Understanding land reform and the associated consequences for land use and livelihoods

Avhafunani Justice Netshipale

Propositions

1. Land reform needs to close social inequality gaps to be sustained.
   (this thesis)

2. Recommending a farming system without understanding its context is like fishing with too wide a net.
   (this thesis)

3. To get correct answers from a survey, a good questionnaire alone will not suffice; also, a well-prepared researcher is needed.

4. Constructivism learning theory makes long PhD trajectories.

5. The judgement of corruption and racism depends on the eye of the beholder.

6. Broad policies discriminate against the vulnerable.

Propositions belonging to the thesis, entitled

'Understanding land reform and the associated consequences for land use and livelihoods'

Avhafunani Justice Netshipale

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Thesis

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In a meeting with the head of the Department of Agriculture, Land Reform and Rural Development, Northern Cape province, the honorable Mr. Viljone Mothibi, held in 2009, he said 'Netshipale you are perceiving agricultural initiatives by the state wrongly', which meant there were other perspectives to those initiatives. That arose the inquest in me to understand the other perspectives which I could not comprehend at my level of responsibility. The inquest was further instigated by the declaration made by an elderly beneficiary to a state official, that 'the underground is ours and beneficiaries have to relocate to the benefited land so I can be reinstated as their traditional leader'. Beneficiaries in land reform farms have nick named this official 'reduce your livestock herds' for enforcing adherence to carrying capacity. Hence, this PhD work was inspired by the pursuit of the colourful invisible colour of life and brought to fruition by the contributors. Hence, I invite you to travel with me on 'it has been, was and still is Land' so you can find out for yourself 'the journey, with symbols of change and change symbols in a mix'.

Abstract

Land reform is important to correct historical injustices in all districts of South Africa, including the Waterberg District Municipality. There is consensus, globally, that there are trade-offs among diverse land reform objectives, namely: social, economic, political and environmental. The general aim of this thesis, therefore, was to understand land reform: the extent to which it meets objectives and the associated consequences for land use and livelihoods. Restitution- Rest, settlement/land acquisition grant- SLAG, land redistribution for agricultural development phase 1- LRAD1 and phase 2- LRAD2, and proactive land acquisition strategy- PLAS, were the five South Africa's land reform farm types. The results show that the socio-economic classes of beneficiaries was determined by synergies between policies and their implementation outcomes. Land uses were diverse in Rest, and less diverse and like previous uses in LRAD1, LRAD2 and PLAS. On-farm livestock and overall on-farm livelihood contributions were high for capital-endowed households in LRAD1, LRAD2 and PLAS, and low for capital-poor households in Rest and SLAG. This suggest that land reform was unable to bridge the inequality gap between capital-poor and capital-endowed households, and livestock influenced on-farm contribution in semi-arid conditions. Crop plus ruminants- CR, horticulture- H, ruminants- R, ruminants plus horticulture- RH and monogastrics- M were the five farming systems in land reform farms. These farming systems developed from interactions among the biophysical conditions, land reform policies, socio-economic class of farmers, physical capital endowment of farms, and the type of produce market used. The results suggest that land reform policies could influence land use activities by transferring farms of a particular size, and availability of external physical and financial capital support could determine participation of the poor. Strengths and weaknesses of land reform farms were determined by socio-economic class of farmers and the characteristics of land use activities. Use of farms by the poor led to strengths of low opportunity costs for family labour and farms being prioritised by the state for support, and weakness of being dependent on external support as farmers and farms lacked physical and financial capital, compared to farms used by the better-off. Farms where capital-extensive activities were key had strengths of less capital investment requirements and moderate susceptibility to climate, and a weakness of low possibility for partnerships with large-scale commercial farmers, compared to farm where capital-intensive activities were key. Overall, our results suggest limited use and limited livelihood contributions of land reform farms. These results arise doubts about the relevancy of land reform, and its future depends on stakeholders advocating for it to ensuring that it is implemented through approaches which pays landowners fairly, that correct people benefit, and that appropriate land uses are adopted.

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List of abbreviations

ANOVA - Analysis of variance

BIC - Bayesian Information Criterion

CR - Crop plus ruminants

FGDs - Focus group discussions

H - Horticulture

ICRA - International Center for Development Oriented Research in Agriculture

IDP - Integrated development plan

LRAD - Land Redistribution for Agricultural Development

LRAD1 - Land Redistribution for Agricultural Development Phase 1

LRAD2 - Land Redistribution for Agricultural Development Phase 2

M - Monogastric

NUFFIC - Netherlands University Foundation for International Cooperation

PC - Principal component

PCA - Principal component analysis

PLAS - Proactive Land Acquisition Strategy

PNS - Produce not for sale

R - Ruminants

Rest - Restitution

RH - Ruminants plus horticulture

RRA - Rapid Rural Appraisal

SLAG - Settlement/Land Acquisition Grant

SMMEs - Small, Medium, and Micro-sized Enterprises

SSSA - South Africa Social Security Agency

TLUs - Tropical livestock units

UNIVEN - University of Venda

Chapter 1

General introduction

Diverse uses of reformed land

1 Land reform in South Africa

1.1 Introduction

Land is defined (a) legally 'as any tract of ground which can be owned as property together with what is on it and below its surface, and from which other rights like heredity may exist' (The Free Dictionary 2012), and (b) economically 'as a primary input and factor of production which is not consumed but without which no production is possible' (Business Dictionary 2012). Equitable ownership and access to land are critical for long term development and economic growth. Globally, the persistence of poverty among rural dwellers is in part caused by inequitable ownership and access to land (World Bank 2001, 2003; Griffin et al. 2002; Borras Jr. et al. 2007; Binswanger-Mkhize et al. 2009; Wegerif and Guereña 2020). Inequalities in ownership and access to land, emanating from historic colonisation, are still persistent in Southern Africa and Latin America, and are most evident in Brazil, Colombia, Guatemala and South Africa (Deininger 2003; Binswanger-Mkhize et al. 2009). Hence, land reform is a key theme in development plans of these countries. This thesis will focus on land reform in South Africa.

The native people of South Africa had experienced colonisation by the Dutch and the British for more than two centuries (SA History Online 2020a). Colonisation of South Africa started after the Dutch East India Company had established a trading post in Cape Town in 1652. The Dutch Cape Colony was established to be a settlement in the Cape for the Europeans who worked in that post. Some among the European colonisers established farms. The British invaded the Colony in 1795 and 1806, and the invasions caused mass migration and establishment of Dutch settlements in the interior of South Africa. As colonisation progressed, the Transvaal and the Orange areas were both divided into two. The Dutch controlled Transvaal and Orange Free State, whereas the British controlled Cape, Natal, Transvaal and Orange River colonies. The Dutch and the British will be referred to as the European colonisers from this point onwards.

The European colonisers dispossessed land and other resources like livestock from the natives using land seizures and division of territories, and they passed declarations and laws over time. One such law was the 'Glen Grey Act of 1894', on which the spatial division of South Africa was based (Feinberg 1993). The colonisation focused mainly on areas with high potential for agriculture, and in those areas, land use by the natives was restricted. During those colonial times, the South Africa economy was agriculture based. The discovery of gold and diamonds towards the end of the eighteenth century led to a 'South African War' of 1899–1902 (SA History Online 2020b). During that war, the Dutch and British fought at opposing sides for the control of the mining

industry. The establishment of the Union of South Africa (union between the Dutch and the British) in 1910 was an outcome of that war, and the establishment allowed the European colonisers to develop legislative means to consolidate their wealth by prohibiting the natives from economic participation to restricting their means of gaining a living. "The Natives Land Act, Act No. 27 of 1913" was one such law, which together with earlier legacies gave the European colonisers control of 93% of the land in South Africa (Feinberg 1993). Unlike the legislations which preceded it, the Natives Land Act is most pronounced in discourses for land dispossession of the natives because it prohibited them from buying or renting land in areas controlled by the colonisers i.e. what was the 'White South Africa' (Feinberg 1993; Louw 2013). Hence, the main objective of the Natives Land Act was racial segregation, which was achieved through separate occupation and land ownership between the European colonisers and the natives.

The historic colonisation of the natives in South Africa implied that they were designated to marginal lands which limited their avenues to sustain livelihoods (Feinberg 1993). In addition, they were made to supply labour needed on large-scale commercial farms and in industrial mines owned by the colonisers. Therefore, South Africa is an example of a country in the Global South where land dispossession of natives led to large-scale commercial farms owned by people of European descent. In 1993, those farms had an average farm size of 1427 ha (DAFF 2012). Inequalities between the natives and the European descents not only prevailed regarding land ownership but also regarding lack of recognition, by the law, of the access rights (tenure security) of the former on land owned by the latter. In South Africa, that system of institutionalised racial separation between the natives and people of European descent was called "apartheid" (SA History Online 2020c), and that system ended with the birth of democracy in 1994. The African National Congress (dominated by the natives) is the ruling party since the birth of democracy. The democratic South Africa is rooted in "the Constitution of The Republic of South Africa, Act No. 108 of 1996" in which the correction of injustices of apartheid is emphasised (DOJ 1996). In 1994, people of European descent (the white minority, approximately 13% of the population) owned 87% (82 million hectares) of agricultural land, whereas the natives owned the remaining land (Louw 2013; Chimere-dan 1992). Since 1994, several initiatives, among which land reform, intended to correct the colonial injustices are being implemented. The implementation of some of these initiatives yielded negative outcomes. For example, implementation of initiatives on land tenure reform, minimum wage and trade liberalisation resulted in evictions of farm dwellers and retrenchments of farm labourers (Simbi and Aliber 2000; Wegerif et al. 2005; Stern and Flatters 2007; Genis 2012; Smet 2013; World Bank 2013). These evictions and retrenchments occurred because (a) people of European descent did not want the natives to have enforceable access rights on their land (originating from implementation

of land tenure reforms), (b) commercial farmers were not prepared to pay higher wages for labour, based on enforceable minimum wage and had resorted to reducing the number of labourers so that the wage bill did not change, and (c) further, some of the commercial farms collapsed, as they could not compete for the markets with farmers from elsewhere in the world who had comparative advantage. The victims of those evictions and retrenchments ended up in the congested marginal areas occupied by the natives, where land is scarce, but livelihoods depend mainly on land-based activities. In addition to apartheid legacies, the initiatives mentioned above are among the factors that make land reform key in the development plan of South Africa since 1994.

For the past two decades, South Africa had been implementing land reform as a redress measure for the historic injustices of colonialism. Land reform is being implemented with an aim to contribute to reduction of inequalities, poverty and unemployment. Towards this aim, land reform intends to transfer 30% (24.6 million hectares) of the land owned by people of European descent to the natives (Louw 2013). Land reform is an initiative, often by the state, intended to restructure land tenure (land rights and ownership), production (application of production resources, including land), and support services so that reformed land can be used for the well-being of beneficiaries (World Bank 1975; Zarin and Bujang 1994; SEAMEO 2000; Binswanger-Mkhize et al. 2009). Often the state, in the form of central government, plays a key role in land reform as it controls the national resources.

The two approaches used to implement land reform in South Africa are: (a) rights/restoration based, in which those who can prove previous ownership or access to land could get those rights restored, and (b) discretion based/broad entitlement, in which the state had decided to correct inequalities in ownership and access to land by partially funding the transfer of land from the white minority ('whites') to the natives (DLA 1997, 2006; MALA 2001; Lahiff 2007b; Binswanger-Mkhize et al. 2009). The rights-based approach comprises the land reform subprogrammes restitution and tenure reform, whereas the broad entitlement approach comprises the subprogramme redistribution. Under restitution, the state either (a) pays for the land to be restored (using land expropriation with fair compensation mechanism), which could be the same land that the dispossessed once owned or be an alternative for that, or (b) pay money to the dispossessed in cases were restoration is not possible. Tenure reform aims to make access rights of the natives, who use or have access to the land owned by the whites (for settlement and production purposes), enforceable by the law. Under redistribution, the state identifies land to be redistributed guided by the prevailing needs for the land (settlement and/or production), and selects the natives to either become new landowners or have access to land based on the set criteria. Redistribution uses the

market-assisted willing-buyer willing-seller mechanism, in which the state purchases land which is available for sale. Restitution and tenure reform have not changed since the inception of the land reform programme; redistribution changed over time in terms of the subprogramme/model name, targeted beneficiaries and grants receivable. On inception, redistribution was called Settlement/Land Acquisition Grant (SLAG), a model which functioned from 1995 to 2000 and which provided grants of R15,000 per household (DLA 1997). The name was changed to Land Redistribution for Agricultural Development (LRAD). From 2001 to 2007, LRAD provided grants ranging from R20,000 to R100,000 per adult individual, whereas from 2008 to 2010, LRAD provided grants ranging from R111,000 to R400,000 per adult individual (MALA 2001; Kepe and Hall 2016). Since 2006, the redistribution programme is called Proactive Land Acquisition Strategy (PLAS) and provides adult individuals with access to land, with an option of becoming owners based on evidence of success in land use (DLA 2006). In South Africa, these restitution and redistribution programmes are central to land reform because they contribute the most to the redress of inequalities in land ownership and access to land by the natives. Whereas tenure reform secures the rights of owners and users of land. From 1994 to 2014, approximately 7.4 million hectares of land were reformed through the restitution (3.1 million hectares) and redistribution (4.4 million hectares) programmes. These 7.4 million hectares contribute 30% to the country's land reform target of 24.6 million hectares that was set for 2014, and constitute only 9% of the 82 million hectares privately owned by people of European descent (DRDLR 2014). Hence, this thesis focuses on land reform in South Africa, in particular restitution and redistribution programmes.

1.2 Land ownership and use

In South Africa, a beneficiary in these restitution and redistribution programmes has to meet the following stepwise criteria defined by the Department of Land Affairs (DLA 1997): (a) should be an adult historically disadvantaged (on race basis) South African citizen (b) who is legally competent to contract (c) who has successfully claimed land that was taken away, under restitution programme or has been selected after meeting criteria set for redistribution programme, and (c) whose name was on a farm beneficiary list at the time of land hand-over by the Department of Land Affairs or the Department of Rural Development and Land Reform. Most of the reformed land is owned by groups of households instead of by a single household because of two reasons. First, land was communally owned (with a household being a unit of representation) before dispossession and the disposed are the new landowners, under restitution. Second, as land reform process was allocated only a limited amount of money and farm subdivision was discouraged, beneficiaries of redistribution pooled their land grants. It was for these reasons that beneficiaries (i.e. groups of households) of restitution

were forced, whereas those of redistribution were encouraged, to form entities that are recognised by law to act on their behalf (DLA 1997). Beneficiaries of restitution formed Communal Property Associations, whereas beneficiaries of redistribution formed entities suitable for their needs and must abide by the rules of the chosen entity. Under restitution, beneficiaries became new permanent and absolute landowners (given freehold land titles) and have decisive powers on land use. Similarly, beneficiaries of redistribution received freehold land titles under SLAG and LRAD, whereas under PLAS most of the beneficiaries have only access to land which is owned by the state. In addition, beneficiaries are expected to use land for purposes it was reformed for, in all redistribution models (DLA 1997, 2006; MALA 2001). Land reformed through restitution and redistribution could be used for land-based activities like agriculture, forestry and eco-tourism, among others. According to Lahiff (2007a) the four general land use models feasible in land reform farms were: '(a) individual small-scale agriculture and natural resources harvesting, (b) collective large-scale commercial farming, and arrangements between beneficiaries and external parties, in the form of (c) joint ventures and (d) production contracts'.

Land and agriculture are interconnected (World Bank 2020). Hence, re-establishment of ownership and access to land to the dispossessed rural dwellers through land reform and development of agricultural activities on the land are pivotal in addressing injustice and poverty (Griffin et al. 2002; Borras Jr. et al. 2007; Binswanger-Mkhize et al. 2009; Vista et al. 2012). Approximately 80% of the land in South Africa was and still is used for agriculture. Hence, agriculture is at the centre of South Africa's land reform policies (DLA 1997, 2006; MALA 2001). Of this 80%, only about 12% has potential for irrigated or rain-fed crop cultivation, whereas the major part of the land (±69%) is suitable for grazing only (DEAT 2006; World Bank 2020). Hence, livestock farming is the largest agricultural sector in South Africa. Moreover, about 19% of households in South Africa are involved in agriculture, of which 14% in farm land cultivation and 86% in backyard gardening (STATS SA 2014). Of the 19% of households involved in agriculture, about 77% of them was practicing agriculture to only provide a supplementary source of food. It was the provisions for the subsistence of poor households, made by the South Africa Social Security Agency (SASSA), which made agricultural production supplementary to those households. Households that benefited from land reform used land for various agricultural activities (e.g. crop, horticulture and livestock production), depending on prevailing agro-ecological conditions and resource availability (Bradstock 2005; Lahiff et al. 2008; Antwi and Oladele 2013; Aliber and Cousins 2013).

1.3 Land reform and livelihoods

On inception, the South African land policy intended to contribute to 'economic growth and improvement of household welfare' (DLA 1997). Inequality, poverty and unemployment are persistent national challenges which are expected to be reduced by implementation of land reform, since the former land dispossession contributed substantially to these challenges (DRDLR 2011). The use of reformed land by beneficiaries was expected to ensure agricultural production for household consumption and selling, thereby contributing to household and national food security, and job creation. Realisation of these contributions from land reform would partially address social inequalities. In South Africa, the land reform programme has been criticised for the slow rate of land transfer and lack of tangible contribution to livelihoods of beneficiaries (Lahiff and Li 2012; Aliber and Cousins 2013; Binswanger-Mkhize 2014). The slow rate of land reform was blamed on adoption of the market-assisted willing-buyer willing-seller mechanism and lack of cooperation from landowners (shown through inflation of land prices). The lack of livelihood contribution from land reform, observed in South Africa, was blamed mainly on group dynamics (in group owned farms), inadequate participation of beneficiaries, preference for large-scale commercial farming model by implementers of land reform, beneficiaries' lack of knowledge and skills, and insufficient post settlement support (Valente 2011; Lahiff and Li 2012; Aliber and Cousins 2013; Marais 2013; Binswanger-Mkhize 2014). Globally, land reform had limited impact on livelihoods of beneficiaries in instances where a land reform programme prioritised short-term political aims, ignored the needs of beneficiaries and was not a component of a broader national development strategy (Deininger 2003). Only giving land to the landless has proven to not being adequate for a successful land reform as the victims of land dispossession are often natural, physical and financial capital poor. Therefore, there is a need for additional initiatives aimed to ensure that beneficiaries of land reform utilise the restored land. Some authors suggested that agrarian reform, which mean redirecting the agricultural system, should be part of land reform because it will ensure provision of support aimed to improve livelihoods of land reform beneficiaries (Thiesenhusen 1989; Binswanger-Mkhize et al. 2009). In this thesis land reform will encompass agrarian reform.

2 Problem statement

In South Africa, land reform is implemented to reduce the severity of poverty, among others, by re-establishing relations which used to exist among 'land, livestock, cropping and communities' (DRDLR 2011). This objective of land reform seems to be illusive as contribution of land reform to

livelihoods is limited, in terms of food security and job creation, and this limited contribution is a major concern, especially in resource-poor rural areas of the developing world (Griffin et al. 2002; Borras Jr. et al. 2007; Vista et al. 2012; Aliber and Cousins 2013; Diniz et al. 2013; Mabhena 2013). Hence, questions are being raised about the relevancy of land reform in poverty alleviation. In South Africa, the gains in peace and stability, and reductions in inequalities which land reform contributed to, are likely to be cancelled-out by its lack of contribution to poverty alleviation and job creation (Valente 2011). Hence, there is an eminent need for reformed land to contribute to these objectives for land reform to remain relevant. The generation of knowledge that will contribute to a broader understanding of land reform in South Africa could lead to the realisation of these objectives.

The objectives of land reform policies are multiple and often conflictual because they are advocated for by stakeholders with diverse interests. Hence, the outcomes of land reform are assessed using diverse paradigms (Binswanger-Mkhize et al. 2009; Cousins and Scoones 2010). The paradigms used to assess land reform include assessment of: efficiency of production, effects of factors and conditions which influence the former, livelihood sources and effect of food produced on reformed land on welfare of benefitting households, impact of land reform on agrarian structures, and class and accumulation dynamics in reformed land (Cousins and Scoones 2010). In South Africa, limited agricultural production on reformed land hampered the contribution of land reform to the livelihoods of beneficiaries (Lahiff and Li 2012; Aliber and Cousins 2013). To my knowledge, the livelihood impacts of land reform in South Africa have either been studied on farms within a single land reform subprogramme or, if subprogrammes were compared, only a limited number of farms were included within subprogrammes (Wegerif 2004; Bradstock 2005; Lahiff et al. 2008; Valente 2011; Aliber and Cousins 2013; Antwi and Oladele 2013; Keswell and Carter 2014). Furthermore, the extent to which land reform farms contributed to livelihoods has not been quantified and factors underlying the households' economics have not been analysed.

The livelihood contribution of reformed land is dependent on the land being used. Variations in institutional drivers, and in natural, physical and human capital endowments of land reform farms are anticipated to have effects on agricultural land use (Köbrich et al. 2003; Senthilkumar et al. 2009; Tittonell et al. 2010; Chikowo et al. 2014; Alvarez et al. 2018) and on policies and interventions essential for further development of land reform farms (Dixon et al. 2001). According to literature, the diversity of farming systems is determined by variations in biophysical, economic and socio-institutional contexts which are often beyond farmers' control (Köbrich et al. 2003; Senthilkumar et al. 2009; Chikowo et al. 2014; Alvarez et al. 2018). Diversity in land reform

programmes will likely result in diversity of farming systems (Griffin et al. 2002; Aliber and Cousins 2013), which could influence farming system development. The assessment of the effects of interactions among land reform, a socio-institutional mediating factor, biophysical factors, and economic factors on the development of farming systems is needed to understand how land reform influenced farming system development.

Comprehensive understanding of farming systems in land reform farms requires knowledge about the constraints, strengths and weaknesses of these farming systems. In South Africa, studies about constraints focused either on only a few land reform farms within subprogrammes (Bradstock 2005; Lahiff et al. 2008; Aliber and Cousins 2013) or on farms within one subprogramme (Wegerif 2004; Valente 2011; Antwi and Oladele 2013). Further, these studies lacked assessment of relationships among socio-economic classes of beneficiaries, farming systems, and the prevailing constraints and opportunities. To my knowledge, there were no instances where researchers had offered stakeholders platforms to contest their perspectives about the constraints, strengths and weaknesses of farming systems in land reform farms of South Africa and paved the way forward as a collective. Therefore, there is an eminent need for a detailed knowledge about farming systems which exist in land reform farms of South Africa, which should allow for a shift from a broader generalisation approach to a farming system targeted development approach (Giller 2013).

The knowledge gap on land reform in South Africa, as illustrated above, calls for a detailed study that uses a mix of standard methodological approaches (like surveys and field experiments) and participatory methodological approaches (like focus group discussions and stakeholder workshops), as participation of key stakeholder determines the appropriateness of land reform development strategies and interventions.

3 Aim and structure of this thesis

The general aim of this thesis was “to understand land reform and the associated consequences for land use and livelihoods”. This thesis comprises of six chapters (see Figure 1): a general introduction, four empirical chapters, and a general discussion (including conclusions). Chapter 1 introduces land reform in South Africa, contextualises the knowledge gap central to the present study and provides background on the methodology. The adoption of a cross-sectional approach with relatively high number of sampled farms made the present study different from other studies on land reform.

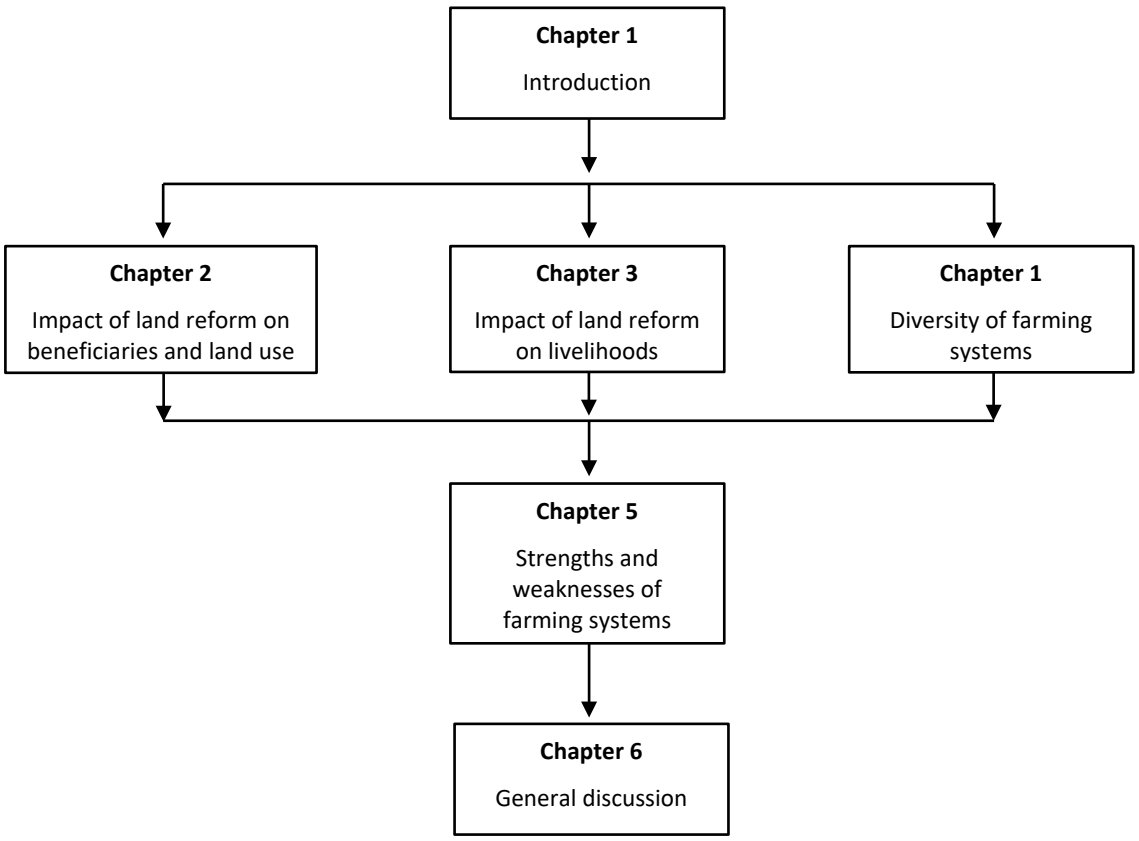


Fig. 1: Overview of the thesis structure.

As contribution to the broader understanding of land reform, in Chapter 2, I (a) assessed the implementation outcomes of restitution and redistribution policies on the number and socio-economic class of beneficiaries; (b) determined levels of beneficiary participation; (c) identified land uses and extent to which the farms were being used, and (d) analysed the research implications of using a cross-sectional study with relatively high representation samples to investigate land reform. In Chapter 3, I assessed the livelihood strategies of land reform beneficiaries to understand livelihood contributions of land reform farms. Therefore, in Chapter 3, I (a) analysed factors (i.e. structures, processes and capitals) underlying livelihood strategies of households; (b) described and quantified contributions of activities and passive sources to livelihoods of households, and (c) assessed the extent to which households combined activities and passive sources to make a living.

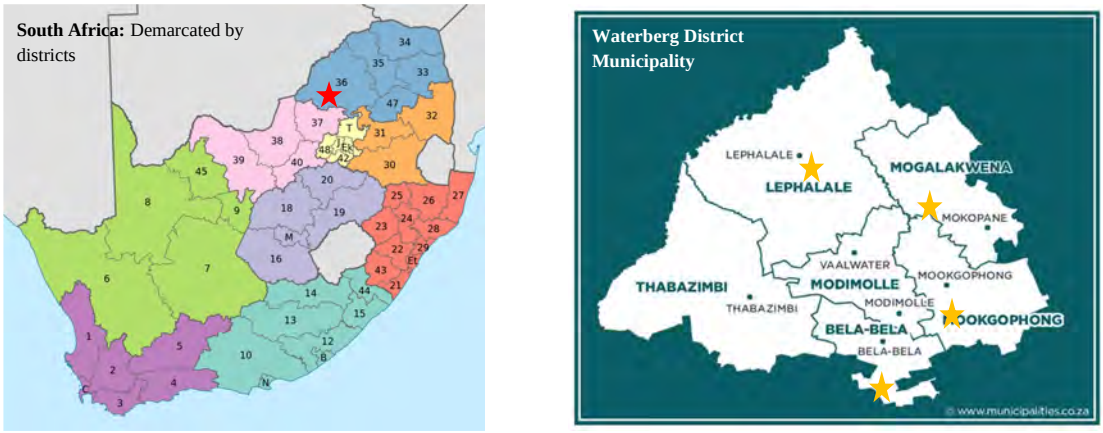
Bio-physical conditions of the farms and socio-economic status of farming households are the determinants of diversities observed in farming system. In Chapter 4, I described the diversity of farming system in land reform farms by (a) identifying the farming system types, (b) characterising the farming systems, and (c) assessing factors underlying farming system development.

Lastly, in Chapter 5, I aimed to understand the strengths and weaknesses of farming systems in land reform farms by (a) identifying stakeholders involved and their contributions; (b) developing an inventory of constraints, and (c) analysing the strengths and weaknesses of farming systems.

4 Methodology

4.1 Description of the study area

I studied the Waterberg District Municipality of the Limpopo province, in South Africa, where all issues and concerns raised in preceding sections are relevant. Figure 2 shows the maps of South Africa (with provinces demarcated by colour and district municipalities numbered and demarcated by solid lines) and the Waterberg District Municipality (with local municipalities demarcated by solid lines and their names written in bold) in Limpopo Province, where the present study was conducted. Limpopo Province constitutes the northern part of South Africa, and the Waterberg District Municipality constitutes the western part of Limpopo Province. The Waterberg District Municipality covers an area of about 45,000 km², which accounts for about 36% of the provincial land and had about 620,000 inhabitants, which was about 12% of the provincial population (LDRT 2012; STATS SA 2012). About 90% of the Waterberg District Municipality is classified as rural (LDRT 2012). The Waterberg District Municipality accounted for about 28% of the total provincial gross geographic



Sources: map of South Africa (Wikipedia 2012); map of Waterberg District Municipality/WDM (WDM 2012)

Limpopo Province
Study area (WDM)
Focus areas

Fig. 2: Maps showing the country, provinces, districts and focus areas of the study.

product and 3.2% of the provincial agricultural gross geographic product (WDM 2009). Further, the Waterberg District Municipality is classified as semi-arid with poor water resources (WDM 2005; Van Averbeke and Khosa 2007) and has limited areas with high potential for crop production (Nhemachena et al. 2011). The Waterberg District Municipality has an average rainfall of 577 mm per annum, evaporation of 2100 mm per annum, aridity index of 0.3, and average minimum and maximum atmospheric temperature of 11.9 ^{o}C and 27.2 ^{o}C, respectively (M'Marete 2003). Agriculture, mining, and electricity are key to the economy of the Waterberg District Municipality, with contributions to the gross geographic product and employment of about: 29% and 27% for agriculture, 57% and 16% for mining, and 36% and 1% for electricity (WDM 2009). Three agricultural practices exist, being cash and field crop production, horticultural crop production and livestock production (WDM 2005). Water constraints in Waterberg District Municipality have led to a shift from dry land and irrigated crop production to extensive livestock production, game ranching, and eco-tourism. The agricultural sector is the largest employer in Waterberg District Municipality, with game and cattle farming using more land area than any other activity (DEAT 2010; Environment.gov.za 2010).

The Waterberg District Municipality, like other districts in South Africa, is subjected to land reform and the extent to which local municipalities under it were subjected to land restitution varied. For instance, 41%, 9% and 9% of the land was under claim at Mogalakwena, Lephalale and Mookgopong local municipalities, respectively (LDRT 2012). We selected four out of six local municipalities (i.e. Bela-Bela, Lephalale, Mogalakwena and Mookgopong) of the Waterberg District Municipality as focus areas (Figure 2). The contributions of the selected local municipalities to the Waterberg District Municipality's land area were Bela-Bela 7%, Lephalale 40%, Mogalakwena 12% and Mookgopong 9% (LDRT 2012), and to the Waterberg District Municipality's population were Bela-Bela 9%, Lephalale 17%, Mogalakwena 48% Mookgopong 5% (STATS SA 2012). The Waterberg District Municipality and the focus areas for the present study were selected based on prevalence of land reform farms and the dominance of livestock production as a land use activity. The prevalence of land reform farms in Waterberg District Municipality was high and comparable solely to the Vhembe District (DRDLRa, n.d.).

4.2 Research approach

Table 1 shows an overview of the methods used in each empirical chapter of this thesis. I covered the information about research methods used, visited/sampled farms and households or number of participants, and personnel responsible for data collection. I reviewed policy documents and

Table 1: Methods used in each empirical chapter of this thesis

Chapter	Research method	Sample size	Persons responsible
2	Desk study on South African land reform policies and semi-structured interviews	Land reform policies; 76 farms	PhD candidate; candidate plus enumerators[1]
	First stakeholder workshop held in Toowoomba Research Station, Bela-Bela	55 participants (contextualisation of the findings of chapter 2)	Team of academics[2] plus state officials[3]
3	Focus group discussions; semi-structured interviews	43 farms; 87 households	PhD candidate plus enumerators[1]
4	Focus group discussions, semi-structured interviews and transect walks	50 farms	PhD candidate plus enumerators[1]
	Second stakeholder workshop held in Klein Kariba, Bela-Bela; mapping the way forward	55 Participants (validating findings of chapters 3 and 4, mapping the way forward)	Team of academics[2] plus state officials[3]
5	Focus group discussions, semi-structured interviews and SWOT analyses	50 farms	PhD candidate plus enumerators[1]

[1]Graduates employed by either the University of Venda (UNIVEN) or Limpopo Department of Agriculture (LDA); [2]Academic staff for UNIVEN and University of Limpopo; [3]Officials from LDA and Department of Rural Development and Land Reform Regional Office in Polokwane.

literature about land reform, used farm surveys to collect background information of the farms, household surveys to collect demographic and livelihood information at household level, focus group discussions in farms owned by households in groups to gather information about households' involvement on-farm, transect walks to gather information about agricultural land use activities, and stakeholder workshops to validate the findings, gather perceptions and discuss the views of stakeholders.

Chapter 2

Land Reform in South Africa: beneficiary participation and impact on land use in the Waterberg District

Land use activities in land reform farms

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Abstract

National challenges of food insecurity and unemployment in South Africa prompted an increase in expectations for agricultural land acquired through land reform programmes to make meaningful contributions. Embedded in these expectations is the need for understanding the situation in reformed farms. This study reviewed policies and literature on land reform, and analysed beneficiary participation in reformed farms and the impact of land reform on land use in land restitution and land redistribution farms in Waterberg District Municipality. Data were collected through individual surveys, key informants' interviews and stakeholder workshop. Beneficiary participation levels were significantly lower in restitution farms (18% per farm) than in redistribution farms (65% per farm). The changes in land redistribution policy over time resulted in significant differences in beneficiary participation among land redistribution models, with participation levels increasing with time. Land redistribution model Settlement/Land Acquisition Grant (SLAG) had the lowest beneficiary participation level (19% per farm) while the latest model Proactive Land Acquisition Strategy (PLAS) had the highest (100% per farm). The changes in land redistribution policy over time resulted in significant differences in extent of land used among land redistribution models, though the trend was not systemic. On average, redistribution farms under SLAG and Land Redistribution for Agricultural Development Phase 2 (LRAD2) models used ≤70% of the farmland, while farms under Land Redistribution for Agricultural Development Phase 1 (LRAD1) and PLAS models used more than 90% of the farmland. The research approach used in this study found similar results in beneficiary participation to those in literature where case studies approach was used in restitution farms. On the contrary, in redistribution farms the research approach resulted in findings that differed from case study literature and revealed the needs for representative sample and time if conclusive recommendations were to be reached.

Key words: beneficiary participation, change in policy, land reform, land use, South Africa.

1 Introduction

The Natives Land Act, Act No. 27 of 1913, played a key role in the restriction of native people of South Africa to occupy only 13% of the country's land (Feinberg 1993; Louw 2013). This restriction resulted in huge differences in land holdings between people of European descent, who occupied on average 1600 hectares per person and native people, who occupied only 1.3 hectares per person (Deininger 1999). The birth of democratic South Africa in 1994 resulted in initiatives that aimed to benefit those who were discriminated against by the former apartheid government (DOJ 1996). One of these initiatives is land reform, which has been executed for the past two decades in South Africa. Land reform has social, economic, and political objectives (Moyo 2009). The emphasis each of the objectives receives is often a political issue, and mostly depends on prevailing societal circumstances. The South Africa land reform programme is being executed through three major programmes: land restitution, land redistributions and land tenure reform (DLA 1997). Land restitution aims to give back previously owned land or to provide alternative land or money to individuals whose land was taken away through racial discriminating laws and practices. Land redistribution aims to overcome racial imbalances in ownership and access to land by transferring land from people of European descent (the minority) to previously disadvantaged groups (the majority) for settlement and production purposes. Land tenure reform aims to secure rights of those who are already occupying land with insecure occupation rights (DLA 1997). Land restitution and land redistribution programmes get most priority because they comprise a transfer of large areas of land to targeted groups, which will impact land use and result in social, economic and ecological effects. The present study, therefore, focuses on land restitution and land redistribution programmes of the South Africa land reform programme.

Land restitution policy and its implementation processes have not changed from 1994 to date. Land redistribution policy and its implementation processes were amended and adjusted over the years, in terms of targeted beneficiaries, identification of land to be reformed and land rights provided to beneficiaries. A beneficiary is an adult, historically disadvantaged (on race basis) South African citizen (a) who is legally competent to contract; (b) who has successfully claimed land that was taken away, or has been selected after meeting criteria set for land redistribution programme; and (c) whose name is on a farm beneficiary list at the time of land hand-over by the Department of Land Affairs or the Department of Rural Development and Land Reform; as defined by DLA (1997). Amendments and adjustments of the land redistribution programme have led to four distinguishable models: Settlement/Land Acquisition Grant (SLAG; active from 1995 till 2000); Land Redistribution for Agricultural Development Phase 1 (LRAD1; active from 2001 till 2007);

Land Redistribution for Agricultural Development Phase 2 (LRAD2; active from 2008 till 2010); and Proactive Land Acquisition Strategy (PLAS; active from 2006 to date) (DLA 1997, 2006; MALA 2001). Between 1994 and 2014, land reform processes resulted in the transfer of approximately 7.4 million hectares of land, of which 3.1 million hectares via restitution and 4.4 million hectares ha via redistribution programme (DRDLR 2014). These 7.4 million hectares contribute 30% to the country's land reform target for 2014 of 24.6 million hectares, and constitute only 9% of the 82 million hectares privately owned by commercial farmers (people of European descent) in South Africa. To our knowledge, land reform in South Africa has been studied only with few farms within programmes (Bradstock 2005, Lahiff et al. 2008, Aliber & Cousins 2013), or on farms within only one land reform programme (Wegerif 2004; Valente 2011; Antwi and Oladele 2013). The aim of the present study was to generate knowledge that will contribute to a broader understanding of the South Africa land reform programme. For this purpose, we defined the following research questions (a) what were the implementation outcomes of land restitution and land redistribution policies (b) what are the levels of beneficiary participation in land reform farms (c) for which land uses and to what extent were the reformed farms being used (e) what are the research implications of studying land reform on a broader perspective? We reviewed policy documents and scientific literature on land reform to compare policy intentions against the implementation outcomes and surveyed a relatively high number of farms under land reform. We have chosen the Waterberg District Municipality in Limpopo province as a case study, because it is a district with a relatively large contribution to land reform (DRDLRa, n.d.), i.e. it constitutes 29% and 59% of the provincial restituted and redistributed land, respectively.

2 Methods

2.1 Study area

The Waterberg District Municipality was chosen as the study area because of high prevalence of land reform farms (DRDLRa, n.d.) and its suitability for livestock and crop production (WDM 2005). Four out of six local municipalities of the Waterberg District Municipality were selected as study areas, based on prevalence of land reform farms (DRDLRa, n.d.) and their location in Waterberg District Municipality; namely Bela-Bela, Lephalale, Mogalakwena and Mookgophong. Location implied distance to the nearest city and was used as proxy for market-oriented agricultural activities. Selected local municipalities were categorized into: low distance (Mogalakwena), medium distance (Bela-Bela and Mookgophong) and high distance (Lephalale) between their main

local municipal towns and the nearest cities (with distances ranging from 58 km to 219 km). The contributions of selected local municipalities to the district land area were: Bela-Bela 7%, Lephalale 40%, Mogalakwena 12% and Mookgophong 9% (LDRT 2012).

2.2 Farm selection and data collection

To identify potential farms to be included, we derived a list of 184 land reform farms by reconciling land reform secondary data from the Department of Rural Development and Land Reform, and Limpopo Department of Agriculture. Table 1 provides information on number of farms in the Waterberg District Municipality, in the study area, and included in the present study. Based on secondary data from the Department of Rural Development and Land Reform, and Limpopo Department of Agriculture, we could not differentiate between LRAD1 and LRAD2 farms, and, therefore, combined they are referred to as Land Redistribution for Agricultural Development (LRAD) farms in Table 1. Farms that were reformed in 2013 were at their inception stage; hence, they were excluded from this study.

Farms included in the study were the active farms where we could find someone willing to be interviewed. Hence, farms not included were either idle farms, active farms with users refusing to participate or farms we could not locate. Idle farms were farms where land was not being used and active farms were farms where land was being used. The Rapid Rural Appraisal (RRA) approach (Chambers 1981) was used to gather information from 76 farms, of which 16 were under land restitution programme and 60 were under land redistribution programme (Table 1). Using semi-structured questionnaires, interviews were conducted with respondents who varied from one beneficiary or farm worker per farm to a group of beneficiaries or farm workers per farm. Qualitative and quantitative data were collected to address *beneficiary participation,* and *land and its use*. Information about programme (restitution or redistribution), previous ownership (private or state), type of beneficiary (households or individuals), their numbers and level of participation, and land users (beneficiaries, strategic partners, other land users and their applicable combinations) were collected to address *beneficiary participation*. Strategic partnership "signifies a joint venture or other form of collaboration between an established commercial firm and a new (or 'emerging') group of workers, shareholders, small farmers, entrepreneurs or community members with limited commercial experience and little or no access to finance or leading-edge markets" (Lahiff et al. 2012). In some occasions the involvement of strategic partners was encouraged by the Department of Agriculture, and the Department of Rural Development and Land

Table 1: Number of reformed farms in Waterberg District Municipality (WDM), and local municipalities in the study area (since inception to 2012). Between brackets number of farms included in the study

Programme	Model	WDM	Local municipalities in the study area				
			Bela-Bela	Lephalale	Mogalakwena	Mookgopong	Total farm no.
Restitution		38	8 (3)	7 (5)	12 (8)	6 (0)	33 (16)
Redistribution		146	27 (18)	29 (9)	21 (12)	39 (21)	116 (60)
Redistribution	SLAG	13	2 (2)	2 (0)	2 (1)	6 (3)	12 (6)
	LRAD	109	25 (16)	15 (5)	16 (10)	25 (16)	81 (47)
	PLAS	24	0 (0)	12 (4)	3 (1)	8 (2)	23 (7)
Total		184	35 (21)	36 (14)	33 (20)	45 (21)	149 (76)

SLAG- Settlement/Land Acquisition Grant; LRAD- Land Redistribution for Agricultural Development; PLAS- Proactive Land Acquisition Strategy.

Source: compiled by the author using land reform records from Department of Rural Development and Land reform, and Limpopo Department of Agriculture .

Reform through provision of capital support (Lahiff et al. 2012; Aliber and Cousins 2013). Other land users are individuals who were not on the list of farm beneficiaries and do not qualify to be considered strategic partners, but have arranged (with those responsible for managing the farm) to use the whole or parts of the farm with or without making financial contributions to the farm. An example of another land user is someone who uses reformed land under lease agreement. Information about previous land use, land size and its current proportional land use were collected to address *land and its use*. Agriculture, forestry, tourism, conservation and mining were listed by Lahiff (2007a) as economic sectors relevant to the land reform programme, and for the purposes of this paper they were referred to as general land uses. Land uses were further broken down into land use classes i.e. crop production, livestock production, game farming and their relevant combinations. Game farming refers to keeping of wild animals and contributes to conservation and tourism sectors of the economy. Secondary data were obtained from reports and relevant records from the Department of Rural Development and Land Reform, and Limpopo Department of Agriculture, while additional information was acquired from interviewing key informants, to substantiate information acquired through RRA. Additionally, a stakeholder workshop was organized to further substantiate information acquired through RRA and secondary sources.

2.3 Data analysis

Most data obtained from RRA could be analysed directly; only level of beneficiary participation was calculated as 100 × (number of active beneficiaries / total number of beneficiaries) and land availability per active beneficiary was calculated as total farmland / number of active beneficiaries per farm. An active beneficiary is a beneficiary who is involved in managing the farm and/or using

the farmland. Data analysis indicated that of the 47 farms under LRAD, 13 belonged to LRAD1 and 34 belonged to LRAD2. Unless specified, programme analysis was based on 16 land restitution farms and 60 land redistribution farms, whereas redistribution model analysis was based on 6 SLAG farms, 13 LRAD1 farms, 34 LRAD2 farms and 7 PLAS farms. Differences between means of quantitative variables were tested using one-way analysis of variance (ANOVA) and post-hoc Tukey's test where applicable. Statistical differences will only be mentioned when significant ($P<0.05$). We used SPSS statistical package (IBM Corp. Released 2013) for statistical analysis. Qualitative data were analysed descriptively.

3 Results

3.1 Land restitution and land redistribution policies, and their implementation outcomes

Table 2 gives characteristics of the South Africa land restitution and land redistribution programmes and the outcomes of their implementation processes. Land restitution policy intentions had not been changed since it started. The amount allocated per restitution claim was not fixed and it differed from claim to claim. Land restitution policy targeted households whose land was dispossessed, and their land claims were settled only when successful. So, the outcome of land restitution implementation had been the beneficiation of the victims of historic racial land dispossession. Restitution farms are being owned by groups of households.

Land redistribution policy, on the contrary, was amended over time (Table 2). The amendments to the land redistribution policy led to four distinctive models: SLAG- Settlement/Land Acquisition Grant; LRAD1-Land Redistribution for Agricultural Development Phase 1; LRAD2-Land Redistribution for Agricultural Development Phase 2; and PLAS-Proactive Land Acquisition Strategy. The models differed in implementation periods and funds allocated to targeted beneficiaries. Grant amount allocated to qualifying beneficiary increased overtime from SLAG to LRAD2 with beneficiaries gaining land ownership. Under PLAS, the state did not allocate grants and beneficiaries had to make lease payments to access land with possibilities of becoming future landowners. The socio-economic classes of targeted beneficiaries broadened, and the type of targeted beneficiaries changed under land redistribution programme, with time. All land redistribution models had a business plan as one of the application requirements. In addition to the business plan requirement, a household income ceiling was set for SLAG whereas contribution

Table 2: Characteristics of the South African land reform programme and the outcomes of the programmes' implementation process

Programme[a]	Model[ab]	Period[b]	Amount allocated (R)	Policy targeted beneficiaries *Social class (type)*	Requirements	Basis for grant allocation or access to land	Implementation outcomes Beneficiaries- *Social class (type)*
Land restitution		1995- date	Not fixed	Dispossessed households/communities (household/s)[am]	Rights to claim[am]	Claim success[a]	Dispossessed households/communities (household/s)[j]
Land redistribution	SLAG	1995-2000	15 000-16 000/H[ae]	The poor (household/s)[a]	Set criterion[1] and business plan (BP)[a]	Demonstration of viability and sustainability of proposed project on the BP[ag]	The poor (household/s)[j]
	LRAD1	2001-2007	20 000-100 000/I[ce]	Rural poor and previously disadvantaged individual/s intend to farm full time (adult individual/s)[c]	Contribution (in cash or kind) and BP[c]	Prospects of economic viability of the proposed project on the BP[cgh]	Mostly better-off (adult individual/s)[jkl]
	LRAD2	2008-2010	111 000-430 000/I[f]	Rural poor and previously disadvantaged individual/s intend to farm full time (adult individual/s)[c]	Contribution (in cash or kind) and BP[c]	Prospects of economic viability of the proposed project on the BP[ci]	Mostly better-off (adult individual/s)[jl]
	PLAS	2006- date	Access to farm[d]	The poor and previously disadvantaged small-scale and commercial farmers (adult individual/s)[d]	Economically viable BP[d]	Signed lease or caretakership agreement[di]	Previously disadvantaged small-scale and commercial farmers and enterpreneurs(adult individual/s)[d]

SLAG- Settlement/Land Acquisition Grant; LRAD1- Land Redistribution for Agricultural Development Phase 1; LRAD2- Land Redistribution for Agricultural Development Phase 2; PLAS- Proactive Land Acquisition Strategy; H- Household; I- Individual.

[1] Only households with a monthly income of ≤ R 1500 per months qualified for selection.

Source: [a] DLA 1997, [b] *prepared by the author based on literature;* [c] MALA 2001; [d] DLA 2006; [e] Hall and Cliffe 2009; [f] Ranwedzi 2013; [g] Cousins 2013a; [h] Lahiff 2007b, [i] Lahiff and Li 2012; [j] Lahiff 2008; [k] Wegerif 2004; [l] Aliber and Cousins 2013; [m] DOJ 1994.

from each of the beneficiaries was expected under LRAD. The basis for grant allocation shifted from demonstration of business plan viability under SLAG to prospects of economic viability of the business plan under LRAD and signing of lease or caretakership agreement under the PLAS model. Targeted beneficiaries of the South Africa land reform programme are provided in Table 2. Poor households were the only target during the inception model SLAG, implying that the household head or a nominated household representative should appear on the farm beneficiary list and only one household member could be a beneficiary. Under SLAG, a farm is owned by a group of households. Hence, an individual household cannot be owner of a farm. The latter models (LRAD1, LRAD2 and PLAS) targeted adult individuals, which made it possible that a whole farm is owned by a single household. Implementation outcomes of land redistribution indicate that SLAG benefited the poor while LRAD1, LRAD2 and PLAS models benefitted mostly other social classes (Table 2).

Table 2 also provides requirements to qualify for South Africa land reform programme. Land restitution processes required that victims of dispossession made claims and prove their validity, whereas the state was responsible for availing the claim settlement funds. Under SLAG and LRAD, beneficiaries were responsible for land identification and making applications, whereas the state was responsible for provision of funds. Under PLAS the state was responsible for identifying and buying the land with beneficiaries having to apply for access to the land.

Overall, we found that the vulnerable owned 23.7% of the farms investigated (n=76), of which farms solely owned by (a) the poor were 7.9% (b) women were 9.2% (c) the youth were 5.3%, and (d) people with disability were 1.3%.

3.2 Historic situation in reformed farms

Of the 16 restitution farms visited during the RRA, 15 were previously owned by private entities and/or individuals, whereas the remaining farm was previously owned by the state. Out of the 60 redistribution farms visited during the RRA, 53 were previously owned by private entities and/or individuals, whereas 7 farms were previously owned by state. Of these 7 redistributed state farms, 5 were under LRAD1, 1 under LRAD2 and 1 under PLAS. Of all restitution farms visited, 63% was previously used for agricultural purposes, 6% for game farming, and 31% for combined agricultural and game farming. Of all redistribution farms visited, 90% was previously used for agricultural purposes, 5% for game farming, and 5% was not used.

Table 3: Previous land use at land reform farms

Programme	Models	Farms (n)	Land use (% of farms)					
			Crop	Livestock	Crop & Livestock	Game	Livestock & Game	Idle
Restitution		16	38	25	0	6	31	0
Redistribution		60	32	28	30	5	0	5
	SLAG	6	33	17	50	0	0	0
Redistribution	LRAD1	13	31	31	24	7	0	7
	LRAD2	34	38	18	35	6	0	3
	PLAS	7	0	86	0	0	0	14

SLAG- Settlement/Land Acquisition Grant; LRAD- Land Redistribution for Agricultural Development Phase 1; LRAD2- Land Redistribution for Agricultural Development Phase 2; PLAS- Proactive Land Acquisition Strategy.

Table 3 presents previous land use of land reform farms visited during the RRA. For restitution farms, crop production, livestock production and the combination of livestock production and game farming were most prevalent previous land uses, whereas for redistribution farms crop production, livestock production and the combination of crop and livestock production were most prevalent. The PLAS farms were to a major extent previously used for livestock production.

3.3 Current situation in reformed farms

Beneficiary participation

Table 4 presents beneficiary numbers and their participation levels for programmes and models, in farms visited during the RRA for which their information was verified using secondary data. The number of beneficiaries differed between land reform programmes and among land redistribution models, while the number of active beneficiaries did not differ between land reform programmes and among land redistribution models. Beneficiary participation levels differed between land reform programmes and among land redistribution models. On average, 216 households benefited under restitution programme, with a range from 30 to 638. On average, 14 households benefited under redistribution, with a range from 1 to 100. The mean levels of beneficiary participation were 18% for restitution farms and 65% for redistribution farms. On average, 57 households benefited under SLAG, with a range from 29 to 80, and 9 individuals benefited under combined LRAD1, LRAD2and PLAS, with a range from 1 to 100. Beneficiary participation level was lowest for SLAG (19%) and highest for PLAS (100%).

All restitution farms were transferred to groups of households, whereas only 10 percent of the redistribution farms were given to households and 90% to “individuals” (either on individual capacity or in groups). A total of 3,030 households benefitted from the 14 visited restitution farms

Table 4: Beneficiary numbers and their participation levels for programmes and models (mean ± sd)

Programme	Models	Farms (n)	Beneficiaries (n/farm)	Active beneficiaries (n/farm)	Participation (%/farm)
Restitution			216^{+} ±191 (n = 14)	18 ±17 (n = 6)	18^{+} ±16 (n = 6)
Redistribution		60	14^{-} ±21	6 ±14	65^{-} ±38
Redistribution	SLAG	6	57^{a} ±20	10 ±8	19^{a} ±16
	LRAD1	13	15^{b} ±28	11 ±27	69^{b} ±41
	LRAD2	34	8^{b} ±10	5 ±6	65^{b} ±35
	PLAS	7	3^{b} ±4	3 ±4	100^{c}

SLAG- Settlement/Land Acquisition Grant; LRAD1- Land Redistribution for Agricultural Development Phase 1; LRAD2- Land Redistribution for Agricultural Development Phase 2; PLAS- Proactive Land Acquisition Strategy.

$^{+,-}$ Different superscripts in a column indicate significant differences between programmes ($P < 0.05$).

^{a,b,c} Different superscripts in a column indicate significant differences between land redistribution models ($P < 0.05$).

with beneficiary information. In total, 339 households and 504 individuals benefited from the 60 visited redistribution farms.

Table 5 gives the frequencies of the reformed farms, visited during the RRA, in which specific group of land users were involved. Combined farm use by beneficiaries and non-beneficiaries was more common in restitution farms and less so in redistribution farms. Other land users were operating independently in 12% and together with the beneficiaries in 44% of the restitution farms. Land use by non-beneficiaries was less and similar in SLAG, LRAD1 and LRAD2 farms, but did not exist in PLAS farms.

Table 5: Frequencies (percent) of land reform farms under specific user

Land users	Restitution	Redistribution	Redistribution models			
	n = 16	n = 60 (6+13+34+7)	SLAG (n = 6)	LRAD1 (n = 13)	LRAD2 (n = 34)	PLAS (n = 7)
Beneficiaries	81	95	100	100	91	100
Non-beneficiaries	75	15	17	16	18	0
Strategic partners	*19*	*5*	*17*	*8*	*3*	*0*
Other	*56*	*10*	*0*	*8*	*15*	*0*

Land and its use

The sizes of farms visited during RRA (verified using secondary data) differed between land reform programmes and among land redistribution models (Table 6). Land redistribution models also differed on land accessible per active beneficiary. Farm size and accessible land per active beneficiary were the smallest under LRAD2. Average farm size and accessible land per active beneficiary observed under LRAD1 were higher than observed under SLAG or LRAD2. The highest farm size and accessible land per active beneficiary were observed under PLAS. Land reform programmes mostly reformed land previously owned by private entities or individuals. Land

Table 6: Farm size and accessible land per active beneficiary (mean ± sd), previous land ownership and total reformed land for programmes and models

Programme	Models	Farms (n)	Farm size	Accessible land	Previous land ownership (ha; between brackets number of farms)		Reformed total
			ha/farm	ha/active beneficiary	Private	State	
Restitution		16	3 430^{+} ±3 179$^{\beta}$	145 ±82$^{\gamma}$	53 033 (15)	1 848 (1)	54 881
Redistribution		60	417^{-} ±564	258 ±543	16 234 (53)	8 502 (7)	24 736
Redistribution	SLAG	6	480^{a} ±535	42^{a} ±22	2 614 (6)	0	2 614
	LRAD1	13	747^{b} ±235	578^{b} ±737	2 833 (8)	6 877 (5)	9 710
	LRAD2	34	134^{a} ±235	30^{a} ±50	4 522 (33)	45 (1)	4 567
	PLAS	7	1 121^{b} ±668	953^{b} ±823	6 265 (6)	1 580 (1)	7 845

SLAG- Settlement/Land Acquisition Grant; LRAD1- Land Redistribution for Agricultural Development Phase 1; LRAD2- Land Redistribution for Agricultural Development Phase 2; PLAS- Proactive Land Acquisition Strategy.

$^{\beta}$ n = 16; $^{\gamma}$ n = 6.

$^{+,-}$ Different superscript in a column indicate significant differences between programmes ($P < 0.05$).

^{a,b} Different superscript in a column indicate significant differences between redistribution models ($P < 0.05$).

redistribution programme reformed four times more land that was previously owned by the state than land restitution programme. The total land reformed under land restitution programme was more than double of that reformed under land redistribution programme. Though, the number of farms reformed under land redistribution programme (116) was three times more than the number reformed under land restitution programme (31) in the study area (Table 1).

Table 7 presents current land use at land reform farms visited during the RRA. Restitution farms had no dominant land use and crop production did not exist as an independent activity in farms under the present study. The percentage of redistribution farms used for either crop production or livestock production or crop and livestock production was comparable, with few idle farms. Most of the farms were used for crop and livestock production under SLAG model, for livestock production under LRAD1 and PLAS models, and for crop production under LRAD2 model.

Table 7: Current land use at land reform farms (percentage of farms under a specific land use)

Programme	Models	Farms (n)	Land use (% of farms)						
			Crop	Livestock	Crop & Livestock	Game	Crop & Game	Livestock & Game	Other use
Restitution		16	0	13	31	19	6	25	6[1]
Redistribution		60	32	34	32	0	0	0	2[1]
Redistribution	SLAG	6	33	17	50	0	0	0	0
	LRAD1	13	16	46	38	0	0	0	0
	LRAD2	34	45	26	26	0	0	0	3[1]
	PLAS	7	0	71	29	0	0	0	0

SLAG- Settlement/Land Acquisition Grant; LRAD1- Land Redistribution for Agricultural Development Phase 1; LRAD2- Land Redistribution for Agricultural Development Phase 2; PLAS- Proactive Land Acquisition Strategy.

[1] Farm used for non-agricultural and non-conservation purposes.

Figures 1 and 2 give the size of land use per land redistribution farm for farms visited during RRA, for crop and livestock production, in hectares and as percentage of total farmland, respectively. Land used for livestock production and total area used differed among models when expressed in hectares and percentages, while land used for crops differed among models only when expressed in hectares.

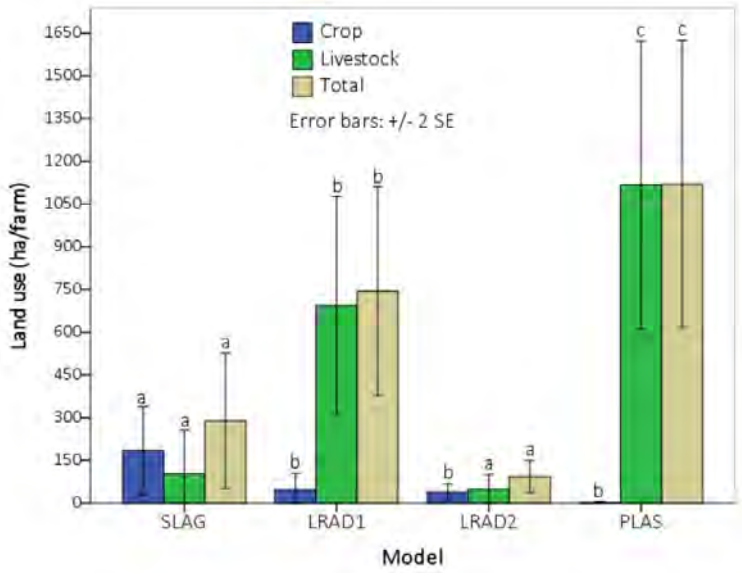

Fig. 1: Average land area used per farm.

[a,b,c] Different superscripts on bars with same colour indicate significant differences between models (P < 0.05).

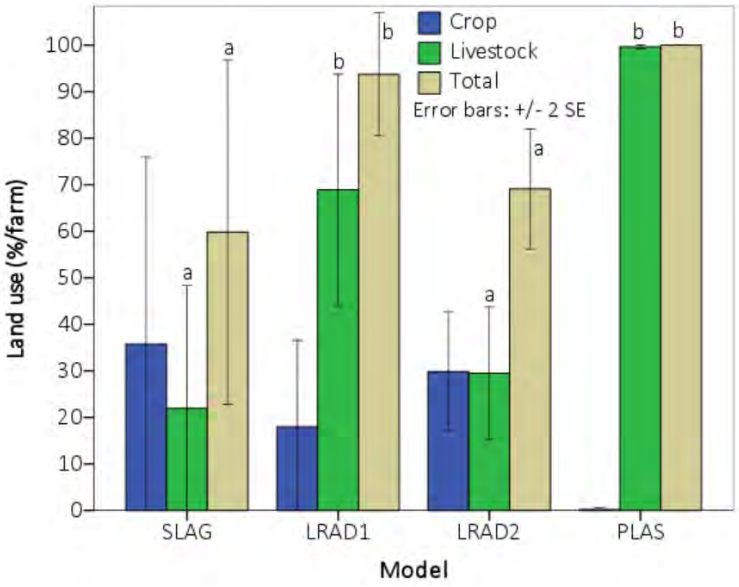

Fig. 2: Average proportional land use per farm.

[a,b,c] Different superscripts on bars with same colour indicate significant differences between models (P < 0.05).

3.4 Comparison between pre- and post-land reform situations

Pre- and post-land reform land uses of farms visited during the RRA are shown in Table 8. Crop farming as sole activity was present pre-land reform in restitution farms, but not anymore. All other land use classes were observed in restitution farms post-land reform. Post-land reform no game farming was observed, while some of the previously idle farms were in use in redistribution farms.

Table 8: Comparison of previous and current land use at land reform farms (percentage of farms under a specific land use)

Programme		Land use (% of farms)						
	Period	Crop	Livestock	Crop & Livestock	Game	Crop & Lame	Livestock & Game	Other use
Restitution (n=16)	Previous	38	25	0	6	0	31	0
	Current	0	13	31	19	6	25	6[1]
Redistribution n=60 (6+13+34+7)	Previous	32	28	30	5	0	0	5[2]
	Current	32	34	32	0	0	0	2[1]

[1] Farm used for non-agricultural and non-conservation purposes; [2] idle farms.

4 Discussion

Farms investigated in the present study represented 43% and 54% of land reform farms in Waterberg District Municipality and focus areas. In the focus area, farms not located (19) were likely to be idle farms and in addition to idle farms (6 identified and 3 investigated) they could all be considered “idle farms”. Representation of active farms was 51% (57 of 112), while that of idle farms was 11% (3 of 28) in the focus area. The present study did not compare active and idle land reform farms, and the findings are conclusive for active land reform farms. With 28 of the 140 land reform farms in Waterberg District Municipality being idle, we conclude that 80% of the land reform farms in Waterberg District Municipality were active and contribute to beneficiaries’ livelihoods.

We assumed that farms Beneficiary participation (numbers and involvement) was an indicator of contribution to equality in land ownership and access objective, while land use could indicate contributions to food security and job creation objectives. The present study reviewed land reform literature with an intent of understanding the findings on beneficiary participation in and land use of reformed farms. It further compared the relevancy of cross-sectional study (with relatively high representation samples) with case study approach in land reform studies.

4.1 Relevant land reform policies

The adherence to the policy targets of land restitution and land redistribution programmes was assessed by evaluating the implementation outcomes of the programmes (Table 2). The adherence of land restitution programme and SLAG redistribution model implementation outcomes to their policy targets emanated from clearly defined targeted beneficiaries. It was the broadening of targeted beneficiary socio-economic classes during later redistribution models (LRAD1, LRAD2 and PLAS) that led to the better-off (small-scale and commercial farmers) benefiting the most. It could be concluded that land restitution and SLAG model met their policy targets fully, while partial fulfilment was realized under LRAD1, LRAD2 and PLAS redistribution models.

Similarly to literature, we found that the vulnerable (the poor, women, the youth and people with disability) were poorly served by the South Africa land reform programme (Wegerif 2004; Lahiff 2008; Aliber and Cousins 2013; Khutswane 2013; Kleinbooi 2013; Meer 2013).

4.2 Beneficiary participation

Land restitution and the initial land redistribution model SLAG were characterized by relatively high number of beneficiaries per farm. However, most of these beneficiaries did not become land users, in line with the findings by Lahiff et al. (2008), and Aliber and Cousins (2013). The observed low beneficiary participation in land use could not be attributed to the conditions of the reformed farms as most of these farms were used before land reform. Inadequate post-land reform support by the state and low resource endowment of the beneficiaries were reported to be among the key factors contributing to low beneficiary participation (Lahiff and Li 2012). High number of restitution farms was used by other land users i.e. observed to be operating independently in 12% and together with the beneficiaries in 44% of the farms. This was likely the result of the low levels of beneficiary participation and large size of the farms, leaving considerable portions of unused land, in line with the findings by Lahiff et al. (2012), and Aliber and Cousins (2013). For reasons associated with low beneficiary participation, state departments, especially in Limpopo province, advocated for involvement of strategic partners as land users (Lahiff 2008; Lahiff et al. 2012; Aliber and Cousins 2013). Involvement of non-beneficiaries as land users in land reform reform farms could have both positive effects (i.e. utilisation of reformed land and availability of working capital coupled with advisory and farm management skills) and negative effects (lack of beneficiary involvement defeating the knowledge and skills transfer objective associated with strategic partnering and unsustainable use of natural resources) (Lahiff et al. 2012).

Changes made to the land redistribution policy (LRAD1, LRAD2 and PLAS being the outcomes of those changes) resulted in land acquisition by financially better-off individuals (Table 2). That led to a decrease in beneficiary number per farm, with most of the beneficiaries being involved in land use (Table 4). High levels of beneficiary involvement in land use could be attributted mainly to the large amount of own investment committed towards land acquisition (MALA 2001; Hall et al. 2003; DLA 2006). The decrease in number of beneficiaries over time could be considered a lack of adherence to the social objective of land reform programme by state and could pose social cohesion challenges in future.

4.3 Land and its use

Land restitution programme had reformed more land than land redistribution programme in the study area and the Limpopo province (DRDLRb, n.d.). However, land redistribution programme had reformed more land than land restitution programme in provinces where the extent of historic racial land dispossession was low e.g. Free State and Northern Cape provinces. Land redistribution programme is expected to deliver more land than land restitution programme in the future (until land reform target of 24.6 million hectares is reached (DLA 1997), since 30 June 2019 was the last date to lodge restitution claims (RSA 2014).

The land restitution programme did not target land for reform on basis of its use. Restitution farms, therefore, had no dominant land use, and the land use changed to more diversification in most of the farms (Lahiff et al. 2008; Aliber and Cousins 2013). These changes in land use could be attributed to beneficiaries' (a) lack of finance to continue capital intensive production activities of the previous farm owners (Hall et al. 2003), (b) benefit of having own livestock readily available to use acquired land, and (c) rights to make decisions on what the land could be used for (DLA 1997). The land redistribution programme, on the other hand, required that those who wanted to benefit included farm business plans as part of their portfolio for land application. Business plans were developed on the basis of land uses which existed in farms targeted for land reform, which generally implied continuation of those land uses post-land reform (Hall 2009; Aliber and Cousins 2013).

Land redistribution programme targeted land for reform randomly and not for a particular agricultural activity. This was reflected by the diversity of agricultural land uses observed in redistribution farms. Agricultural activities vary in their land use e.g. intensive poultry production or irrigated crops use limited land with high possibility that only a fraction of a farm is used (portrayed by LRAD2 model in Figure 2), while beef production on natural pastures or dry land

crop production use a huge amount of land with high possibility that the whole farm is used (portrayed by LRAD1 and PLAS models in Figure 2). The agricultural potential of the area (Eastwood et al. 2006; Lahiff 2007a; Nhemachena et al. 2011) determined the extent to which the land was used per farm. Beneficiaries' lack of resources (portrayed by SLAG model in Figure 2 and backed by Table 2), insufficient government support and type of agricultural activities being practiced (extensive versus intensive production) were among the factors leading to portions of unused land in reformed farms (Lahiff et al. 2008; Aliber and Cousins 2013).

Changes made to the land redistribution policy (LRAD1, LRAD2 and PLAS being the outcomes of those changes) did not result in identifiable trends in the amount of land reform and the extent of land use among redistribution models. The lack of trends could be attributed to the fact that previous land ownership, intended land use (mostly influenced by the district agro-ecological conditions), developments in agricultural sector of an area (as reflected in the 'integrated development plan') and the socio-economic class of beneficiaries represented the context in which land redistribution was being implemented. All these factors did not result in systematic trends regarding the size of the land reformed and the extent of land use. The higher farm sizes coupled with higher extent of land used resulted from (a) under LRAD1 – reform of large state farms (5 of 13 farms), better-off individuals being the beneficiaries and majority of farms being used for extensive livestock production (b) under PLAS – reform land being either previously or currently owned by state, wealthy individuals being the beneficiaries and extensive livestock production dominating the land use (requiring large land sizes to be economically feasible). Smallest farm sizes coupled with high extent of land use observed under LRAD2 model resulted from private owned land being reformed, better-off individuals being the beneficiaries, and reform of land intended for broiler production (in line with the integrated development plan) and intensive crop production. The introduction of LRAD brought the requirements that (a) district municipalities should influence land use patterns in areas they control and (b) state organs key to land reform should ensure that land reform programme adhere to integrated development plans of the districts (MALA 2001; DRDLR 2012). In future, the amount of land to be reformed under land redistribution programme will be determined by the integrated development plans.

4.4 Research approaches

Case studies covering relatively few land reform farms had been the most used research approach to investigate land reform in South Africa (Bradstock 2005; Lahiff et al. 2008; Aliber and Cousins 2013). Though land restitution and land redistribution programmes could be investigated

simultaneously, we comment that the programmes should be considered different for analysis of beneficiary participation. The separation of SLAG model from LRAD1, LRAD2 and PLAS models is also opted for in analysis of beneficiary participation for land redistribution programme. The findings on beneficiary participation confirmed the observations from case study literature (Bradstock 2005; Lahiff et al. 2008; Aliber and Cousins 2013). Hence, we concluded that case studies are appropriate for studying land reform beneficiary participation in land restitution and land redistribution farms. Since the findings from case studies could portray a true reflection of beneficiary participation in land reform farms throughout South Africa.

The cross-sectional study (with relatively large number of samples) used in the present study will require more resources to effectively investigate land use in restitution farms. The inability of case studies to portray the context in which land redistribution was implemented was revealed by the approach used in the present study. Land redistribution findings on land and its use from case studies should be considered portraying the situation on farms investigated. Whereas the findings obtained through the approach used in the present study portrayed land redistribution situation in the study area. For land use investigation, it could be concluded that the approach that could be used to investigate restitution farms should depend on availability of resource, while the approach which strive for representativeness should prioritized in redistribution farms.

5 Conclusions

As contribution to the broader understanding of the South Africa land reform programme, it seems justified to conclude that (a) land restitution benefited the targeted beneficiaries, whereas land redistribution benefited the targeted beneficiaries fully during the inception phase and partially during later phases of the programme, (b) land restitution programme created high number of new land owners who were less involved in using the land, whereas the number of new land owners created decreased and their participation level land increased over time under redistribution programme, (c) (i) historic land dispossession of the area will determine the area of land that could be reformed through restitution and redistribution programmes (ii) restitution farms will not have dominant land use, while redistribution farms will mostly adhere to previous land use (iii) previous land ownership, agro-ecological conditions, integrated development plan of the area and the socio-economic class of beneficiaries will, to a degree, determine the extent to which redistribution farms will be used, (d) case study approach is appropriate for studying land restitution programme (beneficiary participation and land use); whereas beneficiary participation could be studied using

case study approach in redistribution farms, but approaches which consider representativeness and time are critical for knowledge generation on land redistribution.

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Chapter 3

Agriculture in land reform farms: impact on livelihoods of beneficiaries in the Waterberg district, South Africa

Livelihood activities and passive livelihood sources in land reform farms

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Abstract

Countries have pursued land reform to contribute towards equity, poverty alleviation and job creation. Land confiscation and market-assisted approaches are used the most in expediting land reform. The approach adopted in each of the countries will depend on the prevailing circumstances and priorities of those advocating for land reform. South Africa implemented land reform for the past two decades aimed to provide meaningful contribution to the livelihood of beneficiaries, among others. However, economic quantification of livelihood gains attained by households from land reform farms is unknown. The present study aimed to quantify the economic contributions to livelihoods of various activities at land reform farms, and to analyse factors underlying these contributions. We surveyed 87 households who were active in 43 land reform farms in Waterberg District, Limpopo Province. Five land reform farm types were distinguished: Restitution (Rest), settlement/land acquisition grant (SLAG), land redistribution for agricultural development phases 1 and 2 (LRAD1 and LRAD2) and proactive land acquisition strategy (PLAS) farms. We used a stepwise approach for data collection, which included focus group discussions, household surveys and livelihood pie charts. On-farm contributions were higher (±49.5%) in LRAD1, LRAD2 and PLAS, compared to on-farm contributions of households in Rest and SLAG (±15.5%), because most of the household heads (±68.3%) were younger (≤59 years), and households were physical capital endowed and farmed in physical capital endowed farms. Livestock farming was a key land use activity because of the prevailing agroecological conditions. The land reform policy should prioritise provision of farm physical capital and livestock production to improve on-farm livelihood contributions in physical capital poor farms.

Key words: agrarian reform; farmland; household survey; livelihood contribution; rural population; South Africa.

1 Introduction

The persistence of poverty among rural dwellers in the world is in part caused by injustices regarding ownership and access to land (World Bank 2001; Griffin et al. 2002; Borras Jr. et al. 2007). An injustice regarding land ownership and access is when indigenous citizens have become dispossessed from their land, and became either tenants or landless labourers to the new land owners (Griffin et al. 2002; Moyo 2011). Former owners becoming tenants was most prevalent in East Asia, which could be related to the fact that farm sizes were relatively small (±2ha) and used for own cultivation. In the rest of the Global South and especially there where farm sizes were relatively large and used for commercial agriculture former owners often became hired labourers. South Africa is an example of a country in the Global South where land dispossession led to large scale commercial farms, with an average farm size of 1427 ha reported in 1993 (DAFF 2012). Some descendants of former landowners had become tenants and agricultural labourers, but most of them were having non-agricultural jobs or were unemployed. These descendants of former owners made up a considerable proportion of the rural poor. Agriculture could be an important livelihood activity of the rural poor. Hence, re-establishment of ownership and access to land to dispossessed rural dwellers through agrarian reform [of which land reform is part of] and development of agricultural activities on the land are pivotal in addressing injustice and poverty (Griffin et al. 2002; Borras Jr. et al. 2007; Binswanger-Mkhize et al. 2009; Vista et al. 2012). Agrarian reform aims to re-establish ownership and access to land by the dispossessed and include provision of support to improve livelihoods of beneficiaries (Thiesenhusen 1989).

Many countries (e.g. Zimbabwe, Kenya, Algeria, Mexico, Bolivia, Kazakhstan, Poland and Romania, for example) have implemented land reform in an attempt to address social inequalities, and thereby contribute towards eradication of poverty and creation of jobs (Griffin et al. 2002; Borras Jr. et al. 2007). Objectives of land reform may depend on the perspectives of stackeholders (Binswanger-Mkhize et al. 2009; Borras Jr. et al. 2007). Economists advocate for efficient use of capitals in a 'market-led' land reform process facilitated by the state. Social activists advocate for security of tenure for the landless by prioritising the interests of the landless. Environmentalists advocate for sustainable use of natural capital. Politicians advocate for peace and stability while pursuing the agenda of the most influential stakeholder, i.e. economists or social activists or environmentalists. A 'state/society-driven' land reform approach, as explained by Borras Jr. et al. (2007), which takes into account objectives of all stakeholders advocating for land reform, probably presents the best approach (Griffin et al. 2002). In practice, land reform is often an outcome of political processes and has to meet multiple, sometimes conflictual objectives for different

stakeholders (Binswanger-Mkhize et al. 2009; Moyo 2011; Keswell and Carter 2014). Land reform, therefore, is a complex process and its outcomes are difficult to evaluate. Implementation of land reform reduced social inequalities and poverty in countries where it (a) was not implemented according to market principles, (b) benefited mostly the tenants, and (c) was a component of the broader rural development strategy (Griffin et al. 2002). The reduction of social inequalities and poverty depended also on the balance of power between the landowners and the movements for the landless.

The outcomes of land reform can be assessed using various 'viability' paradigms (Lahiff et al. 2008; Cousins and Scoones 2010):- the 'neo-classical economics' paradigm assesses the efficiency of production in reformed land of viable size; the 'new institutional economics' paradigm assesses the effects of factors and conditions which influence efficiency of various scales of production; the 'livelihood' paradigm has two perspectives i.e. the 'development' perspective which assesses the livelihood sources of land reform beneficiaries and the 'welfare' perspective which assesses the impact of food production, on reformed land, on welfare of benefitting households; the 'radical political economy' paradigm assesses impact of land reform on agrarian structures; and the 'marxism' paradigm assesses class and accumulation dynamics which exist in reformed land. The present study assessed land reform through development and welfare perspectives of the livelihood paradigm. Chambers and Conway (1992:5) define livelihood as *"a means of gaining a living"*, but with time the definition included: material as well as non-material aspects of well-being (Scoones 2009). Walker et al. (2001) defined livelihood strategy as "an organized set of lifestyle choices, goals and values, and activities influenced by biophysical, political/legal, economic, social, cultural, and psychological components". Livelihood strategies were reported to differ between regions, between households within a region, and in time (Jansen et al. 2006; Tittonell et al. 2010). Livelihood capitals (natural, physical, financial, social and human) are the main determinants of livelihood strategies that are geared towards attainment of livelihood goals, because capitals are considered as stock that can be stored, accumulated, bartered, and used as production inputs to generate income (Scoones 1998; Ellis 2000; Carney 2003; Fang et al. 2014; Dzanku 2015; Gautam and Andersen 2016; Martin and Lorenzen 2016). Households' access to capitals are influenced by 'mediating processes' like tenure structure, shocks like floods or droughts, trends like technological developments, and seasonality of weather and agricultural production (Ellis 2000). Collectively, the factors which influence households' access to capitals are considered "vulnerabilities" (Carney 2003). Therefore, households choose livelihood activities based on capitals and vulnerabilities.

In South Africa, 18% of households were involved in the agricultural sector in which (a) large scale commercial farms (owned by 14% of agricultural households) used hired labour to produce most commodities sold in markets, and (b) small-scale farmers (86% of agricultural households) used backyards and communal land to secure food (Aliber and Cousins 2013; STATS SA 2014). In pursuit of addressing challenges of social inequalities, poverty and unemployment (emanating from the colonial past), South Africa has been implementing land reform for more than two decades through market-assisted willing-buyer willing-seller approach (DLA 1997). *Land restitution* (referred to as 'Rest' from this point onwards), *land redistribution* and *land tenure* are the three sub-programmes of the South Africa land reform programme (DLA 1997). Individuals of all social classes (poor to wealthy) are benefiting from Rest. Three land redistribution models exist. The Settlement/Land Acquisition Grant (SLAG) is benefiting poor individuals, the Land Redistribution for Agricultural Development (LRAD) is benefiting mostly capital endowed individuals, whereas the recent Proactive Land Acquisition Strategy (PLAS) is benefiting mostly wealthy individuals (DLA 1997, 2006; Wegerif 2004; Lahiff 2008; Aliber and Cousins 2013). The sub-programme land tenure is benefiting mostly capital poor individuals with limited security of tenure on the land they lived or resided on (DLA 1997). The land reformed under the Rest programme is used by beneficiaries as they wish, whereas land reformed under the redistribution programme is used for settlement and other uses under SLAG, and solely for agricultural uses under LRAD and PLAS. For beneficiaries, land reform implies acquired ownership of and/or access to land and farm capitals such as infrastructure, equipment, permanent crops and livestock (Lahiff et al. 2008). Active households may benefit from land reform through employment (as farmer or farm worker), food supply, cash income and access to natural capitals like fire wood and thatch grass (Lahiff et al. 2008; Hall 2009).

Similarly to other countries that implemented agrarian reforms, South Africa struggled with achieving synergy among social, political, economic and ecological objectives of the land reform (Lahiff 2008; Valente 2011; Netshipale et al. 2017). South Africa's land reform programme has been mostly criticized for its lack of contribution to the livelihoods of beneficiaries, which resulted from the limited agricultural production on reformed land (Lahiff and Li 2012; Aliber and Cousins 2013). Hence, there were questions about the ability of land reform to contribute to the socio-economic objectives of reduction of inequalities in household income and creation of jobs. To our knowledge, the livelihood impacts of land reform in South Africa have been studied on farms within one land reform programme and, if programmes were compared, only with a limited number of farms within programmes (Wegerif 2004; Bradstock 2005; Lahiff et al. 2008; Valente 2011; Aliber and Cousins 2013; Antwi and Oladele 2013; Keswell and Carter 2014). Furthermore, the extent to which land reform farms contributed to livelihoods has not been quantified. Therefore, the objectives of the

present study were to quantify the economic livelihood contribution of diverse activities in land reform farms, and to analyse factors underlying the households' economics, among five land reform farm types (i.e. Rest, SLAG, LRAD1, LRAD2 and PLAS). To our knowledge, the present study is the first cross-sectional study addressing these objectives.

2 Methods

2.1 Study area

The study was conducted in the Waterberg District Municipality of Limpopo Province, South Africa. Similarly to district municipalities in provinces like Mpumalanga, North West and Eastern Cape, most of the land in Waterberg District Municipality was owned by the minority (of European decent), though there were patches of land owned by the majority (indigenous people) (SA History Online 2019). Land reform in South Africa aimed to change ownership and access to land infavor of the landless majority. Hence, we considered the land reform situation in Waterberg District Municipality to reflect the status of land reform in South Africa. We selected four of the six local municipalities of the Waterberg District Municipality as focus areas, based on prevalence of land reform farms (DRDLRa n.d.). The selected local municipalities were Bela-Bela, Lephalale, Mogalakwena and Mookgopong. The contributions of selected local municipalities to the district land area and population were as follows: Bela-Bela 7 and 10 percent, Lephalale 40 and 17 percent, Mogalakwena 12 and 45 percent and Mookgopong 9 and 5 percent, respectively (LDRT 2012; WDM 2014).

2.2 Farm selection and sampling of households

Land reform farms were classified based on the land reform programme (i.e. restitution and redistribution farms) under which land transfer took place and farms under the land redistribution programme were classified further based on the four models implemented under the redistribution programme. The classification resulted in the following land reform farm types (a) restitution farms (Rest), and the redistribution farm types (b) Settlement/Land Acquisition Grant (SLAG) farms (c) Land Redistribution for Agricultural Development phase 1 (LRAD1) farms and (d) phase 2 (LRAD2) farms, and (e) Proactive Land Acquisition Strategy (PLAS) farms (Netshipale et al. 2017).

Table 1: Sampling of farms and households, and their distribution within farm ownership types and farm operation styles

Sampling of farms and households (hhs)						Distribution of farms and household (hhs) samples						
						Individual[1] owned	Group owned					
		Farms		Active hhs			Collective operation		Individual operation		Dual operations	
Programme	Farm type	Active	Sample	In sample farms	Sample		Farms	Hhs	Farms	Hhs	Farms	Hhs
Restitution	Rest	33	7	123	38	0	1	2	1	9	5	27
Redistribution	SLAG	6	4	44	13	0	1	2	1	2	2	9
	LRAD1	14	8	23	10	4	2	4	1	1	1	1
	LRAD2	38	17	32	18	8	4	4	4	5	1	1
	PLAS	21	7	12	8	5	2	3	0	0	0	0
	Total	112	43	232	87	17	11	15	6	17	9	38

[1] Where hhs owned farms individually, the number of farms = the number of sampled hhs; Rest- Restitution, SLAG- Settlement/Land Acquisition Grant, LRAD1- Land Redistribution for Agricultural Development phase 1, LRAD2- Land Redistribution for Agricultural Development phase 2, PLAS- Proactive Land Acquisition Strategy.

Land reform farms could be owned either by households individually or by households in groups (DLA 1997, 2006; MALA 2001; Wegerif 2004; Lahiff 2007a). Farms were owned by groups of households under Rest and SLAG, whereas farms were owned either by groups of households or by individual households under LRAD1, LRAD2 and PLAS (Table 1) and we classified the farms in these programmes accordingly (group or individual). If farms were owned by a group of related households but the farm capitals were controlled by a single household, we classified these farms as individually owned. The possibilities for two farm-ownership-types (i.e. group and individual) under LRAD1, LRAD2 and PLAS made it possible to compare these farm-ownership-types within each of these farm types. We also classified farms according to the operation style i.e. farms owned by groups of households could be used either for the benefit of households collectively (referred to as 'group farming') or for the benefit of households independent from each other (referred to as 'individual farming') or have both collective and individual benefits (referred to as 'dual farming'), in line with Lahiff (2007a) and Hall (2009). Hence, farms under group ownership were classified further based on operation styles (i.e. collective farming or individual farming or dual farming).

Active households refer to households that had at least one member appearing on a beneficiary list of a farm and that had also at least one member (beneficiary or non-beneficiary) involved in farm management and/or land use. Targeting of active households was based on the notion that one had to be actively involved to earn tangible outputs from the farm (Lahiff et al. 2008). Stratified random sampling which considered strata on land reform farm types, farm ownership types and operation styles was used to select 43 farms (7 restitution farms and 36 redistribution farms which represented diversity in land reform programmes and in redistribution models) and 87 households (38 under restitution farms and 49 under redistribution), as shown in Table 1. In each of the selected farms, we targeted >20% of the active households for data collection.

2.3 Data Collection

Socio-economic data were collected to estimate livelihood contributions of on-farm activities (on-farm agriculture i.e. crop and/or livestock farming, on-farm employment and leasing out of farm capitals) among land reform farm types in the period 01 April 2013 to 31 March 2014. Most households did not keep records of their on-farm activities (Cousins 2013b). Hence, we collected data on off-farm livelihood activities and passive livelihood sources, which we used to estimate on-farm livelihood contributions. Table 2 provides information about research methods, study sample size and information collected. The following stepwise approach was used for data collection (a) focus group discussions (FGDs) in 26 of the 43 farms, where there were >1 active household per

Table 2: Methods used, sample size and information collected

Research methods (followed stepwise)	1. Focus group discussions (FGDs), in farms where there >1 active household (hh) per farm	2. Hh interviews using semi-structured questionnaire	3. Development of livelihood pie charts
Study sample size	26 farms	87 hhs	87 hhs
Information collected	On-farm activities and number of hhs involved; proceeds from collective on-farm activities and their allocation among active hhs; farm' s physical capital (infrastructure, machinery, and equipment) and its access by active hhs; farm capital control and management; and leasing out of farm capitals and allocation of proceeds among active hhs	***Demography:*** respondents (gender, relation to the hh head), hh head (gender, age, area of residence, occupation, and educational qualification) and hh (hh size and on-farm participation status of other hh members[1]) ***Livelihood contribution of activities:*** livelihood activities of hhs: agriculture (crop and/or livestock farming), employment, private pension, and small, medium, and micro-sized enterprises (SMMEs), and their earnings ***Extent of on-farm agricultural land use:*** extent of on-farm land used for crops in hectares/hh[2] and the species and number of livestock that used benefited land expressed in *tropical livestock units-TLUs*/hh[3] ***Passive sources of livelihood:*** other sources of income: social grants, remittances and leasing out of farm capitals Hh physical capital endowment (used as proxy for hh wealth) and farm physical capital on farms owned by single hh	Based on livelihood activities identified through the use interviews (method 2), respondents were facilitated to draw either by pen on paper or by a stick on the ground, a pie chart presenting the proportions of contributions of the various livelihood activities and or passive sources to the total hh livelihood, and the first author estimated numeric values from the drawn proportions in the pie charts

[1] Additinally, on-farm participation of hh members (hh members actively involved) was also used as a proxy for hh human capital endowment.

[2] Estimated by multiplying the area given in morgen by 0.8567 to convert it to hectares (ha), and in cases where on-farm crop land was used by hhs in groups, the land area used per hh was computed by dividing the total area used by the number of hhs that used the land.

[3] The numbers of livestock were converted to TLUs using the following conversion factors:- 1 cow = 0.7 TLU, 1 small ruminant = 0.1 TLU, 1 pig = 0.2 TLU and 1 chicken = 0.01 TLU, 1 calf = 0.35 TLU, 1 kid/lamb = 0.05 TLU and 1 piglet = 0.1 TLU (AGRODEP 2010), and in cases where group livestock farming was practiced, TLUs per hh were computed by dividing the total number of TLUs by the number of hhs involved. The TLUs that used benefited land included livestock sold during the period under investigation.

farm (b) household surveys using structured questionnaire (through interviews with respondents i.e. household heads or their representatives, for 87 households), and (c) development of livelihood pie charts for 87 households (done by respondents with assistance of enumerators). Focus groups discussions did not apply in farms where there was only 1 active household.

2.4 Data Analysis

Demographic data

For demographic analysis, household heads were classified into two age groups (i.e. pensioner = ≥60 years, and worker = 18-60 years) and three occupations (farmer, pensioner farmer and other). The category farmer referred to household heads who had farming as the only livelihood activity, whereas the category pensioner farmers referred to household heads who were farmers and received old age pension (social grant from state or money from former employer). The category other comprised household heads who were (a) employed and owned Small, Medium and Micro-sized Enterprises (SMMEs), but who were also part-time farmers, (b) either employed or SMMEs or pensioners and their combinations, and (c) no occupation.

Classification of household physical capital endowment in Table 3 was based on household ownership of prevalent movable assets (e.g. wheelbarrow, car and tractor). Households that owned nothing or wheelbarrows only were classified as *"physical capital poor"*, households that owned either a car or a tractor or both were classified as being *"physical capital endowed"*. Regarding classification of farm physical capital, we defined "*physical capital poor farms*" as farms where

Table 3: Farm classification based on physical capital

Agric activity	Capital	Farm physical capital level[1]	
		Poor	Endowed
Livestock			
Extensive	Fences and animal water sources	Only border fence and ≤25% of water points functional	Border and subdividing fences, and >25% of water points functional
Intensive	Housing[2] (number and condition)	Owning ≤25% of required for a continuous business cycle	Owning >25% of required for a continuous business cycle
Crop			
Extensive	Machinery and equipment	In possession of ≤ 25% of required	In possession of >25% of required
Intensive	Infrastructure[3] and machinery and equipment	In possession of ≤25% of required	In possession of >25% of required

[1] Farm physical capital levels were estimated by comparing the existing farm capitals to what could be the desired optimum capitals for the existing agricultural activity/activities.

[2] Only poultry production (broilers or layers) was practiced.

[3] Not specified due to variations between farms caused by variations in type of crops being produced.

physical capital limited farm utilisation, and "*physical capital endowed farms*" as farms where physical capital allowed for moderate and optimal utilisation of the farms.

Economic data

Economic data on contribution (percentage and monetary) of livelihood activities and passive sources to the total household income needed further computation and merging before they could be analysed. The computations were feasible because respondents provided information about proportional contributions of each livelihood activity and source to the total household livelihood. On-farm activities, off-farm activities and passive sources were the three main categories of the sources of livelihoods. The category on-farm activities was computed as the sum of contributions from on-farm agriculture (crop and/or livestock farming), on-farm employment and leasing out of farm capitals. Whereas the category off-farm activities was computed as the sum of contributions from off-farm agriculture (crop and/or livestock), employment, private pension and SMMEs. The category passive source of livelihood was computed as the sum of contributions from social grants provided by the state and remittances from relatives.

Derivation of monetary values for livelihood activities and passive livelihood sources

Households were classified into (a) social grant income earning, (b) employment income earning, and (c) other income earning households, for purposes of estimating household monetary contribution of livelihood activities and passive livelihood sources. The other income earning households depended on livelihood activities and passive livelihood sources other than employment and social grants i.e. SMME, private pension, agriculture and remittances. Agriculture as livelihood activity in households that depended on other income earning indicated that agriculture (regardless of where it took place i.e. on-farm or off-farm or both) was the only activity from which contributions of livelihood activities and passive livelihood sources could be estimated.

(a) Social grant income earning households

Social grant income could be estimated and was used to estimate monetary livelihoods contributions for 72.4% of households. Social grant information from the South African Social Security Agency (SASSA) for the 1 April 2013 to 30 March 2014 financial year (SASSA 2015) was used to estimate the amount of social grant which an individual qualified for under various social grant schemes (Table 4).

The grant income for the i^{th} household (GI_i) was estimated as:

$GI_i = \sum_{k=1}^{n} SG_k N_{ik}$ [equation 1]

Table 4: Types of South African social grant and the amount allocated per qualifying individual during 2013/14 financial year

Social grant type[1]	Description	Amount allocated (R/month)	Amount allocated (US$/month)	Amount allocated (US$/year)
Old age pension	Elders ≥ 60 yrs.			
Disability grant	Disabled 18 – 60 yrs.	1 270	124.63	1 495.58
Care dependency grant	Disabled child < 18 yrs.			
Child support	Children < 18 yrs.	300	29.44	353.29
Foster child grant	Child < 18 yrs. under foster care	800	78.51	942.10

[1]*Source:* SASSA 2015.

Only South African citizens that passed the "Means Test" (based on asset and income threshold) for applicable social grant type/s qualified for social grants. Average exchange rate of R10.19/US$ for April 2013 –March 2014 was used for South African Rand (R) to United States Dollar (US$) conversion.

Where n is the levels of k, SG_k is the grant amount allocated to the k^{th} grant type and N_{ik} is the number of the members of the i^{th} household receiving k^{th} grant type.

The total income (TI_i) for the i^{th} household was estimated, using GI_i (equation 1) and proportional contribution of GI_i (GC_i) to the total income, as:

$TI_i = \frac{GI_i}{\%GC_i} X\ 100$ [equation 2]

For social grant earning households, the monetary contribution from other livelihood activities or passive sources (YI_i) for the i^{th} household was estimated, using TI_i (equation 2) and proportional contribution of YI_i (YC_i) to the total income, as;

$YI_i = \frac{TI_i\ X\ \%YC_i}{100}$ [equation 3]

(b) Employment income earning households

It is a taboo in the study area to ask elders how much they or members of their households earn. To estimate employment income for households without social grant income but with an employment income, we classified employment types observed for grant earning households and computed the average annual employment income (US$ per person per year) for each employment type. We identified five employment types as shown in Table 5, and subsequently estimated employment income for the 12.6% of the households without social grant income using average annual employment income for similar employment types.

The employment income for the i^{th} household (EI_i) was estimated as:

$EI_i = \sum_{l=1}^{n} ES_l N_{il}$ [equation 4]

Where n is the levels of l, ES_l is the salary amount received for the l^{th} employment type and N_{il} is the number of the members of the i^{th} household receiving income from the l^{th} employment type.

Table 5: Employment types and their annual income (mean ± se)

Category	Type	Description	Sample size[1]	Annual income (US$/person/year)
1	Informal[1]	A day to a week employment without relations between employer and employee, wage negotiable	6	217.27 ±16.78
2	Informal[2]	More than a week to 3 months' employment with employer and employee relation, with predetermined but not fixed wage	7	424.57 ±42.05
3	Semiformal	More than 3 months' employment, employer and employee relations determining duration of employment. Adhered to some of Basic Condition of Employment Act[2] (e.g., minimum wage)	6	1 526.01 ±211.20
4	Formal	Permanent employees in registered companies and civil servants. Basic condition of employment fully adhered to	3	3 188.57 ±191.44
5	Formal (executive)	Like Category 4, with added managerial employment benefits	3	6 334.10 ±1 048.96

[1] Social grant earning households that also had employment income.
[2] DOL 2014.

The total income (TI_i) for the i^{th} employment earning household was estimated, using EI_i (equation 4) and proportional contribution of EI_i (EC_i) to the total income, as:

$TI_i = \frac{EI_i}{\%EC_i} \; X \; 100$ [equation 5]

Equation 3 was used to estimate monetary contribution from other livelihood activities or passive sources for employment income earning households.

(c) Other income earning households

The main household income contributing activities and passive livelihood source in the other income earning households were agriculture (6.9%), private pension (4.6%), SMMEs (1.1%) and remittances (2.3%). The monetary livelihood contributions of these activities and passive source were estimated based on possible household income from livelihood activities and passive livelihood sources. We estimated as follows: households with members who did not qualify for social grants because of having assets and income above the threshold for being entitled to receive such social grants were considered to be having employment income above that of category 3 employment type (Table 5) and we classified them either in category 4 or 5 based on possible household income. Capital poor households (based on possible household income) that did not receive social grant because household members did not meet the set qualification criteria (e.g. age requirement) were considered to be having household income equivalent to that below category 3 employment (Table 5) and we classified them either in category 1 or 2 based on possible household income.

Household income from other household activities and passive sources (YI_i) in no grant-no employment income household was estimated as:

$YI_i = \sum_{m=1}^{n} ZI_{mi}$ [equation 6]

Where n is the levels of m, ZI_m was the anticipated income from the m^{th} livelihood activity or passive source for the i^{th} household.

The total income (TI_i) for the i^{th} no grant-no employment household was estimated, using YI_i (equation 6) and proportional contribution of YI_i (YC_i) to the total income, as:

$TI_i = \frac{YI_i}{\%YC_i} X\ 100$ [equation 7]

2.5 Statistical analysis

Analyses of on-farm activities, off-farm activities and passive livelihood sources were based on 87 households. We considered farm natural and physical capital determinants of feasibility of specified on-farm activities. Hence, the analyses of on-farm livestock production were based on 55 households and on-farm crop production was based on 43 households (Table 6). Twenty households that practiced on-farm mixed farming of livestock and crop were included in both the households that practiced on-farm livestock and the households that practiced on-farm crop.

Differences in distributions of demographic and capital endowment variables among farm types were tested using Fisher's exact test. Binomial logistic regression was done to analyse the differences in percentage livelihood contributions of on-farm and off-farm activities, passive

Table 6: Number of households used for the analyses of off-farm activities and passive livelihood sources, on-farm livestock and on-farm crop production

Farm type	Number of households		
	On-farm activities[1], off-farm activities[2] and passive sources[3]	On-farm livestock	On-farm crop
Rest	38	24	8
SLAG	13	9	10
LRAD1	10	6	8
LRAD2	18	8	14
PLAS	8	8	3
Total	87	55	43

[1] On-farm agriculture (crop and/or livestock farming), on-farm employment and leasing out of farm capitals.

[2] Off-farm agriculture (crop and/or livestock farming), employment, private pension and SMMEs.

[3] Social grants provided by the state and remittances.

Rest- Restitution, SLAG- Settlement/Land Acquisition Grant, LRAD1- Land Redistribution for Agricultural Development phase 1, LRAD2- Land Redistribution for Agricultural Development phase 2, PLAS- Proactive Land Acquisition Strategy.

livelihoods sources, crop production and livestock production among farm types, using a dispersion factors derived from Pearson's Chi-square to approximate standard errors. Differences in percentage livelihood contributions among farm types were tested by Fisher's LSD test. Differences in monetary livelihood contributions of on-farm and off-farm activities, passive livelihoods sources, crop production and livestock production among farm types were tested using the Kruskal-Wallis test. In addition, differences in monetary on-farm contributions as influenced by household and farm physical capital endowments within farm types were tested using the Mann-Whitney test. Statistical differences will only be mentioned when significant ($P<0.05$). We used GenStat Release 19 for the binomial logistic regression (VSN International 2017), whereas SPSS statistical package (IBM Corp. Released 2015) was used for other analyses.

3 Results

3.1 Demography

Household heads represented 87% of the respondents and their next of kin 13%. Male household heads were dominant in all farm types (76% overall). Ninety seven percent of the household heads resided within local municipalities where benefited farms were located, and the reminder resided in different local municipalities. Thirty seven percent of households that farmed in land reform farms were also farming in alternative land and households that practiced crop farming in alternative land were twice the number of households that practiced livestock farming. Table 7 shows percentage distribution of household heads according to categorical age and occupation, households according to household members active on-farm and average household size (number of people), among farm types. The percentage distribution of household heads differed in relation to categorical age and occupations, among land reform farm types. Household heads of working age (worker) dominated (±67%) in LRAD1 and PLAS, whereas household heads that were pensioners dominated (±71%) in Rest and SLAG. Household heads that were farmers prevailed the most (±41%) in LRAD1, LRAD2 and PLAS, whereas household heads that were pensioner farmers prevailed the most (±57%) in Rest, SLAG and LRAD2. Household heads that were involved in farming and other off-farm activities or solely in off-farm activities were the least (5.6%) in LRAD2 and differed from household heads (±37%) in Rest, LRAD1 and PLAS. Land reform farm types had different numbers of household members active on-farm per household. Households with a single member active on-farm were the most (±99%) in Rest and SLAG, whereas households with ≥2 members active on-farm prevailed the most (±29%) in LRAD1, LRAD2 and PLAS. The highest number of household members active on-farm was 4. Most households (≥86.2% overall) availed a

Table 7: Distribution (%) of household (hh) heads according to age and occupation, hhs according to hh members active on-farm and hh size (number of people), among farm types

		Age hh head		Occupation hh head			Hh members active on-farm		Hh size
Farm type	Hhs (n)	Worker (18-60 yrs.)	Pensioner (≥60 yrs.)	Farmer	Pensioner farmer	Other	1	≥2	
Rest	38	34.2^{ab}	65.8^{bc}	13.2^{ab}	52.6^{bc}	34.2^{b}	97.4^{b}	2.6^{a}	6.4
SLAG	13	23.1^{a}	76.9^{c}	7.7^{a}	69.2^{c}	23.1^{ab}	100^{b}	0^{a}	5.3
LRAD1	10	80.0^{c}	20.0^{a}	40.0^{c}	20.0^{a}	40.0^{b}	70.0^{a}	30.0^{b}	6.8
LRAD2	18	50.0^{b}	50.0^{b}	44.4^{c}	50.0^{bc}	5.6^{a}	66.7^{a}	33.3^{b}	5.8
PLAS	8	75.0^{c}	25.0^{a}	37.5^{bc}	25.0^{ab}	37.5^{b}	75.0^{a}	25.0^{b}	6.0

Two-sided Fisher's exact test (P=0.015 for farm type and age hh head; P=0.017 for farm type and occupation hh head; P=0.002 for farm type and hh members active on-farm).

^{abc} Different superscripts in a column indicate significant differences among farm types [$\alpha=P(\chi^2>0.02;10)$ for age hh head and for hh members active on farm; $\alpha=P(\chi^2>0.02;15)$ for occupation hh head].

Other- comprised of hh heads who were (i) employed and owned SMMEs, but who were also part time farmers (ii) either employed or SMMEs or pensioners and their combinations, and (iii) no occupation.

Rest- Restitution, SLAG- Settlement/Land Acquisition Grant, LRAD1- Land Redistribution for Agricultural Development phase 1, LRAD2- Land Redistribution for Agricultural Development phase 2, PLAS- Proactive Land Acquisition Strategy.

single household member for on-farm activities. The average household size did not differ among land reform farm types and overall, household had an average of 6.1 members. Educational levels of household heads did not differ among land reform farm types. Most of the household heads had either primary (36.1%) or secondary education (47.0%).

3.2 Physical capital endowments

Table 8 shows distribution of households according to physical capital endowments, of households and of farms used by households, across farm types. Physical capital endowments of households and of farms differed across farm types. Physical capital poor households dominated (≥65%) in Rest and SLAG, whereas LRAD1, LRAD2 and PLAS were dominated (≥70%) by physical capital endowed households. Similarly, most households (>70%) in Rest and SLAG farmed in physical capital poor farms, whereas most households (>70%) in LRAD1, LRAD2 and PLAS farmed in physical capital endowed farms.

Table 8: Distribution (%) of households (hhs) according to physical capital endowments of hhs and of farms used by hhs, across farm types

Farm type	Hh (n)	Household physical capital		Farm physical capital	
		Poor	Endowed	Poor	Endowed
Rest	38	65.8[b]	34.2[a]	76.3[c]	23.7[a]
SLAG	13	76.9[b]	23.1[a]	84.6[c]	15.4[a]
LRAD1	10	30.0[a]	70.0[b]	10.0[ab]	90.0[bc]
LRAD2	18	11.1[a]	88.9[b]	27.8[b]	72.2[b]
PLAS	8	12.5[a]	87.5[b]	0.0[a]	100[c]

Two-sided Fisher's exact test (P=0.010 for farm type and household physical capital; P=0.000 for farm type and farm physical capital).

[abc] Different superscripts in a column indicate significant differences among farm types [$\alpha=P(\chi^2>0.02;10)$].

Rest- Restitution, SLAG- Settlement/Land Acquisition Grant, LRAD1- Land Redistribution for Agricultural Development phase 1, LRAD2- Land Redistribution for Agricultural Development phase 2, PLAS- Proactive Land Acquisition Strategy.

3.3 Contribution of livelihood activities and passive livelihood sources

On-farm, off-farm and passive livelihood sources contribution

Table 9 shows proportional and monetary livelihood contributions of activities and passive livelihood sources among farm types. The proportional and monetary on-farm livelihood contributions differed among farm types. The proportional and monetary on-farm contributions were higher in LRAD2 and PLAS, and differed from those in Rest and SLAG. There were no within farm type differences in on-farm livelihood contributions between group owned and individual owned farms, in LARD1, LRAD2 and PLAS. We observed low proportional and monetary contributions to livelihoods from off-farm activities in SLAG and LRAD2, which differed from those in Rest. The proportional passive sources livelihood contribution was highest in SLAG (64.2% ±8.86) and differed from those in LRAD1, LRAD2 and PLAS, with PLAS having the lowest contribution (6.6% ±5.70). The monetary passive sources livelihood contribution did not differ among farm types. The total livelihood income (US$/annum) differed solely between SLAG (US$2864 ±1872/annum) and PLAS (US$10240 ±5025/annum).

The household physical capital endowment affected the monetary on-farm livelihoods contributions within farm types Rest and LRAD1, but the farm physical capital endowment class did not affect the monetary on-farm livelihood contributions within farm types. Physical capital poor households had lower on-farm income (US$120 ±44 for Rest and US$0 for LRAD1) than physical capital endowed households (US$2 458 ±1 038 for Rest and US$3 401 ±553 for LRAD1).

Table 9: Percentage and monetary (US$/annum) livelihood contribution of livelihood activities and passive livelihood sources (mean ± se) among farm types

Farm type	n	On-farm activities		Off-farm activities		Passive sources		Total income
		Proportional (%)	US$/annum	Proportional (%)	US$/annum	Proportional (%)	US$/annum	
Rest	38	12.2^{a} ±3.37	920^{a} ±392	42.7^{b} ±5.56	2543^{b} ±435	45.0^{bc} ±5.38	1910 ±245	5378^{ab} ±540
SLAG	13	18.9^{ab} ±6.92	828^{ab} ±402	16.9^{a} ±7.18	366^{a} ±166	64.2^{c} ±8.86	1669 ±321	2864^{a} ±519
LRAD1	10	33.5^{bc} ±9.52	2381^{abc} ±642	32.0^{ab} ±10.22	2884^{ab} ±1164	34.5^{b} ±10.02	1082 ±286	6347^{ab} ±1154
LRAD2	18	51.6^{c} ±7.51	3036^{bc} ±703	13.1^{a} ±5.50	1008^{a} ±513	35.3^{b} ±7.51	1646 ±357	5690^{ab} ±881
PLAS	8	63.4^{c} ±10.86	5703^{c} ±1012	30.0^{ab} ±11.22	3976^{ab} ±1588	6.6^{a} ± 5.70	561 ±393	10240^{b} ±1777

^{a,b,c} Different superscripts in a column indicate significant differences among farm types [Kruskal-Wallis test, $P<0.05$ used for contributions in US$/annum, Binomial Logistic Regression followed by Fisher's LSD with se approximated using a dispersion factor derived from Pearson's Chi-square, $P<0.05$ used for proportional (%) contributions]; Rest- Restitution, SLAG- Settlement/Land Acquisition Grant; LRAD1- Land Redistribution for Agricultural Development Phase 1; LRAD2- Land Redistribution for Agricultural Development Phase 2; PLAS- Proactive Land Acquisition Strategy.

Table 10: Extent of on-farm crop and livestock activities, and proportional and monetary (US$/annum) livelihood contributions (mean ± se) of activities, among farm types

Farm type	Crop production				Livestock production			
	n	Area (ha)	Proportional (%)	US$/annum	n	TLUs	Proportional (%)	US$/annum
Rest	8	2.8^{ab} ±0.49	31.9^{ab} ±10.91	1453^{ab} ±540	24	6.8^{a} ±1.31	7.7^{a} ±3.21	880^{a} ±536
SLAG	10	5.9^{ab} ±3.37	9.9^{a} ± 6.23	562^{a} ±509	9	34.0^{ab} ±10.63	7.9^{a} ±5.34	273^{ab} ±137
LRAD1	8	53.4^{ab} ±49.53	16.9^{ab} ± 8.75	1165^{ab} ±696	6	38.5^{b} ±10.88	33.3^{b} ±11.43	2415^{bc} ±578
LRAD2	14	35.5^{b} ±20.67	35.3^{b} ± 8.46	2345^{b} ±879	8	49.8^{b} ±11.80	45.0^{b} ±10.45	2280^{bc} ±593
PLAS	3	0.3^{a} ±0.10	3.7^{a} ± 7.19	313^{ab} ±225	8	114.8^{b} ±27.73	50.8^{b} ±10.50	5395^{c} ±1097

^{a,b,c} Different superscripts in a column indicate significant differences among farm types [Kruskal-Wallis test, P<0.05 used for ha, US$/annum and TLUs, Binomial Logistic Regression followed by Fisher's LSD with se approximated using a dispersion factor derived from Pearson's Chi-square, P<0.05 used for proportional (%)]; TLU- Tropical livestock units; Exclusion of outliers farm areas used for crops (for 3 hhs) lead to averages (ha, % and US$/annum, respectively) of 3.8ha ±1.17, 14.4% ±11.95 and US$931 ±757 for LRAD1 when n=7; 5.2ha ±1.80, 31.2% ±9.16 and US$1520 ±611 for LRAD2 when n=12; 4.3ha ±1.02, 21.0% ±4.39 and US$1073 ±279 for total when n=40, and similarities on area used for crops and on-farm contribution from crops among farm types; Rest- Restitution, SLAG- Settlement/Land Acquisition Grant, LRAD1- Land Redistribution for Agricultural Development phase 1, LRAD2- Land Redistribution for Agricultural Development phase 2, PLAS- Proactive Land Acquisition Strategy.

Livelihood contribution of specific on-farm agricultural activities

On-farm livestock production was practiced by 28% more households than on-farm crop production. The on-farm area used for crops and the on-farm crop livelihood contributions (proportional and monetary) differed among farm types (Table 10). Households in LRAD2 had more crop land (35.5 ha) than households in PLAS (0.3 ha). On-farm crop livelihood contributions were higher in LRAD2 (35.3% and US$2 345) and differed from those in SLAG and PLAS. The herd size per household and livestock contributions to livelihoods differed among farm types (Table 10). Households in Rest had smaller herd sizes than households in LRAD1, LRAD2 and PLAS. The livestock contributions to livelihood were lower in Rest and SLAG, than in LRAD1, LRAD2 and PLAS. Other on-farm activities, besides livestock and crops were rare and comprised employment and leasing out of farm capitals, were each observed in 4.6% of the households. Netshipale et al. (2017) reported that there were unused portions of land reform farms and Lahiff et al. (2008) reported that in land reform farms "land itself was generally not in short supply", since land use was often restricted to a limited number of beneficiaries per farm. The results indicated that farm ownership type (group and individual) had had no effect on on-farm livelihood contributions (% and US$), in LRAD1, LRAD2 and PLAS farms where both farm ownership types existed. Hence, in the present study we considered households to be independent of each other in terms of access to use of benefited land.

4 Discussion

4.1 On-farm livelihood contribution (overall & specific activities)

Physical capital endowed households that farmed in physical capital endowed farms (in LRAD1, LRAD2 and PLAS) had higher livelihood gains from benefited farms. Physical capital endowed households and farms observed in the present study emanated from land reform policies and their implementation outcomes (mediating factors) which prioritised land use (economic land reform objective) over land ownership (social land reform objective). The prioritisation of land use indicated adoption of neo-classical economic viability paradigm, which prioritises production efficiency, by the state during implementation of LRAD1, LRAD2 and PLAS (Cousins and Scoones 2010). Household physical capital endowments (proxy for wealth) and total livelihood income (proxy for households financial capital endowments) observed in LRAD1, LRAD2 and PLAS (Table 10) confirmed that households with high physical and/or financial capital endowments had been selected to become beneficiaries of these farm types (Wegerif 2004; DLA 2006; Lahiff 2008; Aliber

and Cousins 2013). Moreover, physical capital endowed farms observed under LRAD1, LRAD2 and PLAS (Table 10) confirmed provision of capital support by the state in pursuit of production efficiency (DLA 2006; DRDLR 2014). In addition, most of the household heads (≥50%) were under 60 years of age (proxy for differences in human capital among farm types), probably willing to venture into business opportunities and accept associated risks as indicated in literature (Bajtelsmit and Bernasek 2001; Kabra et al. 2010). Capital endowed households had access to credit (mediating factor) from formal financial market like banks due to their financial capital endowments. Similarly, Scoones et al. (2012) reported positive relationship between on-farm contribution and capital endowments in reformed land in Zimbabwe.

The total livelihood income in Rest was similar to those observed in LRAD1, LRAD2 and PLAS, however, the lower livelihood contributions observed in Rest could be attributed to the prominence of central control of farm capitals (by the committee comprised of few beneficiaries) and group farming (mediating factors) reported to deter productive use of farm capitals (Lahiff 2007a; MacLeod et al. 2009). The lower livelihood contributions observed under SLAG could be due to limited capital support from the state which was caused by acquisition of land at market price and lack of broader rural development strategy (DLA 1997; Griffin et al. 2002), in addition to households under SLAG being physical capital poor and headed by pensioners. Additionally, household capital endowment had positive influence on on-farm contribution within a farm type. These positive relationships between both household and farm physical capital endowment and livelihood contributions from land reform farms have trade-offs towards addressing the sustainable development goals of no poverty, decent work and economic growth, and reduced inequalities (UNDG 2016). Hence, we deduce that (a) income inequalities between capital poor and capital endowed households that benefited from land reform remained wide, and (b) the impact on unemployment will be determined by the ability of on-farm economic activities to create jobs. The findings of the present study also show high diversity in on-farm contribution within farm type, an indication of variations in biophysical, institutional and personal factors, among others. We conclude that there is a positive relationship between on-farm livelihood contribution and capital endowments (i.e. household financial and human capital, and farm physical capital). Moreover, prioritisation of specific objectives and implementation outcomes of land reform policies influenced capital endowments. Hence, land reform policies influenced the on-farm livelihood contribution indirectly.

Agro-ecological conditions of the area determined which of the agricultural land use activity will have the most influence on on-farm livelihood contribution. The Waterberg District is classified as

semi-arid (Nhemachena et al. 2011; Netshipale et al. 2017) and is potentially suitable for livestock activities. It was this potential suitability of the area for livestock which led to positive relationship between farm physical capital and on-farm livestock contribution. On the contrary, the agro-ecological conditions of the area did not favour crop production. Hence, capital endowments had no influence on on-farm crop contribution. The exploration of other on-farm activities (on-farm employment and leasing out of farm capitals) was not necessary since their prevalence were low. Therefore, we concluded that optimum on-farm livelihoods gains will be attained through prioritisation of agricultural land use activities suited for a given agroecological condition.

4.2 Household capital allocation to on-farm activities

Households allocated human capital for on-farm activities either based on anticipated risk and returns on investments (Lahiff et al. 2008) or as surety for future returns. Most households (86.2%) allocated a single household member for on-farm activities, regardless of household total livelihood value and farm physical capital endowment. A household member could have earned US$2 679/annum (opportunity cost) as farm labour elsewhere during the period under investigation (My wage 2016). We deduced that by availing a single household member for on-farm activities (a) capital endowed households in LRAD2 and PLAS gained an average of US$1 691/annum over the opportunity cost of labour (LRAD1 excluded because farmers that used farm income to repay land acquisition loans did not include the amounts on farm income; hence, LRAD1 on-farm income is slightly lower than in LRAD2 and PLAS), and (b) capital poor households in SLAG and capital endowed households in Rest earned on average US$1 805/annum less than the opportunity cost of labour. The findings of the present study confirmed that the net on-farm livelihood gains in Rest and SLAG were below statutory minimum wage, and households in these farms availed household members to secure farm capitals as surety for future livelihood gains (Lahiff et al. 2008). Therefore, we deduced that capital endowed households availed members based on anticipated risks and returns on investments, whereas capital poor households and households in farms where capital control possesses challenges availed members as surety for future livelihood gains.

4.3 Poverty reduction through land reform

The findings of the present study confirmed that capital poor households could not make meaningful economic gains because they lacked capital. The situation is worse in South Africa because land for reform is bought at market price depleting the fiscus further, leading to limited number of beneficiaries receiving post-settlement support from the state per annum. The current

debate on land expropriation without compensation in South Africa (DPW 2018) paint a mixed picture. On the positive side, reforming land at least costs (administrative costs of reforming land will remain) will avail finance which could be used to prioritise financial post-settlement support for the poor, thereby contribute towards reduction of poverty. On the negative side, not paying for land might lead to capital flight which could have negative impact on the economy. Though land expropriation is a debated way forward for land reform in South Africa, the risks associated with it require that pathways with less risks be identified.

5 Concluding remarks

As contribution to the knowledge on impact of land reform on livelihoods of beneficiaries, it is justified to conclude that (a) there is a positive relationship between on-farm contribution and capital endowments (of households and farms) in situations where mediating factors have positive influence on access and use of capitals, and (b) on-farm livelihood contribution will be determined by the agricultural land use activity most suited for the agroecological conditions of the area. Land reform in South Africa could only address challenges of social inequalities, poverty and unemployment when land reform policies prioritise provision of capital support to the financial and physical capital poor households who are beneficiaries of the programme, and ensure that reformed land is used for agricultural activities suited for the agroecological conditions.

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Chapter 4

Farming system diversity and its drivers in land reform farms of the Waterberg District, RSA

Agricultural activities in land reform farms

This chapter is submitted in a slightly modified version authored by:

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Abstract

South Africa has implemented land reform for the past two decades with the aim to contribute to addressing challenges of inequality, poverty and unemployment. Systemic classification of farming system typologies in land reform farms is lacking. Distinguishing types of farming system with common characteristics (e.g. farm size, land use activities and livelihood strategies) is essential for targeted agricultural development interventions. In addition, understanding the drivers that lead to different farming system typologies may contribute to policy making and design of interventions to achieve a certain land reform outcome. We investigated 50 land reform farms in the Waterberg District, South Africa, with the aim of exploring diversity of farming systems and analysing the drivers of farming system development. We performed multivariate techniques of principal component analysis (PCA) and two-step cluster analysis. Variables included in the PCA were associated with ruminants, horticulture and crop farming, and comprised extent of land use and economic importance. Five farming systems were distinguished: crop plus ruminants- CR, horticulture- H, ruminants- R, ruminants plus horticulture- RH, and monogastric- M. The development of CR, R and RH was driven by the semi-arid conditions of the study area which led to transfer of farms of large sizes (±1116 ha) for extensive resource use. Land reform policies drove the development of H and M by targeting capital endowed farmers and areas with potential for horticulture, and by ensuring that farms were physical capital endowed. The present study suggests that (a) beneficiaries of diverse social classes can participate in any of the identified farming systems provided external physical and financial capital support are available, and (b) land reform policies could influence land use activities by transferring farms of a particular size.

Key words: farming systems, typology, land reform, land use activities, multivariate analysis, semi-arid conditions.

1 Introduction

Globally, countries that implemented agrarian reform/land reform have struggled to attain synergy between social and economic objectives of land reform programmes (Binswanger-Mkhize et al. 2009). In the past two decades, land reform implementation in South Africa has experienced this dilemma (Valente 2011; Keswell and Carter 2014); different sub-programmes were implemented with different objectives and a diversity of outcomes can be observed. The initial land reform programmes were social-oriented, and this resulted in social diversity of new landowners. In recent years the South Africa land reform programmes aimed at establishing farms with good economic performance (Netshipale et al. 2017). Not only institutional drivers attributed to land reform farm development, but land reform farms also vary for example in natural capital (water availability and soil types) and physical capital (equipment and infrastructure) endowments. Variation in institutional drivers, and natural and physical capital endowments of land reform farms is anticipated to have an effect on agricultural land use (Köbrich et al. 2003; Senthilkumar et al. 2009; Tittonell et al. 2010; Chikowo et al. 2014; Alvarez et al. 2018) and on policies and interventions implemented for further development of land reform farms.

Farming system research is applied to better understand the agricultural land use, its drivers and to design interventions for development (Giller 2013). In the present study, we consider a farming system to be '*a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and for which similar development strategies and interventions would be appropriate*' (Dixon et al. 2001:2). Identifying farming system typologies allows to shift from broader generalisation towards targeted, context based development approaches based on identified challenges and opportunities (Giller 2013) which may differ among farming system typologies. The aim of the present study was to generate systemic knowledge on farming systems, through (a) identification of principal variables underlying the diversity in land use, (b) classification of farming system typologies, (c) characterisation of identified farming system typologies, and (d) analyses of drivers of farming system development, in land reform farms of the Waterberg District in South Africa. To our knowledge no studies have systematically classified farming system typologies in land reform farms of South Africa, and we envisage that the results will contribute towards sustainable economic use of these farms.

2 Methods

2.1 Study area

We conducted the study in the Waterberg District Municipality of the Limpopo Province, South Africa. The district is classified as semi-arid with poor water resources and limited areas with high potential for crop production, though most of the land in the district is used for commercial farming (Nhemachena et al. 2011; WDM 2014). We considered the Waterberg District Municipality to represent the agroecological conditions in South Africa, which limit arable farming though most of the land is used for agriculture (GCIS 2018). The climate of Waterberg District Municipality is characterised by an average rainfall of 577 mm per annum, an evaporation of 2100 mm per annum, an aridity index of 0.3 and average daily temperatures of 11.9 ^{o}C minimum and 27.2 ^{o}C maximum (M'Marete 2003). The total annual rainfall was reported to be consistent over the past two decades and temperatures were anticipated to increase by between 1 and 2 ^{o}C during the period 2015-2035 (DEA 2013; Adeola et al. 2019). Three agricultural practices exist: cash and field crop, horticulture and livestock production (WDM 2005). Cash and field crops encompass cotton, maize, wheat, sorghum, soybean, groundnut, lucerne, paprika, tobacco, potato and watermelon. Horticultural crops encompass grape, citrus, peach, plum and vegetables, and livestock encompass laying hens, broilers, pigs, dairy, beef cattle, game and crocodiles.

We selected four of six local municipalities (Bela-Bela, Lephalale, Mogalakwena and Mookgopong) of the Waterberg District Municipality as study area, based on prevalence of land reform farms (DRDLRa n.d.). The respective contributions of the selected local municipalities to the district were: Bela-Bela 7%, Lephalale 40%, Mogalakwena 12% and Mookgopong 9% for land area, and Bela-Bela 10%, Lephalale 17%, Mogalakwena 45% and Mookgopong 5% for population (LDRT 2012; WDM 2014).

2.2 Farm selection and data collection

In South Africa, land reform farms were established under (a) two land reform programmes (i.e. restitution- Rest and redistribution), and (b) within the redistribution programme, under the Settlement/Land Acquisition Grant- SLAG from 1995-2000, Land Redistribution for Agricultural Development phase 1- LRAD1 from 2001-2007, Land Redistribution for Agricultural Development phase 2- LRAD2 from 2008-2010, and Proactive Land Acquisition Strategy- PLAS from 2006 to date (DLA 1997, 2006; MALA 2001). Hence, in the present study, Table 1 shows that land reform

Table 1: Targeted and investigated farms, across land reform (LR) policy models, and distribution of investigated farms within ownership types and operation styles

				Distribution of investigated farms according to farm ownership type and farm operation style			
	Farms			Individual-owned	Group-owned		
LR policy model[1]	Land user social class	Targeted	Investigated		Collective operation	Individual operation	Dual operations
Rest	Better-off	16	7	0	1	1	5
SLAG	Poor	6	4	0	1	1	2
LRAD1	Better-off	13	11	5	3	2	1
LRAD2	Better-off	34	21	8	9	3	1
PLAS	Better-off	7	7	5	2	0	0
Total		76	50	18	16	7	9

[1] Rest- Restitution, SLAG- Settlement/Land Acquisition Grant, LRAD1- Land Redistribution for Agricultural Development phase 1, LRAD2- Land Redistribution for Agricultural Development phase 2, PLAS- Proactive Land Acquisition Strategy. *Sources:* Netshipale et al. (2017), except information on investigated farms.

farms fell under either of the following land reform policy models: - Rest, SLAG, LRAD1, LRAD2 and PLAS.

In chapter 3, we observed in the study area that farmers under SLAG belonged to households that were physical and financial capital poor, whereas farmers under Rest, LRAD1, LRAD2 and PLAS belonged to households that were physical and financial capital endowed. Farms had different ownership types: Farms were owned by households in groups (group-owned) under Rest and SLAG models, whereas farms were either group-owned or owned by households individually (individual-owned) under LRAD1, LRAD2 and PLAS models (DLA 1997, 2006; MALA 2001; Wegerif 2004; Lahiff 2007a; Netshipale et al. 2017). Active households took land use decisions as a collective in group-owned farms, whereas a single household took land use decisions in individual-owned farms. In the present study, the way land use decisions were taken in a farm is considered a proxy for 'farm organisational arrangements'. Group-owned farms had different operation styles: 'collective farming'- where land was used for the benefit of households as a collective, 'individual farming'- where land was used for the benefit of households independently from each other, and 'dual farming'- where land was use for collective and individual farming, in line with Lahiff (2007a). We targeted 76 of the 140 land reform farms in the study area based on our knowledge of their accessibility and willingness of beneficiaries to participate. Of the 76 targeted farms, we investigated 50 which were differentiated according to land reform models, farm ownership type and farm operation style, as shown in Table 1. In each of the investigated farms, we targeted at least 15% of the 'active households' for data collection. A household was considered active when it had 'at least one household member on a beneficiary list of a farm and also at least one household member (either a beneficiary or non-beneficiary) involved in farm management and/or land use'

(Netshipale et al. 2017). The distances between farms and the nearest urban centres were recorded and were considered proxy for 'farm location'. Three locations were identified: the urban location at less than 16 km distance, peri-urban location between 16 and 40 km and rural location at above 40 km.

The Rapid Rural Appraisal (RRA) approach (Chambers 1981) was used to gather information from 81 active households. These households comprised 11.9% (estimated based on Table 4 in chapter 2) and 29.7% of active households in targeted and investigated farms, respectively. Using semi-structured questionnaires, we interviewed respondents (household heads or their representatives). We collected qualitative and quantitative data for the 2013/2014 agricultural year by asking recall data for the 12 months before the date of interview. Information about the agricultural activities being practiced i.e. livestock farming (with distinctions among species), horticulture farming and crop farming (with distinctions among cultivars, for both), and combinations of these activities, and the land use associated with each of the agricultural activities, were collected under *land use*. Information about agricultural commodities produced, quantities produced, quantities sold and produce not for sale were collected under *income generation*. Information about the use of production factors and associated costs were collected under *production costs.* In the study area, production factors were acquired mainly from formal markets except hired labour, though remuneration was predetermined (Mywage 2016) and governed by the Basic Conditions of Employment Act, no 75 of 1997 (DOL 2014). Whereas agricultural produce were sold in formal and informal markets. The present study adopts the descriptions of formal and informal markets as given by (Ferris et al. 2014). Informal markets operate outside of the taxation system, with no prescribed quality standards and volumes of goods, and the opposite suffice for formal markets. Examples of informal markets for produce are sales which take place at farm gate, roadside, village and rural gathering, and examples of formal markets are retailor shops, fresh produce markets and livestock actions. For each of the agricultural commodities produced, information about the type of market used to sell the produce was collected under *market type for produce.* We conducted focus group discussion (FGD) with representatives of active households (in group-owned farms) to collect information about *farm organisational arrangements*, *farm physical capital endowment* (infrastructure and equipment) and households' *access to farms' natural, physical, financial and social capitals*. In farms owned by households individually information about *farm physical capital endowment* was collected from the respondents. Transect walks were taken (on farm) to verify the existence of listed activities and to assess the extent of agricultural land use, in instances where respondents were not knowledgeable. To understand the drivers of farming system development, we studied biophysical conditions of the study area, South Africa land reform policies and capital

endowment of farmers, in addition to cross-examinations of the findings on farm organisational arrangements, farm physical capital endowment and market types for produce used.

2.3 Determination of input costs and income from sales

In the present study we considered farms as economic units in which investments were made with intent to generate income and create wealth; hence, we excluded the bank and insurance values of livestock farming (Oosting et al. 2014). Extensive farming systems will be used synonymously to low-input low-output farming systems and intensive farming systems will be used synonymously to high-input high-output farming systems (Nemecek et al. 2011). A herd was considered natural capital as it encompassed livestock that was not intended for sale or to be used as produce not for sale (e.g. home consumption and donations) during the next six months. Farm income referred to cash received (actual from sales and the opportunity value for produce not for sale) in exchange for provision of farm produce. The opportunity value was the monetary equivalent estimated based on market prices obtained for the same commodities.

Most households did not keep formal records of farming activities, in line with Cousins (2013b), and provided information based on recall. Seventy two percent of the farms had complete information and we estimated production costs and income for the remaining 28% of the farms using prices for inputs and produce which prevailed in the study area for the market type farmers participated in, for the period under investigation. These prices are given in Table 2. We used an average exchange rate of R10.19/US$ for April 2013 – March 2014 to convert South African Rand (R) to United Sates Dollar (US$).

The next section explains the process followed to determine costs and income in (a) group-owned farms used for collective farming and individual-owned farms, and (b) group-owned farms used for individual farming. Collective farming meant a group of households pooled the capitals (natural, physical, financial, social and human) required (at cost to household) for farm operations together and the farm income generated belonged to the collective. Therefore, in collective farming the costs and income were for the farm as an entity. Similarly, individual-owned farms were entities. Hence, the costs and income were estimated similarly for group-owned farms with collective farming and individual-owned farms. On the contrary, farming costs and farm income were for households independently from each other in group-owned farms with individual farming.

Table 2: Commodities, their rate of usage and prices, used to estimate farming costs and income

Commodity	Price of input[1]	Price of produce	
		Formal market	Informal market[5]
Crop & horticulture	Fertilizer (US$/ha)	US$/ton	US$/unit
Maize		187.9[2]	
Sunflower		456.0[2]	
Swiss chard (Spinach)	522.1	241.9[4]	0.3/ bundle
Sweet potatoes	357.2	406.4[3]	
Butternut	357.2	2 53.8[2]	
Pumpkins	357.2	222.1[2]	
Gems squash	357.2	3 49.4[3]	
Chili (green)	357.2	905.1[4]	
Tomatoes	714.4	530.9[2]	7.9/crate, 2.8/box & 1/packet
Cabbage	604.5	213.9[2]	0.8/head
Green paper	467.1	609.4[4]	
Green beans	274.8	883.2[3]	
Potatoes	604.5	331.6[2]	
Beetroot	329.7	376.8[3]	
Green peas		322.2[3]	
Onion		350.1[2]	
Watermelon		124.6[3]	
Citrus (oranges)		203.6[2]	
Table grapes		1057.0[2]	
Livestock	Feed (US$/kg)	US$/kg	US$/animal
Cattle		2.9[2]	686.9
Milk (cow)		0.4[2]	
Sheep			88.3
Goat			68.7
Pig & Broiler	0.5	2.0[2]	58.9
Broiler	0.6	1.8[2]	3.6
Eggs (laying hens)	0.5	1.1/dozen[2]	

Sources: [1] Adapted by the author based on information from DoA (2008). [2] DAFF 2015.[3] Adapted by the author based on information from Tables 43 and 57 by DAFF (2012) and information about other vegetables from DAFF (2015).
[4] Adapted by the author based on information from Joburg Market (2016) and DAFF (2016).
Cost of other production inputs were estimated based on survey data for the present study as follows:- (i) land preparation cost for vegetable production = R850/ha (without own tractor) and R500/ha (with own tractor) (ii) fertilizer price for vegetables = R280/50kg (iii) cost for vegetable seeds = R667/ha and pesticides plus herbicides = R727/ha, and for dry land crops seeds = R600/ha and pesticides plus herbicides = R250/ha, and (iv) cost of family labour = R2275/person/month (minimum wage for farm worker, 2013/2014 financial year).

Group-owned farms with collective farming and individual-owned farms

Gross agricultural cost (GAC_i) and gross agricultural income (GAI_i) of the i^{th} farm were estimated as:

$$GAC_i = \sum_{k=1}^{n} CP_k N_{ki} \qquad \text{[equation 1]}$$

Where N_{ki} was the number of the units of the k^{th} agricultural input purchased by the i^{th} farm, n was the types of agricultural inputs k and CP_k was the cost price per unit of the k^{th} agricultural input type.

$$GAI_i = \sum_{l=1}^{n} SP_l N_{li} \qquad \text{[equation 2]}$$

Where N_{li} was the number of the units of the l^{th} agricultural product sold by the i^{th} farm, n was the types of agricultural products l and SP_l was the sale price per unit of the l^{th} agricultural product.

Group-owned farms with individual farming

The cost of the k^{th} agricultural input CK_j and income from the l^{th} agricultural product IL_j for j^{th} household were estimated as:

$CK_j = CP_k N_{kj}$ [equation 3] and $IL_j = SP_l N_{lj}$ [equation 4]

Where CP_k was the cost price per unit of the k^{th} agricultural input and N_{kj} was the number of the units of the k^{th} agricultural input purchased by the j^{th} household, and SP_l was the sale price per unit of the l^{th} agricultural product and N_{lj} was the number of the units of the l^{th} agricultural product sold by the j^{th} household.

Whereas the cost of the k^{th} agricultural input CK_i and income from the l^{th} agricultural product (IL_i) for i^{th} farm were estimated as:

$CK_i = \left(\frac{\sum_{j=1}^{n} CK_{ji}}{n_{ji}}\right) NK_{ji}$ [equation 5] and $IL_i = \left(\frac{\sum_{j=1}^{n} IL_{ji}}{n_{ji}}\right) NL_{ji}$ [equation 6]

Where CK_{ji} was the cost of the k^{th} agricultural input for the j^{th} household that farmed in i^{th} farm, IL_{ji} the income from the l^{th} agricultural product for the j^{th} household that farmed in i^{th} farm and n the number of households; n_{ji} was the number of households (sample) with available data on variable under consideration in i^{th} farm; and Nk_{ji} and Nl_{ji} were numbers of households (population) conducting similar activity in i^{th} farm.

Gross agricultural cost (GAC_i) and agricultural income (GAI_i) for the i^{th} farm were estimated as,

$GAC_i = \sum_{k=1}^{n} CK_i$ [equation 7] and $GAI_i = \sum_{l=1}^{n} IL_i$ [equation 8]

Where CK_i was the cost of the k^{th} agricultural input purchased by i^{th} farm and IL_{ji} was the income from the l^{th} agricultural product sold by i^{th} farm, and n was either input types or product types.
In all farm ownership types and operational styles, farm gross margin (GM_i) for the i^{th} farm was estimated by subtracting equation 7 from equation 8.

Livestock numbers were converted to tropical livestock units for standardisation, with a TLU representing a hypothetical animal of 250 kg live weight, using the following conversion factors: - cow = 0.7, sheep or goat = 0.1, pig = 0.2 and chicken = 0.01 (AGRODEP 2010). Animals had

offspring of varying ages which led to adjustments of conversion factors as follows: calf = 0.35, kid or land = 0.05 and piglet = 0.1.

Farm gross margin per hectare (GM/ha) and gross margin per TLU (GM/TLU) were estimated as:

$(GM/ha)_i = (GIC_i - GCC_i)/hectares\ used\ for\ crops$ [$equation$ 10] and

$(GM/TLU)_i = (GII_i - GCL_i)/TLUs\ sold$ [$equation$ 11]

Where GIC_i was the gross income from crop production and GCC_i is the gross costs of crop production, and GIL_i was the gross income from livestock production and GCL_i was the gross costs of livestock production, of the i^{th} farm.

2.4 Data analysis

Principal component analysis (PCA) and cluster analysis (CA) have been used to generate typologies of farming systems (Köbrich et al. 2003; Tittonell et al. 2010; Cortez-Arriola et al. 2015; Kuivanen et al. 2016). We used PCA to explore relationships between variables and to reduce the dataset of 27 variables (Table 3) into a smaller number of principal components (PC's). Principal components were considered when having at least four variables with loading scores of >0.60 (Pituch and Stevens 2016). Variables which loaded >0.5 on one of the PC's were retained and became the reduced dataset (PCA output) which we used in a two-step cluster analysis (Domínguez-Rodrigo et al. 2009; Constatini et al. 2010; Dossa et al. 2011). We used the overall silhouette measure of cluster cohesion and separation, of the Bayesian Information Criterion (BIC), to determine the optimum number of clusters (Rousseeuw 1987; Jain and Koronios 2008). Cluster cohesion and separation value of ≥0.5 was used as the starting point as it indicated that assignment of data points to cluster centers were clear (Kaufman and Rousseuw 1990). We repeated the two-step cluster analysis with pre-specified number of clusters required (i.e. cluster numbers above the number which resulted in cohesion and separation values of >0.5) and for each of the analysis we identified the characteristics of each of the identified cluster until the number of clusters which gives logic (optimum number of clusters) was identified. The number of clusters was considered optimum when the characteristics of each of the identified clusters complied with our knowledge of the farms in the study area. We repeated two-step cluster analysis with the optimum number of clusters and created a variable named cluster group to ascertain which farms belong to a particular cluster. Kruskal-Wallis test was used to explore differences among clusters in the 16 principal variables and 7 additional variables. The seven additional variables were explored because they contributed to describing the characteristics of cluster groups. The final clusters attained were described and given cluster names. Further, in cluster groups where two social classes of farmers

(the capital poor and capital endowed) were involved, differences in all 23 variables were explored between social classes using Mann-Whitney U tests. Fisher's exact test was used to compare distributions of farms within land reform policy models and within market types, across the farming system clusters. Statistical differences will only be mentioned as a difference when significant ($P<0.05$). We used SPSS statistical package (IBM Corp. Released 2019) for statistical analysis.

3 Results

3.1 Classification of farming system typologies

Table 3 provides description of variables used for PCA. We explored three principal components (PC's) as they explained 60.4% of the variation in the data set (Figure 1: A and B). The first component (PC 1) explained 22.6% of the variation in the data and was related to ruminants, second component (PC 2) explained 21.2% of the variation and was related to horticulture, and third component (PC 3) explained 16.5% of the variation and was related to crops. The three PC's comprised 16 influential variables as shown by non-repeating variables which loaded >0.5 on one of the PC's in Figure 1 (A and B).

The relationships among the most influential variables suggested three farming system types (i.e. ruminant, horticulture and crop) for land reform farms in the study area (Figure 1: A and B). We explored up to six-cluster solutions, however, five-cluster solution (hence, 5 farming system typologies) was considered because it (a) had data points clearly assigned to cluster centres, with an overall silhouette measure of cluster cohesion and separation of 0.6, and (b) increased variations among farming system types and reduced variation within a farming system type, in line with our knowledge about agricultural activities being practiced.

Four and six-cluster solutions were also explored. Four-cluster solution was rejected because it resulted in a merge between farming system R (n=13) and RH (n=4) from five-cluster solution (Tables 4 and 5) into a farming system R (n=17), which made the existence of horticulture in farms dominated by ruminant farming uncertain. The R farming system from four-cluster solution led to decreases (in values observed in RH) in (a) size of arable land (1.6 to 0.4 ha) (b) horticulture land ratio (1.0 to 0.24) (c) horticulture cost ratio (0.35 to 0.08), and (d) horticulture income ratio (0.11 to 0.03). We rejected six-cluster solution because it resulted in subdivision of H (from five-cluster solution) into H (n=11) and HC (n=3) which had similar characteristics. Farming systems H and

CH from six-cluster solution were similar in sizes of arable land (15 ha and 13 ha), horticulture cost ratios (0.96 and 0.78), and horticulture income ratios (0.96 and 0.94), but differed solely in uses

Table 3: Description of variables used for PCA (n = 50)

Variable	Unit	Mean	SEM	Min.	Max.
Household					
Active households per farm	Number	6.98	1.85	1	55
Agricultural land use					
Farm size	Hectares	781.94	201.68	9	9254
Arable land	Hectares	15.33	6.04	0	210
Crop land ratio[a]		0.22	0.06	0	1
Horticulture land ratio[b]		0.38	0.07	0	1
Herd size (livestock capital)	TLU[c]	51.1	11.40	0	391.2
Cost ratios[d]					
Crop		0.12	0.04	0	1
Horticulture		0.31	0.06	0	1
Ruminant		0.33	0.06	0	1
Monogastric		0.23	0.06	0	1
Hired labour		0.49	0.05	0	1
Income ratios[e]					
Crop		0.09	0.03	0	1
Horticulture		0.30	0.06	0	1
Ruminant		0.36	0.06	0	1
Monogastric		0.23	0.06	0	1
Sale ratios[f]					
Crop		0.15	0.05	0	1
Horticulture		0.40	0.07	0	1
Ruminant		0.50	0.07	0	1
Monogastric		0.25	0.06	0	1
Produce not for sale (PNS) ratios[g]					
Crop		0.02	0.01	0	1
Horticulture		0.20	0.05	0	1
Ruminant		0.21	0.05	0	1
Monogastric		0.19	0.05	0	1
Farm productivity					
Livestock sales	TLU/yr	39.6	11.54	0	425.6
Farm gross margin[h]	$/yr	17 408	5 133.80	-17 890	207 263
Gross margin per hectare cultivated[i]	$/ha/yr	627	282.08	-2412	6796
Gross margin per TLU[j]	$/TLU/yr	30	180.86	-6811	1483

[a] Share of arable land used for crops (maize and sunflower); [b] Share of arable land used for horticulture (citrus, grapes and vegetables); [c] Tropical livestock unit (TLU) computed using the following conversion factors: cow = 0.7, sheep or goat = 0.10, pig = 0.20, poultry = 0.01; Livestock offspring were of varying ages and the following conversion factors were used for offspring: calf = 0.35, kid/lamb = 0.05 and piglet = 0.1; [d] Share of variable costs accrued to a specified land use activity or production item (i.e. crop, horticulture, ruminant and monogastric, or hired labour); [e] Share of income generated by a specified land use activity (i.e. crop, horticulture, ruminant and monogastric), [f] Share of value emanating from sales in relation to the total value generated from a specified land use activity (i.e. crop, horticulture, ruminant and monogastric); [g] Share of produce used for none-sale purposes (used for home consumption and or donations) emanating from a specified land use activity (i.e. crop, horticulture, ruminant and monogastric); [h] Income less production costs, when family labour and opportunity cost for land were ignored; [i] Income from crop and horticulture production less costs incurred from crop and horticulture production divided land by area used for crop and horticulture production; [j] Income from livestock production less costs incurred from livestock production divided by TLUs sold.

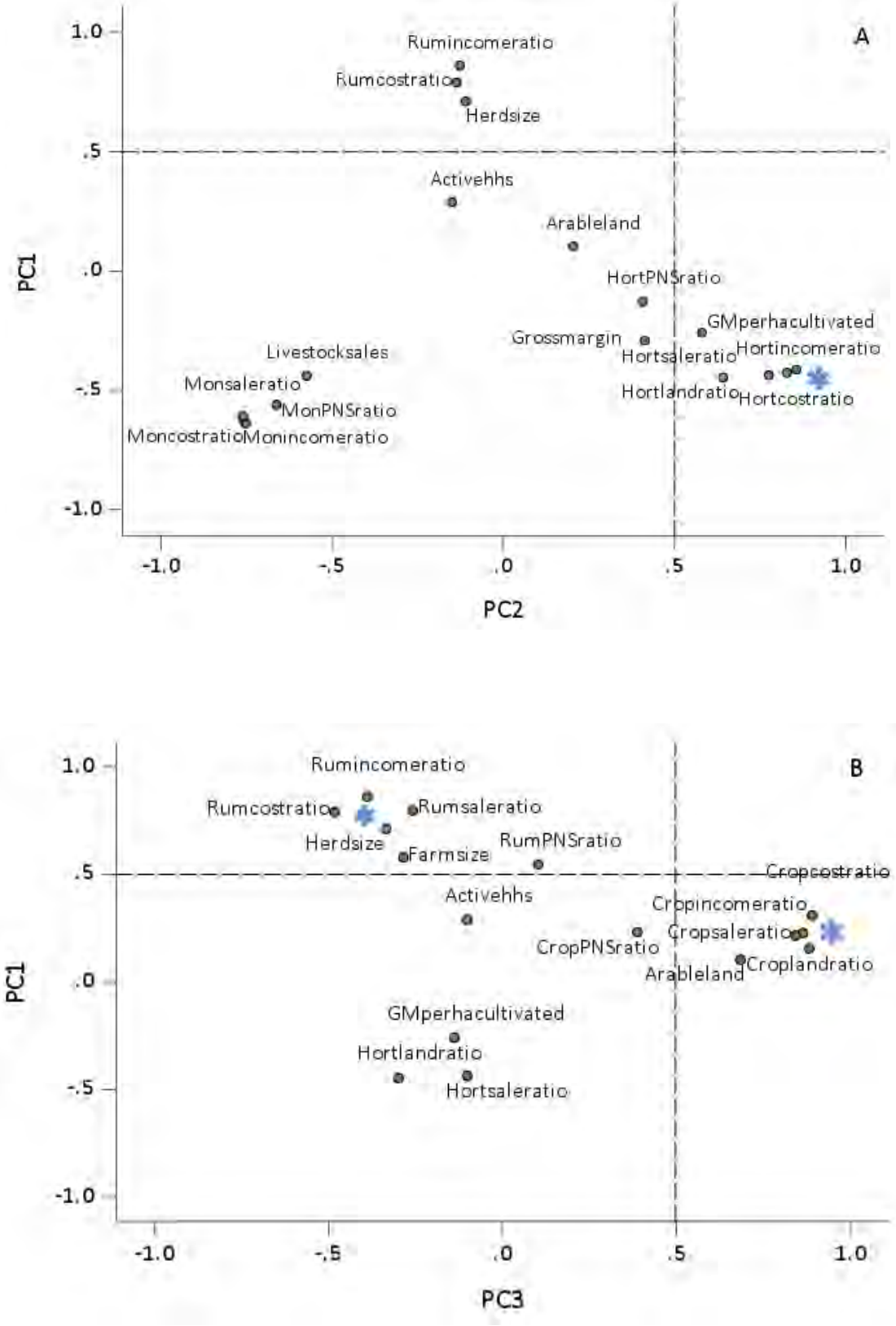

Fig. 1: Plots of component loadings from the PCA (A-B), with the cut-off for variable inclusion in cluster analysis at 0.5 and suggested farming systems shown by stars.

of arable land, whereby arable land was used for horticulture in H and mostly for crops (ratio of 0.8) in HC.

3.2 Characteristics of farming systems in land reform farms

We defined five farming system types/farming systems: crop plus ruminant- CR, horticulture- H, ruminant- R, ruminant plus horticulture- RH and monogastric- M, based on 16 principal variables identified using PCA and 7 additional variables. The seven additional variables were: - cost, income, sales and produce not for sale associated with monogastrics, livestock sales, farm gross margin and gross margin/TLU/yr. Crop farming was rain fed and prevailed the same in peri-urban (42.9%) and rural (57.1%) locations, whereas horticulture was under irrigation based on relatively intensive resource use and was practiced in all locations but prevailed the most in peri-urban location (50.0%). Ruminant farming was cattle and/or sheep and/or goats based on veld (natural grazing land) and was dominant in rural location (≥75% in both R and RH), though it was also practiced in peri-urban location. Monogastric farming was poultry or pig based on relatively intensive resource use and was practiced in all locations but was most prevalent in urban (41.7%) and peri-urban (50.0%) locations. Farmers in CR, R and RH explained that livestock was rarely sold as herd sizes were below carrying capacities of the farms. Farm gross margins were similar among farming systems (US$17408 ±5133.80/yr, overall), an indication that each of the farming systems was efficient in its own way (Table 5). The characteristics of farming systems explained below (mean ±se) are based on 23 variables shown in Tables 4 and 5.

Table 4: Farm characteristics (mean ± se) across the farming systems

	Farming systems				
	CR	H	R	RH	M
Farms (n=50)	7	14	n = 13	n = 4	12
Variable					
Farm size (ha)	676.7^{ab} ±391.73	318.5^{ab} ±136.95	1919.0^{c} ±642.39	751.0^{bc} ±150.13	162.5^{a} ±70.14
Arable land (ha)	78.5^{c} ±33.90	14.6^{c} ±6.10	0.00^{a} ±0.00	1.6^{bc} ±0.55	0.5^{ab} ±0.24
Crop land ratio	0.97^{b} ±0.024	0.17^{a} ±0.092	0.00^{a} ±0.000	0.00^{a} ±0.000	0.15^{a} ±0.103
Horticulture land ratio	0.03^{a} ±0.024	0.83^{b} ±0.092	0.00^{a} ±0.000	1.00^{b} ±0.000	0.26^{a} ±0.129
Herd size (TLUs)	45.8^{ab} ±28.30	14.8^{a} ±8.73	131.9^{b} ±29.31	67.6^{b} ±19.26	3.5^{a} ±2.05
Livestock sales (TLU/yr)	6.9^{ab} ±4.31	3.8^{a} ±2.78	12.2^{b} ±2.35	6.9^{ab} ±2.40	140.9^{c} ±34.84

CR- Crop plus ruminant, H- Horticulture, R- Ruminant, RH- Ruminant plus horticulture, M- monogastric; TLUs- Tropical livestock units; ^{abcd} Means with different superscripts within rows are statistically different (Kruskal-Wallis test, P≤0.05).

Table 5: Economic characteristics (mean ± se) of farms, across farming systems

	Farming systems				
	CR	H	R	RH	M
Farms (n=50)	7	14	13	4	12
Variable					
Crop farming ratios					
Cost	0.76^{b} ±0.064	0.05^{a} ±0.034	0.00^{a} ±0.000	0.00^{a} ±0.000	0.01^{a} ±0.007
Income	0.64^{b} ±0.123	0.01^{a} ±0.012	0.00^{a} ±0.000	0.00^{a} ±0.000	0.00^{a} ±0.000
Sales	0.81^{b} ±0.143	0.07^{a} ±0.071	0.00^{a} ±0.000	0.00^{a} ±0.000	0.05^{a} ±0.053
Horticulture farming ratios					
Cost	0.13^{ab} ±0.082	0.92^{c} ±0.034	0.00^{a} ±0.000	0.35^{bc} ±0.205	0.03^{a} ±0.022
Income	0.03^{ab} ±0.031	0.96^{c} ±0.020	0.00^{a} ±0.000	0.11^{bc} ±0.067	0.02^{a} ±0.012
Sales	0.14^{ab} ±0.143	0.99^{C} ±0.008	0.00^{a} ±0.000	0.82^{bc}±0.066	0.17^{ab} ±0.111
Ruminant farming ratios					
Cost	0.11^{ab} ±0.044	0.03^{a} ±0.015	0.99^{c}±0.012	0.65^{bc} ±0.205	0.00^{a} ±0.004
Income	0.32^{ab} ±0.133	0.03^{a} ±0.018	1.00^{c} ±0.005	0.89^{bc} ±0.066	0.01^{a} ±0.005
Sales	0.51^{ab} ±0.183	0.21^{a} ±0.113	0.96^{c} ±0.015	0.97^{bc} ±0.033	0.07^{a} ±0.067
Produce not for sale	0.44^{b} ±0.171	0.05^{a} ±0.035	0.44^{b} ±0.138	0.21^{ab} ±0.208	0.01^{a} ±0.014
Monogastric farming ratios					
Cost	0.00^{a} ±0.000	0.00^{a} ±0.000	0.01^{a} ±0.012	0.00^{a} ±0.000	0.95^{b} ±0.022
Income	0.00^{a} ±0.000	0.00^{a} ±0.000	0.00^{a} ±0.005	0.00^{a} ±0.000	0.98^{b} ±0.013
Sales	0.00^{a} ±0.000	0.00^{a} ±0.000	0.06^{a} ±0.057	0.00^{a} ±0.000	0.98^{b} ±0.005
Produce not for sale	0.00^{a} ±0.000	0.00^{a} ±0.000	0.02^{a} ±0.025	00.0^{a} ±0.000	0.76^{b} ±0.113
Gross margin					
Farm gross margin	12274 ±7953	27106 ±10199	5819 ±1919	2477 ±1235	11043 ±3617
US$/ha cultivated/yr	-30^{a} ±86.06	2529^{b} ±774.40	0^{a} ±0.00	-373^{a} ±338.78	-196^{a} ±316.54
US$/TLU/yr	267^{abc} ±295.54	-177^{a} ±278.54	-206^{bc} ±603.79	921^{c} ±207.24	93^{ab} ±15.32

Farming systems: CR- Crop plus ruminant, H- Horticulture, R- Ruminant, RH- Ruminant plus horticulture, M- monogastric; TLU- Tropical livestock unit; ^{abc} Means with different superscripts within rows are statistically different (Kruskal-Wallis test, P≤0.05).

Crop plus ruminant- CR (14% of sampled farms)

Farms under CR had medium to large farm size (676.7 ±391.73 ha) and a large area of arable land (78.5 ±33.90 ha). The arable land was used mostly for crops (ratio of 0.97 ±0.024) and least for horticulture. Herd size was medium (45.8 ±28.30 TLUs), and herds did not include monogastrics. Farmers in CR explained that mixed farming of ruminants and crops was the intended land use when land was transferred. Livestock sales were low (6.9 ±4.31 TLUs/yr) and differed from high livestock sales in M. Crops incurred most of the farming costs (ratio of 0.76 ±0.064) and generated most of the farm income (ratio of 0.64 ±0.123), whereas ruminants also incurred costs (ratio of 0.11 ±0.044) and contributed to the farm income (ratio of 0.32 ±0.133). Most of the produce were sold, with sales ratios of 0.81 ±0.143 for crops and 0.51 ±0.183 for ruminants. Ruminants had moderate

contribution to produce not for sale. Gross margin per hectare cultivated and gross margin per TLU were low (US$-30 ±86.06/yr and US$276 ±295.54/yr, respectively).

Horticulture- H (28% of sampled farms)

Farming system H had relatively small farm size (318.5 ±136.95 ha) but had relatively medium area of arable land (14.6 ±6.10 ha) which was used mostly for horticulture (ratio of 0.83 ±0.092). The herd consisted of ruminants only (14.8 ±8.73 TLUs). Livestock sales were low (3.8 ±2.78 TLUs/yr) and differed from livestock sales in R (low) and M (high). At H farms, horticulture incurred most of the farming costs and generated most of the farm income (ratios of 0.92 ±0.034 and 0.96 ±0.020, respectively). Most of the horticulture produce were sold (ratio 0.99 ±0.008). Ruminants had low contribution to produce not for sale. Gross margin per hectare cultivated was high (US$2529 ±774/yr) and differed from low gross margins in other farming systems, and gross margin per TLU was low (US$-177 ±278.54/yr) and differed from those in R and RH.

Ruminant - R (26% of sampled farms)

Farms under R had large farm size (1919.0 ±642.39 ha) and were without crop and horticulture. Ruminant farming (based on extensive resource use) was the dominant farm activity, as reflected by the large herd size of 131.9 ±29.31 TLUs which differed from small herd sizes in H and M. Livestock sales were low (12.2 ±2.35 TLUs/yr) and differed from those in H (low) and M (high). Ruminants incurred most of the farming costs (ratio of 0.99 ±0.012) and generated most of the farm income (ratio of 1.00 ±0.005), with most of the ruminants' produce being sold (ratio of 0.96 ±0.015). Ruminants had moderate contribution to produce not for sale. Monogastrics accounted for the residual costs, income and produce not for sale. Gross margin per TLU was low (US$-206 ±603.79/yr).

Ruminants plus horticulture - RH (8% of sampled farms)

Farming system RH had a medium to large farm size (751.0 ±150.13 ha) and a relatively small area of arable land (1.6 ±0.55 ha). The arable land was used solely for horticulture. Farmers in RH explained that horticulture was an added land use activity at exploratory phase because the activity was not included on the farm business plan when land was transferred. Herd size was medium (67.6 ±19.26 TLUs) and herds did not include monogastrics. Livestock sales were low (6.9 ±2.40 TLUs/yr) and differ from high livestock sales in M. At RH farms, ruminants incurred most of the farming costs (ratio of 0.65 ±0.205) and generated most of the farm income (ratio of 0.89 ±0.066), whereas horticulture accounted for the residual costs and income. Most of the farm produce were sold, with sales ratios of 0.97 ±0.033 for ruminants and 0.82 ±0.066 for horticulture. Ruminants

had low contribution to produce not for sale. Gross margin per hectare cultivated was low (US$-373 ±388.78/yr) and differed from high gross margin in H, and gross margin per TLU was moderate (US$921 ±207.24/yr).

Monogastric- M (24% of sampled farms)

Farms under M had a relatively small farm size (162.5 ±70.14 ha) and very small area of arable land (0.5 ±0.24 ha). The arable land was used for crop and horticulture at land ratios of 0.15 ±0.103 and 0.26 ±0.129, respectively. Herd size was relatively small (3.5 ±2.05 TLUs). Livestock sales were high (140.9 ±34.84 TLUs/yr) and differed from low livestock sales in other farming systems. The high livestock sales observed in M indicate that most of the animals were sold within a financial year. Monogastrics incurred most of the farming costs and generated most of the farm income (ratios of 0.95 ±0.022 and 0.98 ±0.013, respectively). Most of the monogastric produce was intended for sale (ratio 0.98 ±0.005) and monogastric contributed the most (ratio 0.76 ±0.113) to produce not for sale. The high contribution of monogastrics to produce not for sale showed that monogastric farming had a potential to alleviate household food insecurity. Gross margin per hectare cultivated and gross margin per TLU were low (US$-196 ±316.54/yr and US$93 ±15.32/yr, respectively).

3.3 Farming system development

We analysed the influence of biophysical conditions, land reform policy models plus capital endowments of farmers, organisational arrangements and physical capital endowments of farms and market type for produce used, on the development of farming systems. Poor water sources associated with the semi-arid nature of the study area (Nhemachena et al. 2011; WDM 2014) led to fewer farms which relied on irrigation (36%: H and RH combined) compared to farms which did not (64%: CR, R and M combined). Table 6 shows the distribution of farms among farming systems, across policy models. In Rest farms, R was most prevalent with four farms. Farming systems CR and M were important in SLAG farms. All farming systems were observed in LRAD1 farms and there was no dominant farming system. In LRAD2 farms, H and M were important, whereas in PLAS farms, R and RH were important. In the present study, we observed that capital poor (in SLAG farms) and capital endowed farmers (in Rest, LRAD1, LRAD2 and PLAS) participated in CR and M, an indication that these two social classes of farmers participated in land reform farms. On the contrary, capital endowed farmers (in Rest, LRAD1, LRAD2 and PLAS) participated in H, R and RH. There were differences in ruminant sales ratios within CR and farm gross margins within M, between capital poor and capital endowed farmers. Ruminant sales ratio was high (ratio of 0.99

Table 6: Distribution of farms among farming systems, across land reform (LR) policy models

	Farming systems				
	CR	H	R	RH	M
Farms (n)	7	14	13	4	12
LR policy model					
Rest (n = 7)	1^{a}	1^{a}	4^{b}	1^{a}	0^{a}
SLAG (n = 4)	2^{b}	0^{a}	0^{a}	0^{a}	2^{b}
LRAD1 (n = 11)	2	2	3	1	3
LRAD2 (n = 21)	2^{a}	11^{b}	1^{a}	0^{a}	7^{b}
PLAS (n = 7)	0^{a}	0^{a}	5^{b}	2^{b}	0^{a}

Farming systems: CR- Crop plus ruminant, H- Horticulture, R- Ruminant, RH- Ruminant plus horticulture, M- monogastric. LR policy model: Rest- Restitution, SLAG- Settlement/Land Acquisition Grant, LRAD1- Land Redistribution for Agricultural Development phase 1, LRAD2- Land Redistribution for Agricultural Development phase 2, PLAS- Proactive Land Acquisition Strategy.

Tow-sided Fisher's exact test (P=0.000 for LR policy model and farming systems), ^{abc} Different superscripts in a row indicate significant differences among farming systems [$\alpha=P(\chi^2>0.05;25)$].

±0.01) where CR was practiced by capital poor farmers than where CR was practiced by capital endowed farmers (ratio of 0.32 ±0.44). This difference in ruminant sales ratios indicate that capital poor farmers were likely to sell ruminants, whereas capital endowed farmers were likely to use ruminants for products not for sale. Capital poor farmers in CR explained that crop farming was dependent on availability of external financial support. Farm gross margin was high (US$13157 ±4026.92/yr) where M was practiced by capital endowed farmers than where M was practiced by capital poor farmers (US$472 ±304.00/yr). Farmers explained that the number of production cycles per year were consistent where M was practiced by capital endowed farmers, whereas the number of production cycles depended on availability of external financial support where M was practiced by capital poor farmers. Hence, the observed differences in farm gross margins between farms used by the two social classes in M.

Farm organisational arrangements did not differ among farming systems and in most of the farms (62%, overall) land use decisions were taken by an individual household. Farming systems did not differ in farm physical capital endowments, with most of the farms (70%, overall) being physical capital endowed. Table 7 shows distribution of farms between market types for produce, across farming systems. Most of the farms under H, R and RH sold produce in formal markets, whereas most of the farms under CR and M sold produce in informal markets. Farmers in M explained that they sold produce in informal markets because farm infrastructure (i.e. number and size of broiler houses) were insufficient for production levels required in formal markets. Hence, farmers in M had adopted production scales of 600-1200 broilers per production cycle of 42 weeks which met demand in informal markets. We did not analyse the distribution of farms between market types

Table 7: Distribution of farms (%) between market types for produce, across farming systems

	Farming systems				
	CR	H	R	RH	M
Farms (n)	7	14	13	4	12
Market type					
Formal	42.9^{b}	85.7^{d}	61.5^{c}	75.0^{cd}	8.3^{a}
Informal	57.1^{c}	14.3^{a}	38.5^{b}	25.0^{ab}	91.7^{d}

Farming systems: CR- Crop plus ruminant farming, H- Horticulture farming, R- Ruminant, RH- Ruminant plus horticulture farming, M- monogastric farming.
Two-sided Fisher's exact test (P=0.001 for market type and farming systems), ^{abc} Different superscripts in a row indicate significant differences among farming systems [$\alpha=P(\chi^2>0.05;10)$].

for produce between capital poor and capital endowed farmers within CR and M because the frequencies of poor farmers were low.

4 Discussion

4.1 Methodology

The present study adopted a positivist approach to develop typologies using multivariate techniques. Multivariate techniques were used because they are repeatable and allow for comparison of results across scales and contexts (Kostrowicki 1977; Kuivanen et al. 2016). The use of multivariate techniques to develop typologies require selection of variables to be used and determination of the number of clusters (Emtage et al. 2006; Gelbard et al. 2007; Dossa et al. 2011). Using PCA, we reduced the data set of 27 variables into three PC's comprised of 16 principal variables and the three PC's suggested three clusters. Two-step clustering method was reported to have advantages compared to classical clustering methods like hierarchical clustering (Kostov and McErlean 2006; Emtage et al. 2006; Dossa et al. 2011). Further, the two-step clustering method acknowledges that typology research is subjective in nature; hence, the method allows users to specify required number of clusters. In the present study, two-step cluster analysis using principal variables suggested three clusters. Hence, we explored cluster solutions from three up to seven. We decided to retain five-cluster solution based on subjective judgement made in line with our knowledge about land reform farms in the study area. The interactions among biophysical, economic and socio-institutional conditions dictate that farming systems are dynamic in nature (Tittonell et al. 2010; Kuivanen et al. 2016). Hence, the present study provides a snapshot of farming systems which existed in land reform farms during the study period.

4.2 Farming system development

The diversity of farming systems was reported to arise from, among others, biophysical, economic and socio-institutional variation which often were beyond the control of farming households (Köbrich et al. 2003; Senthilkumar et al. 2009; Tittonell et al. 2010; Chikowo et al. 2014; Alvarez et al. 2018; Guiomar et al. 2018). The farming systems observed in the present study (i.e. CR, H, R, RH and M) resulted from interactions among biophysical conditions, land reform policy models, capital endowments of farmers, physical capital endowments of farms and the market type for produce. Where land reform policy models (a) acknowledged the semi-arid conditions of the study area (Nhemachena et al. 2011) by transferring farms of relatively large size, regardless of land reform policy model adopted, for extensive resource use (i.e. rain fed crop and ruminants on natural grazing), and (b) ensured that farms were physical capital endowed and given to capital endowed farmers capable of owning ruminants, farming systems CR, R and RH developed (Table 4). In addition, the ability of farmers in CR, R and RH to sell ruminants in formal markets meant cashflow was certain, given that the demand for crop and ruminant products in informal markets was low. The large farm size required for CR, R and RH meant farms under these farming systems could only exist in peri-urban and rural locations, and their economic viability depended on produce being sold in formal markets which were reliable than informal markets (Ferris et al. 2014). Ruminant farming is the most suited agricultural activity for semi-arid conditions (Mcdermott et al. 2010; WDM 2014; Boval et al. 2017). Hence, the activity was key in 48% of the investigated farms. The existence of farming systems with mixed farming (CR and RH) could be attributed to (a) the targeting of land suitable for mixed farming by land reform policy models and intent by farmers to spread risk in CR, and (b) an intent solely by farmers to spread risk in RH since arable production was not planned for when land was transferred. The results suggest that mixed farming was possible in farms of relatively large size and was intended to spread risk, in line with literature (Culas and Mahendrarajah 2005; Thornton and Herrero 2015; Waha et al. 2018).

Where land reform policy models transferred farms of relatively small sizes (mostly under LRAD2) either with potential for horticulture farming (i.e. good soils and availability of water sources, WDM 2014) or for monogastric farming, under intensive resource use, farming systems H and M developed. In addition, capital endowed farmers with access to capital required for intensive land uses benefited the most from land reform policies (Netshipale et al. 2017) and post-settlement financial support was provided (DRDLR 2014). The small farm size required for H and M meant farms under these farming systems could exist in urban, peri-urban and rural locations. Farms under H prevailed the most in peri-urban location because markets for farm inputs were often in

urban centres and farmers sold produce in formal markets to ensure that farms were economically viable. Farms under M were in peri-urban and urban location because farm physical capital (number and capacity of production units) limited the scale of production which meant production levels could not meet the demand in formal markets. Hence, M farms could only exist (i.e. economically viable) next to locations where relatively large populations live (i.e. in peri-urban and urban location) as produce were intended for informal markets. In line with our findings, literature reported that H was dependent on suitable natural capital (i.e. good soils and availability of water source), and availability of physical and financial capita (Nesamvuni et al. 2016a). The low prevalence of H and M farms (28% and 24%, respectively) could be attributed to scarcity of water sources associated with the semi-arid conditions of the study area for H (Nhemachena et al. 2011; WDM 2014) and targeting of economically disadvantaged section of the society by land reform policies for both H and M (DLA 1997, 2006; MALA 2001).

4.3 Implications for policy

The findings of the present study show that participation of capital poor farmers in CR and M depended on natural capital endowment (ruminant ownership) and availability of external capital support (DRDLR 2014). Poor farmers did not participate in H due to lack of physical and financial capital required for H (JavaTpoint 2018), whereas their lack of participation in R and RH was due to (a) not owning farms of large sizes since "the grant amount was R1 500 per household when land price was around R900/ha when land reform policy targeted the poor under SLAG" (Aliber and Cousins 2013), and (b) limited natural capital (owned small number of ruminants) compared to number of ruminants needed to attain economic viability in farms of large sizes in R and RH (Claessens et al. 2012; Gautam and Andersen 2016). Farming systems where capital poor farmers participate (CR and M in this case) present a last resort for the state, through land reform, to contribute to the livelihoods of the poor; because, in chapter 3, we observed that Rest farms were used by the capital endowed farmers and capital endowed farmers are the main beneficiaries of the current redistribution model PLAS. Therefore, the state should prioritise provision of physical and financial capital support to farming systems where the poor participate (CR and M in this case) through targeted land reform and other development-oriented policies. Prioritisation of such farming systems provide iconic symbols of how state policies are geared towards eradication of social class inequalities and poverty alleviation.

5 Conclusions

The present study used mathematical classification approach to explore the diversity of farming systems and analysed the drivers of farming system development in land reform farms of the Waterberg District of South Africa, using data collected through surveys and focus group discussions. Crop plus ruminants, horticulture, ruminants, ruminants plus horticulture and monogastrics where the five identified farming systems. Farming systems developed from the interactions among biophysical conditions, land reform policy models, capital endowments of farmers, physical capital endowments of farms, and type of produce market used. Horticulture existed where irrigation was possible and where not crop, extensive ruminants and intensive monogastric existed. Ruminants existed where land reform policy models transferred farms of relatively large sizes and horticulture and monogastric existed where land reform policy models transferred farms of relatively small sizes with good infrastructure. Medium- and large-scale production took place in farms where produce was sold in formal markets and small-scale production took place in farms where produce was sold in informal markets. The present study suggests that that land reform policies could influence land use activities by transferring farms of a particular size, and farmers of all social classes could participate in any of the identified farming systems if access to physical and financial capitals is guaranteed and farmers sell produce in applicable market type.

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Chapter 5

Analysis of strengths and weaknesses of land reform farms in diverse farming systems in the Waterberg District, South Africa



Household survey and stakeholder workshops

This chapter will be submitted in a slightly modified version authored by:

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Abstract

The limited livelihood gains attained by beneficiaries of land reform in South Africa are partly blamed on the lack of understanding of the strengths and weaknesses of land reform farms. Therefore, in the present study, we aimed to analyse the strengths and weaknesses of land reform farms in diverse farming systems, in the Waterberg District, South Africa. We investigated 50 farms in 5 farming systems, classified based on land use activities and their contribution to farm revenues and costs. The farming systems were (between brackets the number of farms): rainfed crops plus ruminants on natural pastures- CR (7), irrigated horticulture- H (14), ruminants on natural pastures- R (13), ruminants on natural pastures plus irrigated horticulture- RH (4), and in-house monogastrics- M (12). The study followed a stepwise approach. We first conducted a survey to collect information about stakeholder involvement, extent of support from the state and constraints. Second, we organised a stakeholder workshop to validate findings from the survey and to map the way forward. Lastly, we conducted a strengths, weaknesses, opportunities, and threats (SWOT) analysis, based on knowledge generated from earlier steps and on literature. Limpopo Department of Agriculture, Department of Rural Development and Land Reform, and private organisations were the key stakeholders in land reform farms. Limpopo Department of Agriculture supported most of the farms (94.0%) of which majority received capital plus services (61.7%), followed by the Department of Rural Development and Land Reform (42.0% of the farms) of which majority received capital (81.0%), and lastly private organisations (24.0% of the farms) of which majority received capital (66.7%). The vulnerable participated in 86.0% of the farms and oversaw operations 36.0% of those, with women dominant in both aspects. The number of farms supported by the state and those which perceived financial and natural constraints differed among farming systems, whereas occurrences of other whole farm constraints did not. Most of the farms in CR (85.7%) and RH (75.0%) received financial support from the state, whereas only few farms in R (15.4%) and M (25.0%) did. The occurrence of farms which were financially constrained was high in CR (85.7%), moderate in H (42.9%) and M (50.0), and low in R (15.4%) and RH (0.0%). Most of the farms in H perceived natural constraints (64.3%), whereas only few farms (≤28.6%) in CR, R, RH and M did. Livestock diseases were the most important constraint (52.6% of the farms) in farms with livestock, whereas pests were the most important constraint (45.0% of the farms) in farms with crop plus horticulture. Using the SWOT issues, we re-grouped farming systems into three groups, namely: better-off farms with extensive activities comprising CR, R and RH; better-off farms with intensive activities comprising of H and M; and poor farms with extensive or intensive activities comprising of CR and M. Strengths of better-off farms with extensive activities were that

farms had good physical capital and farmers needed less external support, whereas the weaknesses were limited possibilities for partnerships and high opportunity costs of family labour. Better-off farms with intensive activities differed from better-off farms with extensive activities solely by having ample possibilities for partnerships among the strengths and farmers needed more external support being among the weaknesses. A strength of poor farms with extensive or intensive activities was low opportunity cost of labour, whereas the weaknesses were insufficient farm physical capital which limited possibilities for partnerships and high dependence on external support. Acknowledging the diversity in farming systems is essential for land reform to play a key role in rural development.

1 Introduction

In the execution of land reform in South Africa, like in many other countries implementing land reform, the political leadership aims to (a) to address inequalities in land ownership and access, and (b) to mitigate the 'triple challenges' of inequalities in household income, unemployment, and poverty (Borras Jr. et al. 2007; Binswanger-Mkhize et al. 2009; Moyo 2011; Vista et al. 2012; Diniz et al. 2013; World Bank 2018). In South Africa, these aims of land reform have substituted each other over time, whereby the earlier redistribution model settlement/land acquisition grant (SLAG) served mainly the fair land ownership aim and the later models land redistribution for agriculture development (LRAD) and proactive land acquisition strategy (PLAS) served mainly to address the triple challenges by ensuring that reformed land is used (Netshipale et al. 2017). Beneficiaries' livelihood gains from land reform were low in all these land reform models (Bradstock 2005; Lahiff et al. 2008; Valente 2011; Aliber and Cousins 2013; Antwi and Oladele 2013).

In South Africa, there is lack of understanding of the reasons why land reform farms do not meet the policy objectives. South African studies about land reform farms have focused on constraints, looking at relatively few farms either across land reform programmes or within a programme (Wegerif 2004; Bradstock 2005; Lahiff et al. 2008; Valente 2011; Aliber and Cousins 2013; Antwi and Oladele 2013). Organisational challenges, inadequate participation of beneficiaries, preference for large-scale commercial farms (which causes that only few households can participate in land reform), beneficiaries' lack of knowledge and skills, and insufficient post-settlement support, were challenges cited the most in literature (Valente 2011; Lahiff and Li 2012; Aliber and Cousins 2013; Binswanger-Mkhize 2014). The latter three challenges were stated to be applicable to most land reform farms, whereas the first two were observed in farms owned by households in groups.

An analysis of strengths, weaknesses, opportunities, and threats (SWOT) is a way to study constraints in a systemic way. Moreover, to my knowledge, no studies have analysed constraints in land reform farms from a farming systems' perspective. Literature shows that farms in diverse farming systems are likely to have diverse strengths and weaknesses (Senthilkumar et al. 2009; Tittonell et al. 2010; Kuivanen et al. 2016). Insight in such strengths and weaknesses will contribute to identify development pathways for different farming system types that lead to successful farms under a given context to meet the objectives of addressing inequalities in land ownership and access, and of mitigating the 'triple challenges' of inequalities in household income, unemployment, and poverty. Therefore, the aim of the present study was to analyse the strengths and weaknesses of land reform farms in diverse farming systems in the Waterberg District Municipality in Limpopo

province, South Africa. Towards this aim, we (a) assessed the involvement of stakeholders, extent of support from the state and constraints, among farming systems, and (b) we conducted a SWOT analysis.

2 Methods

2.1 Study area

The study was conducted in the Waterberg District Municipality of Limpopo Province, South Africa. Waterberg District Municipality has a semi-arid climate (WDM 2014; GCIS 2018). Mining, agriculture, and tourism are the main economic sectors in Waterberg District Municipality. In Waterberg District Municipality, agriculture contributes about 4% to the gross geographic product and employs about 21% of the labour force, in line with the whole of South Africa (WDM 2014; GCIS 2018). The study focused on four of the six local municipalities of Waterberg District Municipality: namely Bela-Bela, Lephalale, Mogalakwena and Mookgopong. We selected these four local municipalities because they house about 80% of the land reform farms in Waterberg District Municipality (Netshipale et al. 2017).

2.2 Farm selection, and data collection and analysis

In South Africa, land reform farms are used for diverse agricultural activities (Lahiff 2008; Aliber and Cousins 2013; Antwi and Oladele 2013). In 2012, there were about 175 land reform farms in Waterberg District Municipality, of which 140 were in the focus area of the present study (Netshipale et al. 2017). In the present study, we targeted 73 farms which were being used (referred to as 'active farms'), particularly for agriculture (Netshipale et al. 2017). In an earlier study in Waterberg District Municipality, land reform farms were classified based on land use activities and on the contribution of activities to farm revenue and costs into five farming systems i.e. rainfed crops plus ruminants on natural pastures- CR, irrigated horticulture-H, ruminants on natural pastures- R, ruminants on natural pastures plus irrigated horticulture- RH, and in-house (semi-controlled environment) production of monogastrics- M (Netshipale et al. 2020b/Chapter 4). Further, farms under H, R and RH were used by farmers with high physical and financial capital endowments (referred to in this study as 'better-off farmers'), whereas farms under CR and M were used by both better-off farmers and those with limited physical and financial capital endowments (referred to in this study as 'poor farmers'). For the present study, we excluded one crocodile farm which did not fit under any of the farming systems and one fully automated large-scale commercial

poultry farm as its SWOT issues were likely to differ from those of small- to medium-scale poultry farms in M. Moreover, we excluded 21 farms who could not avail knowledgeable respondents willing to participate in the present study. Hence, we investigated 50 farms, which represented 35.7% of land reform farms in the focus area and 28.6% of land reform farms in the whole of Waterberg District Municipality. Each of the farms investigated was under one of the five farming systems which the present study focused on. The distribution of investigated farms across farming systems were: CR = 7, H = 14, R = 13, RH = 4, and M = 12.

This study followed a stepwise approach. First, we conducted a survey to collect information about the involvement of stakeholders, support provided to farmers by the state and constraints. In Bela-Bela and Lephalale local municipalities, researchers were accompanied by state officials from the Limpopo Department of Agriculture during farm visits. The presence of state officials might have influenced farmers to over-report the support provided by the state. Hence, in all four municipalities, to counter this bias we (the researchers) took transect walks during farm visits aimed to inquire about the origin of (a) all resources (except land) which were visible on the farms, and (b) farm inputs (like fertilizers for crop and horticulture, and medication for livestock) used or to be used for the existing and imminent land use activities. The observations during these transect walks helped us to judge whether reported government support was realistic or not. If we considered farmers' reports biased, we discussed the level of government support with the farmer. Second, a stakeholder workshop was organised to validate the findings of the survey and to explore solutions to identified constrains. Third, we conducted a SWOT analysis of farms in divers farming systems based on knowledge generated from earlier steps (Leigh 2006; Chermack and Kasshanna 2007; Gürel and Tat 2017). In the following sections, I explain how these steps were executed.

The survey was conducted between May and September 2014. Using semi-structured questionnaires, interviews were conducted with household heads or their representatives in farms owned by households individually, whereas group interviews were conducted with members representing 'active households' in farms owned by households in groups. An active household is a household that has at least one member involved in management of the farm, in land use or in both. We collected qualitative and quantitative information, based on recall for the year preceding the interview. In the present study, an external stakeholder refers to a person who or an organisation that was not affiliated to a farm under investigation but had either mandatory or voluntary interests in it. In South Africa, state policies envisaged participation of external stakeholders in land reform (DLA 1997, 2006; MALA 2001). Hence, (a) state institutions (e.g. Department of Rural Development and Land Reform, Department of Agriculture, Forestry and Fisheries and

Municipalities), and (b) private organisations (e.g. Agricultural Research Council, farmer organisations and large-scale commercial farmers) were expected to provide support to land reform beneficiaries. Involvement of external stakeholders was assessed from the date on which beneficiaries received the land up to the day of the interview. Information about the stakeholder and the type of support provided (capital or advisory services or both) were collected to address *stakeholder involvement and their contributions*. Capital comprised financial contributions for acquisition of farm physical capital, production inputs, payment of wages for farm workers and their mixes. Information about external support provided by state institutions was used to address *the extent of support from the state*. For each active household, we investigated whether either the whole household or an individual household member involved in farm operations could be classified as 'vulnerable' or 'not vulnerable'. As a category, the vulnerable comprised poor households, women, youth, and people with disability. Women and people with disability were self-defined, but we had to give meaning to the subcategories: the poor and youth. The poor referred to households in which a single household member was living from less than US$91.50 per month, in 2013 (STATS SA 2019), whereas the youth referred to individuals that were between the ages of 18 (guided by the ability to make decisions which are legally binding) and 35. The intent of land reform to contribute to reduction of inequalities, among others, meant we had to collect information about participation of the vulnerable in land reform farms, to address the *extent of participation of the vulnerable*. We also collected information about constraints faced by farmers in the five farming systems to address *constraints*.

We used SPSS statistical package (IBM Corp. Released 2019) to analyse the information from the survey. Differences in distribution of variables among farming systems were tested using Pearson's Chi-square. In the present study, differences will only be mentioned when significant ($P<0.05$).

We used the findings from the survey for sharing and interrogation with stakeholders during the stakeholder workshop, which we organised in Klein-Kariba, Bela-Bela. The aim of the workshop was to validate the findings of the survey and to explore possible solutions to constraints faced in land reform farms of Waterberg District Municipality. Farmers, officials from state institutions mandated to support land reform (i.e. Department of Rural Development and Land Reform, Department of Agriculture, Forestry and Fisheries, and municipalities (district and local) and representatives of private organisations (the Agricultural Research Council, large-scale commercial farmers, African Farmers Association of South Africa, Agriculture South Africa, Waterberg District Communal Property Associations Forum and the Electricity Supply Commission) were the targeted stakeholders. All these targeted stakeholders, except the Agricultural Research Council and the

Electricity Supply Commission were represented during the workshop. The discussions at stakeholder workshop yielded a summary of constraints and possible solutions.

2.3 SWOT analysis

To conduct the SWOT analysis of land reform farms in these five farming systems, I (the first author) used the findings from the survey and the stakeholder workshop, and conclusions from a review of literature about the consequences of climate change for South Africa and prospects of the financial status of the South African economy on farming systems. I categorised relevant information into internal and external issues. Internal issues describe the attributes of the farms within a particular farming system, which I considered either as strengths or weaknesses, whereas external issues describe the attributes of the environment in which farms exist, which could present either opportunities or threats. I used these internal and external issues to construct SWOT matrices of land reform farms in the five farming systems. The SWOT analysis was finalised after discussions with co-authors and representatives of stakeholders, namely: Agricultural Research Council, Universities of Limpopo and Venda, large-scale commercial farmers, Waterberg District Communal Property Associations Forum, Department of Agriculture, Forestry and Fisheries, and Department of Rural Development and Land Reform.

3 Results and discussion

3.1 Stakeholders contributions and inclusion of the vulnerable

We identified the following key external stakeholders in land reform farms: state institutions at provincial level (mainly Limpopo Department of Agriculture and Department of Rural Development and Land Reform) and private organisations (comprised of large-scale commercial farmers, farmer organisations and research institutions), which is in alignment with the literature (DLA 1997; Lahiff et al. 2012; Aliber and Cousins 2013). Farmers in large-scale commercial farms were strategic partners and mentors in land reform farms, as they advised land reform beneficiaries based on their farming experience. Further, their connections with organisations that sell production inputs and those that buy farm produce made them intermediaries between those organisations and land reform beneficiaries. The frequency of key external stakeholder involvement and contributions of them to land reform did not differ among farming systems. In the 50 farms we assessed, the percentage of farms in which stakeholders were involved, were: Limpopo Department of Agriculture 94.0%, Department of Rural Development and Land Reform

42.0% and private organisations 24.0%. The observed high involvement of the Limpopo Department of Agriculture was expected, as provision of support to farmers is its primary mandate (Lahiff and Li 2012; Business Enterprises 2015). The involvement of the Department of Rural Development and Land Reform was moderate because its primary mandates were to facilitate land acquisition processes and make full or partial payments for the land to be transferred (DLA 1997, 2006; MALA 2001) and involvement after establishment of the land reform farm was secondary. Low involvement of private organisations could be attributed to lack of incentives for their involvement, given that beneficiaries would likely not be able to pay for their services because of the limited beneficiaries' gains from land reform farms (Valente 2011; Lahiff and Li 2012; Aliber and Cousins 2013; Netshipale et al. 2020a). Of the farms supported by the Limpopo Department of Agriculture, the most received capital plus services (61.7%), whereas 31.9% received only services and 6.4% received capital only. Farms supported by the Department of Rural Development and Land Reform with capital were the most (81.0%), whereas services, and capital plus services were each supplied to 9.5% of the farms. Most of the farms supported by private organisations received capital (66.7%), whereas 33.3% received services. Literature also indicates that state institutions cater for capital plus services, whereas private organisations often cater for support based on voluntary roles they play in land reform farms (DLA 2006; Nesamvuni et al. 2016b). We conclude that the extent of involvement of external stakeholders and the type of support they provided to farmers in land reform farms were guided by their mandates or objectives.

In South Africa, land reform policies emphasised the inclusion of the vulnerable (i.e. the poor, women, youth and people with disabilities) among land reform beneficiaries (DLA 1997, 2006; MALA 2001). The frequencies of participation of the vulnerable did not differ among farming systems. Overall (n=50), the results show that the vulnerable participated in 86.0% of the farms and oversaw operations in 36.0% of the farms. The poor participated and oversaw operations in 8.0% of the farms, women participated in 60.0% of the farms and oversaw operations in 26.0% of the farms, youth participated in 16.0% of the farms and did not oversee operations, and people with disabilities participated and oversaw operations in 2.0% of the farms. In LRAD projects in Ngaka Modiri Molema District of the North West Province, Antwi and Oladele (2013) reported that women and youth oversaw operations in 46.0% and 41.0% of the projects, respectively. Further, in 'Vuki farm' under LRAD, in the Overberg District of the Western Cape, it was observed that youth were not involved in farm operations (Khutswane 2013). It could be concluded that women were involved in land reform farms more than other categories under the vulnerable, but their involvement in managing the farm operations was lower than the desired minimum of 50.0%.

When assessing constraints of land reform farms, we neither observed gender specific constraints nor were they expressed by the respondents. The lack of gender specific financial challenges, in South Africa, could be because (a) post-settlement support for women was prioritised (Nesamvuni et al. 2016b) and there were funding initiatives targeting women, like the Isivande Women's Fund (Government Investment Incentives 2020), and (b) 'there was no gender gap in access to credit' (Fanta and Mutsonziwa 2016). South Africa's land reform seems to be a positive deviation from the general situation, as in developing countries women were more adversely affected by limited access to financial services than men (Fanta and Mutsonziwa 2016; Holloway et al. 2017; Trivelli et al. 2018; Hendriks 2019). We did not analyse youth involvement further, as the youth did not oversee operations in any of the investigated farms, but literature suggests that when overseeing operations, youth tends to make investments (Bajtelsmit and Bernasek 2001; Kabra et al. 2010). We deduced that women inclusion is strived for and they do participate in land reform farms.

3.2 State support and constraints

We categorised constraints into constraints perceived for the whole farms and constraints associated with specific land use activities. Whole farm constraints comprised natural occurrences (i.e. drought, floods, hail and frost), lack of access to inputs, shortage of labour, theft of farm physical capital, inability to participate in markets for input and produce, inability of active households to make compulsory decisions about farm operations (considered proxy for 'organisational challenges' particularly in farms owned by households in groups), lack of finance, and lack of knowledge and skills on agricultural activities being practiced. An example of organisational challenge is when a compulsory decision cannot be made because available beneficiaries cannot form quorum, in a farm overseen by a communal property association. The constraints specific to ruminants and monogastrics were similar, and those specific to crop and horticulture were also similar. These similarities led to two main categories of land use activities with specific constraints: livestock and crop plus horticulture. Constraints specific to livestock were lack of fences dividing grazing land, shortage of grazing land, lack of drinking water for livestock, livestock diseases, illegal hunting, livestock theft and predation. Illegal hunting was a constraint in livestock farms because livestock were killed by traps set by people hunting game in game farms which shared borders with livestock farms. Hence, game farming was unauthorised/illegal in livestock farms. Constraints specific to crop plus horticulture were poor soil quality, lack of equipment and implements, pests, and theft of produce.

We observed that, in investigated farms (n=50), farmers had been using the land for an average of 4.9 years. Table 1 shows the proportion (%) of farms which received financial support from the state, and the portion (%) of farms which perceived financial and natural constraints, for the different land reform farming systems. The number of farms which received financial support from the state, and encountered financial and natural constraints differed among farming systems. Most of the farms in CR (85.7%) and RH (75.0%) received financial support from the state, whereas only few farms in R (15.4%) and M (25.0%) did. Farmers in RH reported that the financial support they received was not based on financial need, but on the inclusion of horticulture among the land use activities, as the support comprised mainly seedlings, pesticides and herbicides, and fertilizers. The prevalence of farms which were financially constrained was high in CR, moderate in H and M, and low in R and RH.

The percentage of farms which perceived natural constraints were high in H, low to moderate in CR, RH and M, and low in R (Table 1). In the study area, farmers in H reported that production was often affected by incidences of flood, hail, and frost. Further, inconsistent rainfall patterns were also observed, but that has not led to drought. Hence, few farms with ruminants on natural pastures perceived low natural constraints. Therefore, the results confirmed the standard trend in which farming systems dominated by livestock (R, RH and M in this case) are less susceptible to climate change than those dominated by crops and horticulture (CR and H in this case) (Deuninck et al. 2008; DPIF 2008; University of Arkansas 2012; Scholtz et al. 2016).

Table 2 presents a summary of constraints encountered in land reform farms and proposed solutions, as discussed during the stakeholder workshop. Stakeholders agreed that there were no quick solutions to constraints listed in Table 2, but only processes which could lead to solutions. The consensus reached during the workshop indicated that lack of finance was a major constraint

Table 1: Proportions (%) of farms which received financial support from the state, and perceived financial and natural constraints, for the different land reform farming systems

	Farming system (FS)				
	CR	H	R	RH	M
Farms (n = 50)	7	14	13	4	12
Financed by state	85.7^{c}	50.0^{b}	15.4^{a}	75.0^{c}	25.0^{a}
Farms constrained					
financially	85.7^{c}	42.9^{b}	15.4^{a}	0.0^{a}	50.0^{b}
naturally	28.6^{b}	64.3^{c}	7.7^{a}	25.0^{ab}	16.7^{ab}

CR- Crop plus ruminant farming, H- Horticulture farming, R- Ruminant farming, RH- Ruminant plus horticulture farming, M- Monogastric farming; Natural- (drought, floods, hail and frost); Pearson Chi-square (P=0.012 for FS and financed by state, P=0.013 for FS and financial constraints, p=0.017 for FS and natural constraints); ^{abc}Different superscripts in a row indicate significant differences among farming systems [$\alpha=P(\chi^2>0.05;10)$].

Table 2: Summary of constraints encountered in land reform farms and proposed solutions, as discussed during a stakeholder workshop

Constraint	Proposed solution/s
Lack of finance	Government funding process for land reform was under review at the time of the workshop. When finalised the Limpopo Department of Agriculture (LDA) should assist farms with applications for funding. The LDA was tasked with organising information days between government approved private funders and farmers
Lack of electricity	The chairperson of Waterberg District Communal Property Associations Forum will liaise with the power supplier (Electricity Supply Commission) and organise a stakeholder workshop to pave the way forward
Lack of water	Solving financial challenges would partially address water challenges. Affected farms were advised to have water use plans by the 25th of April 2015 and the LDA would facilitate interactions between farmers and responsible departments
Inconsistent cash flow, lack of access to markets and land bank debts	The economic division of LDA would be given opportunities to map out the way forward on these constraints during a workshop to be arranged for government approved private funders
Illegal hunting, stock theft and predation	These constraints had implications for several departments (like Agriculture, Policing and Environment) and could be addressed through inter-sectorial forums

Source: stakeholder workshop organised by authors (04 March 2015, Klein Kariba in Bela-Bela).

and was the most felt by farmers, as also reported in literature (MacLeod et al. 2009; Lahiff and Li 2012; Binswanger-Mkhize 2014). In an earlier study, we distinguished two physical and financial capital endowment classes in CR and M: poor farmers and better-off farmers. In the present study, we found no associations between capital endowment class of farmers and financial constraints, in both CR and M. Farmers reported that they received support from the state (especially production inputs for crops, horticulture and monogastrics) based on the adopted scale of production. In addition, the support provided by the state did not discriminate between farmers in different capital endowment classes. We attributed the observed lack of association between capital endowment classes of farmers and financial constraints, in CR and M, to the high requirements for market inputs for crop and monogastrics, as the poor lacked capital and the better-off had insufficient. Hence, we deduced that without the support from the state poor farmers will be more financially constrained than better-off farmers, as suggested in literature (Lahiff et al. 2008; Binswanger-Mkhize 2014).

It seems justified to conclude that farms in R and RH, dominated by ruminants on natural pastures (i.e. capital-extensive activity), were financially stable, as land use activities required little market inputs because these farms have low or no arable activities. Arable activities are usually more capital requiring and risky than ruminant grazing, because of the semi-arid nature of the study area. Farmers in H and M (where capital-intensive activities of horticulture and monogastrics dominated), and in CR (where capital-extensive activity of rainfed crops dominated) could not

support themselves and required external support, because activities in these farms required more capital (beyond what disadvantaged farmers could have) and inputs from the markets. Moreover, even if financially supported by the state, a moderate to high number of farms in H in CR remained financially constrained, which implies that the support provided did not yield desired results. Based on these inferences, we conclude that, under semi-arid conditions, farming systems dominated by ruminants on natural pastures are more financial stable than farming systems dominated by horticulture, crop, and monogastrics.

The percentage of farms which perceived any of the below mentioned other whole farm constraints did not differ among farming systems. Of all farms (n=50), 20.0% mentioned inability to participate in markets for inputs and produce, 10.0% mentioned organisational challenges, 10.0% mentioned lack of knowledge and skills, 8.0% mentioned theft of farm physical capital, 6.0% mentioned lack of access to inputs and 2.0% mentioned shortage of labour. Whole farm constraints reported most in literature were: lack of access to inputs and markets, lack of knowledge and skills of farming, and organisational challenges (MacLeod et al. 2009; Valente 2011; Lahiff and Li 2012; Aliber and Cousins 2013; Antwi and Oladele 2013; Binswanger-Mkhize 2014). The lower prevalence of these constraints in our study compared to literature could be attributed to various factors. First, in most of the farms, farmers had adopted small- to medium-scale farming (guided by their farming experience of about 4.9 years) which requires less skills and knowledge than large-scale commercial farming. Hence, farmers' knowledge and skills level were appropriate for their farming practices. Only in the few case where farmers had adopted large-scale commercial farming models, external stakeholders provided training and advisory services (Valente 2011; Business Enterprises 2015). Second, farmers adapted their activities to capital availability (own or from the state). Third, farmers in farms owned by households in groups seem to have found common interests which served as remedy for organisational challenges.

In summary, the financial constraint i.e. access to capital, was by far the most important, and for other whole farm constraints farmers have adapted their practices, partly based on experience.

Of the 50 farms we assessed, 38 had livestock. The percentages of farms which encountered constraints specific to livestock did not differ among farming systems. In 38 farms with livestock, livestock diseases were the most important constraint (52.6% of the farms), whereas the prevalence of other constraints were: stock theft (28.9% of the farms), lack of drinking water for livestock (18.4% of the farms), lack of fences dividing grazing land (15.8% of the farms), shortage of grazing land (13.2% of the farms), predation (10.5% of the farms) and illegal hunting (7.9% of the farms). Livestock diseases were highly prevalent, because eco-tourism (which encompasses game farming)

is a major economic activity in Waterberg District Municipality, which makes the district a livestock/game contact area (WDM 2014). Game farming increases the possibility of transmission of diseases from game to livestock in livestock/game contact areas (Siembieda et al. 2011; Meunier et al. 2017). In livestock/game contact areas, management of livestock diseases requires interventions from external stakeholders, especially the state. During the stakeholder workshop, it was recommended that farmers should participate in inter-sectorial forums. Such forums may yield integrated strategies which could contribute to addressing constraints of diseases, but also illegal hunting, stock theft and predation. Lack of fences dividing grazing land, shortage of grazing land and lack of drinking water for livestock could be partially resolved by addressing financial constraints. This is because money is needed to buy resources to establish fences and sources of drinking water for livestock, and buy more land. We concluded that livestock diseases were the main constraint for livestock.

Of the 50 farms we assessed, 31 had crop plus horticulture. The percentages of farms which encountered constraints specific to crop plus horticulture did not differ among farming systems. In 31 farms with crop plus horticulture, pests were the major constraint (45.0% of the farms), whereas the prevalence of other constraints were: lack of equipment and implements (25.8% of the farms), theft of produce (9.7% of the farms) and poor soils (3.2% of the farms). We could not find literature addressing pests as a constraint for land reform farms. The observed low prevalence of lack of equipment and implements (25.8%) could be because farmers received physical capital support from the state, over the years (Business Enterprises 2015; Nesamvuni et al. 2016b). We concluded that pests were the main constraint faced by farms with crop and horticulture. The observed importance of diseases for livestock and pests for crop plus horticulture is not limited to land reform farms, but to the whole agricultural sector in South Africa (GCIS 2018). Therefore, we concluded that diseases and pests are the most important constraints associated with specific agricultural land uses.

3.3 SWOT issues of farming systems

Contextual issues

Stakeholders indicated two contextual issues that were very important for the development of land reform farms: climate change and availability of financial support from the state. First, climate change is important because ‘natural ecosystems and human systems’ are sensitive to it (IPCC 2014). Out-door agriculture depends on agroecosystems, and hence on climatic conditions. The consequences of climate change could present either opportunities or threats to farms. In general,

South Africa (including the study area) is among the semi-arid regions of the world, where climate change is projected to result in high variability in rainfall and prolonged periods of drought (Turpie and Visser 2012; Hornby and Cousins 2016; Pereira 2017). The projected consequences of climate change will affect all farming systems, but the impact will be immediate in H because drought reduces availability of irrigation water from rivers and underground.

Since the inception of land reform in South Africa, in 1995, the state has been unable to provide adequate post-settlement financial support required for land use by disadvantaged beneficiaries. Hence, deficiency in post-settlement financial support is partly blamed for limited contribution of land reform to livelihoods (Valente 2011; Aliber and Cousins 2013; Binswanger-Mkhize 2014). This association between post-settlement financial support and land use meant we should envision the consequences of availability of financial support from the state on the development of land reform farms. The availability of financial support from the state is in part influenced by the financial status of the nation's economy. The South African economy has not been doing well (Karodia et al. 2016) and it is anticipated to decline further (AFDB 2020). The anticipated decline of the South African economy will limit the availability of financial support to farmers from external stakeholders. We deduce that poor farmers, in CR and M, will be affected most by the anticipated decline of the South African economy. Next, is an analysis of SWOT issues of farms in diverse farming systems.

Analysis of SWOT issues

Capital endowment class of farmers influenced the opportunity cost of family labour. In South Africa, the lack of knowledge and skills, associated with limited access to education especially in rural areas, made poor farmers and members of their households unlikely to get better paying employment in formal sectors of the economy (World Bank 2018). Further, access to education for the poor led to young people from poor households who could get formal employment, often in towns and cities, and when employed they migrated from rural to urban areas. Hence, poor households that received land from land reform in the mid-2000s were still poor in 2014 (Netshipale et al. 2020a). In rural South Africa, members of poor households are likely to get employment in the informal sector which pay less salaries, which makes opportunity cost of family labour for these households low. On the contrary, members of better-off households can get employment in formal sectors, as their access to resources ensure that they can afford better education and as such their opportunity cost of family labour tend to be high.

In this section we discuss the SWOT issues of farms in five farming systems, guided by the findings from the survey and conclusions from a review of literature. Strengths and weaknesses of farming systems covered issues of financial requirements of land use activities, opportunity cost of family

labour, conditions of farm physical capital and extent of dependence of land use activities on external support. Opportunities and threats covered issues of possibility to partner with farmers in large-scale commercial farms, prospects of financial support from the state, susceptibility of land use activities to climate change, and availability of formal markets for produce.

In CR and M we found poor as well as better-off farmers (Netshipale et al. 2020b/Chapter 4). The observed diversity in endowment class of farmers, within these farming systems, is acknowledged in literature and is caused by differences in capital endowments, household aims and ability of farmers to tolerate risks, among others (Giller 2013). This diversity in endowment class of farmers, within CR and M, led to the diversity in SWOT issues between farms used by poor farmers and those used by better-off farmers. Hence, we subdivided farms in CR and M into 'poor farms' used by poor farmers and 'better-off farms' used by better-off farmers. In section 3.1, we observed that the involvement of women in land reform farms was high (60.0%), an indication that they were prioritised during implementation of land reform policies. We deduced that women will also be prioritised for financial support from the state (i.e. resulting in a gender specific opportunity), based on above observation and the fact that they are included among the vulnerable in land reform policies. However, that was the only SWOT issue we could associate with gender. Hence, we did not explore the effect of gender on SWOT issues. We observed, in the study area, that farms dominated by capital-extensive activities (i.e. in CR, R and RH) had limited possibilities of partnerships with large-scale commercial farms, and the opposite held for farms dominated by capital-intensive activities (i.e. in H and M). Some of the farming systems and farming system sub-types (in CR an M) had similar SWOT issues. Hence, we grouped them into three farming system groups as follows: better-off farms dominated by capital-extensive activities comprising CR, R and RH (i.e. 'better-off farms with extensive activities'); better-off farms dominated by capital-intensive activities comprising of H and M (i.e. 'better-off farms with intensive activities'); and poor farms dominated by either capital-extensive or capital-intensive activities comprising of CR and M (i.e. 'poor farms with either extensive or intensive activities'). We conducted the SWOT analysis of farms in these farming system groups.

Table 3 presents the description and SWOT issues of farms in three farming system groups. Strengths for better-off farms with extensive activities were: farms had adequate physical capital and farmers needed less external support as activities required limited inputs from the markets. Weaknesses of better-off farms with extensive activities were: limited possibilities for partnerships with large-scale commercial farms as activities were capital-extensive, which reduced possibilities for external stakeholders to invest in these farms, and family labour had high opportunity costs

Table 3: Description, and strengths, weaknesses, opportunities, and threats (SWOT) issues, of farms in three farming system (FS) groups

	FS group		
	Better-off farms with extensive activities (in CR, R and RH)	Better-off farms with intensive activities (in H and M)	Poor farms with extensive or intensive activities (in CR and M)
Description	Farms where rain-fed crops or ruminants on natural pastures were dominant; scale of production determined by market demand	Farms where horticulture under irrigation or in-house monogastrics were dominant; Scale of production determined by market demand	Farms where rain-fed crops plus ruminants on natural pastures or in-house monogastrics were dominant; scale of production determined by available support
Attribute			
Strengths	Farms had adequate physical capital, and farmers needed less external support as limited inputs from markets were required	Farms had adequate physical capital, and ample possibilities for partnerships with farmers in large-scale commercial farms (LSCF) as activities were capital-intensive	Family labour had low opportunity cost
Weaknesses	Limited possibilities for partnerships with farmers in LSCF as activities were capital-extensive, and family labour had high opportunity cost	Farmers needed more external support to acquire ample inputs from markets, and family labour had high opportunity cost	Farms had insufficient physical capital which led to limited possibilities for partnerships with farmers in LSCF, and farmers depended on external support as they were poor
Opportunities	Formal markets for produce existed, and susceptibility of activities to climate change was moderate	Existence of formal markets for produce	Susceptibility of activities to climate change was moderate, and there were ample possibilities for state support as farmers were poor
Threats	Possibilities for state support were limited as farmers were better-off and activities were extensive	Susceptibility of activities to climate change was high, and possibilities for state support were in-between as farmers were better-off and activities were intensive	Farms might collapse due to limited state finance

FS- farming system, CR- crop plus livestock, R- ruminants, RH- ruminants plus horticulture, H- horticulture, M- monogastrics; LSCF- large-scale commercial farms.

as family members were likely to get employment elsewhere in the economy. Opportunities of better-off farms with extensive activities were: formal markets for produce existed and the susceptibility of activities to climate change was moderate. The moderate susceptibility of activities to climate change was because water was required for drenching livestock only and rainfed crops were planted based on weather predictions. Climate change predictions are that there will be

sufficient rain to sustain these practices (Turpie and Visser 2012; Hornby and Cousins 2016; Pereira 2017). A threat for better-off farms with extensive activities was that limited state finances might reduce possibilities for support, as farms were given to the better-off as measures to address inadequate post-settlement support and extensive activities were not prioritised. Most of the SWOT issues of better-off farms with intensive activities were like those of better-off farms with extensive activities. Hence, we highlight the differences only. Better-off farms with intensive activities had the following distinctive SWOT issues: an additional strength of ample possibilities for partnerships with large-scale commercial farms as adequate physical capital and intensive activities brought opportunities for external stakeholders to invest; a weakness that farmers needed more external support as intensive activities needed ample inputs from the markets; and a threat of high susceptibility of activities to climate change as activities depended on availability of water for irrigation and in-house climate controls like air cooling systems to ensure constant room temperature.

SWOT issues of poor farms with extensive or intensive activities are presented in Table 3. Low opportunity cost of family labour was a strength of poor farms with extensive or intensive activities, as these farmers were poor because they (including members of their households) were unlikely to get employment elsewhere in the economy. Members of these households often lacked necessary knowledge and skills needed for employment types which pays descent salaries (World Bank 2018). Weaknesses of poor farms with extensive or intensive activities were: farm physical capital was insufficient which limited possibilities for partnerships with large-scale commercial farms, and farmers depended on external support as they were poor. Opportunities for poor farms with extensive or intensive activities were: moderate susceptibility of activities to climate change as rainfed crops depend on whether predictions and in-house monogastric production at relatively small-scale levels did not require sophisticated in-house environmental controls; and farmers were being prioritised by the state for support as they fall under the vulnerable. The envisaged limited support from the state is a threat to poor farms with extensive or intensive activities and without state support these farms are likely to collapse.

The future of land reform farms

We explored the future of land reform farms under each of the three farming system groups by analysing the output of the SWOT analysis further, through confrontation of the internal issues (strengths and weaknesses) with the external issues (opportunities and threats). The confrontation matrices yielded four futures for each farming system group, namely: high production, improved production, maintained production, and an unwanted future. The unwanted future is either least

production or change in land use activities or idle farms. For each farming system group, we discuss the most likely future in detail and other possible futures briefly. Maintained production is the most likely future for better-off farms with extensive or intensive activities, as better-off farmers in these farms might have enough physical and financial capital to counter the envisaged adverse climatic conditions by adopting of climate-smart agricultural practices. These better-off farmers could adopt the climate-smart agricultural practices, which include among others the use of (a) drought tolerant varieties, rainwater harvesting, drip irrigation, integrated pest management and intercropping with legumes, in farms with crop plus horticulture, and (b) improved livestock feeding, climate-smart housing and drought tolerant animal species like goats, in farms with livestock (Murage et al. 2015; Managa and Nkobole-Mhlongo 2016; Khatri-Chhetri et al. 2017; Shikuku et al. 2017; Lopez-Ridaura et al. 2018; Rust 2019). Goats are mixed feeding ruminants (i.e. eat mainly leaves from bushes but also grass) which can survive solely on browse and some trees that are less susceptible to droughts than grass as they have well-developed root systems (Mkhize 2015). Idle farms are the most likely future in poor farms with extensive or intensive activities, as (a) farmers in this group have insufficient capital, and (b) we envisaged limited state finances, adverse climatic conditions and lack of consensus, among beneficiaries. Next, I discuss prospects of improved and high production in land reform farms.

Consequences of climate change and limited state finances suggest that improved and high production levels are unlikely in land reform farms because access to finance through involvement of strategic partners in the study area was rare (Netshipale et al. 2017) and when involved beneficiaries were often worse-off because strategic partners often took over farm operations which led to beneficiaries being spectators entitled to rental fees for their land (Lahiff et al. 2012). However, international organisations and governments may prioritise food production since demand is projected to increase (FAO 2009). Hence, we envisage possibilities for improved and high production levels associated with availability of finance from external stakeholders, in all three farming system groups. In better-off farms with extensive or intensive activities, improved and high production levels could be realised when access to finance leads to increased use of farm inputs and to an increase in extent of land use, in addition to adoption of climate-smart agricultural practices mentioned earlier. In poor farms with extensive or intensive activities, improved production levels are envisaged in the short term, as farm physical capital was inadequate for high production and will be the first whole farm constraint to be addressed when finance become available. High production is a possibility in poor farms with extensive or intensive activities in the long term, on condition that availability of external finance led to adequate farm physical capital.

By exploring the future of land reform farms in the three farming system groups, we have broadened our understanding of the causal process, connections and logical sequence underlying farming system diversity, and generated the knowledge needed to develop strategies and interventions (Leach et al. 2010; Wright et al. 2013; Lindahl et al. 2016).

The implication of our study is that the ownership and access to land, gained by the South African natives through land reform, can contribute more to mitigate the 'triple challenges' of inequalities in household income, unemployment, and poverty if external stakeholders (the state and private organisation) provide support to enable farmers in land reform farms achieve improved production, at least.

4 Conclusions

In this study, we assessed stakeholder involvement, the extent of support from the state and constraints, in land reform farms in five farming systems. Further, we conducted a SWOT analyses of farms in these farming systems, aimed to understand the strengths and weaknesses of these farms. The level of stakeholder involvement and the type of support provided to farmers were determined by either stakeholder mandate or objective. The provision of financial support to farmers by the state was neither influenced by the capital endowment class of farmers nor by the capital requirements of land use activities. Lack of finance was the main whole farm constraint, and farming systems where crop plus horticulture were key activities were more prone to natural constraints than those where ruminants and monogastrics were key activities. Livestock diseases was the most prevalent constraint for farms with livestock, whereas pests was the most prevalent constraint for farms with crop plus horticulture. Two factors influenced strengths and weaknesses of farms in the five farming systems: capital endowment class of farmers and the characteristics of the land use activities. Farms used by poor farmers had strengths of low opportunity costs of family labour and being prioritised by the state for support, and a weakness of lacking physical and financial capital which led to dependency on external support. The opposite held for farms used by better-off farmers. Farms where capital-extensive activities were key (i.e. CR, R and RH) had (a) strengths of needing less capital investment, as less on input from the markets were required, and moderate susceptibility to climate change, as arable activities were limited, and (b) a weakness of low possibility for partnerships with large-scale commercial farms. The opposite held for farms where capital-intensive activities were key (i.e. H and M). We conclude that provision of financial support could lead to improved production in land reform farms, which could result in significant

contributions of the gained land ownership and access to land, to inequalities in household income, unemployment, and poverty.

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Chapter 6

General discussion

In South African, land reform depicts a known destiny with unclear path

1 Introduction

Globally, there is consensus that land reform has diverse objectives, namely: social, economic, political and environmental, and that there are trade-offs between objectives (Binswanger-Mkhize et al. 2009; Valente 2011; Keswell and Carter 2014). This is also the case in South Africa, where land reform is important to remedy the injustices of the past (DLA 1997). However, it is to the large extents unknown which trade-offs occur and how socio-economic and biophysical contexts interact with meeting the objectives. To address this knowledge gap, I focused on the Waterberg District Municipality, in which land reform brought changes in land ownership and access to land, similarly to other district municipalities in South Africa. Land reform cannot be wished away, and countries (among them South Africa) continue to implement land reform programmes. Therefore, generation of systemic knowledge on land reform is vital for the realisation of its objectives.

The goal of this thesis, therefore, was to generate systemic knowledge on land reform which should enlighten future land reform policies and programmes. I aimed to understand land reform, the extent to which it meets objectives and the associated consequences for land use and livelihoods. The first step towards attainment of the aim was to have a broader understanding of land reform in South Africa. The aim of chapter 2, therefore, was to generate knowledge to broaden our understanding of land reform through (a) comparison of the social objectives of land reform policies (restitution and redistribution) against their implementation outcomes, (b) assessment of levels of beneficiary participation in land reform farms, and (c) identification of land uses and quantification of extent to which land reform farms were being used.

To understand the livelihood contribution of land reform farms, I assessed the livelihood strategies of beneficiaries in chapter 3. The objectives of chapter 3 were to (a) to quantify the economic livelihood contribution of diverse activities in land reform farms, and (b) analyse factors underlying the households' economics, among five land reform farm types (i.e. restitution- Rest, settlement/land acquisition grant- SLAG, land redistribution for agricultural development phase 1- LRAD1, land redistribution for agricultural development phase 2-LRAD2 and proactive land acquisition strategy- PLAS). In chapter 4, I generated systemic knowledge about farming systems which exist in land reform farms, through (a) classification of farming system typologies based on principal variables underlying the diversity in land use, (b) characterisation of identified farming system typologies, and (c) analyses of drivers of farming system development. Finally, to understand the strengths and weaknesses of land reform farms in diverse farming systems, the objectives of chapter 5 were to (a) assess the involvement of stakeholders, (b) make an inventory of

the constraints faced in land reform farms, and (c) analyse the strengths, weaknesses, opportunities and threats (SWOT) of land reform farms. The next sections will sequentially present (a) the main findings of the chapters mentioned above, (b) a reflection on research design and methodology, and (c) a discussion about land reform and the associated consequences for land use and livelihoods.

2 Main findings

2.1 Understanding land reform farms

In chapter 2, I state that South Africa land reform farms originated from the implementation of two programmes, namely: rights-based/restoration-aimed 'land restitution' and choice-based/equality-aimed 'land redistribution' (DLA 1997; Lahiff 2008; Aliber and Cousins 2013). Beneficiaries take land use decisions in restitution farms, whereas land use decisions are taken by the state in redistribution farms. Beneficiaries of land reform were classified based on their wealth either as 'the poor' or as 'the better-off'. People in targeted wealth classes benefited under Rest (both the poor and the better-off) and during the inception model of land redistribution SLAG (the poor), as land reform policies clearly defined targeted beneficiaries. The clear definition of targeted beneficiaries made the implementation of land reform policies easy. Hence, I observed synergy between land reform policies and their implementation outcomes under Rest and SLAG. Targeted beneficiaries were not clearly defined during the later phases of land redistribution (LRAD1, LRAD2 and PLAS), as they comprised the vulnerable (the poor, women, the youth, and people with disabilities) and men who are better-off. There was no synergy between land reform policies and their implementation outcomes during these later phases of land redistribution, as the better-off (i.e. a small fraction of the targeted beneficiaries) benefited the most (Wegerif 2004; DLA 2006; Lahiff 2008; Aliber and Cousins 2013). The results show that many people became land owners under land restitution but most of them did not use the land, whereas few people became land owners under redistribution and, over time, most of them used the land (Lahiff et al. 2008; Aliber and Cousins 2013). More land was reformed under land restitution than under land redistribution in the study area, as the study area was among the areas in South Africa where the natives suffered severe historic land dispossession and land subjected to restitution claims was exempted from land redistribution (DRDLRb, n.d.). Restitution farms had no dominant land use and uses were diverse, whereas redistribution farms adhered to previous land uses and there was limited diversity in land use (Lahiff et al. 2008; Hall 2009; Aliber and Cousins 2013). In redistribution farms, the extent of

land used was determined by agro-ecological conditions, previous land ownership, the integrated development plan of the area, and the wealth class of beneficiaries.

2.2 Land reform and livelihoods

Chapter 3 aimed to improve our understanding of livelihood contributions of on-farm activities and factors underlying the households' economics. The results show positive relationship between on-farm livelihood contributions and capital endowments of farmers and farms (Scoones et al. 2012). Early land reform policies (Rest and SLAG) yielded relatively low on-farm livelihood contribution because these policies resulted in farms with insufficient physical capital, as the policies were developed and implemented based on the 'development perspective of the livelihood paradigm' i.e. land reform policies considered land reform farms to be one of the diverse sources of livelihood to the benefitting households. Whereas late land reform policies (LRAD1, LRAD2 and PLAS) yielded higher on-farm livelihood contributions because these policies led to farms with adequate physical capital, as the policies were developed and implemented based on 'neo-classical economic paradigm' i.e. land reform policies emphasised that land reform farms should be of viable sizes and there should efficient utilisation of resources (DLA 1997, 2006; MALA 2001; Cousins and Scoones 2010). The results also show that on-farm involvement of members from better-off households was based on the gains they could attain, whereas involvement of members from poor households was to safeguard farm resources, including land (Lahiff et al. 2008). The present study showed that rural households associated with land reform farms in South Africa made their living by combining diverse livelihood activities and passive sources, which was a livelihood strategy regularly found in developing countries (Ellis 2000; Tefera et al. 2004; Neves and Du Toit 2013; Fang et al. 2014; Gautam and Andersen 2016).

2.3 Farming systems in land reform farms

Results of chapter 4 indicate that crop plus ruminants on natural pastures- CR, horticulture- H, ruminants on natural pastures- R, ruminants on natural pastures plus horticulture- RH, and in-house monogastrics- M were the five farming systems that developed after land reform in Waterberg District Municipality. These farming systems developed because of the interactions among biophysical, economic (capital endowments of farmers and farms, and the type of market for produce) and socio-institutional (land reform policy models) conditions (Köbrich et al. 2003; Tittonell et al. 2010; Chikowo et al. 2014; Guiomar et al. 2018). Rain fed crops and ruminants on natural pastures were key activities in farms of relatively large sizes (observed in CR, R and RH)

found mainly in peri-urban and rural locations, whereas horticulture and monogastrics based on intensive resource use were key activities in farms of relatively small sizes (observed in H and M) found mainly in urban and peri-urban locations. The results also show that mixed farming (ruminants plus crops or horticulture observed in CR or RH), with an aim to spread risks through diversification of land use activities, was feasible in farms of relatively large sizes (Culas and Mahendrarajah 2005; Thornton and Herrero 2015; Waha et al. 2018). In addition, the participation of poor farmers in land reform farms depended on availability of external support (DRDLR 2014).

2.4 Strengths and weaknesses of land reform farms

The results in chapter 5 show that state institutions provided support mainly of capital plus services as a package to land reform beneficiaries guided by their mandates, whereas private organisations provided mainly capital guided by their objectives. Further, the results confirmed that the support provided by the state (as a custodian of land reform) to land reform beneficiaries was insufficient, and farming systems where land use activities were resource-intensive and poor farmers participated were the most affected by insufficient external support (Lahiff and Li 2012; Aliber and Cousins 2013; Binswanger-Mkhize 2014). Farms where ruminants on natural pastures was a major activity (in R and RH) perceived fewer financial constraints than farms where crop (in CR), horticulture (in H), and monogastrics (in M) were major activities, as crop, horticulture and monogastrics required more inputs from the markets. The dominant land uses in CR (i.e. crop) and in H (i.e. horticulture) made farms under these farming systems more susceptible to climate change, as the climate in the study area is characterised by relatively low rainfall and high atmospheric temperatures, and climate change will results in high variability in rainfall and longer dry spells (Deuninck et al. 2008; DPIF 2008). In land reform farms, the financial constraint was by far the most important, and for other farm level constraints farmers had adapted their practices, partly based on experience (MacLeod et al. 2009; Lahiff and Li 2012; Antwi and Oladele 2013). Livestock diseases were the most important constraint for farms with livestock and pests were the most important constraint for farms with crop and/or horticulture. Two factors influenced the strengths and weaknesses of land reform farms in diverse farming systems: capital endowment class of farmers and the characteristics of the land use activities. The use of land by poor farmers, in CR and M, led to strengths of the low opportunity costs of family labour and farmers being prioritised by the state for support, and a weakness of lacking capital which led to dependency on external support, compared to when land was used by better-off farmers. Farms in farming systems where capital-extensive activities were key (CR, R and RH) had strength of having adequate physical capital and moderate susceptibility to climate change, and a weakness of low possibility

for partnerships with farmers in large-scale commercial farms, when compared to farms in farming systems where capital-intensive activities were key (H and M).

As contribution to our understanding of land reform and the associated consequences for land use and livelihoods, chapter 2 contributed to our understanding of land reform by providing insights in land reform programmes, beneficiaries of the programmes, and the uses of reformed land. We gained knowledge about the consequences of land reform on livelihoods in chapter 3, as this chapter provided insights in the contributions of activities on land reform farms to livelihoods and factors underlying households' economies. Chapters 4 and 5 enhanced our understanding of the agricultural uses of land reform farms by providing insights in the diversity of farming systems in land reform farms, factors underlying farming system development, as well as the strengths and weaknesses of farms in the observed farming systems. Overall, the chapters 2 to 5 broadened our understanding of land reform and the associated consequences for land use and livelihoods. Next, I will reflect on research design and methodology used for the studies in the present PhD thesis.

3 Reflection on research design and methodology

This section reflects on representativeness of sample farms and households, information quality, research methods adopted, and the influence collaborators had on data collection.

The land reform programme in South Africa encompasses restitution, redistribution and tenure, and these sub-programmes either availed land or provided access to land for various uses (DLA 1997, 2006; MALA 2001). I focused on restitution and redistribution, as most of the farmland was reformed through these programmes. Restitution reformed more land in areas (district municipalities) where the natives suffered severe historic land dispossession (DRDLRb, n.d.). In the present study, I focused on Waterberg District Municipality which represents districts where most of the land was being claimed for restoration, under land restitution, because the natives had suffered severe land dispossession by the colonisers (LDRT 2012). Most of the land reform farms in Waterberg District Municipality were in the four local municipalities which were chosen to be the focus areas of the present study. In chapter 2, I investigated most of the accessible land reform farms and their distributions across land reform programmes and redistribution models give a true reflection of their prevalence in South Africa districts where the natives suffered severe historic land dispossession. I sampled representative numbers of active farms across farm types and investigated a representative number of active households in each of the selected farms, in chapters 3, to ensure that there was fair representation of farms and households. In chapters 4 and 5, the

sampling procedure considered diversities in farm types and in land use activities to ensure fair representation of farm types and that the findings account for diversity in land use. Therefore, the findings of this thesis are a true reflection of active land reform farms and households, in semi-arid districts of South Africa in which land restitution reformed more land than land redistribution.

Two classes of beneficiaries exist in land reform farms based on participation on-farm, namely: active (either managing the farm or using the land or both) and inactive beneficiaries, often reflected in literature by participation levels (Lahiff et al. 2008; Aliber and Cousins 2013). These two classes of beneficiaries hold different views about the use of the farms. Hence, being in contact with active beneficiaries limits the possibilities of contacting inactive beneficiaries. Active beneficiaries consider contact with inactive beneficiaries an attempt to get them involved in the affairs of the farm, with consequences of making a farm ungovernable. My interest on activities on land reform farms limited the present study to focus on active beneficiaries. Therefore, the findings of the present study are applicable to active farms and active beneficiaries only.

Farm record keeping was not done or not done properly in most of the investigated farms (Antwi and Oladele 2013; Cousins 2013b) and I overcame this challenge by interviewing knowledgeable respondents. For the study in chapter 4, at some farms I could not collect complete information for economic characteristics of farms (farming costs and revenues). Hence, I had to estimate incomplete information by corroborating the information available for that specific farm with information from (a) farms with similar land use activities which had complete records, and (b) the literature. However, the findings and conclusions made in chapter 4 were not affected by estimation of incomplete information, as information about farm characteristics were complete and these sets of information perfect each other in determining the characteristics of farming system types.

Stakeholder participation is key in development oriented research, though researchers of land reform often included only beneficiaries, but not other stakeholders (Valente 2011; Reed et al. 2013; Ernst et al. 2018). Inclusion of views of various stakeholders is, however, important as land reform has objectives beyond the livelihood of beneficiaries. Further, the targeting of those who were historically disadvantaged by land reform makes external support key. Standard research methods dominated the present study, but in addition I (a) reviewed policy documents to generate knowledge about the intentions of the state and literature about land reform to generate knowledge on implementation outcomes of land reform polices, and (b) organised two stakeholder workshops to gather information about the views and perceptions of stakeholders about land reform. The inclusion of policy review and stakeholder workshops sheds lights on issues which standard research methods like a survey cannot. For example, it was disclosed during the stakeholder

workshop that small- to medium-size broiler farms resulted from an intent to build an abattoir for broilers by the Waterberg District Municipality.

In Limpopo province, all studies investigating agricultural activities practiced by smallholder farmers had to be sanctioned by the Limpopo Department of Agriculture. The Limpopo Department of Agriculture in liaison with Department of Rural Development and Land Reform were mandated by the state to oversee agricultural development in land reform farms (DLA 1997, 2006; MALA 2001). The study approval from Limpopo Department of Agriculture dictated that the present study should be conducted in liaison with its local municipal offices. In two of the four local municipalities studied we could only access respondents when accompanied by an Limpopo Department of Agriculture official. Hence, in those two municipalities enumerators were considered government officials, which might have resulted in respondents over-reporting support provided by the state, during collection of information for chapter 5. To overcome this bias from respondents, we triangulated farmers' narratives with transect walks which were taken during farm visits. During transect walk enumerators inquired about the origin of (a) all resources (except land) which were visible on the farm, and (b) farm inputs (like fertilizers for crop plus horticulture and medication for livestock) used or to be used for the land use activities which existed during farm visit.

4 Land reform and the associated consequences for land use and livelihoods

Land reform is one of the measures taken, often by the state, to correct historic injustices of forced removals and land dispossession (Binswanger-Mkhize et al. 2009). Creation of new farmers (farm owners and land users), land uses and contribution of new farms to the livelihoods of beneficiaries are the anticipated results of land reform policies and their implementation outcomes. Hence, the present study probed the association between these anticipated results and land reform (policies and implementation outcomes). In this section, I discuss issues, which the finding can shed light on, aimed to addressing global challenges of inequality, poverty and unemployment, through identification and implementation of land reform policies which are socially and economically sustainable. The first section describes land reform and the subsequent land reform farms, followed by sections which describe associated consequences of land reform for land use and livelihoods, and the future of land reform.

4.1 Understanding land reform

In this section I will discuss the state as a key stakeholder in land reform. In most countries, among them South Africa, the state was and is responsible for the establishment of enabling land reform policies, and provision and mobilisation of support to the beneficiaries (Binswanger-Mkhize et al. 2009). These critical roles of the state stem from it being a custodian of the nation's resources. First, I look at the state as a facilitator of change in land ownership and access to land, and later, at the state as the coordinator of post-settlement support. In South Africa, implementation of land reform was aimed to provide beneficiaries with permanent and absolute ownership of the land i.e. 'freehold titles to land' (DLA 1997; Lahiff and Li 2012), though the department which is a custodian of land reform (Department of Rural Development and Land Reform) still holds some of the land titles. In land reform farms, the decisive powers held by the state oppose the powers held by beneficiaries, whereby beneficiaries have decisive power under restoration-aimed restitution and the state has decisive power under equality-aimed redistribution. The state (mainly its organs Department of Rural Development and Land Reform and Department of Agriculture, Forestry and Fisheries) as the initiator of the land reform processes has a mandate to provide and mobilise support to the new farmers, for settlement and land use (DLA 1997; Binswanger-Mkhize et al. 2009). Therefore, I conclude that the state is key in land reform, as it upholds nation's resources needed for land reform. Consequences associated with who holds decisive powers in land reform farms and provision of support by the state, for land use will be discussed in section 4.2.

In the next paragraphs, I discuss the policies used to change land ownership and access to land, and the farms which resulted from implementation of these policies.

In chapter 2, policies on South Africa land reform revealed that land reform farms resulted from adoption of market-assisted willing-buyer willing-seller as well as of land expropriation approaches, similarly to land reform approaches used in Brazil and the Philippines (DLA 1997; Binswanger-Mkhize et al. 2009). In South Africa, the market-assisted willing-buyer willing-seller approach was a choice by the state to redistribute land to address inequalities in land ownership and access to land, whereas land expropriation approach was used to restore land ownership rights of those who were historically removed by force from their land. In these two land reform approaches, landowners were compensated fairly because the state held political power and landowners held economic power. Hence, the approaches were dictated by the need for synergy between socio-political and economic objectives (Binswanger-Mkhize et al. 2009; Valente 2011). Land expropriation can also be executed without paying the land owners (the fast-track land reform

in Zimbabwe is an example), as this mechanism transfers land fast but often chases away investors and leads to economic sanctions (Binswanger-Mkhize et al. 2009). In Brazil, land expropriation with fair compensation to landowners was found to be more expensive than market-assisted land reform (Navarro 2009). The diversity in resource (i.e. natural, physical, human, financial and social) endowments among countries makes countries interdependent, with implications that development initiatives, including land reform, should be implemented through approaches and mechanisms which are globally accepted (Deininger 2003; UNCTAD 2016). These interdependences of countries command that national developments (including land reform) should not only consider the development needs of the nation, but also consider globally accepted practices used to address those needs. These globally accepted practices are often entrenched in policies of world governing bodies like the United Nations (UNDG 2016) and institutions like the World Bank (Deininger 2003). I conclude, based on the above discussion, that approaches used for land reform are determined by historic land dispossession, the balance of power between those advocating for land reform and the landowners, and globally accepted practices as reflected in policies of international organisations.

Next, I discuss the farms which originated from implementation of land restitution and land redistribution.

The present study shows that, in South Africa, the diversity of land reform farms resulted from differences in land reform programmes (restoration-aimed land restitution and equality-aimed land redistribution) and also from changes made to the land redistribution policies over time which led to redistribution models: SLAG, LRAD1, LRAD2 and PLAS (DLA 1997, 2006; MALA 2001). I recognised two categories of farms at programme level, namely: few farms of relatively large sizes in which many people benefited but most of them were not involved in land use (under land restitution programme) and many farms of relatively small sizes in which few actively involved people benefited (under land redistribution). In addition, over time there were four categories of farms that developed under sequential land redistribution policy models (i.e. SLAG, LRAD1, LRAD2 and PLAS) in which a decreasing number of people benefited but their involvement in land use increased (Aliber and Hall 2012; Binswanger-Mkhize 2014). However, both at programme level and over time under land redistribution policy models, I observed that only few people used the land, which implies that land reform was socially unsustainable. In addition, the results in chapter 2 show that in these four farm types under land redistribution, farm sizes were determined by targeted land uses, whereby farms of relatively large sizes where transferred for extensive resource uses like ruminant on natural pastures and rainfed crops. Therefore, I conclude that land reform

policies and their alterations over time influenced the diversity of land reform farms in terms of land size, and the number of people who benefited and their involvement in land use.

4.2 Influence of land reform on land use

I observed that land reform influenced land use at two levels: policy and provision of support to land reform beneficiaries. Further, the influence of land reform on land use had implications for farming models on land reform farms as determined by the scale of production and the use of family labour. In chapter 2, conclusions based on policy review revealed that land reform policies determined the balance of power between the state and beneficiaries regarding land use decisions. The findings in chapter 2 show that, in Rest farms, land use activities were diverse as beneficiaries could change uses at will because the primary aim of land restitution was to give land back to the rightful owners. Whereas in redistribution farms beneficiaries maintained previous land use activities because the state chose land for reform based on its agricultural potential as depicted by existing land use (Lahiff et al. 2008; Aliber and Cousins 2013). Land benefited under redistribution could be used solely for what was planned but uses could be changed with approval from the state (DLA 1997). Further, under redistribution, selling or using land as collateral was prohibited on fear that land could get back to the previous owners.

Literature exposed two issues associated with the use of land reform farms, namely: absence of the collateral value of land, and permanent and absolute ownership of land by beneficiaries (i.e. beneficiaries having freehold titles for land) (Lahiff and Li 2012). The absence of collateral use of land was based on the view that stakeholders will provide adequate support required by the disadvantaged beneficiaries to use the land (DLA 1997). The findings, in chapter 5, show that the anticipated support did not suffice, as most land reform farms were financially constrained (Aliber and Hall 2012; Lahiff and Li 2012; Business Enterprises 2015). Hence, I conclude that denying beneficiaries the collateral use of their newly acquired land is denying them access to finance, which is denying them an opportunity to use that land (Deininger 2003; Lahiff and Li 2012). In South Africa, the state has a hope of using the principle of 'use it or lose it' under land redistribution, aimed to take away land from beneficiaries who cannot use it (especially farms under earlier redistribution models SLAG, LRAD1 and LRAD2) and giving it to people who can (DLA 2006). However the principle was difficult to implement as in most of the farms beneficiaries were permanent and absolute owners of the land (Lahiff and Li 2012). The inception of the redistribution model PLAS in 2006 allowed the state to implement the 'use it or lose it' principle, because the state was, or in some instances is, the permanent and absolute owner of the land. The adoption of this

principle meant that only the better-off had access to land, as they had resources to use it, and could become new landowners based on evidence of success or landless on failure (DLA 2006). I conclude at land reform policy level that choice-based land redistribution tend to be a trade-off between giving beneficiaries permanent and absolute ownership of land and depriving them such rights to ensure that reformed land is used.

The state can also influence land use by providing support to land use activities of national interest, regardless of the holder of the decisive powers on land use (the state vs beneficiaries). In the study area, I observed in restitution farms that the state directed beneficiaries to use land for agriculture by providing support for agricultural activities only. Though some of the beneficiaries wished to reside in some of the restitution farms, their wishes were not fulfilled because the state did not provide resources for settlement, which those beneficiaries lacked. In redistribution farms, the state used its decisive powers to dictate the broader land use (mainly agriculture) and further direct land use towards specific activities (e.g. horticulture and/or monogastrics) through provision of support mainly to specific activities. This prioritisation of specific land use activities by the state, took into consideration factors such as the agro-ecological conditions of the area, zoning of agricultural commodities in line with availability of markets, among others (MALA 2001). The findings, in chapters 4 and 5, show that the support from the state was important in all farming systems, but more valuable in farming systems with resource-intensive uses (horticulture and monogastrics in this case) as intensive uses required more inputs from the markets. The support provided by the state determined the scale and level of production in farms used by poor farmers. In South Africa, land reform is continuing, while its budget is declining over time and the economic status is deteriorating (Karodia et al. 2016; Kepe and Hall 2018). Therefore, I conclude that financial limitations will reduce the influence of the state, through provision of support, to farms used by poor farmers only. Next, I discuss farming models in land reform farms which resulted from land reform policies and support provided by the state, discussed above.

The findings in chapters 2 and 4 show that, in Waterberg District Municipality, majority of land reform farms were small- to medium-scale commercial farms. These findings show that large-scale commercial farms were rare, though preferred by implementors of land reform (Aliber and Hall 2012; Lahiff and Li 2012; Aliber and Cousins 2013; Binswanger-Mkhize 2014). Inadequate post-settlement support from the state also contributed to the observed small- to medium-scale commercial farms. Further, the findings in chapters 2, 4 and 5 show that there were instances where land reform subdivided large-scale commercial farms into small size family farms. These family farms established through land reform did not result in production efficiencies associated with the

use of family labour (World Bank 1975), as the findings in chapter 4 show that family labour contributed only half of the required labour (including in family farms). I deduced that, on land reform farms in the study area and South Africa in general, the family farm model was inappropriate because (a) agriculture is not needed for subsistence, as the basic needs of the poor were catered for by social grants from the state and members of better-off households could receive better salaries off-farm, (b) land reform farms were far away from residential areas of beneficiaries, and land reform farms were in areas which lack infrastructure and there were no incentives for beneficiaries to relocate, and (c) limited state finance makes the development of infrastructure in rural areas unlikely in the near future (Bradstock 2005; Lahiff et al. 2008; Moyo 2009; Vista et al. 2012; Agri SA 2016). The family farm model was successful in situations where land reform beneficiaries had relocated to their new land and depended on it for subsistence, and is appropriate in countries with contexts which differ from that in South Africa (Navarro 2009; Diniz et al. 2013). I conclude that the context should determine the applicable farming model/s and land use activities in land reform farms.

4.3 Influence of land reform on livelihoods

I observed, in the study area, that most households did not relocate to benefited farms and might have forgone the opportunity of having a decent place to stay, in farms with decent houses (Bradstock 2005; Lahiff et al. 2008). I assessed contribution of land reform to the livelihoods of beneficiaries, in chapter 3, by quantifying livelihood contributions of on-farm activities, and the findings confirmed that contributions of land reform to the livelihoods of beneficiaries were limited (Lahiff and Li 2012; Aliber and Cousins 2013). Households that used land reform farms accepted limited livelihood contributions from land reform farms because (a) the subsistence of the poor was catered for by social grants, provided by the state, and they were involved in agriculture either to supplement their food sources or to generate income which they used to acquire household necessities, and (b) the better-off gained their living mainly from off-farm activities (Aliber and Cousins 2013; Cousins 2013b). These findings about contribution of land reform to livelihoods of beneficiaries confirmed that a single development initiative like land reform could not make farming a dominant livelihood activity (Tittonell et al. 2010; Aliber and Hall 2012; Phetlhu 2013).

4.4 The future of land reform

Globally, there is a consensus that land reform aims to contribute to solving challenges of inequality, poverty and unemployment (Binswanger-Mkhize et al. 2009). In the sections to follow, I discuss the prospects of land reform to contribute to addressing these challenges and I describe

what land reform programmes are likely to be, based on abovementioned findings and literature. I identified, in the present study, two types of inequality in land ownership and access to land, namely: origin inequalities (i.e. between people of European descent who are land-rich, and the native people who are land-poor (Feinberg 1993; Griffin et al. 2002; Borras Jr. et al. 2007) and inequality among the natives (Cousins 2013b; Diniz et al. 2013). In South Africa, origin (race based) inequality is the focus of land reform policies, and inequalities within targeted beneficiaries i.e. between the vulnerable (the poor, women, the youth and people with disability) and men who are not vulnerable, are also highlighted (DLA 1997, 2006; MALA 2001). Land reform had transferred only 2.7%, of the targeted 30%, of the land from the land-rich to the land-poor since inception in the period from 2005 to 2014 (DRDLR 2014), a reasonable attempt given that the state has limited finance. The findings in chapters 2 and 5 suggest that land reform have addressed gender inequalities but ignored socio-economic, age and ability inequalities, as women owned more farms and had access to more farms than other categories under the vulnerable combined. In chapter 2, I showed that the vulnerable owned 23.7% of the investigated farms, a figure which represented reformed land owned by women at national level (HLP 2017). In addition, farms owned by the poor were few, and those owned by youth and people with disabilities were rare. These findings imply that better-off men who were able and old benefited the most from land reform (Wegerif 2004; DLA 2006; Lahiff 2008; Aliber and Cousins 2013; Meer 2013), with rich men benefiting the most under land redistribution over time (Kepe and Hall 2018). I conclude that land reform could address origin and gender inequalities in land ownership and access to land, but often fails to address socio-economic, age and ability inequalities amongst beneficiaries.

In section 4.3 I deliberated on prospects of land reform to contribute to livelihoods (i.e. on-farm livelihoods contribution and job creation). In this paragraph I will discuss the prospects of land reform to address poverty. The positive association between on-farm livelihood contribution and household capital endowment, observed in chapter 3, led to poor households gaining the least from land reform farms. Hence, I conclude that land reform as a stand-alone development initiative cannot address poverty (Tittonell et al. 2010; Aliber and Hall 2012; Phetlhu 2013). Next, I discuss the future of land reform.

The need to balance the objectives of land reform (social, political, economic and environmental) put countries implementing land reform in dilemma. In most countries, the dilemma is vicious because often the governments hold political power, whereas landowners hold economic power (Binswanger-Mkhize et al. 2009; Valente 2011). Prioritisation of the social objective accelerates change in land ownership and access to land but compromises land use, whereas prioritisation of

economic objective ensures land use but compromises ownership and access to land. Given this perpetual dilemma, I strive to give insight to the following questions: which land reform approach/es could yield desired results, who should benefit from land reform, and which land use/s should land reform prioritise?

The next sections suggest answers to each of these questions separately, but in a relational way, guided by the findings and earlier discussions.

I conclude, based on literature, that implementation of policies which are not globally acceptable leads to sanctioning of countries implementing such programmes, as countries of the world are interdependent (UNCTAD 2016; UNDG 2016) . For example, implementation of land expropriation without compensation around the year 2000 in Zimbabwe resulted in economic sanctions being imposed and hardships, whereas the adoption of market-assisted land reform in South Africa did not result in such sanctions (Binswanger-Mkhize et al. 2009). In South Africa, there are discussions about land expropriation without compensation, but the likelihood that this approach will be adopted is low, as the bill of rights protects both the land-less and the land-rich, and the approach is opposed by international organisations like the World Bank (DOJ 1996; Deininger 2003; DPW 2018). If adopted, land expropriation without compensation will result in contests in courts of law between the state and landowners, and these contests will use all the money allocated for land reform and delay the land reform process further. Further, South Africa is a net exporter of agriculture products mainly to Europe and Africa, and adoption of land expropriation without compensation might affect access to these international markets (AGBIZ 2019). In countries implementing land reform, it is likely that the costs of expropriating land without compensation will surpass the benefits, even without international pressure. Therefore, I concluded that countries implementing land reform will use approaches which exclude land expropriation without fair compensation of landowners (Deininger 2003).

After conceding that payment of fair compensation to landowners is a must, the next question is who should benefit from land reform? The answer to this question is context dependent, but there could be some general principles as the need for land reform is greatest in developing nations (Binswanger-Mkhize et al. 2009). It is recommended that development initiatives should target the poor and prioritise women, and there is also a global concern about youth unemployment (Deininger 2003; ILO 2013; FAO 2014). The findings in chapter 3 show that the poor had the least livelihoods gains from land reform farms and were involved in agriculture either to supplement their food sources or generate income to acquire household necessities, as they depended on social grant provided by the state for subsistence and not on agriculture (Aliber and Cousins 2013;

Cousins 2013b). In chapter 5, the findings show moderate involvement of women in land reform farms and that gender did not influence SWOT issues. The youth could be considered absent from land reform, as the findings in chapters 2 show that they own only few farms and the findings in chapter 5 show that youth did not oversee operations in any of the farms. I conclude that the poor and the youth often lack own capital required to use the farms and the situation is made worse by the inability of the state to provide adequate support. In South Africa, it seemed the state had acknowledged that finance was limited and those who benefited during earlier phases of land redistribution lacked resources to use the land. Hence, the state adopted the current redistribution model PLAS in which the better-off benefit, to remedy financial challenges (DLA 2006). Not all developing countries have social welfare initiatives which cater for the subsistence of the poor. Hence, the need for the poor to fend for their survival persists. Given the diversity in contexts where land reform is being implemented, I conclude that in countries where (a) social welfare initiatives cater for the subsistence of the poor and the state lacks finance to support land use by the poor, the state should prioritise better-off women and youth, and (b) the poor are responsible for their own subsistence, the state should create an enabling environment (provide infrastructure where farms are located, capitalise farms and provide financial support) for the poor to use land and subsequently ensure that the poor are given land. Next, I deliberate on uses of future land reform farms.

I discuss possible uses of land reform farms, in this section, based on the prevailing agroecological conditions, wealth class of new landowners, the likelihood of adverse climatic conditions and limited state finance. In tropical and sub-tropical regions, where arid and semi-arid conditions are dominant, land reform should consider interactions among land use activities, scale of production and the wealth class of targeted beneficiaries. I envisage that, in land reform farms, the four major specific land use activities i.e. rainfed crops, horticulture, ruminants on natural pastures and in-house monogastric will persist. Further, I envisage that (a) large-scale commercial farms will only be fairly represented in land reform farms, as I had indicated in section 4.2 that land reform farms were dominated by small- and medium-scale commercial farms, and (b) land reform will benefit both the poor and the better-off. I conclude, based on above envisages, that (a) large-scale commercial farms in which small ruminants (i.e. goats and sheep) on natural pastures and in-house monogastrics (under controlled environment) are the major activities, and (b) small- to medium-scale commercial farms in which rainfed crop and irrigated horticulture guided by climate-smart agricultural practices are the major activities, should be the targeted farming models and land use activities, where land reform targets the better-off. Further, small-scale commercial farms where horticulture guided by climate-smart agricultural practices is the major activity should be the

targeted farming model and land use activity, where land reform targets the poor. Now that I have shed light on approaches to land reform, targeted beneficiaries and land uses, I conclude that the future of land reform will be determined by the ability of the state to (a) choose relevant approach/es to reform land and appropriate beneficiaries, and (b) align faming model/s and land uses with those choices.

Agricultural production in land reform farms of the semi-arid South Africa, in the short term, will be hindered by limited state finance, as the land reform programme benefits people with insufficient resources due to historic colonisation, and whose success as farmers depends on external support (Karodia et al. 2016; AFDB 2020). Further, agricultural production will be affected by irregular rainfall and prolonged droughts predicted to result from climate change (Turpie and Visser 2012; Hornby and Cousins 2016; Pereira 2017). In the long term, agriculture production in land reform farms will increase in response to the increase in demand for food associated with population growth, projected to be fastest in sub-Saharan Africa (FAO 2009). The increase in demand for food will attract resources towards agriculture, which land reform farms will benefit from, as the newly acquired land is part of natural resources available for agriculture production. Further, the increase in demand for food will be met only when resources, including land, are used efficiently, which implies when production in land reform farms is high. In the short-term land reform farms will have limited contribution to the livelihoods of the beneficiaries, national food security, and the economy; but these should improve over time.

5 General conclusions

The general aim of this thesis was to understand land reform and the associated consequences for land use and livelihoods. Below are key conclusions of this thesis:

- Choice-based land redistribution tend to be a trade-off between giving beneficiaries permanent and absolute ownership of land and depriving them such rights to ensure that reformed land is used.
- A holistic rural development strategy is key to addressing inequality, poverty and unemployment in rural areas, as a single sector strategy cannot.
- The poor should benefit from land reform where the state lacks resources to cater for their basic needs, and where resources are available the better-off should benefit.

- In South Africa, short term limited livelihood gains from land reform farms are expected due to limited national finance and improved livelihood gains are expected in the long term due to the increase in demand for food associated with population growth.
- Land reform will be implemented with payment of fair prices to landowners, regardless of land reform approach being adopted.
- The future of land reform will be determined by the ability of the state to choose relevant approach/es to reform land and appropriate beneficiaries, and to align faming model/s and land uses with those choices.

Summary

Globally, there is consensus that land reform has diverse objectives, namely: social, economic, political and environmental, and that there are trade-offs between objectives. This is also the case in South Africa, where land reform is important to correct historic injustices. However, it is to a large extent unknown which trade-offs occur and how socio-economic and biophysical contexts interact with meeting the objectives. In South Africa, land reform has been investigated as soon as it commenced, but to date there still are knowledge gaps about (a) beneficiation and land uses, (b) livelihood strategies of beneficiaries, (c) farming systems in land reform farms, and (d) the strengths and weaknesses of the farms. The general aim of this thesis, therefore, was to generate systemic knowledge on land reform which should enlighten future land reform policies and programmes. I aimed to understand land reform, the extent to which it meets objectives and the associated consequences for land use and livelihoods. To address this objective, the present study focused on the Waterberg District Municipality, in Limpopo province of South Africa, in which land reform brought changes in land ownership and access to land.

The initial step in generating systemic knowledge on land reform was to understand the context in which land reform was being implemented in Waterberg District Municipality. The objectives of **chapter 2**, therefore, were to (a) compare the social objectives of land reform policies (restitution and redistribution) against their implementation outcomes, (b) assess levels of beneficiary participation in land reform farms, and (c) identify land uses and quantify the extent to which land reform farms were being used. I reviewed land reform policies and collected qualitative and quantitative information about beneficiaries and land use. Five farm types were distinguished:- under restitution- Rest, and four other types under land redistribution, which were Settlement/Land Acquisition Grant- SLAG (2005-2000), Land Redistribution for Agricultural Development phase 1- LRAD1 (2001-2007), Land Redistribution for Agricultural Development phases 2- LRAD2 (2008-2010), and Proactive Land acquisition Strategy- PLAS (2006 to date). Targeted beneficiaries benefited in Rest and SLAG, an indication that synergy existed between policies and implementation outcomes. Unclear definition of targeted beneficiaries led to better-off households benefiting the most under LRAD1, LRAD2 and PLAS. Large numbers of less involved new landowners were found in Rest and SLAG, and few involved new landowners were found in LRADs and PLAS. Land uses were diverse in Rest, and less diverse and like previous uses in SLAG, LRAD1, LRAD2 and PLAS. Our cross-sectional study with a relatively large sample size yielded conclusive results about land use and beneficiaries, and it helped interpret results from case studies reported in literature. Results of **chapter 2** show that (a) Rest and SLAG were socially

oriented as they prioritised equality in ownership and access to land over land use, and LRAD1, LRAD2 and PLAS were economically oriented as they prioritised land use, and (b) cross-sectional studies with relatively large samples should be used to assess land use in land reform farms.

Afterward, to understand the economic contribution of land reform farms to livelihoods, I assessed in **chapter 3** the economic contributions of on-farm and off-farm activities, and passive sources to the livelihoods of households of active land reform beneficiaries. The objectives of **chapter 3** were to quantify the economic livelihood contribution of diverse activities in land reform farms, and to analyse factors underlying households' economics, among five land reform farm types. Farm types were determined by the programme and land redistribution model under which they were established i.e. Rest, SLAG, LRAD1, LRAD2 and PLAS. I collected qualitative and quantitative information about demography, household and farm capitals, household livelihood activities (on-farm and off-farm), passive livelihood sources and contribution of activities and sources to households' livelihoods. In addition, I reviewed literature about social welfare programmes in South Africa. Rest and SLAG were dominated by physical capital-poor households and farms, whereas LRAD1, LRAD2 and PLAS were dominated by physical capital-endowed households and farms. On-farm livestock production and the overall on-farm livelihood contributions were high for capital-endowed households in LRAD1, LRAD2 and PLAS, but were low for capital-poor households in Rest and SLAG. The observed positive association between on-farm contribution and household capital endowment shows that livestock production determined on-farm livelihood contribution, as it was the activity most suited to the semi-arid conditions of the study area. The structuring and implementation outcomes of land reform policies influenced on-farm livelihood contributions, as they determined the endowment classes that benefited in the five land reform farm types investigated. Most households, regardless of endowment class, relied on at least two livelihood sources to earn a sustainable living, and few capital-endowed households (in LRAD2 and PLAS) earned a stainable living solely from on-farm activities. This study suggests that land reform was unable to bridge the gap between the capital-poor and those who were capital-endowed, hence land reform should prioritise provision of capital to the poor.

Subsequently, I applied farming system research in **chapter 4** to understand the agricultural land use activities in land reform farms and their drivers. The aim of **chapter 4** was to generate knowledge about farming system diversity and its drivers in land reform farms, through (a) classification of farming system typologies based on principal variables underlying the diversity in land use, (b) characterisation of identified farming system typologies, and (c) analysis of drivers of farming system development. I collected qualitative and quantitative information about (a) farm

location, (b) agricultural land use activities and their contributions to revenues, costs, and produce not for sale, and (c) markets for inputs and produce. Literature about production of relevant agricultural produce was also reviewed. Results showed that land use activities (crop, horticulture, ruminant and monogastric) and their contributions to production costs, farm income and produce not for sale were the principal variables which determined farming system diversity. Crop plus ruminants- CR (14%), horticulture- H (28%), ruminants- R (26%), ruminants plus horticulture- RH (8%), and monogastrics- M (24%), were the five identified farming systems. Crops were rainfed and existed in peri-urban (42.9%) and rural (57.1%) locations. Horticulture was under irrigation based on relatively intensive resource use and had higher prevalence in urban location (50.0%). Ruminants were under natural grazing and were dominant in rural location (≥75.0%, in both R and RH). Monogastrics were based on relatively intensive resource use and had higher prevalence in peri-urban (41.7%) and urban (50.0%) locations. Biophysical conditions, land reform policy models, endowment classes of farmers and farms, and the type of produce market used, underlined the development of farming systems. Horticulture developed where irrigation was possible and where not crops, ruminants and monogastrics developed. In addition, crop, ruminants and mixed farming (in CR and RH) developed where land reform policies transferred farms of relatively large sizes, and horticulture and monogastrics developed where land reform policies transferred physical capital-endowed farms of relatively small sizes. The scale of production was determined by available market types for produce, with small-scale production aimed at informal markets, and medium- and large-scale production aimed at formal markets. Results of **chapter 4** suggest that land reform policies could influence land use activities by transferring farms of a particular size, and the poor could participate in all farming systems if physical and financial capital is availed.

Next, land reform is not fulfilling its obligations of reducing inequality, alleviating poverty and creating jobs. Understanding the stakeholders and constraints faced in land reform farms in diverse farming systems might give insights about the strength and weaknesses of land reform farms. In **Chapter 5**, therefore, I aimed to (a) assess the involvement of stakeholders, (b) make an inventory of the constraints faced in land reform farms, and (c) analyse the strengths, weaknesses, opportunities and threats (SWOT) of land reform farms. I collected qualitative and quantitative information about stakeholder involvement and constraints, and conducted a SWOT analysis. Further, a stakeholder workshop was organised to validate the findings of the survey and to explore possible solutions to constraints faced in land reform farms of the Waterberg District Municipality. State departments, with key roles in land reform farms, were involved the most and as a collective, they provided farmers with a package of capital plus services in line with their mandates. Farms where crop, horticulture and monogastrics (CR, H and M) were key were more susceptible to

financial constraints than farms where ruminants were key (R and RH). Horticulture was more susceptible to natural constraints than crop, ruminants, and monogastrics. Diseases were the major constraint for livestock and pests were the major constraint for crop and horticulture. Overall, finance was a major constraint in land reform farms. We regrouped farming systems based on similarities in SWOT issues into three farming system groups: better-off farms with extensive activities (CR, R and RH), better-off farms with intensive activities (H and M), and poor farms with either extensive or intensive activities (CR and M). Endowment class of farmers and the characteristics of land use activities determined the strengths and weaknesses of farming system groups. Farms used by poor farmers (in CR and M) had strengths of the low opportunity costs of family labour and being prioritised by the state for support, and a weakness of lacking physical and financial capital which led to dependency on external support. The opposite held for farms used by better-off farmers in all farming systems. Farming systems where capital-extensive activities were key (CR, R and RH) had (a) strengths of needing less capital investment, as less inputs from the markets were required, and moderate susceptibility to climate change, as arable activities were limited, and (b) a weakness of low possibility for partnerships with farmers in large-scale commercial farms. The opposite held for farming systems where capital-intensive activities were key (H and M). This study suggests financial support could improve levels of production in land reform farms.

In **chapter 6**, I discussed aspects which broaden our understanding of land reform and the future of land reform, based on the findings of the previous chapters. The discussion about understanding land reform revealed that (a) the state plays key roles in land reform of establishing appropriate policies and mobilising support to the beneficiaries, (b) historic land dispossession, balance of power between advocates for land reform and landowners, and international accepted practices will determine the approach to be used for land reform, (c) farm sizes and number of beneficiaries per farm will be determined by land reform policies and alterations over time, (d) households do not need agricultural income for subsistence, hence, there is no need to apply family labour at the farm, and (e) limited state finance and climate change are threats to land reform farms. There are three interconnected choices which will determine the future of land reform, namely: the land reform approach, selection of beneficiaries and selection of land uses. Countries will implement land reform through adoption of approaches which ensure that landowners are compensated fairly. In countries where (a) national resources are used to cater for the subsistence of the poor, land reform will prioritise the better-off and ensure that women and the youth are given first preferences, and (b) the subsistence of the poor is on their own hand, land reform will capitalise the farms and farmers to ensure that the poor use the land to gain sustainable living. The better-off

will use land reform farms for large-scale small ruminants (sheep and goats) farming based on natural pastures or for small- to medium scale rainfed crops and irrigated horticulture based on climate-smart agricultural practices. Small-scale horticulture farming based on climate-smart agricultural practices will be the only option where land reform benefits the poor. Lastly, the discussion concludes that the future of land reform will depend on advocates for land reform choosing correct approaches to reform land, ensuring that relevant people benefit and safeguard that land uses are aligned with approaches and beneficiaries.

Khutsofatšo

Lefase ka bophara go na le kwešišo ya gore lenaneo la phetolelo ya bong bja mobu le na le maikemišetšo a fapaneng bjalo ka a leago, moruo, sepolotiki le tlhokomelo ya tikologo. Se le sona ke seemo go Afrika Borwa fao lenaneo la phetolelo ya bong bja mobu le šomišwago go lokiša tshenyo le bohlokatoka bja mengwaga ya maloba. Le ge go le bjalo ga go tsebege gore go kgethwa le go lekalekanywa bjang maikemišetšo, le gore tša leago le morou le boemo bja mobu le leratadima di amana bjang le phihlelelo ya maikemišetšo ao. Mo Afika Borwa dinyakišišo tša lenaneo la phetolelo ya bong bja mobu di thomile le lona lenaneo le eupša go sa na le dikgeu tša tsebo ge go šetšwa: (a) Tlhabollo le tšhomišo ya naga, (b) Mekgwana ya go iphidiša ya baholegi ba lenaneo, (c) Mekgwana-tirišo ya bolemi mo polaseng tša mobu wo o fetotšweng bong, le (d) dintlha maatla le mafokodi a dipolase tše di fetotšweng bong. Dinepo e be e le go kwešiša lenaneo la phetelolelo ya bong bja mobu, magomo bokgoni bja lenaneo go fihlelela maikemišetšo a lona le kamano le ditlamorago godimo ga tšhomišo le mekgwana ya go iphidiša ya boholegi bja lenaneo. Go phetagatša dinepo, nyakišišo ye e šeditše stereke sa Waterberg sa mmušo wa selegae, probenseng ya Limpopo ya Afrika Borwa moo lenaneo la petholelo ya bong bja mobu le tlešitšeng phihlelo ya phetogo ya bong bja naga le khwetšagalo ya dipolase.

Legatong la mathomo la tšweletšo ya tsebo ya tshepedišo ya phethagatšo ya lenaneo la phetoleleo ya bong bja mobu, re lebeletše go kwešiša boemo le mabaka ao lenaneo le tšweleditšweng ka gona mo seterekeng sa mmušo wa selegae wa Waterberg. Dinepo tša **kgaolo ya 2**, e be e le (a) go bapetša dinepo tša leago tša melawana ya lenaneo (lenaneo pušeletšo le lenaneo phatlhalatšo) le ditlamorago tša pethagatšo, (b) go sekaseka magomo a tšeo ya karolo ya baholegi go polase tšeo di fetotšwego bong, le (c) go hlatha ditšhomišo tša mobu le go sekaseka magomo a tšhomišo ya polase tše di fetotšweng bong.

Go ile gwa farologantšhwa mehuta ye mehlano ya dipolase go ya ka manenewana a phetolelo ao a šomišitšweng go fetola bong bja mobu, yona e be e le o tee wa lenanewana la pušetšo morago (le theilwe ka sejahlapi go ba Restitution (Rest)) le ye mengwe ye mene ya mananewana a phatlalatšo (a theilwe ka sejahlapi go ba Settlement/Land Acquisition Grant- SLAG (2005 - 2000), Land Redistribution for Agricultural Development phase 1- LRAD1 (2001-2007), Land Redistribution for Agricultural Development phases 2- LRAD2 (2008-2010), and Proactive Land acquisition Strategy- PLAS (2006 go fihla ga bjalo).

Baholegi bao go bego go lebeletšwe gore ba fihlelwe ke lenaneo le bao ba holegilego go lenanewana la Rest ba laeditše kwano magare ga melawana tshepidišo le dipoelo tša phethagatšo. Go hlokega

ga peakanyo ya hlalošo ya gore bao ba bego ba lebeletšwe go ba baholegi ke malapa a mohuta goba maemo afe, go hlotše gore le malapa a go ikgona a holege go mananewana a LRAD 1, LRAD 2 le PLAS. Bontši bja baholegi bo hweditšwe go ba bo sa tšee karolo tšhomišong ya dipolase go mananewana a REST le SLAG mola ka go le ngwe go hweditšwe go na le baholegi ba go tšea karolo ka bontši go mananewana a LRAD le PLAS. Mekgwa ya tšhomišo ya mobu e be e fapafapane ka bontši bja yona mo lenanewaneng la REST mola go be go na le mekgwa ya thomišo mobu ye mmalwa ye e bego e le ya beng ba peleng ba polase go mananewana a SLAG, LRAD1, LRAD2 le PLAS. Nyakišišo ya rena ya tshekatsheko ya boemo ka nako ye e rileng go šomišwa palo ya godimo ya boemedi bja sehlopa kakaretšo sa se šeditšweng go nyakišišo, e bontšhitše dipoelo tše di tiileng mabapi le tšhomišo ya mobu ke baholegi, ya buša ya thuša le go hlaologanyeng ga dipoelo tše dingwe tše di amanang le nyakišišo ya rena ka tša dingwalweng phatlalatšo. Dipoelo tša **Kgaolo ya 2** di bontšhitše gore (a) Mananewana a REST le SLAG a be a theilwe go mabaka a leago e bile a beile pele tekatekano go khwetšego ya mobu go feta tšhomišo ya ona mola LRAD1, LRAD2 le PLAS di be di theilwe go mabaka a moruo ka ge di be di šeditše gore mobu wo o fetotšweng bong o tšwele pele go šomišwa go dira letseno, le gore (b) Nyakišišo ya tshekatsheko ya boemo ka nako ye e rileng go šomišwa palo ya godimo ya boemedi bja sehlopa kakaretšo sa se šeditšweng go nyakišišo ke yona e swanetšeng go šomišwa go sekaseka tšhomišo ya mobu mo dipolaseng tša go fetolwa bong.

Morago, maitapišong a go kwešiša karolo ya moruo ye e tlišwang ke dipolase tše di fetotšweng bong go mekgwana ya boiphedišo ya baholegi, ke sekasekile mo **Kgoalo ya 3** Letseno le le šomišwang ke baholegi go mekgwana ya bona ya boiphedišo. Go šeditšwe kudu letseno le le tlišwang ke kgwebo ye e dirwang mo polaseng le letseno le lengwe le le tšwang go medirwana ye mengwe ye e seng mo dipolaseng. Dinepo tša **kgoalo ya 3** e be le go bea seelo sa letseno go tšwa go mekgwa ya tšhomišo ya mobu ye e fapafapaneng, le go sekaseka dilo tšeo di nago le khuetšo go morou wa malapa a baholegi. Mehuta ya dipolase e hlathilwe go ya ka mananewana ao di fetotšeng bong ka ona go bolelwa REST, SLAG LRAD1, LRAD2 le PLAS. Ke kgobokeditše tsebo ye e bolelwago le ye e e ngwalwago mabapi le bong le maemo malapa, dithoto tša malapa le tša dipolase, mekgwana ya boiphedišo ya malapa (go tseneletšwa ya letseno la polase le letseno le letšwang go gongwe), tlhago goba botšo bja letseno le le sa šomelwego le karolo ya lona go mekgwana ya boiphedišo bja malapa a baholegi. Go tlaleletša ke ile ka lebeledišiša dingwalwa phatlalatšo tše di amanag le mananeo a tša leago tša Afrika Borwa. Go hwetšagetše gore, mo dipolaseng tša go hwetša ka lenanewana la REST le SLAG, go be go na le bontši bja baholegi ba go itlhokela ka malapeng le go hloka didirisšwa le dipolaseng tša bona. Tšweletšo ya diphoofolo tša leruo le tšweletšo ya polase ka kakaretšo di be di tsenya seelo se se golo go letseno la mekgwana ya boiphedišo ya malapa a go ikgona a hwetšegago ka bontši go dipolase tše di hweditšwego ka mananewana a LRAD1,LRAD2 le PLAS, eupša letseno

le hweditšwe go ba le se nyana go malapa a go itlhokela ao a hwetšwago ka bontši go dipolase tše di hweditšwego ka mananewana a REST le SLAG. Go amana ga letseno le go ikgona ga malapa go bontšhitše gore tšweletšo ya diphoofolo tša leruo ke ona mokgwa wo o beng o šoma ga botse go dira letseno. Se se dirwa kudu ke gore lefelo le go dirilweng dinyakišišo, le boemo bja leratadima ke tša seka-leganata ke ka moo le kgonang tšweletšo ya diphoofolo e seng dimela. Peakanyo le phethagatšo ya melawana tshepedišo ya lenaneo la phetolelo ya bong bja mobu e hueditše seelo sa letseno le le hweditšweng go tšwa tšhomišong ya dipolase bjale ka ge di hueditše seelo sa bohloki goba go ikgona ga malapa a baholegi go polase tše di tšerego karolo go dinyakišišo. Bontši bja malapa go sa lebelelwe bohloki goba go ikgona bo be bo ithekgile ka letseno go tšwa go methopo ye mebedi go iphediša, eupša malapa a senyana a go ikgona (a a hweditšweng go dipolase tša LRAD2 le PLAS) a be a kgona go iphediša ka feela letseno le tšwang tšweletšong ya polase. Dipoelo tša dinyakišišo tše di laetša go re lenaneo la phetolelo la bong bja mobu le šitilwe go fokotša phapano magareng ga malapa a bahloki le malapa a ba go ikgona, ke ka moo lenaneo le le swanetše gore le šetše kudu malapa le dipolase tša bahloki ge le e fa mašeleng a thušo ya tšweletšo dipolaseng.

Morago, ke šomišitše tsela ya nyakišišo ya mokgwana-tirišo wa bolemi mo **kgaolong ya 4** maitekong a go kwešiša tšhomišo ya mobu mo dipolaseng tše di fetotšweng bong le dilo tše di nago le khuetšo go tšhomišo yeo. Nepo kakaretšo ya kgaolo ya 4 e be e le go tšweletša tsebo ka mekgwa tšhomišo ya bolemi ka go fapafapana ga yona le tšeo di dirago gore mekgwa yeo e kgethwe mo dipolaseng tšeo di fetotšweng bong ka go: (a) hlatha mehutahuta ya mekgwana-tirišo ya dipolase go šeditšwe dika tša yona, (b) go šetša tlhago ya mehutahuta yeo le (c) tshekatsheko ya tše di huetšang mekgwa tšhomišo ya mobu. Ke kgobokantše tsebo ye e bolelwago le ye e nago le seelo mabapi le (a) lefelo le polase e leng go lona, (b) Mediro ya tšhomišo ya mobu le seabe sa yona go letseno, ditshenyagalelo le ditšweletšwa tše di jewang goba go šomišwa ka malapeng. Dipoelo di bontšhitše gore mediro ya tšhomišo (go bjala dithoro, go bjala dienywa le merogo, leruo la go otla ((dikgomo/dipudi/dinku) le leruo le le sa otleng (dikgogo/dikolobe)) le seabe sa yona mo go ditshenyagalelo tša tšweletšo, letseno la polase le ditšweletšwa tše di jewang goba go šomišwa ka malapeng e be e le tšona dintlhakgolo tše di fapafapantšeng mekgwana-tirišo ya dipolase. Mekgwana-tšhomišo ya dipolase ye mehlano e ile ya hlathwa, yona e be e le go bjala dithoro go kopane le leruo la go otla (14%), go bjalwa ga merogo le dinywa (28%), go rua ga leruo la go otla (26%), go bjala merogo le dienywa go kopane le leruo la go otla (8%) le go rua leruo le le sa otleng (24%). Dithoro di be di bjalwa di nošetšwa ke pula mo dipolaseng tša kgauswi le ditoropo (42.9 %) le dipolaseng tša kgole le ditoropo (57%). Go bjalwa ga merogo le dienywa go be go dirwa ka go nošetšwa e bile go bonagala gantši mo dipolaseng tša kgasuwi le ditoropo (50%). Leruo la go otla le be le hwetšwa gantši mo go leng mafulo a tlhago le gona dipolaseng tša kgole le ditoropo (≥75% mo

go ruiwagao feela le moo leruo le kopaneng le go bjalwa ga merogo le dienywa). Go rua ga leruo le le sa otleng go ithekgile ka go šomišwa mengwako ya leruo go hweditšwe go ba go diragala dipolaseg tša kguaswi le ditoropo (41%) le tša ditoropong (50%). Mekgwana-tirišo ya dipolase e be e huetšwa ke boemo bja bosa le leratadima, melawana tshepidišo ya lenaneo, go hlokega goba go ba gona ga ditlabelwa dipolaseng le malapeng a baholegi le mebaraka ya thekišetšo ya ditšweletšwa. Go bjalwa ga merogo le dienywa go hlabologile kudu moo go bego go kgonega gore dibjalo di nosetšwe, moo go bego go sa kgonege go hlabologile leruo la go otla le le le sa otleng. Go bjalwa ga dithoro le go ruwa ga leruo la go se otle goba moo leruo le kopanywago le merogo le dienywa go hlabologile kudu mo melawanatshepidišo ya lenaneo e fileng dipolase tše dikgolo go dumelela seo. Ka go le lengwe tlhabologo ya merogo le dienywa feela le lerou la go se otle e diragetše mo dipolaseng di sengnyana ebile le baholegi ba nang le ditseka tša go tšweletša ditšweletšwa. Seelo sa tšweletšo se hweditšwe goba se huetšwa ke bogolo le mehuta ya mebaraka ya thekišetšo, batšweletšipotlana ba be ba ithekgile kudu go rekišetšeng batho ba tseleng mola ba tšweletšo ya magareng le ye kgolo ba be ba rekišetša ditlamo tše kgolo tša mebaraka. Dipoelo tša kgoalo ya 4 di re laetša gore melawanatshepidišo ya lenaneo e ka huetša mekgwana-tšhomišo ya dipolase ka go fa dipolase tša bogolo bjo bo rileng, le gore malapa a go ihlokela a tšee karolo go ye mengwe le ye mengwe ya mekgwana- tšhomišo ya dipolase ye e lebaneng polaseng ye ba e filweng feela ge ba fiwa thekgo ya mašeleng a tšweletšo.

Go lateleng go šeditšwe go šitwa ga lenaneo la phetolelo ya bong bja mobu go fokotša go se lekalekane ga batho, phokotšo ya tlala le tlholo ya mešomo. Kwešišo ya batšeakarolo le mathata a dipolase di lebaneng le ona go ya ka mekgwana tšweletšo ya tšona e ka re thuša go kwešiša maatla le bofokodi tša dipolase tše di fetotšweng bong. Mo go **kgaolo ya 5** dinepo e be le go (a) sekaseka go bapala karolo ga batšeakarolo (b) go hlatha mathata ao a lebaneng le dipolase tšeo di fetotšweng bong le (c) go sekaseka maatla, bofokodi, ditšhono le dikotse go kgwebo (*SWOT analyis* ka polelo ya go adingwa) mo dipolaseng tše di fetotšeng bjong. Ke kgobokantše tsebo ye e bolelwago le ye e elwago mabapi le seelo sa botšea karolo ga batšea karolo le mathata tše di šomišitšweng go *SWOT Analyis*. Go netafatša tsebo ye e tšerwego go baholegi ka o tee ka o tee le go lebeledišiša ditharollo tše di ka tlišwago go mathata a tšweletšo go dipolase tše di fetotšweng bong mo masepaleng wa setereke sa Waterberg, go ilwe gwa beakanywa kopano tšhomo ya batšeakarolo. Mafapha a mmušo ao a nego le karolo ya bohlokkwa mo dipolaseng tše di fetotšweng bong a bontšhitše go tšea maikarabelo a ona. A ohle a be a thuša baholegi ka thekgo ya mašeleng a tšweletšo le dikeletšo. Go hweditšwe go re dipolase tšeo go bjalwago dithoro, tšeo go bjalwago merogo le dienywa le tšeo go ruiwago leruo le le sa otleng di be di kopana le mathata mašeleng a tšweletšo go feta dipolase tšeo go tšona go ruiwang leruo la go otla goba mo le kopanywang le merogo le dienywa. Go bjalwa ga

merogo le dienywa go be go kopana kudu le mathata a tlhago (bjalo ka boemo bja naga le bja leratadima) go fetiša go bjalwa ga dithoro le go rua leruo. Maletšwi e be e le bothata bjo bogolo bja leruo mola go dibjalo bothata bjo bo golo e be e le dibokwana. Ka kakaretšo bothata bjo bogolo e be e le mašeleng a tšweletšo mo dipolaseng tše di fetotšweng bong. Re beakantšhitše ka boswa dihlopha tša mekgwana-tšhomišo ya dipolase go ya ka go swana ga tšona ge go lebeletšwe tshekastsheko ya SWOT go hloma dihlopha tše tharo tše diswa. Tšona ke dipolase tša baikgoni tša ditiro tšweletšo tša molaleng (re bolela go bjala dithoro, go rua leruo la go otla le go kopanaya leruo la go otla le go bjala merogo le dienywa), dipolase tša baikgoni tša ditiro tšweletšo tša ka mengwakong tšweletšo (re bolela go bjala merogo le dienywa leleruo la go se otle) sa mafeleo sehlopha ke sa dipolase tša ba go itlhokela tša ditiro tšweletšo tša go dirwa molaleng goba ka gare ga mengwako ya tšweletšo (go bolelwa dithoro le lerou la go se otle). Go ikgona goba go itlhakela ga baholegi le dikana tša tiro tšhomišo ya mobu ke tšona di laolago maatla goba bofokodi bja mekgwana-tirišo ya dipolase. Dipolase tša baholegi ba bahloki (tše di bjalang dithoro goba di rua leruo la go se otle) di bonagetše go ba le maatla a go se be le tobo ye ntši ge go šomišwa matsogo a mong wa lapa go šoma polaseng le go bewa ka pele ge go e tla thušong ya mašeleng a tšweletšo ka mmušo. Bofokodi bja bona ke go hloka ditlabelwa le mašeleng a tšweletšo tšeo di dirang gore ba ithekge kudu go thušo ya ka ntle. Go bonagetše se se fapaneng go dipolase tše di filwego malapa a go ikgona. Go mekgwana-tšweleletšo yeo go yona go nago le ditiro tšhomišo tše di nyakago ditlabakelwa le mašeleng a tšweletšo a mannyane (re bolela go bjala dithoro, go rua leruo la go otla le mo di kopaneng) di bonagetše di na le (a) maatla a go se nyakege ga ditlabakelwa le mašeleng a se nene mebarakeng ya kadimo (b) bofokodi e be e le bja kgonagalo ye nyane ya go dira ditlamagano tša tirišano mmogo le balemi ba ba golo. Go mekgwana–tšweletšo ya polase ye e hlokago ditlabelwa le mašeleng a tšweletšo a mantši (re bolela go bjala merogo le dienywa le leruo la go se otle) go bontšha phapano ye e thulananeng le ya tšeo di hlokago ditlabakelwa le mašeleng a se nene. Dipoelo tša dinyakišišo di laeditše gore thekgo ya mašeleng e ka hlabolla tšweletšo ya dipolase tše di fetotšweng bong.

Go **kgaolo ya 6**, ke hlalošitše dintlha tše di phurollago kwešišo ya rena ya lenaneo la phetolelo ya bong bja mobu le bokamoso bja lona ka go tsitsinkela dikutollo tša dikgaolo tša morago. Tlhalošo ya kwešišo ya lenaneo la phetolelo ya bong bja mobu e beile pepeneneng gore: (a) mmušo o raloka karolo ya bohlokwa mo go hlongweng ga melawana tshepedišo ya lenaneo le go goketša thekgo go išwa go baholegi ba lenaneo, (b) go tšewa ga mobu ka dikgoka, le tetatekanyo ya maatla magareng ga bathekgi ba lenaneo la phetolelo ya bong bja mobu le beng ba mobu ba bjalo le tshepedišo ye e amogelegago ya boditšhabatšhaba di tla ba dilo tšeo di laolago ka moo lenaneo le le tlago phethagatšwa ka gona, (c) bogolo bja dipolase tše di fetolwago bong le palo ya baholegi mo polaseng

di tla tšwela pele di laolwa ke melawana tshepedišo ye e lego gona ga bjalo le phetogo ya yona ka moso, (d) malapa a baholegi ga a ithekge ka letseno la tšweletšo ya polase gagolo mo mekgwaneng ya go iphediša, ke ka fao ba sa bonego mohola wa go šomiša matsogo a lelapa ka moka mo polaseng le gore (e) dikotse tša kgwebo tše dikgolo mo dipolaseng tše di fetotšweng bong ke tlhokego ya mašeleng a thekgo go tšwa mmušong le phetogo ya boemo bja boso le leratadima. Go na le dikgetho tše tharo tšeo di tlogo laola bokamoso bja lenaneo la phetolelo ya bong bja mobu, tšona ke: maano a pethagatšo ya lenaneo, go kgethwa ga mohuta goba maemo a baholegi le kgetho ya mekgwana-tšhomišo ya mobu mo dipolaseng. Mebušo ya dinaga e tla pethagatša lenaneo la phetolelo ya bong bja mobu go ya ka maano ao a netefatšago gore beng ba mobu ba bjalo ba hlatswiwa diatla go ya ka toka. Go dinaga tšeo (a) methopo ya tlhago e šomišwago go hlokomela bahloki, lenaneo le tla setša kudu go hola ba go ikgona le go netefatša gore basadi le baswa ba fiwa sebaka sa go holega pele ga ba bangwe, (b) bahloki ba itlhokomelang ka ditšweletšwa tša mobu, lenaneo le tla šetša go kaonafatša dipolase tšeo le go netefatša gore batho ba kgona go tšwela pele ba iphediša ka dipolase tša bona. Baholegi ba go ikgona ba tla šomiša dipolase go tšweletša ka seelo sa godimo sa dipudi le dinku go ya ka ponagalo ya phulo ya tlhago goba ba lema dithoro (go nošetša pula) le merogo le dienywa (ka go nošetša) go šomišwa tsebo tša mahlale go nyalanya bolemi le boemo bja leratadima. Tšweletšo ya seelo sa fase ya merogo le dienywa go šomišwa tsebo tša mahlale go nyalanya bolemi le boemo bja leratadima e tla ba bjona botšhabelo bja baholegi ba go itlhokela. Bofelelong, tlhalošo e ruma ka gore bokamoso bja lenaneo la phetolelo ya bong bja mobu le tlo laolwa ke ge bathekgi ba lona ba kgetha maano a phetolelo yeo, go netefatšwa gore baholegi ke batho ba maleba go hwetša dipolase le netefatšo ya taolo godimo ga mekgwanatšhomišo ya dipolase gore di sepedišane le maano le baholegi ba dipolase.

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Thohoyandou, Limpopo Province, June 24th, 2020

Avhafunani Justice Netshipale

About the author

Avhafunani Justice Netshipale was born on April 6th, 1977 in Venda, Limpopo province, South Africa. He started schooling in 1982 and received a Senior Certificate (known as Matric in South Africa) in 1994 from Khangale Secondary School. In 2005, he enrolled for a Bachelor of Science in Agriculture in Animal Science (BSc Agric Animal Science) with the University of Venda (UNIVEN). He graduated the BSc Agric (Animal Science) in 1999, and in 2000 he joined the University of Natal (now the University of Kwazulu-Natal) for an MSc Agric (Animal Science, specialising in poultry nutrition). In 2002 he graduated from the University of Natal, and in 2003 he joined the Northern Cape Department of Agriculture and Land Reform as an Animal Scientist. He was involved in Agricultural Research for Development training in 2005 and attended facilitation workshops in 2006/2007, both organised by the Agricultural research Council (ARC) in collaboration with International Center for Development Oriented Research in Agriculture (ICRA) and Provincial Departments of Agriculture (PDAs). In 2009, he returned to UNIVEN as a lecturer in the Department of Animal Science, School of Agriculture. From 2011 to 2013 he was among the team of coordinators and facilitators responsible for the South African ARD programme, led by the ARC. In 2011 he was selected for a sandwich PhD programme (in which Wageningen University and UNIVEN were collaborators) funded by Netherlands Universities Foundation for International Cooperation (NUFFIC), with ICRA coordinating the scholarship. Since 2012, he had been juggling his job and studies until 2021 when he successfully completed this PhD thesis. Avhafunani's motto in life is: "learning is inevitable, with approaches to it being optional".

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Publications

Articles in peer-reviewed scientific journals

Netshipale, A. J., Benyi, K., Baloyi, J. J., Mahlako, K. T., Mutavhatsindi, T. F., 2012. Responses of two broiler chicken strains to early-age skip-a-day feed restriction in a semi-arid subtropical environment. *African Journal of Agricultural Research* 7(48): 6523-6529.

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Benyi, K., Tshilate, T. S., Netshipale, A. J., Mahlako, K. T., 2015. Effects of genotype and sex on the growth performance and carcass characteristics of broiler chickens. *Tropical Animal Health and Production* 47: 1225-1231.

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Netshipale, A. J., Raidimi, E. N., Mashiloane, M. L., de Boer, I. J. M., Oosting, S. J., 2020. Farming system diversity and its drivers in land reform farms of the Waterberg District, South Africa. Submitted.

Netshipale, A. J., Oosting, S. J., Raidimi, E. N., Mashiloane, M. L., de Boer, I. J. M., 2021. Analysis of strengths and weaknesses of land reform farms in diverse farming systems in the Waterberg District, South Africa. Submitted.

Abstracts in conference proceedings

Netshipale, A. J., 2015. Characterization of farming systems in land reform farms of the Waterberg District Municipality, RSA. In: Book of Abstracts of the 66th Annual Meeting of the European Federation of Animal Science. Warsaw, Poland, p. 346.

Netshipale, A. J., Oosting, S. J., Raidimi, E. N., Mashiloane, M. L., de Boer, I. J. M., 2015. Effects of land redistribution on land entitlement and use in Limpopo Province, RSA. In: Book of Abstracts of the International Conference Tropentag. Berlin, Germany, p. 36.

Netshipale, A. J., Oosting, S. J., Raidimi, E. N., Mashiloane, M. L., de Boer, I. J. M., 2016. Land redistribution in South Africa- beneficiation and land use. In: Book of WIAS Science Day 2016. Wageningen, The Netherlands, p. 24.

WIAS Education certificate

Completed training and supervision plan[1]

The Basic package (3 ECTS)
WIAS introduction course, Wageningen, October 2012
Ethics and Philosophy in Life Sciences, Wageningen, November 2012

International conferences (4.4 ECTS)
Best practices in inter-institutional linkages for collective innovation, Polokwane, 22 -23 September 2014
Annual meeting of the European Association for Animal Production, Warsaw, August-September 2015
Tropentag, Berlin, September 2015
LANDac International Conference, Utrecht, 8 - 10 July 2015
18th ICLMED, Johannesburg, 12- 3 January 2016

Seminars and workshops (2.1 ECTS)
Research Forum organised by Limpopo Department of Agriculture (LDA), Polokwane, June 2013
Research grant proposal writing workshop, Sibasa, October 2013
Stakeholder workshops organised by the author in collaboration with LDA, Bela-Bela, July 2014 & March 2015
Farmers day organised by LDA, Bela-Bela, July 2014
WIAS Science Day, Wageningen, February 2016

Presentations (5 ECTS)
Oral presentation at LDA Research Forum (2013)
Poster presentation at Annual meeting of the European Association for Animal Production (2015)
Poster presentation at Tropentag (2015)
Oral presentation at ICLMED (2016)
Oral presentation at WIAS Science Day (2016)

In-Depth Studies (6.7 ECTS)
WIAS Advanced statistics courses: Experimental Design, October 2012
Tropical livestock farming system research and development, February 2013
Land Governance for Development, July 2015
Genotype by environment interaction, uniformity and stability , October 2015

Professional Skills Support Courses (5.6 ECTS)
Effective behaviour in your professional surrounding (EB), November 2012 & January 2013
Information Literacy including EndNote Introduction (ILP), October 2012
Interpersonal Communication for PhD students (IPC), December 2012
Project and Time Management (P&TM), January & February 2013
Techniques for Writing and Presenting a Scientific Paper (TWP), October 2015
Communication with Media and the General Public (CMGP), November 2015

Research Skills Training (10 ECTS)
Preparing own PhD research proposal
Member of project which investigated effects of strain, sex, season and stocking density on broiler performance

Didactic Skills Training (10.3 ECTS)
Facilitating Animal Production learnership at UNIVEN, May 2013
Lecturing at the University of Venda (UNIVEN), 2014
Supervising BSc & BAgric Hons thesis, 2013 & 2014

Management Skills Training (1.5 ECTS)
Facilitating Agricultural Research for Development (ARD) training, July 2013

Total: 48.6 ECTS

[1]With the educational activities listed, the PhD candidate has complied with the requirements set by the Graduate School of Wageningen University Institute of Animal Sciences (WIAS). One ECTS equals a study load of 28 hours.

Colophon

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Cover design: Fokje Steenstra.

The cover shows beneficiaries and agricultural activities they conducted on land reform farms, and on the background a map from Sartorius and Sartorius (2016) showing district municipalities in South Africa.

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