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Presenter Information

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Assessing feed gaps on smallholder livestock farms in Limpopo: production system and coping strategies

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Abstract

Smallholder farms in southern Africa are predominantly mixed crop-livestock systems and often characterized by low productivity. Therefore, providing sufficient forage becomes a challenge that results first in feed gaps, i.e. the difference between the demand for and supply of forage, and secondly, in nutrient mining of the soil due to the overuse of the resources. However, the availability of forage follows potentially seasonal patterns. Hence, a key entry point for any intervention strategies for improvement is an assessment of forage quantity and quality throughout the year. Against this background, we investigated six locations, smallholders' cattle production systems and their adaptation options in periods of feed deficit across three distinct agro-ecological zones in the Limpopo province (South Africa). We interviewed 90 farmers from May to September 2019 and found that farmers struggle in winter-spring (June – September) to access feed resources for their livestock. Most farmers mentioned that feed deficit in that period is a regular phenomenon. Mixed crop-livestock farmers stated that they rely on on-farm resources (crop residues) while sole livestock farmers stated that reducing herd size is a top adaptation option. Farmers also indicated that feed availability in required quantity and quality is the biggest constraint to sustaining livestock production throughout the year. This study demonstrates a sound assessment of the temporal pattern of feed gaps in Limpopo province and potential farmer avenues for their mitigation.

Introduction

In Southern parts of Africa, rangelands are key feeding resources, particularly supporting the livelihood of inherently resource constrained farmers. However, the effects of climate-related drought in the region has been reported as changes in the natural ecosystems affect the quantity and quality of the feeding resources (Descheemaeker et al. 2016). With respect to livestock production, providing sufficient forage through the year amid these climate uncertainties propels livestock keepers to put more pressure on the natural resources translating into feed gaps. Feed gap is explained by the variability in the supply of forage that cause discrepancy between livestock demand and forage provision (Moore et al. 2009). Feed gaps may occur seasonally within one year or vary inter-annually due to biological and socio-economical influences. For smallholder livestock systems, this variability in the supply of livestock feed incites inefficiencies in production. Hence, livestock keepers are compelled to adopt strategies and tactics to provide sufficient feed at times when forage quantity and quality are low, creating opportunities to either prevent or cope with feed gaps.

Approximately 90% of Limpopo's smallholder cattle farmers relies heavily on communal rangelands for feed. Evidence from the literature suggests that these farmers already perceived climatic shocks as frequent dry spells affecting the productivity of the rangelands leading to forage shortages (Marandure et al. 2020). However, the projected frequent and prolong drought in the region will further affect livestock productivity unless appropriate actions through improving the common property status of the feeding resources are considered. In the smallholder context, nevertheless, the uncertainty of the farming systems in relation to when and where do feed gaps occur and how it affects livestock productivity is rarely investigated. Therefore, it is important that any intervention strategies as a response to feed gaps will first take into account context-specific assessments of the variability of the forage supply and the already existing farmers' coping approaches. In this study, we capture farmers' perception of feed gaps based on seasonality in a smallholder context. Additionally, we explore the existing farmer's adaptation strategies to cope with feed gaps impacts.

Methods and Study Site

Using a semi-structured questionnaire, we conducted a survey among 90 farmers across seven different rural locations representing the key agro-climatic zones of the Limpopo region (Republic of South Africa). All farmers kept cattle, mainly locally adapted Nguni cattle with herd numbers varying between 5 – 50. Farmers were asked farm-specific questions about seasonal livestock feeding availability so to understand periods of feed supply/shortages, the frequency of feed gaps, the impact of feed gaps on livestock, the perception of cattle losses during feed gaps, and farmers' main strategies during the feed gaps. For instance, we asked farmers about their perception of months/seasons (winter, spring, summer, fall) and their perception of feed availability (in quantity and quality) during the dry season (winter). Feed availability is then considered to be high if farmers perceive feed to be adequately available without any sign of feed gap and low when there are clear signs of feed gap. In between, feed availability is medium when feed is satisfactory with slight variations in the supply. Furthermore, we asked farmers if the occurrence of feed gap is regular (a seasonal variability in feed supply) or irregular (year-to-year variability in feed supply). Also, farmers were asked whether they lose cattle due to feed gaps (often if a farmer lose at least one animal every 1-2 year due to feed gap, sometimes if a farmer lose an animal at least once every 3-5 years and not likely if feed gap does not lead to losing animals). The survey data was subjected to simple descriptive statistics (mean, frequency) on the farmers' perception and adaptation strategies using the R software 3.6.0.

Results

The results showed that farmers perceived feed gaps mainly in the winter season (June – August), followed by spring (September – November) and fall (March – Mai) seasons (Fig 1A). Clearly, the summer season (December – February) was the period of feed availability and supply to the livestock.

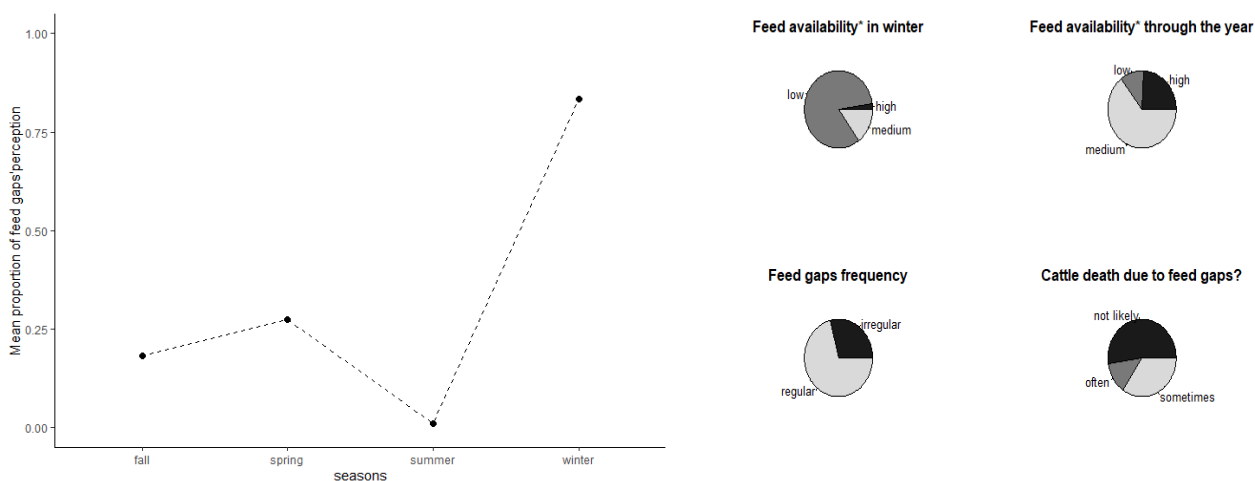


Fig. 1 Farmer's perception on: (A) the seasons of feed gaps (B) on the feed availability in winter, (*feed availability here = feed in quantity and quality), feed availability throughout the year to maintain production, feed gaps frequency and death of cattle due to feed gaps (n=90).

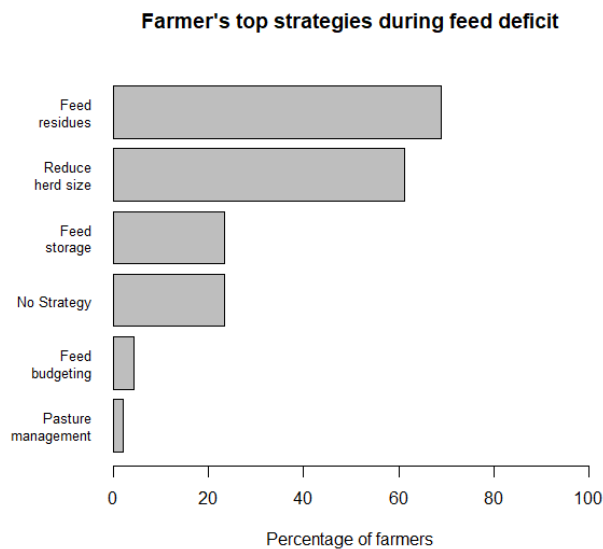


Fig 2: Farmer's top adaptation strategies during feed gaps (n=90)

The majority of the farmers (80%) asserted that in the winter season, feed availability in quantity and in quality is low, while 2% of the farmers thought that feed availability in that period is high (Fig 1B). When farmers were asked about their perception of feed availability through the year to maintain livestock, 62% of farmers responded to have satisfactory feed quantity and quality (medium) (Fig 1B). Meanwhile, 23% of the respondents claimed that feed is adequately available (high, Fig 1B) throughout the year as summer and fall seasons make up for the winter and spring deficits. However, 12% of the farmers stated that feed supply remains too low to maintain production through the year, while 3% of farmers remained unsure. Regarding the perception on the variability of feed gaps, 71% of the total farmers considered the occurrence of feed gaps as regular seasonal phenomenon happening in most years – if not all. Meanwhile, 29% of farmers reported irregular feed gaps that mainly occur in some years (for instance in 2014 – a period of severe drought). Besides, the extent to which farmers will lose their cattle (animal death) due to feed gaps was identified (Fig 1B) and more than half (52%) of the farmers believed that animal death in relation to feed gaps is unlikely. About 35% of farmers reported that animal death occurs 'sometimes' and at a greater consequence of feed deficit. 13% admitted that they often lose livestock (animal death occurring at least once every 1-2 years) (Fig 1B). The reported adaptation strategies to cope with feed deviated in frequency (Fig 2). Feeding crop residues and or reducing herd sizes were the top strategies employed by farmers (about 70% and 60% respectively). Farmers also stored feed in periods of feed availability that is fed to the animals in periods of feed gaps (22% of respondents). Nevertheless, about 22% of farmers stated that they do not engage in any strategy (no strategy) as the animals continue to graze the unproductive rangelands in periods of feed gap potentially leading to animal losses (Fig 2). Further, only very few farmers engaged in other strategies such as feed budgeting (5%) and pasture management (2%) in a way to cope with feed gaps.

Discussion

Farmers' perceptions of seasons of feed gap and availability is linked to precipitation patterns in the region. In Limpopo, the summer (December – February) is the season of relatively high rainfall while the winter (June – August) is rather a season of precipitation deficit with no rain. Therefore, the perception of feed gap across the seasons is explained by the dry spells that affect the productivity of the common grazing resources in periods of low or no rainfall. Our findings suggest that farmers primarily rely on rangelands for livestock feed, therefore, seasonal changes in pasture conditions (quantity and quality wise) are perceived as either season of feed availability or deficit. According to Moore et al. (2009), the balance between cattle feed demand and supply is important as it directly affects production and may lead animals to lose weight and regain it later. As a consequence, a study conducted by Mpfu et al. (2017) in Limpopo observed that season had a significant effect on the body weight of cattle as animals normally gained weight in summer and lose it in winter. However, animal losses can be attributed to a combination of different factors that include forage availability, consumption of poisonous herbs, bush encroachments and diseases (Mapiye et al. 2018). Therefore, management strategies that can be deployed to reduce the frequency and intensity of feed gaps may improve the profitability of smallholder farms. Farmers have opted for the traditional measures of

relying on on-farm residues and herd size reduction. Crop residues play an important role as feeding resource, especially in smallholder livestock systems in Southern Africa (Thornton and Herrero 2015). Generally, crop lands are owned individually, but leftovers become a common property once crops are harvested and can be freely grazed by animals. In line with this, crop residues remained the first option for livestock keepers during feed gaps. However, farmers additionally reduce their herd sizes which indicates that crop residues within the region do not necessarily alleviate feed gaps. Furthermore, the nutritive value of residues is often unknown. Therefore, despite the complexity of the smallholder livestock systems, there is the need to consider management options that will allow farmers to be adapted to the frequent occurrences of feed gap.

Conclusion/Implications

Seasonality is key in understanding livestock feed gaps in the smallholder context. Based on our findings, we suggest that to avoid regular seasonal feed gaps, there is the need to ease the pressure on the common feed resources (e.g., communal rangelands). Here, regulations on community-level which target the herd sizes to accommodate proper grazing management are needed. Additionally, rangelands can be improved through resting periods and by managing enclosure areas for recovery (Pfeiffer et al. 2019). Another strategy that has not yet been generally applied is destocking during periods of feed availability in order to conserve rangeland biomass. We are aware that the frequent occurrences of feed gaps are not only governed by biological factors, but also farmer's socio-economic capacities. For instance, high sensitivity to feed gaps can also be reduced when financial opportunities are created for smallholder farmers who could purchase livestock feed, or supplements to improve the quality of crop residues.

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