



Balance sheet of pork production and consumption in Nagaland: Implications for strengthening of pork value chain

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ABSTRACT

Per capita meat and pork consumption is highest in Nagaland, India. The present study analysed pork production and its consumption in Nagaland, North East India vis-à-vis the pork value chain. In Nagaland, two processes are simultaneously present: a high demand of pork and a continuous decline in the pig population. The pig population in Nagaland has decreased by almost 42% since 2007 and almost 20% since 2012. Highest pork production in Nagaland was recorded in 2014–2015 with 60.45 thousand metric tonnes and then it declined to 15.77 thousand metric tonnes in 2018–2019. Compounded annual growth rate in pig population and pork production saw negative growth rate during last two decades. In consumption basket, pork constitutes almost 50% of total meat consumed. The state is deficit by 51.34% in meat production in 2017–18. The structure of pig value chain is dominated by small holder farms, traditional out dated technology, unorganized input services, lack of infrastructure, and absence of marketing channels. To make the pig value chain competitive, there is urgent need to revamp the pig production technology, strengthen the marketing infrastructure including slaughter houses, and increase in credit flow in the pig sector.

Keywords: Compounded annual growth rate, Nagaland, Pork, Value chain

There is rising demand for livestock products particularly during the post WTO period (Kumar and Roy 2011). Consumption of animal protein is expected to increase by two to three times by 2050 (FAO 2011). Rising income, animal feed market, human population growth and eating habits will influence the pork production in future (Grgic *et al.* 2015). Pigs are raised traditionally in Nagaland since long time and they have become the symbols of Naga culture (Singh *et al.* 2019a). Pigs alone account for 72% of the total livestock population in Nagaland as per 20th Livestock Census (GoI 2019). The pig production systems in Nagaland is mainly characterized by small units, fattening over breeding, dependence on locally available feed and food waste, low productivity and uses of different Indigenous Traditional Knowledge (ITKs) (Singh *et al.* 2019b). The traditional management, based on local traditional knowledge, continues to dominate production system (Singh and Mollier 2016). The per capita consumption of pork in Nagaland is the highest in the country (NSSO 2012). Pork production in the state does

not meet domestic consumption, which leads to a significant import of live pigs from other states (GON 2018). A few reports are available on the analysis of pig production system in Nagaland. However, there are no reports available in the literature regarding pork production and consumption pattern in Nagaland. Therefore, the present study was conducted to analyze pig population dynamics, pork production and its consumption in the state of Nagaland over the last twenty years.

MATERIALS AND METHODS

Nagaland is located between 96° and 98° E longitudes and 26.6° to 27.4° N latitudes. It is situated in the eastern Himalayas and altitude varies from 200 m at mean sea level to 3000 m at mean sea level. Data for the present study were drawn from various Livestock Census, Government of India (GoI), Statistical Handbook of Nagaland, Government of Nagaland, and National Sample Survey Organisation, GoI. The study analysed the dynamics of pig population over the year in Nagaland. Pork consumption pattern was analysed based on National Sample Survey report, Statistical handbook of Nagaland and Basic Animal Husbandry Statistics, Government of India (GoI). Records for pig population were retrieved from 1997 to 2019. Similarly, trend in pork and total meat production were retrieved from 2001 to 2018. Compound Annual Growth rate (CAGR) was computed using ordinary least square

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Table 2. Compounded annual growth rate (%) in total meat and pork production in Nagaland

Year	CAGR in total meat production (%)	CAGR in pork production (%)
2001-02 to 2006-07	0.14037	-0.01020
2006-07 to 2011-12	0.04199	0.06597
2011-12 to 2016-17	-0.13910	-0.11990
2016-17 to 2018-19	0.01440	-0.03400

Table 3. Meat production from different species of animal in Nagaland (2018-19)

Species	Number of animals slaughtered for meat production	Meat production (tonnes)	Average meat yield per animal (kg)	Per cent contribution in total meat production
Cattle	78,150	9,670	123.73	29.96
Buffalo	26,840	4,350	162.07	13.48
Goat	42,190	660	15.64	2.04
Pig	199,000	15,770	79.24	48.86
Poultry	687,920	1,830	2.66	5.66
Total	1,034,100	32,280		100.00

Source: Basic Animal Husbandry Statistics, GoI, 2019.

Table 4. Per capita availability of pork and total meat in Nagaland

Year	Pork* (kg/year)	Meat* (kg/year)
2013-14	—	34.10
2014-15	30.55	33.35
2015-16	7.85	16.80
2016-17	8.57	15.85
2017-18	8.49	16.37
2018-19	7.97	16.31
India (2018-19)	—	4.40

*Authors estimate (calculated by total production divided by total population of the state).

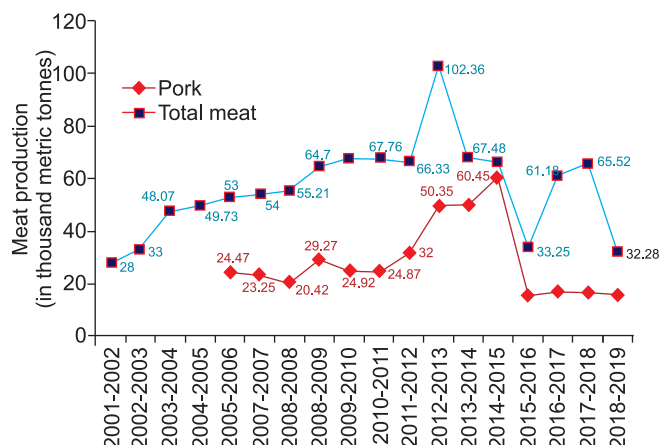


Fig. 1. Trend of total meat and pork production in Nagaland (in thousands metric tonnes).

Source: Various Statistical Handbook of Nagaland, Government of Nagaland.

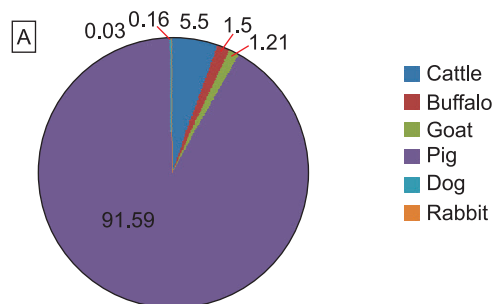
400) and it hovers in the range of 370 to 400 thousand metric tonnes. Per capita consumption of pork in India was 0.28 kg in 2013 (FAOSTAT).

Per capita consumption of pork was highest in 2014-15 (Table 4) in Nagaland. Similarly, highest total meat consumption was in the year 2013-14. Meat and pork consumption in Nagaland is much higher than the national average. Per capita availability in pork and meat declined after 2013-14. In consumption basket, pork constitutes almost 50% of total meat consumed.

Nagaland is deficit in all livestock product to the tune of almost 55%. There is deficit of 79.61% in egg and 51.34% in meat availability (Table 5). Further, in 20th livestock census, the total livestock population is further decreased by almost 40%. The state produced livestock products worth of ₹ 12,061 million and leaves a shortfall of ₹ 19,757 million in 2017-18.

Pork is the most consumed meat followed by cattle, buffaloes and poultry in Nagaland. There is wide variability in the total meat as well as pork production over the year, mainly due to availability of livestock from other states. However, it is interesting to note that pork constitute almost 40 to 50% of total meat production in the state. In

Per cent share of total meat in Nagaland in 2014-15



Per cent share of total meat in Nagaland in 2018-19

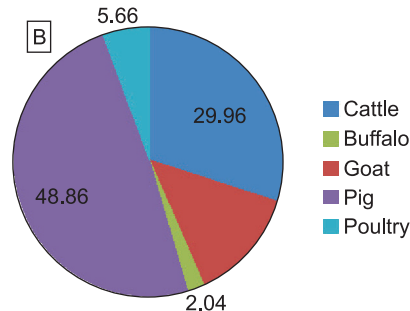


Fig. 2. Species wise contribution of total meat production in Nagaland.

Table 5. Availability and shortfall in different animal products in Nagaland

Item	Total requirement of the state	Availability (State internal production)	Monetary value of availability in the state (Rupees in millions)	Shortfall in the state	Per cent deficit in the state
Meat	66700.00 tonnes	32450.00 tonnes	6863.20	34250.0 tonnes	51.34
Milk	117710.00 tonnes	78460.00 tonnes	13534.40	39250.0 tonnes	33.34
Egg	1956.50 lakhs	398.76 lakhs	239.30	1557.7 lakhs	79.61
Total (Monetary value in Rupees Million)	35589.50		12061.50	19757.2 Million	55.14

Source: Statistical Handbook of Nagaland, 2018, Government of Nagaland.

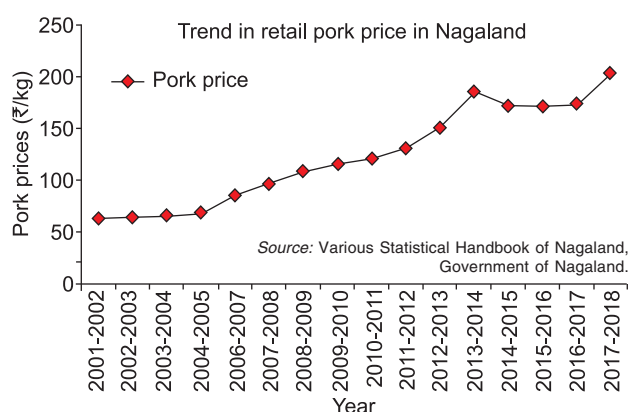


Fig. 3. Trend of retail pork price in Nagaland since 2001–02 to 2017–18.

comparison to its pig population, Nagaland produces highest pork among all NE states. The compounded annual growth rate in pork in last twenty year is in negative except for the duration of 2006–07 to 2011–12. This may be due to variation in pig population of the state as well as variation in import of live pigs. There is absence of any pork processing industry in the state. This is partly due to food habit of the tribal, as they prefer fresh pork and partly due to lack of surplus pork for processing (Singh *et al.* 2016, Tripathi *et al.* 2019). Also, there is wide variability in pork consumption in rural and urban area of the state (NSSO 2012) mainly due to availability and income constraints. As the household income will increase, the demand for pork will further increase. By about 50% of Nagaland's demand for pork is met by imports of live pigs, which makes it one of the major pig importing states in the North East India. The structure of pig production in Nagaland is dominated by small holder farms, traditional out dated technology, low bio-security with minimum inputs (Kumaresan *et al.* 2009, Singh *et al.* 2018). There is considerably lacking of investment in the pig husbandry particularly credit flow and livestock insurance. There is absence of feed industry in the state. There is no organized farm from which farmer can get good germplasm (Singh *et al.* 2018). The cost of construction of modern pig farms in Nagaland is higher than in other parts of the country. According to Grgic *et al.* (2015), small pig farmers do not succeed due to unsuitable agricultural policy, the lack of infrastructure

(slaughterhouses, meat processing facilities) and their own disorganization and disorientation in market economy. Per capita consumption of pork as well as total meat is highest in Nagaland as compared to other states of India. This is also much higher than national average of India. This is on expected line as people of Nagaland are of Mongoloid race and have non-vegetarian food habit. Meat consumption increases as the world is getting rich.

Trend in price of pork in Nagaland: In the year 2008–2009, the average price of pork was found to be 107.80 rupees per kg and in 2017–2018 it was 202.90 rupees per kg (Fig. 3). In 2017–18, highest price of pork was found in Phek district with 222.00 rupees per kg and lowest price was recorded in Wokha district with 195 rupees per kg.

The wholesale price of pork in India increased from ₹156/kg in 2008–09 to ₹308/kg in 2016–17 (Basic Animal Husbandry Statistics, GoI, 2019) which are higher than price in Nagaland. This is partly due to the fact that in rest of India, pork is being consumed by elite population in high end restaurants. Price of pork in India is low compared to world market (Kumar and Rai 2011) and here is the opportunity for Indian farmers to capitalize in the world pork market. The price of pork is increasing due to increase in the prices of animal feed, awareness in animal welfare measures and stringent sanitation condition for raising animals. At the same time, the demand on the world market increased due to the growing demand in the countries with rising incomes, increasing population and higher degree of urbanization (OECD-FAO, 2014).

The direction and overall effects will need to be rigorously assessed for implications on the viability of smallholder pig production in Nagaland. If this trend continues, Nagaland will have to import majority of its pork requirement from out of the state. It is also expected that there will be increase in per capita consumption of pork in the future. To improve upon the current pork production in the state, the following remedial measure can be implemented. Establishments of large and medium size intensive pig production farm with modern technologies. These farms will act as the nucleus farm and farmers can get the quality pig germplasm from these farm. This will also improve pig production efficiency through increasing productivity, quality and competitiveness of pork products. There is need to develop the sustainable systems of pig

production in sync with local conditions. Feed is the major constraints in the raising of livestock. High cost of feed deters the smallholder farmers for expansion of their farm. The state is producing maize and soybean in abundant quantity particularly in Mon, Kiphire, Tuensang, Dimapur and Zunheboto districts. This can be utilized for setting up of animal feed processing unit in the state. It will be prudent to establish organized pig farm in these districts that is in close vicinity to feed producing areas. Also, the human population density is low in these districts, so there will be less chance of human health conflicts. Health care system needs to strengthen to prevent any major outbreak. The market systems needs complete overhaul and there is need to strengthen the market infrastructure. There is only one slaughterhouse in the state. Generally, slaughtering of pig is done by raw methods in unhygienic condition. Marketing facilities are least developed and very unhygienic. Strict quality control of pig imports may be considered to protect both domestic producers and consumers. To overcome the above shortcomings, farmers, input suppliers, service providers and processors require incentives to encourage them to produce higher quality products. Currently, the state has low comparative advantage in pork production; therefore, it is unrealistic to expect it to become a major pork exporter in short time. Thus, focusing on improving pork production for the domestic market appears to be the best short to medium term strategy for development of the pig sector. Once pork value chain is strengthened, it can target to export the pork in China, Vietnam, Japan, Honkong and South Korea.

This paper reviews pork production and consumption in Nagaland *vis-à-vis* India and the world. The per capita consumption of meat as well as pork is highest in the state in India. The state has to import live pigs from other states to meet its minimum demand. However, off late 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 in demands and on the other side there is continuous decline in livestock population. This is a very paradoxical situation for attaining self sufficiency in the food. In pork industry, opportunities are available for farmers to export in South East Asian and East Asian countries. However, pork value chain is fragmented and it needs to develop in a holistic way to integrate it with world economy. There is urgent need to upgrade pig production technology, strengthen market infrastructure, infuse more credit into the sector and put more efforts in quality control.

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