



Trends in livestock population, production, productivity, availability, and demand in the Nagaland State of India

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Nagaland is an agrarian North Eastern state of India with over 71% of its population dependent on agriculture and allied sectors. Livestock sector contributes around 18% of the state gross domestic product of Nagaland. Livestock and poultry farming are practiced by the people since time immemorial and are symbolic to the health and wealth of a Naga family (Singh *et al.* 2019a). Livestock farming plays a pivotal role in supplementing family income and generating employment (Singh *et al.* 2022) for the rural poor apart from efficient utilization of agricultural products and byproducts not suitable for human consumption (GON 2015, Report of Task force on agriculture development).

Food consumption is influenced by economic, social, cultural factors; globalization, urbanization and other factors, but income is an important driving force that enables people to change their consumption patterns (Vranken *et al.* 2014). As income rises, there is a shift towards diets with more meat, fat, sugar, processed foods and less fiber (westernized diet) (Erik M 2015). Consumption of livestock products in developing countries is projected to increase from 29% to 35% in 2030 and by 37% in 2050 which compares to an average of 48% in industrial countries (FAO 2006). Increased consumption of livestock products will lead to increased demand for natural resources to produce more livestock products (Sharma *et al.* 2018). This has to compete with the production of other agricultural products and also with the use of grains for human consumption (Gandhi and Zhou 2010).

It is expected that income growth will lead to changes in food consumption basket in Nagaland. There are no recent updates available on changes in food composition basket of Nagaland with reference to livestock products. Nagaland

is mainly inhabited by people of mongoloid ethnicity and their food and cultural habits are very distinct from people of mainland India. People of this region consume high amount of animal protein. Therefore, this paper analyses livestock population dynamics over the last twenty years in Nagaland, demand and supply of livestock products in Nagaland.

Livestock populations of the state were retrieved from 1997 to 2019 from various Livestock census, GoI. Compound Annual Growth Rate (CAGR) was computed using ordinary least squares method to fit the exponential function (Tripathi *et al.* 2019). Data for the number of animals slaughtered, total meat production, livestock product production (meat, milk and egg) were collected from Statistical Handbook of Nagaland, Government of Nagaland (GON), published on annual basis. Monthly per capita consumption of livestock product were taken from National Sample Survey Organization (NSSO), GoI, 2004-05 and 2011-12 and published in the year 2006 and 2014, respectively. Percentages, ratios, trends and other tabular analysis methods were also utilized to meet the above objectives.

Livestock population: Pig almost accounts for 50% of total livestock population from 1997 to 2007 (Table 1). However, share of pig in total livestock population increased to 55% in 2012 and 73% in 2019. Crossbreed pig comprises almost 50% of total pig population. Tenyi Vo is indigenous unique germplasm of pig characterized by early sexual maturity. Pig rearing is the main stay of livestock farming because of high preference of pork by the tribal people (Singh and Mollier 2016). Tribal farmers prefer pig rearing for fattening purpose rather than for breeding purpose (Kadirvel *et al.* 2012, Singh *et al.* 2019a). Cattle population was highest in 2007 and thereafter it decreased to 76.87 thousand in 2019. Tho-tho is indigenous germplasm of the cattle present in Kohima and Zunheboto districts. Buffaloes are of swamp type, mainly used for draught and meat purpose. Cattle are mainly reared for meat purposes and there are very few dairy farms in the state. Urbanization

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Table 1. Livestock population of different species in Nagaland (in thousands)

Livestock/Year	1997	2003	2007	2012	2019
Pig	571.176	644.214	697.791	504	404.70
Cattle	383.308	423.017	469.818	234.97	76.87
Buffaloes	36.131	33.757	35.022	32.72	15.65
Mithun	33.345	40.452	33.345	33.00	23.12
Sheep	2.333	4.187	3.649	3.84	0.36
Goat	160.761	174.929	178.072	99.35	31.60
Total Livestock	1187.054	1320.55	1417.69	907.88	552.3
Poultry	2443.56	2722.13	2866.30	2172.00	2838.94

(Source: Various livestock census, GoI, 2003, 2012, 2019)

leads to development of dairy sector, at the periphery of urban areas. Mithun is a unique bovine animal present in Nagaland, concentrated in remote and hilly districts of the state. It is a wild animal and survives in forest. Population of mithun has also decreased over the years and it is being used for meat purpose. Goat breed is non-descript and it is small in size which is suitable for mountainous region.

Population of total livestock decreased by 55% in 2019 compared to 1997. Compound annual growth rate (Table 2) is very low and even negative in almost all of the livestock species. Poultry is the only species which has increased in 2019 over the base population of 1997. Positive growth in poultry sector is mainly due to expansion in backyard poultry farming. Research station of Indian Council of Agricultural Research is vigorously engaged in spread of technology of scientific backyard poultry farming with improved breeds like Vanaraja and Srinidhi (Singh *et al.* 2018a, Singh *et al.* 2018b) in the region.

Livestock farming in Nagaland is constrained by increase in human population, decreasing land resources, climate variability, changes in livestock disease pattern, lack of quality germplasm, inadequate extension, use of outdated technologies, lack of animal health infrastructure, absence of feed processing plant, high dependence on subsistence agriculture, poor marketing infrastructure and problem of credit flow in the sector (Singh and Mollier 2016). Due to decrease in livestock population, Nagaland imported livestock and livestock products worth of ₹2120.51 million in 2018 from other parts of the country (GoN 2018). Backyard livestock production is the main livestock rearing system in the region and it is zero to low input and low output system (Kumaresan *et al.* 2009, Kumar *et al.* 2017). Production cost of livestock is

much higher in Nagaland than other states of the country mainly due to high feed cost, remoteness and hilly terrain (Singh *et al.* 2018b).

Total meat production increased from 28 thousand metric tonnes in 2001-02 to 102 thousand metric tonnes in 2012-13, denoting a 364% growth and thereafter it decreased to 32 thousand metric tonnes in 2018-19 (Table 3). Pork constitutes almost 50% of total meat production from 2011-12. In the year 2014-15, share of pork was 90% in total meat production.

Nagaland is deficit in production of all livestock products (Table 4). Meat, milk and eggs production are deficit to the tune of 51.34, 33.34 and 79.61%, respectively. Nagas are highest consumers of pork as well as meat in India (NSSO 2014).

SUMMARY

This paper analyses livestock population dynamics, demand and supply of livestock products and their consumption pattern in Nagaland. Livestock population of all species except poultry has decreased. Similarly, meat and egg production decreased over the last two decades whereas milk production has increased on a small scale. However, due to changing lifestyle, increasing urbanization and increasing income; demand of meat and more specifically pork has considerably increased. The state is deficient to the tune of 50% in all livestock products. On one side, there is increasing demands and on the other side there is continuous decline in livestock population. It is imperative that Nagaland's domestic supply will be unable to meet its current demand. To meet the growing demand for livestock products, Nagaland has to adopt competitive and sustainable livestock production technologies which

Table 2. Compound annual growth rate of different livestock species in Nagaland

Livestock	1997-2003	2003-2007	2007-2012	2012-2019
Pig	0.019729	0.020966	-0.06311	-0.03145
Cattle	0.527454	0.02658	-0.1294	-0.14753
Buffaloes	-0.01126	0.00924	-0.01351	-0.10
Mithun	0.032725	-0.04715	-0.00208	-0.04956
Sheep	0.10238	-0.0338	0.010256	-0.28692
Goat	0.014176	0.004462	-0.11015	-0.15095
Total Livestock	0.017921	0.017903	-0.08528	-0.06854
Poultry	0.018156	0.012985	-0.05396	0.038996

Table 3. Meat production in Nagaland from different animals (in thousand tonnes)

Species	Year																	
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Cattle				25.14	26.28	25.08	20.42	27.12	27.31	20.44	30.94	-	3.63	11.50	9.51	9.73	-	-
Buffalo				1.89	2.82	8.26	11.78	11.24	11.05	11.68	14.4	-	0.99	5.44	2.99	4.56	-	-
Mithun				-	-	-	1.50	0.51	0.43	0.44	0.63	-	N/R	N/R	NA	NA	-	-
Sheep and Goat				1.50	1.66	1.45	1.73	2.28	2.44	1.77	3.46	-	0.80	0.76	0.66	0.66	-	-
Pig				24.47	23.25	20.42	29.27	24.94	24.87	32.00	50.36	50.0	60.45	15.55	16.99	16.81	15.77	-
Dog				-	-	-	-	1.61	1.70	-	0.95	-	0.11	N/R	0.62	NA	-	-
Rabbit				-	-	-	-	0.06	0.10	-	1.62	-	0.02	N/R	0.30	0.31	-	-
Total	28.00	33.00	48.07	49.73	53.00	54.00	55.21	64.70	67.76	67.90	66.33	102.36	67.48	66.00	33.25	31.37	32.40	32.28

Source: Statistical Handbook of Nagaland of various years, GoN.

Table 4. Availability and shortfall in different animal products in Nagaland in 2017-18

Item	Total requirement of the state	Availability (State internal production)	Monetary value of availability in the state (Rupees in millions)	Shortfall in the state	% deficit in the state
Meat	66700.00 metric tonnes	32450.00 metric tonnes	6863.20	34250 metric tonnes	51.34
Milk	117710.00 metric tonnes	78460.00 metric tonnes	13534.40	39250 metric tonnes	33.34
Egg	1956.50 lakhs	398.76 lakhs	239.30	1557.7 lakhs	79.61
Total (Monetary value in millions)	35585.925 millions		20636.90 millions	14922.025 millions	41.93

Source: Statistical Handbook of Nagaland, 2018, GoN.

not only increase the productivity, but have positive impact on environment and animal ethics.

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