

Livestock economy in North East India: emerging patterns and its implications

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Journal of Livestock Science (ISSN online 2277-6214) 15: 60-68
Received on 17/1/24; Accepted on 27/2/24; Published on 10/3/24
doi. 10.33259/JLivestSci.2024.60-68

Abstract

The article examines the composition, production, growth, and contribution of the livestock economy of North East India. It observes that cattle, goats, and pigs are important components of the livestock population in North East India. However, growth rates of milch livestock show a slow and negative growth rate, implying profound implications for milk production in the region. Pig and poultry show robust growth rates, suggesting North East farmers' inclination towards low capital-intensive and short-maturity livestock. Important livestock products like milk, meat, and eggs depict a slow growth rate in the region compared to all India figures, resulting in a huge shortage in the region. The contribution of livestock to the total Gross Value Added and its growth in the region shows signs of strength but is still lagging behind India's overall performance. Livestock feeds and infrastructure are also areas of concern, even though there is vast potential for improvement in the Northeast region. The article emphasizes the need for a dairy revolution in the region.

Keywords: North-East India; Livestock Population; Livestock Density; Livestock Products; Livestock Consumption

Introduction

The livestock sector is becoming a critical subsector of agriculture as it generates strong backward and forward linkages in the economy, providing gainful income and employment to the farmers and enriching the nutrition of the rural and urban food basket. Globally, this sector employs at least 1.3 billion individuals and directly supports the livelihoods of 600 million poor smallholder farmers in the developing world with its increasingly organized long-chain market (Thornton *et al.* 2006). The livestock sector contributes 40 % of the global value of agricultural output. It supports the livelihoods and food security of almost a billion people. It contributes 15 % of the total food energy and 25 % of dietary protein, providing essential micronutrients not easily obtained from plant-based foods (FAO, 2009). Empirical studies carried out in India have found strong indications that livestock rearing has a significant positive impact on equity in terms of income and employment and can help in rural poverty eradication (Birtal & Ali, 2005). The importance of livestock is more profound in tribal dominated hill areas like North East India as it is an important source of protein in addition to the income and employment augmenting potential of the sector (Singh 2023). Moreover, livestock distribution is more egalitarian than land distribution (Taneja & Birtal, 2004). Unlike land, livestock assets are not bounded by property rights, and therefore, these can be acquired with small start-up capital multiplied effortlessly to accumulate wealth and generate cash flows (Birtal, 2022).

Sustained economic growth, expanding urban population, changing lifestyles, and increasing health consciousness are affecting a significant shift in the food basket in India, with the per capita consumption of food grains either stagnating or showing signs of decline, but the consumption of high-value livestock food commodities has increased significantly (Kumar *et al.* 2006; 2007). Livestock sector plays a critical role in reducing poverty, improving resilience, and combating food insecurity and malnutrition (Enahoro *et al.*, 2019). But on the supply side, India has a substantial livestock population with very low productivity due to poor feeding, low quality of animals, and inadequate veterinary facilities accompanied by other infrastructure, output marketing, institutions, and price incentives problems (Chand & Raju, 2008). Nevertheless, India's demand for various superfood products, mainly animal-based, will continue to increase, necessitating a possible change in the food production system and agricultural trade with rising per capita income, urbanization, and globalization (Gupta, 2018). On the other hand, the conventional role of livestock as draught power in developing countries is on the decline because of increased mechanization and factory farming (Khan & Bidabadi, 2004).

The importance of livestock in North East India is more pronounced owing to limited arable land, a high proportion of the meat-eating population, and rapid urbanization. The North East Region with its eight states: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim has its definite identity due to its peculiar physical, economic, and socio-cultural characteristics. The Northeast region is also one of the world's most biodiverse regions, reflecting ecological and cultural contrasts between the hills and the plains. Arunachal Pradesh, Meghalaya, Mizoram, Sikkim, and Nagaland are almost entirely covered by hilly areas, 40 -50 % of Assam by plains, whereas Manipur and Tripura have both plains and hilly regions. Agriculture is the prime source of livelihood for the majority of the rural population in this region, characterized by subsistence, low input-low output, and a technologically lagged mixed farming system dominated by smallholders. Marginal farmers and landless labourers rear different sub-types of livestock to expand their livelihoods (Das *et al.* 2017). Traditional meat-eating habits, increasing per capita income, urbanization, changes in lifestyle, and social and cultural acceptance all mean that meat consumption is relatively higher in this region than milk and milk products (Kumar *et al.* 2007). The present paper seeks to understand the various issues confronting the livestock economy of Northeast India and the need to strengthen the sector for rural transformation and the nutritional security of the region.

Data Source & Methods

The article uses secondary data to analyze some macro-level issues facing North East India's livestock economy. The data on livestock population is compiled from different livestock censuses, including the latest 20th Livestock Census. The compound growth rates were computed to analyse the population trends of livestock species. The %age contribution of the agriculture and livestock sub-sector is calculated using Basic Animal Husbandry Statistics (BAHS) 2019, published by the Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India and North Eastern Development Finance Corporation Ltd. Databank. Monthly per capita consumption of livestock products is calculated using data from various reports on household consumption of multiple goods and services in India 2011-2012 conducted by the National Sample Survey Organization (NSSO) of the Ministry of Statistics and Program Implementation, Government of India. For the calculation of per capita availability of meat products, population figures are used from Population Projections for India & States 2011-2036, published by the National Population Commission of India, Government of India. The percentage share of employment to the state-wise number of workers and total employment by livestock sector was calculated from the 5th and 6th All India Report Economic Censuses,

Government of India Ministry of Statistics and Program Implementation. Basic livestock infrastructure like veterinary institutions, artificial insemination (AI), permanent pasture, grazing land, etc., are analyzed using data from BAHs.

Livestock Resource in the North Eastern Region (NER)

The North Eastern Region of India had a total of 24.3 million livestock and total poultry of 69.2 million in 2019 (See Table 1 & 2), contributing 4.5 % to the all-India livestock population and 8.1 % to the country's poultry population, respectively. Cattle occupy the most significant %age share of 54.84 % of the total livestock population in North East India. The goat population is about 22 %, followed by the population of pigs, which contributes around 17 % of the total livestock population in NER. In contrast, the population of horses and ponies, mithun, mules, donkeys, camels, and yaks had a small and negligible share of the total NE livestock population. The number of different species of livestock, such as cattle, pigs, mithun, and yaks, has shown a faster and increasing annual compound growth rate compared to other species, such as buffaloes, sheep, goats, horses, and ponies, which have witnessed negative and decelerating trends. A negative and negligible growth rate of milch livestock like cattle (0.02 %), buffaloes (-1.9 %), sheep (-6.1 %), and goats (-5.2 %) will have severe implications for the availability of milk in the region.

The structure of the livestock population is changing in North East India, where the overall growth of the population of livestock has decreased by -2.6 % in the period 2012-2019 as compared to 1.5 % in the period 2007-2012 while that of poultry exhibited a significant increase by 6.3 % in the period 2012-2019 as compared to -0.3 % in the period 2007-2012 (see Table 1). It is clear from Table 1 that cattle, pigs, and poultry have a significant share in the livestock population. Two important observations can be drawn from these trends and figures. First, NER focuses more on time-tested species like cattle and pigs serving local needs. Secondly, the region is orienting towards less capital-intensive animals, short maturity, economically efficient, and better feed conversion. Table no. 2 depicts the state-wise distribution of livestock population. The percentage share of NER's total livestock to all India is 4.5 %, and that of poultry was 8.1 % in 2019.

The contribution of North East India's pig population to India's total pig population is impressively high, amounting to 46.8 % (see Table 2). North East India has a vital role in the pig segment of India's livestock. Assam possesses the highest number of total bovines (cattle & buffalo) and ovine (sheep & goat), which is more than two-thirds in each category, half of pigs, and approximately two-thirds of poultry birds in the region. Assam is the largest state in NER while sharing the border with the other six states helped facilitate the movement of livestock, particularly beef, cattle and pigs, and poultry, across the border, partly fulfilling the gap between demand and supply of meat in the states like Nagaland and Manipur (Kumar et al., 2007).

As a result of observed changes in the population of livestock and poultry birds, their densities too varied across the North Eastern States. The livestock density per '00 person has declined in the North Eastern States from 60 in 2012 to 54 in 2019, which is moderately higher compared to the India figure of 44. On the other hand, poultry density in North East India has increased from 96 in 2012 to 152 in 2019. The poultry density in NE India is much higher than India's figure of 70. Among the NE states, Manipur has the lowest livestock density at 21, and Arunachal Pradesh has the highest at 84. Except in Meghalaya & Mizoram, all the Northeast states register a fall in livestock density, with the highest incidence in Sikkim at an astonishing 191.11%. On the contrary, except for the states of Arunachal Pradesh and Tripura, all the other North East states experience a high %age growth of poultry density. These changes in livestock and poultry density in North East India further emphasize the earlier argument for the region going for less capital-intensive and short-maturity animals.

Livestock Production Trends in NER

A demand-driven revolution in livestock production and consumption is taking place in many developing countries, including India, impacting nutrition, health, environment, and marketing (Khan & Bidabadi, 2004). Livestock products are broadly divided into five categories, namely (a) milk, (b) meat, (c) poultry, (d) dung, and (e) wool and hair (Chand & Raju 2008). For this study, the focus will be on only three products: milk, meat, and egg, as North East India, has a significant production of these three products, and the rest are not produced meaningfully in the region. North-East Indian farmers have responded positively, but not robustly, to the increasing demand for livestock products. In absolute terms, milk production in North East India has increased from 1141.43 thousand tonnes in 2008-09 to 1454.17 thousand tonnes in 2018-19 (see Table 3). During this period, egg production increased from 9887.14 lakh to 11356.9 lakh, while meat production increased from 207.05 thousand tonnes to 245.5 thousand tonnes. Despite increased production of these three essential components, the North East share in India's production has shrunk. The percentage of NER in the country's annual milk production was 1.02 % in 2008-09, which declined to 0.77 % in 2018-19. Likewise, the share of egg and meat production was 1.78 % and 4.93 %, respectively, in 2008-09, which declined to 1.1 % and 3.03 % in 2018-19, respectively. This implies that all the composition of livestock output, viz. milk, egg, and

meat, have increased at a slower rate in NE at 2.45 %, 1.4 %, and 1.72 %, respectively, than at the national level's 5.28 %, 6.4 %, and 6.81 %.

Table 1: Structure and Growth of Livestock Species Population (NE States)

Species	Population in million	% To total population (NE total)	compound growth rate (% in annum)	
	2019	2019	2007-2012	2012-2019
Cattle	13.3	54.9	-0.11	0.02
Buffaloes	0.5	2.09	-2.08	-1.9
Sheep	0.4	1.5	6.7	-6.1
Goats	5.4	22.3	5.7	-5.2
Pigs	4.2	17.5	-2.8	1.01
Horses & Ponnies	0.01	0.07	89.1	-38.5
Mithun	0.4	1.6	2.4	3.8
Mules	0.000730	0.003	-	-
Donkey	0.000910	0.004	-	-
Camel	0.000570	0.002	-	-
Yaks	0.03	0.12	-1.08	7.2
Total Livestock (NE)	24.3	4.5 (to all India total)	1.5	-2.6
Total Poultry (NE)	69.2	8.1 (to all India total)	-0.3	6.3

Source: Government of India (2019) Various Livestock Censuses All India Report 2007, 2012, 2019, Ministry of Agriculture & Ministry of Fisheries, Animal Husbandry & Dairying, Department of Animal Husbandry & Dairying; *CAGR for 2007-2012 and 2012-2019.

Table 2: Livestock population in NE States of India: 2019 (in Millions)

State	Bovine	Ovine	Pigs	Total Livestock	Poultry
Arunachal Pradesh	0.35	0.2	0.3	1.2	1.6
Assam	11.3	4.6	2.1	18.1	46.7
Manipur	0.3	0.04	0.2	0.6	5.9
Meghalaya	0.9	0.4	0.7	2.03	5.4
Mizoram	0.05	0.02	0.3	0.4	2.04
Nagaland	0.09	0.03	0.4	0.6	2.8
Sikkim	0.1	0.09	0.02	0.3	0.6
Tripura	0.7	0.4	0.2	1.3	4.2
NER	13.89	5.8	4.2	24.3	69.2
All India	303.31	223.1	9.1	536.8	851.8
Share of NE in India %	4.6	2.6	46.8	4.5	8.1

Source: Government of India (2019) 20th Livestock Census All India Report, Ministry of Fisheries, Animal Husbandry & Dairying, Department of Animal Husbandry & Dairying.

Table 3: Composition of Livestock output in NE states of India 2008-09 and 2018-19

State/Region	Milk ('000 tonnes)			Egg (lakh no.)			Meat ('000 tonnes)		
	2008-09	2018-19	CGR	2008-09	2018-19	CGR	2008-09	2018-19	CGR
Arunachal Pradesh	24.39	55.1	8.49	360.5	594.64	5.13	20.36	21.87	0.72
Assam	753.15	882.27	1.59	4658.93	5014.61	0.74	30.69	50.4	5.09
Manipur	78.47	85.75	0.89	1105.25	1053.24	-0.48	23.11	28.05	1.96
Meghalaya	77.47	86.61	1.12	994.52	1090.36	0.92	37.02	45.25	2.03
Mizoram	16.88	25.75	4.31	411.14	415.19	0.10	12.54	16.12	2.54
Nagaland	53.44	72.57	3.11	831.92	374.74	-7.67	63.22	32.28	-6.50
Sikkim	42.04	60.85	3.77	136.51	54.56	-8.76	0.89	3.71	15.34
Tripura	95.59	185.27	6.84	1388.41	2759.56	7.11	19.22	47.82	9.54
NER	1141.43	1454.17	2.45	9887.14	11356.9	1.40	207.05	245.5	1.72
India	112183	187749	5.28	555624	1033176	6.40	4199.65	8114.45	6.81
Share of NE in India %	1.02	0.77		1.78	1.1		4.93	3.03	

Source: Government of India (2019) Basic Animal Husbandry Statistics, Various Issues, Ministry of Fisheries, Animal Husbandry and Dairying, Department of Animal Husbandry and Dairying; CGR: Compound Growth Rate

There existed a considerable variation in milk, egg, and meat production growth rate across the states in North East Region, which varied from 8.49 % in Arunachal Pradesh to as low as 0.89 % in Assam in terms of milk production. Tripura showed the highest growth rate regarding egg production, while Manipur, Nagaland, and Sikkim witnessed a decline at an annual rate of -0.48 %, -7.67 %, and -8.76 %, respectively. The growth rate of meat production saw the highest in the state of Sikkim at an annual rate of 15.34 % to as low as 0.72 % in Arunachal Pradesh, while Nagaland witnessed a decline at an annual rate of -6.5 %. Such wide variations in livestock output or production affect the availability of livestock products and their consumption pattern in the region. The high rate of meat products in the largest state of North East India, Assam, is likely to facilitate the meat demand gap in other neighbouring states.

Livestock consumption and per capita availability of livestock products

A major opportunity for the development of the livestock sector lies in the increasing demand for animal food products (Ali, 2007). With the changes in lifestyles, per capita income, and growing urbanization, the consumption pattern of India is experiencing a significant change with no exception to the North Eastern states of India. Compared to other food items, the demand for livestock products or animal food products is more responsive to changes in income (Kumar et al., 2011; Gandhi and Zhou, 2010). Milk and milk products are primary sources of proteins in India, particularly for most of the vegetarian population, and their contribution to calorie and protein intake has been increasing over time and was the second highest after cereals in 2009–10 (Kumar et al., 2014). However, the monthly per capita consumption of livestock products, that is, milk, particularly milk liquid, eggs, and meat (goat meat/mutton, beef/buffalo meat, pork, chicken) for the North Eastern States remained far below the recommendation of the Indian Council of Medical Research (ICMR) which is 280 gram per day of milk, 11 kg of meat per annum and 182 numbers of egg per year. Owing to this deficiency in the livestock products' consumption level, the NER's livestock sector has a vast scope for scaling up of livestock production. It can be observed from Table 5, that the monthly per capita consumption of milk is higher in urban areas of all North East states except in Sikkim, where per capita consumption is higher in rural areas vis-à-vis urban areas. The overall comparison shows the per capita milk consumption is relatively low in both rural and urban areas of North East India compared to all India's milk liquid consumption. The lower level of consumption of milk and milk products in the region could be partly attributed to the lower purchasing power of the populations and the deviant food habits in these states.

In terms of per capita consumption of eggs, both urban and rural consumption is relatively low in all North East states, where consumption is higher in urban areas compared to rural areas except for the states of Manipur, Nagaland, and Sikkim, where rural and urban area consume approximately the same amount of eggs (see Table 4). Coming to the monthly per capita consumption of meat, some contrasting figures in urban and rural consumption in some states are observed in Table 4, where rural consumption in Assam, Manipur, Meghalaya, and Nagaland is greater than urban consumption, and in Arunachal Pradesh, Mizoram, Sikkim, and Tripura has higher urban consumption of meat. Overall, the consumption of livestock output is below the recommended requirement for a balanced diet in North East states and India as a whole.

Further, in 2018-19, the all-India per capita availability of milk far exceeds the daily consumption recommendation of ICMR by 40.72 %, which amounts to a surplus of 147976.67 tonnes. India is the highest producer of milk in the world had its credit to the Operation Flood Programme started in 1970, resulting in an impressive increase in milk output started as a part of this programme, along with institutional support for milk marketing and production complemented by technological intervention for breed improvement, remunerative pricing environment for milk based on quality and infrastructure for dairy animals (Chand and Raju, 2008). However, the per capita milk availability at the aggregate level in the Northeast Region is far below the recommended milk consumption level. Sikkim has the highest at 251 grams/day, yet below the required recommendation, whereas Assam has the lowest per capita availability at 71 grams/day, having a deficit of 6931.70 tonnes of milk. The overall per capita availability of milk for the North Eastern states is 82.89 grams/day, which amounts to a total deficit of 9474.29 tonnes of milk, about 70.4 % of the recommended consumption requirement, a substantial nutritional deficiency in this region. One of the main reasons for this outcome is relatively low-yielding milch animals, making the situation even worse: the average productivity of local cattle and buffalo was less than half of the national average for North East states (Kumar et al. 2007). In spite of the weakness, the region has enormous potential in the dairy sector. A study carried out in Mizoram emphasised the need for regular training programs of dairy farmers in the areas like vaccination, deworming, fodder cultivation, AI, herd recording etc. to make the dairy sector vibrant and sustainable (Malsawmdawngliana and Rahman 2016). The role of Self Help Groups (SHGs) in improving the productive performances of dairy cattle is well documented in a study by Rahman and Gupta (2016) in Assam.

The country's per capita availability of eggs is less than half of the recommended consumption requirement of 79 eggs/annum, resulting in a deficit of 133 billion per annum. The per capita availability of eggs in NER states is also far below the adequacy to meet the recommended requirement. But amongst the states, Tripura has the highest consumption at 70 eggs per capita per annum and the least for the state of Sikkim at just 8 eggs per

capita per annum for the year 2018-19, having a deficit of 61.54 % and 95.6 %, respectively to the total requirement of the respective states. However, the overall picture is a huge deficiency regarding egg availability. The per capita availability of meat products in the aggregate level in North Eastern states is 5.11 kg per annum, which is almost half the required recommendation by ICMR, an overall deficit of 53.55 %. Arunachal Pradesh (48.27 %), Meghalaya (45.27 %), Mizoram (34.91 %), Nagaland (20.73 %), and Tripura (11.27 %) have a surplus of meat products except Assam (-86.18 %), Sikkim (-48.82 %), and Manipur (-3.64 %), which have a deficit in the per capita availability of meat. The consumption of livestock products is driven by religious and cultural factors also, and some sections of the population may or may not consume certain livestock products, but a huge shortage of meat (-53.55 %) and eggs (-87.36 %) in the predominantly meat-eating population of North East India is going to experience its huge resources being diverted in the import of livestock products which the region has enormous production potential.

Table 4: Monthly per capita consumption (2011-12)

States	Urban			Rural		
	Milk (litres)	Egg (no.)	Meat (kg)	Milk (litres)	Egg (no.)	Meat (kg)
Arunachal Pradesh	1.384	6.772	0.946	1.017	3.865	0.73
Assam	1.74	5.441	0.423	1.388	4.097	0.434
Manipur	0.405	1.456	0.165	0.252	1.671	0.369
Meghalaya	1.598	3.961	0.741	0.984	1.89	0.832
Mizoram	2.105	6.851	1.252	0.535	3.531	0.866
Nagaland	0.238	3.522	1.607	0.161	3.172	1.822
Sikkim	5.45	1.972	0.845	6.433	1.654	0.549
Tripura	1.363	4.268	0.429	0.887	2.799	0.388
All India	5.422	3.18	0.388	4.333	1.937	0.278

Source: Government of India (2014) NSS report no. 558: Household Consumption of Various Goods and Services in India 2011-12, Ministry of Statistics and Programme Implementation, New Delhi.

Table 5: GVA by economic activity (compound growth rate in %) at constant price 2011-2012 for 2018-19 (2011-12 to 2018-19).

States	Agriculture	Livestock	Manufacturing	Construction	Service	Total GVA
Arunachal Pradesh	-0.55	4.74	22.33	7.16	6.55	4.77
Assam	3.14	4.19	10.32	6.71	7.06	6.94
Manipur	1.66	2.27	5.81	15.02	5.13	4.62
Meghalaya	3.6	2.75	-8.95	1.63	6.73	2.36
Mizoram	9.56	3.81	4.87	6.62	6.63	8.25
Nagaland	2.21	-7.07	8.66	3.11	5.8	4.56
Sikkim	5.52	7.67	7.84	1.2	4.86	5.49
Tripura	7.72	16.69	11.44	7.47	6.77	8.25
NE Total	3.56	3.85	7.84	6.77	6.69	6.35

Source: NEDFI Databank: <https://databank.nedfi.com/content/ner-databank>

Livestock's Contribution to Income & Employment

Livestock contributes nearly 25 % to the gross value of agricultural output and has been increasing consistently (Ali, 2007). Growth in the livestock sector has always remained higher than in the crop sector (Birthal and Taneja, 2006). Livestock contribution to income and employment in rural India is immense and can be observed at household and individual levels. The contribution of livestock to income can be captured through data on GVA by economic activity. India is experiencing robust growth in the livestock sector in recent times, it is growing at 4.47 % from 2013-14 to 2017-18, higher than agriculture (1.64 %), and construction (2.85 %). The contribution of livestock in terms of income is keeping up its pace in North East India. The share of livestock in total GVA in NE India is 1.66 % compared to India's 4.1 %. Manipur, Meghalaya, and Tripura are the states in NE India, with more than 3 % of livestock in total GVA. The livestock sector in NE India is growing at an annual compound rate of 3.85 % as against 3.56 % of the agricultural sector from 2011-12 to 2018-19 (see Table 5). Tripura experienced the highest growth rate at 16.69 %, followed by Sikkim with 7.67 %. Nagaland is the only state with a negative growth rate of 7.07 %. Other states like Arunachal Pradesh, Assam, Manipur, Meghalaya, and Mizoram have a moderate growth rate. It is now becoming evident that the livestock sector is emerging as essential in generating income.

Many poor farmers take up livestock as a sub-sector of agriculture as a self-employment practice. Data from the NSS Livestock Ownership Survey will highlight the importance of self-employment in livestock as an

important source of income. According to NSS 70th Round “Livestock Ownership in India,” around 1.75 % of the total rural households of the country derived significant income from self-employment in livestock farming, which comprises about 2.7 million rural households, owning around 0.489 hectares of land per household. Assam, with 4.27 %, is the only state with a higher %age of households having a major source of income from livestock as self-employment, followed by Sikkim with 1.48 % and Tripura with 0.96 %. States like Meghalaya (0.02 %) and Nagaland (0.22 %) have a limited share of households with livestock as major income sources from self-employment. In North East states of India, the %age distribution of household operational holdings reporting animal farming by category of operational holdings is the highest in the marginal category followed by small and semi, with only Assam and Mizoram reported to have 0.61 % and 5.26 % of the medium class of operational holdings and none of the states have reported to be under large category of holdings. So, it is likely that farmers with minimal land holdings find it quite profitable when their farming has been diversified to livestock farming, yielding their income quickly. Also, with the increase in population and land fragmentation due to the law of inheritance that prevails in India, the number of marginal farmers is on the rise, which may be the reason for the increase in diversification of crop cultivation to livestock farming. Overall, NE states are yet to treat the livestock sector independently as a source of income, though it is significant as a sector for diversification.

The livestock sector has been employing a large section of the rural population and has been a key driver of rural diversification in India. An important data source for people engaged in livestock activities is the Economic Census data. The Economic Census Data is enterprise-based, not a worker-based survey. Still, it provides data on persons involved in livestock enterprises and is useful in understanding livestock livelihood and employment aspects. Livestock provides livelihood to the majority of the landless, marginal, small, and medium smallholders in the North Eastern States of the country, which is around 3 lakhs workers of this region contributing a %age of 1.65 % of the total workforce in the area in 2013 as per the report on 6th Economic Census. Mizoram has the highest number of people employed in this sector, with 4.34 % of the state’s workforce engaged in livestock. The lowest %age share accounts for the states of Arunachal Pradesh and Nagaland at 0.2 % and 0.8 %, respectively, against all India’s %age share to the total workforce of 4.1 %. But when we look into the annual growth rate of the number of persons employed in the livestock sector in the NE, all the States except Arunachal Pradesh and Nagaland showed a positive growth rate from 2005 to 2013. Assam has the highest growth rate at 18.9 % annually, which is even higher than the NE combined growth rate and much higher than the all-India growth rate of 8.64 %.

Livestock Feeds & Infrastructure

The growth and productivity of livestock output depend on the availability of grazing lands, feed and fodder, veterinary facilities, and technology. Feed and fodder play a crucial role in determining the growth of the livestock sector. Livestock in India are mainly fed on crop residues and byproducts and grazing lands where cultivated fodders and gathered grasses are the two essential sources of green fodder supply in which 2 % of the gross crop area in the country were allocated to fodder crops (Kumar & Dhiraj, 2008). As per NSS data, only Assam has a fodder crop area of 3 thousand hectares among the NE states of India. The total livestock served per hectare is very low and almost insignificant compared to India’s total area of hectares, which is 9249 thousand hectares. North-East states have a total of 199 thousand hectares of permanent pastures and other grazing land where the total livestock served per hectare is just 0.008, which is insignificant considering the considerable livestock population. There is an indication of a massive gap between the requirement for and the availability of feeds and fodders in the region.

Livestock infrastructure, particularly artificial insemination, determines the output level. A 1 % increase in artificial insemination (AI) increases livestock output by 0.24 % (Chand & Raju, 2008). The number of AIs performed, as measured by the ratio of AIs performed to total livestock in NE states, is 0.13, marginally less than all of India’s 0.14. Arunachal Pradesh has the highest number of AI performed among the NE states, with 2.07, while Mizoram, with 0.01, has the least. Assam, having the largest livestock population of 18.1, has comparatively fewer AI performed with 0.02.

Veterinary institutions and practitioners are critical in fostering livestock growth and productivity by reducing the cost and risk factors involved in livestock rearing. The total number of veterinary institutions in NE is 3138, as per Basic Animal Husbandry Statistics, which is just 4.7 % of the total numbers in the country. Consequently, one veterinary institution caters to as many as 7759.5 livestock, which seems a little overcrowded. Assam has the highest number of veterinary institutions and the least in Sikkim. But Assam has the highest number of livestock served per veterinary institution, amounting to 14793.3, which is overcrowded compared to most other North Eastern states. Apart from the number of veterinary institutions, the National Commission on Agriculture (1976) recommends one veterinarian for every 5000 livestock for effective delivery of veterinary services. The states of Arunachal Pradesh, Assam, Meghalaya, and Tripura have more than 5,000 livestock per veterinarian. The lesser number of institutions and veterinarians has a negative impact on livestock rearing and the production process. There are frequent outbreaks of diseases like foot-and-mouth disease

(FMD), black quarter (BQ), pestedespetits ruminant (PPR), and influenza in India (Birthal 2022). Livestock diseases can severely harm animal and human health and have adverse economic impacts on farmers' incomes, markets, trade, and consumers.

Policy Implications

Commercial motivation in the livestock sector in the region is lacking due to a shortage of feeds and fodder, high marketing costs, and technological obstacles. This trend of continuing shortfalls in meat and egg production, and more importantly, stagnant milk production in the region, will have a ripple effect both in the short and long term, resulting in income and nutrition deficits. The transition from household base to commercial base can only be achieved through proper institutional support in the form of an increase in institutional investment, well-defined extension services, and an increase in the availability of feed and fodder. The share of the livestock sector (including animal husbandry and dairy development) in the total public spending (revenue and capital expenditure) on agriculture and allied activities (union and state governments) is estimated at 5.2 %, which is disproportionately low compared to the sector's contribution to the agriculture GVA (Birthal, 2022). This is all India figures, and the state-wise allocation for North East India could be worse. There is a need to pump up the investment in North East India as the region has huge potential in the livestock sector, especially for milch livestock, pigs, and poultry.

Basically, the region needs a dairy revolution to boost milk production and consumption, benefiting producers and consumers. The dairy revolution must focus on accelerating production and increasing efficiency in distribution through value additions and value chains. The region has enormous potential for growing and producing livestock feeds and fodder from its rich, unutilized hill and mountain resources. Improving the efficiency of breeding services of these milch livestock in the region will be a critical step towards the dairy revolution.

Conclusion

Traditionally a meat-consuming region, North East India, in recent times, has experienced accelerated consumption of livestock products, especially meat, and egg, driven by an increase in income and urbanization. Milk is considered an important segment that North East India is yet to pick up in both production and consumption. The growth and production of the livestock sector in North East India are abysmal. This is both a challenge and an opportunity for the entire North East Region. A high livestock-consuming region will take less time to transform into a high livestock-producing region if appropriate policy interventions and investments in livestock are made.

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