Perceptions of Gauteng Beef Farmers on Significance of Practising Climate Smart Agriculture

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Perceptions of Gauteng beef farmers on significance of practising climate smart agriculture

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Abstract

Farmers are crucial role-players in agriculture, especially in beef farming. Daily farm activities affect climate change, either negatively or positively. Therefore, farmers' ability to relate climate change with farm activities is highly imperative. A study was conducted to investigate perceptions of Gauteng beef farmers on significance of practising climate smart agriculture (CSA). Semi-structured key informant interviews were conducted with 57 beef cattle farmers from three areas (Bronkhorstspruit, Rust de Winter and Cullinan) of Tshwane region (Gauteng province). A fully detailed ethical statement was used to explain the study and request farmers' participation. Data analysis was done using a Statistical Package for Social Sciences (SPSS) software version 20 with a significance of $P<0.05$. Majority (71%) of farmers who participated were males. Most (43%) of participated farmers were middle age, which indicates that farmers are now considering beef farming as a full-time job. Majority (60%) of participants had access to enough land (>700 hectares), which makes them suitable for practising CSA, provided they get appropriate training. Few participants showed good understanding of climate change (14%), global warming (14%), climate change reduction strategies (29%), cattle contribution to climate change (14%), adaptation strategies for climate change (29%) and the role played by CSA on reduction of farm operational costs (14%). Majority of farmers had average understanding of climate change (86%), global warming (86%), cattle contribution on global warming (71%), climate change adaptation strategies (71%), climate change reduction strategies (71%), recommendation of climate smart feed resource (71%) and impact of CSA on economic development (86%). Majority (71%) of participants identified water pollution as the only environmental hazard associated with beef farming, whereas few (29%) identified air pollution due to greenhouse gases emissions from poorly managed cattle manure. All participants (100%) showed good understanding regarding the benefits of practising CSA and its impact on food security. Furthermore, they were willing to adopt CSA and promote it to fellow farmers. There is a need for farmers' training on CSA.

Keywords: Adaptation, climate smart agriculture, global warming, mitigation, perceptions.

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Introduction

Most of published studies emphasize the impacts of climate change on agriculture and environment at large, rather than the impacts that agricultural activities have on climate change (Ncube *et al*., 2016; Mandleni, 2011). As a result, our society is solely concerned about how climate change affect the farming industry, not about how the daily activities of the farming industry affect climate change. This has resulted to a situation whereby the farming industry is reactive through adaptation to climate change instead of being proactive by practising CSA (Elum *et al*., 2017). Anthropogenic activities contributes 30% of total greenhouse gases (GHG) emission (Hunerberg *et al*., 2015). GHG emitted through agricultural activities include methane, carbon dioxide and nitrous oxide. However, the global warming potential of methane is 23 times that of carbon dioxide (Scholtz *et al.*, 2013). Methane emitted by beef cattle wastes 2–12% of dietary energy, which is actually supposed to cater for animal production and maintenance (Ramin & Huhtanen, 2013). Livestock industry accounts for approximately 5–10% of the overall agricultural contribution to global warming (Rust & Rust, 2013). Beef cattle have been identified as the major source of enteric methane production among other domestic ruminants (NRC, 2002).

Farmers are the key role players in agriculture industry. Daily farming activities affect climate change, either negatively or positively (Jana *et al*., 2019). GHG emission from livestock can be reduced by minimising livestock

numbers through improving the production per individual animal (Scholtz *et al*., 2014). Simply by grinding the forage before feeding it to livestock, farmers can reduce enteric methane emission by increasing the passage rate through the rumen (Hook *et al*., 2010). Feeding livestock with high quality diets can reduce GHG emission (Meissner *et al*., 2012). Efficient on-farm handling of cattle manure can reduce the emission of GHG and improve agricultural productivity (Wambugu *et al*., 2014). Farmers' ability to relate climate change with their daily farm activities is highly imperative. Therefore, the current study was conducted to investigate the perceptions of Gauteng beef farmers on significance of practising CSA.

Materials and methods

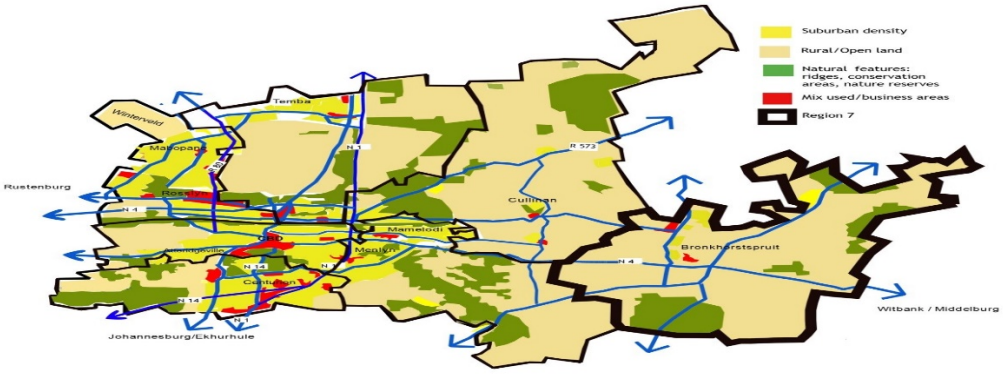

Figure 1 Map showing several areas of Tshwane region (source: www.tshwane.gov.za)

A detailed ethical statement was read and explained to each participant before the interviews begin. Ethical statement was used to clarify the study purpose and to request farmers' participation. Questionnaires were interpreted to local languages (isiNdebele, Sepedi and Setswana) that farmers are more comfortable with, for the ease of communication between farmers and questionnaire administrators. Both female and male farmers were consulted, depending on their willingness to participate. Farmers gave responses based on their basic information, demographic information, socio-economic status, perspectives on climate change adaptation and mitigation strategies, relationship that agriculture have with climate change and corrective measures that can be applied by beef farming community to mitigate climate change. Data analysis was done using SPSS software version 20 to perform both descriptive and analytical statistics with a conventional significance of $P<0.05$.

Table 1 Gender, age and level of education for respondents per area

		Gender			Age		Level	of	education
Area	**Resp.**	**F**	**M**	**18-35**	**36-55**	**>55**	**N**	**P**	**S**
Bronkhorstspruit	12	3	9	3	5	4	8	2	2
Rust de winter	25	7	18	7	11	7	16	5	4
Cullinan	20	6	14	6	8	6	13	4	3
Total	57	16	41	16	24	17	37	11	9

Resp. = Respondents, F = Females, M = Males, N = None, P = Primary, S = Secondary.

More male farmers participated in this study compared to females (Table 1). This might be due to the fact that in most farms or villages it's usually the fathers and sons who take a full responsibility for livestock husbandry daily activities, while mothers and daughters commonly take care of food gardens, baking, cooking and sewing. Furthermore, livestock husbandry is one of the main duties for male servants (usually referred to as herd-men) in most villages / farming communities. More middle age farmers participated compared to youth and pensioners

(Table 1). This indicates that our society has already started to consider livestock farming as a full time job that needs complete dedication, not just as a hobby for retired senior citizens. Furthermore, it is becoming a common habit for middle age agricultural professionals to start their own farming businesses.

Results and discussions

Less participants (14%) showed good understanding of climate change, whereas more participants (86%) showed average understanding (Figure 2)**.** This raise a crucial need for farmers' climate change awareness campaigns through comprehensive trainings or brief information sessions. More farmers (71.4%) had average understanding of how cattle contribute on global warming, compared to good (14.3%) and poor (14.3%) understanding (Figure 2)**.** Therefore, it is imperative ensure that beef farmers fully understand the role that they can play in reduction of GHG emission from livestock at the farm level.

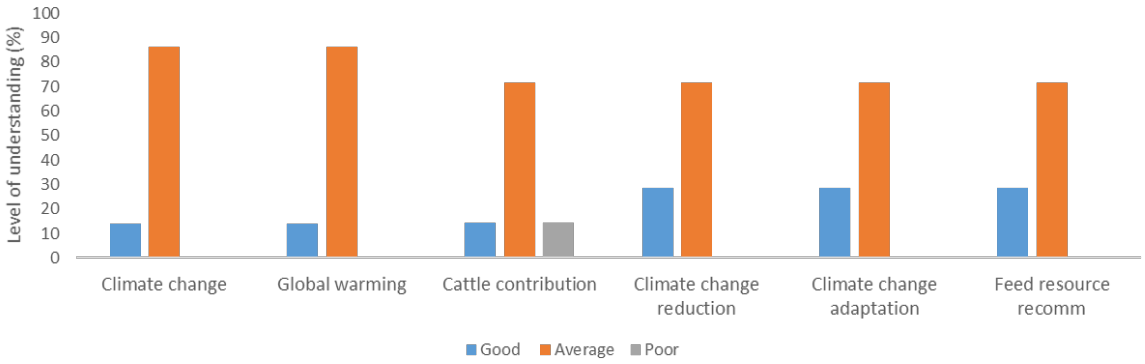

Figure 2 Farmers understanding of climate change and its relationship with agriculture

Less participants (28.6%) showed good understanding of climate change reduction strategies compared to average (71.4%) understanding (Figure 2). More farmers (71.4%) had average understanding of climate change adaptation strategies compared to good (28.6%) understanding (Figure 2). More participants (71.4%) used grazing only as the main feed resource, whereas the rest (28.6%) use all means of feeding. More farmers (60%) had access to enough land (>700 hectares), whereas the rest (40%) had <100 hectares. This illustrate that it would be viable for the respondents to practise CSA, provided they get proper training. More participants (71.4%) identified water pollution as the only environmental hazard associated with beef farming, whereas the rest (28.6%) also identified air pollution due to GHG from poorly managed cattle manure and soil erosion due to overgrazing by cattle. This shows that the respondents have a clue, but they need a comprehensive training on GHG emitted by livestock.

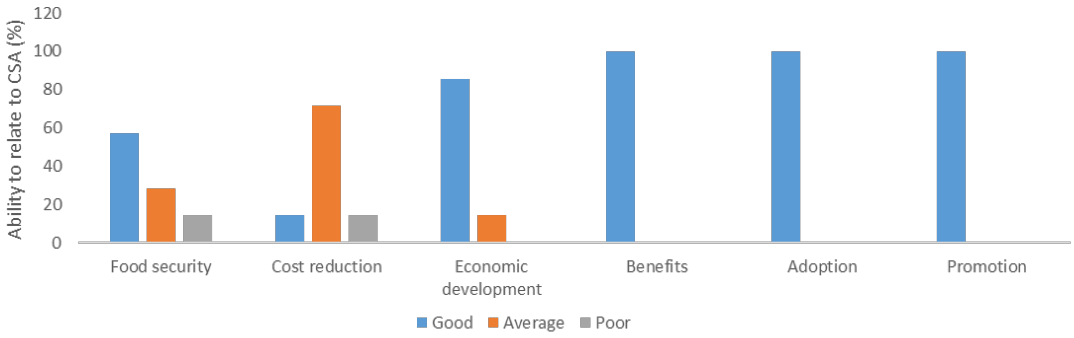

Figure 3 Farmers ability to relate CSA to beef farming profitability

All (100%) participants showed good understanding of benefits associated with practicing CSA and its impacts on food security (Figure 3). More (85.7%) farmers were able to link CSA with economic development (Figure 3). Only few (14.3%) participants were able to relate CSA with cost reduction (Figure 3). All (100%) farmers were willing to adopt CSA and promote it to others. All farmers (100%) suggested the use of water troughs as a

corrective measure to avoid contamination of rivers and use of cattle manure as pasture fertiliser to avoid air pollution.

Conclusions and recommendations

Respondents were able to relate CSA with economic development and food security. However, farmers showed average understanding when it comes to global warming, climate change adaptation and reduction. Participants recognised the benefits of practising CSA, willing to adopt it on their own beef farms and prepared to promote it to their fellow beef farmers. Most of consulted farmers had access to enough land, which will make it possible for them to practise CSA, provided they receive a proper training. Special programmes are required for encouraging more youth to consider beef farming as their lifetime career. A viable strategy is needed to encourage more female farmers to join beef farming. Training beef farmers on viable CSA practises is recommended, thus contributing to mitigation of climate change and reduction of GHG emission.

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