

Expected Impact of Global Climate Changes on the Regional Small Ruminant Industry

*Albert L. Fearon
Animal Productionist
Caribbean Agricultural Research and Development Institute
Jamaica Unit*

Introduction

Small ruminant represent an important socio-economic asset in the Caribbean region with some 100,000 farm families currently deriving part of their incomes as well as protein and calorie nutrition from them. The Caribbean region produces only about 15% of the demand for small ruminant products making it clear that this part of the food system is primarily based on imports. Imports figures indicated that the bulk of small ruminant products are from United States, Australia and New Zealand meaning that any effect on these countries from global climate changes will be past on to the region. These changes can however, necessitates the production of more improved livestock and forages and improved management practices to ensure efficient use of the available resources to maximize production in the ruminant livestock sector.

As a commodity the contribution of small ruminant towards poverty alleviation, rural development and diversification of the export crop agriculture is also well recognized by authorities of the region that had made the rapid development of the industry a major priority. In an effort to make the industry competitive within the region and in the global marketplace different organizations including the Caribbean Agricultural Research and Development Institute (CARDI) proposed an industry development plan. Among the key issues were policy, marketing, genetic resources, cost effectiveness and diversification of production enterprises, quality assurance of products, information and communication and human resource development. There was however, little or no reference made to the impact of Global Climatic Changes (GCC) on the industry at present and the perceived effect in the future. This paper therefore, sets out to look at the global warming phenomenon and the threats and or benefits that exists and seek to determine research needs to address the effects of global climate changes on the small ruminant industry in the region.

What we know about global climate changes

It has been proven that global temperatures are rising. Data collected over the last century suggest that the average land surface temperature has risen 0.45-0.6 °C. The surface of the ocean has also been warming at a similar rate. Studies have also revealed that combined land and sea measurements have estimated that global temperatures have warmed 0.3-0.6 °C in the last century. About two-third of this warming took place between 1900 and 1940. While global temperatures declined slightly from the 1940s to the 1970s they have risen more rapidly during the last 25 years than in the period prior to 1940. If the warming trend continues at the same rate global temperature is estimated to rise by 1.4-5.8 °C and sea level 0.09-0.88m by the year 2100. There is increasing evidence that most of the warming over the past 50 years have been attributable to human activities, which have altered the chemical composition of the atmosphere through the buildup of greenhouse gases – primarily carbon dioxide, methane and nitrous oxide.

Uncertainties about global climate changes

Figuring out to what extent the human induced accumulation of greenhouse gases since pre-industrial times is responsible for global warming trend is not so easy. This is because other factors, both natural and human, affect our planets temperature. Since the beginning of the industrial revolution atmospheric concentration of carbon dioxide have increased nearly 30%, methane concentration have more than doubled, and nitrous oxide concentrations have risen about 15% resulting in increased heat trapping capability of the earth. Over the past few hundred years however, there is addition release of carbon dioxide through the burning of fossils to run motor vehicles, heat buildings, and power factories. Increased agriculture, deforestation, landfills, industrial production, and mining contribute significantly to emission of greenhouse gases. It is difficult to estimate future emissions, as it will depend on demographic, economic, technological, policy and institutional developments. It is relatively easier to predict global temperature changes over a large area but is very much touch and go when dealing within small locations like the Caribbean. There is a possibility that a warmer world can lead to more frequent and intense storms, including hurricanes. Preliminary evidence suggests that once these hurricanes form they may be stronger if the oceans are warmer there is however, no evidence whether they will become more frequent. Scientists are concerned but uncertain that the

accumulation of greenhouse gases could inject enough heat into the Pacific Ocean such that El Niño events could become more frequent and fierce.

Livestock Production and Global Climate Change

Ruminant because of their special digestive system are able to convert otherwise unusable plant materials into nutritious food and fiber. This same system however, is a major producer of methane, a potent greenhouse gas that can contribute significantly to global climate changes. Different production systems practised in ruminant production can cause the emission of greenhouse gases such as nitrous oxide and carbon dioxide into the atmosphere. It is estimated that ruminant livestock produces 80 million tons of methane annually, accounting for about 22% of the global methane emission from human related activities. Climate changes can be positive in some instances while can be devastating in others. Rising water levels can results in more water available in current water-scarce areas resulting higher forage yields. On the other hand frequency of extreme weather such as floods and droughts especially in the tropics could increase, resulting in less forage and feed availability and an increase in tropical pest and diseases, which affects plant and animals.

Research needs

It is therefore incumbent on scientist in the region to find ways and means to reduce or utilize some of these emissions thus creating a balance. One of the most effective ways of reducing methane emissions is to improve the productivity and efficiency of livestock operation by engaging in the correct production systems. Improved ruminant livestock management can also reduce the atmospheric concentration of carbon dioxide, the chief greenhouse gas, through the mechanism of carbon sequestration. An important environmental benefit that accompanies improved grazing management is increased organic matter production through increased forage production. While the grazing animals remove some of the forage, significantly increased residues remain to add to the organic matter content of the soil thus increasing the carbon held in the soil. Some of the carbon will remain in the soil or plant root system for long periods instead of being released into the atmosphere as carbon dioxide. Pastures established on previously cultivated or overgrazed soil could act as a carbon sink, reducing the amounts of carbon dioxide in the atmosphere. Since there is certainty that human activities relating to ruminant livestock

production are rapidly adding greenhouse gases to the atmosphere resulting in warming of the planet it is important to generate research activities to address these concerns. Some of these concerns could look at;

- ◆ Educating the peoples of the region regarding the effects of global climate changes and solicit their contribution to lessen the effects
- ◆ The effect of global climatic changes on feed and forage resources (corn, soybean, grass and legume forages)
- ◆ The measurement of the rate at which carbon is sequestered
- ◆ Development and establishment of high yielding forages
- ◆ Measurement of the effect of forage management such as controlled grazing
- ◆ Improved forage utilization systems such as hay, silage
- ◆ How the use of more organic manure could delay global warming
- ◆ How high producing breeds of ruminant livestock could offset or reduce the deleterious effect of global warming
- ◆ Increasing stocking rates to get more production from animal units

Expected benefits

- ◆ Efficient management of fodder and livestock will lead to other positives in controlling to balance of the global environment;
- ◆ Healthy root systems make soil erosion less likely
- ◆ More organic material encourages more vigorous and nutritious plant growth
- ◆ Increased annual production of high quality forage
- ◆ Efficient forage utilization by ruminant livestock
- ◆ Maximum unit production per hectare by ruminant livestock