



Livelihoods after Land Reform in Zimbabwe

Working Paper 8

Comparative Analysis of Agricultural Productivity
between Newly Resettled Farmers and Communal
Farmers in Mashonaland East Province

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The land reform that has unfolded in Zimbabwe since 2000 has resulted in a major reconfiguration of land use and economy. Over 7 million hectares of land has been transferred to both small-scale farm units (the A1 model) and larger scale farms (the A2 model). The land reform has had diverse consequences, and there is no single story of what happened and its implications.

The Institute of Development Studies (University of Sussex, UK), the Institute for Poverty, Land and Agrarian Studies (PLAAS, University of the Western Cape, South Africa), the African Institute for Agrarian Studies (AIAS, Harare), the Centre for Applied Social Sciences Trust (CASS Trust, Harare) and the Ruzivo Trust (Harare) came together to support a small grant competition aimed at generating new case study insights based on original and recent field research by young Zimbabwean scholars. The aim was to bring together solid, empirical evidence from recent research in the field. There were over 70 applicants, and 15 small grants were offered. The result is this Working Paper series. All papers have been reviewed and they have been lightly edited. In all cases however they remain work-in-progress.

Today policymakers are grappling with the question of ‘what next’? How can a new agrarian structure be supported, and a vibrant rural economy be developed? Yet such discussions are often taking place in a vacuum, with limited empirical data from the ground and overshadowed by misperceptions and inappropriate assumptions. We hope this series – together with the wider research work being undertaken by our organisations and partners – will help to enhance policy making through a solid evidence base.

As these papers clearly show, there have been highly varied impacts of the post-2000 land reform: on rural livelihoods, on agricultural production, on markets and the economy, on farm workers and employment, on the environment and on institutions and governance arrangements, for example. And these impacts have played out in very different ways in different places. These papers cover a range of themes and offer insights from across the country.

They add up to a complex picture, but one that offers key pointers for the way forward. They counter the excessively pessimistic picture often painted about Zimbabwe’s land reform, yet highlight important failings and future challenges. We very much hope that they are widely read and shared, with the insights made use of as Zimbabwe charts its way forward.

Professor Ian Scoones, Institute of Development Studies, UK

Professor Ben Cousins, Institute for Poverty Land and Agrarian Studies, South Africa

Professor Sam Moyo, African Institute for Agrarian Studies, Harare

Dr Nelson Marongwe, Centre for Applied Social Sciences Trust, Harare

Dr Prosper Matondi, Ruzivo Trust, Harare

The small grant competition was coordinated through the Livelihoods after Land Reform research programme (www.larl.org.za).

Summary

Based on a sample size of 286 farmers in Mashonaland East province, and employing descriptive statistics, the paper analyzed productivity of A1 farmers for various crops in comparison to communal farmers. An extensive review of literature was done on land reform programme in Zimbabwe. The review was buttressed by interviews. The study used both qualitative and quantitative analysis of the impact of land reform on productivity. Fieldwork was carried out in 2008. The results indicate that there is a significant difference between yields before and after the land reform program. The A1 yields for cash crops are lower when compared to those attained by communal farmers. However, the A1 farmers perform better in the food crops. The study also analysed factors that affect the productivity levels and found that availability and accessibility of inputs needed in the production of crops, security of tenure, and institutional structures play a great role in influencing productivity levels.

Contents

Summary	iii
Acronyms	vi
Introduction	7
Methodology	8
Empirical findings	9
Conclusions	18
References	20

Acronyms

AGRITEX	Department of Agricultural, Technical and Extension Services
Cottco	Cotton Company of Zimbabwe
ESAP	Economic Structural Adjustment Program
FARA	Forum for Agricultural Research in Africa
FTLRP	Fast Track Land Reform Program
GMB	Grain Marketing Board
GoZ	Government of Zimbabwe
Ha	Hectare
MLARR	Ministry of Lands, Agriculture and Rural Resettlement
PLAAS	Programme for Land and Agrarian Studies
UNDP	United Nations Development Programme

Introduction

The most significant change to Zimbabwe's social and economic structure after the ESAP period in the 1990s was the initiation of the Fast Track Land Reform Programme (FTLRP) in June 2002 by the Government of Zimbabwe (Moyo *et al.* 2004). The accelerated land reform programme sought to reverse the legacy of colonialism, i.e. the distribution inequalities brought about by the Land Apportionment Act which formalised the separation of land between blacks and whites. The FTLRP witnessed a massive movement of people from various localities into mainly large-scale white owned commercial farms in search of prime agricultural land. Under this programme, the landless peasants were settled under the A1 model (which comprises of villages and land use pattern similar to those found in communal areas) as well as the A2 model or the self contained farms which involve commercial farming (Ibid). The A1 plots were put in place largely to de-congest communal farming areas from where most of the beneficiaries were drawn. The size of arable land ranged from 5ha to 12ha (MLARR 2001).

Prior to the year 2000, about 1.3 million people including farm owner and farm worker households, lived on and off 4,660 large-scale commercial farms covering over 10 million hectares (ha), while over 1 million households (5.6 million people) in the communal areas subsisted on 1.6 million ha (Rugube and Chambati 2001:7; UNDP 1998; CSO 1998). UNDP (2002) noted that the large-scale commercial farmers owned 15.5 million hectares while 8,500 small-scale commercial farmers, who were indigenous Zimbabweans, owned 1.4 million hectares or five per cent of the agricultural land. Furthermore, the majority of the indigenous population subsisted on 16.4 million hectares of leased and congested communal lands that represent less than 50 per cent of the total agricultural land (UNDP 2002:3 cited by GoZ 2001). This inequity has placed land reform at the centre of the GoZ's poverty alleviation and development strategy. The fast track resettlement programme was implemented using the A1 model for reducing land pressure in overcrowded communal lands, and the A2 model intended to create a black commercial farming sector. Farm sizes differed by agro ecological region with occupants in the relatively drier zones getting bigger arable land sizes. The average land size for regions 1, 2a and 2b was 5ha while for region 3, 4 and 5 it was 10 ha of arable land (Moyo *et al.* 2004). The A2 farmers got arable land ranging between 20 and 240 ha for small scale commercial farmers. By June 2009, a total of 725,000 ha arable land was given for A1, small scale commercial and large scale commercial, 710,000 arable land for A2, 250,000ha for communal and 800 ha for old resettlement (FAO 2009).

Internationally, studies have demonstrated that the impact of land redistribution on incomes, quality of life and livelihoods may take some years to become apparent. This is evident, for example, from the longitudinal panel study conducted by Kinsey in Zimbabwe, from the early 1980s to the late 1990s (Kinsey 2005). The key lesson that can be drawn from a range of country studies is that, irrespective of the political or historical milieu, the transfer of land alone is not sufficient; it requires buttressing with settlement support provision from a range of institutions and sectors. In the absence of ongoing support and capacity building, new land owners will run the risk of being set up to fail. For development activities on acquired land to be sustainable and to impact positively on the lives of beneficiaries, it requires a comprehensive, responsive and on-going interaction between those requiring and determining the support they require and those who provide such support (PLAAS 2006: 41).

This study therefore sought to analyse the livelihoods of a small sample of A1 farmers in two districts compared to their communal area counterparts in two districts 6 years later from the initial inception of FTLRP. The study also measured and compared productivity between A1 and communal farmers on food and cash crops. It also identified the sources of income for the two categories of farmers.

The main objective of the study was to compare the performance of communal farmers to that of A1 newly resettled farmers after the land reform programme. The A1 have relatively bigger land sizes compared to communal farmers and some of them were resettled on farms that had prime agricultural land, irrigation facilities and infrastructure like barns for tobacco processing.

In this study, the following research questions will be answered:

1. What are the characteristics of newly resettled A1 farmers?
2. What technologies are currently being used by A1 farmers?
3. What are the productivity levels for various crops in both communal and A1 farmers?
4. What factors might have influenced the different level of productivities for various crops?
5. What are the possible options to increase productivity of the newly resettled farmers?

Methodology

The study was carried out in three districts namely Wedza, Murehwa and Marondera. |The districts are found in Mashonaland East province as shown in figure 1 below. Marondera has an area of around 3 513km² and lies approximately 78km south east of Harare. It was a major centre of Zimbabwe's large forestry (timber) and farming district (tobacco, corn (maize), beef, and dairy products) until the seizure of white-owned farms. The soils in this district are mainly sandy soils and common trees there are the *munhodo* (*Julbernardia globiflora*), *muhacha* (*Parinari curatellifolia*) and *musasa* (*Brachystegia spiciformis*). The district lies in a watershed area and is in agro-ecological region II – a relatively high potential area of the country Average annual rainfall ranges from 600-1200mm. These rains are enough to enable crops to reach maturity stage without irrigation. The soils of the whole district are varied in derivation, texture and depth. The common soil type is sandy loamy. Major economic activities in the district are horticulture and livestock rearing.

Figure 1: Map of study area



Murehwa district lies 60 – 100 kilometers north east of Harare. The district falls in region IIa, IIb and III. It consists of communal areas and a small scale commercial area. The altitude in Murehwa district is between 900–1200 metres above sea level with mean annual air temperatures of around 18 degrees celcius but maximum temperatures are recorded in October - November and lowest in June - July. The area generally receives 750 – 1000 mm of rainfall annually rendering it less subject to drought than the semi-arid regions of Zimbabwe. Soils in the district are generally the grained sandy type belonging to the paraferallitic group (Nyamapfene 1991). The soils are of low clay, organic matter and weatherable

minerals content. They are generally of low pH and are deficient in nitrogen and phosphate and therefore farmers require fertilizer to optimize plant growth.

Wedza district is located about 50 km south of Marondera, and 127 km south of Harare. Like the other two districts described above, it is found in natural region two (IIb) which receives between 750 to 1000mm of rainfall annually and is suitable for intensive production of crops like maize. The interviewees were randomly selected by computer after obtaining a list of the households from the village heads.

This study required both quantitative (crop output, land area, inputs amount used e.t.c.) and qualitative (awareness, knowledge of technologies, key challenges) data. A cross design of qualitative and quantitative methods and tools for primary and secondary data collection and analysis were developed. Different tools complimented, triangulated and verified the data, thus enhancing quality of the data collected.

- Key informant interviews with local leaders who included agricultural research and extension services officers, knowledgeable farmers and village heads were done. The key informant interview technique was used to cross check the reliability of data gathered using other methods, and facilitated an in-depth understanding of the functions and performance of service providers to crop farmers within the newly resettled area as well as communal areas.
- Quantitative data was necessitated by the need to capture data on crop production from selected households. Household survey data used for this study was collected from 89 resettled households randomly chosen from the 10 villages. Data was collected in November 2008. Respondents were randomly chosen from the 10 randomly selected villages. The households were asked information on demographic characteristics, general farming practices and information on production.
- Secondary data on land reform was reviewed from government's documents, NGO documents and academic papers and seminar proceedings. This was done to capture information on studies that have analyzed land reform as well as get a background on how and why the land reform was implemented.

Analysis of household questionnaire data was performed using Statistical Package for Social Scientists (SPSS) version 16.0. Frequencies were run as well as t tests.

Empirical findings

Socio economic profile and livelihoods

The majority of the household heads were males (85%) and had some significant level of literacy with the majority of them having attained secondary education. Most of the main houses for these people have asbestos and the walls are made of bricks.

The farmers in communal areas seem a bit older than their A1 counterparts. The average household head's age in the communal areas was 54 years with a range between 23 and 90 years yet in A1 areas the average household age was 43 years with a range between 19 and 78 years. Farmers in communal

areas have more experience in farming (24 years) compared to 8 years for the A1 farmers. The household size is however the same for both A1 and communal farmers. Family size has implications on labour availability. The communal farmers have smaller land sizes of around 2.1 ha on average and the A1 have double that (5 ha arable land). The A1 farmers are likely to face more labour challenges compared to the A1.

Table 1: Household head characteristics

Settlement Type	Characteristic	N	Minimum	Maximum	Mean
communal	Age of Household head (Yrs)	149	23	90	54
	age of spouse in years	96	17	77	43
	Household size	149	1	18	6
	Experience in Farming	147	1	70	24
A1	Age of Household head (Yrs)	136	19	78	43
	age of spouse in years	106	17	73	35
	Household size	137	1	13	6
	Experience in Farming	136	0	37	8

The majority of the respondents in the survey were males (65% and 85% in communal and A1 settlements respectively). The majority of the households were monogamously married (56% in communal and 69% in the A1 areas). In terms of education, the household heads had attained some form of education ranging from primary through secondary, tertiary and vocational to adult education. There are very few uneducated household heads in both communal and A1 areas (2% in both areas). Overall we can say that all of the farmers had at least primary school education which suggests that they can read or write. In order to complement this education there is need for extension to reach out to the new farmers who have less experience in farming techniques.

Table 2: Socio economic characteristics of respondents

Characteristics	Response	Settlement type			
		Communal		A1	
		Frequency (N)	% frequency	Frequency (N)	% frequency
Gender	Female	52	35	21	15
	Male	97	65	116	85
	Total	149	100	137	100
marital status	Single	13	9	11	8
	Monogamously married	83	56	95	69
	Polygamous married	4	3	7	5
	Widowed	39	26	20	15
	Separated/Divorced	10	7	4	3
	Total	149	100	137	100
Education level of household head	no formal education	3	2	3	2
	Adult education	1	1	1	1
	primary education	68	47	45	33
	vocational training	3	2	1	1
	secondary education	66	45	81	60
	tertiary education	5	3	4	3
	total	146	100	135	100
savings	no	102	69	71	53
	yes	45	31	63	47
	Total	147	100	134	100

Livestock ownership

Livestock is an indispensable component of the agricultural production system in the country, which contributes highest next to field crops in agriculture. It is considered a provider of food for humans, manure for plants, and draft power for farms and cash income for farm families. Cattle, goats and poultry are the major livestock species reared among smallholder farmers. The survey results showed that the A1 farmers have more cross-bred cattle averaging about 7 heads compared to a mean of 6 heads for indigenous cattle breeds. There are few households keeping sheep and goats in both communal and A1 areas according to the results of the household survey.

Table 3: Livestock ownership patterns

	Livestock	N	Range	Min	Max	Mean	mode	median	% Frequency ownership
communal	cross breed cattle	10	4	1	5	2.10	1	1.5	6.7
	indigenous cattle	76	20	1	21	4.59	4	4	51
	indigenous goats	76	10	1	11	3.05	2	2	52.3
	indigenous sheep	3	2	2	4	3.00	2	3	0.7
	indigenous pigs	1	0	1	1	1.00	1	1	0.7
	improved chicken (broilers of layers)	2	2	10	12	11.00	10	11	1.3
	local chicken	125	30	0	30	6.74	5	5	87.2
A1	cross breed cattle	33	38	1	39	7.09	1	4	24.1
	indigenous cattle	65	30	1	31	5.82	2	4	48.2
	indigenous goats	60	16	1	17	3.85	2	3	45.3
	indigenous sheep	4	3	1	4	1.75	1	1	2.9
	indigenous pigs	2	0	1	1	1.00	1	1	1.5
	improved chicken (broilers of layers)	1	0	2	2	2.00	2	2	0.7
	indigenous chicken	119	39	1	40	9.48	3	7	89.7

Livestock numbers in both communal and A1 areas are on the low side. This means that the farmers are limited in terms of converting the livestock into liquidity whenever they need cash for critical operations like buying agricultural inputs. The modes for indigenous cattle breeds in A1 farms were only 2 heads. This means most of the households have two cattle which reflects a constraint as during peak agricultural production households need draft power and considerable pairs would speed up operations and ensure timely planting that in turn increase yields. However, communal farmers seem better off with a mode of 4 heads and considering their smaller pieces of land they can manage to do land preparation in time. Small livestock like goats, sheep and chicken are also on the lower side. Small livestock are also important among farmers as they can be used in exchange for services like draft power for land preparation and labour for operations like weeding and planting.

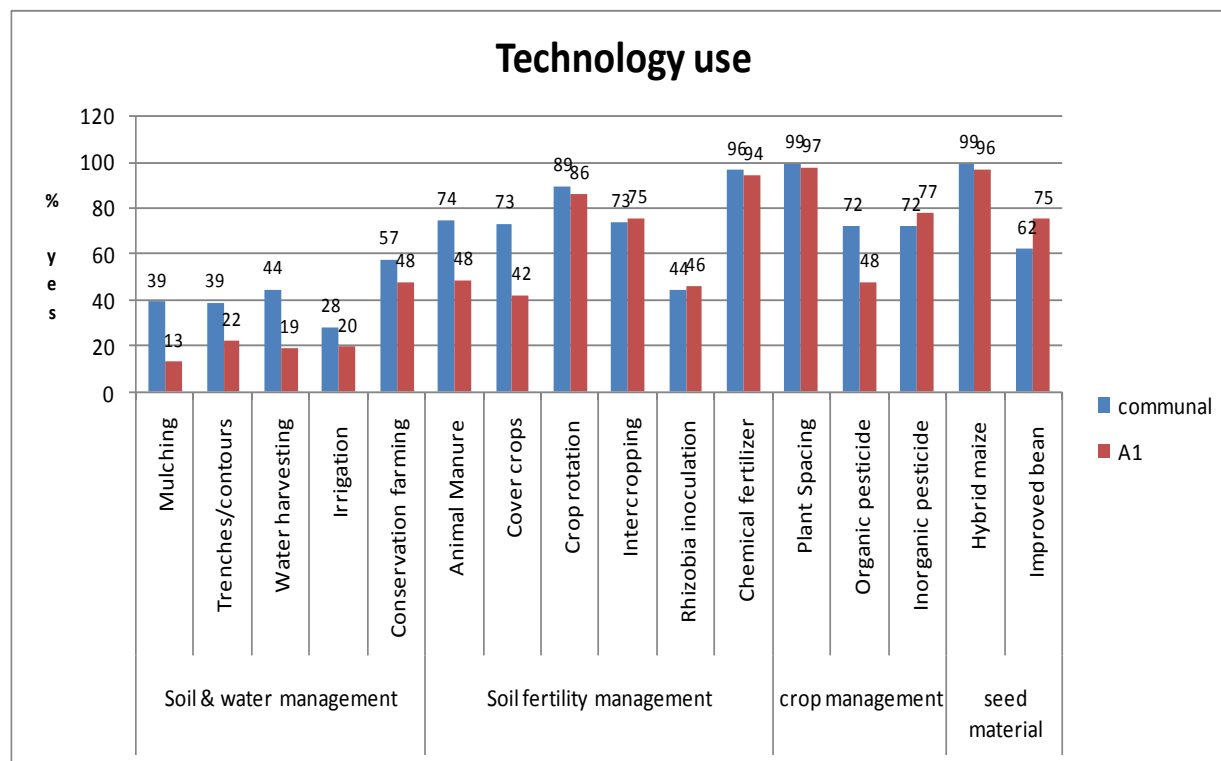
Farming techniques and agricultural extension

This section analyses the technologies currently being used by the resettled farmers. The generation, dissemination and diffusion of adaptive agricultural technology hold the key to tackling rural poverty and making agriculture the bedrock of the development process (Feder *et al.* 1985; Kinsey 1993). There is need for newly resettled farmers to make use of improved farming practices adapted to their farming systems. Technologies examined in this study are appropriate in resettlement areas especially given their circumstances of limited resources as well as in order to ensure sustainable farming practices. To complement the limited fertilizers used they could adopt soil fertility management practices. Most of the farmers are not irrigating at all and this means they are relying on rain-fed cultivation so they also need to engage in water management practices to conserve moisture and better their yields.

Table 4: Farming techniques employed in communal and A1 areas

	Communal				A1			
	No		Yes		No		Yes	
	Count	%	Count	%	Count	%	Count	%
Mulching	71	61	45	39	81	87	12	13
Trenches/contours	30	61	19	39	46	78	13	22
Water harvesting	20	56	16	44	39	81	9	19
Irrigation	90	72	35	28	99	80	24	20
Conservation farming	45	43	60	57	42	53	38	48
Animal Manure	37	26	107	74	66	52	62	48
Cover crops	9	27	24	73	28	58	20	42
Crop rotation	16	11	129	89	18	14	107	86
Intercropping	30	27	83	73	29	25	88	75
Rhizobia inoculation	38	56	30	44	37	54	31	46
Chemical fertilizer	6	4	141	96	8	6	117	94
Row planting	2	1	150	99	4	3	123	97
Plant Spacing	2	1	148	99	3	2	123	97
Organic pesticide	19	28	48	72	32	52	29	48
Inorganic pesticide	35	28	88	72	27	23	92	77
Hybrid maize	2	1	145	99	5	4	122	96
Improved bean varieties	31	38	50	62	26	25	77	75

Figure 2: Farming techniques



In terms of soil and water management techniques, communal farmers are using more of the techniques compared to their A1 counterparts. For instance, 39% use mulch, 39% have functioning contours, 44% do water harvesting, 57% practice conservation farming whereas in A1 areas only 13% use mulch, 22% have contours, 19% are water harvesting and 48% practice conservation farming. Greater percentages of 74% and 73% in communal farmers practice soil fertility management techniques in the form of use of animal manure and cover crops respectively while among A1 farmers, 48% use animal manure and 42% use cover crops. Crop management techniques like plant spacing and use of chemical fertilizer are high in both communal and A1 farmers. Use of hybrid seed is also high in both communal and A1 areas. Use of farming techniques is also influenced by the extension that farmers receive. Farmers receive extension through membership in farmer organisations or get it direct from government extension agents.

Social capital refers to the institutions, relationships, and norms that shape the quality and quantity of a society's social interactions (Ahn and Ostrom 2002). Increasing evidence shows that social cohesion is critical for societies to prosper economically and for development to be sustainable. Social capital is a very important aspect for development to be recognised among the newly resettled farmers. However, only 29% and 22% of farmers in communal and A1 areas respectively belong to at least one association. The majority of the farmers are not members.

Table 5: Access to farming information

Characteristics	Response	Communal		A1	
		Frequency (N)	% frequency	Frequency (N)	% frequency
Membership to farmer groups/organization	no	104	71	104	78
	yes	43	29	30	22
	Total	147	100	134	100
visit by extension agent	no	61	51	56	48
	yes	58	49	60	52
	Total	119	100	116	100

There is therefore need to educate farmers on the potential benefits of associations in procuring inputs in bulk as well as marketing produce as a group and the bargaining power that is within associations. About 49% and 52% of farmers in communal and A1 areas respectively indicated to having received at least a visit by an extension agent in a year. This is caused by the unavailability of resources to extension staff to extensively reach out to all farmers. There has also recently been high staff turnover in the civil service due to poor remuneration as the salaries offered were too low and quickly got eroded by hyperinflation. This suggests a need to boost extension services and provide extension staff with adequate resources to enable them to adequately and effectively service the newly resettled farmers. The Zimbabwe extension system has been experiencing a myriad of challenges. After the fast track land reform exercise, there has been loss of experienced staff because of the harsh macroeconomic environment that prevailed resulting in very low unsustainable remuneration. As a result, a large proportion of extension staff that ended up serving the farmers after the land reform was inexperienced. The government even went on to introduce a fast track eight month apprenticeship training programme that produced officers with little knowledge and experience to assist the farmers. Extension services were also affected as staff increasingly continued to be emasculated by the AIDS pandemic (UN 2006). This further compounded the problem of limited extension.

Crop productivity

High and sustained rates of agricultural growth, largely driven by productivity growth, will be necessary for accelerated poverty reduction. This is because agricultural growth has powerful leverage effects on the rest of the economy, especially in the early stages of development and economic transformation, when agriculture accounts for large shares of national income, employment, and foreign trade (FARA 2006). The study analysed productivity levels during the 2007/08 agricultural season, when rainfall was significantly below longer term averages across the country.

Maize, being the staple diet for people in Zimbabwe, occupies a central position in agricultural policies to the extent that government over so many years has kept maize prices low under the argument of poverty and malnutrition. On the other hand, lower maize prices have direct implications on maize production especially in the scenario of rising inputs costs. Fertilizer is one of the key inputs for augmenting the productivity. On the whole, farmers in A1 area were applying an average of 81 kg fertilizer per ha of maize, 116 kg/ha of sunflower, 204 kg/ha of tobacco and 79 kg/ha of groundnuts. Communal farmers were applying on average 87 kg, 137 kg, 189 kg, 80 kg and 182 kg per ha on maize, sunflower, tobacco, groundnuts and soybean respectively. All these rates fall below the recommended rates of between 150-200Kg/ha for maize and sunflower and use of residual fertilizer for crops like groundnuts. Instead of making use of residual fertilizer by engaging in crop rotation, it seems the farmers are also applying some fertilizer on groundnut which they could be using on cereals like maize. There is therefore need for knowledge to be disseminated to the farmers on fertilizer application rates for various crops in order to ensure efficiency in the use of fertilizers by the farmers. The farmers have limited resources to purchase the recommended amounts and the little they purchase, they apply it to cover all the cultivated area rather than intensifying it on a small piece of land.

Weeds are a major limiting factor responsible for decreasing maize yields. They compete with crop plants for nutrients, water and sunlight. Thus, depending upon the type of weeds and their intensity, the extent of yield loss varies from field to field. The farmers were asked the frequency of weeding on the various crops in the fields. When correlation analysis was done on the relationship between crop yield and number of weeding, it emerged that there was a significant positive relationship between yield and number of weeding on crops such as tobacco, sunflower, and sugar beans, round nuts, paprika and maize.

Table 6: Productivity for various crops

crop	A1					Communal				
	N	Range	Min	Max	Mean	N	Range	Min	Max	Mean
bean	94	287.20	0.80	288.00	67.60	156	2398.38	1.62	2400.00	195.22
cotton	12	512.20	87.80	600.00	343.90	41	1140.00	60.00	1200.00	396.53
cowpea	43	1196.57	3.43	1200.00	199.51	49	117.00	3.00	120.00	40.10
groundnut	1009	4799.20	0.80	4800.00	241.70	914	2399.19	0.81	2400.00	188.65
maize	3237	7200.00	0.00	7200.00	331.75	2728	4799.20	0.80	4800.00	272.42
millet	100	88.00	8.00	96.00	44.43	33	88.00	8.00	96.00	43.64
paprika	51	734.45	4.75	739.20	213.90	48	832.00	8.00	840.00	282.73
potatoes	12	1438.12	161.88	1600.00	880.94	30	1584.00	16.00	1600.00	390.81
rapoko	391	838.79	1.21	840.00	74.41	393	286.33	1.67	288.00	68.01
rice	117	187.14	4.86	192.00	68.86	23	713.60	6.40	720.00	206.43
roundnut	352	359.19	0.81	360.00	68.37	213	2398.38	1.62	2400.00	124.00
soyabean	123	358.00	2.00	360.00	60.65	215	591.43	8.57	600.00	165.27
sugarbean	147	732.80	3.20	736.00	162.72	8	556.80	19.20	576.00	297.60
sunflower	280	3592.00	8.00	3600.00	238.04	290	1198.40	1.60	1200.00	138.61
sweet potato	86	1580.80	19.20	1600.00	521.90	160	4796.76	3.24	4800.00	550.95
tobacco	161	4312.80	7.20	4320.00	659.90	362	4789.15	10.85	4800.00	590.62
wheat	10	1120.00	80.00	1200.00	640.00	6	72.00	72.00	144.00	108.00

NB: N is multiple responses for different fields cultivated by the household.

Communal farmers are attaining higher yields for crops such as bean, cotton, paprika, roundnut, soyabean, sugarbean and sweet potato, while A1 farmers are obtaining higher yields for tobacco, sunflower, rapoko, rice, potato, millets, maize and groundnut. This has implications on the amount of cash that the A1 farmers get to enable them to purchase inputs for use in their fields as well as hiring labour. There is need for more high value products to be promoted among the new farmers. Most of the fields in both A1 and communal areas are committed to the traditional food crops i.e. maize and groundnuts which fetch lower prices on the market due to price controls.

Figure 3: Crop Productivity

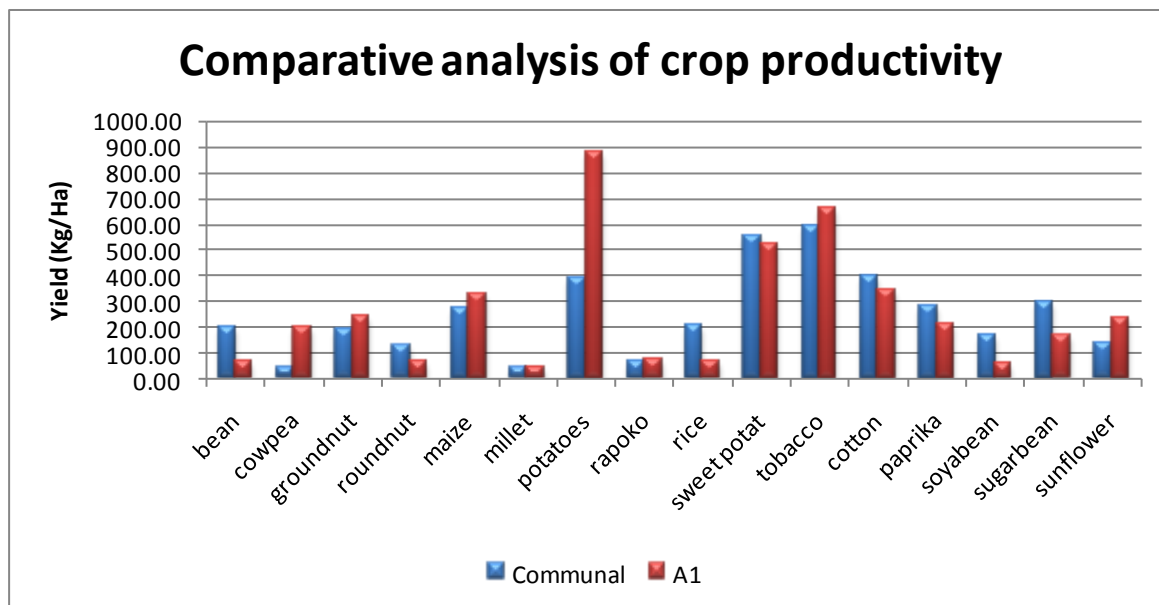


Table 6 gives the mean yields for the different crops grown by the farmers in kg/ha. A one sample *t*-test was run to test if there is difference between mean yields currently being achieved by the A1 farmers and average yields obtained during the 1990s before the FTLRP. Table 7 below shows the results of the sample *t*-test on selected crop commodities.

Table 7: One sample *t*-test results

Crop	<i>t</i> value	Test value	p
Maize	-59.6	1225	0.00
Tobacco	-20.78	2283.4	0.00
Sunflower	-3.14	333.2	0.02
Soybeans	-193.7	1685.6	0.00

The *t* test shows that there is a significant difference between the average yields for the major crops for A1 farmers and the period before the reform. The hypothesized means are the mean yields for the 1990s which were 1225 kg/ha for maize, 2283.4 kg/ha for tobacco, 333.2 kg/ha for sunflower and 1685.6 kg/ha soya beans (Moyo *et al.* 2004). However, whether the 2007-08 data are lower compared to 1990s national averages for the communal areas due to rainfall effects or other productivity effects is difficult to ascertain, given the single year's data.

There are a number of determinants of agricultural productivity ranging from human capital, demographic factors, and wealth and technology factors. Agricultural productivity change is explained by many factors ranging from land and water related factors (such as farm/water course location, quality of land, sources of water, quality and quantity of water and timing of water application, etc.), climatic factors (rainfall, temperature, sunshine, frost, etc.), agronomic factors such as quality, quantity and timing of input application (i.e. seeds, fertilizers, herbicides, labour, etc.), and socio-economic factors (such as farmers' health, education, experience in farming, farm size, tenancy terms, land fragmentation and availability of credit). Farm management factors (i.e. adoption of modern production technologies, farm planning and management practices, etc.).

Agricultural policies implemented by the government during the FTLRP era did not favour investment in agriculture. Commodities like maize were controlled under the government's repressive policies. The Grain Marketing Board (GMB) was the sole buyer and sole seller of grain. The GMB paid farmers late and this had negative effects on the value of the money due to the hyperinflationary environment that was prevailing. The delay in payment of farmers for maize grain delivery by GMB meant that by the time they received the payment, it would have long been eroded by inflation and thus their profits were greatly compromised. The prices paid by GMB were also lower and could not cover the real operating costs given the hyper inflationary environment. The high levels of inflation also impacted negatively on the availability of major agricultural inputs like hybrid seed, fertilizer and chemicals.

Before the FTLRP, adequate fertilizer was produced locally but afterwards there was a fall in fertilizer production. Fertiliser dropped from about 505 000 tonnes in 1999 to 330 180 tonnes in 2006. The fertilizer manufacturing firms lacked enough foreign currency to import raw materials and maintain their machinery (Moyo and Sukume 2006). There were also problems of electricity power cuts and this impacted negatively on production of fertilizers which greatly rely on it. The government banned export of fertilizer so the firms had nowhere to secure foreign currency for use in their operations. There was also shortage of hybrid seed. Previously commercial farmers produced seed and when they lost land there were reductions in area cultivated for seed production. The shortage of fertilizer also impacted negatively on seed producers resulting in reduced seed output. The new farmers lacked technical knowhow on the agronomy of seed production and thus there was shortage on the market.

Some farmers interviewed indicated that they ended up using retained seed "*Tinongodyara chibage chemudura, chembeu chinemushonga chataisitenga hachiwanikwe uye kwachinenge chiri kutaundi chiri kudhura.*" (We end up planting retained seed because the hybrid seed that we used to purchase is hardly available and in towns where it is available, it is very expensive). This also means that the seed was no longer available in rural shops in most cases. It was available in towns and due to limited finances it was difficult for most of the farmers to travel to access the seed.

There was also limited access to credit by the new farmers. The Reserve Bank of Zimbabwe had a loan facility that farmers could access through commercial banks. Most farmers did not access the facility. The other challenge that the A1 farmers faced was the limited availability of labour.

Conclusions

Efforts to address productivity should centre on the availability and accessibility of inputs that are needed in the production of crops as well as security of tenure. There is need for market policies that stimulate production. A liberalised market is necessary and the GMB should also strive to pay import parity prices to the farmers in order to ensure that they get profits to enable them to buy inputs and go back to the field the next season. The GMB still plays a crucial role as it has infrastructure already in place in nearly all districts and is accessible to many farmers. There is a need to put in place a functioning extension system in the newly resettled areas, fully equipped with resources to ensure effective dissemination of agronomic information to the new farmers.

Organisations that could play a critical role in supplementing government extension services are the buyers of commodities being produced by the A1 farmers. Companies like the Cottco have put in place

extension staff in areas that they are operating and this has yielded positive results. These companies should also provide inputs to farmers in the form of credit and purchase farmer's products at competitive prices around the import parity prices in order to stimulate productivity. Private buyers as well as the government need to come up with starter packs for these farmers that will be closely monitored in order to boost productivity.

Compounding the unavailability of inputs has been the poor road and communication networks in these newly resettled farms. Government has not been resurfacing gravel roads servicing these areas and as a result there has been limited transport operating in these areas to ferry produce and inputs to and from the markets. This has led to high transport costs. There is need for government to start committing funds to improve the road network especially among farmers.

Labour is another constraint that the farmers face and there is need to educate farmers on the use of herbicides in order to ensure timeliness in weeding operations. There is also need to promote export commodities that are of high value.

Thus the success of the fast track land reform programme in Zimbabwe lies in addressing input and output markets, extension services as well as the security of the tenure

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