conference presentations

Small Holder Animal Production Systems in Eastern and North-Eastern India



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Introduction

griculture and allied activities are still the main source of livelihood for more than 50 percent of the population in India. It is estimated that the I percentage of agricultural workers of total work force would drop to 25.7 per cent by 2050 from 58.2 per cent in 2001 (www.financialexpress.com). The tremendous drop in manpower in agricultural sector as forecasted can be best explained by the relatively low level per capita income opportunity in agriculture sector as well as overdependence of agricultural activities on the mercy of weather. Indian agriculture still can be considered as 'Complex, Diversified and Risk Prone' because of its extreme dependence on weather (Mohammad and Chatterjee, 2018). Still agriculture is the principal source of livelihood for more than 58 percent of the population of this country (Anand, 2017). Farmers who are rearing livestock along with crop farming are not only generating sustainable livelihood but also capable of managing the challenges of diverse farm situation vis-à-vis vagaries of nature. Currently, India is the world's largest producer and consumer of milk

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accounting for 19% of the world milk production and consisting of about 57 % of world buffalo and 16% of world cattle population (DAHD, NAPDD, 2018). If we analyze the agricultural situation of Eastern India, it reveals that the zone is facing peculiar problem which is characterized by fragmentation of land holding. In case of West Bengal, all the farmers are falling under marginal farmer category because of land ceiling policy adopted in late seventies. On the other hand farmers from Northeastern India is facing the problem of lack of input support, harsh climatic condition coupled with problematic soil which are also hindering the agricultural development of the region. The agriculture situation of North Eastern states is characterized by subsistence, low input-low output, technologically lagged mixed farming system, and is dominated by smallholders. Although cereals dominate the cropping pattern in this region, livestock are an important component of mixed farming system and dependence on livestock as an alternative source of income is significant (Kumar et al, 2007). In these circumstances, it can be said that, only raising field crops cannot generate the livelihood of the farmers of eastern and north eastern states of India but the livestock based farming system can cushion the small holder farmers from the losses and further deserting farming as occupation. Livestock

April 2019

Conference Special (Part - II)



sector contributes significantly, around 26 percent of the rural poorest household and 12 percent of the total rural household income. It signifies the role of animal husbandry sector in the livelihood generation of small holder farmers. Thus, it is very much important to understand animal production system of eastern and north eastern India for formulating policy pathways to strengthen the sector.

Status of Livestock vis-à-vis dairying in Eastern and North Eastern India

The animal production of Eastern India (West Bengal, Bihar, Jharkhand and Odisha) and North Eastern India (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura) is mainly depended on grazing with little supplementation. Eastern (102.07 million) and north eastern states (26.60 million) have large number of livestock population (19th livestock census, Govt. of India). A study conducted by Gupta et al (2014) revealed that the animal production system in eastern and north eastern India is dominated by rearing of non-descriptive animals as a result of that milk production per animal is very low. Milk production Bihar is leading in Eastern India; whereas, all the North eastern states are lagging far behind. The enormous potentiality of North Eastern states can be tapped in terms of milk production if proper implementation of dairy development plans is executed.

The eastern and north-eastern region has about 320 lakh human population, 86% of whom live in the rural areas (India-73%). Estimated productivity of the region per lactating animal is much lower than India's average, though the numbers of milch animals per household are comparable (0.69 and 0.65 animals, respectively). The per capita milk availability in this region is generally much lower than the national average (145 versus 355 g in 2016-17). The milk production in India was 165.4 MT in 2016-17. Agro-climatic condition of India is always

considered to be the triggering factor for diversification in livestock population and its productivity.

More than 48 percent of the milk produced in the farmers' household is consumed by the farmer's household and it generates around 52 percent of the marketable surplus of milk. This marketable surplus are either directly sold to the consumer or unorganized milk marketing systems. Very limited amount is channelized through organized marketing system. If we look into the production system of livestock sector of eastern and north eastern India, it can be clearly understood, the system is subsistence in nature.

Major constraints in livestock development in Eastern and North-eastern India

Livestock and dairy development have received little attention in the Eastern and north-eastern regions of the country. Though the cattle and buffalo improvement strategy has been laid down by the Govt. of India at national level, but it is very hard to implement to state level where the animals is being reared in small herd size of 2-3 animals mainly by small, marginal and landless farmers of different socio-economic levels and lack of availability of sufficient organized cattle/buffalo farm. Some of the major constraints for a sustainable dairy/ livestock development in this region are as follows:

Limited land for fodder cultivation: As the farmers are having limited land holding, they are not ready to cultivate fodder crops in eastern India, whereas, land is not a limiting force for fodder cultivation in north eastern India but farmers are reluctant to grow fodder crops as farmers are not aware about the scientific fodder cultivation technologies or understand the benefit of fodder cultivation. There was a sharp shortage in area under permanent pastures and other village grazing lands in eastern and NER. Acute shortage of concentrate and green fodder is the root cause of the poor

8	
Type of dairy animals	Milk yield (kg/d/animal)
Exotic/Crossbred Cows (kg/day)	6.78
Indigenous/Non-Descript Cows	2.50
Buffalo (kg/day)	4.91
Goat (kg/day)	0.45

Source: Annual Report 2014-15, Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Government of India, New Delhi

Table 1: Average Yield Rate for Milk

April 2019

Indian Dairyman

Patna 2019, 7-9, February

conference presentations

47th Dairy Industry Conference

performance as the genetic potentiality of an animal cannot be exploited fully in the absence of proper nutrition.

Predominance of non-descriptive animals: Poor genetic potential of local indigenous animals resulted in poor animal productivity. Predominance of non-descriptive cattle especially in north eastern and eastern states makes the animal husbandry sector subsistence in nature. Though different pockets of Jharkhand, Bihar, Orrisa or West Bengal has adopted crossbreeding programme as well as upgradation with Indian pure milch breed of Sahiwal/ Gir/Red Sindhi etc., but still the progress in crossbreeding or breed up-gradation in north eastern states is not up to the mark. Lack of superior germplasm is another main constraint for dairy development in this region (Das, 2006; Mandal *et al*, 2012). Use of scrub bulls hinders the genetic improvement of cattle and buffalo in these states.

Low lactation length: Average lactation length of ND cattle in the region varies between 6.5-10 months, whereas, in crossbred cattle it varies between 9-11 months.

Long dry periods: In case of ND cattle dry period varies between 4.5-14 months and in case of crossbred cattle it varies between 2.5-7.5 months.

Housing and health care: The housing management and health care management system is still not an important proposition for majority of the farmers of eastern and north eastern India. Farmers in several north eastern states free their animals in the night and only search out their animals whenever they require milk or other animal product.

Inadequate surveillance and monitoring of infectious and contagious diseases

Lack of proper performance recording schemes, especially in the smallholder sector and for indigenous breeds. Small population sizes, small herd sizes and unreliable animal identification are major constraints for implementation of different livestock development programmes.

Lack of proper marketing facility causes another serious problem for purchasing raw material as well as selling different products and slaughterhouse by-products. Above all, sometimes lack of trained manpower leads to production of poor quality products which is unfit to compete in regional and national market.

Inadequate monitoring of field works, feedback failure, rate of adoption of the scientific knowhow through various trainings.

Indian Dairyman

84

Poor perception of the farmers towards livestock production as a viable alternative. Lack of perception of farmers to real need and poor research focus and planning.

Strategies for improving the dairy/livestock sector in Eastern and NE region

The general strategy for sustainable improvement programmes for any dairy/livestock sector in any particular agro-climatic regions should focus on the optimization of the genetic potential according to environmental factors (e.g., the needs of the market, the ecological environment and future development), nutritional intervention, disease control management and proper marketing channels. Unfortunately, the production systems vary considerably from area to area and even from farmer to farmer. Therefore, breeding management, nutritional management, health management as well as proper marketing facility should be taken into consideration for improving the livestock sector in this region.

Breeding strategy for improvement of dairy animals

In eastern and north-eastern regions, the cattle population which is mainly dominated with indigenous cattle population are being reared mainly under lowinput production system where quality feed and fodder resources are not available in sufficient quantity and the farmers are resource-poor as well as infrastructure facilities (marketing, health care etc.) are inadequate. The local non-descript low producing cattle which are being reared mainly under low-input production system in this region can be genetically improved by grading up using high genetic merit pedigreed and preferably progeny tested proven bulls of well known indigenous cattle breeds like Sahiwal, Tharparkar, Red Sindhi etc. To avoid the destruction of valuable indigenous breeds with unique adaptability characters available in this region, selective breeding in the breeding tract/adjoining area of the breeds is suggested for Gangatiri (eastern UP), Bachaur (Bihar) and Siri (West Bengal and Assam). But due to non-availability of adequate number of high genetic merit pedigreed or progeny tested bulls of indigenous breeds, this system of bringing genetic improvement may not be much encouraging (Mandal et al, 2012).

Exotic breeds like Holstein Friesian cattle can be recommended as the breed of choice in the irrigated plains and Jersey cattle can be effectively used in hilly terrain and coastal areas of West Bengal for crossbreeding. The optimum level of exotic inheritance in crossbreed

Conference Special (Part - II)



cattle should range between 50 and 75 per cent as higher level of exotic inheritance would lead to many health and physiological problems attributed to existence of genotype-environment interaction (Steane, 1999). Therefore, to maintain the optimum level of exotic inheritance in crossbred cattle, the F1 crossbred females should be bred with the semen of genetically superior progeny tested crossbred males having exotic inheritance between 50 and 75% produced through inter-se mating among crossbred animals. To sustain the improved productivity of crossbreds and to check the decline in performance in subsequent generations, it requires a well laid down breeding policy along with availability of quality breeding bulls in sufficient numbers, infrastructure on AI and animal health inputs, delivery of services, programme monitoring and regulatory mechanisms.

Nutritional strategy for improving livestock production

In eastern and north eastern part of India farmers are less aware of balanced nutrition to their dairy livestock. The problems are much increased due to marginal cultivation of quality fodders throughout the year. In facts farmers are reluctant for fodder cultivation which has been considered as low valued crops as compared to rice, oilseeds, pulses etc. As per NIANP, Bangalore estimate India faces the shortage of concentrate mixture, green fodder and dry fodder by about 66.3, 45.5 and 13.8 percentages, respectively. The shortage is much higher in eastern and north-eastern part due to less fodder cultivation and small number of organized feed manufacturing industry. On an average 6 percent of total land (328.73 ha) in India is being used for grazing of our livestock.

In eastern and NE India there is lot of opportunities to use monsoon green biomass of hilly terrains as fodder resources after suitable processing; like, hay making, complete feed block/pellet preparation and silage making. We shall be able to enhance the productivity of the dairy animals (targeting cross-breeds/improved indigenous breeds/ buffaloes) in these regions by implementing some feeding strategies as under,

• Judicious use of available degraded/poor soil for grassland development/silvi-pasture/horti-pasture/ agro-forestry development to enhance the fodder production per unit of land.

• Conservation of monsoon herbage with suitable processing and storage for use during the lean period.

• Implementation of complete feeding technology with block/pellet/Total Mixed Ration (TMR) making to enhance milk production/growth by using locally available feed resources (including paddy straw).

• Due to gradual shrinking of land intensive/semiintensive production of dairy animals should be given more emphasis by implementing scientific breeding, feeding and other management practices.

• It is important, therefore, that improved feeding systems and improved efficiency of feed use are viewed clearly in a farming systems perspective. In this context, the following prerequisites are considered important:

- (i) Knowledge of availability of all feeds (forages, crop residues, agro-industrial by-products and non-conventional feed resources) throughout the year.
- (ii) Synchronization of feed availability to requirement by animal species.
- (iii) Assessment of the extent of feed surpluses and deficits.
- (iv) Development of strategies to cope with the shortfalls.
- (v) Increased feed production (e.g. production of multipurpose tree legumes and development of food-feed systems).
- (vi) Priorities for use of crop residues with proper processing to enhance utilization of nutrients. Development of feed conservation measures and strategic supplementation for milk production.

Animal health measures to augment production

The control of animal diseases still has a high priority in livestock production, mainly because infectious diseases can cause heavy losses. Some of these diseases can be controlled with relatively cheap vaccines. However, the control of infectious diseases with vaccines cannot be seen in isolation from other technical inputs better housing and hygiene, nutrition and scientific management practices. Obtaining veterinary services under traditional livestock production system is far from satisfactory and farmers practice traditional herbal treatment. Therefore, the Governmental approach to improved animal health should follow the pathway of reducing disease occurrence by identifying and controlling the risk factors which contribute to the occurrence in a given region.

Management of animal manure produced on farm, represents a major health hazard. The problem increases

conference presentations

with increasing herd size and intensification, and is associated with a number of issues including: quantity and quality of manure and urine produced; inadequate removal, frequency of removal and storage in proximity to where the excreta is produced; labour availability; methods used for manual disposal; value and use of dung; and linkages to rural areas. In most situations, the systems for manure management and use are very haphazard and present serious problems to both animals and humans.

Marketing strategy for improving the livestock sector

Marketing is the key instrument in the development of any dairy/livestock sector. The success story of dairy development in the country through the co-operatives was largely due to an effective marketing network created by the National Dairy Development Board. Unfortunately, marketing seems to have taken the back seat in the context of Eastern and North-Eastern States, though the States have been implementing programmes to increase agriculture, horticulture and livestock productivity, for the last several Five Year Plans. The reason of milk flowing into this region from outside is mainly due to the inadequacies of marketing infrastructure in the region. Though there is excellent demand for milk and milk products of the region, the farmers are not able to produce and receive fair remuneration due to the high cost of input supplies and a poor existence of marketing network. Though the Eastern and North Eastern region has great potential in the animal husbandry sector, the same has not been exploited to the extent it should have been due to reasons of inaccessibility, lack of marketing network, poor infrastructure and delivery system. Though some infrastructure has been created by each of the States in the region, for instance in terms of AI centres, breeding farms, liquid semen banks, hatcheries, liquid nitrogen plant etc. in the livestock sector, but these are not used properly.

Agri-Livestock Integrated Farming System

Mixed farming systems are considered environmentally sustainable because of complementarities between crop and livestock production. Animals derive most of their feed-fodder requirement from agricultural residues and by-products, and in turn provide milk, draught power and dung manure for cropping activities. Mixed farming systems, however, are undergoing a steady transformation due to increasing pressure on livestock

Indian Dairyman

86

to produce more to meet the growing food demand. The non-food functions of livestock, that is draught services and manure production, are declining its importance because of increasing use of biomechanical inputs in crop production and declining size of land holding. Livestock development plans must take into account the diversity of livestock species and, therefore, appropriate packages for cattle, buffaloes, sheep, goat, yaks, mithun, camels, pigs etc. must be developed. These packages include aspects of feeding, health and hygiene, housing and breeding and should be relatively small scale. The income of these subsistent farmers is too low to justify large investments (Deb. 2015). Integrated farming system with either dairy animals (crop/cattle/buffaloes) or with small ruminants (crop/goat/sheep) may increase the productivity and profitability per hectare of land. Introduction of silvipasture/agri-silviculture/horti-silviculture in the livestock based IFS may also enhance the productivity and profitability of the farmers in eastern and north-eastern states of India.

Conclusion

There is a tremendous scope for growth in animal husbandry production sector in eastern and north eastern India. Farmers of Eastern and North Eastern India have limited knowledge for fodder production; whereas, it was observed that quality fodder production and balanced feeding regimen may enhance milk production potential of the animals as well as profitability per unit of land use. Proper planning coupled with strengthening field level extension mechanism can change the overall scenario of animal husbandry sector in Eastern and North Eastern India. For eastern India, alternate feed resources and high yielding fodder crops should be popularized. To enhance the productivity and increasing the lactation length of the animal suitable breed up gradation programme along with strict monitoring regime should be introduced to enhance the productivity of farm animals. Animal husbandry sector by this way can generate the desired level of livelihood for the small holder farmers of eastern and north eastern India. Taking into consideration the conditions prevailing in the Eastern and North-Eastern regions, the States need to formulate plans which are suited to the people of the region. The region has a great potential for development of livestock provided requisite inputs are made available at the door step of the farmers by improving the delivery system. An integrated development programme combining an area-specific

April 2019

Conference Special (Part - II)



farming systems approach with a regional strategy is essential to tap the rich bio-diversity of this region. It is necessary to address several major constraints and issues that affect the totality of production to consumption systems, as well as the environment. The considerable research and development opportunities that exist provide major challenges for demonstration of increased productivity from dairy cattle; efficient management of natural resources; improved livelihoods for poor farmers; and the development of sustainable production systems that are consistent with environmental integrity (Devendra, 2001).

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April 2019

Indian Dairyman

87