analysis

This study used thematic analysis to investigate transcripts of the farmers' interviews. Thematic analysis is a method of "systematically identifying, organizing, and offering insight into patterns of meaning (themes) across a data set" (Braun & Clarke, 2012, p. 57). It involves three steps: describing the phenomena, classifying data and connecting concepts (Dey, 2003). For this study, thematic analysis was useful to examine the self-told narratives of individual smallholders and to come up with often unanticipated insights relevant to answer the research question.

Data analysis was started by transcribing audio-recorded interviews into written format. The researcher herself transcribed the majority of interviews as it facilitated familiarisation with the data through close observation and repeated listening, as suggested by (Bailey, 2008). Line numbers were added to each transcript to facilitate referring and analysing. All the transcripts

were then read carefully, highlighting the potential lines of analysis that appeared relevant to the research question, making notes and brainstorming. Reading each transcript several times assisted the researcher to build a preliminary understanding of the data. As Blanche, Durrheim, and Kelly (2006, p. 323) explain, careful re-reading enables the researcher to know "what kind of interpretations are supported by the data and what are not". Parallel to reading, descriptions of each of the transcripts were produced, including accounts of the study context in which the smallholders' dairy farming is embedded, their processes for milk production and selling, and their motives for undertaking these activities. These descriptions were important as a basis for interpretation and explanatory data, as suggested by Dey (2003) . Once the researcher obtained a thorough understanding of the data, the initial production of codes, the classification process, was begun by manually working through the transcripts.

This study used inductive coding, which is development of "codes from the data by using phrases or terms used by the participants themselves, rather than using the, often theoretical, vocabulary of the researcher" (Linneberg & Korsgaard, 2019, p. 263). Accordingly, the researcher identified topics, issues, similarities, and differences derived from smallholders' narratives related to milk production and selling and assigned codes to selected pieces of raw transcript data (e.g. regularity of selling, consistent volumes, type of market). These codes reflected what is actually in data, capturing its complexity and diversity (Nowell, Norris, White, & Moules, 2017) and it was the initial step that the researcher attached possible analytical interpretations to raw data.

After coding all transcripts, a set of codes are combined into themes. For example, in this research pattern of milk selling was a theme that comprised three codes: regularity of selling, consistency of volume selling and type of market. These themes were then examined carefully, to create connections to answer the research question. Connecting themes also assisted to identify differences and similarities between smallholders' commercial dairying and what factors shaped them related to the study context. It was time consuming to finalize themes, identify connections between them and finally clarify the story they tell about data to answer the research question.

At the end of the data analysis, a typology of smallholders was identified which was relevant to structured answers to the research questions. These farmer types included, not only differences in milk production and selling patterns, but were also found to be associated with important livelihood factors, such as asset holding and portfolio diversification. The identified themes identified were organized to write up as the results chapter of this thesis. As suggested

by King (2004), direct quotes of smallholders were used in the writing up to support the interpretations made and to illustrate the prevalence of themes. The researcher identified key quotes and made notes while coding.

3.8 Ethical considerations

This study was required to be ethically sound according to the protocol of the Massey University Human Ethics Committee (MUHEC), given that it involved human participants. Research ethics are moral principles a researcher needs to adhere to in order to protect the dignity and right of all participants in the research (Aluwihare, 2012). As this research was assessed as not exposing participants to unnecessary harm, it was assessed as being 'low risk' and notified as such prior to field data collection. Complying with the ethical principles described in the Massey University Code of Ethical Conduct for Research, Teaching and Evaluations Involving Research Participants, the researcher followed several steps to ensure this research met the required ethical standards. Prior to the data collection, the researcher used an information sheet (Appendix A) to inform participants of all the relevant information about the research, including its objectives, the benefits for participants and the parties involved in the study and allowed them to participate in the research voluntarily. In addition, a consent form (Appendix B) was used to obtain informed consent from all the participants prior to the data collection. Both information sheets and consent forms were made in the local language of the participant (Sinhala). During the data collection process, participants were respected and ensured their right to refuse to answer questions, withdraw at any time from the research and not allow photos to be taken of their farms and not allowing the recording of their interview. Additionally, it was important to be sensitive to the participants' social and cultural attributes and values (e.g. religion, age) during the field data collection. For example, there were situations in which smallholder farmers expressed their religious beliefs and attachment to cultural norms related to dairying. In such situations, the researcher made sure not to criticise or comment on their views rather than showing interest to gain an understanding of their personal views related to milk production and selling.

3.9 Conclusion

This chapter outlines the methods used to explore commercial smallholder dairying. The study is underpinned by a constructivist-interpretivist paradigm which focuses on the smallholder farmers themselves and aims to understand how they construct their world in relation to commercial dairying activities. A qualitative case study strategy has been used because the

researcher aimed to get an in-depth understanding of how and why smallholders do commercial dairying. This is located in Gonapinuwala in southern Sri Lanka. Before commencing data collection, the ethical protocols of Massey University were followed. The study used purposive and snowball sampling to select participants and data collection was carried out in two distinct phases. Nine key informants, such as a veterinary surgeon and village administrator, were interviewed in the first phase, followed by 35 in-depth interviews with smallholder farmers. Thematic analysis was used to investigate the interview data and the results of this analysis are presented in the following chapter.

4. CASE DESCRIPTION

4.1 Introduction

This chapter provides a description of the study area. The study location is the Gonapinuwala Divisional Secretariat (DS), which is situated in the Galle district of southern Sri Lanka. The chapter opens with a general description of the Galle district, including its climate and agroecology, and typical agricultural activities. Then an overview of Gonapinuwala DS is presented including its agroecology, climate, land tenure, land use and agricultural activities. The chapter concludes with an overview of dairy farming and milk-selling in the study location, including commentary on the cultural significance of dairying in this region.

4.2 Galle District

This section provides a description of physical location, administration, agroclimate, land ownership and tenure, and agricultural activities of Galle district where Gonapinuwala DS is located.

4.2.1 Overview of Galle District

Galle is one of the coastal districts in Sri Lanka located in the Southern Province. It shares eastern boundaries with the Matara district, northern boundaries with the Kalutara and Rathnapura districts and the Indian Ocean to the West (Department of Census and Statistics, 2019). Galle's natural landscape includes stunning beaches, lagoons, mangroves, wetlands, coral reefs, hilly areas and numerous rivers. Part of the Sinharaja (Lion Kingdom) forest, a world heritage site, lies in the district, enhancing its biodiversity.

The total land area of Galle is approximately 165,200 ha (1652 km2), including some 3373 ha (33.7 km2) of reservoirs (District Secretariat-Galle, 2019) . According to land-use data, the majority of land (49%) is under cultivation, with 39% of the land reported as not cultivated and the remaining 12% covered in forest.

Administratively, Galle is made up of 19 DS divisions, which are further subdivided into 895 small units called Grama Niladhari (GN) divisions (Department of Census and Statistics, 2019). These GN divisions are comprised of a few villages. Altogether, there are 2423 villages in the Galle district (District Secretariat-Galle, 2019). The District Secretary, appointed by the central Government, is responsible for the district's administration, bridging with central Government activities and implementing development projects.

Galle's total population in 2018 was 1,124,019, most of whom resided in rural areas (Department of Census and Statistics, 2019). The population consists of multiple different ethnic groups, the majority being Sinhalese, and the rest made up of Sri Lankan Tamil, Indian Tamil and Sri Lankan Moor. The majority religion (nearly 97%) in the district is Buddhism, with a small number of people practicing Hinduism, Islam, and various forms of Christianity. According to the survey of household income and expenditure survey in 2012/13, 102,306 poor people lived in Galle, and this represented 7.7% of the population in the district[4] (Department of Census and Statistics, 2015, 2016a).

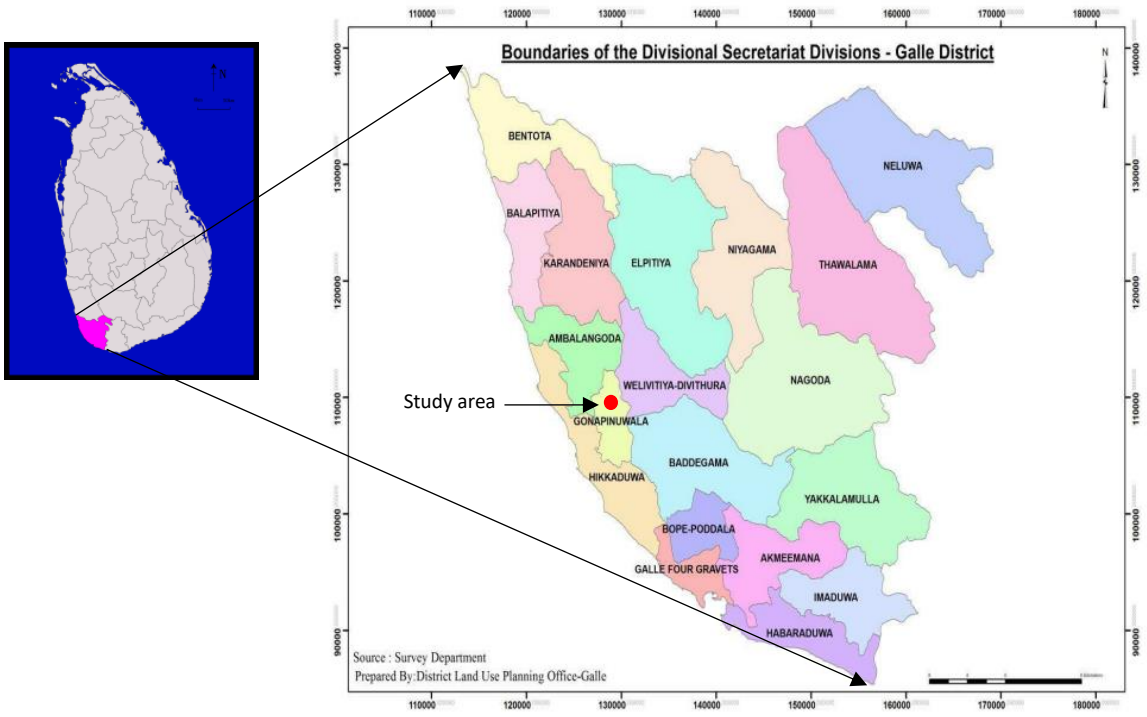

Figure 4.1: Administrative map of Galle District (District Secretariat-Galle, 2019)

4.2.2 Agroecology and climate in Galle district

Galle lies in Sri Lanka's wet zone[5] and features a tropical rainforest climate. The district receives a high amount of rainfall throughout the year in all the country's four rainfall seasons: First inter-monsoon (March-April), Southwest monsoon (May-September), Second inter-

[4] Poverty status is determined by comparing monthly real per capita expenditure to the official poverty line. If the per capita monthly real expenditure is less than the value of the official poverty line, then that individual is considered to be in poverty. The Official Poverty Line (OPL) for 2012/13 was Rs. 3,624 per person per month in 2012/13. It was 2016 Rs.4,166 per capita expenditure per month per person.

[5] Sri Lanka is divided into three climatic zones - wet, dry and intermediate – and 7 agro-climatic zones - wet, mid-country wet, upcountry wet, low country intermediate, mid-country intermediate, up-country intermediate and low country dry zone. These zones are further divided into 46 agro-ecological zones based on uniformity of climate, soil type and terrain.

monsoon (October-November) and Northeast monsoon rain (December-February). The annual rainfall in Galle varies from 2000mm to 2500mm (Department of Census and Statistics, 2019). Late February to early May is considered as the dry period in the district. The average minimum and maximum temperature range in Galle is recorded as 23.5^{0}C to 31.3 ^{0}C (Department of Census and Statistics, 2019). The district features only three of the 46 agro-climatic zones identified in Sri Lanka: WL1a (75% expectancy value of annual rainfall is higher than 3,200mm), WL2a (75% expectancy value of annual rainfall is higher than 2,400mm), and WM1a (75% expectancy value of annual rainfall is higher than 1,700mm) (Department of Agriculture, 2021a).

4.2.3 Overview of agriculture activities in Galle district

The main economic activities in Galle are agriculture, industry (e.g. manufacturing, construction, mining and quarrying, electricity) and services (e.g. wholesale and retail trade, transportation, education, financial, insurance and real estate activities). According to the Department of Census and Statistics (2019), 402,028 people were employed in these three sectors. The agricultural sector employs approximately 27% of Galle's working population, while the industry and services sectors accounted for 27% and 45% respectively (Department of Census and Statistics, 2019).

The agriculture sector is subdivided into cropping, fisheries and livestock farming. The major crops cultivated in the district are paddy, tea, rubber, coconut and cinnamon. Paddy is cultivated in two seasons: Maha, the major growing season (September to March) and Yala, the minor growing season (May to August). Rain-fed paddy farming is the most common practice in the district, with only relatively small areas of paddy cropped under major and minor irrigation schemes[6] (less than 2000 ha). Apart from paddy lands, the most significant land uses are allocated to export agricultural crops: tea (28,844 ha), cinnamon (12,284 ha), coconut (7333 ha) and rubber (4356 ha) (Department of Census and Statistics, 2019). Statistics related to the gross domestic product contribution of agriculture are not available at the district level.

Galle is Sri Lanka's second important fisheries district, with marine fishing being the dominant form, though inland and aquaculture fisheries are also carried out in the district. Statistics for

[6] Irrigation schemes in Sri Lanka are divided into major, medium and minor based on their command areas. Schemes commanding more than 1,000ha of land are categorised as major irrigation systems, while medium schemes account for 80-1,000ha of command area and minor schemes for 80ha or less (Shantha & Ali, 2014).

2018 revealed that the district contributes 12% of total national marine fish production, with an annual harvest of 54,100 metric tons (NARA, 2018).

Livestock activities in Galle are mainly concentrated on poultry farming and dairying. The rearing of goats, pigs, ducks, turkeys and sheep are also carried out in small numbers (Department of Animal Production and Health, 2019b). Poultry are kept both as commercial and backyard farms, with egg production more significant than broiler chicken production. The average daily egg production in the district in 2019 was reported as 65,999 (Department of Census and Statistics, 2019).

Dairying in Galle is carried out with both cattle and buffalo. Currently, there is a growing trend to keep goats as dairy animals in the district, due to the perceived medicinal value of their milk, however, such farming is very small compared to that of cattle and buffalo. The Department of Census and Statistics (2021b) reports that there were 3073 dairy farmers operating in Galle in 2019. The district's cattle and buffalo populations were estimated as 14052 and 9613 respectively (Department of Animal Production and Health, 2019b). Both productive (e.g. milking cows, heifers) and unproductive dairy animals (males and aged cows) are included in these estimates. The most common cattle breeds reared in the district are Indian and crosses, European and crosses and local cattle. The livestock statistical bulletin published by the Department of Animal Production and Health (2019b) reports that the highest percentage of cattle (50%) are Indian and crosses, while nearly 40% were European and crosses and only 10% belonged to local breeds. Information regarding buffalo breeds reared in the district are not available. According to the Department of Animal Production and Health (2019b), the average daily milk production per cow in Galle was one litre, considerably less than the national figure for the same year, which was reported as 2.8 litres per day per cow.

Annual milk production in Galle was reported as 2,429,253 litres in 2019. According to available statistics, the amount of milk produced in the district has been steadily decreasing since 2017, when total production was over six million litres (Department of Animal Production and Health, 2017). Approximately 55% (1,336,089 litres) of the district's total milk production came from dairy cattle, with buffalo milk accounting for the rest (Department of Animal Production and Health, 2019b).

The collection of milk for sale in Galle is a complex process involving many different sorts of actors, including large-scale processors (e.g. the state-owned Milco Pvt Ltd), small-scale private collectors, hotels, restaurants and small-scale entrepreneurs. Formal milk collection

is in the hands of large-scale processors, with an infrastructure comprising 30 collection points and two chilling centres with a total capacity of 6300 litres (Department of Animal Production and Health, 2019b). According to the Department of Animal Production and Health (2019b), approximately 36% (871,251 L) of the district's total milk production is channelled through the formal market. The remainder goes to informal markets and is consumed at the household level as fresh milk or processed products. Accordingly, informal milk marketing is the dominant form in the district.

The following section provides a general overview of the Gonapinuwala Divisional Secretariat, where data collection was carried out for this study.

4.3 Gonapinuwala Divisional Secretariat

The Gonapinuwala Divisional Secretariat is a rural area[7] situated in Galle, with a total land area of 2337 hectares (Gonapinuwala Divisional Secretariat, 2021b). Gonapinuwala was established as a separate administrative area in 2005. Prior to this, it was administered as part of the Ambalangoda Divisional Secretariat. Gonapinuwala is bordered by the Ambalangoda divisional secretariat to the north, Baddegama to the east, and Hikkaduwa to the south, west and south-west.

According to folklore, Gonapinuwala is named after a historical incident related to the hunting of a wild animal. A sambur deer escaped from its hunter by swimming across a stream, giving the area its popular name as "the stream where sambur swam", "Goona peenu wala" in the local language and subsequently evolving into "Gonapinuwala".

Gonapinuwala is subdivided into 19 GN divisions and 67 villages. The number of villages under one Gonapinuwala GN division ranges from one to eight (Gonapinuwala Divisional Secretariat, 2021c). The Divisional Secretary is the highest-level administrative officer who is responsible for planning, organizing and coordinating all the functions of the Secretariat. The services provided through the Secretariat include civil registration, the issuing of permits, land administration, the implementation of development projects, and managing social welfare and benefits, including the payment of pensions (Gonapinuwala Divisional Secretariat, 2021a). All the administrative duties of GN divisions are carried out by Village Administrators/Grama Niladhari, who are appointed by the central Government. The duties of Grama Niladhari

[7] The Department of Census and Statistics defines rural areas as those that are not administered by municipal and urban councils and that do not belong to estate sector (plantations of eight hectares or more in extent and with 10 or more resident labourers)

include collecting of statistics, issuing permits, keeping the register of voters up to date and maintaining peace among villagers by settlement of personal disputes in the area. Since 2014, development officers who are attached to the Ministry of Economic Development have been working in each Grama Niladhari Division. They are also responsible for collecting statistics and assisting development projects.

Gonapinuwala DS was home to 22,997 people by 2018, with a population density of 852 per square kilometre (Department of Census and Statistics, 2019). The DS population comprised 10,846 (47%) males and 12,150 (53%) females. The great majority of the population (99.7%) are Sinhalese, with much smaller populations of Sri Lankan Tamil (0.16%), Indian Tamil (0.02%) and Sri Lanka Moor (0.02%). The majority of the population (nearly 98%) are Buddhists (Department of Census and Statistics, 2019). People who practice other religions (e.g. Hinduism, Islam, Roman Catholicism) also live in the area in small numbers.

4.3.1. Agroecology and climate in Gonapinuwala Divisional Secretariat

Located in the low country wet zone, Gonapinuwala DS has an average annual rainfall of higher than 2400mm. The major soil group is red-yellow podzolic with soft and hard laterite and bog and half-bog soil (Gonapinuwala Divisional Secretariat, 2016). The temperature and rainfall seasons of Gonapinuwala are similar to that of the Galle district as a whole. The combination of these agroclimatic factors provides Gonapinuwala with a good environment for growing a wide variety of agricultural crops, especially cinnamon, rubber, coconut, paddy, and other export agricultural crops (e.g. pepper) and mixed home gardens.

With regard to topography and drainage, Gonapinuwala is located on the southwest coastal plain and lies at an elevation of 10 metres above sea level (Gonapinuwala Divisional Secretariat, 2016). The area includes a 17 hectare mangrove forest in the Thilakagama Grama Niladhari Division. With the exception of the “Gonapinuwala stream”, the area lacks large rivers and has no significant large-scale irrigation systems, meaning that agricultural activities are typically undertaken using rainwater (Gonapinuwala Divisional Secretariat, 2016). Natural waterways and streams are used for a minor irrigation system operated as a collaboration between farmers and government officers in the Agrarian Service Centre. Farmers in the area get their drinking and household water from the national water supply and drainage board, the majority depend on privately or publicly owned wells (Gonapinuwala Divisional Secretariat, 2016).

4.3.2. Land ownership, tenure and land use in Gonapinuwala divisional secretariat

According to Gonapinuwala Divisional Secretariat (2016), there are two types of land ownership and tenure in Gonapinuwala falls: individual property rights and lands that are partially controlled by the Government. Individual property rights are described as freehold titles held by individuals and corporations. There are 1712 hectares of freehold land in Gonapinuwala DS (Gonapinuwala Divisional Secretariat, 2016). These landowners have the right to use lands for residential or commercial activities, and to sell, gift, delegate or rent it to others. However, there are certain government laws that restrict these individual property rights. For example, owners of paddy land require permission from the Government to convert paddy cultivation into any other type of crop.

Other than that, nearly 515 and 46 hectares have been allocated to land-users through Government grants (Jayaboomi) and permits respectively. In addition, approximately five hectares of land are held by religious institutes. Some state-owned lands are allocated to landless people in Gonapinuwala for residence, agricultural and commercial activities, with the intention to improve their livelihoods, ensure food security and prevent illegal encroachment. These lands are alienated through three procedures. First, by way of special approval from the Sri Lankan President with a nominal rent for any purpose such as development projects, charity work and educational institutes. Second, land permits are used to provide short-term tenure rights subjected to certain conditions and with nominal monthly rentals to the state. Permits are signed and issued by the Divisional Secretariat or the Deputy Land Commissioner. If the agreed conditions are violated, the permits are cancelled. Third, grants signed by the President grant offer full ownership of land. Consecutive governments in the country have launched land grant programmes with a variety of titles, such as *Swarnaboomi* (golden lands), *Jayaboomi* (lands of victories), and *Rathnaboomi* (lands with gems). In addition, religious institutes had received land entitlements from the Commissioner of Buddhist Affairs. Land owned by religious institutes can be given to farmers for cultivation under long-term leases of 99 years.

The land of Gonapinuwala is intensively used for residence, agricultural, commercial and development activities. Some lands are used only seasonally and a considerable area has become unproductive and been abandoned due to such factors as seawater intrusion, lack of minor irrigation facilities, and lack of financial capital and labour (Gonapinuwala Divisional Secretariat, 2016). For example, the total area devoted to paddy farming in Gonapinuwala is reported as approximately 355 ha (Gonapinuwala Divisional Secretariat, 2016). In-depth

interviews with smallholders revealed out of these total paddy lands nearly 70 hectares have become unproductive due to seawater intrusion. Paddy lands in the area are used in accordance with the 2000 Agrarian Development Act, which made it a punishable offence to use paddy lands for landfilling or any other commercial activities other than for cultivating paddy. Farmers are supposed to get permission from the Commissioner General in the Department of Agrarian Development, even if they want to grow short-term crops like vegetables and condiments.

4.3.3 Agricultural activities in the Gonapinuwala Divisional Secretariat

Employed population in Gonapinuwala DS is reported as 9735 (Gonapinuwala Divisional Secretariat, 2021c). According to the latest available statistics, agriculture (crop farming, livestock and fishery) provides employment for 887 people (Gonapinuwala Divisional Secretariat, 2016). The predominant agricultural activities in the area are crop and livestock farming. A considerable extent of land in the DS has been allocated to crops including cinnamon (529 ha), paddy (355 ha), rubber (36 ha) and tea (25 ha) (Department of Census and Statistics, 2019). Other than that, commercial vegetable and fruit farming are the activities in the area carried out on a small scale. Croplands in Gonapinuwala are scattered among residential areas (Figures 4.2). Due to its labour-intensive nature, most crop farming activities including paddy farming use both family and hired labour. As described in key informant interviews and in-depth interviews with smallholders, the labour requirement for crop farming is fulfilled within the area.

Paddy farming in Gonapinuwala is carried out in both the Yala and Maha seasons. Commercial paddy farming is not prominent in the area as the market value of rice is low. Some paddy lands have been left fallow due to seawater intrusion (Gonapinuwala Divisional Secretariat, 2016). Paddy lands are usually used for vegetable production in the off-seasons. Some farmers cultivate paddy on their own lands, which they purchased or inherited. Some farmers who do not have their own paddy lands enter into tenancy agreements with landowners. Tenancy agreements are made orally, on the basis of trust. According to the tenancy agreement, the tenant is responsible for any input costs. At the end of each cultivating season, the landowner claims one-fifth of the harvest as the land lease. If the tenant cultivates vegetables in the off-seasons, the same rules are applied regarding the harvest. The amount of harvest that can be claimed by the landowner varies from one GN division to another. For example, it can be one-fifth or one-fourth of the harvest. While paddy farming has remained a largely subsistence activity, the cultivation of coconut, rubber, tea, vegetables and cinnamon have become significant commercial activities.

Cinnamon is the main export crop grown in the study area. The spread of cinnamon cultivation in the area is underpinned by its geographic location, given that the southern coastal zones provide good climatic conditions for producing high quality bark from the crop. According to interviewed smallholders, individual collectors come to Gonapinuwala to buy quills from cinnamon growers. Cinnamon oil extraction has become a profitable business for some people in the Gonapinuwala area and some cinnamon growers earn an income by selling cinnamon leaves to oil extractors whereas some use leaves in their mills to extract oil. Both key informant interviews and in-depth interviews with smallholders revealed that coconut and rubber growers in the Gonapinuwala area are currently converting their plantations into cinnamon due to its high market demand and attractive price.

There are 12 coconut estates larger than eight hectares in Gonapinuwala, with the total land area under coconut cultivation estimated as 280 ha (Department of Census and Statistics, 2019). Rubber is cultivated using a comparatively smaller area of land (36 ha). According to the key informant interviews, the fall of rubber prices in world markets has seen large rubber plantations replaced with cinnamon. Some existing plantations have been left inactive due to the lack of rubber tappers in the area. The remaining agricultural land uses are for pepper (14 ha) and a mix of other crops such as coffee, cashew, fruits and vegetables (Department of Census and Statistics, 2019).

The cultivation of food crops in home gardens is common practice in Gonapinuwala. The harvests of home gardening are mainly consumed by the household and shared with or gifted to neighbours. Some people earn extra income by selling surplus home production to neighbours and local shops. Government programmes are being implemented to expand home garden food production in the area. These programmes provide extension services, free planting materials and organize area level competitions to promote such gardening.

According to the Department of Census and Statistics (2019), poultry and goat farming are carried out by a few farmers in the area. Backyard poultry is a common practice, with a few layers or village hens (indigenous chicken) reared for subsistence. There is a small number of medium-scale layer farms (500 to 1000 birds) and broiler farms in the DS (Gonapinuwala Divisional Secretariat, 2016). In addition, a few farmers (nearly 20) keep goats for milk production and selling. A small number of residents (139) in the Gonapinuwala area are engaged in fisheries (Gonapinuwala Divisional Secretariat, 2016). Dairy farming provides a livelihood for nearly 200 families in Gonapinuwala (Veterinary office – Gonapinuwala, 2018). The next section describes dairy farming in Gonapinuwala DS.

Figure 4.2: A paddy farm located adjacent to a road in the study area

4.3.4 Dairy farming in Gonapinuwala

Dairying has been a traditional livelihood activity of farmers in Gonapinuwala DS. They rear dairy animals for subsistence consumption and earn income through selling milk. According to unpublished data received from the Southern Provincial Department of Animal Production and Health, there were 310 registered cattle farms and 42 registered buffalo farms Gonapinuwala in 2016. There is no data on the number of mixed farms where cattle and buffalo are reared together. However, the number of dairy farmers in the area showed a decrease in 2018. According to the records of Gonapinuwala veterinary office, only 98 dairy farms were active at the time of field data collection in 2018. Key informant interviews of this study revealed that farmers are leaving dairying for a variety of reasons, including increased cattle rustling, a lack of access to lands, and farmers' interest in cinnamon cultivation and oil extraction as a lucrative income source.

Dairying in Gonapinuwala DS is carried out with either cattle or buffalo or a mix of the two. Cattle farming is the predominant type of milk production as it required relatively less resources than buffalo farming. Some dairy farms in the DS run integrated crop-livestock systems. Generally speaking, three dairy management systems are practised in the area, with system choice determined by the resource availability (Veterinary Office, Gonapinuwala).

- ***Intensive System –*** crossbred dairy animals are kept in enclosed cattle sheds and fed with cut grass, concentrated feed and mineral mixtures.
- ***Semi-intensive system –*** the majority of animals are crossbred or zebu crosses that graze outside during the day and are kept in sheds at night. Concentrated feed and minerals are used as supplements.
- ***Extensive System -*** this is a low input/output system in which the animals are not kept in sheds and supplementary feed is not provided. The cattle are grazed on common lands and in the woods.

The majority of the district's dairy farmers (approximately 85%) use the semi-intensive system, and only some 10% farm intensively. Most of the cattle in the DS are European and crosses (65%), followed by Indian and crosses (30%) and a small number of local cattle (5%). Nearly 75% of the buffalo are Indian crosses and very few farmers keep local buffalo under extensive management systems (Veterinary office, Gonapinuwala).

Dairy farming in Gonapinuwala DS is spread across all GN divisions. In general, dairy farming is carried out on part of residential lands or on separate lands closer to the homestead. Smallholders who are landless or have marginal lands rely entirely on communal or villagers' lands for dairying. According to key informant interviews, lands dedicated to cultivating specific crops (e.g., rubber, coconut) also serve as tethering areas for dairy animals (Figures 4.3 and 4.4). In the off-seasons, all smallholder dairy farmers in the area have access to paddy lands to graze their animals. Additionally, fallow paddy lands are used for grazing throughout the year. During the greater part of the year, pasture for dairy animals is readily available within the Gonapinuwala DS. When the dry season arrives (February to May), grass becomes scarce, and some dairy farmers in the study area travel to nearby DS divisions (Baddegama DS) to cut and carry grass. Furthermore, rice farming in the Gonapinuwala is important for dairying because straw and by-products of rice polishing (rice polish) provide a low-cost source of animal feed.

The average total daily cow and buffalo milk production in Gonapinuwala in 2018 is reported as 674 and 366 litres respectively (Department of Census and Statistics, 2019). This milk production data imply that buffalo is a significant aspect of dairy farming in Gonapinuwala DS as it contributed nearly 46% of the total milk production in the DS.

Figure 4.3: Buffalo grazing on a paddy land

Figure 4.4: A cattle tethered on a coconut plantation

Cultural value of cows and dairying in Gonapinuwala

In Sri Lanka, cows are treated with a higher value than other farm animals and it was noticeable even among the farming community in the study area. The cultural value of a cow in Sri Lanka is different than that of its place in Indian or Nepalese culture, where cows receive a sacred status and are venerated with the belief that they (cows) are representatives of the Divine (Stewart, 2016). As also explained by Stewart (2016), prudential reasoning is one of the key factors that shaped the way smallholder farmers in Gonapinuwala value and treat cows. Accordingly, dairy cows are valued because they provide multiple benefits for livelihoods, particularly milk for family nutrition and a source of income.

Attribution of humanity to dairy cows was common in Sri Lanka including the study area, and this was displayed by calling them kiri amma (milk mother). Religious beliefs, especially Buddhism, seemed to support the existing norms regarding cows in terms of treating them with kindness and protecting their lives. In Buddhism, harming or killing living beings (human and animals) are considered a sin that will bring bad consequences (karma) and lead to unfavourable rebirth. Though all smallholder dairy farmers in Gonapinuwala did not practice Buddhism to a greater extent, their thoughts, beliefs regarding cows are rooted in Buddhism. This made some smallholders avoid slaughtering cows as well as male animals.

Aside from that, animal welfare activities in the study area provided insights into the cultural significance of cattle. The welfare activities were mostly concerned with cow protection. According to key informant interviews, individuals in Gonapinuwala come together voluntarily to protect cows which are condemned to death. However, due to a lack of financial capital, these activities are carried out on a small scale. The main function of cattle protectionism is that an organised group of people raises funds to purchase cows from slaughterhouses and then redistributes the saved animals among a group of poor smallholder farmers with a verbal or written agreement to maintain the cows until they die naturally. In some ways, these programmes help low-income families to start and maintain dairy farms by donating cows.

Despite the fact that cows are respected and handled with respect, the value of dairy farming as a profession in the research area was low. In Gonapinuwala, for example, people, including smallholder dairy farmers, saw dairying as a low-level occupation performed by uneducated people. Even in the field data collection, none of the smallholder farmers identified themselves as dairy farmers, though some of them relied exclusively on milk sales for a living.

4.3.5 Other livelihood activities pursued by farmers in Gonapinuwala

People in Gonapinuwala DS have multiple livelihood activities and those who engage in agriculture, including dairying, do not depend on it completely for their livelihoods. They are small farmers who engage in agriculture as well as a variety of other income-earning activities such as labouring and other non-agricultural employments (e.g. carpentry, retailing, masonry). Although some farmers in Gonapinuwala contribute to the labour force in formal government and private sector jobs, statistics regarding this are not available.

4.4 Conclusion

This chapter describes the research context, including its physical characteristics as well as agricultural operations including dairy farming. Dairying is one of the multiple livelihood

activities smallholder farmers in the study area pursued as a living. Smallholder farmers in the area have traditionally raised dairy animals for consumption and the sale of milk. Cattle is the predominant type of dairy farming activity. Additionally, some smallholders produce buffalo milk, which accounts for 46% of total milk output in Gonapinuwala.

The next chapter presents the findings regarding how and why smallholder dairy farmers produce and sell milk in Gonapinuwala, Sri Lanka.

5. RESULTS

5.1 Introduction

This chapter delineates findings related to how and why smallholder farmers are engaged in commercial dairying in Sri Lanka. Smallholders' milk production and selling are complex and dynamic. Findings related to a single, short time frame (one year in this study) provide little information to answer how and why smallholders participate in milk markets as past circumstances, events and experiences in dairying also shape the way they sell milk and why they do it in the way they do now. The findings presented in this study are derived from both a snapshot analysis of dairying as well as considering the changes which have occurred historically.

Commercial dairying was one of multiple livelihood activities smallholders pursued for a living. How and why smallholders engage in commercial dairying in Sri Lanka is shown in this research to vary across smallholders. From the analysis of livelihood data, three smallholder types emerged as distinctly relevant to answer the research question; the types are identified as high, middle and low smallholders. Of the 28 smallholders who actively engaged in commercial dairying at the time of data collection, ten fell into the high type, 11 into the middle and seven into the low type. Informal and formal marketing options existed in the study area and the three types of smallholders' participation in these market options varied in terms of volumes and types of milk products sold and the consistency and regularity of milk selling throughout a year. The reasons smallholder types engage in the milk markets, as they do, are multiple and inter-related and include resource endowment, nature of social capital, the extent of diversification and adherence to religious and cultural norms. In this chapter, characteristics of formal and informal milk markets and identified smallholder types are outlined first in sections 5.2 and 5.3 respectively, followed by the findings on how and why they participate in milk markets in section 5.4.

5.2 Milk markets in Gonapinuwala

The milk market in the study area is organised into formal and informal markets. State-owned Milco (Pvt) Ltd [Milco] was the only formal market channel in operation. Milco organised its collection network as one main collection centre and a few Farmer Managed Societies (FMSs) that served as sub-collection points. According to Milco, the purpose of FMS is to organise dairy farmers at the village level to empower them to cope with challenges in dairy farming

(e.g. getting inputs, obtaining better price for milk). There are 20 FMSs which are operating under the main collection centre located in Arachchikanda GN division in Gonapinuwala. Smallholders, whose dairy production is low (40L per day or less), are encouraged to be members of these FMSs. However, it is not compulsory. Any farmer could receive membership if he/she supplied milk to Milco continuously for three months. Members of FMS are eligible for a variety of benefits from the society's farmers social security fund. Farmers, for example, are provided financial assistance/funds for family members' surgeries and special family events such as marriages, funerals, and childbirth. Farmers and Milco both contribute money to the security fund. Whether farmers had a membership of FMS or not, LKR 50 cents (USD 0.003) per litre is deducted from each farmer's milk payment and this money goes to the social security fund. Similarly, Milco contributes LKR 50 cents to the fund for each litre of milk they collected from farmers.

The collection network of Milco ensured consistency of milk collection, providing opportunities for farmers to deliver any volume of milk, any day, throughout the year. Milco accepted both cow and buffalo milk from farmers. However, dairy farmers' milk-selling activities with Milco mostly revolved around cow milk as Milco did not differentiate between two types of milk (cow and buffalo milk) in their pricing. Milco imposed sanctions on milk quality and priced milk based on the fat and solid non-fat content (SNF). At the time of data collection (2018), the unit price offered by Milco for farmers' milk ranged from LKR 41 to LKR 89.50 (nearly USD 0.25 to 0.55). According to the general milk collection procedure, farmers who produced less than 40 litres per day should supply milk to Milco through FMSs while farmers with higher production levels (40L per day or more) delivered their milk directly to Milco's main collection centre.

The informal milk market in the study area comprised a diverse mix of buyers: neighbours, local shops and small-scale yoghurt producers and mobile vendors. Smallholders sold both cow and buffalo milk in these local markets. Most importantly, the informal market provided opportunities to sell value-added dairy products (e.g. yoghurt, curd) other than fresh milk. There was a well-established informal market in Gonapinuwala for curd made of buffalo milk. The informal market for yoghurt has not developed to the level of the curd market in the study area. The informal market was characterised by less concern for quality standards and it also offered a slightly higher price, LKR 65 to 100 per 750ml (USD 0.4 to 0.6 per 750ml) for a unit volume of milk than the formal market.

5.3 Characteristics of three types of smallholders

As this study aimed to understand smallholder commercial dairying in relation to their overall livelihoods, data analysis focused on exploring characteristics of milk production systems, milk market participation and livelihood factors (e.g. resource endowment, social capital, level of income activity diversification, adherence to cultural norms). This enabled the researcher to identify differences and similarities between smallholders in commercial dairying and how livelihood factors were associated with their milk production and selling. Based on the differences in production systems, milk selling and livelihood factors, three smallholder types were identified which ranged along an ordinal scale from low to medium to high. This section illustrates their livelihood characteristics and milk production systems Table 5.1 presents a summary of the key differences between the three smallholder types.

5.3.1 High smallholders

The high type comprised 10 interviewed smallholders. They were relatively highly endowed with all five types of assets (e.g. lands, labour, financial capital, machinery, knowledge and experience related to dairying) which were required for dairying. The majority of them (9 out of 10) owned agricultural lands from which they allocated a certain part to dairy farming. More than half of high smallholders had accumulated land through purchasing. The land holding size ranged from 0.5 to 12 acres. Similarly, high smallholders had a greater level of access to others' land through social relationships. The following quote exemplifies their land access for dairying:

> *I tether animals in villagers' paddy lands. Two years ago, I bought land for dairying using my savings. (SF 18_Upali)*

High smallholders' social networks consist of ties with peer farmers, villagers, as well as with Government officers whose work related to dairy farming and other agricultural activities in the area (e.g. staff from the nearby veterinary office, extensionists, and staff of Milco). Their relationships with Government personnel (bridging social capital) in the area were stronger than that of the other two types of smallholders. Data evidenced that high smallholders invested in bridging relationships by giving gifts, organizing social events and making frequent contacts with relevant parties.

All the high smallholders had at least one or two stable income sources supported by several other livelihood activities which also generated relatively good incomes. They had gone

through a process of income activity diversification to spread the risk associated with relying on one or two income sources. Agriculture provided the primary income source for most of the high smallholders (8 out of 10). At the time of data collection, high smallholders had a greater level of diversification in their portfolios than other smallholders. The number of livelihood activities they pursued ranged from three to six. A high smallholder explains his livelihood portfolio as:

> *My main income comes from vegetable growing. Additionally, dairying also gives me daily income throughout the year. I produce eggs and organic fertiliser for selling. I grow rice in both seasons only for home consumption, but when I get a surplus, I sell it (SF 2_Wijesena)*

Dairying was the primary income-earning activity for only two high smallholders. For others, it provided a secondary or extra income. Out of ten high smallholders, one diversified within dairying rearing cattle and buffalo on the same farm. Three high smallholders reared only buffalo. The rest of the group (6) engaged in cattle farming. High smallholders used relatively high amounts of inputs in dairy farming, allocating more lands, technology (farm machinery) and financial capital (Figure 5.1). Their herd sizes ranged from 6 to 50 animals. At the time of data collection, only two high smallholders had less than ten animals as they reduced the herd in order to carry out renovations on their farms. Parallel to the input usage, their production levels were relatively high (e.g. 12 to 120 L/day), and they produced milk regularly throughout the year. It was noticeable that the high smallholders adhered comparatively less to social norms and religious beliefs that directly or indirectly impacted commercial dairying. This meant they primarily valued milk and dairy cows as commercial assets and mainly used them for earning income.

Figure 5.1: A dairy farm run by one of interviewed high smallholders

5.3.2 Middle smallholders

Middle smallholders occupy the midpoint on the ordinal scale, with high and low types at the extremes. A total of 11 smallholders consisted of the middle type. They were moderately endowed with five types of assets. Two middle smallholders were landless. For others, the size of landholdings ranged from 0.1 to 4.5 acres. Additionally, all middle smallholders accessed lands through social relationships and none of them had accumulated land through purchasing. All middle smallholders possessed a strong network of relationships with other villagers. Two of them had wider social networks, building close relationships with the Milco staff and the veterinary office.

Middle smallholders' portfolios were made up of one stable and regular income activity which was supported by other irregular, uncertain activities. They had a moderate level of diversification in livelihood activities. More than half (7 out of 11) of middle smallholders' portfolios comprised less than three livelihood activities. Three middle smallholders primarily relied on milk selling for a living. The primary income of the rest of the smallholders came from crop farming, non-agricultural salaried employment, or self-employment. Family or Government remittances were important sources for four middle smallholders.

Out of 11 middle smallholders, two kept only buffalo and two maintained cattle/buffalo mixed farms. Others kept only cattle. All the production systems operated with lesser inputs (e.g. land, machinery) than the high type (Figure 5.2), and production was at a moderate level (e.g. 5-35 L/day). The herd size of the middle group ranged from 2 to 15. Nearly half of the middle smallholders had less than five animals. Four middle smallholders strongly adhered to norms and religious beliefs which impacted milk production and selling. Those four smallholders did not value dairy animals as commercial assets. Instead, they considered them as family members. They used milk both for earning income and social functions (e.g. gifting). The rest of the middle smallholders prioritised the commercial value of milk and dairy cows.

Figure 5.2: A dairy unit owned by a middle smallholder

5.3.3 Low smallholders

Low type is composed of seven smallholders who were asset-constrained. Four of them were landless (agricultural lands) and the rest (three low smallholders) owned agricultural lands which were mainly devoted to paddy. The size of their agricultural lands ranged from 0.5 to one acre. The size of lands held by low smallholders did not correspond to the benefits they derived from it for living. For example, one of the low smallholders who owned one acre lost more than half its productivity due to sea water intrusion. Another low smallholder entered into an oral tenancy agreement providing the land to nearby farmers as he lacked the resources to cultivate it. He received one-fifth of the harvest each season and it was mainly used for home consumption. None of the low smallholders had accumulated lands during their farming lifetime. Low smallholders received access to other villagers' lands through their social relationships. A low smallholder explains his ownership and access to lands for dairying:

> *I don't have agricultural lands. This land has 0.04 ha and is sufficient only for housing. I can't grow any crops here except a few ornamental plants. I keep animals in my brother's land. Some neighbours allow me to tether animals on their lands and some don't (SF 12__ Premadasa).*

All low smallholders had close relationships with peer farmers and some villagers. Comparatively, their relationships with officers who work related to agriculture in the area were not strong and were characterised with less number of contacts. For example, they all had membership in a farmer society managed by the veterinary office, yet only two of them participated in meetings and occasionally communicated with the staff of the veterinary office.

Dairying was the main income source of five low smallholders. The other two primarily relied on non-agricultural labour work for living and earned secondary income from milk selling. They engaged in crop farming at a subsistence level and sometimes earned a side income by selling the surplus. All the low smallholders mentioned that they do not have stable income sources. Their livelihood portfolios comprised a bunch of uncertain activities which generated seasonal and low incomes. Lower smallholders had the least level of diversification in their portfolios. The majority of them (6 out of 7) had two to three livelihood activities. Owing to the seasonality of livelihood activities, they sometimes underwent no income periods within a particular year. Therefore, family support and Government remittances were important for their living. A low smallholder explains his livelihood activities as:

I do poultry farming and sell eggs to local shops and neighbours. There are months (religious festival seasons) when I cannot sell eggs. Egg production also changes with the number of birds. For example, I had 34 layers a few months ago. Now I have six. Additionally, I do dairying. After this lactation period, I do not have milk to sell until the next calving. Sometimes I sell home garden vegetables and ornamental plants to villagers and get a small income (SF 20_Manel)

All the low smallholders produced cow milk, and as shown in the following quote, lack of resources (e.g. land, labour, money) prevented them from engaging in buffalo farming:

I can't do buffalo farming as land is limited. Buffalo prefer wallowing and we need to feed them well. Cattle farming is easier than buffalo farming because buffalo need to be maintained well (SF 5_Somawathi)

All the low smallholders operated low input-output dairy systems and their daily average production rarely exceeded five litres (Figure 5.3). An exception to this was one smallholder who produced 18 litres per day at the time of data collection as he received two cows unexpectedly from the Samurdhi programme (one of the livelihood development programmes carried out by the Government). Low smallholders' herd sizes ranged from two to six animals. However, the number of milking cows on their farms in most cases did not exceed two. All the low smallholders adhered to the dairy-related norms and religious beliefs in a way that shaped how they valued milk and dairy cows, and finally influenced the regularity of milk production, the volume of milk sold, gifted and consumed. For example, other than its exchange function, they valued the social functions of milk and diverted a relatively higher proportion of milk for gifting to maintain their relationships with neighbours, and relatives. They considered dairy animals as part of the family who supports their living by providing milk for selling. The commercial value of cows was not prioritised in dairying. As such, the majority of low smallholders did not value cows as a saving or assets which can be converted to financial capital when there is a financial hardship, or when the productivity of animals decreased.

Figure 5.3: Cattle shed owned by a low smallholder

Table 5.1: Key differences between identified smallholder types

	High smallholders (10)	Middle smallholders (11)	Low smallholders (7)
Milk production systems	Used high input (e.g. lands, financial capital, machinery) High output – 12 to 120L per day Cattle, buffalo or mixed farms	Used moderate level of inputs Moderate output – 5 to 35L per day Cattle, buffalo or mixed farms	Used low inputs Low output – five or less than five litres per day Only cattle farms
Resource endowment	High i.e. Landowners/high access to others' lands, average size of landholding ranged 0.5 to 12 acres	Moderate i.e. Landowners/moderate access to others' lands. average size of landholding ranged 0.25 to 4 acres	Low i.e. Landless or marginal landowners, limited access to others' lands, average size of landholding ranged 0.5 to 4 acres
Social capital	Strong bridging and bonding relationships	Strong bonding relationships	Strong bonding relationships
Income activity portfolio/livelihood portfolio	Highly diversified with more than one stable, high-income source Four to six income sources	Moderately diversified with one stable, high-income source Two to four income sources	Least diversified with seasonal income sources Two to three income sources
Adherence to cultural norms and religious beliefs	Low	Moderate	High

The following sections of the chapter present detailed findings on how and why three categories of smallholders participate in milk markets.

5.4 How smallholders participate in milk markets and why

Three types of smallholders showed significant differences in their patterns of milk market participation in terms of regularity of selling throughout a year, consistency of volumes sold and type of market they participated in most. Section 5.4.1 presents the findings on how the regularity of selling and consistency of volume sold to markets varied between smallholder types. Section 5.4.2 then describes the factors that impacted the continuity in selling consistent volumes.

5.4.1 How the regularity of selling and consistency of milk (cow and buffalo) volumes sold to markets varied between smallholder types

Results showed that dairying provided a regular source of income for all high smallholders throughout the year. The regularity of selling was enabled as they continued milk production with minimal fluctuations. Aside from regular selling, the majority of high smallholders (8 out of 10) sold relatively consistent and larger volumes (e.g. 12 to 120L/day) to markets. A high smallholder describes the regularity of selling and consistency of volume he delivers to market as:

> *I sell 60 litres of cow milk every day. There are no breaks in sales and changes in quantity, it is done year-round (SF 6_Chandrasiri)*

Three middle smallholders whose primary income came from dairying sold milk regularly throughout the year, delivering relatively consistent volumes. The milk sold by the rest of the middle smallholders was irregular and they delivered variable volumes. On the other hand, milk selling provided seasonal, erratic incomes for all the low smallholders. They had no or little control over the milk volumes sold at markets. The quantity of milk they sold was low and fluctuated frequently due to changes in production and the use of milk for other functions, especially for gifting. In-depth interviews revealed that low smallholders experienced frequent production drops and no production periods within a year. For example, a low smallholder who sold five litres of milk on a particular day failed to supply the same volume the following day, or a few days later. A low smallholder explains his milk selling activities as:

> *I own two cows. When one calved, the other one weaned. I usually get five litres from a cow. But it depends on the feed I provided to them. On some days I can't get that much milk (5L). Yesterday I got five litres. But it was three and a half litres today. Also, there are times I do not sell milk (SF 12_Premadasa)*

Findings of this study identified resource endowment, income activity diversification and adherence to dairy-related norms and religious beliefs shaped smallholders' dairy management practices impacting the regularity of selling and consistency of volume sold. Home consumption and gifting of milk also ultimately defined the differences between smallholders' milk selling patterns.

Access to land, fodder and financial resources for feeding animals

Data and field observations showed that all types of smallholders had access to common lands and some of the other villagers' lands for grazing dairy animals. Comparatively, high smallholders had an extra source to find roughage as they owned land which they used as personal grazing areas and to grow pasture. According to the data, more than half of high smallholders (six) maintained pasture cultivations. The average size of pastures ranged from 0.1 to 3 ha. In addition, all high smallholders fed relatively large quantities of concentrates (one to six kilograms per animal) to all animals in the herd despite the cost, and frequency was one or two times per day. They increased quantities of concentrates given to animals during dry periods when pasture was scarce. This was enabled as they had access to cash to buy commercial animal feeds. As smallholders described, part of the income gained from milk selling is used to buy animal feeds. If not sufficient, they used the income derived from other sources (e.g. crop farming, self-employment) to buy animal feeds. Access to animal feeds enabled high smallholders to maintain the continuity of production and selling with minimum fluctuations.

Only two middle smallholders had their own lands to use as tethering areas and to cultivate pasture. Furthermore, only three provided concentrates to all animals daily. These middle smallholders were concerned about maintaining production levels as dairying was the only income source they had. The majority of middle smallholders provided only a small quantity of concentrates (e.g. one to three kilos per animal per day) to selected animals in their lactation periods as they lacked financial resources. This was a strategy they used to reduce the cost of production. One middle smallholder explains this as:

> *I do not provide calves concentrates because it's expensive. Usually, feeding concentrates started at late pregnancy (SF 10_Dhanapala)*

Compared to the other two types, low smallholders had a lesser amount of all resources (e.g. land, money) to feed their herds. None of them had their own lands to graze animals or to grow pasture. They relied entirely on common and other villagers' lands to feed animals. Access to other villagers' lands by low smallholders was facilitated through social

relationships: kinship, friendship and neighbours. Sometimes permission from the landowner was needed to tether animals on their lands. A landless low smallholder describes how she grazes animals:

> *I do not have enough space on my land to keep animals. It's got 0.04 ha. I graze animals in common lands and some villagers' residential and agricultural lands (e.g. coconut plantations, paddy lands). Sometimes, I have to get the owners' permission for that. It's not a problem if I keep animals on their lands as the cows do not destroy owners' property mainly trees and plants (SF 5_Somawathi)*

Data revealed that there were situations when landless smallholders received access to other smallholders' lands through reciprocity. In order to access lands, landless smallholders were supposed to assist the landowners in their livelihood activities. A smallholder explains how it is practised:

> *I do not allow other farmers to tether their animals in my land. A farmer next door sometimes keeps her animals here with my permission only in paddy-cultivating seasons as she does not get access to lands during that period. I give her permission because she helps me to look after my animals when I am busy with other work. If we went out, she looks after my animals. It is a help for the help received (SF 22_Amunugama)*

Low smallholders provided a small quantity (one to two kilos per animal per day) of concentrates only to milking cows occasionally as they lacked financial resources to buy animal feeds. One low smallholder points out:

> *I tether animals in paddy fields during the daytime. I sometimes give animals rice polish [a by-product of the rice polishing process which is used as concentrates]. But I missed it one or two days. The veterinarian advised me to feed my female calf with cattle feed. But I can't buy it. Instead, I feed it grass (SF 20_Manel)*

Sometimes low smallholders provided concentrates to milking cows just to tame them and stimulate milk secretion at milking rather than to provide extra nutrients. This reduced the quantity of concentrates they had to purchase each time. Another low smallholder describes this:

> *I have never fed animals commercially processed cattle feed as it is too expensive. But I have to give my milking cow a small quantity of coconut poonac every morning. Otherwise, it won't allow milking (SF 12_Premadasa)*

As a whole, feed management practices used by the majority of middle and all low smallholders are associated with irregular and low productivity of their cows resulting in seasonality in selling of milk.

All types of smallholders stated that feeding dairy animals was becoming a problem for a number of reasons. Middle and low smallholders were the ones who experienced difficulties in production and selling due to these problems. Land for grazing dairy cows and for dairying had become scarce in the study area for a number of reasons including the parcelling of lands for residential purposes, deforestation and use of common lands for agricultural activities, and the conversion of coconut and rubber estates into cinnamon cultivation. Further, due to changes in rainfall patterns, pasture availability had been affected. In general, pasture becomes more scarce during the dry season which falls between February to May.

Smallholder dairy farmers in the study area relied on paddy lands to graze their animals. In the study area, paddy was cultivated in both Yala and Maha seasons. Smallholders explained that they used fallow *wel* (paddy fields) throughout the year for feeding animals, whereas paddy lands used to cultivate in both seasons (Yala and Maha) were accessible only in off-seasons in the months of February, March, August and September. Availability of paddy lands in the off-season varied, depending on the paddy varieties cultivated and the length of time the variety took to reach maturity. For example, if farmers grew two-and-a-half-month varieties they are able to harvest a couple of months earlier than if they grew four-and-a-half-month varieties. The growing of slower maturing varieties reduced the period available for dairy farmers to use the land for grazing before the onset of the subsequent cultivation season. A middle smallholder explains how the seasonality of paddy farming impacts on feeding dairy animals:

> *At the time of sowing, grasses are scarce as we can't use paddy lands. As this is the harvesting season, we can feed animals well. The problem starts again when farmers begin to prepare land for the next cultivating season (SF 24_Lakruwan)*

Apart from that, changes in smallholders' relationships they had with other villagers also matter in terms of secured access to lands and access to fodder. For example, some smallholders lost access to grazing lands when conflict arose in their relationships with neighbours or when a close friend or relative who provided access to land passed away. One middle smallholder explains his experience:

I lost access to land as the lady who permitted me to use her land to graze and tether animals died. I do not have a close relationship with her children, so they ask me not to use the land anymore. Due to this, I sold part of my herd (SF 4_Karuna)

Smallholders responded to land scarcity in different ways. Interviews revealed that high smallholders coped with land scarcity by purchasing more land for dairying. One smallholder provides an example of this:

The land was a problem when we started dairying. With time we saved part of our milk income and bought this land. Now we have enough space for dairying (SF 6_Chandrasiri)

The majority of the middle (except one) and all low smallholders did not have the financial capital to buy lands for dairying. They relied entirely on social relationships to access lands. Alternatively, if they could not access land they minimized the impact of feed scarcity by limiting their herd to a manageable size.

Access to stud bulls for animal breeding

All types of smallholders used predominantly artificial insemination (AI) along with natural breeding to expand their herd. Smallholders practised natural breeding for cows when consecutive AIs were not successful. All the high smallholders had access to bulls when they required natural breeding. Three high smallholders maintained stud bulls on their farms and others borrowed them from friends. Strong relationships they maintained with nearby farmers facilitated free access to stud bulls. In the study area, hiring stud bulls was comparatively more expensive than AI. For example, a smallholder had to spend LKR 500 (USD 3) per day to hire a bull, but it costed them LKR 200 (nearly USD 1) for the AI service. High smallholders reported fewer problems related to animal breeding than other smallholders and they were able to achieve a consistent flow of pregnant and milking cows to sustain their desired production volumes of milk.

None of the middle and low smallholders reared stud bulls as the maintenance cost was too high. Three middle smallholders mentioned that they borrowed stud bulls from friends. The remaining middle and all the low smallholders had to hire stud bulls from nearby farmers and experienced difficulties in some situations. The data revealed that the relationships some middle and low smallholders maintained with their peer farmers did not facilitate their access to breeding bulls as their friends were also resource-poor and did not keep bulls on farms. Lack of access to stud bulls sometimes meant problems in animal breeding, adversely impacting on the continuity of milk production and selling. One middle smallholder describes this:

My cow went through a number of AIs, but it did not work. It is hard to find patti wasso (stud bulls). It has been eight months since my cow's milk production stopped as I could not find a bull (2-SHF-1-_Dhanapala)

Role of financial and social capital, adherence to cultural norms and religious beliefs in accessing and replacing dairy animals

All three types of smallholders differed in how they accessed replacement dairy cows or cows to expand their herd. Availability of cash and access to formal credit facilities from banks enabled all high smallholders and a half of the middle smallholders to purchase animals when required. This was important for the continuity of production and selling consistent volumes throughout the year. One high smallholder describes this:

Production fluctuates in general. During the calving season, it goes up, at the time of drying animals, it goes down. Also, there are some unexpected things like diseases that make changes to the volume of milk we produce. Somehow, I make sure to sell 40 litres every day. I did it from the start of dairy farming. If there is any production drop, I buy a milking cow to keep that constant (1-SHF-1_Cyril)

On the other hand, half of the middle and all low smallholders lacked the financial resources to buy animals when they experienced problems in milk production or wanted to replace unproductive animals. Instead, they entirely relied on sourcing free animals. For example, gifting of dairy animals is a common practice in the dairy farming community in the area. Social relationships smallholders maintained with peer farmers were important in giving them access to animals through gifting. Accordingly, some dairy farmers loaned cows to close friends who did not have the financial capital to buy cows, to assist them to enter dairying or expand their herd. Based on a verbal agreement, once the cow had given birth to a female calf, the cow was returned and the calf was retained as a gift from the original owner.

Moreover, some cultural norms and religious beliefs in society led to non-dairy farming families gifting animals to dairy farmers. One middle smallholder was gifted four animals by non-dairy farming families in the belief that good karma would then befall those gifting the animals[8]. As explained in an interview, the motivation to gift animals might be because the giver or his family member was experiencing harsh times due to health issues. Givers did not

[8]Karma constitutes all the intentional verbal, mental and physical deeds. Volition is an important factor which determines karma. When the volition is absent, deeds are not literally constituting karma. That means unintentional, unconscious deeds are not considered as karma. "In its ultimate sense Karma means all moral and immoral volition" (Ven. Sayadaw, 2004). Good karma makes good consequences in present birth or future births. Bad karma makes bad consequences.

expect anything in return from the receivers of cattle (smallholders) but wished good health for the family. This was achieved via two good deeds, freeing animals condemned to death and then gifting them to people who can get benefits from that animal. A receiver of the cattle (smallholders) is supposed to look after the particular animal until they die naturally. A smallholder who received cows from a specific family to start and expand dairying described it as:

> *I started dairying with one animal. It was an animal saved from death by a family when their child was sick. When people have a difficult time, they do good things to get relief. Within a few months, I received three animals from such families… We can't sell those animals to others, especially for slaughterhouses as it badly impacts the patient (2-SHF-30_Lili)*

Cattle protectionism programmes[9] were also an important source of free dairy animals for low and some middle smallholders. Data identified that a few middle (3 out of 11) and four low smallholders received cows to enter into dairying or expand herds from these programmes. A smallholder who received two cattle from a cattle protectionism programme explains the process:

> *I've got a cow and a calf from a programme that frees nearly 50 animals from death every year. That programme provides animals to unemployed people to start dairying and they also provide cows for dairy farmers to expand their herd. There were lots of rules and regulations I had to agree with before getting the animals. In addition, they wanted recommendations from a Buddhist monk in my village, Village Administrator and Samurdhi Officer. I'm planning to apply for another animal soon (3-SHF-17_Milton)*

The dairy animals smallholders received from these free sources tended to have low productivity and the animals were not necessarily available when smallholders wanted to access them. These difficulties limited these smallholders' ability to maintain regular and consistent production and selling of milk.

Cultural norms and religious beliefs attached to the value of dairy cows were revealed in the study as influencing smallholders' animal replacement practices differently. High smallholders

[9] Cattle protectionism programmes were open for low-income families who were interested in dairying. As smallholders described, those programmes were implemented in both informal and formal ways. Informal programmes distributed dairy animals among smallholders on verbal agreements and mutual trust. It did not involve signing agreements with animal receivers. The main eligibility criterion for getting an animal was not to consume beef. This is because, if the beneficiary household consumed beef, they may kill the animal and consume its meat at home or sell it again to a slaughterhouse for money by violating the objectives of the programme.

were less attached to traditional norms and religious beliefs associated with cattle and milk, highlighting the commercial value of dairy animals. As stated in the following quote, they valued dairy animals as an asset which could be liquidated:

> *Dairy farmers always have savings in the form of animals. If we have a money requirement, we can sell one of the animals and get the work done. We can get a salary from other jobs, but can't save. But animals are like deposits. We can sell them and earn money (1-SHF-1_Cyril)*

The findings of the study revealed that the majority of high smallholders (7 out of 10) had changed their religious beliefs and adherence to norms related to dairying over time. A quote from a high smallholder provides evidence for it:

> *Earlier I felt guilty when it came to selling animals for slaughter. So, I used to sell animals only for drafting as there were bullock carts in this area. I was even not happy to cull poultry birds to the extent that I stopped egg production. I do not bother about these things anymore as it does not help us to move forward as commercial farmers. Recently I re-started egg production as well (SF 1_Cyril)*

All high smallholders culled unproductive dairy cows to reduce the cost of production and maintain production levels. More than half of middle smallholders culled unproductive cows in the same way. However, three middle smallholders did not cull cows as they valued them as family members. Some middle smallholders became emotional when they talked about replacing and culling cows. The words they used when talking about their cows: *amma* (mother), *putha* (son) or *daruwo*(kids), also illustrated the emotional farmer-cow bond. Some or all which?? Several smallholders felt they needed to show gratitude to animals who supported their living. This was done by taking good care of animals and saving their lives until they died naturally. One middle smallholder who kept an old and unproductive buffalo in the herd points out the reason behind it:

> *My husband has a permanent Government job now. Before he got the job, we lived thanks to these animals. We'll never sell buffalo to the slaughterhouses. We have an option like other farmers to sell animals to other farms after 2-3 lactations, but these animals will be taken to slaughterhouses when they got old. That's why I don't sell them. We owe these animals. They love us very much, and I feel sorry for them. We give them some feed and water, but they give us milk in return. Amma's (mom's) milk yield was high. Her patiya (calves) also gave us more milk. Due to milk income, I could send my daruwa (child) to a tuition class. I could spend more on food and clothing. It wasn't the same before we started*

dairying. The most important thing is I used that money (from selling milk) to build our new house. We must treat animals well who did a great service for us (SF 19_Rohana)

A few middle smallholders took steps to avoid the accumulation of old, unproductive cows in the herd and, therefore, avoided the need to sell them directly for slaughter. For example, they sold cows to other farms once they had produced 3-4 calves and that animal was replaced by a newborn female calf. One smallholder who practised this strategy explains:

I don't sell animals for killing. What I do is sell cows to other farms after they got 3-4 calves (SF 19_Rohana)

Similarly, more than half of low smallholders valued cows as if they were family members who made money for their living. These low smallholders would not consider replacing unproductive animals even when they were experiencing severe financial hardships. One low smallholder who doesn't have a regular income source explains his unwillingness to sell his unproductive animals:

During the last few years, there were periods when our milk production ceased. I have only two cows. Usually when one cow is dry, the next one calves. Sometimes they do not come into heat on time. Recently, I artificially inseminated one of the cows two times, and it was not successful. So, after this lactation period, I can't produce milk for the next 5-6 months. Whatever, I do not want to sell the unproductive cow. It delivered 5 calves and gave us milk for years. A few days ago, a person came and asked for that cow for LKR 45,000 (USD 277). I said no. I'll keep it as it is and when it dies I'll spend LKR 2000 (USD 12) to bury it. But I am not selling this cow even if I have to kill it myself and bury it (SF 12_Premadasa)

It was clear that an unwillingness to remove unproductive animals caused some middle and low smallholders to experience low and no production periods. This explains their irregular selling pattern and inability to supply consistent milk volumes to a certain extent.

Home milk consumption

Whether or not smallholders consumed milk in the household also influenced their milk selling. Depending on the size of the family, most (8 out of 10) high smallholders consumed 1 to 3 bottles (750ml to 2L) of milk per day. However, this level of consumption did not affect the amount or regularity in which they sold milk.

Two middle smallholders avoided daily milk consumption as they strongly believed the fact that fresh milk caused phlegm formation and make them ill. Only two middle smallholders households consumed milk daily, with the remainder consuming it occasionally. Middle

smallholders who consumed milk indicated that any household consumption of milk reduced their marketable volumes, and this was the main reason they only consumed milk occasionally. Further, these smallholders indicated that sometimes they avoided or adjusted the amount they consumed depending on how much was being produced to minimize the impact of consumption on the consistency of volumes delivered to markets. Middle smallholders, for example, consumed more during peak production periods and, subsequently, lowered their consumption as production declined. One smallholder provides an example of this:

> *If the production is good, we take two bottles for home. Half a bottle is consumed during periods of low production (SF 29_Laurance).*

The impact of consumption on low smallholders' selling volumes was minimal. In general, low smallholders' milk consumption was lower than the middle and high types. Only three low smallholders mentioned that they occasionally consumed milk. The rest of the low smallholders avoided milk consumption completely because they believed that drinking fresh milk led to them developing mucus and other health problems.

Adherence to cultural norms related to the gifting of milk

The practice of gifting milk was present among all three types of smallholders, however, it varied greatly. Only three high smallholders gifted milk to others (e.g., villagers or friends) occasionally, and the amounts they gifted had no significant impact on their marketable volumes. Data revealed that their gifting was associated with certain individuals in the community. They sometimes gifted to higher-level personnel who worked in the dairy sector to maintain good and strong relationships. Gifting also occurred to some people who they believed deserved to receive free milk (e.g. patients, and older adults). This gifting was done only to assist someone in need as high smallholders felt unable to charge these people for milk. The following quote exemplifies this:

> *A university student came to buy milk yesterday. His leg was fractured, and he was unable to walk. How can we charge a child who is in such kind of situation? (SF 6_Chandrasiri)*

Nearly half the middle smallholders and the majority of low smallholders (5 out of 7) often gifted milk. Milk was an important resource these smallholders used to strengthen the ties in their social network. Further, they practised gifting as a token of gratitude, in thanks to those who aided them in their dairy-related activities or when they had experienced hard times. A smallholder explains this:

Villagers are friendly to me. If they need something, I go over and help, and they do the same for me. They recently helped me to find a stolen animal. Now I'm going to gift them the milk of that mee wassi [female buffalo] and show my gratitude (SF 4_Karuna)

The middle and low smallholders who gifted milk did so without considering the impact the gifting would have on the amount of milk they were then able to sell. A smallholder who currently produces nearly three litres of milk provides an example of this:

We don't drink milk and instead seek to sell whatever quantity we produce. Every week, however, I give fresh milk free to one of my cousins who lives nearby (SF 12_Premadasa)

The gifting of milk had a greater impact on some middle and the majority of low smallholders' selling volumes compared to those high smallholders who gifted.

Furthermore, interviews revealed that all smallholders, regardless of their type, donated their whole daily production to the yearly *kiri dansala* (milk food stall) organised by the farmers' society in the study area under the supervision of the veterinary office. *Danasal* (plural) are small food stalls organised by people during religious festival seasons to provide free foods to the public. Kiri Dansal offers free fresh milk along with a variety of sweets, mostly jaggery (a traditional sugar cane-based sweet). A smallholder who was involved in the planning and execution of a *kiri dansala* explains how other farmers donated milk:

All dairy farmers contribute to the dansala gifting their entire daily production. Last year, Wijesena mama (Wijesena uncle) gifted 20L, Cyril Manawadu gifted 40L. Farmers whose milk production had ceased at that time contributed financially to buy cups and jaggery (SF 20_Manel)

The findings on how and why smallholders' participated in the informal milk market are presented in the following section.

5.4.2 Smallholders' participation in the informal cow milk market

The informal milk market in the study area comprised a diverse mix of buyers: neighbours, local shops and small-scale yoghurt producers and mobile vendors. Smallholders sold both cow and buffalo milk in these local markets. Most importantly, the informal market provided opportunities to sell value-added dairy products (e.g. yoghurt, curd) other than fresh milk. Research showed that the demand for smallholders' milk in the informal market was irregular and variable across multiple buyers. A variety of factors influenced the informal market demand, including weather (rainfall pattern), festival seasons, and the personal preferences of buyers. The informal market had little concern for quality standards and offered a slightly

higher price (USD 0.6 per 750ml) for a unit volume of milk than the formal market. The next section describes how smallholders sold cow milk to neighbours.

How smallholders sold cow milk to households/neighbours and why

At the time of data collection, two high smallholders avoided selling milk to neighbours. All the other high smallholders sold milk to neighbouring households when requested. The volume of milk high smallholders usually sold to other households ranged from one to five litres per day. In general, high smallholders considered their current production level before they agreed to sell milk in this way. In some cases, if they saw a possibility of producing extra volume, they came to a verbal agreement with the households about the duration and quantity of milk they could supply. This avoided informal selling having an impact on the volumes of milk they were committed to supply to Milco daily.

All the middle and low smallholders sold milk to neighbours when they requested it. The average volume they sold to a household varied from 750ml (one bottle) to two litres per day. Middle and low smallholders were not concerned as to the impact selling to the informal market had on the volumes they were then able to sell to the formal market (Milco). Whatever amount of milk they had to sell after satisfying the informal market demand was delivered to Milco.

All types of smallholders described the uncertainty associated with the informal market as the demand for milk changed daily, based on factors that included other households' health conditions and financial status. A smallholder explains the risk of milk selling to households:

> *Neighbours do not buy milk every day. If a child gets sick, they stop buying. Whomever the buyer, they drink large amounts of milk for two weeks and the next day, tell us they are ill [and no longer buy any milk]. Many people in the area do labouring jobs. If they cannot pay us, they stop buying milk (SF 8_Ransiri)*

As all types of smallholders described, the importance of maintaining good relations with their neighbours influenced their selling decisions. As alluded to previously, smallholders had a feeling of obligation to sell milk to neighbours. The majority of interviewed smallholders said, "we can't say no to our villagers" when they were questioned about milk selling to neighbours. They were concerned about the possible criticisms that may emerge from the community if they neglected to serve neighbours. A high smallholder explains this:

> *Neighbours buy milk occasionally. More people come during the New Year festival season. Actually, it's a problem for us. But we can't stop selling milk to them. Because people will*

speak out against us saying that we did not treat them with even a small volume of milk (kiri tikakata salakuwe na kiyala) (SF 6_Chandrasiri)

The majority of all types of smallholders also believed that individual buyers could affect their long-term survival and success in dairying because they relied on neighbours for assistance for grazing and in the protection of their animals from raiders. As they indicated, neighbours acted as unpaid marketing agents who promoted their milk selling and recommending the quality of their milk to other buyers. This quote from a smallholder illustrates this:

They are our villagers. It's better to supply them milk than to companies. Otherwise, we can't survive. They help us in dairying in several ways. If an unknown vehicle or person wanders around our gate, they call and advise us to be on alert. If an animal breaks their rope and strays outside, they let us know. Most villagers know that I produce milk. Outsiders get to know about us through them and come to buy milk (SF 1_Cyril)

In addition, selling milk to neighbours generates the highest unit price for smallholders' milk. This was a factor that influenced middle and low smallholders' preference to sell milk to neighbours. One middle smallholder describes this:

It's better if we can sell to neighbours than delivering milk to Milco as we can earn LKR 100 from one bottle (750ml) (SF 4_Karuna)

Price setting in informal cow milk selling

All the high smallholders set their own selling price when they sold milk to individual households considering the cost of production, nature of the relationship, and Milco's standard purchasing price. It was a common practice that milk delivered to households was measured using standard bottles holding 750ml. At the time of data collection, the common selling price of one milk bottle (750ml) in the study area was LKR 100 (USD 60 cents). High smallholders identified that there were no requirements to stick with a common price. As such, their selling price ranged from LKR 90 to 120 per bottle. A high smallholder explains how he sets his selling price:

We can decide on the selling price independently. I do not even discuss it with my family. No one influences it. I give one bottle (750ml) of milk to neighbours at Rs. 90 because they are in our village. Companies do not pay us that much for one litre. If Milco changed their standard price, I might alter the selling price (SF 1_Cyril)

More than half of the middle smallholders (except 5), and all low smallholders followed the common selling price which was LKR 100 (USD 60 cents) per bottle (750ml). It appeared from

interviews that their decision on selling price was influenced by peer pressure, particularly from high smallholders. A quote of one lower smallholder exemplifies this:

> *I don't decide it. Cyril (a high smallholder) asked me to sell one bottle for Rs. 100. So I do (SF 5_Somawathi)*

It was clear that high smallholders vary their selling price in informal selling but they insist that low and middle smallholders stick to the price they set.

If middle and low smallholders decreased their selling price, they indicated that nearby farmers would visit them and get into heated arguments about the price, even when their decision to change their price was not driven by economic gains, but close relationships. One low smallholder whose milk production had ceased at the time of the interview explains:

> *Farmers sell milk for LKR. 100. I sold to neighbours at Rs. 80. They all are my relatives and friends. But some farmers came to my house and rebuked me for that. So, I followed the price they proposed (SF 17_Sumanawathi)*

Impact of social capital (bridging relationships) on milk selling

High smallholders revealed that opportunities for informal milk selling emerged during periods when the Government undertook dairy development programmes. These opportunities were not long-lasting because programmes came and went with changes in governments. From 2011 to 2017, there were opportunities in the study area for farmers to sell milk to pre-schools at high prices under the 'A glass of fresh milk to pre-school children' programme.

In addition, Government offices located within the study area also demanded smallholders' milk. For example, the divisional secretariat office purchased milk when they organised certain functions. Research findings identified that only high smallholders and one middle smallholder benefited from these opportunities facilitated by their social relationships with Government personnel (e.g. veterinary surgeons, divisional secretary) working in dairying related areas. A high smallholder who, at the time of interviews, was selling milk to a kiosk that was not Milco's explains the significance of relationships with the veterinary office for making contacts with new buyers:

> *There is a kiosk in Ambalangoda (a nearby towns to the study area). It started through Ambalangoda veterinary office. Based on the relationship I had with the veterinarian, he introduced me to the kiosk and directed me to supply milk. It pays me a higher price than Mandale (Milco). Currently, I get LKR 75 (USD 50 cents) per litre. I have supplied them 15*

litres every day since it opened in 2008. I also sold milk to three pre-schools. They paid me Rs.70 (USD 40 cents) per litre including Rs.10 of the transport cost. I got that chance through the divisional secretary and veterinary officer in the area (SF 1_Cyril)

Selling cow milk to small-scale yoghurt producers

Data revealed the presence of three yoghurt producers (Sameera yoghurt, Royal yoghurt and DJ yoghurt) in the research area's informal market. As all types of smallholders pointed out, selling milk to yoghurt producers carries a risk as they did not collect milk consistently throughout the year. Yoghurt producers did not collect milk on poya days[10], which are public and bank holidays. Likewise, they stopped collecting milk for ten consecutive days during the New Year festival season which is celebrated in April. Moreover, the uncertainty of selling was triggered by changes in rainfall. According to smallholders, local demand for yoghurts decreased on rainy days as people believed the consumption of dairy products in cold weather makes them ill. Owing to the reduction in local market demand yoghurt producers reduced or stopped milk collection during the rainy seasons.

As one smallholder explains this:

They (yoghurt producers) don't collect milk on Poya days and rainy days. Likewise, they don't come here for a week in the New Year season. We can't do milk selling with such buyers (SF 1_Cyril)

None of the high smallholders sold milk to yoghurt producers at the time of data collection. However, interviews revealed that four of them had sold milk to yoghurt producers in the early stage of their milk-selling trajectories. As those smallholders explained, yoghurt producers were not trustworthy in their milk-selling transactions as they did not act according to the verbal agreements they made. This was one of the reasons for their decision not to sell milk to yoghurt producers. A high smallholder describes this:

A yoghurt producer requested nearly 20L of milk and promised to pay me for that volume even though they could not collect on rainy days. As time passed, they reduced the purchasing volume to 10L and then to 5L. And they did not even pay the agreed price (SF 6_Chandrasiri)

In addition, the irregular milk collection pattern of yoghurt producers did not fit with the high smallholders' selling requirements.

[10] In Sri Lanka, every month has a poya day which is a full moon day devoted to religious observances.

Yoghurt producers were important for nearly half of middle and low smallholders to sell the majority of the cow milk they sold. There are a number of reasons why middle and low smallholders relied on yoghurt producers. First, they received a stable unit price from yoghurt producers for milk supplied within a lactation period and smallholders considered this profitable rather than delivering milk to Milco for variable prices that changed daily based on fat and solid non-fat content of milk. As smallholders described, yoghurt producers had minimal quality requirements for the milk they purchased. Only the water content of milk was critical in getting a good price from yoghurt producers as they took lactometer readings before agreeing to buy and set the unit price accordingly and that ranged from LKR 55 to 70 (nearly USD 30 to 40 cents). A low smallholder explains:

> *He [the yoghurt producer] pays me LKR 65 [USD 0.4] per litre. The fat content of milk is not tested. He just takes the lactometer reading. The price of milk does not change and I'm getting the same price every day (SF 10_Dharmasiri)*

Second, yoghurt producers collected milk from the farm gate. This was a relief for middle and low smallholders who lacked transport facilities. Not having to transport milk saved smallholders time which they could then allocate to livelihood activities. Third, low smallholders valued the personal loans they could receive from yoghurt producers when they were in financial hardship. As emerged in interviews, there were situations when smallholders experienced urgent cash requirements to pay for, for example, animal feed and/or children's education. In such situations, yoghurt producers financially helped them and provided extra relief for smallholders to repay the loan in small instalments from their milk income. Finally, middle and low smallholders described the yoghurt producers as trustworthy buyers as they paid cash on time for the milk they supplied. A middle smallholder states the importance of yoghurt producers in selling milk:

> *It is easy to sell milk to Sameera (name of the yoghurt producer). He comes and collects milk daily. We don't need to transport milk. Even when on some days we have to go to other work we can leave our milk in front of our home and it will be collected. He pays us fortnightly. We don't need to worry about it as he comes and provides us cash (SF 22_Amunugama)*

Selling buffalo milk in the informal market

Out of all interviewed smallholders, only four high and four middle smallholders produced buffalo milk. None supplied buffalo milk to the formal market despite there being no restrictions on doing this. The common practice among buffalo milk producers was to sell their

milk as curd, for a higher price. As the findings of this study revealed, local demand for curd encouraged smallholders to retain the informal market for selling buffalo milk. There was a well-established informal market for buffalo milk in the study area as well as in nearby urban areas. Multiple buyers of buffalo milk included households, local shops, mobile vendors and restaurants. From interviews and confirmed by observations, curd selling produced a higher revenue than selling cow and buffalo milk in liquid forms. One smallholder explains:

> *We get a low price when buffalo milk is sold as fresh milk. Normally, milk buyers give us only half of a curd pot's price. Currently, one pot of curd costs Rs.150. But fresh milk is valued at Rs 70-65 per litre (SF 9_Neel)*

Relationships middle and high smallholders had with community members were important in curd selling. It saved their time, labour and transport cost needed to search and reach buyers. A high smallholder describes how he sells curd through relationships:

> *We don't have any difficulty in selling curd. We have close relationships with people. I supply curd to 2-3 groceries. The thing is I never go after them. Instead, they call me and request (SF 9_Neel)*

Buffalo curd was a traditional ceremonial food that was locally called mee kiri. Owing to the social and cultural value, curd selling marked higher sales on poya days when most people organised almsgivings, followed by weddings, Christmas and the New Year season.

The main problem high and middle smallholders experienced in curd selling was difficulties in selling on rainy days which characterised low demand for curd. Reduction in curd demand during the rainy season was associated with certain common beliefs about the adverse health impacts of curd. It was believed that consumption of dairy products (curd) in cold weather led to mucus/phlegm formation in the body. However, middle and high smallholders coped with this by travelling to nearby villages with unsold curd which they could do because they owned vehicles. Although Milco readily accepted buffalo milk, not differentiating it in any way from cow milk, it was rare for smallholders to deliver fresh buffalo milk to Milco.

High smallholders used a similar procedure to set curd prices as they did in cow milk selling informally. Accordingly, they had the freedom to use the common curd price (LKR 150 per pot) in the area or make alterations to that. They all set selling prices individually, considering the current market price and type and size of the container they used. For example, they used glass bottles, plastic cups and clay pots as curd containers. A smallholder explains:

There is a common price everywhere. We discuss with nearby farmers and neighbours about the price. Also, curd price in supermarkets is checked. Currently, a one-litre plastic cup of Highland[11] curd is sold at Rs. 290 (USD 1.80). But we don't sell our ones at the same price. Considering all these things we decide the price independently. I sell a one-litre plastic cup for Rs.200 (USD 1.20). One bottle (glass) costs Rs.130 (USD 80 cents) (SF 18_Upali)

Unlike high smallholders, middle smallholders did not set the price of curd independently. Instead, they followed the common price (LKR 150) set by high smallholders. A middle smallholder explains how he sets the selling price:

There is a common price everywhere. We can't charge more. We follow it (SF 19_Rohana)

A few middle smallholders emphasised that nearby farmers influenced them to follow their prices when they made a minor alteration to the selling price. A middle smallholder shares her experience in this regard:

A couple of years ago, I sold one pot of curd for Rs. 120 (USD 70 cents). But other smallholders sold at 130 (USD 80 cents). Once they got to know I was questioned. They asked me to increase the price. I told them that I can't do so as all buyers are close friends. But they said no…and insisted that I use their price. Then I did it. Now they sell one pot for Rs. 150, and I do the same (SF 4_Karuna)

It was revealed that high and middle smallholders received large daily orders of 50-100 curd pots for weddings and almsgivings. Sometimes they struggled to process the requested number of curd pots using their own milk. If the order is received in advance, they collect 2-3 days' milk in refrigerators and managed to fulfil the demand. Alternatively, they worked together with other buffalo farmers in the area to maintain the continuity of selling to retain customers. For example, if a smallholder lacks the required volume of milk to process curd they borrowed or bought liquid milk from a nearby farmer in order to meet demand. Most importantly, they made sure to inform the customer about their production levels and to get their consent to use other farmers' milk. Moreover, if smallholders failed to serve a customer during the low production periods, they recommended another curd processor and coordinated the relationship until the sale was made. As such, there was a strong social network between buffalo farmers in the study area that facilitated their selling activities. A smallholder describes how buffalo farmers help each other in curd selling:

[11] Highland is the brand name of Milco's dairy products

When I get big orders to supply 100-150 curd bottles, I borrow liquid milk from nearby farmers. Trust is important here. If the milk I borrow is not good, it will be a problem for me as well as the customer. Some farmers expect money for that milk. Some don't. I do the same when they require liquid milk. We do this as we are close and have the sense of being in a group (SF 18_Upali)

5.4.3 Smallholders' participation in the formal milk market

Smallholders in the study area participated in the formal market primarily to sell cow milk to Milco. All the high smallholders who produced cow milk (7 out of 10) relied heavily on Milco to sell the majority of their production. Owing to their ability to produce relatively large volumes of milk daily (nearly 40L per day), four high smallholders directly delivered milk to Milco's main collection centre. Others sold milk through FMSs, because their daily production was less than 40 litres.

Compared to the high type, middle smallholders' formal market dependency was less. Less than half of middle smallholders (4 out of 11) sold the majority of milk to Milco through FMSs. The rest of the middle smallholders relied highly on the informal market (yoghurt producers) to sell the majority of milk. Similarly, the majority of low smallholders' (5 out of 7) formal market participation was relatively low, but, in contrast, sold a greater part of their production in the informal market. Those who sold in the formal market delivered milk to Milco through FMSs. When opportunities arose, low smallholders diverted milk to the informal market and frequently moved between the two markets.

The size of their daily production volume was a significant factor influencing high smallholders' reliance on the formal market. High smallholders choose to stay with Milco because the large volume of milk they produce could be sold to them since Milco did not place restrictions on the amount of milk they purchased from smallholders. However, high smallholders had less certainty of selling large volumes of milk in the informal market because informal customers determined the amount of milk they purchased and this was fickle. As such, selling large volume of milk in the informal market required engaging with multiple buyers and this was time-consuming. A smallholder describes the importance of the formal market in terms of selling volumes:

We can sell only small quantities to individual buyers (in the informal market). It's easy to sell milk to Mandale [Milco (Pvt) Ltd]. It takes whatever quantity we supply (SF 2_Wijesena)

Unlike high smallholders, middle and low smallholders did not indicate the production volume as a factor that shaped their participation in markets.

Next, regular selling opportunities offered by Milco throughout the year was an important reason why high smallholders chose Milco as their main buyer. A higher smallholder explains:

> *Selling milk to yoghurt producers (informal market) brings us lots of trouble. They don't collect on rainy days and the New Year[12] holidays. So, I supply my production to Mandale. But their milk price is low. We can earn good money if it is sold to yoghurt producers (SF 2_Wijesena)*

On the other hand, low and middle smallholders participated in the formal market with the purpose of minimizing the risk associated with selling to informal buyers. Their tactic was to be active milk suppliers to Milco by supplying at least small volumes. As such, they could sell to Milco whatever the volume they had when informal buyers were not available, especially on rainy days. The quote of a middle smallholder illustrates this:

> *I sell more milk to Sameera (the name of a yoghurt producer). When he doesn't collect milk, I deliver it to Milco. It's really important to hold that relationship. So, some days I supply them one litre or half a litre. It's not for earning money but to retain my membership (in the FMS). So, records will show them that I have supplied them milk every day (SF 10_Dhanapala)*

As interviews revealed, incentives provided by Milco contributed to the different ways in which smallholders participated in the formal market. High smallholders received comparatively more incentives from Milco than other types of smallholders. Evident in interviews, Milco provided free transportation to the majority of high smallholders (6 out of 7) to deliver their milk, irrespective of their daily production levels. The strong relationships that high smallholders maintained with Milco was one of the factors that facilitated to gain free transport facilities from Milco. A high smallholder describes the time and labour benefits he gains as a result of not having to transport his milk to Milco's plant:

> *I supply milk to Milco as they come and collect it. Time is very important to me. I hire out my three-wheeler to earn extra income. I need to go to the bank in the morning hours to do cheque work related to my transport service. Also, I can take a Korean class (SF 26_Dilum)*

[12] Sri Lankans celebrate New Year in April. Interviews revealed that yoghurt producers do not collect milk for nearly 10 days starting from 11 th April.

The majority of the middle smallholders and all the low smallholders did not receive free transport for the milk they supplied to Milco. Only two middle smallholders received free transport from Milco as they had long term and close relationships with Milco's staff. As pointed out by low smallholders, Milco provided more facilities to a selected number of farmers whose production capacity were high. One low smallholder who supplies milk through FMS criticises this:

> *I have to take milk every day to the Bulugaha junction (location of the milk collection point), where the farmer management society is. Milco goes to farmers who produce large volumes. The vehicle comes every day to Cyril ayya 's (ayya means brother in Sinhala) farm, which is next door. They (Milco) show favour to some farmers. They do not come to farms that produce small quantities (SF 5_Somawathi)*

Transporting milk to Milco was a problem for some middle and low smallholders and this meant they relied on the informal market as all the informal buyers collected milk from their farm gate. Transport costs in the formal market directly impacted on middle and low smallholders' profit from milk. For example, some smallholders' farms were located far away from FMSs and the main collection centre. These farms lacked reliable public transport and even if they hired the cheapest mode of transport (three-wheeler), the cost exceeded the daily income they gained from selling milk, especially in the lean production periods. One middle smallholder explains the difficulties in transporting milk to Milco:

> *There are no FMSs near our home. We can't carry milk cans by bicycle as it's a long distance and it should be delivered before 11 in the morning. So, we hire a three-wheeler. It costs Rs 150 (USD 90 cents). There are periods, we get only five, two, or three litres per day. So, if we don't have at least 10 litres we do not send milk to Milco. What we do is, store milk for two or three days in the fridge and deliver it all together (SF 30_Lili)*

Transporting milk competed with middle and low smallholders' other livelihood activities for time and labour. For example, there were situations when they had to both transport milk to the FMS and fulfil other employment commitments. Smallholders indicated that they worked hard to not have to compromise one livelihood activity for another. This led them to alter their milk-selling practices and this included: getting assistance from family members or relatives to transport milk or finding another buyer who provided free transport. One smallholder describes why he made a switch from Milco to informal selling:

> *Collection point in the society (FMS) opens at 9. I find it difficult to bring milk at that time as I miss my other work. I do not have a workshop at home for carpentry. I usually go out when there is any work. So, I decided to supply milk to Sameera (one of the yoghurt*

producers in the area, an informal buyer). I keep the daily milk yield in front of the home. He comes and collects even though there is nobody at home (SF 10_Dhanapala)

In addition to transport facilities, Milco (Pvt) Ltd provided a price incentive of LKR 3 per litre to high smallholders who maintained 40L or more of daily supply. This incentive motivated high smallholders to invest to attain higher production levels and remain in the formal market. One of the high smallholders who received the price incentive at the time of data collection states:

If the production dropped, I would lose that additional LKR 3 (less than USD 10 cents). So, I produce more than 40…actually it's 60 now (SF 6_Chandrasiri)

Smallholders with low production volumes received different benefits from Milco through social security funds maintained by the FMSs. These benefits were not linked to the level of production and volume of milk they supplied to Milco. These benefits were given in situations when smallholders needed cash on special or unexpected occasions in their lives (e.g. medical expenses, childbirth, funerals). In order to receive these benefits, farmers must have membership in FMS and contribute financially to the social security fund. Accordingly, Milco withheld 50 cents from the value of each litre of milk low and middle smallholders provided and this money went to the social security fund. This study identified that only one middle and two low smallholders received incentives from the social security fund since they started milk selling. The majority of middle and low smallholders explained these incentives as less attractive to keep farmers in the formal market.

All high smallholders had a close and strong relationship with Milco staff that they had built over time. They all mentioned that Milco staff personally visited their farms and frequently shared information about milk prices and incentives with them. High smallholders' relationship with Milco started with being regular milk suppliers, then developed into more close relationships through frequent contact. High smallholders strengthen their relationships with Milco through gifting, arranging social work together and providing their farms to Milco for field demonstrations. A high smallholder explains the relationship he has with Milco and how Milco works to establish a relationship with him:

We have a good relationship with the centre manager. If there is an important thing, he calls us. If they need us to bring some curd for their family members, they let us know. When we sell milk to yoghurt producers, Milco officers come and advise us not to. They ask "why don't you sell us your whole production?". Also, they tell us Milco is the one who helps farmers by giving incentives not the yoghurt producers (SF 6_Chandrasiri)

Most importantly, high smallholders believed Milco was trustworthy. On the other hand, they also accepted that it was their responsibility to be a trustworthy milk supplier. So, they stayed with Milco even though they received offers from other buyers to sell milk at attractive prices. A high smallholder who rejected a request to supply milk to other informal and formal buyers explains why he said no:

> *Its easy to sell milk to Mandale (Milco). They collect milk at the farm gate and pay us on time. I have been supplying milk to Mandale [Milco] since it started milk collection in this area in 1978. Ten years ago, a new company called Nestle came into operation in this area. They requested me to provide them milk. But I didn't as I wanted to stay with Mandale. Again, when I supply milk to one of the pre-schools under that Government project, some other pre-schools asked for milk. One pre-school in Aluthwala (a nearby village) wanted 10L per day. But I said no. Because if I sold to them, I won't be able to supply milk for Milco (SF 2_Wijesena)*

Data revealed that the greater number of the middle (except two) and all low smallholders maintained a very different relationship with Milco than high smallholders. The staff of Milco did not visit their farms and no contact was made other than when farmers dropped off milk. The milk testing and pricing procedure used by Milco adversely impacted the relationship middle and low smallholders had with Milco. As all middle and low smallholders explained, Milco tested their milk daily for fat and SNF content. Thus, the milk price they received from Milco fluctuated daily, and middle and low smallholders were not happy about this. However, high smallholders stated that Milco did not test the fat content of their milk daily. Instead, their milk samples were collected weekly or fortnightly. Therefore, high smallholders gained relatively stable milk prices from Milco and it further encouraged them to stay in the formal market.

In addition, middle and low smallholders doubted the transparency of the milk pricing procedure carried out by Milco. In-depth interviews identified a number of situations when middle and low smallholders switched several times from Milco to informal buyers due to weak relationships. As they explained, Milco used to deduct money from smallholders' payments accusing them of adding water to their milk and reducing its quality. A middle smallholder who switched from the formal market to the informal market criticises Milco's milk behaviour towards him:

> *It's a loss selling milk to Milco. They tested fat content. Some misconduct happens in the main centre. Sometimes our milk becomes water when it reaches there. They complain to*

us and reduce money from our payments which are then added to another farmer's account. (SF 10_Dhanapala)

Nearly half of the low smallholders (five) received complaints from Milco for adulterating the milk by adding water. These complaints made them find buyers in the informal market. For example, a middle smallholder whose milk was rejected for three to four consecutive days ended up changing their main buyer from Milco to a yoghurt producer.

As middle and low smallholders explained, Milco made their complaints without understanding the actual reasons that caused low-fat content. Milk produced in the early lactation period is watery as it naturally has a low density and low-fat content. As a middle smallholder states in the following quote, certain grass varieties also increased water content in milk:

There is a grass called "Hulabatu" which grows in mud. It is there in wel (paddy fields). The water content of that grass is high. So, milk becomes watery if animals eat it. Even their dung will be runny. It takes time if you try to boil milk. Dairy farmers know it. However, others do not believe us, if we tell this (SF 10_Dhanapala)

According to smallholders interviewed, another motive behind mixing milk with water was to ensure the well-being of dairy animals. Those who added water to milk strongly believed that if the milk gets caramelised when it is boiled/cooked, it has an adverse effect on the health of cows that produced that milk. They valued dairy animals' lives and good health rather than money, even though they did not have adequate income sources to support their living. Some smallholders admitted adding water to milk, but contested the amount they added and argued for the value it brought to their cows. A smallholder explains this:

I add a small amount of water to the milk. I do it for the good health of my cow. Because if someone boils milk, it can split on the stove and the milk gets caramelized. It's not good for the cow. One litre of milk sold by some farmers contains three-quarters of milk and one quarter of water. People may think that I do the same. I don't do that kind of cheap work. I only add one ounce of water (30ml) into one bottle of milk (750ml). But people do not believe me. (SF 28_Karunarathna)

Low smallholders were aware that buyers were not happy with their practice of treating milk which is described in the market as adulteration. Further, they knew that people considered mixing milk with water as "cheap work" which led to negative consequences for them. In the interviews, they emphasised that the sole objective of treating milk is not for economic

benefits. However, the practice of treating milk returned them low prices in the formal market and sometimes acted as a barrier for their long-term milk selling in the formal market.

Middle and low smallholders mentioned that it was difficult for them to find other buyers once their milk was rejected by Milco. However, they found other methods to minimise economic loss as their production was small. These methods included: making milk toffee for home consumption and processing curd and selling it to neighbours. Sometimes smallholders exited dairying as a result.

A few middle smallholders (two) viewed adding water to milk as cheating their customers and a sin. Cheating customers for financial gain was considered bad as states one smallholder:

> *People pay us for milk. Sometimes they buy milk for patients. I never mix water with milk, even when I sell to households. It's a sin. (SF 4_Karuna)*

Middle and low smallholders explained further that in their view Milco did not accurately measure milk volumes they supplied and misled smallholders by taking incorrect measurements. According to smallholders, due to this, a smallholder who supplied five litres got paid for only three litres. This was economically a disadvantage for smallholders who produce small volumes of milk. A low smallholder outlines what he thinks of Milco's milk measuring process:

> *We know what they do. That's why we measure milk at home before it is delivered. Earlier, we did not do so. They enlarge milk measuring jugs by crushing inside of the bottom. So, we need to give them 4.25 litres to fill the four litres jug. One of my relatives worked in the collection point, and he told me that (SF 15_Dharmasiri)*

In-depth interviews with high smallholders did not reveal misconduct related to Milco's milk collection, and none of the high smallholders received complaints from the formal market regarding the quality of their milk. They had a sound knowledge regarding the possible problem they could confront if the quality of milk was not up to the market standards. A high smallholder shares his opinion about this:

> *You'll lose if you add water to milk you sell to Manadale [Milco]. If you need a profit, pure milk should be sold. For example, if you add 250ml water to 10L of milk, it makes a sudden reduction in fat content. It's like you receive LKR 75 (USD 40 cents) for something that could have sold at LKR 100 (USD 60 cents). It's useless. Some farmers do not know this. So, they add water. It's a loss (SF 2_Wijesena)*

Regardless of the type, the majority of smallholders had multiple livelihood activities in their portfolios. The next section describes how commercial dairy activities were impacted by other livelihood activities.

5.5 Impact of other income-earning activities on commercial dairying

As the findings of this study showed, other income sources in livelihood portfolios were influential on smallholders' commercial dairy activities. High smallholders' portfolios were characterised by a greater level of complementarity between other income sources and dairying, while low smallholders' livelihood activities had the least level of complementarity.

Impact of crop farming on dairying

The majority of high smallholders (9 out of 10) and more than half of middle smallholders (six) engaged in commercial crop farming. The crops they cultivated include paddy, vegetables, cinnamon, tea, coconut and fruits. As paddy was cultivated in both seasons (Yala and Maha) and mainly used for home consumption, only the remainder was sold in the local market generating income. Vegetables were sold to local shops and individual collectors. As smallholders mentioned, vegetables generated income every three months. Smallholders could harvest cinnamon two times per year. A number of harvestings are decided based on the availability of labour and cost of labour. Accordingly, some gained income from cinnamon once a year, while some gained income twice a year. In addition to selling cinnamon bark, three high smallholders and two middle smallholders extracted cinnamon oil which generated a relatively higher income flow than any other livelihood activity. Although the oil extraction is profitable, it did not generate a continuous flow of income throughout the year as smallholders could collect cinnamon leaves only in cinnamon harvesting time. Usually, cinnamon was harvested two times per year. Comparatively, tea produced a year-round income.

Crop farming and dairying complement each other in two ways. First, crop fields provided residues for animals to eat and, in return, manure from animals was used to grow crops. Second, money derived from both income sources was used interchangeably to buy inputs for both activities and cover urgent cash requirements.

Data revealed that low smallholders' involvement in crop farming was the least as they lacked agricultural lands. None of these smallholders cultivated cash crops. Only one lower smallholder cultivated paddy for consumption. He sometimes sold part of the rice harvest but

only when faced with unexpected financial hardship. Nearly half of low smallholders grew small plots of vegetables in home gardens for home consumption.

Other livestock farming: poultry and goat

Poultry was the second most common livestock farming activity carried out by a few high (three), middle (two) and the majority of low smallholders (five). Those who kept poultry had started as the veterinary office provided them free birds under a Government livelihood development programme called Samurdhi (prosperity). It provided ten layers to selected smallholders. Smallholders in all three groups managed to add some village chickens into the flock expecting economic benefits in selling eggs. Usually, village eggs had the highest demand due to their nutritional benefits and were sold at the higher price of LKR 30 per egg. At the time of data collection, three high smallholders kept free-range chickens to produce eggs for home consumption. Sometimes they sold a few eggs to neighbours if they made a request. High smallholders' flock sizes ranged from 10-20 and they reared birds extensively, using a small amount of inputs: land, labour, capital. One of the high smallholders explains their poultry management:

> *We don't have a production cost for eggs. We allow birds to free-range in the daytime. So, they, scavenge for food in the garden. Mostly they peck rice polish that was left over on the floor after feeding cattle. We house them in night (SF 6_Chandani)*

Similarly, two middle smallholders are involved in poultry farming under an extensive management system. Other than egg selling, some generated extra income by selling well-grown hens to nearby poultry farmers. In general, one hen was sold for LKR,800 (USD 5). However, middle smallholders carried out poultry farming as a short-term, income-earning activity. As such, they frequently exited and re-started it.

More than half of the low smallholders produced eggs for selling as their secondary income-earning activity. However, the maximum number of birds each smallholder had did not exceed ten. They preferred poultry farming as it demanded low inputs. However, they did not have the financial resources to expand flock size and make necessary arrangements to protect birds from predators and thieves. Therefore, egg selling became a seasonal income source that derived small incomes. One of the low smallholders explains:

> *I started egg selling eight years ago. We also take some eggs to eat. Now I have got 10 layers and three village chickens. Egg production changes frequently. This is not a thing that produces you money continuously. Three hens are hatching these days. So, no eggs to sell (SF 5_Somawathi)*

Two low smallholders kept turkey birds with layers to sell for meat.

Goat farming was carried out only by one middle smallholder to produce milk for selling and home consumption. On average 3-4 goats were reared and fed mainly tree fodder. As he explained, goats milk was sold at higher prices than cow milk. For example, 250ml of goat milk cost LKR 100 (USD 60 cents). However, goat milk selling was seasonal. He also generated an income by selling live animals to nearby farmers.

It is apparent that other livestock activities carried out by all types of smallholders were mostly at the subsistence level and provided them with an extra income. These activities did not provide significant support for commercial dairying.

Agriculture-related employment

Only one high smallholder was engaged in agriculture-related regular employment in a coconut and cinnamon estate in the study area. Benefits of this employment included a monthly salary and other personal benefits: free accommodation and access to lands for dairying. As this employment derived a stable flow of income, it facilitated dairying financially when the smallholders required cash to buy inputs.

High and middle smallholders did not engage in agriculture-related labour work for their living. Casual on-farm labour work was highly crucial for low smallholders. Labouring work was available on paddy farms and during cash crop cultivation. It revolved around land preparation, weeding, cinnamon peeling, fertilising, harvesting, repairing drainage systems and planting seedlings. All the agriculture-related labour work was seasonal and was not particularly complementary to dairying.

Non-agricultural livelihood activities

From findings, smallholders' non-agricultural income sources were generally labour work, salaried employment and self-employment. Nearly half of low smallholders relied on general labour work which included logging, construction work and delivering bakery products. All labour work was seasonal and derived low incomes. No low smallholders had salaried jobs or were self-employed.

A Government sector job provided the main income for only one middle smallholder. Middle smallholders' self-employment included carpentry and transport services. On the other hand, two high smallholders produced income from non-agricultural activities. One carried out self-employment activities related to transport service, the other received income from a government sector salaried job. Non-agricultural livelihood activities of high and middle

smallholders generated stable and relatively high incomes and financially supported dairy-related activities when required.

Family and Government remittances

High smallholders did not rely on remittances for living. Two middle smallholders depended on financial support given by their children and two received monthly remittances provided by the Government Samurdhi development programme. According to interviews, low smallholders received limited support from family members as they also were not financially well off. Monthly Government remittances were an important component of nearly half of low smallholders' livelihoods. The remittance each low smallholder received varied with their family size. For example, some smallholders whose family size was two, received LKR 1200 per month (nearly USD 7), while large families with 4-5 members received LKR 3000-3500 (nearly USD 18-.22)

As revealed through interviews, remittances sometimes facilitated middle and low smallholders to save part of the dairy income and sometimes buy inputs such as animal feeds, and ropes to tether animals.

5.6 Commercial dairy trajectories pursued by smallholders

So far, the findings presented have described how smallholders participate in milk markets over a year. Factors that shaped the annual milk selling patterns were identified by considering both the static form of dairying and circumstances in smallholders' livelihoods that occurred historically since they first started dairy farming. To further enhance the understanding of how existing production and selling patterns emerged over time and what factors shaped them, this study analysed the commercial dairy trajectories of all smallholders. The findings of the research identified three trajectories pursued by smallholders and they are aligned with the three types of smallholders. High smallholders' trajectories were relatively stable from the start of dairying to the current level of production and selling. Middle smallholders had fluctuating trajectories which were highly dynamic. The low type had vulnerable trajectories in which they were locked into low levels of production and irregular and inconsistent patterns of selling. The majority of commercial dairy trajectories followed by smallholders were made up of a number of dairy strategies: stepping up, stepping down, stabilizing, hanging in and dropping out. Before describing the three types of trajectories, the below section describes each dairy strategy as they relate to this study.

Stepping up - investment in dairy related assets (lands, dairy cows, farm machinery) to expand milk production and selling to improve livelihoods

Stepping down – reduce production levels and selling volumes by choice or necessity. This strategy is characterised by the loss of or reduction in dairy related assets (e.g. reduction of herd size, reduced access to land and labour)

Stabilizing – contribution of milk selling to total income is stable considering income gained from the overall livelihood portfolio. When stabilized, investments are made when required to maintain the production and selling at a desired level.

Hanging in – dairying is carried out with a low level of inputs just to maintain livelihoods. This strategy is often done when farmers are in a vulnerable situation and do not have the capacity to invest in dairying even though they would like to increase production and selling.

Dropping out – smallholders terminate milk production and selling by choice or through necessity.

The following section describes these commercial dairy trajectories and the factors associated with them.

5.6.1 Characteristics of stable commercial dairy trajectories and factors that shaped them

Three dairy farming strategies: stepping up, stepping down and stabilizing, were prominent in stable trajectories. Stable dairy trajectories are distinguished by sporadic periods of significant investment (nearly 2-3 years) to improve production, selling, and income (stepping up). For example, some of the investments high smallholders made included buying lands, machinery and high-quality dairy cow breeds. Then, there were periods in trajectories when high smallholders purposefully step down in commercial dairying by reducing production and selling for a variety of reasons (e.g. ill-health, labour shortage in the area). However, for all, milk selling was a consistent income source in their livelihood portfolios. When there were unexpected production drops that adversely impacted their selling, they allocated resources (financial capital, lands, social relationships) to bring back the production levels. For example, a high smallholder who lost a number of animals due to flooding used his savings to purchase animals and carry on producing milk and selling. Another high smallholder lost seven dairy cows due to a disease and it reduced his daily production by half. He managed to come back to the normal production and selling status by buying cows using a formal bank loan he received with the assistance of Milco. Stable trajectories were also characterised by significant

periods of stabilizing strategies (e.g nearly five years). Smallholders stabilized their production and selling at a level of milk income they deemed sufficient for living. For example, one of the high smallholders stabilized his production and selling for three periods within the trajectory. Initially, he produced 40L daily for selling for nearly 15 years and then decided to double daily production as he had increased expenses for his children's education. Then he stabilized selling of 80L milk daily to markets for five years. Once his children were employed, he decided to bring back the production level to 40L again and stabilize.

All the high smallholders (except buffalo farmers) chose the formal market (Milco) as the main milk buyer since the early stage of milk selling. Thus, the majority of their production reached Milco throughout their trajectories. In addition, three high smallholders diverted nearly one-third of their production to small-scale yoghurt producers for a particular period (one to two years) in their milk selling trajectories. As they explained, this was an attempt made to find the most suitable market that fit their selling requirements. However, those who delivered milk to yoghurt producers ended up with the decision not to supply them milk in future as there was a risk associated due to irregular collection. High smallholders perceived them as less trustworthy as they failed to purchase the agreed quantity of milk and pay the agreed unit price.

Since the start, the majority (8 out of 10) sold a small volume of milk to households when demanded. Most importantly, none of the high smallholders made complete switches from the formal market to the informal market to sell milk. In terms of non-commercial functions of milk, the majority (8 out of 10) used milk daily for home consumption and a few (3) gifted small volumes to villagers occasionally throughout trajectories.

As a whole, the research findings identified stable trajectories associated with a high level of income activity diversification. Over time, these farmers developed a combination of livelihood activities that were complementary to each other and enabled regular and consistent engagement in the dairy market. For example, a high smallholder received access to a coconut plantation to graze animals and received two acres of free land to cultivate grass through his employment as an estate supervisor. This secured his employment in the estate as dairying provided manure for coconut plants and ensured his availability in the estate all the time. Similarly, commercial crop farming provided residues to feed animals, and this was important during dry periods when grass was scarce. On the other, dairying provided manure for the crops.

In stable dairy trajectories, commercial dairying was important for earning income, consumption, spread risk through diversification, accumulation of wealth over time and, finally, and to a lesser extent, social functions (e.g. gifting). The accumulation of assets over time was also a characteristic of smallholders who pursued stable trajectories. Finally, it was noticeable that these smallholders changed their beliefs and attitudes related to dairy-related norms and religious beliefs over time and, as was evident in the previous results, sought also to influence other farmers in ways that benefited the incomes they could generate from dairying.

5.6.2 Characteristics of fluctuating commercial dairy trajectories and factors that shaped them

Fluctuating trajectories were more turbulent, made up of irregular upward and downward movements repeated over time. These trajectories consisted of a mixture of stepping up, hanging in, stepping down and dropping out strategies. Access to resources was a limitation for middle smallholders to invest in dairying or to step up as high smallholders could. However, there were situations all made efforts to enhance production and selling using their savings, family remittances and incentives received from the Government. When dairying was affected by adverse factors (e.g. loss of animals, problems in AI) they had a moderate level of resources to cope with and bring back the production and selling to the level it had been. Sometimes they could manage the situations and sometimes could not. However, the stepping down strategy was mostly driven by necessity rather than by choice. For example, two middle smallholders ran farms with low production for a few years as their cattle were stolen. There were situations when all middle smallholders hung in when they experienced adverse circumstances such as loss of primary income, and ill-health. In such situations, they avoided investing in dairying and whatever production they got was sold for money.

Market participation activities in this trajectory were characterised by multiple switches made from one market to another (e.g. formal to informal and then to formal). For example, a middle smallholder who produced cow milk, delivered milk to the formal market for a few years. As he could not meet the required quality standards, he moved to informal selling and again, after a few years, he started delivering milk to the formal market. Again, he moved to the informal market as his milk was priced low by Milco.

The fluctuating trajectory was associated with a moderate level of diversification, and a moderate to low level of asset accumulation. In these trajectories, commercial dairying facilitated the exchange function, low to moderate levels of asset accumulation, spread risk

through diversification and social functions. Throughout their trajectories, a few middle smallholders (nearly 4) changed their views and attitudes on norms and religious beliefs related to dairying. At the time of data collection, they had reduced their adherence to norms related to dairying, but not as aligned to a commercial logic as the high smallholders.

5.6.3 Characteristics of vulnerable commercial dairy trajectories and factors that shaped them

Smallholders who went through vulnerable trajectories were hanging in dairying as they lacked resources to move beyond this. Only one low smallholder stepped up for a considerable period (e.g. stepping up slowly for 5 years) in the early stages of their trajectories. When situations (shocks) impacted their production and market participation, these smallholders had little capacity to bounce back. For example, due to the sudden death of one milking cow in their herds, a few low smallholders experienced no production periods for a few years and waited until their female calves matured as they lacked the financial capital to purchase a cow to continue milk production and selling.

In terms of milk selling, low smallholders also made complete movements across the formal and informal milk markets several times for a number of reasons, which included the high price in the formal market, lack of transport facilities and weakening of relationships with milk buyers. Milk selling provided low smallholders with income for their survival and spread risk through diversification. but the contribution of dairying to asset accumulation was not significant. Milk made a significant contribution to their livelihood through its social function (e.g. gifting). It facilitated reciprocal relationships, maintained and strengthened their social network and, in particular, their bonding relationships. Finally, it ensured villagers' assistance for access to resources (e.g. lands, labour).

Vulnerable trajectories were associated with the least level of income diversification. The majority of low smallholders experienced loss of stable income sources throughout their livelihood trajectories. This reduced the possibilities for complementarity between income activities and, therefore, also the support needed to achieve stability and continuity in dairying. Their accumulation of assets was also limited. Considering the overall trajectory, it can be seen that low smallholders' are trapped in low-producing, unstable and vulnerable dairy livelihoods when compared to the other two types of smallholders and trajectories.

5.7 Conclusion

The findings presented in this chapter illustrate the differences and diversity of smallholder milk production and market participation in a context where both formal and informal markets operate providing a variety of options for selling different types of milk and milk products. This study identified three categories of smallholders as high, middle and low based on their differences in milk selling patterns and milk production systems. Inductive analysis of data on smallholders' participation in commercial dairying derived three criteria: regularity of milk selling, consistency of volume sold and type of market to which they delivered the majority of their milk, which differentiate these smallholder categories. Smallholders' differences in market participation across these criteria were strongly associated with smallholders' asset endowment, livelihood activity diversification, and adherence to social and cultural norms linked to cows and milk.

High smallholders who were well-endowed across all five assets generated a regular flow of income from dairying through a continuous supply of relatively high and consistent volumes of milk to markets. They are the ones who participated most in the formal milk market but also dominated informal milk selling. For the low smallholders who lacked assets, dairying provided seasonal income. Their milk selling pattern was characterised by irregular selling of low and inconsistent volumes. Low smallholders relied highly on informal selling. Middle smallholders' selling patterns consisted of both regular selling of consistent volumes and seasonal selling of variable volumes. A half of middle smallholders relied highly on formal selling while others participated most in the informal market.

In Gonapinuwala, both formal and informal markets coexist, providing dairy farmers with a variety of milk-selling opportunities to sell different types of milk and milk products. The formal market is distinguished by milk quality requirements. State-owned Milco (Pvt) Ltd carried out the formal milk collection in the area and cow milk was the most common type of milk farmers delivered to Milco. The formal market (Milco) demanded milk quality and the price of milk was determined based on the fat and SNF content. The formal market did not distinguish between buffalo and cow milk and used the same pricing procedures for both types of milks.

The informal milk market in the area consists of multiple buyers and it has less concern for milk quality. Smallholder dairy farmers sell both cow and buffalo milk in the informal market. Buffalo milk was always sold to informal buyers as curd. The informal milk market in the study

area valued cattle and buffalo milk differently and even provided opportunities for smallholder dairy farmers to sell value-added milk products (e.g. curd, and yoghurt). Informal milk selling did not demand quality standards and the price of milk was not controlled through a milk pricing mechanism. As such, high smallholder farmers and small-scale yoghurt processors could set the milk price.

Consistent with the three categories of smallholders that emerged as relevant to market participation, the historical dairying and livelihood trajectories of smallholders were also distinct with high smallholders identified as following a stable trajectory, the middle a fluctuating trajectory and low smallholders a vulnerable trajectory.

The theoretical and practical contribution of these results to the field of rural development and smallholder commercialization studies, including smallholder trajectories, is now discussed and explored in the following chapter.

6. DISCUSSION

6.1 Introduction

This chapter discusses the key findings that answer the research question of the study, 'how do smallholder farmers engage in commercial dairy activities in Sri Lanka and why?', in conjunction with relevant literature and the research context. This study shows the dynamic nature, diversity and complexity of smallholders' commercial dairying and how the existing patterns of milk production and selling emerged over time under the influence of different factors including asset endowment, social norms and social relationships. The chapter is organized into seven sections including the introduction. Following the introduction, it discusses smallholders' diversity in milk production and selling patterns in section 6.2. Section 6.3 explores the diversity of commercial dairy trajectories And, In section 6.4, factors that shape different commercial dairy trajectories are described. Section 6.5 discusses the contribution of commercial dairying to smallholder livelihoods based on the holistic analysis of livelihood portfolio and then, in section 6.6., brings forward an argument on why smallholders have not made the transition from informal to formal markets as expected by the Government. The final section presents a summary of the chapter.

6.2 Smallholder diversity in milk production and selling

The findings of this study illustrate that smallholders' commercial dairy activities are complex, dynamic and diverse. Their differences, however, can be organized into similar sets of criteria. Based on criteria related to production systems and milk-selling patterns, this study identified that Sri Lankan dairy farming smallholders can be categorised into high, middle, and low. High smallholders were endowed with a relatively high level of assets, had highly diversified livelihood activity portfolios and maintained relatively high input-output dairy production systems. Some of the high smallholders maintained buffalo or cattle-buffalo mixed farms. They showed a high level of formal market participation, selling relatively high and consistent volumes of milk regularly throughout the year. In addition, they were able to supply different types of milk across multiple markets: informal and formal. Middle smallholders were endowed with a relatively moderate level of assets and had diversified their livelihood portfolio to a lesser extent than the high smallholders and, likewise, maintained dairy production systems characterised by levels of input and output that were less than the high, but more than the low smallholder farmers. Some of the middle smallholders also keep only buffalo or both cattle and buffalo at the same farm. Nearly half the middle smallholders were

regular milk sellers who also supplied relatively consistent volumes of milk to both informal and formal markets. The other half of middle smallholders sold milk irregularly and the volumes they supplied to market were low and variable. Similar to high smallholders, middle smallholders also accessed all the markets: informal and formal, available for milk-selling.

Low smallholders are resource-constrained, endowed with the least assets of the smallholders, had the least diversified portfolios and ran low input-low output dairy farms based around only dairy cattle. They were seasonal milk sellers and delivered variable volumes of milk to both informal and formal markets but were mostly reliant on one type of milk (dairy cow milk) in the informal market to sell the majority of their milk.

This study explores smallholder diversity in commercial dairying and examines the dynamics associated with production and selling patterns over time. A broad perspective of milk market participation is taken, one which included the regularity of selling and consistency of volumes sold throughout the year, and the predominant type of market in which smallholders participated. Milk-selling emerges as a common livelihood activity all smallholders repeatedly carried out throughout the year for their living. Milk-selling is highlighted as a dynamic process in which the frequency of milk-selling and the volumes sold are not consistent across all smallholders. Previous studies take a narrow, static view of smallholders' market participation, focusing only on the proportion or quantity of output sold from the total production within a specific time period (within a month, season or year) (e.g. Bardhan et al., 2012; Chamboko, Mwakiwa, & Mugabe, 2017; Kembe, Omondi, & Waga, 2016). Many other studies (e.g. Musah et al., 2014; Zamasiya, Mango, Nyikahadzoi, & Siziba, 2014) related to other agricultural commodities conceptualize smallholder market participation in almost the same way. The market participation definition these studies use fails to capture the regularity of selling. Instead, market participation or selling is reflected as a once-a-month or once-a-year activity. Similarly, these studies do not provide insight into the variations in quantity sold across selling activities and the type of market in which smallholders participate the most.

In an effort of identify smallholders' differences/diversity in commercialization and the factors that influence this, many studies used the Household Commercialization Index (HCI) or Crop Commercialization Index (CCI) (e.g. Abu, 2015; C. L. Anderson et al., 2020; Kembe et al., 2016; Mulwafu, Krishnankutty, & Krishnan, 2013; Opondo, Dannenberg, & Willkomm, 2017), which is the proportion or value of farm output or crop production sold during a specific time period. For example, through a study carried out to analyse the influence of socio-cultural factors on smallholders' dairy commercialization, Kembe et al. (2016) identified two farmer categories:

subsistence and semi-commercial, based on the HCI. Similarly, analysing the intensity of groundnut selling and determinants that impact smallholders' differences, Abu (2015) identified three groundnut farmer categories based on the HCI as low commercial farmers (sell at most 25% and below their output), medium commercial farmers (sell between 26 and 50% of output) and high commercial farmers (sell above 50% of output). However, as criticised by other scholars, the use of HCI or CCI to identify differences between smallholders' commercialization seems to provide misleading outputs. For example, as Leavy and Poulton (2007, p. 6) explained, this index "makes no meaningful distinction between the farmer who produces just one bag of maize and sells that one bag and one growing 50 bags of maize who sells thirty of them". Accordingly, HCI denotes the first farmer is more commercialised (HCI equals 1) than the second farmer, which is not true. However, despite this weakness, an extensive body of commercialization literature has applied this index to assess the degree of smallholder commercialization in developing countries based on the assumption that farmers who produce small quantities do not sell all of their products and it is unlikely that farmers who produce a relatively large amount of agricultural commodities sell none of it (Musah, 2013).

As this study highlights, regularity of selling and consistency of volume sold are as important as the proportion of output sold in understanding how smallholders conduct commercial activities, as an uninterrupted flow of income from selling is critical if farmers are to transition from subsistence to commercial. Similar to this study, other scholars (e.g. Jaleta et al., 2009; Olwande et al., 2015) argue that gaining a realistic understanding of smallholder commercialization required studying changes in production and selling patterns over time. The literature on smallholders' participation in high-value and export markets also emphasises the importance of consistency in supplying a specific product in consistent volumes to the market because it ensures smallholders' long-term survival as sellers and improves their livelihood (Dolan & Humphrey, 2000; Tobin, Glenna, & Devaux, 2016). To date, except for a recent study on the impact of agricultural commercialization on household welfare in rural Vietnam (Cazzuffi et al., 2020) which acknowledged the distinction between farmers as regular and occasional sellers, previous market participation studies have not used the regularity of selling and consistency of volume sold over time as important elements that differentiate smallholders' market participation. As this study suggests, regularity of selling and consistency of production volumes sold are important in identifying distress sales when they sell agricultural production in unexpected and urgent money requirements emerged. As

scholars have described, distress sales are driven by necessity and not a commercial motive (Prügl, Reysoo, & Tsikata, 2021; Temesgen, 2014).

In this study, the presence of both an informal and formal market contributed to differences in market participation across the three categories of smallholders because the markets smallholders engaged in the most varied. The existence of both formal and informal milk markets is a noticeable feature in many other developing countries (e.g. India, Bangladesh, Tanzania, Kenya, Thailand). This likely reflects the traditional nature of dairying as a livelihood activity in these countries. What this study does provide evidence of is the complexity and diversity of smallholder participation in markets in developing countries where an emerging formal market is developing alongside a pre-existing informal market. In this situation, this study shows that high, moderate and low levels of asset endowment and income activity diversification correspond with high, moderate and low levels of formal market participation. For example, highly resource-endowed smallholders participated in the market regularly, delivering relatively high and consistent volumes of milk and vice versa. Differences in smallholders' milk market participation based on the type of market and differences in asset endowment were also identified by a few other scholars (e.g. Birthal et al., 2017; Navarro et al., 2015). For example, in understanding farmer and dairy processors' interactions in the contexts where both formal and informal milk markets operated, Navarro et al. (2015) identified resource-rich farmers' reliance on the formal market while resource-poor farmers supplied their milk to informal channels. Some of the existing literature on milk market participation focused only on one type of milk production: only cow milk-selling (e.g. Chamboko et al., 2017; Kuma, Baker, Getnet, & Kassa, 2014) or only buffalo milk-selling (e.g. Singh & Rai, 1998; Tarunvir & Sudhakar, 2014). Additionally, some scholarly work analysed market participation without distinguishing the type of milk and market (e.g. Berhanu, Derek, Kindie, & Belay, 2014). The complexity and diversity of smallholders' milk market participation relates to the presence of both an informal and formal market is discussed in detail in section 6.4.4.

6.3 Diversity of smallholder commercial dairy trajectories

This research adds to a growing body of work that explores smallholder market participation dynamics over time. To date, most of the literature on smallholder market participation has confined its analysis to a single time frame. For example, studies on determinates of market participation (e.g. Berhanu et al., 2014; Chamboko et al., 2017; Kyaw, Ahn, & Lee, 2018), and market channel selection (e.g. Berem, Obare, & Bett, 2015; Kadigi, 2013). To date, a few

scholars empirically examined the existing market participation activities in relation to smallholders' changing historical context based on livelihood pathways and trajectories. For example, Gwiriri et al. (2021) analysed smallholder livelihood trajectories in order to understand how they draw upon assets making the transition from subsistence to commercial cattle farmers. Additionally, studies conducted by Vicol (2019) and Belton et al. (2017) provide an understanding of smallholder farmers' commercial activities in relation to their historical context of livelihood pathways although their main focus was on analysing the implication of contract farming Vicol (2019) and pangasius crop boom Belton et al. (2017) on agrarian change.

This study shows that high, middle and low smallholders pursued diverse commercial dairy trajectories to reach the current production and selling patterns. Their trajectories were made up of different dairy strategies, and changes over time were not linear. Similarly, other scholars have identified the non-linearity in analysing livelihood dynamics (e.g. Mushongah & Scoones, 2012; Valbuena et al., 2015; West, 2013). Analysis of livelihood pathways in the study identified three commercial dairy trajectories: stable, fluctuating, and vulnerable trajectories, pursued by three types of smallholders. High smallholders' trajectories were relatively stable from the start of dairying to the current level of production and selling. Middle smallholders had fluctuating trajectories which were highly dynamic. The low type had comparatively vulnerable trajectories.

This study applied the schema presented by Dorward (2009) to identify how commercial dairy strategies change throughout trajectories. As results showed, the majority of dairy trajectories are made up of multiple strategies (e.g. stepping up, stepping down, hanging in, stepping out and dropping out) that are made by choice or by necessity (Ellis, 2000), and the strategy they were pursuing at the time of data collection did not always reflect their overall dairy strategy. However, it was also the case that some smallholders had only ever pursued one dairy strategy in their commercial dairy trajectories. For instance, smallholders who were hanging in at the time of data collection had stuck to the same strategy since the start of their dairying career.

This study adds stabilizing as a strategy to Dorward's schema to recognise the strategy illustrated by high smallholders who had moved beyond stepping up. As this study identifies, some smallholders actively sought to maintain a stable level of milk production and stable selling strategy which cannot be explained using Dorward's existing schema. Stabilizing is a strategy smallholders used when they decided production levels and income gained from selling milk was sufficient for their living in the context of their overall livelihood portfolio.

When following this strategy, smallholders invested to maintain desired production and marketable volumes with no intention to expand or shrink dairy activities.

The stable trajectory pursued by high smallholders comprised three strategies: stepping up, stepping down and stabilizing. Overall, stepping up and stabilizing strategies were prominent. These strategies were mostly taken out of choice as they had sufficient resources. Fluctuating trajectories of middle smallholders were comparatively more dynamic and consisted of a mixture of hanging in, stepping up, stepping down and dropping out strategies made both out of choice and necessity. Low smallholders who had vulnerable trajectories were hanging-in dairying as they lacked resources to step up and as they were highly dependent on dairying for their livelihoods, they remained in dairying out of necessity. A few low smallholders had pursued stepping up, and stabilizing strategies for a considerable period of time (e.g. stepping up slowly for 5 years, then stabilising for 6-7 years) in the early stage of their dairy trajectories, and then moved into stepping down and hanging in strategies through the rest of their dairying trajectory. The next section discusses the dynamics that explain the diversity and complexity of smallholders' commercial dairy activities.

6.4 Factors that shape commercial dairy trajectories

Smallholders' differences in commercial dairy are shown in this research to be shaped by multiple factors including their level of asset endowment, livelihood diversification, and extent of adherence to sociocultural norms. The following subsections describe how these factors impact the regularity of production, volume delivered to market and type of market stallholders who participated in and diversification within dairying.

6.4.1 Impact of assets endowment and diversification of livelihood portfolio

The empirical results of this study confirm what other scholars have shown (e.g. Olwande et al., 2015; Otieno, 2020) that differences in smallholders' assets endowment are associated with their differences in production and milk market participation. In this research, smallholders with high asset endowments participated most in the formal market delivering relatively high and consistent volumes regularly. On the other hand, low-asset endowment was linked to informal selling of irregular, low and variable volumes of milk. Nearly half the moderately asset endowed smallholders delivered consistent volumes of milk to the formal market regularly, while other middle smallholders irregularly sold milk in low and variable volumes This association between assets and market participation, as shown in this study, provided more richness to what an extensive body of literature has also shown (e.g. Boughton

et al., 2007; Hagos et al., 2020; Musah et al., 2014; Olwande et al., 2015; Sebatta et al., 2014). For example, similar to this research, but looking across multiple livelihood activities including dairy, Olwande et al. (2015) revealed that farmers who sold high quantities of maize, kale and milk were wealthier across all assets. However, these studies discussed only the asset-market participation dichotomy showing that high-asset endowed smallholders have high levels of participation in the markets by selling a relatively high proportion of their agricultural production and vice versa for low-asset endowed smallholders. These studies did not provide an understanding of those farmers who exist in between high and low extremes. Like this study, recently published research related to smallholder dairy farmers and their commercialization, examined the differences across farmers' asset endowment and its link to market participation. Results of Otieno (2020) revealed moderate resource endowment is associated with a moderate level of milk volumes sold to market.

This study was carried out in a context where there were multiple market channels across the informal and the formal market for the type of milk and milk products produced by smallholders. Smallholders with overall higher asset endowment were able to choose and access all potential market options and meet the preferences of these markets in terms of quality of milk, and type of milk products. For example, high smallholders met the preferences of the formal market in a way that gave them advantages over middle and low smallholders. Furthermore, they were able to access and engage in other informal markets in which they chose to be part. This resulted in an ability to secure a consistent and regular income from commercial dairying. Smallholders with low asset endowment overall or in one or more assets were more limited in which market channel they could participate in and tended not to be able to engage in a way that met the full expectations of the formal and informal markets, or that ensured a regular source of income from these activities. This finding provided supporting evidence for the argument made by previous scholars that not all smallholders are able to choose which market channels they participate in. As they explained, it was resource (assets) rich smallholders who could make choices over markets and participated most in lucrative, well-organized, modern markets as they have the capacity to fulfil market requirements (e.g. quality standards, certifications) (Neven, Odera, Reardon, & Wang, 2009; Rao & Qaim, 2011; Sharma, 2015). On the other hand, resource-poor smallholders struggled in participating in modern markets (e.g. formal milk markets handled by private processors, and supermarkets) as they lacked the ability to meet market requirements (e.g.Challies & Murray, 2011; Sharma, 2015). As some scholars argue, (e.g. Handschuch, Wollni, & Villalobos, 2013; Sharma, 2015) resource-poor farmers are threatened with exclusion from modern markets.

Most importantly, the key results of this study illustrate that it is not only the amount of assets, but also the synergy (cooperation between assets to produce a combined effect) between the five assets that are pivotal for smallholders to engage in commercial dairying activities regularly. The synergy between different assets was an outcome achieved by smallholders through a combined process of asset accumulation, asset depletion, and asset transformation over time. The level of synergy that supports market participation in dairying emerged when smallholders' asset portfolios were at a high level in terms of amount and diversity. This has received less attention in market participation literature except in a few studies (e.g. Gwiriri et al., 2021). The importance of asset synergy is clearly illustrated in this research and supports strongly what is emphasised in the SLF: "people require a range of assets to achieve positive livelihood outcomes; no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek" (DFID, 1999a, Livelihood assets 2.3). Smallholders with relatively high assets had a degree of synergy that facilitate their commercial dairying. For example, they had lands, grass cultivation, financial capital to buy feed and labour, farm machinery and strong social relationships to derive desired income from dairy animals. On the other hand, constrained by assets, low smallholders lacked asset synergy. In simple terms, although they owned dairy animals, the lack of other assets (land, labour, and finances) constrained their ability to generate a regular flow of income from milk selling. The middle smallholders are located between the low and the high. Although middle smallholders are moderately endowed with all five assets, their asset portfolios were not at a level across all five assets, in terms of quantity and diversity of assets, to result in the required level of synergy to enable them to move beyond fluctuating trajectories and achieve stability in commercial dairying overtime. Similar to this study, recent scholarly work done by Gwiriri et al. (2021) also provides evidence to highlight the important role of asset synergy for smallholder market participation. According to Gwiriri et al. (2021), all smallholders who received access to sufficient lands through a land reform did not move from subsistence to commercial cattle production, owing to a lack of synergy between assets caused by the limitation of assets other than land (e.g. human, financial, social and physical).

In addition, this study empirically shows how the synergy between five assets has translated into power relationships between three smallholder categories and how it impacted their milk-selling activities. Accumulation of dairy-related knowledge and skills (human capital), combined with other types of assets, enabled highly asset-endowed smallholders to have a high level of synergy in asset portfolios. This level of synergy between all five assets was lacking in middle and low smallholders' assets portfolios. Additionally, middle and low

smallholders depended on high smallholders to access certain resources such as market information, knowledge and skills related to dairying, creating asymmetric exchange relationships across smallholder categories. Asymmetry of exchange, or lack of balanced reciprocity, was evident in power dynamics between high, middle and low smallholders in commercial dairying. High smallholders illustrated a degree of power in their relationships with other smallholders that was not evident between other smallholders. The findings support the argument made by Bebbington (1999), who stated that assets are more than just the things people use to make a living. Assets enable them to act, challenge rules governing asset usage and generate a sense of power in society. Even though Bebbington made this point many years ago, it is still a highly discussed topic in the livelihood literature. The high smallholders determined the selling price for cow milk and buffalo curd in the informal market and enjoyed the freedom of not following the set price. Using their resources, they navigated the informal market for their own benefit. Through peer pressure, they actively sought to influence low and middle smallholders to stick with the selling price they set and to not undermine this price (which some smallholders had been doing). High smallholders felt empowered to influence other smallholders in the market in order to gain additional benefits from their market participation. In this research, the high smallholders derived benefits through influencing other smallholders.

Power relationships identified in this study between smallholder categories emerged as a factor that shaped their milk-selling patterns and it seemed also to impact on the benefits they could derive from milk-selling. This finding adds a new perspective to smallholder market participation literature as previous studies have not examined the power relationships across farmers and how it plays out in markets other than exploring power inequalities between farmers/producers and buyers (e.g. Promme, Kuwornu, Jourdain, Shivakoti, & Soni, 2017).

Differences in farmers' asset endowments, in terms of both amount and diversity of assets, are influential on the level of diversification, is pointed out in the livelihood diversification literature (Martin & Lorenzen, 2016). Smallholders with more diverse assets have a wider range of options and the ability to diversify their livelihood activities to secure livelihood through a variety of means, including spreading risk and wealth accumulation. Complementarity and other inter-relationships between livelihood activities in diversified portfolios enable them to build livelihood resilience providing multiple options to respond to unexpected stresses and shocks (Berbés-Blázquez, Mitchell, Burch, & Wandel, 2017). Empirical evidence in this research aligns with these arguments by showing that high smallholders who had the highest level of diversification coped with fluctuations in production

and impacts to their production systems and were able to minimise the impact of shocks and maintain a stable commercial dairy trajectory with regular selling of milk and milk products in line with market expectations. What emerged in this research is that both: the level of diversification (high or low – the number of activities in the portfolio) and the composition of activities in the portfolio are important in achieving a level of resilience that facilitated the continuity of selling a fixed and relatively large volume of milk across multiple markets. Middle smallholders who had a moderately diversified portfolio with one or no stable income sources provide a good example of this. These smallholders had a level of diversification (number of activities) and composition of activities which resulted in a fluctuating trajectory, was characterised by a moderate level of resilience to respond to shocks in production and selling. Low smallholders who were asset-constrained had limited options to diversify their income activities. They had the least level of diversification, were heavily dependent on dairy as a livelihood activity and lacked a balanced, or complementary mix of activities compared to the high smallholders. In addition to dairying, smallholders undertook labouring work to earn income. For them, diversification was a sign of a distressed livelihood, and this was translated into seasonal selling and limited access to milk markets. These findings support Cochrane and Cafer (2018) critique of diversification in smallholders' livelihoods pointing out the limitations of diversification which, in some instances, was the case for smallholder farmers in this research, does not contribute to livelihood resilience. Seeking off-farm work added additional pressure to smallholder's livelihoods as this activity competed with the available time and labour they had available for livelihood activities.

This study provides an in-depth understanding of how the differences in the endowment of assets, diversification and, finally, overall livelihood well-being, link with differences in smallholders' market participation, looking at their overall livelihood portfolio holistically. Dairying is only one of a number of income-earning activities for all smallholders in this research and studying it in isolation will not provide a comprehensive understanding of how and why smallholders engage in commercial dairying. Supporting other scholars (e.g. Béné & Friend, 2011; Ota, Herbohn, Gregorio, & Harrison, 2020) this study illustrates the value of taking a holistic approach to exploring how commercial dairying fits into smallholders' overall livelihood portfolios. As explained by De Haan and Zoomers (2005) and DFID (1999a), holistic analysis enables the identification of all aspects of the livelihood portfolio, its interconnectedness and how each activity relates to other livelihood strategies.

6.4.2 Impact of social capital on commercial dairy trajectories

Highly endowed smallholders who maintained stability in milk production and participated in the formal dairy market regularly selling large and fixed volumes of milk possessed strong bonding and bridging social capital. In contrast, poorly resource-endowed smallholders, who were heavily dependent on the informal market delivering milk seasonally in low and variable volumes, possessed and heavily relied on strong bonding social capital, only. This finding reflects those of other scholars who have identified that "within the poverty context, bonding social capital seems to be the most abundant among poor individuals" Méndez-Lemus and Vieyra (2017, p. 304) while their bridging relationships are limited Woolcock (2001) and a challenge for them to build (Vervisch, Vlassenroot, & Braeckman, 2013). The differences between smallholders' social capital portfolio/social capital profile as shown in this study is in line with other scholars' findings in different aspects of farming, including agricultural mechanisation and farm innovation (e.g. Cofré-Bravo et al., 2019; Kansanga, 2017). As the results of this study showed, one of the factors that explain the differences in building bridging relationships is differences in resource endowment that provide farmers with the ability to invest in those relationships. This provides supportive evidence for Cleaver (2005) who pointed out that lack of resources limits poor farmers' ability to expand their social relationships beyond the immediate family and get benefits from those relationships by making investments in bridging relationships. As shown in this study, smallholders with high assets could make investments in bridging relationships through making frequent visits, gifting and arranging social events.

Differences in levels of bonding and bridging relationships impacted smallholders' production and milk-selling differently. In this research, high smallholders were the ones who derived opportunities for milk-selling and resources to continue dairying (through incentives) through bridging relationships that cannot be accessed through their bonding relationships. For example, through the bridging relationships with veterinary surgeons, high smallholders received additional opportunities for selling milk at higher prices in the informal market under Government projects implemented in the area. Additionally, these bridging relationships were important as through them they received government incentives and updated market information through Milco. Lack of strong bridging relationships in low and middle smallholders' social capital portfolios limited their opportunities to gain benefits from special milk selling opportunities in the informal market. Further, it limited their ability to acquire production-related incentives and information despite being the groups of smallholders in

most need of assistance, and different from those that access through bonding relationships (Michelini, 2013). The importance of bridging relationships for smallholder market participation was similarly identified by Mwema and Crewett (2019) through a study of the commercialization of African indigenous vegetables. The findings of Mwema and Crewett (2019) revealed that farmers' bridging social capital acted as a market information sources and contributed to increase the likelihood of market participation by selling increased volumes of vegetables.

In general, bonding social capital was beneficial for all categories of smallholders to access resources (e.g. land, farm machinery) in commercial dairying. As in-depth interviews revealed accessing resources through close relationships was a traditional way of coping with resource constraints in commercial dairying which continues to exist for many smallholders. This finding confirms what many scholars have also found that farmers in developing countries cope with resource scarcity in commercial agricultural activities by drawing on their close ties (e.g. Jari & Fraser, 2009; Kansanga, 2017; Koczberski et al., 2018). However, this research highlights that smallholders' level of dependency on bonding relationships was greater for those with the lowest level of asset endowment and least for those with the highest level of asset endowment. Low smallholders heavily relied on bonding relationships to access resources, especially lands for commercial dairying. For example, low and middle smallholders who lacked land relied heavily on their neighbours, relatives and friends to access land for dairying. Smallholders who owned sufficient lands relied less on bonding relationships for access to land, and high smallholders who owned land and had financial capital purchased additional lands and stock feed when required.

As the results of this study show, resource access through bonding relationships, especially access to lands, is a key determinant of resource-poor smallholders' survival in milk markets as those relationships were the only option they have to fulfil land/resource requirements for dairying. In the absence of supportive bonding relationships, resource-poor smallholders experience difficulties in production resulting in low production, and irregular selling of variable volumes. This was clearly described in Chapter 5 in relation to access to stud bulls, dairy cows and lands and its impact on the regular selling of consistent milk volumes. This reliance on bonding relationships also impacted the proportion of the milk produced that they sold because gifting of milk sustained these bonding relationships. Therefore, unlike other studies where the proportion of milk is used as an indicator of commercialization where it is assumed that milk not sold is consumed, this research illustrates the rich diversity of milk's value in smallholders' lives and the influence this has on their participation in milk markets.

Finally, empirical findings of this study revealed both bonding and bridging relationships could act as obstacles to smallholder farmers' production and market participation through influencing their access to resources and market information required for dairying. As results of this study showed deterioration of bonding capital and conflicting bridging relationships created adverse impacts on some middle and low smallholders' resource access and sales resulting in issues including rescued production, in fluctuating and vulnerable dairy trajectories. Smallholders' social capital was a significant factor that could threaten their survival in the milk market in large part because of a lack of diversification in their livelihood portfolios. A middle smallholder entirely relied on dairying for income, for example, stated that his relationship with the president of the farmer managed society in Milco (bridging relationship) had broken down, and then Milco refused to buy his milk. This caused him to supply milk to a yoghurt manufacturer for years which was associated with the uncertainty of selling, as described in Chapter 5. This empirical finding supports the point made by Putnam (2000) and Rostila (2011) that social capital can have both positive and negative effects on people, which is referred to as the dark side of social capital.

Further, there were even situations where a few high smallholders' milk selling was adversely impacted and their survival in commercial dairying became uncertain due to conflicting relationships with villagers. Some smallholders in the area had to exit from dairying as the broken relationships with other villagers acted as a barrier to their informal curd-selling despite the fact that they had access to all other assets. A review of previous literature identified other scholars mostly report on the supportive role of social capital on market participation (e.g. Jari & Fraser, 2009; Koczberski et al., 2018; Muia, Kamau, Kamau, Baiya, & Ndung'u, 2018). However, a recent study by (Kansanga, Luginaah, Bezner Kerr, Lupafya, & Dakishoni, 2020) emphasized the adverse effect of a lack of certain relationships in social capital in terms of creating inequalities among smallholders in accessing agricultural inputs. According to his study, farmers who did not possess strong ties with a tractor owner had problems accessing tractors on time which delayed their production and adversely impacted on their income.

6.4.3 Impact of social norms and religious beliefs on commercial dairying

Value of dairy cows and its impact on commercial dairying

Social norms and religious beliefs influence smallholders' milk production and market participation in this study. Regardless, all smallholders were part of the same culture and social context, showing remarkable differences in adherence to social norms and religious

beliefs, and this influenced their dairy trajectories differently. Norms and religious beliefs shaped the way smallholders valued cows and how they prioritised the functions and attributes of cows in commercial dairying. Resource-endowed smallholders adhered less to norms and religious beliefs, and they valued the productive (manure and milk), exchange (selling cows) and saving and protective functions of cows. Productivity and convertibility attributes of cows were, therefore, relatively more important for them. This translated into commercial dairying with unproductive animals replaced to maintain a continuous flow of milk to market in consistent volumes. In contrast, resource-constrained smallholders strongly adhered to norms and religious beliefs and attributed a greater level of social value to cows treating them as family members. This meant low-producing and unproductive cows were retained. From a commercial perspective, maintaining unproductive animals increases production costs and adversely impacts on the regularity of milk production and selling. However, for low smallholders retaining these animals was the right thing to do and contributed to their spiritual and cultural wellbeing. Further, low smallholders believed that caramelization taken from a cow, results in adverse health effects for the animal. To avoid this, they adulterated the milk by adding water, thus compromising the value of the milk in the market. Such practices increased the risk and uncertainty of milk selling, especially in the formal market which demanded quality milk and penalised poor-quality milk. From a market perspective, as other scholars have argued, norms and religious beliefs in this research shaped the function of cows in dairying and the greater level of adherence to norms the greater the barrier for smallholders to market participation. Similar to this study, previous market participation literature discusses how socio-cultural norms influence the smallholders' decisions on asset functions and attributes in livestock farming and how they acted as barriers to their market participation. (e.g. Forsythe, Nyamanda, Mbachi Mwangwela, & Bennett, 2015; Gwiriri et al., 2019; Tessema et al., 2019) .For example, evaluating a government intervention aimed at increasing smallholder cattle commercialization in South Africa, Gwiriri et al. (2019) reported farmers' socio-cultural norms made them resistant to selling high value young animals to the market. As Gwiriri et al. (2019) explained farmers kept young cattle as socio-cultural assets valuing their contribution to rituals and cultural ceremonies and, instead, animals who had less market value were delivered to the market. Likewise, a study carried out by Tessema et al. (2019) discussed how the market discouraging norms in pastoral communities influenced their market participation. Owing to a norm that valued the ownership of livestock, pastoralists did not use cattle for exchange functions resulting in a low level of participation in the livestock market. However, these studies did not provide insight

into the impact of religious beliefs on market participation. Furthermore, they did not recognise the differences between smallholders' adherence to norms and how it reflected differently in their market participation.

Role of reciprocal gifting of milk in commercial dairying

The supportive role of norms in market participation is also highlighted by this study. Smallholders who are better endowed with resources predominantly used milk for exchange and consumption functions. They adhered less to the norm of reciprocal gifting than other smallholders which meant milk was not diverting from the market for social functions by these smallholders. On the contrary, resource-constrained smallholders used a significant volume of milk frequently for social functions (gifting) rather than for exchange or consumption for their own households. From a single snapshot analysis, the gifting of milk would be seen as reducing the marketable surplus of milk and adversely impact the consistency of volumes middle and low smallholders could sell. However, in reality, gifting enabled and sustained the long-term commercial dairy activities of these smallholders. This understanding has only emerged not only through exploring existing dairy practices, but also those of smallholders' past trajectories. Studies that limit their analysis to one point in time will fail to capture with any depth the rich diversity of smallholders' engagement in markets and the reasons for it. For example, an econometric study related to potato market participation (e.g. Tolno, Kobayashi, Ichizen, Esham, & Balde, 2016) reported the negative effect of gifting on the quantity sold by farmers without further exploring the role played by potato gifting in smallholders' livelihoods. The gifting of milk in this research was influenced by several factors. The social obligation to gift was one factor. As explained in Chapter 5 related to high smallholders' occasional gifting, when situations arose to gift milk these smallholders conformed to the norms and religious expectations to maintain their good name in society and avoid adverse impacts on their overall livelihood activities including social sanctions such as theft of assets (e.g. cows, machinery). On the other hand, this research identified gifting of milk assisted resource-constrained smallholders to access resources through the informal institution of reciprocity in line with the findings of many other scholars (e.g. Boafo, Saito, Jasaw, Otsuki, & Takeuchi, 2016; Koczberski et al., 2018). As many other scholars have described (e.g. Beyene, 2010; Gurven, Jaeggi, Von Rueden, Hooper, & Kaplan, 2015; Osbahr, Twyman, Adger, & Thomas, 2008), gift-giving is a form of "informal insurance" as it engenders norms of reciprocity with others. The social safety net created reduces the risk associated with scarcity of resources and shocks (illness, death of a family member, loss of income sources, flooding). The low smallholders were most vulnerable and also most strongly adhered to

gifting and other social and religious norms. As highlighted earlier, these relationships were also important to them for ensuring access to grazing land for their cows as well as for many how they obtained dairy cows to farm. Counter to this, the high smallholders were the most resilient and adhered the least to social and religious norms, and were careful not to damage the bonding relationships within the community that also enhanced their access to and activity in the informal market. For low, and some middle farmers, gifting facilitated survival in the milk market by accessing scarce resources. Scholarly work that explored the role of gifting in smallholders' market participation is limited. However, similar to this study, the empirical findings of Buechler (2009) revealed the hidden role played by gifting in agricultural production and selling in developing country farming communities. As Buechler (2009) explained, in Sonora women farmers used gifted processed fruits and vegetables they produced in order to tighten their relationships in the existing social network with the expectation of reciprocity. It assisted them to ensure commercial activities through increased access to labour, raw material and marketing.

6.4.4 Influence of market attributes on smallholders' milk market participation

Formal and informal milk market attributes and how these markets valued milk shaped smallholders' market participation in this study. Milk-selling activities to Milco were governed by a set of government regulations (e.g. pricing procedure). This market valued the quality of milk and considered milk as a product that needs to be transferred to end users with care through hygienic handling. Additionally, Milco preferred a regular supply of milk throughout the year in large volumes although they did not enter into contractual agreements with farmers specifying volume requirements of selling. The preference of Milco for high smallholders who have the capacity to meet the formal market requirement is similar to the finding reported by Birthal et al. (2017) who examined the overall efficiency and inclusiveness of the dairy value chain in India. As Birthal et al. (2017) identified, the formal market preferred partnerships with resource-rich dairy farmers rather than the farmers who were constrained by resources. High smallholders' capacity to satisfy market requirements, and collection procedure of Milco fitted best. On the other hand, high smallholders were the ones who could meet the quality and volume requirements of Milco and this facilitated them to participate mostly in the formal market to sell the majority of milk. Middle smallholders are capable of a moderate level of formal market participation. Resource-constrained low smallholders were identified in this study as struggling to participate regularly in the formal market as they lacked

the ability to meet market requirements, and these findings are supported by previous studies (e.g. Challies & Murray, 2011; Sharma, 2015).

Comparatively, the requirements and characteristics (e.g. lack of quality standards and relatively high milk prices) of the informal market were compatible with milk production and selling patterns of resource-poor farmers. Priority and value given for milk quality in the informal market were minimal and the market accommodated the production practices of many middle and low smallholders without demanding they change their production practices or pattern of milk supply to the market. However, the price smallholders received for their milk in the informal market was relatively high and was one of the factors that motivate them to stay in the informal market, as explained in Chapter 5. Similar to this study, (Birthal et al., 2017; Lie, Rich, Kurwijila, & Jervell, 2012; Navarro et al., 2015) also identified milk price as a factor that motivated resource-poor smallholders to rely on the informal market. This may be because they focus on fulfilling short-term money requirements through milk selling (Lie et al., 2012).

Additionally, the informal market in the study area valued cow milk and buffalo milk differently (unlike the formal market) allowing farmers to sell different types of milk and milk products (e.g. fresh milk, curd, yoghurt). The existing food culture in the community also contributed to the diversity of milk and milk product selling opportunities available in the informal market. Buffalo curd, for example, is a ceremonial food that is not to be missed on traditional food tables in Sri Lanka. Homemade curd is preferred to curd processed by large-scale milk processors and such factors led to the existence of a well-established informal market. Contrary to this, the formal market (Milco) did not differentiate between cow and buffalo milk and did not offer opportunities to sell milk products. As revealed by this study, in a context where both formal and informal markets co-exist, resource-rich smallholders, derived more benefits from commercial dairying as they could diversify within dairying (e.g. cow and buffalo mix farms) and invest in the processing of value-added products, that is, curd and yoghurt. As such, they dominated both formal and informal milk markets. However, resource-poor smallholders did not have the capability to diversify their milk production and their selling revolved around one type of milk, thus impacting their ability to gain full benefits from informal selling. This finding provides support for the point emphasised by Donovan and Poole (2014, p. 1) based on their empirical research on smallholder asset endowment and participation in high-value markets: “improved market access alone, even under relatively favourable market conditions and with considerable external support, will have uncertain

impacts on rural poverty if the underlying constraints on household assets and investments are not addressed concurrently".

Finally, the pattern of changes in demand for milk in the formal and informal markets impacted dairy trajectories. As explained earlier, formal market demand was consistent, and it supported the regular selling of milk for farmers who had the capacity to do so. However, the informal market was characterised by irregular demand, and it was strongly associated with socio-cultural norms around milk consumption during rainy periods, as described in Chapter 5. During the rainy season, milk production was reported as high due to the availability of pasture, but this season marked reduced demand. During the dry period (January and February) demand for fresh milk and dairy products in the informal market increased. This is the period many smallholders reported having lean milk production. Changes in the informal market demand made less impact on high smallholders and half of the middle smallholders who sold their cow milk mostly to the formal market. In terms of curd-selling, they had more options to cope with changes in demand due to the availability of resources. For example, if they could not sell curd within the study area, they used to go to nearby villages and sell it during rainy days, even though it demanded time and additional financial capital for transportation. Additionally, they could deliver unprocessed buffalo milk to the formal market without processing. However, the cyclic nature of informal market demand seemed to adversely impact low smallholders who highly relied on informal selling. This sometimes caused resource-poor smallholders to make temporary switches from informal to formal markets throughout their selling trajectories. As other scholars also identified, changes in demand for agricultural products are a problem encountered by smallholders in market participation. Unpublished research by Adu (2018) identified low demand as a constraint for smallholders' rice market participation. A study by Belton et al. (2017) related to the pangasius crop boom in Bangladesh, explored how the domestic market demand, associated changes in land and labour market shaped smallholders' commercial aquaculture activities and overall livelihood pathways. However, these studies did not discuss how the social norms linked with market demand impacted smallholder market participation and the diversity of impacts experienced between smallholders. A shift in demand of one product will have more impact on smallholder farmers who rely heavily on the product and have few if any alternative livelihood activities in their portfolio. What this research highlight is that there are likely to be a diversity of impacts across smallholders, depending on their level of livelihood diversification and resource endowment.

6.5 Role of commercial dairying in smallholder livelihoods

The contribution of commercial dairying for commercial and non-commercial functions varied between three types of smallholders. For all smallholder types, the exchange of milk for money was the primary function of milk. In the stable trajectories, contributing to stepping up, stabilizing strategies, dairying supported the accumulation of wealth for the high smallholders. In vulnerable trajectories pursued by low smallholders, the contribution of commercial dairying to wealth accumulation was limited. Instead, it was more important for them to fulfil immediate cash requirements and cover seasonal income gaps (contributing to hanging-in strategy) and continue to gift milk to sustain bonding capital.

The results of this study provide an understanding of the significance of commercial dairying for three categories of smallholders. Although dairying generated a consistent and relatively high income for resource-endowed smallholders, they were less dependent on commercial dairying for living because they had many more stable income sources in their livelihood portfolio. The majority of middle smallholders earned a moderate income from milk. Having one stable income source in the income activity portfolios, middle smallholders were moderately dependent on commercial dairying for living. Most importantly, resource-constrained smallholders who earned seasonal and low incomes from milk selling were highly dependent on dairying as they lacked other options to generate income. As this study showed, the importance of the exchange function of milk is not similar for all smallholders. When smallholders' income portfolios become more diverse, with more stable, high-income sources, dependency on milk sales for living decreased. This, however, can only be understood through a comprehensive examination of smallholders' livelihood portfolios as has been illustrated in this research.

The holistic approach to livelihood analysis is not new, however, some scholars have studied smallholders' livelihood strategies/income earning activities in isolation to determine their role or contribution to livelihoods. For example, Mian, Fatema, and Rahman (2007) analysed the impact of dairy farming on rural women in Bangladesh to find out the contribution of selling milk, and dairy related by-products (e.g. animal manure and calves) to annual household income, in addition to subsistence consumption of milk. Likewise, Biradar, Desai, Manjunath, and Doddamani (2013) and Mzingula (2019) investigated the holistic contribution of dairying to various aspects of livelihood, including income (exchange function), food security (consumption), security function, and status. The findings of these studies discussed the general benefits farmers derived from dairying, and the results implied that dairy farming

was equally important to all livelihoods. However, in contexts where farmers pursued a mix of livelihood strategies, these studies did not grasp the nuances of who is most reliant on dairying for a living. As such, previous literature related to market participation of dairy farmers has not explored the differences in smallholder dependency on milk-selling through holistic analysis of their portfolios rather than exploring the multidimensional nature of the benefits they received from dairy farming.

However, similar to this study, some scholars applied a holistic approach to identify the role of other agricultural products in smallholder livelihoods (Hogarth, Belcher, Campbell, & Stacey, 2013; Lowore, 2020). As Hogarth et al. (2013) discovered, forest-related income was important to households at all income levels, but lower income households were more dependent due to a lack of other sources as in this research. Higher-income households dominated off-farm income and owned more land than lower-income households. They were less reliant on forest revenue. However, these studies focused only on income contribution to understanding the livelihood dependency of a particular livelihood strategy and failed to capture its non-commercial functions.

6.6 Smallholders transition from informal to formal milk market

In general, the informal market is viewed as a barrier to the overall economic development of a country as it does not generate taxes nor facilitate large scale investments (Sutter, Webb, Kistruck, Ketchen Jr, & Ireland, 2017). This may be one of the factors that influenced the Government's decision to link smallholder dairy farmers to the formal market. In addition to the factors that shape smallholders' commercial dairy activities, this research provides insight into why smallholders do not make the expected transition from the informal market to the formal market.

As identified in the present study, the informal milk market in the area is governed by a set of informal institutions (norms, values), which is a common characteristic of informal markets in other developing countries (Sutter et al., 2017; Webb, Tihanyi, Ireland, & Sirmon, 2009). Smallholders' milk selling in this market is characterised by transactions with people with whom they have strong ties. The process of transition from informal to formal market involves a transformation of fundamental dairy farming and selling activities to conform to new institutions which are formal and governed by rules and regulations as suggested by Sutter et al. (2017). As this study understands, at the individual smallholder level, this transformation process demands a greater level of attitudinal change, changes in adherence to norms related

to dairying and changes in their social network (e.g. developing new relationships) which take a long time. On the other hand, smallholders may perceive these changes as a risk as they put them into a novel environment, and this could slow down or prevent their transformation from the informal to formal market.

6.7 Conclusion

This chapter discussed the key theoretical and practical findings and contributions of the thesis related to how and why smallholder dairy farmers engage in commercial dairying in Sri Lanka through examining both the static and dynamic nature of dairying in relation to their overall livelihood portfolio. Three smallholder categories identified in this study (high, middle and low) clearly reflect the complexity, diversity and differences in their commercial dairy activities and dynamics that shaped their market participation.

Highly resource endowed smallholders maintained stable commercial dairy trajectories and their selling patterns were characterised by regular selling of high, consistent volumes. Low resource endowed smallholders' have vulnerable trajectories, and they sell low and variable volumes irregularly throughout the year. Moderately endowed smallholders went through fluctuating commercial dairy trajectories, and they showed mixed characteristics in selling patterns.

As this study identified, synergy across all five assets and complementarity between livelihood activities have become facilitators for resource endowed smallholders to achieve the level of stability in commercial dairying. Middle and low smallholders lack the required synergy and complementarity as they lack assets, diversification and multiple stable income sources in the portfolios. Applying Dorward's schema this study explored how smallholders move across dairy trajectories and based on the empirical evidence the schema was further extended by adding 'stabilizing' strategy to explain how the smallholders operate in commercial dairying when they have the required level of synergy in assets portfolio along with complementary livelihood activities.

Findings of this study confirm the value of examining smallholder dairying by going beyond the single timeframe snapshot analysis that this research illustrates fails to capture the overall dairy trajectories and how smallholders move across dairy strategies. The conclusions that can be drawn from the research are now presented in the final chapter of this thesis. The practical implications for rural development in Sri Lanka and beyond are outlined and

recommendations made for future research that extends the foundation of knowledge presented here are made.

7. CONCLUSIONS

7.1 Introduction

Dairy farming has captured the interest of smallholder livelihood development interventions in Sri Lanka due to its anticipated contribution to the alleviation of rural poverty. Using a case study of Sri Lankan smallholder dairy farmers, this research set out to answer the research question: how and why smallholders engage in commercial dairying, through the lens of the livelihoods approach. Findings gained from this research on smallholder commercial dairy activities will contribute and provide suggestions to policymakers and international funding agencies to promote and facilitate smallholder milk market participation, to alleviate rural poverty and uplift smallholder dairy farmers' livelihoods. This study has examined dairying in its static form, as well as the temporal dynamics of production and selling patterns to gain an in-depth and comprehensive answer to the research question. Key findings of this study illustrate that smallholders engage in commercial dairying differently, and these differences are explained by multiple livelihood factors of smallholders including asset endowments, income diversification, adherence to norms and social capital. The types of markets for milk and milk-based products operating in the area and market attributes also influenced the differences in smallholders' market participation. This chapter begins with key conclusions and the theoretical contribution of the research. Practical implications and suggestions for future research are then presented.

7.2 Key conclusions and theoretical contribution

Smallholders are diverse

Smallholders are not a homogeneous group, and they engage in commercial dairying differently. Likewise, in countries like Sri Lanka, where dairying is a traditional livelihood activity for smallholders, the market is likely to be based around multiple types and forms of milk and will more than likely comprise both an established informal and emerging formal market.

Although identification of smallholder categories was not an initial objective of this study, it emerged as important to answer the research question by exploring the complexity and diversity of smallholder milk-market participation. Variation in smallholder milk production and selling activities are strongly associated with differences in multiple livelihood factors. Smallholders who are relatively highly endowed with all five assets (physical, financial, human,

natural and social) including strong bonding and bridging ties, are also likely to have a high level of livelihood activity diversification and adhere weakly to social norms and religious beliefs relating to dairy animals and milk. These smallholders can meet market preferences and sell milk regularly throughout the year, supplying relatively large and consistent volumes to the milk market. Further, relative to less well-off smallholders, they can participate to a greater extent in the formal market, yet also dominate the informal market. In contrast, smallholders who are constrained by assets, have a low level of diversification in livelihood activities and are more likely to strongly adhere to norms and religious beliefs related to dairy animals and milk, and irregularly participate in milk markets delivering low and variable volumes throughout the year. They are likely to rely heavily on the informal market for milk-selling with a low level of participation in the formal market. Moderately asset-endowed smallholders showed mixed characteristics of resource-rich and poor in their milk-market participation. As such, nearly half of them regularly sold milk in high and consistent volumes, primarily to the formal market. The other half were seasonal milk sellers who sold the majority of milk to the informal market in low and variable volumes.

Findings of this research suggest that dairy development interventions in Sri Lanka that aim to increase smallholders' participation in the formal milk market alone will produce more benefits for smallholder farmers who are well-resourced. This may increase the existing inequalities between smallholders in terms of their overall well-being.

Smallholder Commercial Dairying is Dynamic

Smallholder commercial dairy activities are dynamic, and their dairy strategies change overtime. An understanding of how and why smallholders participate in markets thus requires an examination of their selling patterns, taking into account the temporal dynamics associated with dairying (e.g. changes in access to assets and social relationships). Examining the static form of commercial dairying provides an understanding about a specific time, but it does not reflect the non-linearity of commercial dairying and how smallholders move across dairy strategies (e.g. step up, stabilise, hang in) over time, the complexity and interconnectedness of dynamic livelihoods and multiple milk markets, as clearly shown in this study. This study applied schema of livelihood strategies proposed by Dorward et al. (2009) in order to explore how smallholders' dairy strategies change with time and how the existing production and selling patterns emerged through different commercial dairying trajectories. Based on their empirical findings, Dorward et al. (2009) schema was extended by this research to include "stabilising" to capture dairy strategy used by smallholders who have synergy across all five

assets, and complementarity in multiple livelihood activities to manage their dairy production systems to meet market requirements.

In a research landscape where there is a call for livelihood studies to analyse the temporal dynamics of rural livelihoods (e.g. Sakdapolrak, 2014; Scoones, 2009; Thanh et al., 2021), this study contributes to filling this research gap by analysing the dynamic nature of smallholders' commercial dairying activities. In terms of smallholder overall well-being and ability to purposefully engage in commercial dairying, the diversity of dairying and livelihood trajectories of smallholder dairy farmers is usefully classified by the research into three types of trajectories: stable, fluctuating and vulnerable. These trajectory types extend and complement the concept of livelihood strategies proposed by Dorward et al. (2009) and extended by the research by enabling the exploration and analysis of changes in livelihoods and commercial dairying over time. Most importantly, analysis of dairy trajectories paved the way to investigate the rich diversity of moderately resource-endowed smallholders who have progressed beyond vulnerability but have not yet reached the level of stability in commercial dairying. This work has potential relevance across all livelihood activities engaged in by smallholders in countries where the commercialization of agriculture is sought as a strategy for developing the smallholder farming sector.

The Importance of Asset Synergy

It is not only the level of asset endowment across all five asset types but also the synergy across assets that impact smallholders' market participation. A certain amount of all assets is necessary for smallholders to achieve the synergy required to facilitate market participation across both formal and informal markets. This study expanded the existing understanding of the association between asset endowment and smallholders' milk-market participation. Previous literature identified and discussed a high level of assets as important to increase the level of market participation by selling a high proportion/percentage of agricultural products (e.g.Olwande et al., 2015; Otieno, 2020). However, the importance of synergy between assets for market participation has, until now, received little attention.

Farmer to Farmer Dynamics and Dairying

A contribution of this research is to highlight how power relationships between smallholder dairy farmers influence their market participation in a context where there is an informal market in which price-setting is not controlled and commercial relationships are embedded in bonding networks. In this situation, when there are differences between smallholders' overall

asset endowment and circumstances, well-endowed smallholders are likely to have a higher social status than resource-poor smallholders. Simultaneously, asymmetric exchange relationships are likely to emerge as the poor rely on resource-rich smallholders to access certain resources such as market information, knowledge, and skills related to dairying, creating an avenue for resource-poor to be influenced by resource-rich smallholders in market participation.

Livelihood Complementarity and Market Participation

In Sri Lanka, where dairying is one of a variety of smallholder livelihood activities, smallholder market participation is enhanced when smallholders can develop a portfolio of complementary livelihood activities which facilitate their access and purposeful engagement in multiple markets which best fit with their production levels, types of milk and milk products they produce. Counter to this, if livelihood activities are not complementary, this will limit smallholders' market participation and will likely be associated with irregular milk-market participation and selling of low, inconsistent volumes to the market. This study suggests that smallholders' dependency on any one livelihood activity (in this study, commercial dairying) decreases when their livelihood activity portfolio becomes diversified with other stable income sources. On the other hand, smallholders who have the least diversified portfolios with seasonal income-earning activities are likely to be heavily dependent on one livelihood activity (e.g. milk-selling) for their living.

Social Capital and Market Participation

The pattern of market participation across milk markets is shaped by individual smallholders' social capital acting as both a facilitator and a barrier. Bonding relationships enabled all smallholders' market participation, especially in the informal market irrespective of their differences in asset endowments and level of livelihood activity diversification. Likewise, as shown in this study, conflicting bonding relationships can become barriers to milk production and selling by reducing or avoiding access to resources on which dairying depends (e.g. grazing land). Smallholders who had broader social relationships, with both bonding and bridging relationships, reaped additional benefits for milk market participation via a variety of mechanisms. Bridging social capital, for example, enabled them to obtain incentives from the formal market as well as special opportunities to sell milk in the informal market through dairy development projects. Conflicting bridging relationships were a barrier to milk-selling because they sometimes threatened smallholders' survival in milk markets and forced them to move between formal and informal markets. So far, the majority of previous market participation

literature has extended the understanding of the supportive role of social capital only (e.g.Hagos et al., 2020; Jari & Fraser, 2009), giving lesser empirical attention to the dark side of social capital in smallholder commercial activities. Further, studies that explore individual smallholders' social capital and market participation are lacking.

Cultural Capital and Market Participation

Social norms and religious beliefs held by individual smallholders in Sri Lanka play a pivotal role in market participation by influencing the way they value dairy-related assets and how they prioritise asset functions and attributes. This research revealed that smallholders who adhered to social norms use assets (cows and milk) in different ways that are not driven by profit maximisation and production motives. In addition, norms support commercial activities by influencing how smallholders value dairy asset (cows and milk) functions and attributes in ways that enhance their access to resources that support commercial dairying. For example, gifting of milk (social function) facilitated resource-poor smallholders to strengthen social relationships and then access grazing land and dairy animals. Based on empirical evidence, this study challenges the perspective of many previous studies that present social and cultural norms as barriers to smallholder market participation (e.g.Forsythe et al., 2015; Tessema et al., 2019).

Market Participation Redefined

If the aim of research is to understand smallholder commercialization to provide insights into their livelihood development, this research strongly argues that it is important to view their output market participation in terms of regularity of selling (here daily selling of milk) and consistency of volume or proportion (for milk) they sell throughout the year as it provides a level of understanding about the capacity of smallholders' to maintain marketable volumes, selling and how regular the milk income is in their livelihood portfolio. As this study shows, there are smallholders who sell milk daily throughout the year delivering relatively consistent volumes to the milk market as well as those who sell milk irregularly in variable volumes. The conceptualisation of market participation considering the regularity of selling throughout the year, and consistency of volume sold to market, expands the view that is predominantly used in previous commercialization literature. This previous literature has viewed market participation in its static form based on the total volume/amount of agricultural products sold from total production within a specific period (e.g. within a month or year).

Key conclusion to the research question and theoretical contribution made by this research are summarised in Figure 7.1, below.

Key conclusions

- Smallholders show significant diversity in commercial dairying
- In Sri Lanka, dairy development interventions that aim to increase smallholders' participation in the formal milk market will produce more benefits for well-resourced smallholders
- Understanding of smallholders' market participation requires an examination of their selling patterns, taking into account the temporal dynamics associated with dairying
- Complementarity between livelihood activities facilitate smallholders to sell milk regularly in consistent volumes

Theoretical contribution

- Contributed to livelihood literature by analysing temporal dynamics of commercial dairying and identifying three commercial dairy trajectories: stable, fluctuating and vulnerable
- Extended Dorward's schema of livelihood strategies by adding "stabilising" strategy
- Expanded the concept of market participation based on three criteria; regularity of selling throughout the year, consistency of volumes sold and types of markets participated in most
- It is not only amount of assets, but also synergy between all five assets is important for smallholders to regularly sell milk in consistent volumes to formal market
- This research shows how social capital act as a facilitator as well as barrier for smallholder market participation
- Findings of this research shows both supportive role and adverse impact of social norms on commercial dairying
- Provide empirical evidence on how power relationships between smallholder dairy farmers influence their market participation

Figure 7.1: Summary of key conclusions and theoretical contribution

7.3 Practical implications

Development policies must understand differences and diversity among smallholder dairy farmers in designing commercial dairy development interventions. A one-size-fits-all approach to smallholder dairy commercialization will not ensure improved livelihoods through formal market participation because it lacks interventions that match diverse smallholders and how they sell milk. As this study shows, milk selling holds promise for high smallholders who have already achieved a comparatively high level of stability and resilience in dairying. Middle smallholders with moderate levels of resources and a moderate level of resilience have the capacity to make use of support offered by development interventions to use commercial dairying as a means of moving out of poverty. The resource poor smallholders who struggle to engage in commercial dairying could be supported and directed to pursue off-farm income earning activities.

This study has implications for dairy development interventions in Sri Lanka that use asset provision (e.g., funds, dairy cows, equipment, and farm machinery) as a strategy/method to increase smallholder milk-market participation. As this study shows, these interventions need to find ways to improve smallholder asset portfolios holistically, while also increasing asset synergy. The provision of most limited assets (e.g. funds, dairy cows) to smallholders appears to be less effective in increasing their market participation because it is the synergy between multiple assets that causes the expected changes or difference.

Social norms associated with smallholder dairying should not be underestimated in development policies as they perform a hidden role in smallholder livelihoods by facilitating commercial dairy activities. Policies that challenge the existing culture and norms and reliance on short-term plans to change these norms, may not support smallholder dairy commercialization as there is a possibility for smallholders to resist development interventions that challenge their norms. Instead, policies in Sri Lanka could bring forward plans to use norms and other cultural practices in dairy farming community to enhance milk market participation.

Policies aiming at livelihood development through increased formal market participation in Sri Lanka need to understand that it is not a short-term process, especially in a context where a well-functioning informal milk market exists. As this study suggests, smallholder transition from informal to formal market is a process of making farmers ready to make transactions in a market governed by formal institutions. It demands farmer education related to commercial

farming and changes in individual farmers' attitudes and adherence to norms related to dairying and giving them the confidence to lose existing social ties as well as widen their social network beyond close relationships with neighbours, and friends. More specifically, smallholders need to be educated on why they are supposed to make a transition from the informal to the formal market.

7.4 Future research

Making smallholders' transition from informal to formal milk markets is one of the most pressing concerns about dairy commercialization in developing countries. Future research could look into what the formal and informal markets mean for smallholders, as well as how they perceive this transition in relation to their overall livelihood, as this is an area that has received less attention in the literature on market participation.

Individual smallholders' social norms emerged as a critical factor shaping their production practices and market participation in this study. There is a lack of research on the relationship between norms and smallholder market participation. Furthermore, previous research has mostly relied on empirical evidence to conclude that norms act as barriers to market participation, which is not the case in this study. This provides an avenue for future research into the multiple roles that social norms and culture play in smallholder market participation.

Social capital emerged in this research as a factor that significantly associated with Sri Lankan smallholder dairy farmers' market participation. This association could vary with the study context. There is a lack of in-depth studies that examine the influence of individual smallholders' social capital on market participation, as also identified in Chapter 2. This could be a promising research area for future research.

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APPENDICES

Appendix A: Information sheet

Smallholder participation in the milk markets in Sri Lanka: A livelihood analysis

I am Nadeesha Thenuwara, a student (student ID 15280417) at the Institute of Agriculture and Environment, Massey University in New Zealand. At present, I am doing my PhD in Agriculture. My research focuses on understanding smallholder participation in the milk market in Sri Lanka. It will also analyse the contribution of commercial dairying to smallholder livelihoods. Currently, the government, Non-governmental organizations, international funding agencies and dairy processors are interested in dairy commercialization and a number of programmes are being implemented to promote and facilitate dairy commercialization to alleviate rural poverty. So, this research will also provide suggestions to relevant parties to facilitate and promote dairy commercialization. I kindly invite you to participate in this research and share the information about your dairy farming activities with me.

This research will collect data in two phases. In the first phase, I will interview people who have knowledge about dairy-related activities in this area (Veterinary Surgeon, Livestock Development Officer, Village Administrator, Extension Officer, President of the Milk Cooperative, President of the Farmer Managed Society and Justice of Peace). In the second phase, I will interview 35 smallholder dairy producers in this area. These smallholders will be selected based on the data collected from the first phase. It is expected that one interview will take a maximum of 1.5 hours. I will record all these interviews upon your agreement. Only my supervisors and I will have the access to these recordings. I assure you that all the information gathered will be kept confidential and your names will not be used in reports or other publications without permission.

You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question;
- withdraw from the study (specify timeframe);
- ask any questions about the study at any time during participation;
- provide information on the understanding that your name will not be used unless you give permission to the researcher;
- be given access to a summary of the project findings when it is concluded.

This project has been reviewed and approved by the Massey University Human Ethics Committee: Northern (Application ID 400018631). If you have any concerns about the conduct of this research, please contact Dr Ralph Bathurst, Acting Chair, Massey University Human Ethics Committee: Northern, telephone 09 414 0800 x 43404, email humanethicsnorth@massey.ac.nz.

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director, Research Ethics, telephone 06 356 9099 x 86015, email humanethics@massey.ac.nz".

If you need further information, please feel free to contact me or my supervisors.

Dr. Brennon Wood
Senior Lecturer, Institute of Agriculture and Environment
Massey University
Palmerston North 4474
+64 (06) 356 9099 ext. 83626
B.A.Wood@massey.ac.nz

Dr. Janet Reid
Senior Lecturer, Institute of Agriculture and Environment
Massey University
Palmerston North 4474
+64 (06) 356 9099 ext. 84812
J.I.Reid@massey.ac.nz

Dr Thiagarajah Ramilan
Senior Lecturer, Institute of Agriculture and Environment
Massey University
Palmerston North 4474
+64 (06) 356 9099 ext. 86266
T.Ramilan@maseey.ac.nz

Nadeesha Thenuwara
No:7, Wiwekarama Road
Wathugedara, Ambalangoda
+94 715154662
n.thenuwara@massey.ac.nz

Appendix B: **Participant consent form**

Smallholder participation in the milk markets in Sri Lanka: A livelihood analysis

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interview being sound recorded.

I agree/do not agree to the interview being image recorded.

I wish/do not wish to have my recordings returned to me.

I wish/do not wish to have data placed in an official archive.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: ..... **Date:** .....

Full Name - printed .....

Appendix C

Data Collection – Phase I

Interview guideline: Key informant interviews

General information about the key informant

1. Occupation and designation

2. Involvement in smallholder dairying activities in the this area?

Aim – to get an understanding about the study context

3. What are the key livelihood activities in the area (paddy farming, fishery, dairying or other)?

Aim - to understand smallholders' milk production activities/pattern (present situation, history, milk production changes over time)

3.Tell me about smallholder milk production in this area?

- Types of animals smallholders rear
- Breeds
- Average herd size
- Daily average milk production
- Dairy management practices (feeding, animal breeding, animal health, herd replacement)
- Government or private sector institutes that closely work with smallholder dairy farmers in the area
- Labour use in dairying
- Availability of animal feed (pasture, commercial feed)
- Land availability/how smallholder farmers access lands for dairying
- Cultural factors that influence dairy farming
- Dairy commercialization initiatives, dairy related projects implemented or are being implemented in Gonapinuwala
- Milk consumption of people in Gonapinuwala
- Problems and constraints for dairy farming
- Dairy farmers societies and how these societies facilitate milk selling

4.What is the history of milk production in this area? What were the changes occurred over time in milk production? How and why those changes occurred?

Aim - to understand smallholders milk selling patterns (present situation, history, changes over time) and market structure

5. Who are the milk market actors operating in the area (Government or private sector milk collectors) and how they collect milk from smallholder farmers?

- Types of milk markets/milk buyers
- Availability of market for processed milk products

- General milk collection procedure of milk buyers
- Quality standards
- Pricing mechanisms
- History of milk markets
-

6. How do smallholders sell milk in the study area?

Follow up questions

- Do smallholders sell entire production or part of the production?
- Do smallholders sell to one particular buyer or to multiple buyers?
- Do smallholders unprocessed milk/processed milk or both?

Aim - to get a general understanding about value/importance of dairying to smallholders' livelihoods

7. What are the benefits of commercial dairying to smallholders in this area?

Follow up questions

i. What are the other livelihood activities (other farming activities) of smallholder dairy farmers in this area and why?
ii. What factors influence the smallholder livelihood activities? (culture, political factors, other socio-economic factors)
iii. How important the smallholder dairying for this area: income source, nutrition or other

Data Collection - Phase II

Interview guide for smallholder dairy producers

Aim - to understand the context where smallholder dairying takes place

1. **General information about the participants**
   - Age
   - Level of education
   - Size of household
   - Household members who involve in dairying
   - Primary income source
   - Other livelihood activities

Aim - to understand smallholders' milk production activities

2. **How do you produce milk?**

Follow up questions

i. Type of dairy animals – cattle, buffalo
ii. How long have you been engaging in dairying?
iii. How did you enter into dairy farming and why?
   - Source of dairy animals - personal money, bank loans, animals gifted by friends or family
   - Initial herd size, production levels, types of animals
   - Purpose – selling milk or consumption
iv. How do you feed animals?
   - Free grazing, stall feeding
   - Types of animal feeds and amounts given – pasture, concentrates
   - Problems in animal feeding
v. What are the animal breeding methods use?
   - Artificial insemination or natural breeding
   - How to access bulls and AI service
   - Cost associated with breeding methods
   - Problems in breeding
vi. How do you remove unproductive animals?
vii. How do you use labour for dairy farming?
   - Hired labour or family labour
   - Cost for labour
   - Availability of hired labour
viii. How do you access and use resources for dairying?
   - Land
   - Farm machinery
   - Knowledge and skills
   - Market information
   - Dairy cows
   - Financial capital

ix. Do you receive any help from villagers to carry out dairying/how you interact with them?
   - Support from peer farmers
   - Support from neighbors, friends
   - Support from veterinary office

x. What is the purpose of your milk production (past, present and how it changed over time)

xi. What are the cultural factors associated with dairy production in this area?

xii. What were the changes occurred in dairy production over time? How and why those changes happened? (past to present)

xiii. Are you a member of any dairy cooperative or farmer society? What are the benefits you get from these societies to produce milk?

xiv. How do you treat sick animals?

xv. What are the problems associated with dairy farming?

Aim - to understand how and why smallholders participate in milk markets

3. How do you sell milk?

Follow up questions

i. What do you do with milk? (home consumption, processing or value addition, selling fresh milk)

ii. What are the marketing channels available in this area? Can you sell milk to any market?

iii. How different markets collect milk?
   - Type of milk they buy
   - Pricing
   - Quality testing
   - Volume requirements
   - incentives

iv. How do you select particular milk buyers and why?

v. How and why do you process milk products? How and why do you sell milk and milk products? What proportion of milk is sold? Do you sell milk collectively or at household level? Why do you do so?

vi. Who handles the milk selling activities in your household and why?

vii. How do milk prices change through the year? How do you get market information?

viii. What is the history of milk selling? What are the changes occurred over time in milk selling? How and why those changes occurred?
   - Changes in selling volumes
   - Change of milk buyer
   - Changes in milk price

ix. How do the caste system, social classes and gender influence on milk selling and accessing markets?

x. What motivate you to produce milk for selling, and how?

Aim - to analyse the contribution of commercial dairying into livelihood of smallholders

4. **What is the contribution of commercial dairy activities to your livelihood, and how?**

Follow up questions

i. What are the other livelihood activities/farming activities you have? How do these livelihood activities change through the year and why?
ii. How the income you received from livelihood activities change through the year? How do you use the income of livelihood activities for day-to-day activities (food, education, investment)?
iii. How do you allocate resources into each livelihood activity and why?
iv. What is the contribution of these activities to your livelihood (income, nutritional benefits, social status), and how?