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LIVESTOCK AS A DOMINANT ENTERPRISE OF FARMING SYSTEM: A TUG WAR BETWEEN OPPORTUNITY AND ENVIRONMENTAL WELLBEING

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Global livestock production has increased manifold since the recent era of modern conflict (1st and 2nd World War) has ended, and demand for animal-based products has increased. The growth rate is predicted to be sustained in the coming days, too; the continuous increment of real income in developed and developing countries can be taken as the primary driving force. The livestock sector is now accounting for 1.4% of the World's Gross Domestic Product. The most significant achievement we drew from the growth of the livestock sector is fulfilling the per capita protein demand, especially in developed and developing countries, which is now seeping into relatively poorer counters. The animal-based protein created a buffer for such areas where plant-based protein dangles into uncertainty due to harsh climatic conditions, particularly in dry areas. Ifwe look at global statistics, livestock is currently providing food to 1 billion poor people and at the same time responsible for 40% of global agricultural output. Globally approximately 1500-million-hectare land is under livestock/pasture management. In the coming years, livestock will rise to such a stature that it will be providing 50% of global food demand. However, integrating animals in the farming system is different in developing countries from developed countries; in developed countries, livestock farming is a highly specialized, sophisticated stand-alone practice in developing countries; it is more of a part of the integrated system. These family-run integrated systems are responsible for 50% of the worlds meat,90% milk, and 50% cereal production. Moreover, the byproduct material of animal manure is a valuable source of energy and manure, especially in the case of resource-poor farmers.

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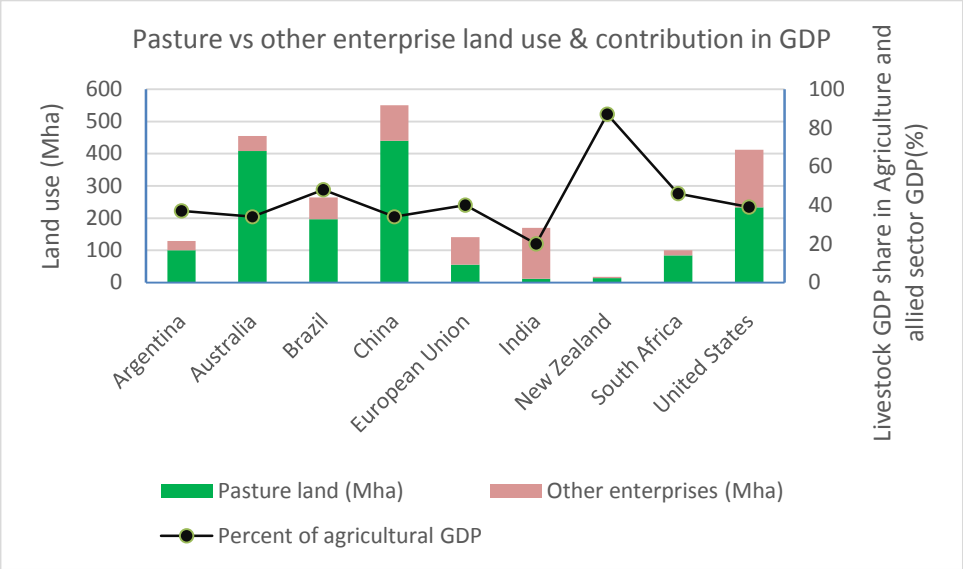

Figure1: Land use by pasture vs other agricultural enterprises and contribution of Livestock GDP in some of the leading countries of livestock production (Source- FAO)

Figure 2: Conversion of Amazon rain forest to grazing land

In the initial days, the growth of the livestock sector was smooth as the land was not a limited resource. However, in recent times land as well as water has become a scarce resource. Apart from resource scarcity, livestock production is also putting substantial pressure on biodiversity conservation. The situation is worsened due to the formidable threat of climate change, especially in developing countries.

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How livestock production can threaten the overall environmental sustainability and hasten climate change, we can cite the example of Brazil. Amazon rainforest is a critical element for global climatic stability, which falls in Brazil. Now, a large portion of the Amazon rain forest is getting destroyed each year and converted to ranch land for livestock grazing. The 70% of Brazilian Amazon rain forest is eventually converted to medium or large size ranch land. In the United States, 55% of the soil erosion and deposition of sediments, 30% of nitrogen and phosphorus loading in waterbodies source back to livestock-related agricultural activities. On a global scale, as livestock production will rise by 115% from 2000 to 2050, simultaneously, it will be responsible foran additional 23% of global N and 54% P circulation, which will ultimately cause air, water and soil pollution. Another projection has shown that 7.1 million tons of greenhouse gas emissions per year will be generated from the livestock sector, accounting for 14.5% of total anthropogenic GHG emissions.

As the demand forlivestock-based products and pollution from the same sector is simultaneously increasing while the supporting resource (land, air and water) is constant, the only way to tackle the scenario is improving resource use efficiency and reducing environmental footprint.

Economic Return and the Consumer Demand of Livestock Sector

The economic aspect of livestock production has two distinct parts. The first part is 2020; it is predicted that a whopping 5 billion people of Asia and Africa will start living in highly dense urban areas, which will lead to tremendous urban growth; however, the same area cannot be used for any production, including livestock. The second part is that the demand of those urban areas will be met by the farmers living in rural areas, the land of whom will be subjected to thrust for producing higher and higher production per unit area. As a result, per capita and unit earning will be much higher. For example, from 1990 to 2000, the demand for meat and milk had been increased by 55% and 20 % respectively in developing countries, which is now predicted to increase by a rate of 30% and 45% by 2030. Thus, the demand for livestock-based products will rise higher every day, especially in developing countries.

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Change of Land Use Pattern Due To Livestock

Livestock production and associated system are Earth's largest land user, holding 30% of the terrestrial landmass. A large part of it is under the subsistence farming system of Asia and Africa. The problem with subsistence farming practice is that it is highly dependent on deforestation; the only way to increase the production in the subsistence farming system is to extend its cultivable area horizontally. Currently, 26% of the global land area is used for grazing while 33% of the crop land is used to produce animal feed. To understand the complexity of land use, we must analyze the world's feed quality and pattern. In developed countries (Such as countries of Europe), animals rearing is specialized and intensive, where animals are feed with highly nutritious feed material. However, in Africa and Asian countries, animals are fed with nutrition deficit food materials or crop residues. As a result, the demand for bulk feed materials can be as high as ten times in resource-poor areas, the primary cause of deforestation and horizontal land expansion. The most resource-poor area on Earth is Sub Saharan Africa, which annually loses 0.3-0.4% of its area to ranching.

Another important aspect is the competitive food support of a particular system. For example, it is seen that a land area of one hectare can feed 19-22 persons when under staple food crops; however, the same amount of land can feed only two persons when under a livestock-based production system. So now, the whole system has to be overhauled to achieve sustainability.

Water Resource and Livestock

Globally livestock sector is one of the significant waters demanding sectors. The total water utilization in livestock rearing is divided into two groups, i.e., upstream and downstream. Upstream activities include growing forage crops, feeding and drinking water for animals while the downstream includes processing livestock derived products such as milk or meat or fur. The entire sector is responsible for 10% of total global anthropogenic water utilization.

In arid and semiarid areas, water is the most critical factor for livestock rearing. However, the water use efficiency in such areas and other areas used for animal production is far less than any other system. On Management per se, the interaction between water bodes and livestock is never taken seriously. The water used for livestock production per unit area

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and on a calorie basis is 30-50 times higher than cereal and root crops. Moreover, the judicious use of water in forage production is often an afterthought.

Impact of Livestock Production System on Land Degradation

Continuous highly mechanized cultivation of the soil for forage production and grazing significantly alters the soil and vegetation. The topsoil often gets loosened up, which results from higher erosion. Soil compaction due to these activities leads to less water infiltration and more runoff. Recent research from countries with high grazing rates points out that the infiltration rate can be reduced up to 80%. In Africa, 50% of land degradation leads to livestock grazing. This is often argued that the grazing land benefits from the animal excreta, which helps enhance the soil nutrient profile; however, higher runoff due to over grazing is asignificant issue. The livestock urine and excreta often get in routed to water bodies due to higher runoff. Another issue is that fodder crops are often not well-fertilized like food crops lead to soil exhaustion, especially in developing countries.

Conclusion

There is no doubt that livestock plays a significant role in modern agriculture and the food system. However, sustainability in livestock production is a burning issue and maybe much more complex than other agriculture enterprises. On one end, livestock is feeding a massive population of the developing world and providing a higher source of income while on the other hand possessing a more significant threat to the environment through several factors. Therefore, it is high time for the agronomist, resource managers, ecologists to engage in collaborative research, development and guidance initiatives to address the issue.

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