

Piggery Development under Changing Climate Scenario in Nagaland

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Pig farming is an age-old traditional practice in Nagaland. Almost every household in Nagaland raises pigs because they require minimum financial investment and manpower. Traditional pig production systems are based on low input and output (zero-grain production system) in a backyard with household kitchen waste and garbage crop residues (Kumaresan *et al.*, 2007; Kadirvel *et al.*, 2017; Singh *et al.*, 2019). The state has a significant opportunity to enhance the socioeconomic status of the Naga people through piggery. Global warming and climate change are emerging threats to global livestock production, including that of pigs (Nardone *et al.*, 2010). Pigs are highly susceptible to heat stress owing to the lack of effective sweat glands and a thick layer of subcutaneous adipose tissue (Ross *et al.*, 2015). Therefore, adaptation of climate-resilient pig farming is the most feasible practical approach to minimize the adverse effects of climate change and piggery development.

Why should pig farming be promoted?

- Naga people consider pork one of their favorite delicacies. In addition, Nagaland has the highest per capita pork consumption compared to other states in our country. Unfortunately, the state is yet to achieve domestic demand for pork self-sufficiency.
- Pigs can digest a range of dietary sources. They can convert inedible feeds, forage, and mill grain byproducts into highly biologically valuable or nutritious meat.
- Pigs grow fast and produce many piglets (8-12 numbers). Under optimal management conditions, sows produce two farrows each year. In addition, the dressing percentage ranges from 60-80 % of the live body weight.
- Pig farming provides quick returns because marketable fatterer weights can be obtained in 6-8 months.
- A small initial investment in buildings and equipment is required to start pig farming.

- Pork is the most nutritious meat because of its high-fat content and higher energy value than other meats. It also contains vitamins, such as thiamin, niacin, and riboflavin.

Challenges

- Climate change is an emerging threat to pig production in Nagaland. Climate change projections for Nagaland indicate an increase of 1.60°C to 1.80°C between 2021 and 2050 (Ravindranath *et al.*, 2011).
- High temperature and humidity increase animal heat load, resulting in lower animal growth and productivity. Pigs are considered more sensitive to high environmental temperatures and thermal stress. Similarly, rising temperatures and shifting rainfall patterns can accelerate the spread of existing vector-borne diseases and parasites as well as the emergence and spread of new animal diseases.
- Pig farmers in the village cannot afford commercial feed; therefore, they rely on backyard pig farming with locally available genetic resources. They rely on small herd sizes with indigenous local animals, which have a very low productive performance.
- Lack of high-quality germplasm, superior breeding of male animals (breeding stock), insufficient Artificial Insemination (AI) infrastructure, and services. Due to the limited number of boars (breeding stock), haphazard and indiscriminate breeding with inferior germplasm leads to a high inbreeding rate, which is an overall reduction in the production and reproductive performance of animals, leading to poor litter size.
- The cost of commercial feed is very high; many farmers are unable to purchase commercial feed due to financial constraints and remote locations.

- Lack of awareness of scientific pig farming. Most farmers are compelled to rely on age-old traditional farming due to their socio-economic backgrounds, remoteness, and inaccessibility to AI and veterinary services.
- Inadequacy of disease diagnosis, vaccine, disease surveillance, and forecasting mechanisms to control disease outbreaks. Recently, African Swine Fever (ASF) has devastated piggery farmers

Opportunities for piggery development in Nagaland

Pork is a favorite meat in Nagaland, with no religious restrictions, yet more than 50% of the domestic pork demand is still imported from neighboring and other parts of the country. Simultaneously, the pig population has declined since 2012 (Livestock Census 2019). These data suggest that there is a huge scope for the livestock and poultry sector in the state to fulfill domestic requirements and help reduce poverty at the household level.

Strategies for Pig Farming Under Changing Climate Scenario

1. Selection of appropriate pig breeds

Pig farming relies heavily on the selection of breeding stock. It is essential to select pig breeds that are well-adapted to local climate conditions to ensure the long-term sustainability and profitability of pig farming, particularly in the face of changing climate scenario. Under changing climate scenario, indigenous local pig breeds like Niang Megha, Mali, and Tenyi-vo and cross variety like Rani, Lumasniang are well-suited for agro-climatic conditions of North Eastern Region of India (Kadirvel *et al.*, 2019; Rutsa and Rutsa, 2019). In addition, they possess relatively better resistance to diseases and attain sexual maturity at an earlier age than exotic and crossbred pigs. Niang Megha and Lumasniang are ability to thrive in hilly ecosystems with low-input production systems.

2. Scientific breeding of practices

In Nagaland, many farmers or tribal households still use age-old traditional breeding methods to raise pigs (Kumaresan *et al.*, 2011). This practice increases inbreeding and results in poor productivity and reproductive performance,

including genetic defects (scrotal, inguinal hernia, etc.), in subsequent generations. Hence, to overcome these challenges and ensure sustainable piggery development, it is imperative to use AI in pigs. AI aids scientific breeding and improves the genetics of animal populations. The advantages of AI are as follows:

- Allows the best boars to be used to produce superior offspring.
- Lower risk of sexually transmitted and infectious diseases, such as CSF, FMD, etc.
- Aids in resolving inbreeding problems in villages.
- Overcomes size discrepancies between boars and sows during breeding.

These benefits make AI an efficient and effective tool to improve pig breeding and genetics.

3. Nutritional and feeding management

Animals reduce their feed intake during hot weather, whereas cold weather may increase the energy needed to maintain their body temperature as part of thermoregulation in animals. Therefore, scientific feeding management practices that involve the production of low-heat diets can be achieved by increasing dietary fat and reducing crude protein or crude fiber content. Additionally, nutritional and feeding strategies should include micronutrient supplementation, such as antioxidants (e.g., selenium, vitamin E, and vitamin C), specific amino acids (e.g., glutamine and betaine), and minerals (e.g., zinc) (Rauw *et al.*, 2020). Micronutrients with immunomodulatory effects, including chromium and vitamin C, may help reduce production losses during heat stress.

4. Housing and shelter management

Pigs are susceptible to temperature change, heavy rain, drought, and sunlight. Ambient temperature affects the body temperature of pigs. The ideal temperature for optimal growth and feed conversion varies according to the age and weight of pigs. For example, piglets 1 d old:35°C; piglets 1 d old:30°C; piglets 1-6 weeks old:30-24°C; pigs weighing 20-60 kg:26-20°C; pigs weighing 60-90 kg:22-18°C; and adult animals:18-22°C. Adequate

ventilation, insulation, and roofing are key to a comfortable and stress-free pig environment.

5. Capacity building and vocation training

Capacity building on climate-resilient pig farming practices and awareness of global change are essential for understanding and mitigating climate change, as well as enhancing production. Training in the selection of appropriate climate-resilient pig breeds, scientific breeding methods, feeding, management, healthcare, vaccination, and value-added pork preparation is required for sustainable and profitable piggeries in the current climate change scenario.

6. Access to weather information:

Weather forecasting and early warning are very important to enable farmers to take preventive measures to protect animals from extreme weather events, such as heat waves, cold waves, and heavy precipitation events, including thunderstorms, cyclones, floods, and disease outbreaks. Therefore, improved access to accurate and timely weather forecasts can help farmers make informed decisions regarding farm management, particularly during extreme weather events. However, this component is lacking in India. To make adaptation measures effective in overcoming the effects of climate change, they should be brought to an international level.

Conclusion

Pig farming plays a vital role in the livelihood and extra income of the rural masses, especially tribal households in Nagaland, but is threatened by climate change-aggravated heat stress. To ensure sustainability, climate-resilient practices should be adopted. Conserving indigenous pigs, using modern breeding techniques, optimizing feeding strategies, capacity building, vocational training for farmers, and ensuring access to weather information are crucial for sustainable piggery development in Nagaland.

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