Chapter 15

Mini Livestock Ranching: Solution to Reducing the Carbon Footprint and Negative Environmental Impacts of Agriculture

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ABSTRACT

The rising demand and cost of animal protein, food and feed insecurity, environmental and climatic challenges of livestock agriculture have made the option of insects as food sources a viable topic. This chapter presents existing information and research on edible insects, insect farms and value-added insect products and assesses insects as a potential source of food and feed. Mini livestock ranching where edible insect species are reared, can reduce some of the negative environmental effects of livestock agriculture as it will produce significantly less greenhouse gas emissions compared with traditional livestock and have similar nutritional profiles. Edible insect species also; have a much lower feed to meat ratio, require small areas of land and have an almost negligible water requirement. There is an untapped potential to increase access to this nutritious, climate-smart food via intensified semi-cultivation and raising insects in farming environments, developing value added products and also a potential for a significant source of income.

INTRODUCTION

World population growth has been projected to be nine billion people by the year 2015 (Gerber et al., 2013) and accompanying this projection is a prediction that the food production rate will have to double in order to feed the future population. This together with rising food insecurity, concerns of agriculture contributing to greenhouse gas (GHG) emissions and how climate change will, in turn, affect agriculture productivity, are causing experts to reassess diets and approaches for food production (FAO, 2010a).
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and 2010b). Increasing food production and especially protein production in the future by increasing agriculture and livestock farming intensity, brings with it many challenges:

- There may not be land available to expand agriculture,
- If current overfishing of the oceans continues, this may deplete this resource for future populations,
- The high cost of animal feed brings with it a debate on whether grains should be used to feed animals or current human population and
- Increasing competition for scarce water resources.

Alternative solutions to conventional livestock and feed sources have led to the serious consideration of the potential for edible insects and commercial insect farming or rearing as an environmental, climate, land and water resource-friendly solution to contribute to food security, health and livelihoods (FAO, 2013). Raising insects for food would avoid many of the problems associated with livestock as they; require less land and water than livestock, they produce less waste, they do not have to be fed grains and they are not significant contributors to GHG emissions. Insect farms also do not require high resource inputs, technology or even medical services as compared to traditional livestock farms. Since insects are so different from man and vertebrate/livestock animals, risks of sharing diseases and co-infection are lower. However, there may be minor concerns of transferring microbial contaminants when feeding livestock with insect based feeds. Of all the known animal species, insects are abundant as 80% of animals walk on six legs (Dicke & Van Huis, 2011) and over 1,900 edible species have been identified by the UN so there are many different varieties that can potentially be sources of proteins for humans and animals with different flavors and potential for different value added products.

This chapter looks at the negative environmental effects associated with livestock farming including the high water and land resources needed to feed the expanding population. Rearing insects requires minimal land and water while offering an opportunity to counter nutritional insecurity by providing emergency food and by improving livelihoods and the quality of traditional diets among vulnerable people. The purpose of this chapter is to present information on edible insects and mini livestock ranching as alternative sources of food and feed; as a viable climate change strategy to combat challenges of conventional livestock farming, and that has the potential to become as important as traditional food production.

BACKGROUND

While industrialized agriculture has produced buoyant economies, it also has high external costs related to its environmental impact, climate, human health and animal welfare. The current challenge is producing food sustainably for more people, with fewer resources (particularly fossil fuels, land and water) and less environmental impact.

Current crop farming practices of land clearing and inefficient fertilizer and pesticide use, lead to significant release of GHG. Livestock production is also a major source of methane and nitrous oxide emissions from ruminant digestion and improper manure management is said to be responsible for 18% of GHS emission worldwide, more than is contributed by the transport sector (FAO, 2006b).

Potable water consumption by cattle, pigs, sheep and chickens in intensive livestock rearing has been calculated to be 103, 17, 9 and 1.3-1.8 litres per day respectively. This is exclusive of the service water requirements for the intensive rearing of these animals which is already water intensive. It takes approxi-
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