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Research Paper

The Relevance of Information Technology in the Context of Food Security and Environmental Degradation as a Global Issue

Engineering

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ABSTRACT

Contribution of livestock towards global food security cannot be denied, but environmental issues associated with livestock production needs immediate attention. Application of innovative approaches in nutrition, breeding, management, and knowledge of information technology are required to be adhered to reduce emissions from animal facilities. The compassion in world farming suggests that policy makers should look afresh at the whole issue of how we should rear animals for food in ways that protect the nutritional needs of people, the livelihoods of farmers, the welfare of farm animals and the global climate and environmental degradation.

INTRODUCTION

India has a total population of around 1.12 billion at present and which is increasing annually at a growth rate of 1.6% .Such fast growth in human population needs nutrition particularly of protein in nature which can be had out of livestock production.FAO has given the prediction that global meat and milk consumption will be about double by 2015. Livestock contributes about 4% of the country's GDP and 27% to the agricultural GDP. Livestock provides nutritional security to the poor. In addition it offers employment and livelihood to millions of people in the rural areas.

Livestock is the major source of protein supply of Indian population but climate change or the global warming out of livestock are also have become an issue due to release of CO_2,CH_4 and NO_2 from them. Therefore an application of innovative approaches embracing knowledge on information technology and better management of animal facilities is the task ahead in future.

Food Security Issues

The livestock consumes more human edible protein then they produce. In fact, livestock consumes round 77 million tons of proteins contained in feed stuff that could potentially be used for human nutrition, whereas only 58 million tons of proteins are contained in food products that are supplied by livestock. This is a result of recent trend towards more concentrated based diets for pig and poultry, with nutritional requirements more similar to humans than ruminants.

This simple comparison directs us to the fact that proteins contained in animal products have fare nutritive values than those in the feed provided to animals. Livestock contributes towards food security by providing a buffer in national and international food supplies that can be utilized upon in case of food shortages.

The different policy objectives like food supply, poverty reduction, food safety and environmental sustainability take on different level of importance depending on factors such as stage of development, per capita income and general policy orientation. In country like us, consumers are both concern for food security and environmental safety. This aspect requires to be revalidated taking into account the information technology as an attribute. This will make a background where livestock-environment interaction will be viewed properly.

Impact Of Livestock On Environmental Issues

FAO has clearly mentioned livestock on the one hand give food security to the hungry mass but at the same time creates environmental hazards including global warming, land degradation, air and water pollution and loss of biodiversity. It has been estimated that livestock is concerned with 18% of the total green house emission which is detrimental from the stand point of public health. These hazard aspects can be monitored by using information technology and modern biotechnology and effective measures could be achieved from such studies.

Global warming is caused by the following pollutants. The impact of such pollutants and their effect on public health are given in the following table.

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Table 1. The impact of such pollutants and their effect on public health

Carbon dioxide emission	Methane emission	Nitrogenous emission
There are three sources of livestock-related CO_2 emission 1) All domesticated animals emit CO_2 as part of basic metabolic function or respiration which is estimated at a total of about 2.8 billion MT annually. 2) Biomass burning results in CO_2 emissions, part of which can be attributed to land clearing and bush fires for pastures and enhancing pasture growth. 3) Livestock related consumption of fossil fuel for heating, manufacturing of machinery and production of feed releases CO_2. However, the same grasslands and forests recapture a part of CO_2 emissions. Improved grassland technologies and information technology can be taken into consideration for recapturing more CO_2 per hectare. Grazing systems with little fossil fuel inputs are likely to have a positive carbon balance, whereas this balance is likely to turn negative while intensity and commercial inputs increase in the industrial farming systems. Leaving aside respiration of domesticated animals, livestock operations can be associated with about 15 to 20 percent of CO_2 emissions.	Methane is 24 times more aggressive than CO_2 in causing global climate change on unit weight basis. Livestock and manure management contributes about 16 percent of total annual production of 550 million tons of CH_4. It is produced as a result of enteric fermentation of feed in ruminants. About 6% of feed energy is lost in methane. Methane emission is the direct result of the capacity of ruminants to digest large amounts of fibrous grasses and other feeds. Pigs and poultry cannot digest these fibrous feeds and therefore emissions from these animals are relatively low. Methane emissions per unit of product are higher when feed quality and level of production is low. Improved feeding leading to more efficient and profitable production can reduce CH_4 emissions. Manure stored under anaerobic conditions accounts for 20 percent of CH_4 emanating from animal production. High levels of CH_4 emissions from manure management are usually associated with high levels of productivity and intensity, as well as from large production units. The global methane emissions from livestock remained static despite growing livestock populations. Two factors are responsible for this trend:- 1) Advances in feed resources and nutrition as well as breed development. 2) Mono-gastric production is growing at a much faster pace than ruminant production. About 80 percent of the total growth of the livestock sector is attributed to pigs and poultry which emit comparatively small amounts of methane. Feeds should be made in such a way with improved biotechnology so that emission of CH_4 is less. This knowledge should be made available to the users end with information technology.	Nitrous oxide is produced in animal manure which contributes about 0.4 million tons N per year or 7 percent of the total global anthropogenic emissions. This gas is the most aggressive GHG. It has 296 times global warming potential compared to CO_2. Livestock sector accounts for 65 percent of human related N_2O emissions from grasslands and through their concentrate feed requirements along with emissions from arable land N-fertilizer used. Intensive animal production is blamed for higher N_2O emissions. In terms of polluting gaseous emissions which are not linked to climate change, livestock waste emits a total of 30 million tons of ammonia. This is focused in areas of high animal concentrations. Livestock and poultry operations account for 60-80% of the ammonia released to the atmosphere. Volatized ammonia contributes to acid rain, which affects biodiversity. It combines with other nitrogen and sulphur pollutants to form small air-borne particles that reduce air quality and threatens human health and results in nitrogen deposition and over fertilization of fragile eco-system. The deposition rates close to 50 pounds of nitrogen per acre has been found to yield and increase bio-mass of exotic grasses at the expense of native shrubs and possible incidence and severity of grass fires. Effective ways and technologies such as biotechnology and information technology may be used to reduce volatile emissions from manure. It is important for the animal industry to obtain better quantitative information on volatile nitrogen emissions (ammonia and nitrous oxide) from animal facilities and manure storage, and then to proceed with reduction of emissions utilizing best management practices and application of existing and new technologies. Better management of animal and manure storage facilities will be crucial while working to reduce volatile nitrogen emissions.

Environmental Degradation Issues

Some agriculture scientists are of the opinion that animal production has to be increased to have more yield per animal but this may also increase the emission output. Organization like Compassion in World Farming emphasizes that intensification of farming strategy may have impact on climate change and environmental effect.

Intensification of farming will definitely help in case of factory farming of pig and poultry and reduction in free range animals. The FAO experts suggest that industrial animal production systems increase at 6 times the rate of traditional mixed farming system and at twice the rate of grazing system. The increased demand for feed would put more pressure on land and water resources and increased pollution from manure and agro chemicals globally.

Conclusions

All out attempt should be made to decrease the pollutant level especially of methane of herbivores. Addition of more concentrate will definitely help in the production especially of monogastric animal but not in poly-gastric animals. It is likely to increase more methane and other pollutants with the help of technological advancement taking bio-engineering into consideration, number of pre-biotic and pro-biotic are developed. This pro-biotic and pre-biotic help in reduction of methane and other gasses. Recently various enzymes on cattle and poultry have been developed with the help of bio-engineering and molecular genetics to use against livestock. This aspect needs to be disseminated through information technology to the farmers' end so that they can derive benefit of production that means food security without much environmental pollution.

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