Productivity gap between commercial farmers and potential emerging farmers in South Africa: Implications for land redistribution policy

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Abstract

A common feature of South African agriculture is its dualistic nature showing wide differences in production levels. For the purpose of land redistribution, existing studies do not provide much detail, because they compare smallholders in general, but not the commercially oriented smallholders, who are regarded as prime land redistribution beneficiaries in the State Land Lease and Disposal Policy. The objective of this study was to provide specific, comparative data on the apparent gap in agricultural productivity between these smallholders and the current commercial farmers. Although there are numerous productivity measures, we focused on comparing output per hectare (crop yields and livestock offtakes) of three crop and three livestock activities of emerging farmers with those of their commercial counterparts. Aggregated livestock input costs and maize production costs per hectare were also compared. Data from a survey of 833 commercially oriented smallholders in three provinces and survey of 939 commercial farmers were used to achieve the study objective. Both surveys were conducted in 2017 and 2018. Results showed that the gaps in output per hectare and production input costs per hectare in crop farming is wide while it is narrow in livestock farming. This may imply that emerging farmers may catch up faster on livestock farms than on crop farms. Within the two activity types, maize and cattle have the narrowest input and output gaps and thus are the best choices for potential emerging farmers.

Keywords: crop, livestock, land reform, offtake, yield
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Introduction

The South African agriculture is best described as 'dual', with smallholders and commercial farmers living side by side and farms being largely unequal in both size and productivity. For example, there are more than 2.3 million smallholder households practicing agriculture for home consumption and sale of surplus and about 40 122 commercial farms producing 90% of the national food supply (Greyling *et al.*, 2015; StatsSA, 2020). The source of this dualism is embedded in colonial policies, which have suppressed and neglected black farmers and supported white farmers (Schirmer, 2015). This has led to a productivity gap because of low input use, low adoption of technology, and human capital development.

Since 1994, the South African government has been concerned with bridging the gap between these two farming systems[1] (smallholder and commercial) through a land reform policy and other support measures (Karaan & Vink, 2014). However, to date, the progress in closing the gap has been minimal (Bureau for Food and Agricultural Policy (BFAP), 2018; Conradie, 2019). Researchers have suggested various reasons. Aliber (2019) found that poor understanding of the needs and characteristics of land reform beneficiaries have led to uninformed and ineffective policies, i.e. a report of the Advisory Panel on Land Reform and Agriculture (2019), appointed by the Presidency, recommended more research on understanding the beneficiaries' aspirations and skills to inform policy design.

In response to this recommendation, a comparison of the productivity of smallholders regarded as potential land recipients (i.e. potential emerging farmers in this study) to that of commercial farmers is presented. In South Africa, land reform beneficiaries are generally, understood as emerging farmers (see e.g. Gwiriri *et al*., 2019). The Sate Land Lease and Disposal Policy identify commercially oriented smallholders as one category of beneficiaries for taking over commercial farms (Department of Rural Development and Land Reform, 2013).

[1] At a surface level one can say South African agriculture is dual, however, there are other typologies or groups of farmers within the umbrella of smallholders and commercial farmers see e.g. Cousins 2010.

Given these two facts, in this study we refer to commercially oriented smallholders as potential emerging farmers. While a more valuable comparison which could be used as a guideline for land, distribution would be a comparison between the "potential emerging farmers" and "subsistence farmers", this study focus on prime land reform beneficiaries and commercial farmers. The idea is to provide some scientific figures showing the productivity gap between the two. Unlike previous studies (e.g. Liebenberg, 2013; Greyling, 2019) which compared general smallholders' maize yields with those of commercial farmers to identify this gap, this study focuses on potential land recipients as identified in the State Land Lease and Disposal Policy (Department of Rural Development and Land Reform, 2013). Previous studies (including Cousins, 2016; Rusere *et al.*, 2019) have already cautioned against the approach of considering smallholders as a homogeneous group, and this warning underscores the importance of focusing on a specific group of smallholders, particularly for land redistribution.

Understanding the productivity gap between potential land recipients and commercial farmers is important for numerous reasons. For example, it will give a perspective on the period of support, i.e. how long it might take emerging farmers to catch up in productivity on the redistribution farms on commercial farmland. Currently, there is no defined support period, and the lack of such period is cited as one of the reasons the support is not efficient (Zantsi *et al.*, 2020). Furthermore, this understanding can be used as a basis for determining the intensity of support needed to close the productivity gap. Therefore, it is under such motivation that this study intends to contribute to closing this gap. The next section provides a brief review of the relevant literature, followed by the description of the methodology in section three. In section four, results will be presented and discussed, before we conclude in section five.

Materials and Methods

This study utilized data from 833 potential land recipients in three provinces of South Africa, which collectively house more than 60% of smallholders in the country. The distribution of the sample across districts is presented in Table 1. This database and the productivity measures used in the present study are used as the basis for an agent-based model (Impact of Land Use Patterns in South Africa) that is designed to model South African land redistribution. The model simulates how commercial farmland can be redistributed to emerging farmers and how the redistributed farms will perform (i.e. how productive they will be assuming full support will be in place). The project is a collaboration between Stellenbosch University and Agroscope, a Swiss federal research institute.

Table 1 Smallholder sample size distribution and study areas

Eastern Cape	***n***	**KwaZulu-Natal**	***n***	**Limpopo**	***n***
Amathole	175	uMkhanyakude	125	Vhembe	89
Chris Hani	120	King Cetshwayo	80		
OR Tambo	84	Harry Gwala	56		
		Zululand	104		
Total	**379**	**Total**	**365**	**Total**	**89**

The smallholders were selected on the condition that they had sold at least 20% of their produce in the previous season. This condition is adapted from a currently vague definition of emerging smallholders, which is: 'farmers who at least sell part of their produce' (see van Averbeke & Mohamed, 2006).

We used one measure of productivity (output) and applied it at commodity level. We furthermore used selected crops (maize, potatoes, and cabbage) and livestock (cattle, sheep, and goats), which were the most produced crops and animals by smallholders. The productivity per hectare in these smallholder households was compared with the output in the commercial system. For crops, the ratio of smallholder yields to commercial yields was used, and for livestock, offtakes were used. Offtakes per household were calculated as shown in Equation 1.

$$offtake_j = \frac{\text{total non-breeding animals sold}_j}{\text{total non-breeding animals on a farm}_j} \qquad (1)$$

Furthermore, the production costs for selected activities were compared with the average of these costs on commercial farms. The data for commercial farms were collected from 939 commercial farmers across the country via an online survey questionnaire (see the sample distribution in Table 2).

Table 2 Commercial farm sample distribution

Province	**Sample size (*n*)**
Limpopo	68
KwaZulu-Natal	139
Mpumalanga	61
Western Cape	464
Eastern Cape	104
Gauteng	10
North West	24
Northern Cape	38
Free State	31
Total	**939**

Results and Discussion

This section presents the results of the study and provides some discussion. We start by providing a general view regarding average yields and costs and then disaggregate the results.

Average outputs and costs

To measure the productivity gap between potential emerging farmers and commercial farmers, we used an output and cost comparison. Table 3 summarizes the average output of three crop and three livestock activities and the associated production costs. We found that in general, the livestock activities have offtakes closer to those of commercial farmers than the crop activities. This result confirms the trend reported in previous studies (Scholtz & Bester, 2010; Greyling & Pardey, 2019).

Within the livestock activities, the extensive sheep production of the smallholders ranks highest with 88% of the commercial farm offtakes. Regarding crop activities, maize has the highest yield with 12% of the yield obtained by commercial farmers. The high productivity in livestock activities of potential emerging farmers may be explained by the associated costs, which are closer to what commercial farmers spend per animal compared with the expenditure on maize production costs per hectare[2]. However, these are just averages, and more details will be needed to understand the productivity disparities.

[2] We only present maize and aggregated livestock costs because of limited data. For maize, the costs include land preparation, planting, and labour. For livestock, the costs include remedies and hired herders.

Table 3 Average costs and outputs of agricultural activities of potential emerging farmers (smallholders) relative to those of commercial farmers

Category of costs and outputs	Smallholder costs and outputs as percentage of commercial farmers' costs and outputs
Average livestock costs per herd and year	65%
Average maize costs per hectare	18%
Average maize yield per hectare	12%
Average cabbage yield per hectare	11%
Average potato yield per hectare	2%
Average cattle offtake per herd	54%
Average goat offtake per herd	30%
Average sheep offtake per herd	88%

Source: Own calculations from survey data

Distribution of crop yields and costs

To understand the specific details of the various crop yields and costs, we disaggregated the yields for each crop and calculated the costs for maize. Figure 1 depicts the distribution of crop yields relative to the yields attained on commercial farms. We found that 95% of potential emerging farmers had maize yields equating up to 40% of the 5.6 t/ha achieved on commercial farms. Only a small percentage (5%) attained more than 40% of commercial maize yield, with the highest being 80% (4.5 t/ha). Thus, no potential emerging farmer in the sample attained the same maize yield achieved on commercial farms.

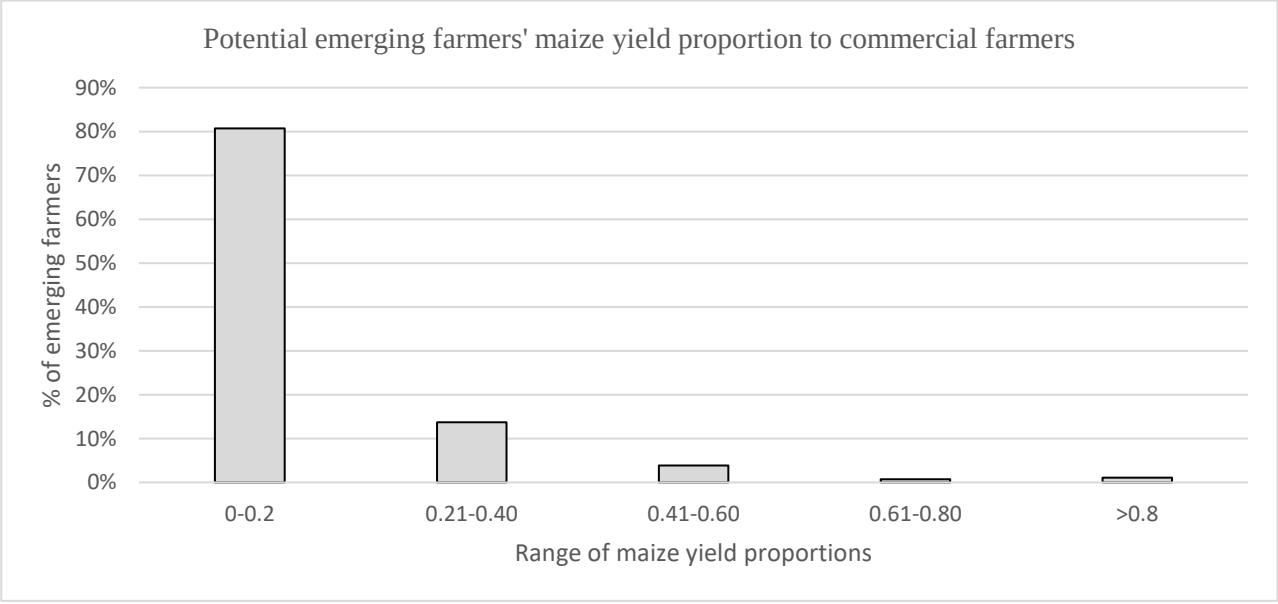

Figure 1 Distribution of maize yield of potential emerging farmers relative to commercial farmers' yield determined in tonnes per hectare. Note: Commercial maize yield used for comparison was 5.6 t/ha

In terms of vegetables (potatoes and cabbage), potato yield showed a wider gap than cabbage yield. As found for the maize yield distribution, most farmers (95%) attained a cabbage yield between 0% and 40% of the 60 t/ha produced on commercial farms (Figure 2). The remaining 10% attained between 60% and 80% of commercial cabbage yield.

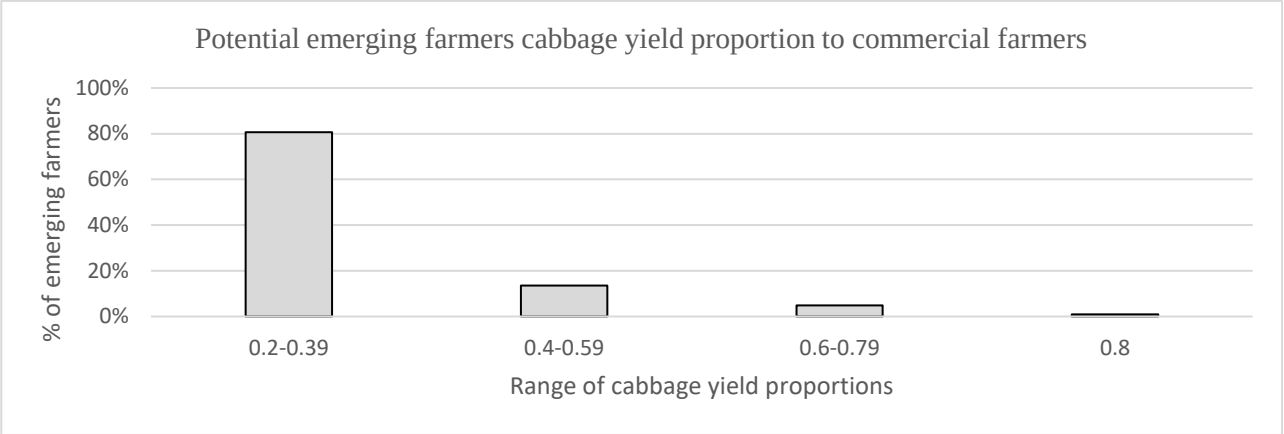

Figure 2 Distribution of potential emerging farmers' cabbage yield relative to commercial farmers' yield determined in tonnes per hectare. Note: Commercial cabbage yield used for comparison was 60 t/ha

The potato yield distribution (Figure 3) showed that the maximum yield attainable by potential emerging farmers was only 0.8% of what commercial farmers produced, achieved by only 1% of the sample of smallholders producing potatoes. Most of them (93%) produced yields up to 0.05% of the yield attained on commercial farms, and 6% produced up to 0.1% (about 0.03 t/ha).

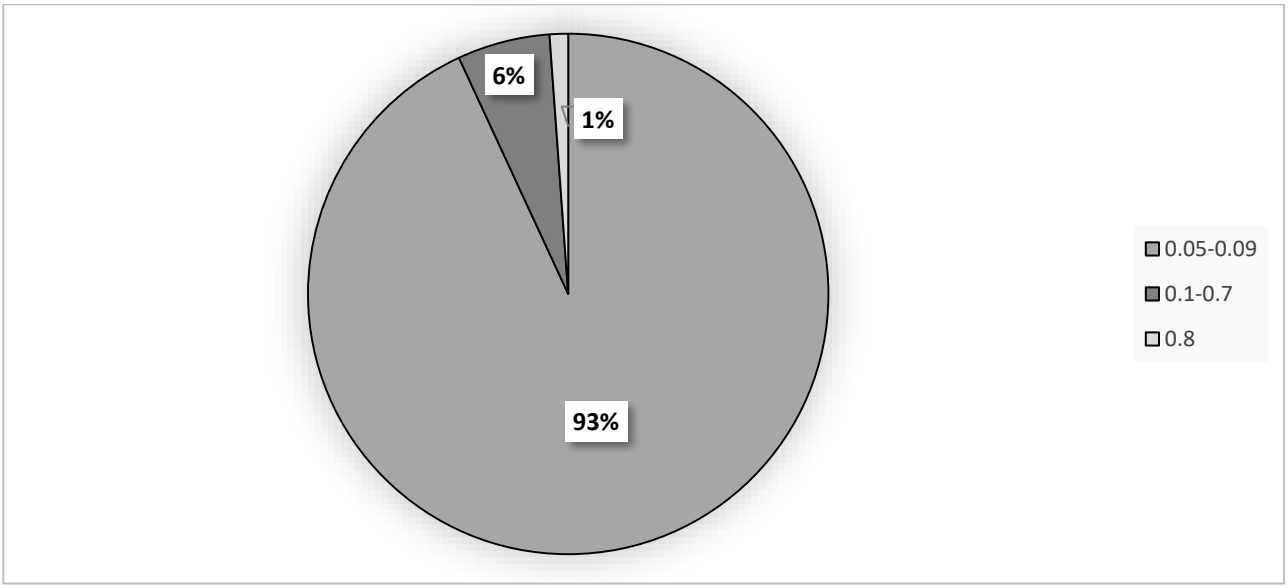

Figure 3 Distribution of potential emerging farmers' potato yield relative to commercial farmers' yield determined in tonnes per hectare. Note: Commercial potato yield used for comparison was 30 t/ha

Yields can be influenced by the amount of inputs and labour used in the production. Figure 4 reveals how much potential emerging farmers invested in the most produced crop, i.e. maize. Relative to what commercial farmers spent per hectare on maize production, most potential emerging farmers (94%) spent between 0% and 40% of that budget. However, commercial farmers mostly used high yielding maize varieties and pesticides in their production, whereas only a few potential emerging farmers applied these methods and used them in small quantities.

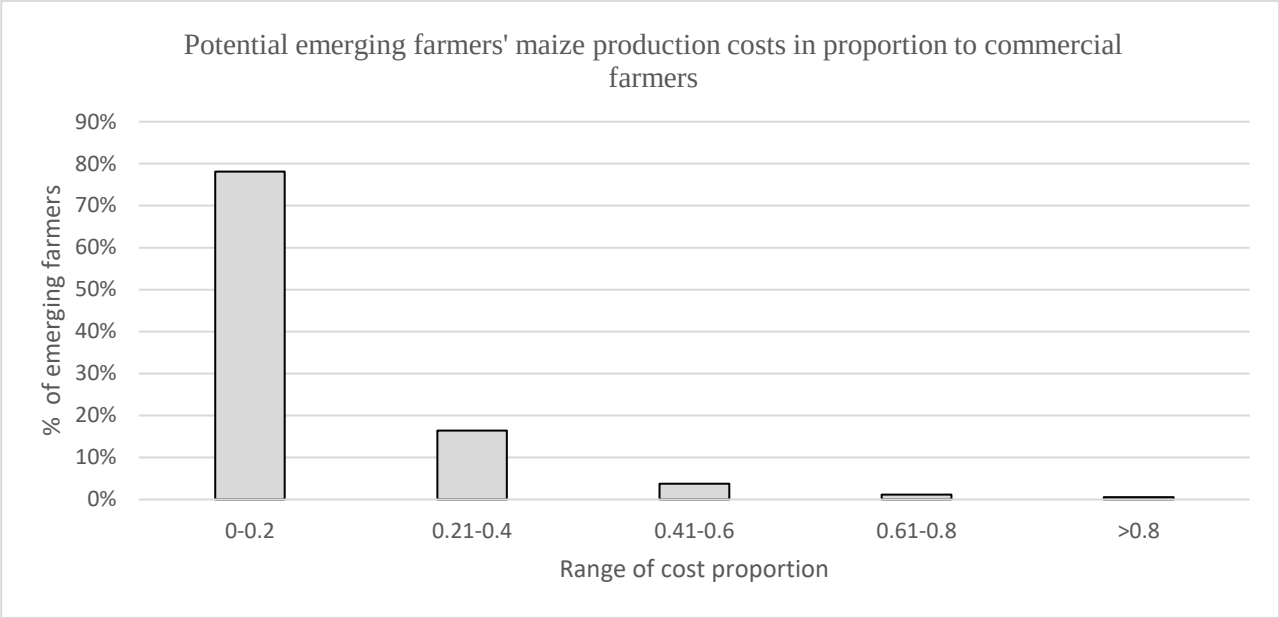

Figure 4 Distribution of potential emerging farmers' maize production costs relative to commercial farmers' production costs determined in Rands per hectare

Distribution of livestock offtakes and costs[3]

Livestock is the largest agricultural subsector in South Africa and a significant contributor to the gross domestic product. Furthermore, it is said to account for about 80% of South African farmland. Thus, it is likely that much of the land to be redistributed to emerging farmers will be grazing land. Figure 5 decomposes the productivity of livestock production among potential emerging farmers relative to their commercial counterparts.

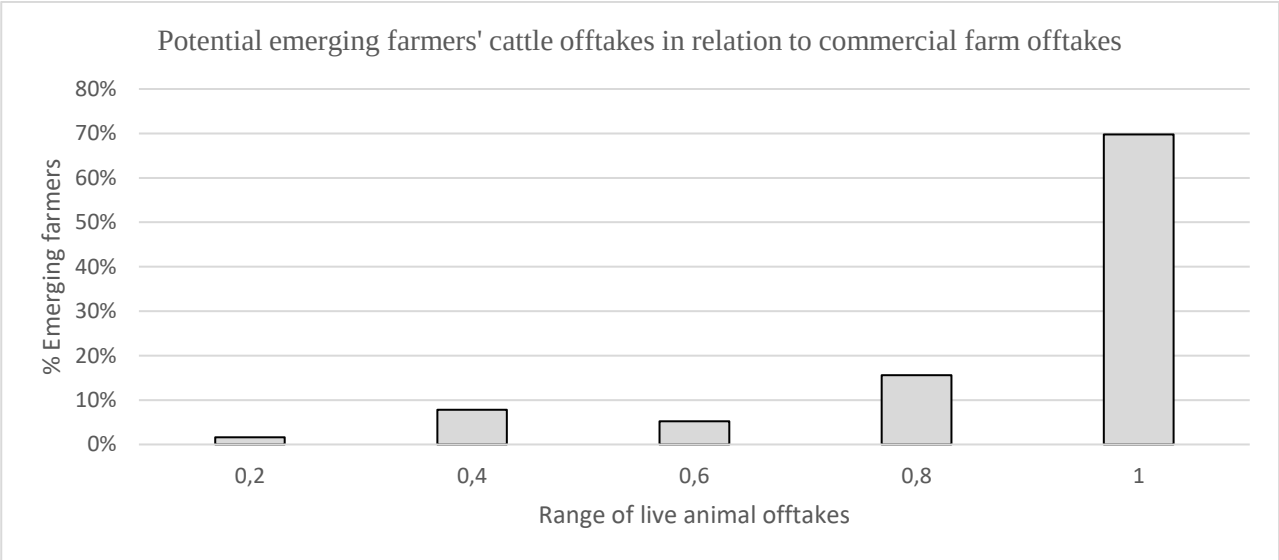

Figure 5 Distribution of potential emerging farmers' cattle farming productivity in relation to the productivity on commercial farms

[3] For consistent comparison of offtakes, we excluded Eastern Cape because we did not capture herd proportion distribution as we did in Limpopo and KwaZulu-Natal. For production costs, Eastern Cape was included.

Contrary to the crop activities, the livestock activities had a rather left-skewed or normal distribution of productivity (measured as offtakes). Regarding cattle, 86% of potential emerging farmers had an offtake between 61% and 100% of the offtake attained by their commercial counterparts (Figure 5). This level of productivity is very impressive and challenges the blanket assumption reported in some of the literature that smallholders are less commercialized than commercial livestock farmers.

Although the assessed livestock activities showed a productivity, level much closer to that attained on commercial farms (100%) than the assessed crop activities, not all livestock activities showed the same productivity trend. As shown in Figure 5, the offtake range for goats was rather normally distributed.

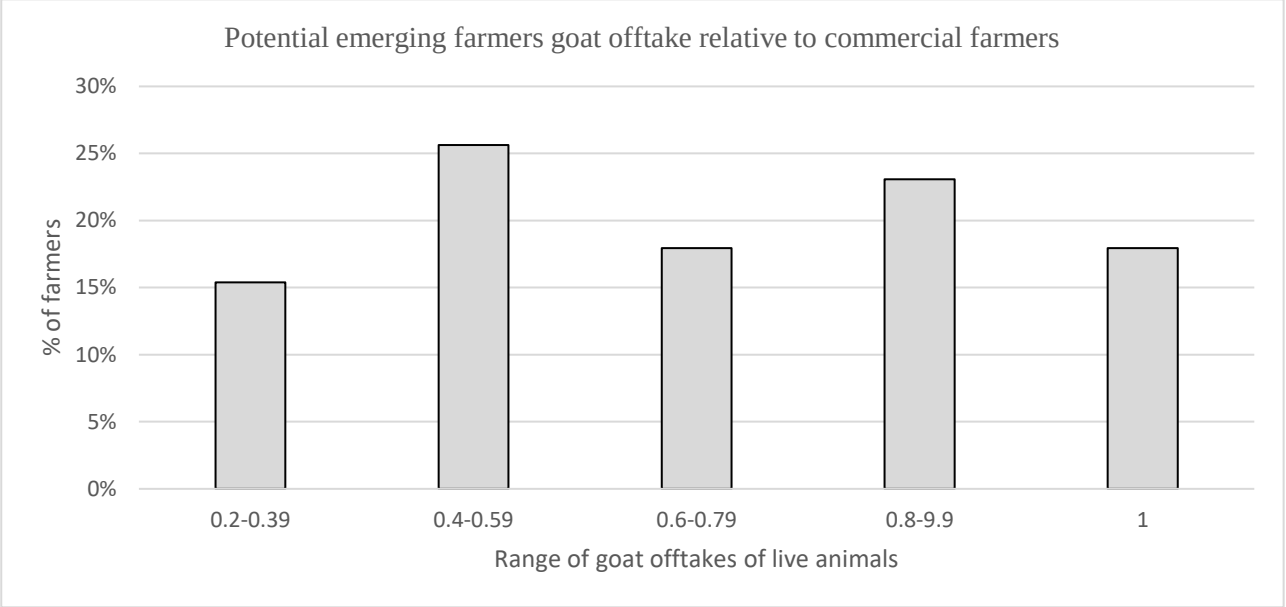

Figure 6 Distribution of potential emerging farmers' goat farming productivity relative to the productivity of commercial farmers

Potential emerging farmers who sold 40% and 80% of their non-breeding goats accounted for almost 50% of the sample of goat farmers. What is impressive is the 18% of potential emerging farmers selling all their saleable animals (non-breeding stock-wethers), albeit in low numbers. However, potential emerging farmers have small herds, so 100% of animals sold might be one or two non-breeding animals existing in a herd.

Sheep on the other hand showed a very low offtake as depicted in Figure 6. The highest offtake rate was only 6% of offtakes attained by commercial farmers. These low rates might be due to the sheep herd distribution in the two provinces (Limpopo and KwaZulu-Natal) used for the analysis. For example, Eastern Cape is the leading province in terms of sheep herd distribution, whereas Limpopo and KwaZulu-Natal have very few herds (StatsSA, 2020).

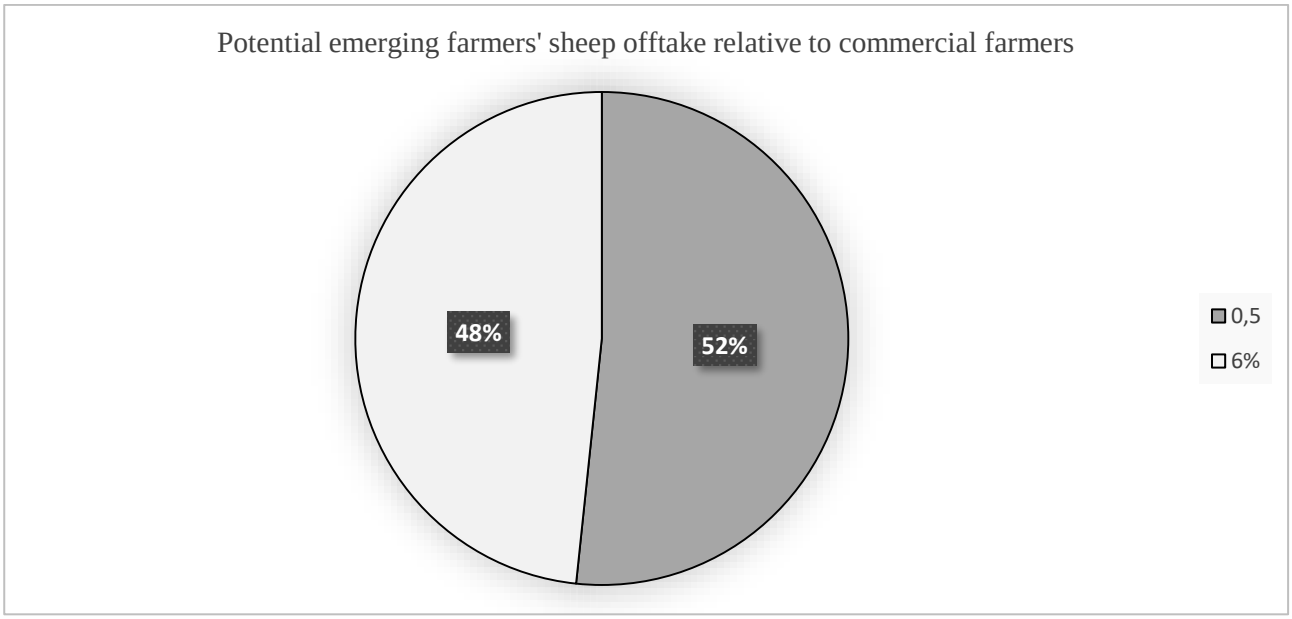

Figure 7 Distribution of potential emerging farmers' sheep productivity relative to the productivity of commercial farmers

The impressive offtakes in cattle and goat farming may have been facilitated by input use. Figure 7 shows the distribution of livestock input costs per livestock unit in Rands. Although potential emerging farmers had a rather high livestock offtake, their input expenditure was rather low compared with what commercial farmers spent per animal. However, there was a small fraction (1/10) of potential emerging farmers who spent even more than the commercial farmers did. The low input expenditure might be due to lower incomes among potential emerging farmers. The impressive offtakes might be due to the keeping of adaptable breeds that produce reasonable numbers of offspring under harsh conditions.

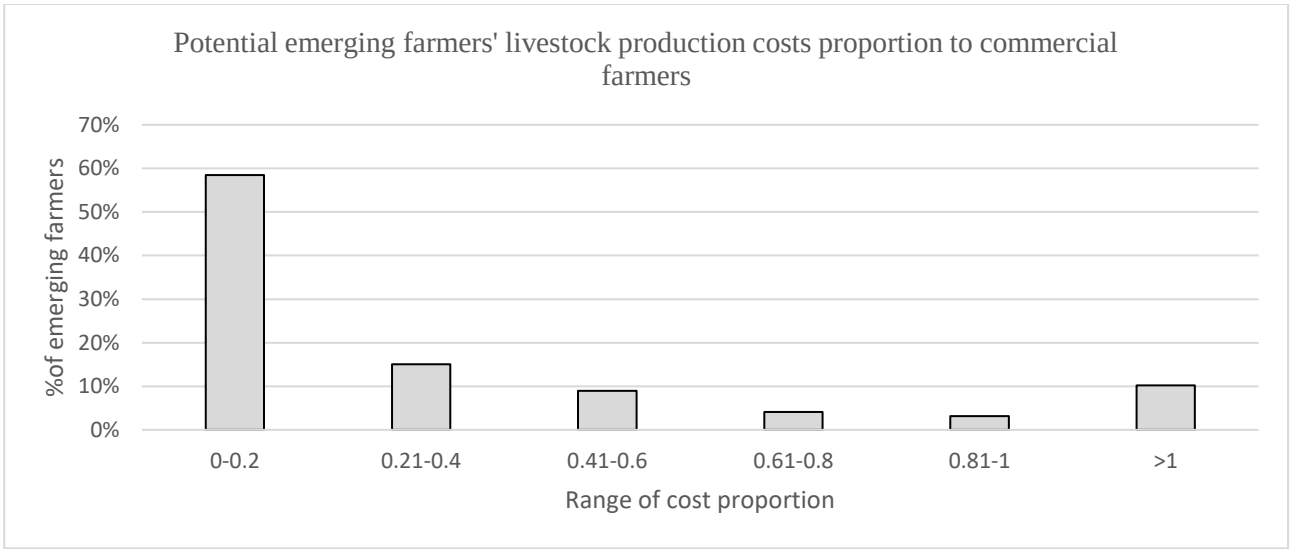

Figure 8 Distribution of potential emerging farmers' livestock production costs relative to commercial farmers' costs determined in Rands per livestock unit

Conclusions

This study was conducted to measure and contextualize the productivity gap between commercial farmers and potential emerging farmers by using one productivity measure in three crop and three livestock activities. We found that potential emerging farmers' livestock activities, particularly cattle farming, show a smaller productivity gap than crop activities relative to their commercial counterparts.

Although crop activities have generally a wider productivity gap, maize yields are higher than cabbage and potato yields. Such discrepancies might be due to several factors including management, intensity of input use and production scale. Future studies could expand in this direction.

Our method has a few limitations. Firstly, outputs and costs reported from smallholders are farmers' estimates because smallholders do not keep records of production. This limitation is not unique to this study. Previous studies, for example Rusere *et al.* (2019), reported the same situation in Limpopo. Therefore, farmers may have under- or overestimated their outputs and costs, as McAllister (2000) argued in a similar smallholder case study. Secondly, we made little distinction between regional production capacities because we used averages in our calculations and we did not differentiate smallholders according to districts. Mucina and Rutherford (2006) identified agro-ecological zones and their farming potentials in South Africa. Other researchers, such as Mapiye *et al.* (2009), showed a disparity in smallholder livestock productivity based on agro-ecological zones. Thirdly, this study calculated the productivity gap by using one measure. Further studies using multiple methods could be useful.

Our findings have some implications for the land redistribution policy that seeks to redistribute land equitably. Firstly, the identified productivity gaps indicate which farm activities might catch up faster than others when emerging farmers take over commercial farms. Secondly, maize and small ruminants were among the aspired farm activities that emerging farmers wanted to pursue should they be selected as land redistribution beneficiaries (Zantsi, 2019). Thus, the herein found productivity gaps should be considered in the planning and provision of trainings and financial support.

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Authors' contributions

Zantsi and Cloete collected the data for this study. Siphe, Möhring and Cloete conducted the analyses of the Results. Zantsi wrote the initial draft of this manuscript. All authors have read and approved the finalized manuscript.

Conflict of interest declaration

We declare no potential conflict of interest

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