Chapter 10
The Impact of Climate Change on Small Ruminant Performance in Caribbean Communities

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ABSTRACT

Many Caribbean small ruminant management systems are forage-based, relying on rain to sustain pastures for feed. Animal performance is thus heavily dependent on forage availability. The nutritive value of pasture was highest during the intermediate season and lowest during the dry season, leading to under nutrition, and declined flock performance in the dry season. Climate change will therefore seriously hamper pasture availability and nutritive value. Hair sheep on pasture, without shade or water, experienced increased respiration rate, they were under chronic heat stress. However, where adequate shade and water were provided, heat stress was reduced. The current system of small ruminant production is prone to the negative impacts of climate change events due to its effect on nutrition, growth and reproduction. Immediate actions are needed to prepare farmers to respond by mitigation methods, to maintain and enhance animal productivity if the envisaged protein security goals set for this sector are to be realized.

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INTRODUCTION

It is recognized that climate change is anthropogenic in nature due largely to the production of greenhouse gases emissions (Co_2, CH_4, N_2O and Halo-carbons) which affects the absorption, scattering and emission of radiation within the atmosphere and at the earth's surface (IPCC, 2007). In the tropics, the effect of climate change will pose a major threat to food, protein security and sustainability of livestock production systems (Henry et al., 2012). The effect of climate on animals in the tropics is most evident through increased ambient temperature and the impact can be both direct and indirect. The direct effect will be on feed intake, growth rate, and reproductive performance and is due largely to heat stress (Lamy et al., 2012). There is a thermal range within which the animal is able to maintain homeothermy through behavioural and physiological mechanisms (Daramola et al., 2012). High ambient temperature, humidity, and radiant heat can hamper the animal's dissipation of heat and ability to maintain homeothermy. The indirect effects are due to fluctuations in the nutritional environment, leading to under-nutrition and subsequent increased risk of disease and parasitism (Gaughan et al., 2012) as a result of a compromised immune system (Daramola et al., 2012). It is estimated that the annual economic loss for the livestock industry in the United States is 1.7 to 2.4 billion US dollars due to heat stress (Pierre et al., 2003). No estimate was ever done for the livestock industry in the Caribbean Community and Common Market (CARICOM).

The Intergovernmental Panel on Climate Change (IPCC, 2007) has indicated that small island states, such as those in the Caribbean, will be hardest hit by climate change. These island states are also located in the tropical agro-ecological zone and are already facing serious food security issues. Protein security in the Caribbean region is largely based on broiler meat which is 80% of the meat consumed with a per capita consumption of 35 kg/hd/annum. Apart from chicken being a climate sensitive species, increasing grain prices and shunting of grain to bio-fuel production threatens the sustainability of protein supply. Further, changes in population growth in the Caribbean to 2050 (as indicated by the United Nation Secretariat, 2009), will put increased pressure on food production systems. When the combined factors of; climate, consumption pattern, and demand for animal protein are taken into consideration (Thornton, 2010) added pressure will be placed on the current systems (Table 1). Thus, there is need to develop new strategies which take advantage of more sustainable intensive systems and/or minimize the negative impacts of climate change on small ruminant agriculture if countries are to maintain or enhance their food and protein security (Harvey et al., 2014; Tansey, 2013; Royal Society, 2009).

In this review, the effect of climate on small ruminant performance and productivity and its implications are explored. The direct and indirect effects of climate are examined and strategies suggested for combating them. Finally, recommendations are made for a way forward and proposals presented to raise the awareness of small ruminant farmers.

IMPORTANCE OF SMALL RUMINANT TO THE CARIBBEAN COMMUNITY

The small ruminant sector plays a significant role in protein security both nationally and regionally. It is also important to national economies and socio-economic development in most countries. Small ruminants, because of their multi-functionality, play a vital role for resource poor farmers in terms of livelihood and poverty alleviation. However, the thermal challenge associated with climate variability and change will have negative socio-economic impacts on farmers and their livelihood (Pant, 2011).

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