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

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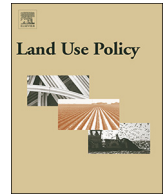# Agriculture in land reform farms: Impact on livelihoods of beneficiaries in the Waterberg district, South Africa

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ABSTRACT

Countries have pursued land reform (LR) to contribute towards equity, poverty alleviation and job creation. Land confiscation and market-assisted approaches are used the most in expediting LR. The approach adopted in each of the countries will depend on the prevailing circumstances and priorities of those advocating for LR. South Africa implemented LR 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 (hhs) from LR farms is unknown. The present paper aimed to quantify the economic contributions to livelihoods of various activities at LR farms, and to analyse factors underlying these contributions. We surveyed 87 hhs who were active in 43 LR farms in the Waterberg District, Limpopo Province. Five LR 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 (hh) surveys and livelihood pie charts. On-farm contributions were higher (± 49.5%) in LRAD1, LRAD2 and PLAS, compared to on-farm contributions of hhs in Rest and SLAG (± 15.5%), because most of the hh heads (± 68.3%) were younger (≤59 years), and hhs 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 LR policy should prioritise provision of farm physical capital and livestock production to improve on-farm livelihood contributions in physical capital poor farms.

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 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 (± 2 ha) 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[1] former owners often became hired labourers. 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 (LR) is part of) and development of agricultural activities on the land are pivotal in addressing injustice and poverty (Griffin et al., 2002; Borras et al., 2007;

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[1] South Africa (SA) 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, 2012:6).

Binswanger-Mkhize et al., 2009:7, 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 LR in an attempt to address social inequalities, and thereby contribute towards eradication of poverty and creation of jobs (Griffin et al., 2002; Borras et al., 2007). Objectives of LR may depend on the perspectives of stackeholders (Binswanger-Mkhize et al., 2009:14-15, Borras et al., 2007). Economists advocate for efficient use of capitals in a 'market-led' LR 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' LR approach, as explained by Borras et al. (2007), which takes into account objectives of all stakeholders advocating for LR, probably presents the best approach (Griffin et al., 2002). In practice, LR is often an outcome of political processes and has to meet multiple, sometimes conflictual objectives for different stakeholders (Binswanger-Mkhize et al., 2009:14-15, Moyo, 2011; Keswell and Carter, 2014). Land reform, therefore, is a complex process and its outcomes are difficult to evaluate. Land reform reduced social inequalities and poverty in countries where it (i) was not implemented according to market principles, (ii) benefited mostly the tenants, and (iii) 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 LR 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 LR beneficiaries and the 'welfare' perspective which assesses the impact of food production, on reformed land, on welfare of benefitting households (hhs); the 'radical political economy' paradigm assesses impact of LR on agrarian structures; and the 'marxism' paradigm assesses class and accumulation dynamics which exist in reformed land. The present paper assessed LR 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. (2001:298) 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 hhs 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). Hhs' 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 hhs' access to capitals are considered "vulnerabilities" (Carney, 2003). Therefore, hhs choose livelihood activities based on capitals and vulnerabilities.

In South Africa (SA), 18% of hhs were involved in the agricultural

sector in which (i) large scale commercial farms (owned by 14% of agricultural hhs) used hired labour to produce most commodities sold in markets, and (ii) small-scale farmers (86% of agricultural hhs) used backyards and communal land to secure food (Aliber and Cousins, 2013; STATS SA, 2014:58-59, 170). In pursuit of addressing challenges of social inequalities, poverty and unemployment (emanating from the colonial past), SA has been implementing LR 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 SA LR 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; Wegerif, 2004; DLA, 2006; 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[2] 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, LR 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 hhs may benefit from LR 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, SA struggled with achieving synergy among social, political, economic and ecological objectives of the LR (Lahiff, 2008; Valente, 2011; Netshipale et al., 2017). SA's LR 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). To our knowledge, the livelihood impacts of LR in SA 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 LR farms contributed to livelihoods has not been quantified. Therefore, the objectives of the present paper were to quantify the economic livelihood contribution of diverse activities in LR farms, and to analyse factors underlying the hhs' economics, among five LR 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 (WDM) of Limpopo Province, South Africa. Similarly to district municipalities in provinces like Mpumalanga, North West and Eastern Cape, most of the land in WDM was owned by the minority (of European decent), though there were patches of land owned by the majority (indigenous people) (SA History Online, 2011). Land reform in SA aimed to change ownership and access to land infavor of the landless

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[2] Beneficiary refers to a South African citizen who was legally competent to contract and whose name was on a farm beneficiary list at the time of land transfer by the Department of Land Affairs or Department of Rural Development and Land Reform (DLA, 1997).

majority, hence we considered the LR situation in WDM to reflect the status of LR in SA. We selected four of the six local municipalities of the WDM as focus areas, based on prevalence of land reform farms (DRDLR, 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 (i) restitution farms (Rest) and the redistribution farm types (ii) Settlement/Land Acquisition Grant (SLAG) farms (iii) Land Redistribution for Agricultural Development phase 1 (LRAD1) farms and (iv) phase 2 (LRAD2) farms, and (v) Proactive Land Acquisition Strategy (PLAS) farms (Netshipale et al., 2017).

Land reform farms could be owned either by hhs individually or by hhs in groups (DLA, 1997; MALA, 2001; Wegerif, 2004; DLA, 2006; Lahiff, 2007). Farms were owned by groups of hhs under Rest and SLAG, whereas farms were owned either by groups of hhs or by individual hhs 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 hhs but the farm capitals were controlled by a single hh 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 hhs could be used either for the benefit of hhs collectively (referred to as 'group farming') or for the benefit of hhs 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 (2007) 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 hhs refer to hhs 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 hhs 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 LR 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 redistribution models) and 87 hhs (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 hhs 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 LR farm types in the period 01 April 2013 to 31 March 2014. Most hhs did not keep records of their on-farm activities, 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 (i) focus group discussions (FGDs) in 26 of the 43 farms, where there were > 1 active hh per farm (ii) hh surveys using structured questionnaire (through interviews with respondents

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

Sampling of farms and households (hhs)					
		Farms		Active hhs	
Programme	Farm type	Active	Sample	In sample farms	Sample
Restitution	Rest	33	7	123	38
Redistribution	SLAG	6	4	44	13
	LRAD1	14	8	23	10
	LRAD2	38	17	32	18
	PLAS	21	7	12	8
	Total	112	43	232	87

Distribution of farms and household (hhs) samples								
		Farm ownership type						
		Individual[1]	Group					
			Collective		Individual		Dual	
Programme	Farm type		Farms	Hhs	Farms	Hhs	Farms	Hhs
Restitution	Rest	0	1	2	1	9	5	27
Redistribution	SLAG	0	1	2	1	2	2	9
	LRAD1	4	2	4	1	1	1	1
	LRAD2	8	4	4	4	5	1	1
	PLAS	5	2	3	0	0	0	0
	Total	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.

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. The first author estimated numeric values from the drawn proportions in the pie charts.

[1] Additionally, 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 (HarvestChoice, 2011), 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.

i.e. hh heads or their representatives, for 87 hhs), and (iii) development of livelihood pie charts for 87 hhs (done by respondents with assistance of enumerators). Focus groups discussions did not apply in farms where there was only 1 active hh.

2.4. Data analysis

2.4.1. Demographic data

For demographic analysis, hh 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 hh heads who had farming as the only livelihood activity, whereas the category pensioner farmers referred to hh heads who were farmers and received old age pension (social grant from state or money from former employer). The category other comprised hh heads who were (i) employed and owned Small, Medium and Micro-sized Enterprises (SMMEs), but who were also part-time farmers (ii) either employed or SMMEs or pensioners and their combinations, and (iii) no occupation.

Classification of hh physical capital endowment was based on hh ownership of prevalent movable assets (e.g. wheelbarrow, car and tractor). Households that owned nothing or wheelbarrows only were classified as *"physical capital poor"*, hhs 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 physical capital limited farm utilisation, and *"physical capital endowed farms"* as farms where physical capital allowed for moderate and optimal utilisation of the farms. Table 3 provides information on farm classification based on physical capital.

2.4.2. Economic data

Economic data on contribution (percentage and monetary) of livelihood activities and passive sources to the total hh 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 hh 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.

2.4.2.1. Derivation of monetary values for livelihood activities and passive livelihood sources. Households were classified into (i) social grant income earning (ii) employment income earning and (iii) other income earning hhs, for purposes of estimating hh monetary contribution of livelihood activities and passive livelihood sources. The other income earning hhs 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 hhs 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.

(i) Social grant income earning hhs

Social grant income could be estimated and was used to estimate monetary livelihoods contributions for 72.4% of hhs. 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

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 optimum capitals required 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.

Table 4
Types of SA 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

Source: SASSA 2015. [1]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 Rand (R) to United States Dollar (US$) conversion.

qualified for under various social grant schemes (Table 4).

The grant income for the ith household (GI_i) was estimated as:

$$GI_i = \sum_{k=1}^{n} SG_k N_{ik} \tag{1}$$

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

The total income (TI_i) for the ith household was estimated, using GI_i (Eq. 1) and proportional contribution of GI_i (GC_i) to the total income, as:

$$TI_i = \frac{GI_i}{\%GC_i} X\ 100 \tag{2}$$

For social grant earning households, the monetary contribution from other livelihood activities or passive sources (YI_i) for the ith household was estimated, using TI_i (Eq. 2) and proportional contribution of YI_i (YC_i) to the total income, as;

$$YI_i = \frac{TI_i\ X\ \%YC_i}{100} \tag{3}$$

(ii) Employment income earning hhs

It is a taboo in the study area to ask elders how much they or members of their hhs earn. To estimate employment income for hhs without social grant income but with an employment income, we classified employment types observed for grant earning hhs 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 hhs without social grant income using average annual employment income for similar employment types.

The employment income for the ith household (EI_i) was estimated as:

$$EI_i = \sum_{l=1}^{n} ES_l N_{il} \tag{4}$$

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

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

$$TI_i = \frac{EI_i}{\%EC_i} X\ 100 \tag{5}$$

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

(iii) Other income earning hhs

The main hh income contributing activities and passive livelihood source in the other income earning hhs 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 hh income from livelihood activities and passive livelihood sources. We estimated as follows: hhs 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 hhs income. Capital poor hhs (based on possible hhs income) that did not receive social grant because hh 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 hh income.

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

$$YI_i = \sum_{m=1}^{n} ZI_{mi} \tag{6}$$

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 hhs that also had employment income.
[2] DOL, 2014.

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

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.

[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 grant provided by the state and remittances.

Where n is the levels of m, ZI_m was the anticipated income from the mth livelihood activity or passive source for the ith household.

The total income (TI_i) for the ith no grant-no employment household was estimated, using YI_i (Eq. 6) and proportional contribution of YI_i (YC_i) to the total income, as:

$$TI_i = \frac{YI_i}{\%YC_i} X\ 100 \qquad (7)$$

2.5. Statistical analysis

Analyses of on-farm activities, off-farm activities and passive livelihood sources were based on 87 hhs. 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 hhs and on-farm crop production was based on 43 hhs (Table 6). Twenty hhs that practiced on-farm mixed farming of livestock and crop were included in both the hhs that practiced on-farm livestock and the hhs 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 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 hh 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 version 23 statistics package (SPSS, 2015) was used for other analyses.

3. Results

3.1. Demography

Household (hh) heads represented 87% of the respondents and their

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.

Farm type	Age hh head		Occupation hh head			Hh members active on-farm		Hh size
	Worker (18-60 yrs.)	Pensioner (≥60 yrs.)	Farmer	Pensioner farmer	Other	1	≥2	
Rest (n = 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 (n = 13)	23.1[a]	76.9[c]	7.7[a]	69.2[c]	23.1[ab]	100[b]	0[a]	5.3
LRAD1 (n = 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 (n = 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 (n = 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 (a− denote lowest, b− denote in−between a and c, and c− denote highest, values) in a column indicate significant differences among farm types [α = P(χ^2 < 0.02;10) for age hh head and for hh members active on farm; α = P(χ^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.

next of kin 13%. Male hh heads were dominant in all farm types (76% overall). Ninety seven percent of the hh heads resided within local municipalities where benefited farms were located, and the reminder resided in different local municipalities. Thirty seven percent of hhs that farmed in LR farms were also farming in alternative land and hhs that practiced crop farming in alternative land were twice the number of hhs that practiced livestock farming. Table 7 shows percentage distribution of hh heads according to categorical age and occupation, hhs according to hh members active on-farm and average hh size (number of people), among farm types. The percentage distribution of hh heads differed in relation to categorical age and occupations, among LR farm types. Household heads of working age (worker) dominated (± 67%) in LRAD1 and PLAS, whereas hh 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 hh 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 hh heads (± 37%) in Rest, LRAD1 and PLAS. Land reform farm types had different numbers of hh members active on-farm per hh. Households with a single member active on-farm were the most (± 99%) in Rest and SLAG, whereas hhs with ≥2 members active on-farm prevailed the most (± 29%) in LRAD1, LRAD2 and PLAS. The highest number of hh members active on-farm was 4. Most hhs (≥86.2% overall) availed a single hh member for on-farm activities. The average hh size did not differ among LR farm types and overall, hh had an average of 6.1 members.

Educational levels of hh heads did not differ among LR farm types. Most of the hh heads had either primary (36.1%) or secondary education (47.0%).

3.2. Physical capital endowments

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

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

Farm type		Household physical capital		Farm physical capital	
	n	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 [α = P(χ^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

3.3.1. 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 differed solely between SLAG (US$2864 ± 1872/annum) and PLAS (US$10240 ± 5025/annum).

The hh 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 hhs had lower on-farm income (US$120 ± 44 for Rest and US$0 for LRAD1) than physical capital endowed hhs (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		On-farm activities		Off-farm activities		Passive sources		Total income
	n	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	10,240[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 3.8 ha ± 1.17, 14.4% ± 11.95 and US$931 ± 757 for LRAD1 when n = 7; 5.2 ha ± 1.80, 31.2% ± 9.16 and US$1520 ± 611 for LRAD2 when n = 12; 4.3 ha ± 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.

3.3.2. Livelihood contribution of specific on-farm agricultural activities

On-farm livestock production was practiced by 28% more hhs 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 hhs 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 hh and livestock contributions to livelihoods differed among farm types (Table 10). Households in Rest had smaller herd sizes than hhs 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 hhs.

Netshipale et al. (2017) reported that there were unused portions of LR farms and Lahiff et al. (2008) reported that in LR 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 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 hhs 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 (hhs) that farmed in physical capital endowed farms (in LRAD1, LRAD2 and PLAS) had higher livelihood gains from benefited farms. Physical capital endowed hhs and

farms observed in the present study emanated from LR policies and their implementation outcomes (mediating factors) which prioritised land use (economic LR objective) over land ownership (social LR 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 hhs financial capital endowments) observed in LRAD1, LRAD2 and PLAS (Table 10) confirmed that hhs 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 hh 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 hhs 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, 2007; 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 hhs under SLAG being physical capital poor and headed by pensioners. Additionally, hh capital endowment had positive influence on on-farm contribution within a farm type. These positive relationships between both hh and farm physical capital endowment and livelihood contributions from LR farms have trade-offs towards addressing the sustainable development goals of no poverty, decent work and economic growth, and reduced inequalities[3] . Hence, we deduce that (i) income inequalities between capital poor and capital endowed hhs that benefited from LR remained wide, and (ii) 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. hh financial and human capital, and farm physical capital). Moreover, prioritisation of specific objectives and implementation outcomes of LR policies influenced capital endowments, hence 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 hhs (86.2%) allocated a single hh member for on-farm activities, regardless of hh 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[4] . We deduced that by availing a single hh member for on-farm activities (i) capital endowed hhs in LRAD2 and PLAS gained an average of US$1 691/annum over the opportunity cost of labour (LRAD1 excluded[5]), and (ii) capital poor hhs in SLAG and capital endowed hhs 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 hhs in these farms availed hh members to secure farm capitals as surety for future livelihood gains (Lahiff et al., 2008). Therefore, we deduced that capital endowed hhs availed members based on anticipated risks and returns on investments, whereas capital poor hhs and hhs 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 hhs could not make meaningful economic gains because they lacked capital. The situation is worse in SA 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 SA (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 LR in SA, 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 (i) 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 (ii) 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 SA could only address challenges of social inequalities, poverty and unemployment when LR policies prioritise provision of capital support to the financial and physical capital poor hhs 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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[3] http://www.undp.org/content/undp/en/home/sustainable-development-goals.html Accessed October, 2018.

[4] http://www.mywage.co.za/…imum-wages/minimum-wages-2013-14/ minimum-wages-for-farm workers-from-march-1-2013-to-feb-28-2014 Accessed June 20, 2016.

[5] 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.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.landusepol.2020.104710.

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