



Review Article

Prospects and Potentiality of Improving Pig Farming in North Eastern Hill Region of India: An Overview

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Abstract

The North-Eastern region of India comprises of a high proportion of tribal people and pig rearing is an integral part of their way of life since time immemorial. The scope for piggery production has high potential, because of the food habit of the inhabitants, being mostly non –vegetarian. Non-existence of properly defined production practices, organized breeding programmes, high cost of feed, lack of appropriate marketing systems, lack of finance, non-availability of quality piglets, lack of knowledge on scientific methods of pig farming and lack of timely health care and vaccination facilities are the main constrains in improvement. It is revealed that unemployed educated youth, retired persons from the affluent families / societies have taken up this venture as means of their livelihood / occupation or as subsidiary income generation.

Key words: Constrain, India, North-Eastern Hill Region, Pig Farming, Potentiality, Strategy

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Introduction

The majority of the people of the North- Eastern (NE) region of India are non-vegetarian and among them a good number of people consume pork (Kumaresan *et al.*, 2007). This is because the NE Region comprises of a high proportion of tribal people and pig rearing is an integral part of their way of life since time immemorial (Payeng *et al.*, 2013). Pig farming in India is primarily a small scale unorganized rural activity and is an integral part of diversified agriculture. Pig farming in North- Eastern states not only contributes to the livelihood security of the rural masses but also plays an important role in improving the socio economic status of the tribal population and weaker section of the society (Naskar and Das, 2007). The meat producing animals like sheep, goat and chicken only cannot fulfill the requirement of meat. Due to





some biological advantages like prolificacy, faster growth, short generation interval, dressing percentage, the pig plays an important role for increasing meat production in this region. Pig is an efficient feed converting animal and also plays an important role in producing manure for crop production and brush industry.

In India the total pork requirement is around 0.88 million ton (considering 20% of total 1210 million human population consuming pork and assuming 10 gm protein consumption daily from pork, *i.e.* $20\% \times 1210 \times 0.010 \text{ kg} \times 365 \text{ days} = 0.88 \text{ million ton}$). However, the country produces 0.33 million ton of pork in 2012 (FAOSTAT, 2014) and there is huge demand and gap exist between requirement and production *i.e.* 0.55 million ton or 62.5%. As per Department of Agricultural Research and Education (DARE, India) report, during 2012-13; the average meat yield of pig in India is 35 kg per animal which is about 55% less than the world average of 78.20 kg per animal. Most of people consume pork from unorganized sector in form of locally raised fresh pork meat. The selling of Pork is not widely distributed in the organized retail sector. Consumption of fresh local meat is more prefer by the north eastern people of India which may be because of cultural perceptions or consumer perceptions (Johari *et al.*, 2014).

Pig production in the state requires an immediate transformation from backyard subsidiary enterprise to a commercial venture. The states of NE region are surrounded by hilly states and the live pigs are transported to these states through various routes to meet up their requirement. The opening of South-East corridor to South East Asian countries will give a global market opportunity for pork and pork products.

Status of Pig Population

The northeastern region of India comprises of eight states namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The region characterized by fragility, marginality, inaccessibility, ethnic heterogeneity and ecosystem diversity (Naskar and Das, 2007). Out of the total reporting area of 27.49 million hectare, only 12% area is under net cultivation (Kumaresan *et al.*, 2007). The society, predominantly inhabited by tribal population, is agrarian in nature and practice ecosystem specific farming systems raising both crops and animals. Due to mono-cropping system practiced by the farming community, animal husbandry plays a vital role in socio-economic development of the region (Pegu *et al.*, 2014). Pig occupies a unique role among the meat-producing animals of the NE region. It is an animal of choice for meat especially to tribal population in northeast India as pig rearing is considered to be the most encouraging and appropriate livestock enterprise to narrow down the gap between the availability and requirement of animal meat in this part of the country and it also plays an important role in improving the socio-economic status of the weaker rural community and creates employment for the unemployed youth of the region (Rahman *et al.*, 2008). According to the 19th livestock census, pig population in India stands at 10.29 million compared to world population of 977.02 million (FAOSTAT, 2014) which



comprises 1.05% of world's pig population. Pig consisting of 2.01% of total livestock (512.05 million) in India and contribute only 0.95% of the global share in pig production. NE region alone is the home for 38.42% of the total pig population of India and Assam possess highest 2,249,690 numbers of pigs among the NE states (Table 1).

Table 1: Pig population in north-eastern states of India (Livestock census, 2012)

State	Indigenous	Exotic/crossbred	Total
Assam	1636022	613668	2249690
Meghalaya	543381	133623	677004
Nagaland	503688	380719	884407
Tripura	362534	213643	576177
Arunachal Pradesh	356345	37369	393714
Manipur	277215	182546	459761
Mizoram	245238	212952	458190
Sikkim	29907	27456	57363

The total percentage shares of pig population in North-Eastern states of India are presented in the Fig. 1. According to livestock census, 2012; Assam possesses highest percentage of 15.89 shares. Although most of the tribal and weaker sections of the society are traditionally involved in pig rearing since long, hardly any improvement has been observed in the overall production of pigs because of 80% of the pigs of this region are of indigenous non-descript type. However, pig being one of the most efficient feed converting animals with shorter generation interval, high prolificacy and faster growth rate, these traits can directly and positively be connected with the overall economy in production by improving the husbandry practices of pig rearing in the region.

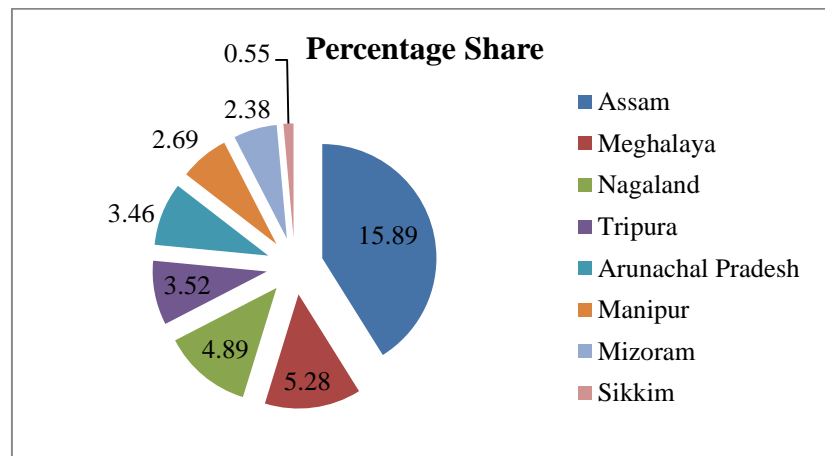


Fig. 1: Percentage share of pig population in north-eastern states of India (Livestock census, 2012)

Breeds of Pig Available in NE Region

A total of seven pig breeds are registered till now by ICAR- National Bureau of Animal Genetic Resources (NBAGR) India, out of which four breeds are from NE region viz. Niang Megha, Tenyi Vo, Doom and Zovawk (Fig. 2).



Fig. 2. Different types of breeds available in North- Eastern region of India

The Niang Megha breed originated from Garo, Khasi and Jaintia hills of Meghalaya. It looks like a wild pig. The body coat colour is black with white patches on forehead and legs with erect bristles on dorsal midline. The ears are small, erect, extended vertically (NBAGR, India). The reproductive traits age at first mating, age at first farrowing, farrowing interval and gestation length and average litter size at birth were 246.440 ± 1.3 , 347.813 ± 3.516 , 206.121 ± 0.785 and 111.848 ± 0.136 days and 6.080 ± 0.219 respectively (Khargharia *et al.*, 2014). The Native Naga pig or Tenyi Vo as it is called locally, is found in the Phek, Tuensang, Kohima and Dimapur districts of Nagaland and in the extreme north-eastern corner of India, along the border with Myanmar. This breed is small with white hooves and a relatively long straight tail with white end. It has small ears and often markings on the elongated face, neck or shoulders. The body coat colour is black and hairy, with a potbelly. Individuals reach 25-35kg body weight at maturity. The animals reach maturity quickly and have a relatively shorter gestation period and a shorter farrowing interval. The Tenyi Vo breed is a hearty breed, able to survive without much care in regards to feeding and disease management. The age at first mating, age of first farrowing, farrowing interval, gestation length and litter size at birth was reported as 248.12 ± 34.20 days, 12.67 ± 5.51 months, 304.90 ± 103.20 days, 111.42 ± 0.16 days, 5.80 ± 2.30 respectively (Borkotoky *et al.*, 2014). The Doom pig breed is found in Dhubri, Goalpara, Bongaigaon districts of Assam. The body coat is black in colour with thick line of hair on the neck and towards the shoulders, extending upto lumber regions with short concave snout (NBAGR, India). The average mature body weight is 36-50 kg. The age at first mating, age of first farrowing, farrowing interval, gestation length and litter size at birth was reported as 250.567 ± 1.481 days, 368.000 ± 1.537 days, 213.533 ± 0.396 days and 112.044 ± 0.295 days and 6.250 ± 0.237 respectively (Khargharia *et al.*, 2014).

The Zovawk pig breed is originated from Mizoram. The body coat is black with white spot on forehead, white patches on belly and white boots with long bristles on mid-line. The ears are erect; snout is concave with pot belly (NBAGR, India). The average body weight is 54-60 kg. The average age at first fertile service, average age at first farrowing, gestation period, average litter size at birth was 323.75 ± 9.90 days, 437.75 ± 9.41 days, 113.63 ± 0.53 days, 7.13 ± 1.18 respectively (Hmar *et al.*, 2010; Kalita *et al.*, 2018). In addition to that, few exotic breeds are also available in NE states like Hampshire, Large Black, Saddle Back, Duroc, Large White Yorkshire and Landrace which are used for up gradation of indigenous non-descript pigs. Moreover, the ICAR- All India Co-ordinated Research Project (AICRP) on Pig, Assam Agricultural University has developed two varieties of genetic groups of pig *i.e.* 50%H50%I (50%Hampshire 50% Indigenous) and 75%H25%I (75% Hampshire 25% Indigenous). These varieties of pig are medium in size and have erect ears. The coat colour is black usually with a white belt in the shoulder region which might extend up to the forelimbs. Occasional white patches in the belly region are also not uncommon. The age at first farrowing, average litter size at birth, litter weight at birth, litter size at weaning,

litter weight at weaning and average weaning (6 weeks) weight, average weight at eight months of 75% H25% I genetic group are found to be 12.5 ± 5.2 months, 8.34 ± 0.15 , 8.26 ± 0.18 kg, 8.00 ± 0.19 , 81.22 ± 1.87 and 10.13 ± 0.01 kg, 73.62 ± 0.19 kg respectively (Ahmed *et al.*, 2016 b; Annual report, ICAR-NRC on Pig, 2017). The 75% H25% I (75% Hampshire 25% indigenous) genetic group named as HD-K75 and released as variety of pig by the Indian Council of Agricultural Research (ICAR), Govt. of India, New Delhi. The ICAR-National Research Centre on Pig, Rani has also developed two varieties of pig viz. Rani and Asha. The Rani variety has been developed by crossing Hampshire (exotic breed) with Ghungroo (indigenous breed) to have 50% inheritance of both the breeds. The breed characters of Rani Crossbred have been stabilized by them for consistent crossbreeding of six generation. The breed can gain almost 75 kg body weight at slaughter age of 8 months with 1.98 cm of back fat thickness. The Rani crossbreds have widely been validated in the farmers' field. Duroc, another exotic germplasm, was crossed with Rani to develop "Asha" crossbred to have 25% Ghungroo, 25% Hampshire and 50% Duroc inheritance (Annual report, ICAR-NRC on Pig, 2017). The Asha can produce 80 kg lean pork at slaughter age of 8 months with 1.75 cm back fat thickness. The farmers mostly preferred the crossbred pigs which had better growth performance, larger litter size, low mortality rate and high back fat thickness than the local pigs (Shyam *et al.*, 2017a).

Pig Rearing Method Adapted in NE Region

The majority of the farmer's rear native pigs as subsidiary occupation where house wives (60%) or day labor (21%) or crop cultivator (19%) maintain it as source of income for their livelihood security (Ahmed *et al.*, 2016a). It was obtained that major proportions of the farmers own other livestock species like cattle, goat, poultry and others. Pigs were reared by neck/girth tethering, straw shed house, fencing and penned system and free range scavenging system (Fig.3). Ritchil *et al.* (2013) opined that girth tethering was the most widely accepted and popular system of rearing where rope was used at the chest girth to keep the pig nearby any hard pillar such as bamboo or tree. In Assam, majority of the farmers (50%) had housing with concrete floor and walls and the roof was either made of CGI sheet or thatch, 30 per cent used locally available wooden/bamboo for constructing the pig sty and rest 20 per cent kept their pigs in the open by tethering their pigs with a rope to a tree in the backyard (Shadap *et al.*, 2017; Shyam *et al.*, 2017a). The free range scavenging system is a traditional system predominates in large areas of the NE states, especially in the rural village (Jini *et al.*, 2010). The local pigs were scavenge for the bulk of their food around homesteads, kraals and adjacent areas and fed some form of supplementary feed later in the day, often in the form of cassava, cracked cereal grains or household scraps. Productivity of these village pigs is generally low, with litter sizes of three to five piglets and low growth rates. The prospective of these basic production

systems for wealth creation is imperfect, but it makes a significant contribution to the livelihoods of the poor peoples of NE region.

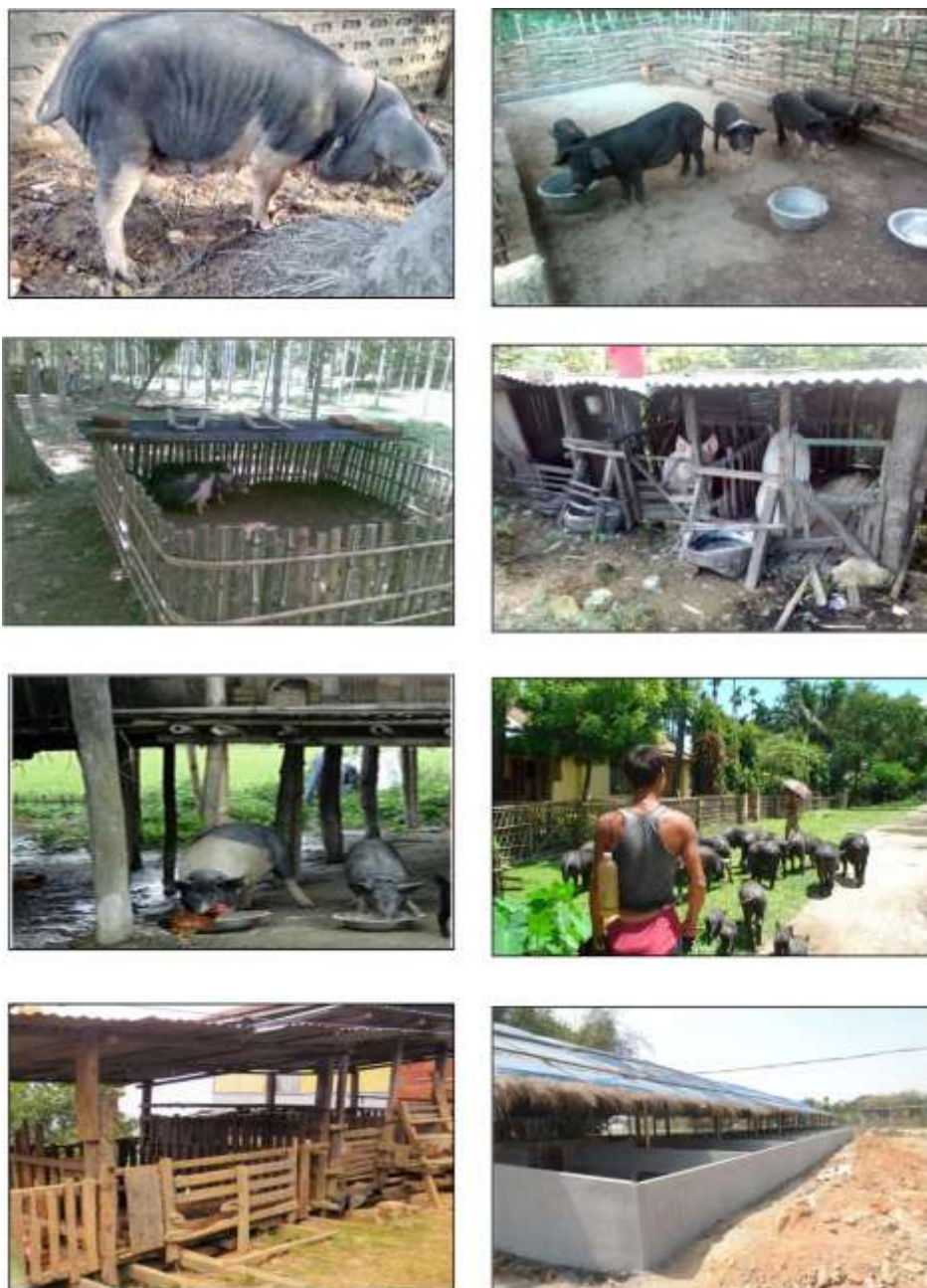


Fig. 3: Rearing and housing of pigs among the farmers of North- Eastern region of India

According to the climatic conditions and the type of pig production system, the pigsty is constructed cheaply by using locally available materials. Pens are raised in slatted floors which usually made from locally available bamboo, wood or timber and cane rope (Naskar and Das, 2007). The roof of the pigsty is made of toko leaves, grass thatch, bamboo sheets, galvanized iron sheets, etc. The roofs made of toko leaves and

bamboo sheets are cheap and good for ventilation, but have to be changed after certain period of time. Though costs of galvanized iron roofs are high, but these roofs last a long time which is used in organized farm.

About 75-80 percent cost of the pig production is contributed towards feeding (Talukdar *et al.*, 2013). The available feeds are rice bran, wheat bran, broken rice, maize, cassava, sweet potato, vegetables, banana, papaya orum, colocasia, joogli (local beverage residue) and waste products. These feeds are mixed and boiled to make the feed more palatable. There are mainly two methods of traditional processing i.e. mixing all different feeds together (rice bran, broken rice, crushed maize and crushed cassava, etc.) in proportion and giving it directly to the pigs and the other method is, cooking the different raw materials together to improve digestibility and to breakdown toxins from some feeds (Rahman *et al.*, 2008). The thumb rule is applied in this part to know whether full feed is he/she feeds the pigs till they are satisfied and do not scream anymore. Alcohol - rice distilling residues/Apong/yonkgin/Joogli is popular form feed for pig which is distillery waste from rice (Haldar *et al.*, 2017; Shyam *et al.*, 2017). These are mixed with other feeds, such as rice bran and broken rice mainly for feeding of boar for fattening. The following mixing ratio is commonly used in combination with distillery waste: Rice bran (2 kg), + broken rice (1 kg) + distillers' residues till gravy (Jini *et al.*, 2010). In Mizoram, peoples provides kitchen waste which is mixed with locally available weeds e.g. *Japan-hlo* (*Mikania micrantha*), *Mau tak* (*Melocanna baccifera*), *Vaivakawn par* (*Tithonia diversifolia*), *Anhling* (*Solanum nigrum*) etc and boiled before feeding to the pigs (Rahman *et al.*, 2008). Farmers mentioned that they boiled the feeds before giving to pigs to kill harm full insects or parasites.

Methods of Pig Breeding Adapted in NE Region

Usually pigs are let lose in their natural environment by mixing a boar with five sow and they are breed in natural condition. In some areas the boar is made to breed with the sow by bringing to the pen, *i.e.*, intensive system of rearing. Mostly household without a breeding boar used boar from neighbour for breeding. The service fees were varied from Rupees 200-1000 depending on the different conditions (Ahmed *et al.*, 2016a). Though natural mating is very common practice but in certain places they did artificial insemination also with liquid boar semen (Rahman *et al.*, 2008; Shyam *et al.*, 2017b).

Marketing of Pig in NE Region

There is neither any government institution nor any market linkages exist to control the production and marketing of pork and by products till now. The whole system of marketing is unorganized. It is entirely in the hand of certain venture, who round up the majority of share of buyer rupee. Most of the local village traders, they tie up with the village producer or farmers, purchase the animal intended for meat in bulk from

the those producers and redistribute in the urban areas, in some areas the retail butcher themselves have some tie up with village level producer (Naskar and Das, 2007; Shyam *et al.*, 2017b) . There is no organized market for pig, the butcher follows traditional system in which there is loss of meat, spoil the quality for longer storage and sometimes if improperly done can possibly cause ailment in human either through consumption of meat or those person handling the meat (Jini *et al.*, 2010). There is no any scientific method of segregation, isolation of newly purchased pigs from other places (Rahman *et al.*, 2008; Shyam *et al.*, 2017a). After slaughtering the animal 58.56% farmers use scientific method of weighing, 22.52% cases use indigenous method of weighing and 18.92% use visual observation to sale the carcass in the market (Patr *et al.*, 2014). The cost of meat ranges between Rs. 160 to 250 per kg and the byproduct the price varies with the product ranging from Rs. 100 per kg (Shyam *et al.*, 2017a).

Disease Prevalence in NE Region

In pig various bacterial, viral, parasitic diseases can causes varying levels of illness that can have a negative impact on the well-being of swine. As a result, these health challenges can adversely affect pig productivity, including average daily gain, reproductive performance, mortality, culling rates, etc. It was found that classical swine fever (CSF), porcine respiratory and reproductive syndrome (PRRS), foot and mouth disease (FMD), haemorrhagic septicaemia, pneumonia, colibacillosis, salmonellosis, diarrhoea, enteritis, piglet anaemia, mange, parasitic infection were the mostly prevalent diseases encountered by the pig rearers of the region (Ahmed *et al.*, 2016a; Kalita and Talukdar, 2017). Ritchil *et al.* (2013) and Pegu *et al.* (2014) reported abscess, botulism, brucellosis, bursitis, coccidiosis, cystic ovaries, diarrhoea, haematoma, laminitis, lameness, listeriosis, mastitis, meningitis, pneumonia and haemorrhagic septicaemia were the most common diseases in pigs. Only 8.5% people used vaccine against swine fever, anthrax, foot and mouth diseases, haemorrhagic septicaemia and others. Deworming of pigs was recorded by 40% of people (Hossain *et al.*, 2011). Shyam *et al.* (2017a) opined that majority (70%) of the farmers never vaccinated their pigs against diseases whereas only 30 per cent of them practiced vaccination. Similarly, 80 per cent never dewormed their pig stock and only 10 per cent of the farmers gave iron injection to their piglets to prevent piglet anemia (Nath *et al.*, 2012).

Constraints of Swine Industry in NE Region

Lack of scientific knowledge of rearing, lack of breeding boar, lack of veterinary and extension services and non-availability of vaccine were the major constrains in pig production among most of the farmers of the north eastern states of India (Nath *et al.*, 2012; Shyam *et al.* 2017b). Whereas, malnutrition seems to be the major problem facing by the pig farmers (Pegu *et al.*, 2014). Pork had a good demand in these areas even though there was no such pork market establishment as clearly indicated that major constraints faced

by piggery entrepreneurs were lack of quality breeding stock followed by lack of linkage with financial institute, lack of training, lack of time, outbreak of disease, lack of proper marketing channel, seasonal fluctuation of price, lack of proper veterinary support, lack of easy access to extension services and scarcity of space in market place (Patr *et al.* 2014; Ahmed *et al.*, 2016a; Shyam *et al.*, 2017a).

Strategy for Improvement of Piggery Sector in NE Region

Breeding Policies

The Government should encourage among the educated unemployed youth for commercial pig farming with improved exotic breed and their crossbred varieties. An attempt was made to boost up the commercial pig farming with certain crossbred varieties like Rani, Asha, HD-K75 and also indigenous breeds (Annual Report, ICAR-NRC on Pig, 2017). The crossbred varieties are getting more popularity among the poor farmers. Upgrading of indigenous breeds with exotic breeds should be done in keeping the interest of the farmers. For that the infrastructures for Artificial Insemination are to be developed at all institutional level. The selected sires should be trained for collection of semen and inseminated at the proper timing of heat of the females. At the same time, measures should be taken to conserve the indigenous pig germplasm *i.e.* improvement should be done through selective breeding. The farmers mostly prefer the black colour pig in certain ethnic community and recent experience of use of Hampshire in crossbreeding programme by north-eastern states is more popular. Selected superior quality sow of Indigenous pigs crossed with Purebred *i.e.* 100% exotic inheritance of Large White Yorkshire/Landrace/Hampshire/Duroc boar from nucleus herd to produce 50% exotic inheritance crossbreds is now adopted in entire North- Eastern region of India.

Alternative Nonconventional Feed Resources

The government should give more emphasis on proper use of locally available nonconventional feed resources like cassava leaves, sweet potato tuber, water hyacinth, banana stems, colocasia, silk worm pupae meal and there should be establishment of a compound feed manufacture for efficient utilization of non-conventional feed resource as a source of pig feed. Currently, much interest was given in tropical countries in the use of cassava leaves as a replacement for soybean meal and fish meal in pig diets (Jini *et al.*, 2010). Water spinach (*Ipomoea aquatica*) does not appear to contain antinutritional compounds and has been used successfully for growing pigs as the only source of supplementary protein in a diet based on broken rice. The nutritional experiments were also carried out by the ICAR-All India Coordinated Research Project on Pig, AAU, Khanapara centre on easily available non-conventional feed of pig such as colocasia, silk worm pupae, for proper utilization in pig ration. The result indicated that 30% replacement concentrated mixture by colocasia and 100% replacement fish meal by silk worm pupae meal in pig ration did not hampered in growth of pigs. The economical costs of production are Rs. 34.01/ kg gain and Rs. 31.49/ kg gain in both



the experiment respectively (Annual report, ICAR-NRC on Pig, 2017). A package of rations for pre-weaned piglets, grower and lactating sows have been developed by combining different ingredients and chemicals for optimum growth of the pigs. Database should be developed on locally available feed resources and their utilization in pig feeding.

Establishing Pig Cooperatives Involving Women Entrepreneur

The government gives more emphasis on developing or establishing pig cooperatives societies like the dairy, so that Government can purchase the products and give to the producer, the amount in remunerative price. The present infrastructure of existing pig farms is very poor. Moreover in certain places the farmers facing problem while purchasing the quality piglets. Establishing more new pig breeding farm in each district is very much essential.

Awareness among the Farmers

For improvement of piggery sector, awareness programme of scientific pig rearing among the piggery farmers has to be taken. Training and empowerment programmes will lay the foundation for a sustainable, decentralised, village based, farmer-to-farmer extension network in the piggery sector, outside of the government departments which will further complement the State's recent initiatives in setting up a extension support system. The new livestock sector policy should enable the Department to structure these village based skill training's. Further identify suitable agencies (NGOs) to impart the training at strategic locations for easy access to small holders. The department's task is to assess and quantify the training need, to structure and package the training programmes and to farm them out to grass root level people's bodies all over the NE states for actual implementation. This type of awareness programme will link with farmers and Government policy by which they can improve their livelihood through piggery sectors.

Establishment of Livestock Extension Services for Pigs

The livestock extension services seek out to teach the necessary skills to the farmers for undertaking improved animal husbandry operations, to make available timely information and improved practices in an easily understandable form suited to their level of literacy and awareness and to create in them a favourable attitude for innovation and change. Establishment of cyber livestock communication system for faster dissemination of information through communication information Centre which is located in each district as it saves money, time and effort.

Modern Disease Diagnostic Laboratory

There should be one modern disease diagnostic laboratory with branches in all districts to keep strict vigilance on diseases and their prevention. Regular monitoring of the pig herd for emerging infectious



diseases should be undertaken in collaboration with ICAR-NRC on Pig/National Institutes. Adequate quarantine, isolation and segregation of newly introduced adult species should be done to reduce the disease risk of healthy herds. Proper managemental care should be taken up to reduce pre-weaning, post-weaning and adult mortality to keep below 10%, 5% and 2% respectively.

Marketing Infrastructure

The primary markets should be created at in rural areas and regulated markets in district level, where the price of pig depends on breed, its FCR. The price of breeder should be 25% more than porker. Apart from that modernization of slaughter houses are needed to ensure public health and enhance competitive market standards of meat and related by products.

Scheme for Pig Insurance

There should be provision for insurance to pig farmers in case of sudden death of pig, in case of any epidemic condition and during any natural calamities like flood, landslide, earthquake etc.

Conclusion

Pig farming as a commercial venture is still to be set up in the NE states. The major constraints like non-availability of superior quality seed stock, imbalanced ration at reasonable price, unscientific management or inadequate knowledge, lack of financial support as well as marketing channel etc. are hampering in the growth and development of pig industry. But a sizeable number of unemployed educated youth, retired persons from the affluent families / societies have taken up this venture as means of their livelihood / occupation or as subsidiary income generation. This development has opened up a new chapter in the entire scenery of piggery development in the NE states.

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