

Livestock production and improvement in India: Problems and opportunities in the context of global scenario

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Abstract

Livestock sector including dairying, poultry and fisheries contribute about 4% to national GDP and 30% to agricultural GDP in India. It provides nutritious food such as milk, meat, egg, fish; wool, hairs, organic manure, draft power, feathers, skin & hides, and other by-products from slaughter house as raw material for industry; nutritional, social and livelihood security and employment to millions of small, marginal and landless farmers; gender empowerment and human wellbeing in number of ways. India witnessed remarkable growth in milk and egg production (white revolution) and fish production (blue revolution) after 1950's and is number one in milk production, second in aquaculture, third in fish and egg production, and fifth in broiler production globally. However, average per unit productivity of milk, wool and pork is lower than in developed countries. Major constraints in livestock production relate to non-availability of adequate quality feed and fodder, low genetic production potential of indigenous breeds, morbidity and mortality losses due to infectious and non-infectious diseases.

Liberalized international trade, increasing demand for value added livestock produce and organic food, and climate change have further highlighted the importance of livestock farming. Livestock are the best insurance against the vagaries of nature like drought, famine and other natural calamities. Modern cutting edge technologies, innovative practices and policies for improved breeding, feeding, health care, management and trade will be necessary for meeting the increasing requirement of animal protein and other livestock produce. Constraints and opportunities in livestock production in India are discussed in the paper.

Key words: India, livestock production, opportunities

Résumé

Le secteur de l'élevage, notamment la production laitière, la volaille et la pêche, représente environ 4% du PIB national et 30% du PIB agricole en Inde. Il fournit des aliments nutritifs

comme le lait, la viande, les œufs, les poissons ; la laine, les poils, la fumure organique, l'énergie de traction, les plumes, la peau et les cuirs, et d'autres sous-produits de l'abattoir en tant que matière première pour l'industrie, la sécurité alimentaire, sociale et de subsistance et l'emploi à des millions de petits agriculteurs marginaux et sans terre, et l'habilitation du genre et le bien-être humain dans un certain nombre de voies. L'Inde a témoigné d'une croissance remarquable de la production du lait et des œufs (révolution blanche) et la production de poisson (révolution bleue) après les années 1950 et est le premier producteur du lait, deuxième en aquaculture, troisième dans la production des poissons et des œufs, et cinquième dans la production de poulets au monde. Cependant, la productivité moyenne par unité de lait, de laine et de viande de porc est plus faible que celle des pays développés. Les contraintes majeures de la production animale se rapportent à la non-disponibilité d'aliments de qualité adéquate et du fourrage, au faible potentiel de production génétique des races indigènes, et aux pertes par morbidité et par mortalité dues à des maladies infectieuses et non infectieuses. La libéralisation du commerce international, la demande croissante des produits d'élevage à valeur ajoutée et des engrais organiques et le changement climatique ont en outre souligné l'importance de l'élevage. Le bétail est la meilleure assurance contre les caprices de la nature tels que la sécheresse, la famine et autres catastrophes naturelles. Les technologies modernes de pointe, les pratiques et politiques innovantes pour l'amélioration de la reproduction, de l'alimentation, des soins de santé, de la gestion et du commerce seront nécessaires pour répondre à la demande croissante de protéines animales et d'autres produits de l'élevage. Les contraintes et opportunités dans la production du bétail en Inde sont abordées dans cet article.

Mots clés: Inde, production du bétail, opportunités

Background

The dynamic and diverse systems of livestock provide ideal safety nets for small holder and landless farmers. Livestock is also preferred tool for livelihoods, social transformation, women empowerment, employment and regular income generation in rural India. Liberalized international trade, increasing demand for value added livestock produce and organic food and climate change have further highlighted the importance of livestock farming. Livestock are the best insurance against the vagaries of nature like drought, famine and other natural calamities.

Livestock including poultry and fisheries contribute significantly to national economy in India. Fisheries alone contribute 1.1% to national GDP and 5.3% to agricultural GDP. Livestock and fisheries together contribute about 30% to agricultural GDP and 5% of national GDP. Average growth rate of dairy sector in India is about 4.2% as compared to world average of 1.1%. The fishery and poultry sectors have an average growth rate of 6%. In the states of Rajasthan, Bihar and Himachal Pradesh, the contribution from livestock sector was about 33% of agriculture GDP and almost half (48.6%) of the value of output from crop husbandry in the year 2009-10. Livestock is still more important in arid, semi-arid areas and hilly states of North-East India where it accounts for 40-50% of agricultural GDP. Human to livestock ratio in India is 2:1. Quality fodder, feed and fodder banks along with water conservation can change the face of hill agriculture.

Livestock provides quality nutritious food (milk and milk products, meat and meat products, egg and egg products, fish and fish products); wool, fuel, organic manure, draft power; feathers, hairs, skin and hides, bones, blood, fat and other by-products from slaughter houses as raw material for industry. Besides, livestock also ensure nutritional and social security; livelihood and employment to millions of small, marginal and landless farmers; gender empowerment and human wellbeing in number of ways. India achieved phenomenon growth in milk and egg production (white revolution) and fish production (blue revolution) after 1950's subsequent to independence in 1947. India has the distinction of being number one in milk production since more than a decade surpassing US, second in aquaculture, third in fish and egg production, fifth in broiler production, and seventh in meat production globally. However, per capita per day availability of animal protein is only 11g against the minimum requirement of 20g. Hence there is urgent need to double the production of milk, eggs, meat and fish to address the malnutrition problem in a sizeable proportion of human population

Average production of milk in cattle per lactation and wool and pork production per animal are lower than in the developed countries. The major constraints in achieving optimum livestock production relate to non-availability of adequate quality feed and fodder, morbidity and mortality due to infectious and non-infectious diseases; low genetic production potential of indigenous breeds which were primarily selected for draft purpose and adapted to harsh climatic conditions, low nutrition

plain, and abiotic stress. Application of modern cutting edge technologies, innovative practices and policies for improved breeding, feeding, health care, trade and management will be necessary for meeting the increasing demand of quality animal protein and other livestock produce as a result of higher incomes, health awareness, and population dynamics.

Challenges in Livestock Production

To face the challenge of global warming and climate change, agriculture production needs to be doubled by 2050 to feed the growing population. India has largest buffalo population in world and ranks second in cattle and goats, third in sheep, fifth in duck & chickens and tenth in camel population. The bovine population constituted 304 million in 2008. The total livestock and poultry population were 529.7 million and 648.8 million, respectively in the year 2007. Total milk production during 2009-10 was 112.5 million tonnes. The requirement of milk will be 142.9 and 171.3 million tonnes in 2015 and 2020, respectively. This will require a growth rate of more than 5% in milk production as against the present growth rate of 3.8%. The poultry industry has made remarkable progress in India by adopting modern management practices, germplasm improvement, quality nutrition and health coverage. Peak production as high as 316 eggs per layer per year, and broiler weight of 1.9 Kg in 39 days have been achieved (2009). Latest egg production estimate in India is 71 billion per year.

To achieve two digits growth by India, agriculture sector need to grow minimum 4 per cent. Since average growth in agriculture after 1990's has been around 2 to 3 per cent only, a growth rate of 6 per cent in livestock, poultry and fishery will push up the agricultural growth to 4 per cent.

Livestock Health

Economic losses due to diseases. Though it is not possible to estimate actual losses due to infectious diseases in want of adequate disease reporting system, over all losses due to animal diseases in India are estimated to be around Rs. 50,000 crores (Rs. 500 billion or US \$ 12 billion) annually. The economic losses due to FMD alone have been estimated to the tune of Rs. 20,000 crores (Rs 200 billion) per year. Approximate losses due to bovine mastitis are Rs 65 billion. Brucellosis is attributed to cause US \$ 58.8 million economic losses annually. For capacity building in animal health protection, investment in R&D needs to be stepped up to at least 2% of agricultural GDP from the present level of 1%.

Economic impact of avian influenza outbreaks in some of the countries is given below:

1. H5N1, Hong Kong outbreak 1997: US \$ 13 millions
2. H5N1 Hong Kong outbreak 2001: US \$ 3.8 million
3. H7N7 2003 outbreak in Europe: 30 million birds destroyed
4. H5N2 1983 outbreak in US: US \$ 65 million plus 30% fall in egg prices
5. H7N1 Italy outbreak 1999-2000: US \$ 100 million compensation and 500 million loss of livelihood

Encouraged by success of the eradication of Rinderpest, CBPP, African horse sickness and Dourine, the Government of India has taken up national control programmes against foot and mouth disease (FMD), PPR and Brucellosis, through mass vaccination of the susceptible population. Vaccines and diagnostics are indigenously available against major diseases of livestock and poultry, namely FMD, PPR, goat pox, sheep pox, enterotoxaemia, anthrax, black quarter, HS, Newcastle disease, fowl pox, IBD, Mareks' disease, swine fever, avian influenza, rabies, duck plague, theileriosis, Brucellosis etc. A DIVA test has been developed to distinguish between the immune response against trivalent FMD vaccine from that develops in response to the natural disease/infection. A battery of diagnostic assays/tests/kits, PCR and its modifications have been developed against important diseases.

Huge production and economic losses incurred as a result of infectious and non-infectious diseases in livestock and poultry, can be minimized considerably if proper health care and policies are in place at farm, national and international level. Besides the use of vaccines against infectious diseases, balanced nutrition, management and bio-safety measures, such as quarantine at national level for imported animals and at farm level for new introductions; control of vectors (mosquitoes, flies, rodents, scavenger and migratory birds), keeping poultry farms away from pig farms; hygienic measures and personal hygiene of the workers at livestock and poultry farms through antiseptic dip at the entrance of vehicles and people, change over and disinfection of shoes, clothing, head covers, compulsory bath while visiting animal farm after working in the laboratory and vice-versa should be used judiciously. Risk assessment is an important component as a safe guard against the introduction of disease producing infectious agent(s) through imported livestock, poultry and their products such as semen, embryos,

skins and hides, wool, hairs, feathers, bones, bone meal, meat and meat meal etc. For optimum production levels and hygienic milk production, timely prevention/control of mastitis needs priority attention for successful dairy farming. Early detection of subclinical and clinical cases through regular somatic cell count (SCC) and other modern tests, coupled with hygiene and GMP will be very helpful in reducing mastitis incidence.

Zoonotic diseases and bioterrorism. Zoonoses and bioterrorism are other important concerns both for animal and human health and wellbeing. Out of 1,465 infectious diseases reported globally from various animals species and man, almost 61 % are communicable from animals to man. Amongst the new diseases reported globally in last two decades, about 75% are zoonotic. Diseases like anthrax, avian influenza, swine flu, *Clostridium botulinum* toxin, equine influenza, glanders have the potential of causing wide spread disease, human sufferings, and crippling army operations. Important zoonotic diseases reported in India include rabies, anthrax, brucellosis, tuberculosis, salmonellosis, leptospirosis, listeriosis, Kayasnoor forest disease and buffalo pox. Rabies is important dreaded zoonotic disease. In spite of the availability of dependable cell culture vaccine, the disease continues to inflict humans and domestic animals. In India dogs are mainly responsible for transmitting the disease to humans and animals. Of the 25 million dog population, about 90% are stray animals, posing difficulty for their vaccination and breaking the cycle of circulation of the virus between pet animals, livestock species and humans. Globally there are about 55,000 deaths annually due to rabies including 20,000 in India. Ten million people are exposed to this disease every year. For effective control of rabies, concerted collaborative efforts of medical and veterinary departments and public awareness are necessary under 'One Health' agenda. In economic terms, prevention is investment whereas treatment is expenditure. Low cost alternate veterinary medicine by using homeopathy and Ayurveda systems of treatment need to be adopted, supported and promoted in rural areas lacking in adequate veterinary clinics infrastructure.

Veterinary Education and Delivery of Veterinary Services

For effective delivery of veterinary services in the field, one veterinarian should be provided for every 3500 adult cattle units. India is short of atleast 20,000 veterinary clinicians even when one veterinarian is to be made available for 5000 adult cattle units. Presently, about 1767 veterinary graduates pass out every year from the 52 veterinary colleges in the country. Average

annual intake of student admission is 60 per college. The requirement of qualified vets per annum in next five years will be 5332. Hence, there is a need to open more veterinary colleges and also to increase the admission capacity in the existing colleges as long term and short term solutions, respectively.

Livestock Nutrition

There is increasing realization about the importance of balanced animal nutrition for faster growth, sound animal health, immune response, reproduction and production. Innovative technologies and feeding practices such as supplementation with micronutrients in the form of area specific mineral mixture (ASMM), probiotics, prebiotics, reduction in methane production by ruminants, urea treatment of straws, and complete fortified feed blocks will have direct impact on livestock production and health. Diversification in the compound dairy cattle/buffalo feed for growing stock and lactating animals for different lactating/pregnancy stages is warranted. Adequate fat in the ration during first 100 days after calving, preferably by using by-pass-fat technology will help in improving milk production as well as reproductive efficiency. Similarly, by-pass-protein technology will ensure higher milk production of about 1 kg per animal/day as well as reduction in methane production. For peri-urban dairies, hydroponic fodder is a good alternative to green fodder due to limited availability of land for fodder production. There is need for research on hydroponic fodder and its use for economic milk production using indigenous technology and designs for various eco-agriculture regions. Any coarse grain like barley, oat, pearl millet, sorghum and maize can be used for this purpose. The technology will ensure enriched green fodder throughout the year having no dependence on land, rains, sunlight etc. Feeding chaffed fodder (1-1.5 inches) should be preferred as it requires less energy by the animal for chewing and rumination, resulting in higher milk production. All options for enhancing fodder production, namely availability of quality fodder seeds, fodder warehouses, silage making and feeding, growing short duration fodder crops (hybrid maize) utilizing the fallow lands after harvest of wheat crops and before paddy transplantation/sowing in north Indian plains, pasture grazing, development of degraded waste lands for fodder production need to be pursued with appropriate policy interventions. Green fodder and pasture grazing will also result in value addition of milk in terms of low cost, low fat content with higher CLA and EFA (essential fatty acids) content which are good for human health. To fulfil the requirement of milk and dairy products, India will require around 1000 MMT of green fodder by 2020.

Dual purpose wheat, barley and oat varieties will immensely help fodder availability. In order to address all the constraints in augmenting feed and fodder production, preservation, transportation and storage, a 'National Fodder Policy' is the need of the hour.

Genetics and Breeding

The genetic makeup of the animal determines its production potential. Best feeding and management as well as health will not increase milk production beyond the inherited genetic limit. Moreover, the breeding strategies should be aligned with market demand. For example, the modern day life style demands milk having low fat but higher contents of CLA and omega III fatty acids. Milk from those breeds of cows or buffaloes which produce A₂ milk, free from the harmful-Beta casein morphine 7 metabolite of Beta casein protein found in milk, which is harmful for infants and human health, will be in more demand in times to come due to more public awareness. As such, our breeding policy should aim to develop A₂A₂ herds by eliminating animals with A₁A₁ and A₁A₂ genotypes. The A₂ milk from indigenous Zebu breeds of Sahiwal, Sindhi, Gir, Rathi and Tharparkar will fetch higher prices as premium grade A₂ milk. Designer milk with higher CLA, omega III and low cholesterol content if produced through breeding intervention, will add to the value of milk which means better profits to the farmer and better health for the consumers.

Extension Services

For successful livestock, dairy, and poultry farming, farmers will require knowledge, training and skills in animal nutrition, feeding, balanced ration, breeding, management and animal health protection, clean milk production, issues related to HACCP, food quality and food safety, biosafety and biosecurity, silage preparation, green fodder production, deworming, first aid, pregnancy diagnosis and AI. Establishment of Extension Training Centres/Schools would be necessary for this purpose in adequate number.

Research and Development Roadmap

The broad agenda for research and development should be decided at national level by the research institutions/ organizations, veterinary and animal sciences universities, policy planners, industry and farmers representatives collectively. It should be shared by various research institutions in public and private sector following time line with in built monitoring and mid-term review and corrections. Model dairy research farms may be established in these institutions and universities. The R&D agenda should address all the components of dairy farming,

namely nutrition, breeding, health, management, processing, value addition, market intelligence and marketing.

Some of the priority areas for R&D consideration include development of technology of sexed semen and sexed embryos for Murraha buffalo and indigenous cattle milch breeds (Sahiwal, Gir, Rathi and Tharparkar); cloning of elite dairy breeds for production of superior males for selective breeding, breeding for enhanced feed conversion, development of cost effective eco-friendly feed formulation and feeding practices for tolerance to higher humidity and temperature and reduction in methane production, enhancing and value addition of feed and fodders by removing antinutritional factors, utilization of ligno-cellulose, development of ASMM and complete feed blocks free of mycotoxins; designer foods from milk and milk products, early pregnancy diagnostic kits, oestrus detection kits, packaging technology for longer shelf life of dairy products and milk, development of improved DIVA based marker vaccines and pen side diagnostic kits; breeding for disease resistance, A₂ milk with higher CLA and low cholesterol and fat.

**Policy Support/
Miscellaneous/
Technology Transfer**

A National Policy on Dairying under 'National Livestock Mission' is the need of the hour for all-round development of dairy industry. Various policies related to dairy development, for example National milk production and pricing policy, National feed and fodder policy, National bovine breeding policy, National Livestock Insurance Policy, National Policy on imports and export of dairy cattle, semen, embryos, milk and milk products, cake and oil meals need to be in place. Producer company, cooperative or PPP based dairy model in rural areas through common service centres for bio-gas production, AI, milk chilling and primary processing for value added products, developing value chain for organic milk, eggs & fish need to be supported through self-help groups with appropriate policy. A national level information centre should be established to collect, collate and provide information on all aspects of dairying, poultry and fishery. The government should support dairy and fishery in all possible ways by providing tax holidays to the industry for setting up cattle and fish feed plants, mineral mixture plants, milk processing plants, dairy parks, cold chain infrastructure, exemption of import duty on dairy equipment and VAT on dairy products; providing subsidy on ASMM, deworming medicines, fodder and fish seeds, vaccines, and incentives for keeping high milk producing animals and their progeny. Soft loans and duty free imports of equipment should be provided for long shelf life

packaging of milk and milk products to circumvent the cold chain requirement during transport to distant markets.

Reducing the burden of unproductive animals (40%) by using sexed semen/embryos, assisted reproduction technologies of embryo transfer, cloning, marker assisted selection; selection for higher productivity, disease resistance and fertility index, along with policy support, are future options to safeguard livestock production and health. Investment in agriculture (inclusive of livestock poultry and fishery) has been reduced to 9% from 18% of agriculture GDP in the initial 5 year plans. It needs to be stepped up both by public and private sectors. The disconnect between technology generation and its successful transfer to the farmer need to be bridged. Instead of research and development (R&D), emphasis should be on research for development (R4D). It is a coincidence that the last words spoken by Dr Norman Borlaug, Nobel Peace Prize recipient were “take it to the farmer”.

Capacity Building for Trade in Livestock and livestock Products

Animal husbandry sector contribute significantly towards exports. India exports meat, dairy products, fish and fish products, leather and leather products to a number of developing and developed countries The export earnings from livestock, poultry, fishery and leather industry were more than Rs.354088.6 million during 2010-11. Under the provisions of WTO, globalization and liberalization, the exporting country is required to meet the SPS requirements, particularly for freedom from specified infectious diseases and residues of drugs, antibiotics, pesticides, metals, preservatives etc with in prescribed MRL. In order to safe guard the interest of the country while exporting or importing live animals, animal produce and products, biosafety aspects need to be looked carefully. To accomplish this, capacity building in developing diagnostics and vaccines as per OIE standards, cold chain facilities for transport and storage, and meeting BIS, Codex Alimentarius standards are pre requisites. Adequate facilities for handling category A infectious agents, exotic pathogens, GMOs in the form of BSL 3 and BSL 4 bio containment laboratories are required.

Conclusion

The major constraints in achieving optimum livestock production are non-availability of adequate quality feed and fodder, low genetic production potential of indigenous breeds, high morbidity and mortality due to existing, emerging, re-emerging infectious diseases, threat of exotic and Transboundary infectious diseases, low value addition and inadequate remunerative prices for

livestock produce. Dairying, Animal Husbandry, Poultry, Fisheries and Horticulture will be the future engine of growth in Indian Agriculture, and an important component for ever green revolution. There is a saying “poverty breeds poverty and hunger breeds hunger”, due to malnutrition, poor hygienic and diseases. Therefore, while increasing livestock production and productivity, the profitability aspect also needs to be looked into. Following quotes signify the importance of agriculture and livestock for India.

“Everything can wait but not agriculture” (Pandit Jawaharlal Nehru, First Prime Minister of India)

“Cultural Development of a country can be judged by the way the animals are kept”
(M.K. Gandhi)