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Review article

Future opportunities and concerns in smallholder livestock production systems in Africa

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ABSTRACT

Smallholder livestock production systems continue to play a key role in African agriculture. Although smallholder livestock production systems have had their own share of success, the truth of the matter is that more needs to be done to make them more vibrant, sustainable and reliable. With this in mind, achieving sustainable smallholder livestock production with emphasis on satisfying basic human needs, improving people's standard of living, enhancing food security and reducing poverty pose a surmountable task in Africa. There are many measures which need to be explored with the aim of making the smallholder livestock systems become driving forces of African economies. Some of the strategic steps that can be adopted for future viable smallholder livestock production systems include and not limited to the following: promotion of gender equality and equity in smallholder livestock production systems, and intensifying activities that support or encourage the utilization of indigenous livestock genetic resources in smallholder livestock production systems. This becomes crucial in the context of climate change and variability. The need to improve the diversity and response capacity of smallholder livestock production systems to enhance resilience is critical. Therefore, it is against this background that livestock species that remarkably possess distinctive qualities enabling them to excel efficiently in the context of the uncertainties of climatic variability

need to be promoted to reduce vulnerability in smallholder livestock production systems. The use of adaptive genotypes such as the local animal genetic resources may sustain smallholder livestock production and enhance adaptive capacity of smallholder livestock production systems. The integration of micro livestock into the mainstream smallholder livestock production system also may play a pivotal role in complementing conventional smallholder livestock production systems in enhancing food security and reducing poverty. Simultaneously, planning for women's participation does, in fact, improve the likelihood that women contribute to smallholder livestock production and improve livestock productivity. The recognition of the role women play in smallholder livestock production systems is fundamental to agricultural and rural development in Africa. Thus improving the status of women within the household and at the community level would deliver significant improvements to smallholder livestock production systems and food security.

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1. Introduction

Smallholder livestock systems in which more than 90 percent of dry matter fed to animals comes from rangelands, pastures, annual forages and purchased feeds and less than 10 percent of the total value of production comes from non-livestock farming activities. According to Nagayets (2005) historical trends in farm size suggest that in Africa smallholder livestock farms will continue to dominate the agricultural landscape for at least the next two to three decades. Smallholder livestock production systems have diverse economic and social functions and are valued as one of the main drivers of agriculture, as well as one of the sectors having enormous potential for poverty reduction and enhancing food security in Africa. However, the dream for smallholder livestock systems becoming a key ingredient for socio economic development may remain elusive if issues of climate change, women participation and livestock productivity in this sector are not fully addressed. The characteristics of the smallholder livestock production systems include low inputs and are mainly grassland based, which make them most vulnerable to climate change and variability. Evidence from the Intergovernmental Panel on Climate Change (IPCC, 2007) is now overwhelmingly convincing that climate change is real, that it will become worse, and that the poorest and most vulnerable people will be the worst affected. The smallholder livestock production systems have been highly dynamic in response to rapidly increasing demand for livestock products as a result of Africa's rapid human population growth. By the year 2050, Africa's population is likely to grow by a staggering 1.3 billion people -- the largest growth of any region in the world (Lazuta, 2013), hence the implications for food security are not favorable. The protein production from conventional livestock has been falling steadily, while human population has been increasing at a faster rate, as a result there is need to reduce the demand supply gap. Between now and 2050, it has been predicted that growth in the global population and changing diets in emerging countries may lead to an increase of around 70% in food demand (EU, 2001). The trends in smallholder livestock production systems have been largely dependent on conventional livestock, which can no longer now adequately supply the projected animal protein requirement for the rapid growing population in Africa, hence the need for alternative sources of protein such as micro livestock. While an attempt has been made to promote smallholder livestock production systems in certain quarters, climate change has been a stumbling block to the viability of this sector. The utilization of adapted local animal genetic resource has to some extent cushioned the smallholder livestock production systems to the vagaries of climate change. This discussion attempt to explore strategies to cushion the future of smallholder livestock systems and sustain productivity in Africa, which also focus on gender equality in livestock production as one of the strategies.

2. Gender and smallholder livestock production systems

Harnessing women's potential in smallholder livestock production systems has been a challenge in Africa. The face of livestock production in Africa is often female, but more often than not, their roles are generally undervalued and constrained by gender inequalities and limitations on their access to resources, services, and market opportunities (ADB, 2013). Full participation of women in smallholder livestock production systems can have a positive impact on production and food security in Africa. The gender aspect of livestock production in smallholder livestock production systems assume significance, if it is widely acknowledged that women are the custodian of food production in many communities in Africa. There is a tendency of men and women participating unevenly in smallholder livestock production systems, have unequal access to productive resources and exhibit different levels of engagement. Despite this anomaly, there is still a common understanding that livestock production in the smallholder sector needs to be increased in order to cope with the increased human population and achieving food security in Africa. With this in mind, smallholder livestock production systems and food security should emerged as key development targets in Africa. This propels the urgent need for promoting in smallholder livestock production systems, reducing food insecurity and poverty reduction in its totality. One of the factors contributing to perpetual low smallholder livestock productivity and food insecurity has been gender discrimination and/or lack of participation of women in livestock programs and projects. Researchers and policy makers have failed to acknowledge the impact of gender-based discrimination on smallholder livestock production systems and its implication on food security. The indispensable role and challenges faced by women in smallholder livestock production systems should be further scrutinized and understood if gender sensitive policies are to be implemented. The need to invest in education and training of women to support smallholder livestock production systems in order to accrue maximum benefit is paramount (Assan, 2013). In this regard, it is imperative that planning and implementation of any smallholder livestock production systems programs focusing on improving food security should be based on gender sensitive policies. Policies which give women due recognition as far as livestock production decision making processes are concerned are sought. Understanding the involvement of women in smallholder livestock production systems becomes a key component of addressing food insecurity in Africa.

3. Micro livestock integration in smallholder livestock production systems.

Micro livestock farming is a sustainable form of animal production that if intentionally integrated in the formal smallholder production systems has significant potential for alleviating malnutrition and food insecurity in Africa (FAO, 2010). This group refers to small indigenous vertebrates and invertebrates both domesticated and wild genetic animal resources which can be produced on sustainable basis for food, animal feed and as a source of income. The little known species should be considered as a normal component of livestock and rural development which has the capacity to improve nutrition and food security. They play an important role in farming systems by offering opportunities for risk coping, farm diversification and intensification, and provide significant livelihood benefits including food security. It is very much associated with increased food security as it lends itself to small scale family production. The opportunities of utilizing micro livestock species in the smallholder livestock production systems as an alternative source of protein solving the food insecurity challenges in Africa are tremendous. Considering their diverse economic and social functions in rural communities, micro livestock integration into the main smallholder production systems holds the future of this sector. Micro livestock can be valued as one of the livestock sub sectors having enormous potential for enhancing food security. The conventional smallholder livestock production sector has been facing multiple challenges as a result of rise in human population, urbanization and climate change. This trend has lead to a rise in demand for livestock products, which means meat productivity or the number of meat animals will have to increase to meet the animal protein demand. The protein production from conventional smallholder livestock systems have been falling, as a result there is need for alternative sources of animal protein supply. Integrating micro livestock species in conventional smallholder livestock production sector, as an alternative source of protein may be just as important. Most animals in the micro livestock class are promising in enhancing food security because they require little capital, equipment, space and labor (Barwa, 2009). The micro livestock constitute an important reservoir of genetic animal resources which has not been given adequate recognition in smallholder livestock production systems. However, it is envisaged the integration of micro livestock in smallholder livestock production systems will address the animal protein challenges facing Africa, especially in the resource poor rural communities where the problem is most apparent. Given the economic, social and ecological advantages of micro livestock farming it is arguably deserves

even greater attention in smallholder livestock sectors. By the year 2050, Africa's population is likely to grow by a staggering 1.3 billion people -- the largest growth of any region in the world (Lazuta, 2013). This current and projected population trend -- growing population require in turn appropriate responses to the anticipated pressures on smallholder livestock production systems. Importantly, the unprecedented rate of population growth will have important repercussions on nutrition and food security in the smallholder farming sector. Africa has considerable micro livestock species which could complement the increased demand for livestock products. Integrating micro livestock as a major livestock component in the smallholder livestock systems for the resource poor livestock keepers could provide many direct and indirect benefits to ecosystem function and food sustainability (Bohringer, 2001; Devendra, 2004). Their farming have potential to meet the criteria of sustainable farming practices, while simultaneously addressing food security (Lenne et al., 2003) in smallholder sector. The major groups of micro livestock animal genetic resources which have shown promising attributes for food security include chickens (poultry), domesticated rabbits, bee keeping, snail production, rodents, guinea pigs, pigeons and many others found in different parts of Africa. The potential for micro livestock to promote food security to help diversify rural livestock livelihoods is believed to be substantial, however very little research has been done to document the benefits that come from micro livestock. The discussion concludes that the biodiversity of micro livestock can act as a valuable source of animal protein and food security if properly integrated in smallholder livestock systems in Africa.

4. Climate change and adapted local animal genetic resources

Due to climatic variability in Africa, smallholder livestock production systems faces a lot of challenges that threaten their viability. The promotion of local adapted livestock genetic resources is one of the many mitigating strategies in confronting climate change in Africa for sustainable smallholder livestock production systems. Local animal genetic resources have effectively thrived in unfavorable climate change induced environmental conditions. These responses have been important in matching smallholder livestock production systems activities to specific environmental conditions ensuring a sustainable level of production. Severe feed shortages resulting from changes in rainfall patterns, and water scarcity are some of the major climate change induced environmental stressors, which have caused smallholder livestock systems capacity decline. Their negative influence on smallholder livestock systems production is calling for use of adapted livestock species to cope with unavoidable climate change effects. For example, goats have shown to be a remarkable animal species that possess distinctive qualities enabling it to excel efficiently in harsh tropical environments. As climate change takes a centre stage in defining smallholder livestock systems livestock productivity in Africa, there is greater need to stress on what type of livestock species to keep (IUCN, 2010). Therefore, the selection of adapted livestock species will be critical in sustaining smallholder livestock systems productivity under this increasingly challenging environment. Identification of livestock species adaptable to uncertainties of climatic variability, is recommended for achieving sustainable levels of production in smallholder livestock systems. This is on the understanding that selection of adapted livestock species counteracts the negative effects of climate change in such a way that productivity can be maintained and improved. While exotic livestock breeds in Africa, tend to be highly vulnerable, local animal genetic resources have evolved a unique and fascinating array of physiological, morphological and reproductive characteristics, which have contributed to their survival and proliferation in unique unfavorable environmental niches. This point to the fact that promotion of local animal genetic resources smallholder livestock systems may be a viable mitigation strategy in the context of climate change. It is thus suggested that as climatic variability worsens, local animal genetic resources will assume a critical role in smallholder livestock production systems due to their adaptive features, such as feeding behavior, disease and heat tolerance. These behavioral, morphological and physiological characteristic enable local animal genetic resources to effectively cope with the stressful nature of the vast agro ecological regions of Africa. The improvement within flocks/herds of local animal genetic resources becomes a key component of smallholder livestock production systems future thrust for their viability. Due to local animal genetic resources numerical strength and greater adaptability to varying harsh agro ecological regions, they offer a compelling solution to smallholder livestock production systems capacity utilization to minimize destabilizing factors associated with the uncertainties of climate change. Lets do away with exotic breeds in the smallholder livestock production systems for sustainable production and avoid genetic erosion.

5. Implications

Climate change and global warming are the major concern that will define livestock production systems and their productivity, and will have even greater influence on selection and management of livestock breeds. Demand for livestock products are projected to increase on the continent due to urbanization and prospects for meeting this demand from smallholder livestock systems are highly unlikely, unless serious investment is done to create knowledge on how to deal with the vagaries of climate change and their influence on livestock productivity. Micro livestock species are likely to become increasingly important source of animal protein as a result of rapid increase in human population in Africa. This is on the understanding that production in the smallholder livestock production systems has been outpaced with the increased human population. Most livestock developmental projects in smallholder production sector should be designed and implemented with fully understanding the potential for the intervention to help women develop sustainable livelihoods through livestock production resulting in poverty alleviation and enhance food security. Lack of consideration of women participation in smallholder livestock production will lead to most livestock developmental programs being inaccessible to women which has result into food insecurity and increased poverty in Africa. The need for a better understanding of the complexity of smallholder livestock systems, many of which are operating in resource constrained environment and are becoming unsustainable is crucial. Smallholder livestock production systems in Africa are exceeding environmental limits or close to doing so, which makes future food security highly uncertain. However, these challenges have taken a social, economic and environmental dimensions, and research will need to cover all of these if improvements in smallholder livestock production systems are to be adapted and considered sustainable. In addition, in order to increase the livestock productivity of smallholder livestock systems in a sustainable manner and increase the resilience of systems to climate change, the interactions between social, economic and environmental implication need to be better well understood. Research into the market opportunities and benefits of indigenous livestock genetic resources should be promoted, and disregard the use of imported animal genetic resources. Motivations for local animal species selection, uses, and profitability based on innovation theory may yield insight as to how to further develop indigenous livestock genetic resources from subsistence production to an income generating opportunity that enables the resource poor farmers engaged in smallholder livestock production systems to save, invest, and further acquire assets.

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