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Improved technologies for pig farming in north eastern India

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Pig farming is most important rural livelihood source in entire north eastern India. However, majority of the pigs are reared in backyard system with minimum input. Implementation of scientific pig husbandry practices with location specific improved technologies will improve the scenario of piggery in the region. The article is aimed to discuss some of the location specific improved technologies for sustainable pig husbandry. Some of technologies related to improved pig breeds, housing models, feed formulations, value addition of pork products and artificial insemination techniques are mentioned. Dissemination and adoption of these technologies will improve pig husbandry in the region.

Keywords: Artificial insemination, Scientific pig husbandry, Value addition

NORTHEAST India has 42,42,597 or 46.85% of India's total pig population (20th Livestock Census). In the NER, highest pig population is in Assam followed by Meghalaya and Nagaland. The pig farming is mostly traditional and reared by the native tribal population of the region. Besides Assam, very few commercial pig farming is practised. Some of the inherent problems with the pig farming in the region include unavailability of superior or improved germplasm, high feed cost, and low productivity of the indigenous pigs, traditional management practices, disease outbreak and poor biosecurity measures under field condition. Though the demand of pork is very high in the region but due to inherent problems associated with the pig farming, the demand for pork is met by supply of live pigs from outside of the region.

Around 67.89 percent of pig in northeast India constitutes of indigenous pigs and the rest 32.11 percent are exotic/crossbred. The indigenous pigs are well adapted to the local climate, traditional rearing practices and resistant to infections in comparison to exotic/crossbred. However, poor litter size and body weight are the limiting factors of the indigenous pigs. From the region, a total of seven indigenous pig breeds are registered and gazette notified.

Table 1. Pig population in northeast India as per 20th Livestock Census, DAHD, 2019

States	Indigenous	Exotic/Crossbred	Total
Arunachal Pradesh	257785	13678	271463
Assam	1640760	458240	2099000
Manipur	207772	27483	235255
Meghalaya	430311	276053	706364
Mizoram	29404	263061	292465
Nagaland	197605	207090	404695
Sikkim	15302	12018	27320
Tripura	101408	104627	206035
NER	2880347	1362250	4242597
All India	7158544	1896944	9055488

Table 2. Pig breeds registered from the northeast India

Sl. No	Breed	State	Accession number
1.	Doom	Assam	INDIA_PIG_0200_DOOM_09006
2.	Manipuri Black	Manipur	INDIA_PIG_1200_MANIPURIBLACK_09012
3.	Wak Chambil	Meghalaya	INDIA_PIG_1300_WAKCHAMBIL_09013
4.	Niang Megha	Meghalaya	INDIA_PIG_1300_NIANGMEGHA_09002
5.	Zovawk	Mizoram	INDIA_PIG_2700_ZOVAWK_09007
6.	Tenyi Vo	Nagaland	INDIA_PIG_1400_TENYIVO_09004
7.	Mali	Tripura	INDIA_PIG_1900_MALI_09009

Lumsniang boar

Lumsniang sow with piglets

Improved technologies for pig farming

Pig variety (Lumsniang): A pig variety has been developed that demonstrates improved productivity compared to local or indigenous pigs and exhibits better adaptability to the hilly regions of the northeastern states. The synthetic pig variety named Lumsniang was developed by crossing Hampshire and Niang Megha pigs. The selection process involved evaluating crossbred pigs with varying genetic inheritance, ultimately choosing those with 75% Hampshire and 25% Niang Megha for further development. Inter-sex mating and continuous selection were conducted over six generations, leading to genetic gain and stability in economic traits. Released on March 6, 2017, Lumsniang is particularly suited for the hilly regions of the north eastern states, exhibiting improved performance in traits such as litter size, weight at birth, and weaning, alongside favourable growth rates at various ages. The introduction of the Lumsniang synthetic pig variety, enhances productivity and adaptability for pig farmers in the north eastern states, contributing to improved livelihoods and sustainable livestock management in hilly regions.

Table 3. Production and reproduction performances of Lumsniang pig

Traits	Mean
Litter size at birth (no.)	9.57 ± 0.21
Litter weight at birth (kg)	8.25 ± 0.42
Litter size at weaning (no.)	8.36 ± 0.37
Litter weight at weaning (kg)	81.06 ± 1.31
Adult weight (kg): Male	69.63 ± 0.01
Adult weight (kg): Female	65.59 ± 0.04
Dressing %	72.33 ± 0.87
Age at first mating (days): Male	197.76 ± 1.76
Age at first mating (days): Female	247.53 ± 0.43
Age at first Oestrus (days)	217.43 ± 0.43
Oestrous cycle duration (days)	21.34 ± 0.43
Age at first farrowing (days)	419.17 ± 1.23

Climate resilient pigpen for high altitude areas with rain water harvesting system: The low-cost, climate-resilient pigpen is constructed from locally sourced, eco-friendly materials, promoting sustainability. Its innovative design enhances animal welfare and hygiene while incorporating a rainwater harvesting system to ensure water availability in high-altitude regions. The climate-resilient pigpen is designed with a dual-area layout to create a comfortable microenvironment for pigs. It features an elevated bedding system that enhances hygiene by preventing waste transfer and promoting animal welfare. This innovative pigpen supports sustainable livestock farming and enhances the resilience of local farmers for challenging climatic conditions in the north eastern states. Cost of construction is around ₹2000 per unit that houses two pigs and durability is 2 years. It requires 83 times less water as compared to conventional housing model as there is limited washing and cleaning of shed similarly, 48.3% less labour intensive compared to conventional models. This technology reduces capital investment in constructing pig sheds while enhancing animal welfare and resilience against climate impacts.

Innovative functional pork products with bloodfruit, chameleon leaves and perilla seeds: These functional pork products uniquely combine traditional and locally sourced ingredients such as bloodfruit, chameleon leaves, and perilla seeds, which are known for their health benefits. This innovative approach enhances nutritional value, flavour, and antioxidant properties while catering to the rising consumer demand for healthier and functional food options. Bloodfruit *(Haematocarpus validus)* is rich in beta carotene, anthocyanins, and iron, providing antioxidant properties that combat free radicals in the body. Incorporating bloodfruit pulp into conventional sausages enhances their nutritional profile, resulting in higher levels of beta carotene, anthocyanins, flavonoids, iron, fibre, and ascorbic acid. Chameleon plant (fish mint) adds further antioxidant benefits, improving the physicochemical properties of emulsified meat products. Additionally, perilla seeds enhance the nutritional value of sausages by increasing protein and polyunsaturated fatty acids (PUFAs), known for their cholesterol-lowering effects and cardiovascular benefits. These innovations create functional pork products

Climate resilient pigpen

appealing to health-conscious consumers. Incorporating traditional ingredients into pork products increases local customer acceptability and promotes healthier dietary options.

Nanoparticle fortified BTS extender for enhanced boar semen preservation: The beltsville thawing solution (BTS) serves as a short-term extender for boar semen preservation, traditionally effective for up to three days at temperatures between 15–18°C. This innovative technology introduces a nanoparticle-fortified extender that includes 1 µm/mL of selenium nanoparticles, significantly enhancing sperm motility and viability. The modified extender maintains sperm motility at 50.12% for up to four days and has demonstrated a 100% conception rate in trials conducted at the ICAR Research Complex for NEH Region in Umiam, Meghalaya, thereby improving the effectiveness of artificial insemination practices. This technology enables the preservation of boar semen in BTS extender for up to four days while significantly enhancing fertility rates, thereby improving the efficiency of artificial insemination in pig farming

Table 4. Composition of the boar semen extender

Ingredients	Quantity
Glucose – D (g)	3.715
Tri-sodium citrate (g)	0.600
E.D.T.A. di-sodium salt (g)	0.125
Sodium Hydrogen carbonate (g)	0.125
Potassium chloride (g)	0.075
Gentamicin sulphate (µg/mL)	150
Selenium nanoparticles	1 µm/mL
Distilled water (mL)	up to 100

Pork sausage incorporated with blood fruit and perilla seeds

Low-cost feed formulation for grower pigs: The north eastern region boasts an abundance of wild banana trees, making incorporation of banana pseudostems into pig feed a cost-effective strategy. This innovative feed formulation allows for the partial replacement of dietary maize with sun-dried banana pseudostem (BP), enabling up to 20% substitution without compromising the growth, blood biochemical parameters, reproductive performance, or carcass quality of crossbred grower pigs. Utilizing 20% sun-dried BP significantly reduces feed costs compared to traditional maize-based diets, thus offering a sustainable feeding alternative for pig farmers.

Table 5. Composition of banana pseudostem incorporated ration for growing pig

Ingredients	Composition %
Maize	35.00
Banana pseudostem	20.00
Wheat bran	14.00
Ground nut Cake	18.50
Soybean meal	10.00
Mineral mixture	2.00
Salt	0.50
Total	100

SUMMARY

Majority of the pig farming in the north eastern states is still traditional resulting in poor productivity and income to the pig farmers. Development of improved technologies related to location pig varieties, housing models and feeding strategies are crucial to improve the pig farming in the region. Development of suitable artificial insemination techniques is another important area in pig breeding as being meat animal most of the male piglets are castrated for fattening purpose. This has resulted in non-availability of good breeding boars under field condition for mating.

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