

A STUDY ON PRODUCTION AND MARKETING OF PIGS IN MIZORAM

*Thesis submitted in fulfillment of the Degree of
Doctor of Philosophy in Management*

By:

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CERTIFICATE

This is to certify that “*A Study on Production and Marketing of Pigs in Mizoram*” by Vanlalmalsawma has been written under my supervision.

He has fulfilled all the required norms laid down under Minimum Standards and Procedure for Award of PhD under UGC Regulations 2009. The thesis is the result of his own investigation. Neither the dissertation as a whole nor any part of it was ever submitted to any University for any research degree.

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DECLARATION

I, Vanlalmalsawma hereby declare that the thesis entitled “*A Study on Production and Marketing of Pigs in Mizoram*” is the record of the work carried out by me that the content of this thesis did not form any basis for the award of any previous degree to me or, to the best of my knowledge, to anybody else, and the thesis has not been submitted by me for any research degree in any other institution/University.

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(VANLALMALSAWMA)

ACRONYMS

ARDC- Agricultural Refinance and Development Corporation

B2B- Business to Business

BIS- Bureau of Indian Standards

CCEA- Cabinet Committee on Economic Affairs

CMC- Central Monitoring Committee

CRAFICARD- Committee to Review Arrangements of Institutional Credit for Agriculture and Rural Development

CSF- Classical Swine Fever

CSO- Central Statistics Office

DADF-Department of Animal Husbandry Dairying and Fisheries

DIC- District Industries Centre

DPR- Detailed Project Report

EDEG- Entrepreneurship Development & Employment Generation

FAO- Food and Agriculture Organisation

FAOSTAT- Food and Agriculture Organization Corporate Statistical Database

FMD- Foot and Mouth Disease

G.I- Galvanized Iron

GDP- Gross Domestic Product

GOI - Government of India

GSDP- Gross State Domestic Product

GVA- Gross Value Added

ICAR- Indian Council of Agricultural Research

ICMR- Indian Council of Medical Research

IFIP- French pork and pig institute

INRA- The French national institute for agriculture research

IRDP- Integrated Rural Development programme

JLG- Joint Liability Group

NABARD- National Bank for Agriculture and Rural Development

NEEPCO- North Eastern Electric Power Corporation Limited

NER- North Eastern Region
NGO- Non Governmental Organization
NHPC- National Hydroelectric Power Corporation
NIB- New Land Use Policy Implementing Board
NLM- National Livestock Mission
NLP- National Livestock Policy
NLUP- New Land Use Policy
NMFP- National Mission on Food Processing
NMPS- National Mission for Protein Supplement
NMPS- National Mission for Protein Supplements
NTPC- National Thermal Power Corporation Limited
NURTW- National Union of Transport Worker
PIGFED- The Mizoram Pig Producers' Cooperative Federation Ltd
RBI- Reserve Bank of India
PRI- Panchayati Raj Institution
PRRS-
RKVY- Rastriya Krishi Vikas Yojana
SHG- Self Help Group
SLSMC- The State Level Sanctioning and Monitoring Committee
SPSS- Statistical Package for Social Sciences
ST- Schedule Tribe
USDA- United States Department of Agriculture
WOAH- World Organization for Animal Health
WRC- Wet Rice Cultivation
WTO- World Trade Organization

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Chapter 1

Introduction

1.1 Introduction

India, with 1.34 billion people (2017) is the second most populous country in the world after China with over 1.41 billion people. The figures shows that India represents almost 17.85 percent of the world's population, which means one out of six people on this planet live in India. Although, China may have the highest population, India is all set to take the top position by 2030 (Ray, 2017). With the population growth rate at 1.2 percent, India is predicted to have more than 1.53 billion people by the end of 2030. So, India is a fast growing country in terms of population. As a result, the feeding habit of the people specially the younger generation is changing. Millennial or the Generation Y (people between the ages 18 and 35) make up 65 percent of India's population. The food habits of the younger generation are also changing. Given the recent growth in income in India, there is a potential for growth in the demand for livestock products (Gandhi and Zhou, 2010). The dietary protein consumption of India is evaluated at 60g/man/day (FAO, 2010) which is lower than the normal dietary protein utilization of the world (85g/man/day), developed nations (104g/man/day) and developing nations (80g/man/day). The low protein consumption is somewhat due to the expensive cost of animal protein sources such as meat of cattle, goat, sheep and poultry.

Agriculture is the mainstay of the Indian economy which contributes nearly 14.1 percent of Gross Domestic Product (GDP) (Economic Survey, GOI 2012-13; base year 2004-05), as about 65 to 70 percent of the population is relying on agriculture for their sustenance. Indian agriculture is largely supported by agriculture contributing 4 percent to national GDP and

generate employment and vital livelihood for 70 percent inhabitants in rural areas. Although it bears main role in addressing poverty, there is still a discrete rural-urban divide and India's emerging image as a global economic force is not backed by its human development statistics. The role of livestock in agriculture sector GDP has been gradually increasing. An increasing trend has been shown in the demand for livestock products, which is the sttribution of economic growth, rising incomes and urbanization.

Livestock is symbolic to wealth and power across civilizations for centuries. India is blessed with diversified type of livestock. Its livestock sector is one of the largest in the world (Islam, et. al., 2016). India packs 56.7 percent of the world's buffaloes, 12.5 percent cows, 20.4 percent small ruminants, 2.4 percent camel, 1.4 percent equine, 1.5 percent hogs and 3.1 percent poultry. The importance of livestock in Indian agriculture is well recognized. Livestock has an enormous valuable products, it enhances food security through supply of milk, meat and it also generates self-employment to man. It also plays a significant role for the alleviation of smallholder livestock farmers and poverty as well. Climate change have minimal effect on livestock and its growth is also higher than agriculture. In 11th Five year plan of the Planning Commission of India, the normal growth of livestock sector was 4.1 percent while it was 3.6 percent for agriculture. The growth in livestock sector is also demand-driven, inclusive and pro-poor. Incidence of rural poverty is less in states where livestock accounts for a sizeable share of agricultural income as well as employment. In India, livestock production system is primarily characterized by low input as well as low output. In most of the countries, meat is normally produced in a planned manner, scientifically at a central place owned either by private sector or by local authority which is called as abattoir or slaughterhouse. According to the definition of Bureau of Indian Standards (BIS), slaughterhouse or abattoir may be defined as any building or premises licensed by local authority for slaughter of animals intended for human consumption.

The growth of demand for animal products has arisen from the growth of population, urbanization and rising income in the developing countries (FAO, 2003). As a result, there has been an increase in production of animal products especially in the poultry and swine production. Pig is one of the most productive and fast growing livestock species that can convert food waste to significant products (Rodriguez-Estevez, et. al., 2010). Further with the growing demand of meat, fast growing products like pigs accounts for a major share in the growth of livestock sector. Pig farming is considered to be an important economic activity which provides opportunity as an income generating activity among the small scale farmers especially in developing countries. Pigs have higher turnover rate due to large litter sizes, shorter gestation period (114 days) and more efficient carcass yield than other cattle, sheep or goat, dressing out at about 70 percent compared to 52.5 percent for cattle and about 50 percent for sheep and goat (Tewe and Adesehinwa, 1995).

Animal farming has been a supply source for meat requirement for consumption since the inception of the civilisation. Looking back in the history of mankind; agriculture and its supplies has played an important role in creating wealth of mankind. Otte et. al. (2007) have rightly mentioned that internationally, The growth pig and poultry production sector are the fastest and industrialization of the livestock sub-sectors with an annual production growth rates of 2.6 and 3.7 percent over the last decade. Likewise, agriculture is the lifeline and main occupation of the people of India. In the rural communities, livestock rearing is bound by socio-cultural norms and primarily practiced for sustenance. Over 58 percent of the rural household depends on agriculture as their principle means of livelihood (Sharma, 1999). According to the Central Statistics Office (CSO) estimation by Government of India, the contribution of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) was 15.35 percent from the Gross Value Added (GVA) during 2015–16 at 2011–12 base year prices.

Pig rearing is an important economic activity in the eastern states of India and particularly among the tribal communities. Animal farming has a special significance as it plays an important role in improving the socio-economic development of the weaker sections of the society. Livestock is the source of income for the small scale farmers and acts as an insurance against crop failures and unforeseen calamities. The importance of livestock goes beyond its food production function (BIRTHAL, et. al., 2002). It provides draught animal power and organic manure for crop production. It also provides hides, skin, bones, blood and fibers to the industrial sector. It creates a persistent stream of income and employment and reduces seasonality in livelihood patterns particularly of the rural poor (BIRTHAL and ALI, 2005).

Located in the north eastern part of India, Mizoram is a mountainous region with a population of about 11 lakhs (Economic Survey of Mizoram, 2016) and it lies within the tropics between latitude 21.19° to 24.35° north and longitude 92.15° to 93.29° east. An aerial survey of the state gives an impression of shape of a bitter gourd which has been cut horizontally and put in north-south direction on the ground. The entire state is broken into countless broken hills locally called as “*Tlang*” with sharp and pointed hill tops. The slopes are steep on all sides and the elevation ranges from 40 metres to 2,157 metres. The average altitude is about 900 metres from sea level. The hills are covered with dense vegetation and bamboo forests are common, due to this rough terrain, growth of industries are difficult. As crop production is still follows traditional method, livestock plays an important role in this hilly state. Livestock rearing is an incumbent part of the people in Mizoram. Amongst the livestock animal reared, pig is most significantly reared in every household as an additional economic activity. Pig farming is one of the main sources of income for the subsistence farmers as well as determining the family’s purchasing power.

The number of livestock owned by the families in the rural areas of Mizoram often is referred as an indicator of wealth of the village. The history of livestock keeping and pig rearing could be traced back to Mizo folklore. According to the officials of Animal Husbandry and Veterinary Department, Government of Mizoram, commonly cited reasons for the increase in meat consumption are due to changing dietary preferences towards meat, poultry and milk being associated with the increase of disposable income and rapid urbanization in the state.

Studies find that improving the local market system could enhance the benefit of smallholder farmers (Tadesse, et. al., 2013). It indicates that the financial benefits can be derived by the small farmers by exploiting the market opportunities. According to Gausi, et. al. (2004), small animal farmers have propensity to pay no attention to new technology even if it appears to be better than their current practices due to market barriers. The farmers prefer to the patterns of pricing, production process in consistent to the best seasonal prices and consumer preferences (Ehui, et. al., 2000). Study of the pig marketing system may lead to innovations, interventions, or opportunities to educate as well as increase the marketing efficiencies and improve product quality, which ultimately increase profitability of farmers (Levy, 2014).

1.2 Problem Statement

According to the 18th Quinquennial Livestock Census-2007 (Animal Husbandry and Veterinary Department of Mizoram), pig is the largest livestock reared in Mizoram. The census also shows that the highest rate of growth in its population, and the crossbred population consist 90 percent where the indigenous pig accounts for only 10 percent of the total pig population. The production and marketing of pig needs to be studied and analysed because it is the most demanded meat in Mizoram. Although studies has been carried out in the field of production, it is felt that still there is further need for study in the process of marketing and production from the managerial point of view.

Pork is one of the most supported meats among the Mizo where more than 85 percent eat meat. Every family either rich or poor makes an effort to have meat at least once in a week. The demand of pork meat is ever rising and the cost of pork, as of April 2016, is Rs.250/- per kilogram and is still increasing. Since the demand for pork is increasing, it is felt that more examinations are required in this field.

Since the local production is not at par with the demand in the market, it forces the marketers to indulge to import from the neighboring country Myanmar (formerly known as Burma), as well as from some of the neighboring state (Assam). This results in the outflow of the economy from the state. It also means that there is a need to study to improve the production so that the quality of the meat is improved and supply is self-sufficient. Since, the topography of the land in Mizoram is quite different from other states, a unique method or practice for production may be explored. It is also felt that if the state could produce more meat than current consumption, then it will create a viable path for exports.

The seed capital for pig farming is quite low in comparison to other meat production like *mithun*. This can attract unemployed youth to venture into pig farming and thus generate employment. As the sector grows, there may be further employment generations in terms of marketing and transportation of the products.

Mizoram have a culture of rearing animals at their backyard and commonly pig is being reared. This is being carried by every household in rural, semi-urban areas and some parts of urban area. Since it is a practicing household activity, it is also felt that study is required for more productive process and for exploring the possibilities of better marketing facilities.

Although there are few studies conducted in general, on production of pigs in north east India, there is limited information in relation to marketing practices, production and management practices, performance and limiting factors of pig production in Mizoram. It is also perceived that the results of the present research will be utilized by different stakeholders

to mainstream the production and marketing system as a trail to uplift the livelihoods of small farmers. Therefore, in view of the above mentioned facts, the present study is planned with the general and specific objectives.

1.3 Literature Review

Several studies have been conducted regarding pig farming and pig management. Some of the literature reviews are presented in the following. The reviews are presented under two sub-headings viz., production of pigs and marketing of pigs.

1.3.1 Production of Pigs

Vann (2009) a retired Austin chef who is a food writer, in his work, “A History of Pigs in America” stated that pigs were domesticated in China around and were being raised in Europe by 1500 BC. His work also mentioned that the Romans had spread pig production and introduces pork throughout their empire. He reported that there were two main types reared: one breed was large, with floppy ears, and produced copious amounts of lard, while the other was of a smaller frame, with erect ears, used primarily for meat.

Moeller (2009) in his work “Overview of World Swine and Pork Production”, mentions domestication of pigs dated back at 4900 BC in China, and pigs were domesticated in Europe since 1500 BC. Domestication of the pig has played a vital role all the way through the world as a source of food for survival, but it has also played a role in cultural, religious, and social aspects of humans. Hernado de Soto first introduced pigs into North America in 1539, with further introductions into Mexico by Hernando Cortez in 1600, stating the versatility and adaptability to a wide-range of environmental condition that made pig play a major role in providing food for human consumption.

Carr (2016) in his work “History of Pigs”, stated that the first pigs evolved in Southeast Asia from earlier, smaller mammals, around two million years back, and spread out from that point

all through Eurasia and Africa. He also mentioned that wild pigs live in forests, especially where there are oak trees that make acorns, because pigs like to eat acorns. His work also stated that people first encountered pigs before they left Africa; they cooperated with dogs and used spears and nets to hunt wild pigs in the forest. According to Carr (2016), it is much safer to domesticate pigs and have them tame, although even tame pigs can still be very dangerous. The study shows that people first began to keep domesticated pigs around 10,000 BC in Central Asia. From Central Asia, domestic pigs reach slowly east to China, and southwest to West Asia and North Africa. People also domesticated pigs separately in Europe, maybe about the same time. In central Europe (what's now southern Germany and Austria), people combined their pigs with the salt from the big salt mines and became expert at preserving pig meat by making it into hams, bacon and sausages. Pigs were a very popular source of food all through antiquity, from West Asia all the way west to England and east to China, from Scandinavia to North Africa. Preservation of pig meat is easy with salt, and bacon and ham are delicious, fatty, salty foods.

“The Cambridge World History of Foods” have shown the advantages of pig, from a contemporary utilitarian perspective; the pig is one of the glories of animal domestication. It is prolific. After a gestation period of only 4 months, a sow gives birth to an average of 10 piglets, though litter size may, on occasion, be as large as 30. In a 6-month period, piglets of 1.2 kilograms can potentially increase in weight by 5,000 percent. This growth translates into a higher return for energy invested than for other domesticated animals. Another advantage is the omnivory of pigs, which permits a wide range of food options; items that are plentiful and cheap can dominate the intake. For example, surplus crops, such as sweet potatoes in New Guinea, coconuts in Polynesia, maize in the mid-western United States, and barley in Denmark, are frequently enhanced in value because they can be fed to swine. A major

disadvantage of pigs is their low ability to digest fibrous plant matter, so that, unlike ruminants, they cannot do well on cellulose alone.

Nguyen, et. al. (2010), states that the pig makes a major contribution to the world's meat supply. Within the global context, it constitutes the most important source of meat (40 percent), followed by cattle (29 percent). It is expected that pig meat will remain the single most important meat source, hence, playing a pivotal role, particularly in the case of meat production in Asia.

Maikhuri (1992) in his study 'Eco-energetic analysis of animal husbandry in traditional societies of India specially in north east India' found that poultry and swine husbandry are largely detritus-based and are less relatively dependent upon forest, unlike cattle and mithun that are sustainable only when the forest-resource base is high. The study found that there is room for recycling of resources within the subsystem e.g., through utilisation of dung that is otherwise wasted.

Fant (2014) stated that China's total pork production and consumption is projected to increase by a little over 20 percent based on new figures from the United States Department of Agriculture. While the increasing appetite for other meats, in China is expected to slow down the growth in pork consumption, its dominant position in the Chinese diet will remain intact for some time to come. In per person terms, the consumption of pork is projected to rise three times more than that of poultry and seven times more than that of beef. Fant have mentioned that the structure of pig farming in China has been changing rapidly as part of the larger transformation of agriculture. There is a growing shift away from small-scale backyard farming to specialized and large-scale commercial farming. Rising production costs (due mainly to higher feed costs), greater demand for food safety (due to more outbreaks of animal disease and use of unsafe feed additives), shrinking farm workforce (due to faster rural-urban

migration) and government policies to promote large commercial farms are some of the key factors responsible for the rapidly vanishing small pig farms.

Harbor et. al. (2006) observed that in many instances, smaller farms behave like retail consumers. On the other hand, larger farms have the ability to interact with input and output markets in a more business-like manner, taking advantage of powers of negotiation, economies of scale, and increased market access.

According to Giuffra et.al.,(2000) the domestic pig originates from the Eurasian wild boar (*Sus scrofa*). Clear evidence was obtained for domestication to have occurred independently from wild boar subspecies in Europe and Asia.

Njuki et. al. (2010) in their work “Pig Production, Management and Marketing in the North East Indian State of Nagaland” found that the ownership of small livestock characteristic of the sample is mirrored in the ownership of livestock by women saying that women mainly owned poultry and pigs. In Kohima, women owned poultry, pigs, dogs and cattle although they were more likely to own poultry and pigs than dogs and cattle. The study also found that improvement of housing, adoption of improved breeds and improvement of feeding practices which are the key interventions of the project have been shown to have a positive impact on productivity as measured by number of piglets per sow.

Kumaresan, et. al. (2009) studied the production system of 320 rural pig rearing households in the north east India. The study found that majority of the livestock are reared in intensive system and fed with home made and cooked feed (kitchen waste and locally available plants). It was also found that the smallholder resource driven pig production is economically practical and sustainable at household level and there is adequate scope to develop the smallholder resource driven pig production system.

Kumaresan et. al. (2006) undertook a study to assess the growth performance of Hampshire, Large White Yorkshire and Mizo local pigs under field conditions in Mizoram. 45 piglets (consisting of 8 males and 7 females of each breed) were selected randomly in and around Kolasib district of Mizoram. The existing local methods of housing, feeding and other management practices were recorded. From this study, it was inferred that Hampshire and Large White Yorkshire pigs gain significantly higher body weight than the Mizo local pigs under field conditions in Mizoram.

Rahman et. al. (2008) studied the production and management system followed by the farmers in Mizoram which was concentrated in Aizawl. The study revealed traditional method of feeding kitchen waste. They also used either traditional or allopathic medicines to deworm the pigs. The study also found that the pigs are marketed at the age of 1 year when they gained the body weight of 90 kg or more.

According to Kumar et. al., (2007), the productivity of animal is very low in north east region (NER) compared to other parts of the country. While increasing farm-level production and productivity will require more improved animals, improved fodder/feed technology, and better access to livestock services, smallholders' access to reliable markets to absorb more milk at remunerative prices is also a critical constraint. Organized marketing of livestock in the NER remains relatively insignificant, despite efforts in the past to develop and promote collective market mechanisms.

Rahman (2007) studied to identify the factors that influence adoption of pig production technology in pig farmers. A total 100 numbers of the farmers were selected for the sample and five different factors which are, housing, breeding, feeding, health care and general care and management practices. The study revealed that 81 of the farmers adopted improved technology on breeding and 63 of them adopted health care practices at higher level in their farms. The age of respondents in adopting improved technology on housing and feeding

practices were very low. The study also found that the adoptions of improved technologies were connected with age, education, operational land holding, farm size, income from piggery, social participation, extension contact, farming experience, farm education exposure, scientific orientation, knowledge level, training and financial help received.

Feroze et. al., (2010) found that the meat production in recognized sector has also gone up by 63% in NE region between the period of 2000-01 and 2005-06 which is significantly higher than the increase in all India level. Though all the states in the region have witnessed increase in meat production but the increase in Nagaland and Assam is significant which may be due to their large livestock base and people's preference for meat.

1.3.2 Marketing of Pigs

The works of Düvel in "Livestock marketing in northern Namibia: cultural versus economic incentives" stated that improving communal livestock farmers' production and marketing efficiency is an obvious means of increasing their income and standard of living. He also found that normally the promotion of production efficiency is given preference, which is based on the logical sequence, but ignores their possible interdependency in the cognitive field of the livestock farmer and in his consequent decision making.

Ajala and Adesehinwa (2008) have worked in "Analysis of Pig Marketing in Zango Kataf Local Government Area of Kaduna State, Nigeria" where they found most of the traded pigs brought to the markets are from pig farmers living in Kafanchan and the surrounding villages. At village levels, itinerant traders visit the homes of pig farmers to buy animals in small numbers such as one or two. They are then sold at local village markets to intermediate traders who are assemblers with more funds and capacities for bulking larger numbers.

According to Nguyen (2014) in his work "Recent Progress in Swine Breeding and Raising Technologies", finds that pork consumption per head in Vietnam increased rapidly from 2001

– 2013. In 2013, the average pork consumption per head is 20.1 kg that is double compared to what it was in 2001 (12.84 Kg/head/year). The pork consumers in Vietnam prefer fresh pork, and don't like the frozen one, that's why they usually buy fresh pork in the small sleeve market. In the countryside, 93.3 percent of the people buy pork in the small market.

Constantinides (2006) emphasizes that marketing mix is a framework of the dominant marketing management paradigm to identify market development, environmental changes and trends.

Ajala and Adesehinwa (2008) have observed the marketing channel of Kaduna state, Nigeria where they found that pigs are first sold at local village markets to intermediate traders who are assemblers with more funds and capacities for bulking larger numbers. These intermediate traders visit similar smaller (rural) markets, such as Zonkwa and Samaru markets, and gradually build up a herd for sale in the Katsit (urban) market. Ownership of pigs may in some cases change hands two or three times before reaching Katsit, while in other cases it may be a direct supply from buyers at the village to the Katsit (Kafanchan) market. They also have stated that proponents of large scale firm operations have argued in favour of higher seller concentration in relation to competitiveness where economic growth in firms will lead to elimination of inefficient small-scale firms.

Coviello et al.,(2003) in their work, "Assessing the Role of e-Marketing in Contemporary Marketing Practice", they have mentioned that several studies confirm that the 4Ps is indeed the trusted conceptual platform of practitioners dealing with operational marketing issues.

Harbor et al. (2006) had pointed out that the market interaction between agricultural input industry and farmer producers is similar to that observed in a Business to Business (B2B) environment. In this interaction, farmer producer is the buyer and agricultural input industry in this case livestock input industry is the industrial market.

Purnomo et. al. (2010) revealed that there is not significant difference among various demographic variables such as provincial area, gender, age as well as educational level. Showing that demographic profile does not influence the customer attitude toward 4Ps.

According to Morgan (1965) in analyzing the pig market of Zango Kataf, Nigeria, found that, considering the services provided in the production and marketing of pigs, the contribution of the margin was considered high in comparison to costs of marketing and the age received by the farmers. He also stated that generally, proponents of large scale firm operations have argued in favour of higher seller concentration in relation to competitiveness where economic growth in firms will lead to elimination of inefficient small-scale firms. The tenability of this argument would depend largely on the empirical evidence of a given market where the existing large holders are not exploitative but more efficient than the small holders. He further concluded that Government involvement in livestock marketing has been limited to the areas of prevention of diseases and provision of public market infrastructures in a few towns, with no major direct participation or regulatory measures.

Mamman (2005) have found that transportation of livestock depend largely of the availability of vehicles (trailers) most of which (95 %) are owned by transporters in Jega town, Kebbi state. It is organised through *Yan Kwammission* (commission agents) who are approached by potential livestock traders for a vehicle. The *yan kwommission* arranges for the price, date and time that the cattle are to be transported. Members of NURTW (*yan union*) also assist the *yan kwommission* in sourcing vehicles for livestock traders.

Aklilu (2008) suggested that value is recommended for milk, meat, hides, skins, wool, honey, bones, blood, feathers, hooves and horns because of their current low value chain that results in low earnings.

Kumar et. al. (2007) finds that organized marketing of livestock in the NER remains relatively insignificant, despite efforts in the past to develop and promote collective market mechanisms.

Singh (1997) reported that, the live animal market of the Guwahati city was operated 6 days in a week, the goats from village markets of neighboring places being sold by households were brought for the city market. They also identified sixteen channels for marketing of live animals from producer to consumer with and without the involvement of middle man.

Sarma (1999) reported that the hygienic and other conditions of butcher shops available in the market area of Guwahati city are far from the satisfaction and that the butchers have aligned and are mostly below the minimum requirement as prescribed by the BIS (1973). There are small number of butcher shops that have some facilities but are maintained in very poor condition. Hazarika (1993) reported that the hygienic status of butcher shops were very poor and primitive in nature.

Changmai (2005) finds that the pork market in Guwahati has not been well organized and running in a chaotic manner flouting all norms of flesh marketing. The markets are more distributed in the area dominated by the tribal and *harijan* community and they follow traditional methods as reported by Assam Livestock & Poultry Corporation. There are also information regarding the rate of consumption of pork is highest in the entire region compared to the rest of the country.

Feroze et. al. (2010) stated that absence of organized marketing channels in NER is one of the major constraints faced by livestock sector of the region. Only a few cooperative milk plants are working in the region. Only three per cent of the total marketed milk and milk products is handled by organized sector, both cooperative and private in Assam. Thus, the traditional

market is the only option available in the region to market the indigenous as well as processed milk products.

Vann (2009) a retired Austin chef who is a food writer, in his work, “A History of Pigs in America” stated that pigs were domesticated in China around and were being raised in Europe by 1500 BC. His work also mentioned that the Romans had improved pig breeding and spread pork production throughout their empire. He reported that two main types were reared: one breed was large, with floppy ears, and produced copious amounts of lard, while the other was of a smaller frame, with erect ears, used primarily for meat.

Moeller (2009) in his work “Overview of World Swine and Pork Production”, mentions domestication of pigs dated back at 4900 BC in China, and pigs were raised in Europe as early as 1500 BC. Since domestication, the pig has played a vital role throughout the world as a source of food for survival, but it has also played a role in cultural, religious, and social aspects of humans. Pigs were first introduced into North America by Hernando de Soto in 1539, with further introductions into Mexico by Hernando Cortez in 1600.

Carr (2016) in his work “History of Pigs”, stated that the first pigs evolved in Southeast Asia from earlier, smaller mammals, around two million years back, and spread out from that point all through Eurasia and Africa. He also mentioned that wild pigs live in forests, especially where there are oak trees that make acorns, because pigs like to eat acorns. His work also stated that people first encountered pigs before they left Africa; they cooperated with dogs and used spears and nets to hunt wild pigs in the forest. According to Carr (2016), it is much safer to domesticate pigs and have them tame, although even tame pigs can still be very dangerous. The study shows that people first began to keep domesticated pigs around 10,000 BC in Central Asia. From Central Asia, domestic pigs reach slowly east to China, and southwest to West Asia and North Africa. People also domesticated pigs separately in Europe,

maybe about the same time. In central Europe (what's now southern Germany and Austria), people combined their pigs with the salt from the big salt mines and became expert at preserving pig meat by making it into hams, bacon and sausages. Pigs were a very popular source of food all through antiquity, from West Asia all the way west to England and east to China, from Scandinavia to North Africa. Preservation of pig meat is easy with salt, and bacon and ham are delicious, fatty, salty foods.

“The Cambridge World History of Foods” have shown the advantages of pig, from a contemporary utilitarian perspective; the pig is one of the glories of animal domestication. It is prolific. After a gestation period of only 4 months, a sow gives birth to an average of 10 piglets, though litter size may, on occasion, be as large as 30. In a 6-month period, piglets of 1.2 kilograms can potentially increase in weight by 5,000 percent. This growth translates into a higher return for energy invested than for other domesticated animals. Another advantage is the omnivory of pigs, which permits a wide range of food options; items that are plentiful and cheap can dominate the intake. For example, surplus crops, such as sweet potatoes in New Guinea, coconuts in Polynesia, maize in the mid-western United States, and barley in Denmark, are frequently enhanced in value because they can be fed to swine. A major disadvantage of pigs is their low ability to digest fibrous plant matter, so that, unlike ruminants, they cannot do well on cellulose alone.

Nguyen, et. al. (2010), states that the pig makes a major contribution to the world's meat supply. Within the global context, it constitutes the most important source of meat (40 percent), followed by cattle (29 percent). It is expected that pig meat will remain the single most important meat source, hence, playing a pivotal role, particularly in the case of meat production in Asia.

Maikhuri (1992) in his study 'Eco-energetic analysis of animal husbandry in traditional societies of India specially in north east India' found that poultry and swine husbandry are largely detritus-based and are less relatively dependent upon forest, unlike cattle and mithun that are sustainable only when the forest-resource base is high. The study found that there is room for recycling of resources within the subsystem e.g., through utilisation of dung that is otherwise wasted.

Fant (2014) stated that China's total pork production and consumption is projected to increase by a little over 20 percent based on new figures from the United States Department of Agriculture. While the increasing appetite for other meats, in China is expected to slow down the growth in pork consumption, its dominant position in the Chinese diet will remain intact for some time to come. In per person terms, the consumption of pork is projected to rise three times more than that of poultry and seven times more than that of beef. Fant have mentioned that the structure of pig farming in China has been changing rapidly as part of the larger transformation of agriculture. There is a growing shift away from small-scale backyard farming to specialized and large-scale commercial farming. Rising production costs (due mainly to higher feed costs), greater demand for food safety (due to more outbreaks of animal disease and use of unsafe feed additives), shrinking farm workforce (due to faster rural-urban migration) and government policies to promote large commercial farms are some of the key factors responsible for the rapidly vanishing small pig farms.

Harbor et. al. (2006) observed that in many instances, smaller farms behave like retail consumers. On the other hand, larger farms have the ability to interact with input and output markets in a more business-like manner, taking advantage of powers of negotiation, economies of scale, and increased market access.

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in meat production but the increase in Nagaland and Assam is significant which may be due to their large livestock base and people's preference for meat.

1.4 Research Gap

Literature study finds that (Kumerasan, et. al. 2009) studies have been conducted regarding the production of pigs in Mizoram. These studies focused primarily on the methods of production system but leaves out issues related after production. Apart from production, management of piggery is also focussed by some of the researchers in Aizawl (Rahman et. al., 2008). These studies also primarily revolve in the process of getting good piglets and the management of production but the post production process is not studied. Very few literatures is found regarding production and marketing of pigs specifically for Mizoram state although some literature can be found about other countries and states. Thus, the study finds a research gap in the area especially for marketing of pigs and production process in Mizoram.

1.5 Objectives of the study

The entire study is based on the following objectives:

1. To examine the role of pig production in the economy of Mizoram
2. To study the production and management systems of pigs in the state
3. To examine the performance of pig production in the select districts of Mizoram
4. To analyse the governments' policies towards piggeries in Mizoram
5. To study the process of marketing of pigs in Mizoram

1.6 Hypotheses

1. There is no significant difference on income generation through pig farming in select districts of Mizoram.
2. The pig farming policies of the government is not significantly conducive in the select districts of Mizoram.

3. There is no significant association between selection of distribution channels to the income from pig farming in the select districts of Mizoram.
4. There is no significant association between joining of collective associations and income from pig farming in the select districts of Mizoram.

1.7 Research Methodology

1.7.1 Description of the Study Area

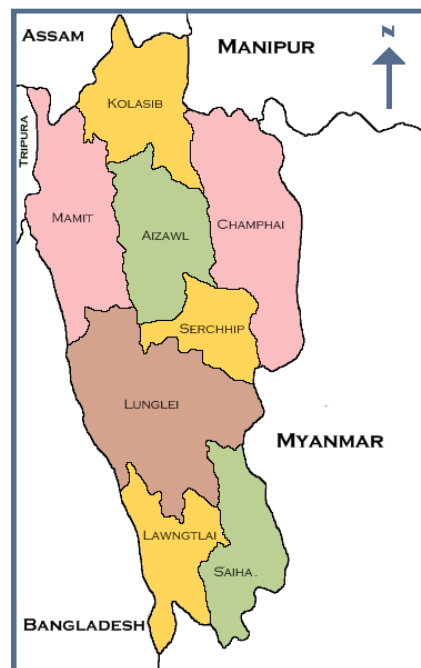
The study was undertaken in three major districts of Mizoram, viz., Aizawl, Lunglei and Kolasib representing urban, semi-urban and rural agro-ecologies, respectively. The selection of study areas was based on their proximity, pig population, pig fattening, feed production, marketing and pork utilization.

Aizawl is located at north of tropic of cancer in the northern part of Mizoram and its average altitude of 1,132 meters above sea level. The area receives a bimodal rainfall with a long rainy season occurring from June to September and annual rainfall of 2,564 millimeter and average temperature of 20.6°C (climate-data.org).

Lunglei district is found at the southern side of Mizoram and bounded by Mamit District and Aizawl districts in the north and by Bangladesh on the west. The district is bound by Lawngthlai on south and on the south-east by Saiha Districts. It is found at an average altitude of 722 meters above sea level. The district is laid out in an area of 4,538 sq. km. Its average annual rainfall is 3435 mm.

Kolasib district is spread over an area of 1382.51 sq. km. It is bounded by Assam on the north and north west, by Mamit district on the west side and by Aizawl district in the south and east. It has a bimodal rainfall pattern, having a main rainy season from May to October. The annual average rainfall and temperature are 2919 mm and 24.7°C respectively.

Fig. 1 Map of Mizoram



Source : Wikipedia.org

1.7.2. Sampling and Data Collection Procedure

The data required for the study has been collected from both primary and secondary sources. Primary data was collected from the pig farmers directly in referential mode. Preset structured questionnaire was the main tool for interviewing and the source of primary data. The secondary data were collected from various sources including Animal Husbandry and Veterinary Department of Mizoram, libraries, journals, newspapers and websites.

1.7.2.1. Determination of the sample size

Population: The population of the study are the farmers who rear pigs in Mizoram state. The population is derived from the total number of household of 2,22,853 in Mizoram (Census of India, 2011). Economic survey also states that 60 percent of the household are involve in agricultural activities which includes jhum cultivation and animal rearing. These household figure is multiplied by 60 percent as representing the household and commercial farmers (Economic Survey, 2011-12) resulting into 1,33,711.

Sample Design: The sample units of the study are the pig farmers who are residents of Mizoram. The sample size is 598 rounding up to 600 respondents which has been derived from a confidence level of 95 percent using a confidence interval of 4 percent from the population of 1,33,711 of Mizoram. The sample is calculated by using the following formula.

$$\text{Sample size} = \frac{Z^2 * (p) * (1-p)}{c^2}$$

where:

Z = Z value (e.g. 1.96 for 95% confidence level)

p= percentage picking a choice, expressed as decimal (.5 used for sample size needed)

c = confidence interval, expressed as decimal (e.g., .04 = ±4)

The above sample size calculation is modified by using correction with finite population.

$$\text{New Sample Size} = \frac{\text{Sample size}}{1 + \frac{\text{ss}-1}{\text{pop}}}$$

where,

pop = population

Convenient sampling technique was employed to select study sites and pig farmers. Firstly, three districts viz., Aizawl, Lunglei and Kolasib were selected based on the availability of pig farms. These districts have been selected as they are the largest producers of pigs in Mizoram. Secondly, the pig farmers were identified on the reference of the suppliers from the local markets of the select districts. A total of 600 household pig farmers were purposively selected and divided into three equal groups of 200 farmers among the three select districts. The sample of 200 each from the three (3) districts is considered to be adequate as per sample selection procedure.

1.7.2.2. Data collection

The data were collected using structured questionnaire. The questionnaire was translated into local language and pre-tested before the actual data collection process to examine the appropriateness and clarity of the questions. The questions were re-framed in such a way that the farmers can understand and respond easily. The questionnaire was administered to the pig producers by the researcher. Based on the questionnaire interview, the following major information was gathered.

-Socio-economic profile pertaining to age, gender, family size, educational level, farming experience in years, source of income and wealth status were accessed.

-Farm characteristics with regard to type of breed, sources of labour, working hour, herd size and source of foundation stock were collected.

-Healthcare practices with respect to vaccination, prevalent diseases etc. and factors affecting pig production were gathered.

-Feed regarding feed types, feed sources, amount of feed offered and body condition scores of pigs were gathered.

-Pig sty construction in terms of design, materials and types were collected.

-Pig performance parameters concerning age at farrowing, farrowing rate, litter size (at birth and weaning), weaning (age), marketing etc. were collected.

-Marketing practices in relation to types of buyers, main product sold ways of buying, sources of market information, reasons of buying, selling place, methods of price estimation, average selling price of live pig and pork, pig value chain, marketing channels and marketing constraints were gathered.

The study also includes interviews of the Animal Husbandry and Veterinary Department (Government of Mizoram) officials regarding the government's role in the development of piggeries in order to assess their performance.

1.7.2.3. Periodicity of the Study:

The study is based on both primary and secondary data. Primary data were collected over the period from 2012 to 2014. Most of the farms were visited more than once. Figures in respect of three years 2012, 2013 and 2014 were taken from each farm. Hence, so far as periodicity of primary data is concerned, it relates to the period 2012 to 2014. For the secondary data, the periodicity of study in respect of different parameters is not uniform. For example, for the pig population in Mizoram, the periodicity of study is 2007 to 2016 (Census figures of pig population for the subsequent periods were not available). Again, so far as meat production in Mizoram is from various sources, and the periodicity of study is from 2007 to 2016.

1.7.2.4. Statistical Data Analysis

Data collected through questionnaire were analyzed by Chi-square and descriptive statistics of statistical package for social sciences (SPSS). Chi-square was used to analyze the following parameters: gender, educational level, source of income, policy perspectives, wealth status, sources of labour and collective associations. Purposes of pig rearing, types of pig operations, pig value chains and pig marketing channels were analyzed by descriptive statistics.

1.8 Scope of the Study

The importance of livestock sector has been adept by nations and the economics can be paired along the contributions of this sector. There are several sub-sectors of livestock which produces milk, meat, eggs etc. The study is focused on piggery and its production and marketing. There are Government interventions and policies which shapes the growth of this sector. The purview of the study is on the four Ps of Marketing viz., product, price, place and promotion. The first P-Product is covered under the area of study “Production of pigs”. This focuses on the production process of pigs. The other 3 Ps viz., price, place and promotion are covered under the area of study “Marketing of pigs”. The research also includes areas of

government policies in improvement of the production as well as the management system of the pig production. For the study purpose three districts i.e., Aizawl, Lunglei and Kolasib has been selected with the assumption that these areas represent pig production in large scale in Mizoram.

1.9 Terminology used

The terms pig, swine, hog, bovine, boar etc. are used in interchanged mode during the process of writing the thesis. The meat of the pig is also sometimes used interchangeably as pork and pig meat. Apart from this, in the thesis, the term pig production is also synonymously used as pig farming.

1.10 Organisation of chapters

The tentative chapters are:

Chapter 1. Introduction

Chapter 2. Piggery in Mizoram and Its Contribution to Economy

Chapter 3. Pig Production and Management System in Mizoram

Chapter 4. Government's Role in Development of Piggeries in Mizoram

Chapter 5. Marketing of Pigs in Mizoram

Chapter 6. Summary of Major Findings, Suggestions and Conclusions

1.11 Limitations of the study

The study deals with the production and marketing aspects of the pig in Mizoram. The study is based on both primary data and secondary data. The limitations of primary data are mainly due to inherent improper response of the respondents. As the study is also to some extent based on secondary data, therefore, it is subjected to the limitations of secondary data. The limitations of the study are as follows:

1. The sample was selected only from three districts i.e., Aizawl, Lunglei and Kolasib. Generalisations made on the basis of these three districts may not represent a true picture of pig production in Mizoram.
2. The questionnaire consisted of 66 questions which may be tiresome for the respondents and they might have lost enthusiasm in the process.
3. The pig market is highly unorganised and collection of data through referencing mode might have missed out some of the relevant farmers.
4. The competitors mainly import pig from Myanmar border in Champhai district which was not included in the area of study.

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Chapter 2

Piggery in Mizoram and Its Contribution to Economy

2.1 Introduction

Mizoram is located at the far east corner of India with an estimated area of 21,081 sq.km., belonging to the seven states of the North Eastern Region. It has an estimated population of 10,97,206 (Census 2011) which accounts for only 0.09 percent of India's total population (1,21,01,93,422). Mizoram also has 722 kms. of international border with the neighbouring countries of Bangladesh and Myanmar. Mizoram is distinctly marked with hilly terrain and steep slopes. The average height of the hills to the west of the state are about 1,000 metres (3,300 ft.) progressively rising to 1,300 metres (4,300 ft.) to the east. The highest peak in Mizoram measures 2,210 metres (7,250 ft.) at Phawngpui Tlang which is also known as the *Blue Mountain*, located in the south-eastern part of the state.

Table 2.1 shows that the Gross State Domestic Product (GSDP) at constant 2011-12 prices was at 9 percent average annual growth rate during the financial years 2011-12 to 2015-16, which was significantly higher than projected national growth rate of 7.4 percent according to the Mizoram Economic Survey, 2015-16. The GSDP at constant prices in 2014-15 is estimated at Rs.9,428.70 crores as against Rs.8,661.31 crores in 2013-14 registering a growth of 9.2 percent during the year as against the growth rate of 9.11 percent during the previous year. At current prices, the GSDP is estimated at Rs.11,457.99 crores as against Rs.9,849.41 crores in 2012-13 showing an increase of 12.6 percent during the year.

Services or tertiary sector dominates the economy in terms of contribution to GSDP represented by 60.02 percent of the total GSDP 2014-15. Services sector continued to be the growth drivers of the economy and contributed 61.4 percent to the GSDP during 2014-15. The primary sector comprising agriculture and allied activities contributed 17.5 percent 2014-15 to the GSDP.

Table 2.1 Select Economic Indicators of Mizoram

Sl. No.	Particulars	Unit	Year	Year
1	State Income		2012-13	2013-14 (Provisional)
	a) GSDP at current price	Rs. in lakhs	851315	997043
	b) Per Capita Income at current price	Rs.	65013	74846
	c) GSDP at constant (2004-05) price	Rs. in lakhs	777797	520289
	d) Per Capita Income at Constant Price	Rs.	60261	39347
2	Livestock Census		2007	2012
	a) Total Livestock	'000	364	384.604
	b) Total poultry	'000	1241.814	1260.298
3	Forest (FSI Report)		2011	2013
	a) Area under dense forest	Sq. Km	6,220	5,971
	b) Area under open forest	Sq. Km	12,897	12,690
4	Electricity		2013-14	2014-15
	a) Installed Capacity	MW	52.47	52.77
	b) Gross Generation	MW	480.31	537.67
	c) Power Purchased	MU	424.97	502.50
	d) Total Consumption	MW	302.78	327.21
5	Industries		2013-14	2014-15
	a) Registered SSI Units	No.	213	122
	b) Average annual growth rate of enterprise		9.60%	9.60%
6	Banking		As on 30.09.2014	As on 31.03.2015
	a) No. of Banks/Branches	No.	159	168
	b) Total Deposits	Rs. crores	4918.58	5678.98
	c) Total Advances	Rs. crores	2318.49	2545.49
	d) Credit Deposit Ratio	%	47.14	44.83
7	Education		2013-14	2014-15
	a) No. of Primary Schools	No.	1,873	1946
	e) No. of High Schools	No.	612	610
	g) No. of Higher Secondary Schools	No.	127	132
	i) No. of Colleges	No.	22	22
	c) Enrollment in Universities	No.	3871	4319
8	Roads		2013-14	2014-15
	i) Total roads	Kms.	5870.739	6297.739
9	Transport		2013-14	2014-15
	Total Motor Vehicles	No.	137225	151486
10	Communication		2013-14	2014-15
	a) No. of Post Offices	No.	387	389
	Rural	No.	344	346
	Urban	No.	43	43
	b) No. of Mobile Connections (excluding Vodafone)	No.	762634	NA

Source : Economic Survey Report 2013-2014

With livelihood of about 60 percent of the population depending on agriculture and allied activities, faster growth in agriculture is both a necessary and sufficient condition for

stronger, sustainable and inclusive growth in the state. The industry sector contributed 21.10 percent of GSDP during 2014-15. The main driving force of the sector is construction sector with a contribution of 9.87 percent to the GSDP in 2014-15. To further study the economy of Mizoram, the sectors of economy are analyzed in the following subheadings.

2.1.1 Transport

The mode of transportation in the state connecting in and out the region is mainly through road transport. The road and national highways are characterized by the snake like winding corners and loops in and out of the steep slopes. The data of the Mizoram State Road Statistics 2015, shows that, the total length of all types of roads in Mizoram as on 2015 is 7,688.86 km. and road density is 35.80 km/100 sq.km. approximately while the average national level road density is 129.00 km/100 sq.km. There is one air route connected to the capital at Lengpui Airport which is also expected to be able to handle about 300 passengers daily. Table 2.1 shows that there are 1,51,486 vehicles in 2014-15 which has been increased from 63,028 in 2008. This shows that there is an increase of number of vehicles in Mizoram by 140.34 percent.

2.1.2 Power and Electricity

The state does not have self sufficient generation of power, thus it has to purchase power from neighbouring states to meet the requirement of various categories of consumers. According to the 18th Power Survey of India 2010, the estimated power requirement of Mizoram is 201MW and the allocated share is 103.09MW (real time power availability is normally 60MW). Despite this huge gap in the power generation and demand, the state can generate only about 15MW from the installed capacity of 29.35MW. There are also some projects still in process, as the generating stations are rain fed run-off the river hydro electric project. Thus the state is forced to seek power from various sources like Loktak, Ranganadi,

etc. from central sector utilities like NEEPCO, NHPC, NTPC, etc. The installed capacity has increased to 52.77 MW in 2014-15 (Table 2.1) and the gross generation has increased to 537.67 MW in 2014-15. The power purchased has also increased to 502.50 MU in 2013-14 from 302.78 MU in 2012-13. On recent developments, Tuirial Hydro Power project is going to be commissioned at the earliest with a capacity of 60 MW.

2.1.3 Financial and Banking Institution

The total bank branches functioning according to the report of Economic Survey of Mizoram as on 31.03.2015 stood at 168 against 159 bank branches as on 30.09.2015 which is an increase of 5.66 percent (Table 2.1). The population (as per 2011 census) served per branch comes to 6,531 while the national average is about 15,000. However the location of branches in the state has been skewed in cities and urban centres. There are still many villages devoid of banking services even within a radius of 80-100 kms. The main reason may be the presence of scattered village with small number of households which makes branch banking unviable.

2.1.4 Industry

Industrialization in Mizoram is very slow owing to absence of many vital factors for industrial setups. The geographical location and topography of the state is not favourable for industrial development due to steep slopes and winding roads which makes slow progress in economic contributions. The industry sector contributed 26 percent while the agriculture and allied sector contributed 16 percent to the GSDP. Average annual growth rate of enterprises in Mizoram is found to be 9.60 percent in 2014-15 (Table 2.1) and remains the same in comparison to 2013-14.

Construction sector is the main contributor among the industrial sector. The contributions made by manufacturing sector is still very low due to factors like road transportation, insufficient power, lack of skilled employees etc. The service sector industries are the main contributors to GSDP. Employment generated by construction industry is significant as it provides employment opportunities for the workers. The flow of investment and employment generated under industries sector as per the Entrepreneurs Memorandum filed at District Industries Centre (D.I.C) during 2007-08 to 2013-14 is tabulated .as below:

Table 2.2 Entrepreneurs Memorandum filed at DICs

Year	No. of Units registered during the Year	Investment (Rs. in lakhs)	Employment (No.)
2007-08	594	593.00	594
2008-09	487	866.30	4113
2009-10	457	1978.29	3977
2010-11	200	2164.50	1328
2011-12	131	1072.99	906
2012-13	122	1432.20	930
2013-14	213	2323.12	1440
2014-15	120	600.00	420

Source :*Economic Survey Mizoram 2014-15*

The state government with its limited available resources and difficult geographical terrains had developed industrial areas with basic infrastructure. These industrial areas which are carved along the rugged hills provides the required infrastructure, and solves the problem of industrial land for entrepreneurs who wants to set up industrial units. Allotment of industrial plots in certain industrial areas has been made as per the Mizoram Industrial Areas (Management, Regulation and Control) Act, 2008. The industrial development in Mizoram is to a certain extent is far behind other states of the country. Several economic barriers such as poor infrastructure, social setups, unskilled manpower etc. are found to have an adverse affect in the development of industry in the state.

2.1.5 Tourism

The main function of tourism department has been the development of tourism and its allied activities and building basic infrastructures for tourists. Since the inception of the department in Mizoram, it has been concentrating in maintaining and building tourist infrastructure for accommodation as well as recreation facilities. It has developed a number of tourist lodges, highway restaurants and picnic spots at maximum possible hotspots within the state through financial assistance from the Ministry of Tourism, Government of India. In addition to this, the department has been running various tourist lodges and highway restaurants in the state, meeting the demands of the Government as well as the general public and the tourists. Anthurium Festival and Thalfavang Kut has been organised by the department every year which are both celebrated with traditional festivities and fanfare to attract more tourists to the state.

Generating revenue by the department has been credited to the Government account during 2015-16 (upto Jan., 2016) was Rs. 1,83,20,934/- while the previous year 2014-15 (up to Dec., 2015) was Rs. 1,73,73,327/-, showing an increase amount of Rs. 9,47,607/-. The number of tourist arrival (Domestic and Foreign) as recorded by the department during 2015-16 (up to Dec., 2015) was 4,472 persons and the previous year was 51,901 persons. The number of tourist has dropped a bit but the revenue collected is higher.

2.1.6. Agriculture

Agriculture occupies a very important place in the economy of Mizoram. As per economic classification of workers 2001 census, about 60 percent of the total workers are engaged in agriculture and allied sector. Paddy is the principal food crop and the staple food of Mizoram.

Out of the total area of 21,08,700 ha., the gross cropped area of the state at present is 1,38,556 ha. which account for 6.57 percent of the total area. Due to the hilly terrain and

steep slopes, potential area for wet rice cultivation (WRC) is very limited. It is estimated that there are 74,644 ha. of area having a slope of 0-25 percent which can be developed for WRC areas. Some of the major crops of Mizoram are rice, oil palm, sugarcane pulses, ginger etc.

2.1.6 Livestock & Veterinary

The department of Animal Husbandry and Veterinary pursue their mission statement of “improving genetic resources, ensuring livestock and poultry health, providing veterinary care, better management of feed and fodder and providing improved mechanism for collection, processing and management of livestock, poultry and dairy products” vigorously. This sector plays an important role for increasing production of animal origin food like milk, eggs and meat as well as socio economic development of the state and contributes substantially to the GSDP. In the endurance of the vision and mission of the department, various schemes under state plan and centrally funded schemes are taken up for up-gradation of local stock, provision of technology to farmers for improved animal husbandry practices and provide provisions for animal health care. The contribution of the department in the GSDP in 2013–14 is near about 5 percent (i.e., 29 percent of total contribution of agriculture and allied sectors). Table 2.1 shows that the total livestock in Mizoram in 2014 was 3,84,604 and poultry consist of 12,60,298 which has substantially increased from 3,64,000 livestock and poultry 12,41,814 of 2007.

2.2 Animal Husbandry in Mizoram

The Economic Survey 2014-15 has reported that the total livestock population according to Livestock Census, 2012 was recorded to be 3.84 lakhs as against 3.64 lakhs in the Livestock Census, 2007. Thus, there was an increase of 5.49 percent in the livestock population of the state. Pigs constitute the largest group of animals reared followed by cattle. To keep animal livestock healthy and to protect them from diseases, the department has set up a network of

veterinary health institutions and services throughout the state for treatment and control of diseases. By the end of March 2015, there were altogether 5 veterinary hospitals, 35 dispensaries and 103 rural animal health centers functioning in the state. The products derived from livestock products are milk, egg and meat. The estimated production of milk in the state in 2014-15 was 20,495 tonnes which was 33.9 percent more than the production of 15,305 tonnes in 2013-14. The per capita availability of milk per day in Mizoram is worked out to be 48 gm against the Indian Council of Medical Research recommendation of 240 gm of milk per day per individual. This may be due to the number of cattle rearing is less in terms of per capita in comparison to all over India. The estimated total egg production during 2014-15 was 377.33 lakhs of which 261.57 lakhs were *desi* and 115.76 lakhs were improved variety. The total egg production is estimated to have increased by 4.14 percent from the previous year. The total production of meat from cattle, buffaloes, *mithun*, goats and pigs during 2014-15 was estimated at 10856 tonnes of which pork and beef accounts for 7,038 and 3,750 tonnes respectively. Meat production from chicken (poultry) during 2014-15 was estimated at 1,669 tonnes. Out of the total meat production (including poultry meat) pork accounted for the highest quantity with 56.19 percent followed by beef with a share of 29.94 percent, poultry meat accounted for 13.33 of the total meat production.

Table 2.3 Swine Production and Supply in Mizoram

Sl. No.	Year	Pig production (Tonnes)	Meat production (Tonnes)	% share of pig	Demand (as per ICMR)	Gap
1	2005 - 06	6230	7869	79	-	-
2	2006 - 07	6810	10253	66	-	-
3	2007 - 08	7355	11430	64	-	-
4	2008 - 09	7894	12480	63	-	-
5	2009 - 10	5313	10235	52	-	-
6	2010 - 11	4545	9700	47	12053	1818
7	2011 - 12	7393	13158	56	12053	2353
8	2012 - 13	6889	12037	57	13,965	807
9	2013 - 14	6925	12189	57	13,917	1843
10	2014 - 15	7908	12525	63	14225	2036

Source: *Economic Survey 2013- 2016*

Table 2.3 shows that there are some fluctuations in the pig production over the years and the fluctuation incline towards increasing till date. On the other hand, the overall meat production shows increase from 7,869 tonnes (2005) till 12,480 tonnes in 2009. It has decreased to 9,700 tonnes in 2010-11 and then increased to 13,158 tonnes in 2011-12, then dropped down a little in 2012-13 and it keep increasing till date. The reasons to the fluctuations may be assumed due to the diseases faced by the different livestock species at times. The Indian Council of Medical Research (ICMR) has recommended meat requirement for a person. The above table also shows that Mizoram has been lacking the supply of meat as per the ICMR recommendations all through these years. The evidence have been experienced in the state as many times the news and headlines shows the shortage and problems associated with meat especially pork and chicken.

2.2.1 Piggery in Mizoram

According to the Indian Council of Agricultural Research (ICAR), 40 percent of the country's pig population spreads within the North East Region (NER). The attributing factor could be the fact that these areas are largely inhabited by the tribes whose religious believes does not restrict them from eating the meat. The culture and the inhabitants of Mizoram do have pig as their favourite meat like those of the other parts of the NER. Piggery or pig farming is an important activity in Mizoram. There are many statements and quote in reference to pork and pigs when written about Mizoram and its culture. The importance of pig and piggery is an important issue in the context or the Mizo cuisine. Most of the households in the rural areas rear pigs mainly for domestic consumption. Likewise majority of the pig farming system is more or less un-organized and is more of the convenient way of farming or rearing of the livestock by families at their backyard or so. This system of rearing pigs is inherited from the forefathers among the Mizo dating back to the history of the local kings and leaders as well. There has been an unending shortage in the supply of pork and

live swine as shown in the earlier table for the demand of the mere people of Mizoram. Most of the meat comes from small-scale operation carried out by local villagers who raise the animals near their homes.

The farmers who keep the pigs are mostly practising in a form of part time or back yard convenience rearers, keeping the pigs to salvage their kitchen waste and to earn additional income of the family at the time of slaughter. Along with beef, pork is one of the favorite dishes of Mizo people. Pig is the most important livestock in the state and plays a major role in the livelihood of the small farmers.

Animal agriculture is an essential component in the national economy and additionally in the socio economic development in a developing country like India, where majority of the population connected with their life in farming, and thus, generating profitable employment in the rural and sub urban areas (Suri, 2102). The livestock sector in India contributes to nearly 32 percent of total agricultural output. India with 2.3 percent share of global geographical area supports nearly 20 percent of the livestock population of the world. India has the largest livestock population in the world. Agriculture is the principle source of income of the average citizens; livestock is a sub sector of agriculture. Pig farming is one vital element of the farmers economic activity in the north eastern region in India. In India, the north eastern region has a sizeable population of pig i.e., around 24 percent of the total pig population in India. It has been estimated that around 50 percent of the country's pork is consumed in north eastern hill region alone. According to Kumaresan et al, (2008) Mizoram has been lacking the supply of sufficient quantity live swine within its premises. Pork is the most favourite meat amongst the Mizo, eventually the rise in population and economy increases in the demand as well. There are very few people who have entered commercial farming of pigs in comparing to the population as a whole to tap the demand which is ever

rising. People in the market have to often stand in long line to purchase their share of meat i.e., pork. This is a clear indicator of the low supply of live pig.

Animals play a vital role in mountainous farming system of Northeast India for improving livelihood and subsequently adding the nutritional security of resource poor people, as the majority of this area is dominated by mono cropping and crop failure very often pushes the farmer's economy at verge of collapse (Kumaresan et, al. 2006). The inhabitants of this region are tribal who are mostly non-vegetarian and hence, the demand for meat is very high. Pork is consumed mostly in this region; and in state like Mizoram, contribution of pork to the total meat consumed is as high as 71 percent. Among the meat-producing animals, pig occupies a unique position in the region, as pig keeping has a special bond to the culture and the livelihood of tribal people of the region (Das & Bujarbaruah, 2005). This region is of the lowest per capita income in the country and like other resource poor areas (Lemke et, al. 2006), the share of household income derived from pig is high.

Pig farming is one of the sources of cash income for the subsistence farmers as well as determines family's purchasing power because of unprofitable "*Jhum*" cultivation practice in the region. The records of the Animal Husbandry and Veterinary Department indicate the popularity and importance of the swine in Mizoram. Rearing of animals has an important role in this hilly state as crop production is still traditional. Pork is the favourite meat among the Mizos, amongst the livestock, pig is most important and every family rears pig as backyard venture.

2.2.2 Economic Implications

Intensive pig farming is a division of pig farming and of industrial animal agriculture, all of which are types of animal husbandry, where domestic pigs are grown up to slaughter weight. Agriculture, as the backbone of Indian economy, plays the most crucial role in the socio-economic sphere of the country. Indian agriculture is a diverse and extensive sector involving

a large number of factors. It has been one of the remarkable success stories of the post-independence era through the association of green revolution technologies. The green revolution contributed to the Indian economy by providing food self-sufficiency and improved rural welfare. Pigs are naturally omnivorous and are generally fed a combination of grains and protein sources (soybeans or meat and bone meal). This may differ from region to region as the availability of these resources differ from region to region. Larger intensive pig farms may be surrounded by farmland where feed-grain vegetation are grown. Consequently, piggeries are reliant on the grains industry. Pig feed may be bought packaged, in bulk or mixed on-site. The intensive piggery system, where pigs are confined in individual stalls, allows each pig to be allotted a portion of feed. The individual feeding system also facilitates individual medication of pigs through feed. This has more significance to intensive farming methods, as the proximity to other animals enables diseases to spread more rapidly. To prevent disease spreading and encourage growth, drug programs such as vitamins and antibiotics are administered pre-emptively, adding the versatility of pigs in and out the country and adding value to the micro and macro economy.

Table 2.4 Socio-economic characteristics of Pig Farmers in Mizoram

Categories		District			Total (%)	Test	
		Aizawl(%)	Lunglei(%)	Kolasib(%)		χ^2 Value	P Value
Gender	Male	177 (90.7%)	190(95.5%)	199(100%)	566(95.4%)	394.453	0.000
	Female	18(9.2%)	9(4.5%)	0(0.0%)	27(4.6%)	17.518	0.410
Educational Qualification	Illiterate	6(42.9%)	7(50.0%)	1(7.1%)	14(100.0%)	19.6	0.033
	Under Matric	114(31.6%)	124(34.3%)	123(34.1%)	361(100.0%)	258.882	0.000
	Matric	58(37.9%)	41(26.8%)	54(35.3%)	153(100.0%)	116.561	0.000
	Intermediate	7(28.0%)	10(40.0%)	8(32.0%)	25(100.0%)	21.995	0.145
	Graduate	6(18.8%)	16(50.0%)	10(31.3%)	32(100.0%)	37.198	0.005
	Post Graduate	4(50.0%)	1(12.5%)	3(37.5%)	8(100.0%)	16.000	0.100
Sources of income	Pig Farming Only	83(32.7%)	70(27.6%)	101(39.8%)	254(100.0%)	220.498	0.000
	Pig Farming + Business	65(36.5%)	53(29.8%)	60(33.7%)	178(100.0%)	172.361	0.000
	Pig Farming + Govt. Job	22(31.4%)	37(52.9%)	11(15.7%)	70(100.0%)	54.9777	0.000
	Agro-Farm + Pig Farming + Govt. Job	13(26.0%)	10(20.0%)	27(54.0%)	50(100.0%)	36.058	0.003
	Others	12(29.3%)	29(70.7%)	0(0.0%)	41(100.0%)	15.659	0.074
Income Category	Poor	127(33.8%)	144(38.3%)	105(27.9%)	376(100.0%)	144.008	0.000
	Middle	62(29.7%)	54(25.8%)	93(44.5%)	209(100.0%)	280.916	0.000
	Well to do	6(75.0%)	1(12.5%)	1(12.5%)	8(100.0%)	2.667	0.615
		Mean±SD	Mean±SD	Mean±SD	Total Mean±SD	F Value	P Value
Age in years		44.83±11.50	48.15± 12.36	50.59± 11.87	48.8±11.91	11.606	0.000
Farm Experience		2.25±.91	2.71±.90	2.51±.822	2.49±879	13.65	0.000

Source: Sample survey

The socio-economic characteristics of pig farmers in Mizoram are shown in Table 2.4 It shows that male respondents are the major pig rearers in all the three districts. Majority (95.4%) of the respondents were male headed households while 4.6 percent were female headed households, (100 percent in Kolasib District). The results of the analysis showed that age of pig farmers at the three districts were similar ($p>0.05$). The average age of the pig farmers with standard deviation was 48.8 ± 11.91 . In examining the pig rearing experiences of farmers, the data shows that the experiences of the farmers were different ($P<0.05$) across the

study areas, the resultant of this findings was that only continuation of at least 2 years were taken, though there are respondents who occasionally practice pig rearing activities at conveniences and not on a regular basis. Table also shows that 44 percent of the respondents have been keeping pig for 2 to 5 years, and 28.2 percent are keeping for 5 to 10 years. A substantial 16.4 percent of the respondents have been keeping pigs for more than 10 years and 11.5 percent below 1 year. It was observed that the diversity in the duration of farming is attributed to be the breakdown of families into smaller nuclear families. It was also observed that there has been inconsistency in the farming due to engagement in other activities. The study also finds some big farms which are in the nascent stages of development. Table 2.4 shows that majority of the pig farmers are matriculates, highest percentage in Aizawl with 58 percent. The study finds that there are variances in the duration of rearing pigs. The mean of farming experience of respondents was significantly higher in Lunglei (2.71 ± 0.91 years) compared to respondents in Aizawl (2.25 ± 0.910 years) and Kolasib (2.51 ± 0.822 years), respectively. The survey also shows that 52.9 percent from the respondents of Lunglei were practicing pig farming with government jobs, 31 percent and 15 percent in Aizawl and Lunglei respectively. This is a clear indication that there has been an immense practice of pig rearing as an extra household activity but in small scale. It was also observed that members of the families help out with the pig farming activities. The study also shows that more than half of the income of the respondents fall under poor category as they claimed to have an annual income savings below Rs.50,000 and there are only 0.8 percent who enjoy substantial amount of income, and there respondents are usually commercial farmers and the respondents who engages in other business as well.

2.2.3 Employment and Income from piggery

The state's per capita income is estimated at Rs.85,356/-while the national per capita income for the corresponding period was estimated at Rs.88,533/-(Economic Survey 2015-16). Pig farmers in Mizoram generates income through the activities of selling litters, meat, servicing etc.. Thus, employment is generated by the production of swine. Those farms who are engaged purely on the rearing of swine are more or less self employed and are generating revenue. From the data, it can be seen that there are few educated respondents who are engaged with production. This indicates that educated people are also involved in the economic activities through quality farming and utilising the Government policies.

Table 2.5 Employment generation in piggery farms in Mizoram

Employment		District			Total
		Aizawl	Lunglei	Kolasib	
Employed others	Count	7	5	5	17
	% Within Sample	41.2%	29.4%	29.4%	100.0%
	% Within District	3.6%	2.5%	2.5%	2.9%
Did not employ others	Count	188	194	194	576
	% Within Sample	32.6%	33.7%	33.7%	100.0%
	% Within District	96.4%	97.5%	97.5%	97.1%
Total	Count	195	199	199	593
	% Within Sample	32.9%	33.6%	33.6%	100.0%
	% Within District	100.0%	100.0%	100.0%	100.0%

Source: Sample survey

Table 2.5 shows the employment generated status of the sample data. The data shows that only 2.9 percent of the farmers from the three select districts have generated employment. All the three districts have minimal generation of employment as a whole. It also can be inferred that there are three aspects of employment. Firstly, the majority of the pig farmers are the ones who own the farm and land. The resulting factor to this is that most of the farms are small scale and have less land necessary for the construction of the sties. There are also farmers who own the farm and land but rearing is not the only reason for revenue generation.

This is carried out due to tradition of rearing one or two pigs generally to feed with the kitchen waste. Often these pigs are kept for substitution of their unpredictable crop farming which in turn may additional income. The second category of employers could be the large farms. Though there are very few large farms in the state which can employ workers by paying them salaries. The presence of large farms are very less in the state although there is an opportunity to fill in the supply gap. There are also another group of people who finds employment related to piggery in the market. These persons consist of agents, brokers or retailers who scoured the rural and urban areas to find live pigs to inform the buyers/sellers/resellers and in return gets a commission for identifying the producer.

Table 2.6 (a) Cross tabulation of Income Category and Educational Qualification of Pig Farmers in Aizawl District

Educational Qualification		Income Category			Total
		Poor	Middle	Well to do	
Illiterate	Count	5	1	0	6
	% Within Sample	83.3%	16.7%	0.0%	100.0%
Under Matric	Count	80	32	2	114
	% Within Sample	70.2%	28.1%	1.8%	100.0%
Matric	Count	32	23	3	58
	% Within Sample	55.2%	39.7%	5.2%	100.0%
Intermediate	Count	5	2	0	7
	% Within Sample	71.4%	28.6%	0.0%	100.0%
Graduate	Count	2	3	1	6
	% Within Sample	33.3%	50.0%	16.7%	100.0%
Post Graduate	Count	3	1	0	4
	% Within Sample	75.0%	25.0%	0.0%	100.0%
Total	Count	127	62	6	195
	% Within Sample	65.1%	31.8%	3.1%	100.0%

Source: *Sample Survey*

Table 2.6 (a) shows the cross tabulation of income generated from pig and the educational qualification of the farmers in Aizawl district. The data shows that there are 114 farmers from Aizawl district who had not passed their matriculation. The table also shows that out of this educational level, there are 70.2 percent whose family are termed as poor as their income level is below Rs. 50,000 per annum. 28.1 percent are having middle level income i.e., between Rs. 50,001 to Rs. 2.5 lakhs, lastly 1.8 percent who are well to do whose income is higher than Rs. 2.5 lakhs. It was also observed from the data that the second highest category

of respondents who have passed their matriculation is 58 respondents. The table also shows that there are few respondents who have passed their post graduate degree (4), and along with this there are few farmers with their graduation degrees (6).

Table 2.6 (b) Cross tabulation of Income Category and Educational qualification of Pig Farmers in Lunglei District

Educational Qualification		Income Category			Total
		Poor	Middle	Well to do	
Illiterate	Count	6	1	0	7
	% Within Sample	85.7%	14.3%	0.0%	100.0%
Under Matric	Count	101	22	1	124
	% Within Sample	81.5%	17.7%	.8%	100.0%
Matric	Count	22	19	0	41
	% Within Sample	53.7%	46.3%	0.0%	100.0%
Intermediate	Count	5	5	0	10
	% Within Sample	50.0%	50.0%	0.0%	100.0%
Graduate	Count	9	7	0	16
	% Within Sample	56.3%	43.8%	0.0%	100.0%
Post Graduate	Count	1	0	0	1
	% Within Sample	100.0%	0.0%	0.0%	100.0%
Total	Count	144	54	1	199
	% Within Sample	72.4%	27.1%	.5%	100.0%

Source: Sample Survey

The data shows that majority of the pig farmers' educational qualification in Lunglei district below matric (124 respondents). Among them 81.5 percent belongs to poor income category who earns less than Rs. 50,000/- per annum. and 17.7 percent earns between Rs. 50,001/- to Rs. 2.5 lakhs and well to do consist of 0.8 percent who earns more than Rs. 2.5 lakhs per annum. The table also shows that 58 respondents have passed matriculation, represented by 53.7 percent earns less than Rs. 50,000/- per annum while 46.3 percent earns between Rs. 50,001/-. From Table 2.6(b) it can be seen that majority of the farmers have their basic education but the contributions made by the farmers with other educational level holders are very less where there are 16 respondents who have graduated and 1 respondent having post graduate degree. It can also be concluded that farmers of Lunglei district are mostly literate but are below matriculation level education.

Table 2.6 (c) Cross tabulation of Income from Pig and Educational qualification of Pig Farmers in Kolasib District

Educational Qualification		Income Category			Total
		Poor	Middle	Well to do	
Illiterate	Count	0	1	0	1
	% Within Sample	0.0%	100.0%	0.0%	100.0%
Under Matric	Count	83	40	0	123
	% Within Sample	67.5%	32.5%	0.0%	100.0%
Matric	Count	16	37	1	54
	% Within Sample	29.6%	68.5%	1.9%	100.0%
Intermediate	Count	4	4	0	8
	% Within Sample	50.0%	50.0%	0.0%	100.0%
Graduate	Count	1	9	0	10
	% Within Sample	10.0%	90.0%	0.0%	100.0%
Post Graduate	Count	1	2	0	3
	% Within Sample	33.3%	66.7%	0.0%	100.0%
Total	Count	105	93	1	199
	% Within Sample	52.8%	46.7%	.5%	100.0%

Source: Sample Survey

Like other districts, Kolasib also shows similar data where majority of the farmers are below matriculation in their education. There are 123 farmer respondents who are below matriculation. Out of these 123 farmers, 67.5 percent belongs to poor income category who earns less than Rs. 50,000/- per annum while 32.5 percent are in middle income category who earns between Rs. 50,001/- to Rs. 2.5 lakhs. There are 54 respondents who have passed matriculation (second largest educational qualification), which is represented by 29.6 percent whose income category are less than Rs. 50,000/- per annum and 68.5 percent earning between Rs. 50,001/- and Rs. 2.5 lakhs and lastly 1.9 percent have or earning income higher than Rs.2.5 lakhs. From Table 2.6(c) it can be concluded that majority of the farmers have their basic education but the contributions made by farmers with other educational level holders are very few where there are 10 respondents who have graduation degrees and 8 farmers having post graduate degree. It can also be concluded that pig farmers at Kolasib district are mostly having basic education.

Table 2.6 (d) Cross tabulation of Income Category and Educational qualification of Pig Farmers in all three select districts

Educational Qualification		Income Category			Total
		Poor	Middle	Well to do	
Illiterate	Count	11	3	0	14
	% Within Sample	78.6%	21.4%	0.0%	100.0%
Under Matric	Count	264	94	3	361
	% Within Sample	73.1%	26.0%	.8%	100.0%
Matric	Count	70	79	4	153
	% Within Sample	45.8%	51.6%	2.6%	100.0%
Intermediate	Count	14	11	0	25
	% Within Sample	56.0%	44.0%	0.0%	100.0%
Graduate	Count	12	19	1	32
	% Within Sample	37.5%	59.4%	3.1%	100.0%
Post Graduate	Count	5	3	0	8
	% Within Sample	62.5%	37.5%	0.0%	100.0%
Total	Count	376	209	8	593
	% Within Sample	63.4%	35.2%	1.3%	100.0%

Source: *Sample Survey*

Table 2.6 (d) shows the cross tabulation of Income Category and Educational qualification of the total three select districts of Mizoram. It shows that majority of pig rearers in Mizoram are literate with a literacy level of under matric (361 respondents). The table shows 73.1 percent (264 respondents) are in the poor income category whose annual income was below Rs. 50,000/- and 26.0 percent (94 respondents) were having middle level income and lastly there are only 0.8 percent whose annual income was above Rs. 2.5 lakhs. The sample also shows that the second highest category of educational qualification belongs to those respondents having matriculation (153 respondents). Among this group, 79 respondents (51.6 percent) belongs to middle income category who earns between Rs. 50,001/- to Rs. 2,50,000/-. The farmers keep the pigs as their secondary source of income and in addition to their other sources of income, the extra income is a substantial amount. The estimated per capita income of Mizoram for the year 2014 - 15 is Rs. 85,356/- and the additional income obtained merely from pig keeping almost averages Rs. 20,00/- assuming that these farmers have their other sources of income, they would definitely hold a much higher income than the state national average per capita income. The other categories of educational qualification are graduate,

intermediate and post graduate consisting of 32, 25 and 8 respondents respectively. This trend may suggest that pig farming does not require high level of literacy.

Table 2.7 Cross tabulation of pig market and governmental aids in three select districts of Mizoram

Availability of ready market for the piglets	Response		Aizawl	Lunglei	Kolasib	Total	
	Yes	Count		138	114	183	435
% Within Sample			31.7%	26.2%	42.1%	100.0%	
No		Count		57	85	16	158
		% Within Sample		36.07%	53.79%	10.12%	100.0%
Total	Count		195	199	199	593	
	% Within Sample		32.9%	33.6%	33.6%	100.0%	
Availing of Government Aids	Yes	Count	27	34	23	84	
		% Within Sample	32.1%	40.5%	27.4%	100.0%	
	No	Count	164	155	171	490	
		% Within Sample	33.5%	31.6%	34.9%	100.0%	
	Applied but no response	Count	4	10	1	15	
		% Within Sample	26.7%	66.7%	6.7%	100.0%	
	Not Applied	Count	0	0	4	4	
		% Within Sample	0.0%	0.0%	100.0%	100.0%	
Total	Count		195	199	199	593	
	% Within Sample		32.9%	33.6%	33.6%	100.0%	
From where the stocks are purchased	Reliable breeder	Count	28	66	59	153	
		% Within Sample	18.3%	43.1%	38.6%	100.0%	
	Nearest farm	Count	21	30	82	133	
		% Within Sample	15.8%	22.6%	61.7%	100.0%	
	Govt farm	Count	9	14	3	26	
		% Within Sample	34.6%	53.8%	11.5%	100.0%	
	Others	Count	137	89	55	281	
		% Within Sample	48.8%	31.7%	19.6%	100.0%	
Total	Count		195	199	199	593	
	% Within Sample		32.9%	33.6%	33.6%	100.0%	

Source: Sample survey

Table 2.7 shows that there is a ready market available where 435 respondents claimed availability of ready markets while 158 respondents claimed to have problems in finding market for their piglets. 73(435 respondents) percent of the farmers reported the availability of ready markets of piglets while remaining 27(158 respondents) found problems in finding the ready markets. The ready piglets imported from Myanmar were in higher demand due to cheaper price in comparison to local piglets market for the local piglets are widely available

but there were instances whereby imported piglets are available at a lesser cost in Aizawl, there are 138 respondents who claim that there is an abundant availability of their piglet market, 114 at Lunglei and 183 at Kolasib respectively out of the 435 respondents claiming the same.

The data also shows the sources of stocks purchased for pig rearing out of 593 respondents, 153 (25.8 percent) respondents have purchased their piglets from reliable breeder, 22.4 percent (133 respondents) bought from their nearest available farms on convenience. There are also 4.38 percent (26 respondents) farmers who only buys from Government farms and there are 47.3 (281 respondents) percent who have sourced their piglets from somewhere else which can be claimed as the Burmese pigs. This also indicates that the local production is low in comparison to Burmese pigs.

The table also shows that availability of government aid for piggery in Mizoram. It was also observed that a majority of the respondents (83.3 percent) have not applied nor availed any subsidies or Governmental aids in their pig farm. It may be assumed that majority of the farmers have been practicing pig farming as their household activity (domestically and non commercial) which may have also not compel them to give concern with developmental policies of the government as well.

The Central Government of India have given importance to piggery and have developed schemes through institutions like National Bank for Agricultural and Rural Development (NABARD) and other banks. Efforts are being made in consultation with Planning Commission and other appraisal agencies to initiate Integrated Piggery Development Scheme under Macro Management Scheme during 11th Five Year Plan. Likewise the state government also implements some schemes like New Land Use Policy (NLUP), RKVY etc. where one can opt for piggery schemes. The above table shows the number of respondents who hand applied and received aids from the Governmental schemes. The data shows that

there are 14.2 (84 respondents) percent who have successfully applied and received, and 77.1(490 respondents) percent who have not applied. The remaining 2.5 percent respondents have applied but were not fortunate enough to receive schemes.

In livestock market, stock refers to the baby animals ready to be sold for rearing, reproduction or meat. In piggery, stock are those piglets and live animals which are bought and sold. Nearly average of the sample, 47.4 percent of the farmers have purchased their stocks from importers directly or indirectly. These are Burmese pigs, which are often credited for contaminating the health condition and even causing the lives of the pigs of Mizoram. Reliable breeders also sold 25 percent of the total purchase of the farmers and there are also convenient buyers who purchased from the nearest farms viz., 22.4 percent, and a small 4.4 percent farmers bought from Government farm.

According to the National Research Centre on Pig, Ran, Guwahati, pig production, among other species has a high potential to contribute to high economic gain. This is because of two folds: First the pigs have high fecundity, high feed conversion efficiency, early maturing, short generation interval and relatively small space requirement. Secondly, they are multipurpose animals providing about 40 percent of meat consumed in the world market, and by-products like pig dung as manure and bristle for brush industry. It is produced under a variety of production systems ranging from simple backyard pigs, pigs living on garbage belts to family operated farms or large scale integrated pig industries with sophisticated bio-safety measures.

Pig is widely distributed in all the eco-regions of the country and is an important occupation of the rural society especially the tribal masses. People of certain ethnic groups prefer to keep pigs, especially black ones, for festivals and ceremonial purposes. Interestingly, these ethnic groups are mainly concentrated in the North-Eastern Region where almost 28 percent of the

country's total pig population exists. According to FAO records, India's pig population is 13.84 million (FAOSTAT, 2009) and it constitute 1.47 percent of world pig population and our piggery sector is gaining slow but steady momentum during the past years. Majority of pig population is held by marginal and small farmers. Further, the average pig population per thousand human populations is about 11.5. Among Indian states, Uttar Pradesh has the maximum number of pigs with about 17% of the total pigs followed by Assam (~12 percent), West Bengal (~10 percent) and Jharkhand (~8 percent). According to ICMR recommendation, out of 60 gm daily protein requirement; 20gm should be from animal protein source. Considering a modest figure of 20 percent of total population consuming pork in the country today, and out of 20gmdaily animal protein, assuming 10 gm from pork source; the total pork requirement is around 0.88 million tons (20 percent of 1210 million human population i.e. $242 \times 0.010 \text{ kg} \times 365 \text{ days}$).

Against this the country as per FAOSTAT figure (2009), produces 0.48 million tonnes of pork in 2009. Thus the present shortfall is 0.40 million tonnes or 45.45 percent. If the deficiency is not met through appropriate technological support the gap is to be widened to such an extent that the country might be forced to import pork by 2030. Further the shrinking resources in terms of land availability, water as well as threats from the changing environment being conducive for emergence of new diseases are gradually expected to limit the capacity for pork production optimization. If the country does not take suitable step now to develop and execute scientific strategies to address the issues of bridging the gap between need and availability of pork, other countries, taking the advantage of WTO, shall make inroads to a sector that is so inextricably linked with the economic condition of rural poor in the country.

The Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India will implement a National Mission for Protein Supplements (NMPS)

in identified states (Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Jharkhand, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttar Pradesh and West Bengal) during financial year 2012- 13, to implement pig component of NMPS with an allocation of Rs. 40.00 crores has been earmarked to encouragement production from piggery.

Table 2.8 Cross tabulation of Family type and Supports from family regarding pig rearing

District	Type of Family		Supports from Family			Total
			Fully	Partially	Alone	
Aizawl	Nuclear	Count	62	59	1	122
		% within Type of Family	50.8%	48.4%	.8%	100.0%
	Joint	Count	36	37	0	73
		% within Type of Family	49.3%	50.7%	0.0%	100.0%
	Total	Count	98	96	1	195
		% within Type of Family	50.3%	49.2%	.5%	100.0%
Lunglei	Nuclear	Count	54	32	1	87
		% within Type of Family	62.1%	36.8%	1.1%	100.0%
	Joint	Count	51	61	0	112
		% within Type of Family	45.5%	54.5%	0.0%	100.0%
	Total	Count	105	93	1	199
		% within Type of Family	52.8%	46.7%	.5%	100.0%
Kolasib	Nuclear	Count	38	23	1	62
		% within Type of Family	61.3%	37.1%	1.6%	100.0%
	Joint	Count	97	14	5	116
		% within Type of Family	83.6%	12.1%	4.3%	100.0%
	Others	Count	19	2	0	21
		% within Type of Family	90.5%	9.5%	0.0%	100.0%
Total	Count	154	39	6	199	
	% within Type of Family	77.4%	19.6%	3.0%	100.0%	
Total	Nuclear	Count	154	114	3	271
		% within Type of Family	56.8%	42.1%	1.1%	100.0%
	Joint	Count	184	112	5	301
		% within Type of Family	61.1%	37.2%	1.7%	100.0%
	Others	Count	19	2	0	21
		% within Type of Family	90.5%	9.5%	0.0%	100.0%
Total	Count	357	228	8	593	
	% within Type of Family	60.2%	38.4%	1.3%	100.0%	

Source : Sample survey

During the sample survey, it was observed that there are many households who practice pig rearing as family chore. Table 2.8 shows the cross tabulation result for family type and support from the family in the pig rearing activities. The table shows that 56.8 percent are nuclear family having full support from their family members and 1.1 percent having no

participating family members and 42 percent have partial help from the other members of the family members.

In Aizawl district, there are 122 farmers who are nuclear family where 50.8 percent have full support from their family, and 48.8 percent have partial support from their family. There are also 73 farmers who are still joint family, where 49.3 percent are having full support from their family while there are 50.7 percent where their families play partial role in the pig farming.

The table also shows that in Lunglei district, there are 87 farmers are nuclear family where 62.1 percent have full support from their family, and 36.8 percent have partial support from their family and there is 0.5 percent who does the farming alone. There are also 112 farmers who are still joint family, where 45.5 percent are having full support from their family while there are 55.5 percent where their families play partial role in the pig farming.

In Kolasib district, there are 62 farmers are nuclear family where 61.3 percent have full support from their family, and 37.1 percent have partial support from their family. There are also 116 farmers who are still joint family, where 83.6 percent are having full support from their family while there are 12.1 percent where their families play partial role in the pig farming. The data also shows that in Kolasib district there are 4.3 percent respondents who do the farming alone.

From the above table, it can be noticed that joint family is more found in the district urban areas than in the rural areas than the urban areas. The table also shows that there are 61.1 percent joint families having full participating family members, 37.2 having partial contribution in the farm and 1.7 percent having no support from the family. There were also another type of family who were mostly combined farms at 90.5 percent having full support from the family and 9.5 percent having partial role in the farm.

Table No. 2.9 Chi Square and Symmetric Value for Family type and support from family

		Value	Df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	9.984 ^a	4	.041
	Likelihood Ratio	11.808	4	.019
	Linear-by-Linear Association	.051	1	.821
	N of Valid Cases	593		
			Value	Approx. Sig.
Total	Nominal by Nominal	Phi	.130	.041
		Cramer's V	.092	.041

Source : Sample survey

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .28.

Families played a large role in the farming and decisions on the activities of farming, though it was observed that differences in the family type have been one of the factor of size of the farm. The association between the types of families and support they give to pig rearing was tested using chi square test. The chi square value is 9.984 with degree of freedom at 4 and the significant value found is 0.041 which is lower than 0.05. So the null hypothesis that there is no association between the family types and support from the family in farming is rejected.

Table 2.10(a) Crosstabulation of Family Income and Sources of income in Mizoram

District Address	Income Category		Sources of income					Total
			Pig Only	PIg + Business	Pig + Govt. Job	Farm + Pig + Govt. Job	Others	
Aizawl	Poor	Count	61	39	8	9	10	127
		% within Income	48.0%	30.7%	6.3%	7.1%	7.9%	100.0%
	Middle	Count	20	26	10	4	2	62
		% within Income	32.3%	41.9%	16.1%	6.5%	3.2%	100.0%
	Well to do	Count	2	0	4	0	0	6
		% within Income	33.3%	0.0%	66.7%	0.0%	0.0%	100.0%
	Total	Count	83	65	22	13	12	195
		% within Income	42.6%	33.3%	11.3%	6.7%	6.2%	100.0%
Lunglei	Poor	Count	61	39	17	3	24	144
		% within Income	42.4%	27.1%	11.8%	2.1%	16.7%	100.0%
	Middle	Count	9	13	20	7	5	54
		% within Income	16.7%	24.1%	37.0%	13.0%	9.3%	100.0%
	Well to do	Count	0	1	0	0	0	1
		% within Income	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	Total	Count	70	53	37	10	29	199
		% within Income	35.2%	26.6%	18.6%	5.0%	14.6%	100.0%
Kolasib	Poor	Count	62	24	4	15		105
		% within Income	59.0%	22.9%	3.8%	14.3%		100.0%

	Middle	Count	39	35	7	12		93
		% within Income	41.9%	37.6%	7.5%	12.9%		100.0%
	Well to do	Count	0	1	0	0		1
		% within Income	0.0%	100.0%	0.0%	0.0%		100.0%
	Total	Count	101	60	11	27		199
		% within Income	50.8%	30.2%	5.5%	13.6%		100.0%
Total	Poor	Count	184	102	29	27	34	376
		% within Income	48.9%	27.1%	7.7%	7.2%	9.0%	100.0%
	Middle	Count	68	74	37	23	7	209
		% within Income	32.5%	35.4%	17.7%	11.0%	3.3%	100.0%
	Well to do	Count	2	2	4	0	0	8
		% within Income	25.0%	25.0%	50.0%	0.0%	0.0%	100.0%
	Total	Count	254	178	70	50	41	593
		% within Income	42.8%	30.0%	11.8%	8.4%	6.9%	100.0%

Source : Sample survey

Raju et. al. (2006) animal husbandry plays an important role in the national economy and socio-economic development. The more the number of income sources, there is likely to be more income for the family. Table 2.10 shows the cross tabulation of family income and sources of income. The data shows that among those family whose monthly income is less than Rs. 2,000/-, 40 percent of the respondents were having pig and farm as their source of income, this is because crop cultivating and rearing pig along side is easy and has been the tradition of the Mizo, and this trend has been carried along. In the family monthly income category between Rs. 2,001/-to Rs. 5,000/-, 53.3 percent of the respondents have pig only as their income source which is the highest. These are mainly those butchers and who also keep pigs and they sometimes function as retailers. There are 40 percent of the respondents having business and pig rearing as their source of income and whose monthly income lies between Rs. 15,001/-to Rs. 20,000/-. In the income category between Rs. 50,001 to Rs.1,00,000 and there are respondents who also have roadside business and there are 62.5 percent of the respondents whose income sources are pig rearing and their business. They are usually have highway hotels and keeping pig to utilize the waste from their shops, and they are usually from Kolasib and Lunglei district who run their business on these roads. There are 50 percent of the respondents whose family income are between Rs. 100,001 to Rs. 2,50,000 and their sources of income are pig and Government job. These are also people who have continued

the culture of keeping livestock and have them as another source of income. Family monthly income above Rs.250,001/- have their sources of income like pig with business at 50 percent, pig and governmental job 50 percent respectively: there are only two respondents in the study whose income is greater than Rs.250,001/- and their income sources are business and government employee. The reason behind this outcome is that these farmers have backup from their business and they have provided jobs in their farm to do the farming activities. There are only two respondents in this family income category, and if there are more entries from the higher level income groups in the state, the production gap could have been better responded. Table 2.10 (a) shows the family income and sources of income crosstabulation of three districts.

Table 2.10(b) Chi and symmetric Value for Family Income and Sources of income

		Value	df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	43.425 ^a	8	.000
	Likelihood Ratio	41.073	8	.000
	Linear-by-Linear Association	5.928	1	.015
	N of Valid Cases	593		
			Value	Approx. Sig.
Total	Nominal by Nominal	Cramer's V	.191	.000
	N of Valid Cases		593	

Source: Sample Survey

There are chances of economic stability when there are more than one sources of income in a household, giving hand in times of failure in one area. The association between income of the families and sources of income was tested using chi square test. The chi square test shows that the calculated value is 43.425 with 45 degrees of freedom and significant value was 0.000 which is less than 0.05. So the null hypothesis that there is no association between family income and sources of income of the family is rejected. Rejection of the hypothesis proves that there is a significant association between the family income and the sources of income of the farmers. The Cramer's V value is between 0.1 and 0.3 which is considered to

have a moderate effect on the association between family income and their sources of income.

Many of the rural people in India seek livelihood through Animal Husbandry (Raju et. al. 2006). Household having another source of income can support pig rearing with lower risk than the others, because livestock are prone to disease and would take time to make return.

Table 2.11(a) Crosstabulation between Income from Pig and properties bought from pig rearing

District Address	INCOME CATEGORY		Properties bought from pig rearing		Total
			Bought	Not Bought	
Aizawl	Poor	Count	106	21	127
		% within Income	83.5%	16.5%	100.0%
	Middle	Count	56	6	62
		% within Income	90.3%	9.7%	100.0%
	Well to do	Count	5	1	6
		% within Income	83.3%	16.7%	100.0%
	Total	Count	167	28	195
		% within Income	85.6%	14.4%	100.0%
Lunglei	Poor	Count	100	44	144
		% within Income	69.4%	30.6%	100.0%
	Middle	Count	43	11	54
		% within Income	79.6%	20.4%	100.0%
	Well to do	Count	1	0	1
		% within Income	100.0%	0.0%	100.0%
	Total	Count	144	55	199
		% within Income	72.4%	27.6%	100.0%
Kolasib	Poor	Count	66	39	105
		% within Income	62.9%	37.1%	100.0%
	Middle	Count	68	25	93
		% within Income	73.1%	26.9%	100.0%
	Well to do	Count	1	0	1
		% within Income	100.0%	0.0%	100.0%
	Total	Count	135	64	199
		% within Income	67.8%	32.2%	100.0%
Total	Poor	Count	272	104	376
		% within Income	72.3%	27.7%	100.0%
	Middle	Count	167	42	209
		% within Income	79.9%	20.1%	100.0%
	Well to do	Count	7	1	8
		% within Income	87.5%	12.5%	100.0%
	Total	Count	446	147	593
		% within Income	75.2%	24.8%	100.0%

Source : Sample survey

Pig rearing and livestock keeping has been a subsidiary income source for many of the residents of Mizoram. The study also reveals that more than 75 percent of the respondents have bought several home appliances like TV, fridge, two wheeler and four wheeler from the

income earned from pig rearing. The above table have shown whether the respondents have purchased properties from the income earned from pig rearing. The study shows 95.8 percent of the household have purchased the above items and are enjoying about Rs. 1,00,001/- to Rs. 2,50,000/- annually from pig rearing. The sample survey also shows that there 48.9 percent of the respondents having income from pig rearing not have bought anything from it. There are only 24.6 percent who have not purchasing anything from the income they generated from pig rearing. The reasons for these respondents not purchasing any properties from pig rearing income were identified as that those respondents having another source of income and they mostly have bought those items from the other income sources. There are also few respondents who happened to live without these properties as they are in the initial stages in the pig rearing.

Table 2.11(b) Chi-Square for income from Pig and Properties bought from pigs

District		Value	Df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	4.779 ^a	2	.092
	Likelihood Ratio	4.958	2	.084
	Linear-by-Linear Association	4.771	1	.029
District		Value		Approx. Sig.
Total	Nominal by Nominal	Phi	.090	.092
		Cramer's V	.090	.092
	No. of Valid Cases			593

Source : Sample survey

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 1.98.

Some of the respondents have claimed to have bought properties like vehicles and household appliances from the income generated from pig rearing. To test the association between the income generated from pig rearing and properties bought from pig rearing, a hypothesis was developed as, 'there is no association between income from pig rearing and properties bought from pig rearing generated from pig rearing . The hypothesis was tested using chi square test, the chi square value was found to be is 80.144 with degree of freedom at 9. The significance is 0.000 which is lesser than 5 percent. Thus the hypothesis cannot be accepted proving that there is an association between properties bought and income generated from pig rearing.

2.3 Testing of Hypothesis 1

Hypothesis 1: There is no significant difference on income generation through pig farming in select districts of Mizoram.

Analysis:

The chi-square test for independence, also called Pearson's chi-square test or the chi-square test of association, is used to discover if there is a relationship between two categorical variables. The data used are the two categorical data of income earned (category) from pig farming and select districts of Mizoram. The two variables are measured as categorical data. Income category has been divided into low, middle and high. Low income category belongs to those whose income is less than Rs. 50,000 annually while middle income category belongs to those who earn between Rs. 50,000 and Rs. 1,00,000 while high income category belongs to those who earn more than Rs. 1,00,000 annually.

Table 2.12 Cross Tabulation of Income from Pig Farming in Select Districts of Mizoram

District		Income Category from Pig Farming			Total
		Low	Middle	High	
Aizawl	Count	127	62	6	195
	% within District Address	65.10%	31.80%	3.10%	100.00%
Lunglei	Count	144	54	1	199
	% within District Address	72.40%	27.10%	0.50%	100.00%
Kolasib	Count	105	93	1	199
	% within District Address	52.80%	46.70%	0.50%	100.00%
Total	Count	376	209	8	593
	% within District Address	63.40%	35.20%	1.30%	100.00%

The above crosstabulation brings together two variables and displays the relationship between them in a single table. Each column in the crosstab corresponds to a category of the independent variable, and each row corresponds to a category in the dependent variable. For example, in the table above, 127 represents all the respondents who are in the income category low and from the variable of selected district viz., Aizawl district. The table shows

that majority of the respondents are from low earning category from pig farming as denoted by 127 respondents (65.10 percent) in Aizawl district, 144 respondents (72.40 percent) in Lunglei district and 105 respondents (52.80 percent) in Kolasib district respectively. Overall from the three select districts, the low category of earners from pig farming consist of 376 out of total 593 respondents comprising of 63.40 percent. Similarly middle income earners are in the consisting of 35.20 percent meaning 209 respondents while high income earners from pig farmers are minimal as reflected by 8 respondents represented by 1.30 percent of the total respondents.

Table 2.13 Chi-Square Tests of Income from Pig Farming and Select Districts of Mizoram

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.417 ^a	4	0.000
Likelihood Ratio	23.683	4	0.000
Linear-by-Linear Association	3.665	1	0.056
No. of Valid Cases	593		
a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is 2.63.			

From the table 2.15, it can be seen that Pearson Chi-square is equal to 24.417 at 4 degrees of freedom, where p value is 0.000 and is less than the alpha value of 0.05. Since the p value is less than 0.05, the null hypothesis is rejected. It means that there is statistically significant difference in earnings from pig farming in the three select districts under study. The research hypothesis that there is no significant difference on income generation through pig farming in select districts of Mizoram is rejected.

Table 2.13(a) Symmetric Measures

	Value	Approx. Sig.
Cramer's V	0.143	0.000
No. of Valid Cases	571	

Since the crosstab involves a nominal variable and an ordinal variable, the appropriate measure of association is Cramer's V. The calculated value from Cramer's V is found to be

0.143 and using the standards that between 0.1 to 0.3 is moderate effect, it can be concluded that the effect size on the variables is moderately effective. It means that the selection of the districts where the farmers sets up pig farming may moderately effect the income earning.

2.4 Conclusion

The economy of Mizoram was floating to growth at an impressive rate of 8.46 percent during 2014-15 financial year with base year 2004-05 which was significantly higher than projected national growth at 7.4 percent, according to the Mizoram Economic Survey 2014-15. As per economic classification of workers 2001 census, about 60 percent of the total workers are engaged in Agriculture and Allied sector. The Economic Survey 2014-15 has reported that the total livestock population according to livestock census, 2012 was recorded to be 3.84 lakhs as against 3.64 lakhs in the livestock census, 2007. Pigs constitute the largest group followed by cattle. The total production of meat from cattle, buffaloes, mithun, goats and pigs during 2014-15 was estimated at 10856 tonnes of which pork and beef accounts for 7038 and 3750 tonnes respectively. Out of the total meat production (including poultry meat) pork accounted for the highest quantity with 56.19 percent followed by beef with a share of 29.94 percent, poultry meat accounted for 13.33 of the total meat production.

The NER has a sizeable population of pig i.e., around 24 percent of the total pig population in India. It has been estimated that around 50 percent of the country's pork is consumed in north eastern hill region alone. Mizoram has been lacking the supply of meat according to the ICMR recommendations all through these years. Pig is the most important livestock in the state and plays a major role in the livelihood of the small farmers. The Records of the Animal Husbandry and Veterinary Department shows the importance popularity and importance of the Swine and the reason of the worth of the study. Rearing of animals have an important role in this hilly state as crop production is still traditional.

The study observed that there are two aspects of employment. Firstly where majority of the farmers own the farm and land. The second category could be the large farms. Though there are very few farms in the state which can employ workers paying them salaries.

Majority of pig rearers in Mizoram can be no doubt estimated to have a literacy level under matric and from the sample, but have certain level of their basic education and their income averages to approx Rs. 35,400/-. On the other hand, table 2.14 shows that majority of the respondents are from low earning category. The study shows that there is an abundant availability for marketing of the piglets. The study also reveals that there is an association in the sources and income from pig and sources of income of the household. Majority of the respondents have made use of the income from pig for purchasing properties to a great extend. The data shows that is there is statistically significant difference in earnings from pig farming in the three select districts under study.

The challenges faced by our country in securing the food as well as nutritional security to fast growing population need an integrated approach for livestock farming. Among the various livestock species, piggery is most potential source of meat production and more efficient feed converters after the broiler. From the above data it can be concluded that pig farming will provide employment opportunities to seasonally employed rural farmers and supplementary income to improve their living standards. The individual level efforts have very little effects. Thus the intervention of the government, be it central or have played an important role in many ways. It is thus important to understand the level of influences and impact that the government actually played. The following chapter will have a study and analyses some of the policies and schemes of the Government.

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Chapter 3

Pig Production and Management System in Mizoram

3.1 Introduction

The north eastern part of the country produces majority of the Indian pork production representing only 7 percent of the country's animal protein sources (Suri, 2012). According to 19th Livestock Census of India-2012, the total pigs in the country is 10.29 million and have decreased by 7.54% over the previous Livestock Census of India of 2007. Pork production is estimated at 464 metric tonnes in financial year 2014-15. This contribution is approximately 8 percent of the country's total animal protein sources. In comparison to financial year 2009-10 to 2014-15, pork production increased with an annual growth rate of 1.4 percent. India's import for processed pork was 527 metric tonnes in 2015, which increased at an annual growth rate of 11 percent from 2010 to 2015 (Report on Global Agricultural Information Network, 2016). The demand for imported pork is mainly in hotel, restaurant and institutional and high-end retail sector. The Indian market for processed pork is small, and the majority of this market is supplied through imports. Although there are some local companies which manufacture processed products such as sausages and bacon, qualities are limited and the industry is small.

The demand for pork is rapidly increasing as population and income of the state increases in Mizoram. The increase in their income and changing lifestyle of the population has also increase the buying and consumption of pork and other meat. The production at local level is in a stagnant stage, and which remains untapped may cause the market to impose import from various available sources, which brings about availability of unhealthy meat and spread of diseases as well. There has been a demand gap of meat as per the recommendation of the Indian Council of Medical Research (ICMR), which recommends required meat consumption

per annum is 10.95 kgs while average consumption in India is still below 5 kg/cap/year(FAO, 2012).

Pig serves majority of the livestock population at 73.35 percent in Mizoram, and the pork production comprising 69.33 percent of the total meat production during the year 2014 to 2015 (Economic Survey, 2014-15). Mizoram today, due to huge supply shortage is experiencing unorganised import of livestock from the border region of Myanmar. There are many instances where reports of swine flu and other diseases as the outcome from importing of livestock (Vanglaini, 6th Aug., 2011). The outcome is, therefore, the worst for the economy, forcing the retailers to look for supplementing the supply either from other neighbouring territories. Since Mizoram is located bordering to Myanmar and Bangladesh the producers resort to import of livestock from these neighbouring countries. This has even lead to the dangers of spreading swine flu and other hazards.

3.2 Pig Production System

In comparison to other livestock species, pig rearing has higher potential to contribute to more economic gain for small and marginal farmers or rural poor belonging to the lowest socio-economic strata (Chauhan et. al. 2016). The study also observed the pig rearing systems followed by the farmers, where it was found that intensive confinement was the most popular method of rearing. The pig production system can be classified in the following three categories:

3.2.1 Extensive or Free-Range (Scavengers)

A free range piggery is a piggery whose pig herd is rotated on pastures or cropland for most of their life. "Free range" implies that animals are not confined in enclosures viz., they may be fed in a shed, but have free access to paddocks. The land requirement for operating a free range

piggery depend on climate, soil type, land topography, pasture cover and other factors such as the pig's age at weaning and at sale. According to Ikani and Dafwang (1995), the free-range system is the traditional method of rearing pigs in most parts of the world where the system is cheap as it requires little investment. It also requires minimal management. Feed costs on range system may be about 20-25 percent less than the intensive rearing method. No special housing other than for night shelter is required and there is minimum disease control. Pigs under this system are given supplementary feeds. This makes them have attachment to their owners. Feeds consist of kitchen wastes, farm by-products such as cassava peels, brans of cereals, fruit pulps and maize cobs. This technique of supplementary feeding to pigs makes them come back home daily to the farmer. Local breeds of pigs predominate the free range system because they are more highly adapted to the environment. The productivity is low with the erratic and often seasonal food supplies under this system. This can result in irregular breeding of sows, slow growth rate and high piglet mortality. Breeding is indiscriminate as no particular attention is paid to selection of pigs on desirable traits. They are particularly susceptible to infestation by parasites from various sources.

In Mizoram, this type of pig rearing system is practiced very less due to the topography of the land except to some extent in Lunglei district. The geography of the land does not permit the farmers for large fencing of farms. Instead, there are some places in the villages where animals are let roam freely on the local streets scavenging for food and other sources for their nutrients.

3.2.2 Semi-Intensive

In this system, sties are provided for the animals and they are made to move out to feed on natural vegetation. Paddocks are provided around the house which is fenced, wallows and shades are also provided. The animals are allowed to move about thereby, exercising themselves to prevent fat built-up in the body. The system requires lower capital investment but the labour requirements,

disease incidence and parasite infestations are to some extent high. Readymade feeds are also provided. Productivity is better than under the free range and therefore, the herd sizes are bigger. The housing provided for night shelter during the dry season is the same as that used during the wet seasons. The semi-intensive system is recommended for small holders and beginner pig farmers. The farmer may expand herd size and grow into a more intensive management system with experience and a conducive marketing environment. It is also easier to cut down the size of the herd should the prevailing conditions demand a reduction in herd size.

The pig farmers in Mizoram are mostly practicing small size farms and this type of semi intensive farming is hardly found in the study area. The researcher found one small farm who practice this kind of farming at Lunglei district at Mualthum. Otherwise there are few farms practicing this type of farming.

3.2.3 Intensive Production

This type of production system refers to raising pigs in confinement in large density. Intensive pig farming is a subset of pig farming, in which domestic pigs are raised up to slaughter weight. This system of rearing pigs from birth to weaning, lactating and weaned sows can embrace large number of piglets and different ages. Usually it is managed at one time (all-in all-out) basis, maintenance pigs of similar ages in groups in a common confined partitions. Food and water are provided in a common place, Farmers also adopted their own methods to maintain pigs' health and promote pigs growth, such as therapeutic use of anti-microbial agents, vitamin supplements and growth hormones. There is an absolute requirement for skilled management including veterinary protection against parasites and diseases to optimize output. Higher performance exotic or crosses between exotic and indigenous breeds are used for cross breeding.

Pig rearing in Mizoram are mostly non commercial, but are in confinement at the backyard of the household. It was found from the sample survey that 94 percent of the pig rearers claim that they have a sty for their pigs. Majority of the farmers fall in the category but the number of pigs reared are in a small scale of production. People keep pigs to feed their kitchen waste and in turn may give economic returns and extra income for the households.

3.3 Housing and Equipments

3.3.1 Site

Studies suggest that the location of a pig unit should ensure that there is free air movement and good natural ventilation. Flooring is to be smooth but not slippery and designed, constructed and maintained so as not to cause injury or suffering to pigs standing or bedding on it. Flooring is to be suitable for the size and weight of pigs and, where no bedding is provided, must form a rigid, even and stable surface. Where bedding is provided, it must be clean, dry and not harmful to pigs. The buildings should be on a slight slope to allow drainage and disposal of effluence. The slope also makes it easier to design a pig-flow with the farrow house at the top of slope and the fattening pens at the lower end. Studies find that it prevents cross-infection from effluent between piglets and the adult pigs. The rearers also have to consider the factors of the access roads, water sources and space for expansion.

3.3.2 Floor

Hard concrete or similar floors are usually recommended even in low cost buildings made of local materials. This prevents the pigs from rooting and digging up the ground and also permits cleaning which minimizes the build-up of diseases and parasites. The floor should provide insulation against both cold and damp. Also the nature of the floor surface is important. If the surface is too smooth and slippery the animals fall and can cause injuries. If it is too rough or

abrasive, this can result in damage to feet and udders. The study finds that majority of the respondents have used wooden floors with some holes between them. These holes are essential for dumping the waste to the bottom. The waste from the pigs is then utilized for manure and for cultivation of other crops. Use of concrete cement and mud flooring was also observed amongst the respondents; these floors were adjusted for draining the waste from the pigs. Among the sample study it was also observed that larger farms have adopted this type of flooring.

Fig. 3.1 Concrete Flooring of Pig Sty



Source: Survey photo

3.3.3 Walls

The walls are made up of strong materials to restrain the pig and ensure protection. Suitable materials include mud, wood, bamboo sticks, stones and cement blocks. Provision are made for suitable flaps, windows and doors which can be opened to allow maximum ventilation during hot periods and closed to contain warmth at colder times. Smooth walls are most ideal. However, the

study observed that majority of the respondents in the three select districts have used wood and bamboo staged at intervals for the walls. This type of wall provides good ventilation and are suitable for easy cleaning.

Fig. 3.2 Wooden Walled Sty



Source: Survey photo

3.3.4 Roofing

Roofing is used for shade and protection of the pigs from rain, sun, etc. The most common material used is tin sheet although there are some places where they still used traditional materials such as grass, leaves, straws, etc, are used which are ideal in the tropics for insulation. They also have the advantage of keeping the house cooler. Unfortunately, however, they are very prone to hazards, and are not durable as the tin sheets. They can become breeding ground for rats and other pests. It was observed from the survey that majority of the sty are having tin sheets as roof for the pig house while in some cases there are roofs are made from straw and some particular leaves *Di* (Long grass Thatch) .

3.3.5 Space Requirement

The sty should provide adequate shelter against direct sunlight and rain since pigs are sensitive to heat and cold. Studies suggested that congestion is a common cause of depressed performance and low productivity in pigs. Therefore, this must be considered in pig house design. Weight, number of pigs per group, air temperature, methods of feeding, ventilation and floor design are factors that affect space requirement. The study finds that from the sample survey, most of the respondents has provides average space requirements for the adequate number of pigs reared and the materials used has provided good ventilation also.

Fig. 3.3 An Average Pig Sty in Mizoram



Source: Survey photo

3.3.6 Pig House Equipment

Pigs require a dry bed and protection from extreme heat and sunburn. Minimum requirements apply for space, fresh air, hygiene, access to feed and water, as well as accommodation. These should not predispose the pigs to illness or injury. A study by Tamil Nadu Agricultural University has laid down some pointers for housing of pigs as follows:

- The house should give adequate protection against direct sunlight and rain. Hogs are sensitive to heat and cold.
- The floor and wall should be strong to withstand the rooting habits of pigs. Concrete flooring is durable and easy to clean. The walls may be of bricks, finished smoothly and doors of strong wooden planks or iron.
- Feed troughs and water troughs may be placed along the front to facilitate feeding from outside.
- Pigs thrive well in temperature range of 20-25°C. Provision of shade, wallowing tank, cooling devices such as water sprinklers, washing etc., to maintain thermal comfort.
- Design should be such that all animals are observable easily from outside and the labour requirement is less.
- Boars, pregnant and dry sows, gilts and growing pigs are usually kept in open yards with partially sheltered area. Farrowing sows are housed in completely enclosed houses or pens.
- Simple low cost houses constructed with locally available materials as per above guidelines are preferred in rural areas. Multipurpose pens, which can be used, for all categories of pigs can also be designed meeting the floor space requirement.
- Individual or group housing in cages made up of vertical GI(galvanized iron). pipes/MS(mild steel) rods and also farrowing crates can be adopted in large high-tech farms.
- Uncastrated males and females should not be housed together beyond the age of four months.

Table No. 3.1 Material used for building sty and type of rearing farms in Mizoram

Materials used for building sty and type of rearing farms		District			Total
		Aizawl	Lunglei	Kolasib	
Bamboo and wood	N	40	71	27	138
	% within Materials used	29.00%	51.40%	19.60%	100.00%
	% within District	20.50%	35.70%	13.60%	23.30%
Wood Only	N	120	96	99	315
	% within Materials used	38.10%	30.50%	31.40%	100.00%
	% within District	61.50%	48.20%	49.70%	53.10%
Mud and others	N	3	6	61	70
	% within Materials used	4.30%	8.60%	87.10%	100.00%
	% within District	1.50%	3.00%	30.70%	11.80%
Concrete	N	2	5	4	11
	% within Materials used	18.20%	45.50%	36.40%	100.00%
	% within District	1.00%	2.50%	2.00%	1.90%
Concrete and wood	N	27	8	8	43
	% within Materials used	62.80%	18.60%	18.60%	100.00%
	% within District	13.80%	4.00%	4.00%	7.30%
Others	N	3	13	0	16
	% within Materials used	18.80%	81.30%	0.00%	100.00%
	% within District	1.50%	6.50%	0.00%	2.70%
Total	N	195	199	199	593
	% within Materials used	32.90%	33.60%	33.60%	100.00%
	% within District	100.00%	100.00%	100.00%	100.00%
Intensive Free land	Count	1	33	0	34
	% within Type of rearing in the farm	2.9%	97.1%	0.0%	100.0%
	% within District Address	.5%	16.6%	0.0%	5.7%
Confined	Count	194	166	199	559
	% within Type of rearing in the farm	34.7%	29.7%	35.6%	100.0%
	% within District Address	99.5%	83.4%	100.0%	94.3%
Total	Count	195	199	199	593
	% within Type of rearing in the farm	32.9%	33.6%	33.6%	100.0%

Source : Sample survey

The survey observed that households have utilise their backyard and other convenient places in their compound for the erection of the sty. An attempt was made to find out the materials used by the respondents for building of pig sty. Table 3.1 shows that majority of the respondents 53.1 percent have used available wood in their premises for construction of the sty which was found to be the most common material. Among the districts which use wood for making sty, Aizawl district shows the highest with 38.1 percent, followed by Kolasib (31.4 percent) and then Lunglei (30.5 percent). In the category of using bamboo and wood, Lunglei district has the highest number 71 of the respondents (51.4 percent) amongst the district, followed by Aizawl (29.0 percent) and Kolasib (19.6 percent). The survey also

observed that the bamboo for pig sties was usually gathered from the geographically abundant forests near their homes and villages. Amongst those whose sties were made up of mud and other materials, it was found that Kolasib has the highest response with 87.1 percent and at low percentages by Lunglei and Aizawl at 8.6 percent and 4.3 percent. It may be assumed that Aizawl and Lunglei districts are far more urban in nature and therefore mud is not easily available resource. Kolasib on the other hand is more closer to lowland areas and rural in nature. Therefore, mud and similar materials are easily and locally available. The data shows that most of the respondents in Kolasib are using mud as denoted by 30.7% within districts. Sties made purely from concrete are very less as the total respondents are represented by 11 respondents consisting of Lunglei(5) followed by Kolasib (4) and Aizawl (2). These sties belong to those farmers who have been in the business for more than 10 years and therefore rely on permanent infrastructure which is made up of concrete. The next category is made up of concrete and partly with wood. In this category, Aizawl has the highest number denoted by 62.8 percent followed equally by the two districts at 18.6 percent each. Here the percent is high in Aizawl district because Aizawl is mostly urbanised and materials like bamboo and mud are not easily available and which needs to be replaced within a short span of time, therefore relies on long lasting materials like concrete and with some wood. The last category others' consist of materials like combinations of bamboo and tin sheets, GI pipes, bamboo mats etc. In this category, Lunglei has the highest denoted by 81.3 percent signifying that uses other materials primarily followed by Aizawl at 18.8 percent. It was also observed that the greater part of the non-commercial farmers' pig pen were based on convenience as the sties were generally small and did not followed the specifications of the experts.

In terms of district wise analysis, in Aizawl, it is found that the maximum material used is wood for making sty represented by 120 respondents (61.5%). This is followed by bamboo

and wood materials (20.5 percent), and in the similar range by concrete and wood at 13.8 percent. The rest of the materials like mud and others, concrete and others are used at a negligible low levels represented by 1.5, 1.0 and 1.5 percent respectively. Similarly for Lunglei district, materials used maximally is wood only at 48.2 percent (96 respondents) , followed by bamboo and wood (35.7 percent) and other materials (6.5 percent). Materials like concrete and wood (4.0 percent), mud and others (3.0 percent) and concrete (2.5 percent) show that these materials are used negligibly. In Kolasib district, the material used mostly is wood only represented by 99 respondents (49.7 percent) followed by mud and others 61 respondents (30.7 percent) and to a great extent by bamboo and wood representing 7 respondents (13.6 percent). Other materials like concrete, concrete and wood are used minimally. The reasons for this pattern may be due to the availability of bamboo, mud, and wood in the district in abundance.

Fig. 3.4 Pig sty in Rural Area of Mizoram (Wooden Flooring)



Source: Survey photo

3.4 Breeds and Breeding

3.4.1 Breeds

There are over 90 recognized breeds and an estimated 230 varieties of pigs in the world. These can be grouped into indigenous and modern exotic types which through selection and breeding have been developed for commercial production.

Breeds and breeding management is an important factor contributing to the productivity and efficiency of the input in the farm. To a large extent, the rural pig rearers are very cautious in selecting breeds and management of stocks in their venture. According to the Animal Husbandry & Veterinary Department of Mizoram's training manual for pig farmers, there are around 60 good breeds in the world and about 20 of them are imported to India to test their performances. Out of these 20 imported breeds about 6 exotic breeds have been imported to Mizoram for the development of the pig production, some of the well-known breeds used for production in Mizoram are as follows Kumaresan et. al. (2007) :

- a) **Large White Yorkshire:** These breeds are distinguished by their picturesque bearing, erect ears, slightly dished face, white colour, pink skin and long deep sides. They have been well known for bacon production. The sows are known for large litters and heavy milk production. An adult male reaches 270 to 360 kgs and adult female reaches 250 to 360 kgs.
- b) **Middle White Yorkshire:** The Middle White is a breed of domestic pig native to the United Kingdom. It originated in Yorkshire roughly around the same time as the Large White. Its name comes from the fact that it was between the size of the Large White and the now-extinct Small White. An adult male reaches 220 to 300 kgs and adult female reaches 250 to 360 kgs.

- c) **Hampshire:** The Hampshire pig is a domestic swine breed characterized by erect ears and a black body with a whitish band around the middle, covering the front legs.
- d) **Berkshire :** Berkshire pigs are a rare breed of pig originating from the English county of Berkshire. A very attractive medium sized pig with prick ears, white socks, a white blaze and a white tip to the tail, otherwise totally black. An adult male reaches 275 to 375 kgs and adult female reaches 200 to 290 kgs.
- e) **Landrace:** This breed is of medium to large breed of domestic pig, white in colour, with long bodies, fine hair, long snouts, and heavy, drooping ears. They are bred for pork production.
- f) **Duroc:** Duroc pig is an older breed of American domestic pig that forms the basis for many mixed-breed commercial hogs. Duroc pigs are red, large-framed, medium length, and muscular, with partially drooping ears, and tend to be one of the least aggressive of all the swine breeds. They also have an excellent rate of gain. Adult male can be 400 kgs and female reaches 350kgs.
- g) **Local :**Local breeds are small in size and usually pot bellied, hairy and black in colour with long face and short ears. These pigs are reported to have an early maturity and are named upon the tribe rearing it. These pigs are sturdy and would survive without much care especially in feeding and disease management.

Breeds selection is a crucial activity and would determine the productivity of the pig. The sample data shows that the pig rearers preferred cross breed pigs which comprise the highest 37.6 percent of the sample. This can be due to a convenient breeding service practiced as per availability by the farmers. The farmers prefer those pigs with higher farrowing capacity. The sample data also find that Burmese imported pigs comprise 24.8 percent. The exotic breeds which are initiated by the Government comprises 23.3 percent and lastly the Mizo local species are at 14.3 percent. These local pigs are known for rich taste meat and it is a favourite

among some of the people. Although the demand for local pig is high due to its small size, the farmers are not opting it for breeding in their venture because the low productivity tends to be disadvantages for the farmers' investment.

3.4.2 Breeding technology

The urban pig rearers have commonly used artificial insemination, which have been provided by the state owned veterinary department. There are also a number of farmers who still practice manual breeding of pigs in their farms. There are some farms who does the servicing of the breeding, these farmers are often called upon by the pig rearers who intends to reproduce their stocks. The study finds that some respondents have their own boars for the service breeding. Commercial farms which are less in numbers have broaden the use of artificial insemination (80.9 percent), which is more cost effective method of breeding according to the pig rearers. On the other hand, the study shows that there are some farmers who still favours the traditional method of servicing by the pigs. Table 3.2 shows that there are 19.9 percent of the respondents do have their own servicing male pigs. At 89.9 percent, farmers at Lunglei district have a highest practice of artificial insemination and 85.6 percent and 67.3 percent at Aizawl and Kolasib respectively. The farmers have found this practice to be more efficient and effective.

Table 3.2 Types of Breeding Service in Mizoram

Types of Breeding Service		District			Total
		Aizawl	Lunglei	Kolasib	
Servicing Boar	Count	28	20	65	113
	% within Breeding Service	24.8%	17.7%	57.5%	100.0%
	% within District	14.4%	10.1%	32.7%	19.1%
Artificial Insemination	Count	167	179	134	480
	% within Breeding Service	34.8%	37.3%	27.9%	100.0%
	% within District	85.6%	89.9%	67.3%	80.9%
Total	Count	195	199	199	593
	% within Breeding Service	32.9%	33.6%	33.6%	100.0%
	% within District	100.0%	100.0%	100.0%	100.0%

Source : Sample survey

Only 19.1 percent of the farmers in Mizoram keeps boar for servicing. The reason to this low service breeding can be assumed to be the effect of artificial insemination which is more efficient and less troublesome. But to certain extent, these services are not in easy access for the farmers at the remote villages, eventually keeping their own boar for servicing the sows at times. Farmers at Kolasib district have the highest percentage (57.5%) of breeding service within the category of having servicing boars, followed by 24.8 percent at Aizawl and 17.7 percent respectively at Lunglei. With the advancement and initiatives of services by the Government departments, 37.3 percent of the respondents (179 respondents) in Lunglei are found to practice artificial insemination which is the highest among the three districts, followed by 34.8 percent in Aizawl (167 respondents) and 27.9 percent (134 respondents) in Kolasib district respectively.

3.4.3 Selection of Breeding

The selection of the correct health status appropriate for the herd and location is vital before breeding stock are purchased. Selecting productive, performance-oriented breeding stock is the first step in a successful swine production. Health is the primary criterion. If pigs are not healthy, they will grow slowly and produce poorly. Pigs originating at a livestock sale facility are exposed to diseases from other pigs at that sale barn, so purchasing pigs directly from another producer is the best way to ensure healthy animals. Quality of pigs is the second criteria. Pigs should be reproductively sound if the farmers are planning to use them as breeding stock. Feeder pigs fed for slaughter should have some muscle expression. Structural soundness is important in pigs purchased for either purpose.

3.4.4 Purchasing breeding stock

In purchasing breeding stock, it is important to buy from a reliable supplier who can give authentic information on the performance traits discussed. On purchase, they should be kept apart for few days to make sure that they are free from any obvious disease and also to enable them acclimatize to the new environment before put to use. However; it is suggested that care is to be taken to keep boars within sight and sound of the female pig in order to enhance stimulation.

3.4.5 Local Techniques

The farmers (respondents) do care for the best breeding stock while purchasing for the farm and they select from the best available within the reach of the farmers. Due to unavailability, the respondents are force to buy as per the convenience of the other breeding farms. The piglets are usually taken apart at around three months for rearing. There are also times when pigs are bought at older age beyond three months where prices are little higher.

Table 3.3 Types of Breeds (Pigs) in Mizoram

Breeds		District			Total
		Aizawl	Lunglei	Kolasib	
Indigenous	N	24	47	67	138
	% within Types of breed reared in the Farm	17.4%	34.1%	48.6%	100.0%
	% within District	12.3%	23.6%	33.7%	23.3%
Cross Breed	N	70	39	114	223
	% within Types of breed reared in the Farm	31.4%	17.5%	51.1%	100.0%
	% within District	35.9%	19.6%	57.3%	37.6%
Mixed	N	86	48	13	147
	% within Types of breed reared in the Farm	58.5%	32.7%	8.8%	100.0%
	% within District	44.1%	24.1%	6.5%	24.8%
Others	N	15	65	5	85
	% within Types of breed reared in the Farm	17.6%	76.5%	5.9%	100.0%
	% within District	7.7%	32.7%	2.5%	14.3%

Source: Sample Survey

In an attempt to find the types of breeds kept by the respondents among the districts, it was found that cross breeds pigs were reared mainly (223 respondents) followed by mix (indigenous, cross, others) (147 respondents), close to that is the indigenous pig breeds(138 respondents) and lastly other (Burmese, Assam border, local variety etc.) represented by 85 respondents. The table also shows that at Kolasib 51.1 percent of the farmers has been keeping cross breed pigs(114 respondents), 31.4 percent in Aizawl (70 respondents) and 17.5 percent in Lunglei (39 respondents) which are sourced from the Government and the local farms. This also shows that Kolasib is suitable for farming of the different breeds of pigs. The indigenous pig is one that is famous for taste, but they are generally smaller in size and they need longer time for fattening, and are thus not as profitable as the cross breed and other pig breeds, Kolasib district is having 48.6percent of it, 47 percent at Lunglei and 24 percent at Aizawl respectively. There are also farms who keep mixed of these breeds; they claimed to have taken varieties of breed for different purposes like breeding, meat etc. The major purpose of pig rearing is meat, there are two types of pig production: (1) sow farms (breeding and rearing) and (2) fattening farms (growing and finishing). It is clearly observed that in Mizoram, the major concern for farming pig is meat where majority of the respondents' activity opt for meat production and fattening, resulting 54.6 percent of the farmers keeping their pigs for the purpose of meat production and 9.1 percent them keep them for reproduction and 35.4 percent keep for both purposes. Lastly, there are a small portion of farmers representing 0.8 percent who does it only for trade because these players are in the market and they have the advantage of keeping and maintain the trade with profits.

Tale 3.4 Sources of Stocks (Pigs) of the Pig Farmers in Mizoram

Sources of stocks		District			Total
		Aizawl	Lunglei	Kolasib	
Reliable breeder	Count	28	66	59	153
	% within From where the stocks are purchased	18.3%	43.1%	38.6%	100.0%
	% within District	14.4%	33.2%	29.6%	25.8%
Nearest farm	Count	21	30	82	133
	% within From where the stocks are purchased	15.8%	22.6%	61.7%	100.0%
	% within District	10.8%	15.1%	41.2%	22.4%
Govt farm	Count	9	14	3	26
	% within From where the stocks are purchased	34.6%	53.8%	11.5%	100.0%
	% within District	4.6%	7.0%	1.5%	4.4%
Others	Count	137	89	55	281
	% within From where the stocks are purchased	48.8%	31.7%	19.6%	100.0%
	% within District	70.3%	44.7%	27.6%	47.4%
Total	Count	195	199	199	593
	% within From where the stocks are purchased	32.9%	33.6%	33.6%	100.0%
	% within District	100.0%	100.0%	100.0%	100.0%

Source: Sample survey

The productivity of pigs is determined by the breed selection and availability of good breed. During the survey, the farmers gave the opinion that they are not able to purchase the piglets whenever they require. The above table shows that 25.8 percent of the farmers have purchased from a reliable breeder at their regions, and among that 43.1 percent respondents from the sample are from Lunglei, 38.6 percent and 18.3 percent at Aizawl and Kolasib respectively. The study also finds that 22.4 percent of the respondents (133) buys from nearest farm on convenience where 61.7 (82 respondents) percent were from Kolasib, 22.6 percent (30 respondents) from Lunglei and 15.8 percent were from Aizawl (21 respondents). Since Kolasib is more rural among the three districts, it shows that the farmers have depend mainly on the local suppliers. The contributing factor to these differences in the districts could be assumed to be the availability of transport, where transport facilities are better in the capital district. The second highest purchase of stocks (piglets) is from the reliable breeders. There are very few Government farms that are at the reach of the majority of the farmers. At 53.8 percent Lunglei have the most elevated rate of stock being obtained from Government

farms, Aizawl and Kolasib has 34.6 percent and 11.5 percent respectively. At Lunglei, it was observed that many private farms have surprisingly been maintaining good breeds and the local farmers have been depending on them as a solid wellspring of piglets too. Aizawl District counts the highest percentage 48.8 percent of piglets being purchased from other sources which were identified as the farms who are self sufficient for their own requirement who are generally the commercial farmers, and Aizawl district counts the highest percent (48.8 percent) and 31.7 percent and 19.6 at Lunglei and Kolasib districts respectively. It was observed that there has been high rate of imported pigs which are kept for breeding. The study sample shows that there are 281 respondents who have purchased the pigs coming from Burma through Champhai, and some from Assam at Vairengte and some from Bangladesh at Lunglei districts as they bring convenience to the farms at time of need when the local resources are not supplying the demand to the farmers. From the above table farmers purchasing stocks from 'other sources' are found as, for Aizawl, there are 195 respondents (48.8 percent), Lunglei 89 respondents (31.7 percent) and Kolasib 55 respondents (19.6 percent) respectively. Thus, it can be assumed that there has been a huge demand gap in the supply and supply of stocks and supply of live animals.

Table 3.5 Ages of Piglets at the Time of Purchase

Age of Stocks at purchase time		District			Total
		Aizawl	Lunglei	Kolasib	
Less than 2 months	N	32	50	55	137
	% within Average age of stocks Purchased	23.4%	36.5%	40.1%	100.0%
	% within District	16.4%	25.1%	27.6%	23.1%
2-3months	N	148	130	94	372
	% within Average age of stocks Purchased	39.8%	34.9%	25.3%	100.0%
	% within District	75.9%	65.3%	47.2%	62.7%
4 months and above	N	15	19	50	84
	% within Average age of stocks Purchased	17.9%	22.6%	59.5%	100.0%
	% within District	7.7%	9.5%	25.1%	14.2%
Total	N	195	199	199	593
	% within Average age of stocks Purchased	32.9%	33.6%	33.6%	100.0%
	% within District	100.0%	100.0%	100.0%	100.0%

Source: Sample survey

Weaning substantial litters, having a proper size and weight is a key factor for a productive livestock farm. There are some pig rearers represented by 14.2 percent who buys pigs at older age i.e., at or after 4 months with the assumption that these pigs have high rate of growth and some of them will be sold in the market. It was also found that majority 61.9 percent of the litters when bought are of 2 to 3 months old of which 39.8 percent are from Aizawl, 34.9 percent from Lunglei and 25.3 percent from Kolasib districts respectively. Farmers of 23.1 percent have purchased piglets at the age below 2 months. There are also 14.2 percent of the farmers who keep pigs for shorter period of time as they play the role of retailer, as they resale the pigs in the market after keeping them for fattening and other value adding treatments. Kolasib stands the highest in this category at 25.1 percent where Lunglei and Aizawl are below 10 percent.

Table 3.6 Annual farrowing in Mizoram

Number of Farrowing in a year		District			Total
		Aizawl	Lunglei	Kolasib	
Once	N	7	32	43	82
	% within Number of Farrowing in a year	8.5%	39.0%	52.4%	100.0%
	% within District	3.6%	16.1%	21.6%	13.8%
Twice	N	148	151	85	384
	% within Number of Farrowing in a year	38.5%	39.3%	22.1%	100.0%
	% within District	75.9%	75.9%	42.7%	64.8%
Meat Producers	N	40	16	71	127
	% within Number of Farrowing in a year	31.5%	12.6%	55.9%	100.0%
	% within District	20.5%	8.0%	35.7%	21.4%
Total	N	195	199	199	593
	% within Number of Farrowing in a year	32.9%	33.6%	33.6%	100.0%
	% within District	100.0%	100.0%	100.0%	100.0%

Source: Sample survey

Farrowing is another name for giving birth after a normal gestation period. A productive sow usually farrows twice in a year, the study shows that in the selected districts 82.4 (384 respondents) respondents claims that their sows farrows twice a year. Out of which 38.5

percent of the farmers at and Aizawl (148 respondents), and Lunglei 151 respondents (39.3 percent)are enjoying two times farrowing sows and are quite productive, where 60 percent of the average litters per sow is above 8 piglets, whileat 22.1 percent (85 respondents)from Kolasib are having their sows that farrows two times.

Table 3.7 Size of litters at birth in Mizoram

No. of Litters		District			Total
		Aizawl	Lunglei	Kolasib	
Less than 5	N	12	10	2	24
	% Among Districts	50.0%	41.7%	8.3%	100.0%
	% within District	6.2%	5.0%	1.0%	4.0%
5-8	N	35	68	84	187
	% % Among Districts	18.7%	36.4%	44.9%	100.0%
	% within District	17.9%	34.2%	42.2%	31.5%
Above8	N	61	23	13	97
	% % Among Districts	62.9%	23.7%	13.4%	100.0%
	% within District	31.3%	11.6%	6.5%	16.4%
Meat & Traders	N	87	98	100	285
	% Among Districts	30.5%	34.4%	35.1%	100.0%
	% within District	44.6%	49.2%	50.3%	48.1%
Total	N	195	199	199	593
	% Among Districts	32.9%	33.6%	33.6%	100.0%
	% within District	100.0%	100.0%	100.0%	100.0%

Source: Sample survey

Table 3.7 shows that the size of litters at birth in select districts of Mizoram. Though majority of the respondents have pig keeping as part time, it was found that the breeds are quite productive. It can be assumed that if more time is allocated to the care practices, productivity in aspects of farrowing can be at higher level. The table also shows that 31.5 percent of the sample farrows between 5 to 8 litters per birth. In this category,44.9 percent are from Kolasib, 36.4 percent from Lunglei and 18.7 percent in Aizawl. It was also observed that some special sows at Lunglei District gave birth up to 17 litters and these farmers do engage more than the others in caring the pigs. There are some responses where 7.8 percent of the sample produces less than 5 litters per farrowing. The attributes of this group of low rate of

output per sow may have resulted from the rearing of local pigs. There were also substantial farmers who carry on with meat production and trading who keep pigs for short duration.

Table 3.8 Size of litters at weaning

Size of litters at the Farm		Aizawl	Lunglei	Kolasib	Total
Less than 4	N	12	15	8	35
	% Among Districts	34.3%	42.9%	22.9%	100.0%
	% within District	6.2%	7.5%	4.0%	5.9%
4 to 6	N	27	50	26	103
	% Among Districts	26.2%	48.5%	25.2%	100.0%
	% within District	13.8%	25.1%	13.1%	17.4%
Above 6	N	70	36	66	172
	% Among Districts	40.7%	20.9%	38.4%	100.0%
	% within District	35.9%	18.1%	33.2%	29.0%
Meat & Traders	N	86	97	99	282
	% Among Districts	30.5%	34.4%	35.1%	100.0%
	% within District	44.1%	48.7%	49.7%	47.6%
Total	N	195	199	199	593
	% Among Districts	32.9%	33.6%	33.6%	100.0%
	% within District	100.0%	100.0%	100.0%	100.0%

Source: Sample Survey

Weaning is the taking away of piglets from the mother on or after two months. Cross breeding among the exotic breed are found to give larger litters till the time of weaning. It was also found that 29.0 percent at weaning time were above 6 and 17.4 percent were 4 to 6 months and 5.9 percent were below 4 months. It was observed that the breed reared does have a substantial impact in the size of the litters at birth and weaning. The study also shows that majority of the respondents at 55.5 percent piglets of majority of the reproducing farms have qualified sale of piglets more than 6 per weaning time showing that there is a good survival of the litters. The study also observed that there are substantial amount of respondents who have kept the pigs only for meat and trading representing 282 of the 593 (47.55 percent) respondents among the sample. This can contribute to the reasons for low supply of live pigs in Mizoram as only few of the sow keeping firms have maintain more than two sows for multiplication of the pigs

3.5 Pig Management

3.5.1 Daily routines

Cleaning: After watering and feeding, the pens are needed to be cleaned. It is advisable to remove moist bedding and replace with a dry one. The farmers usually feed the pigs twice a day and water at noon. Wood shavings can be used for young animals and sawdust for older ones. If a pen is vacated it is advised to wash, disinfected and allowed to rest for at least one to two weeks before other animals can be brought in. The study observed that majority of the farmers wash the sty twice in a week. The study also observed that majority of the respondents prepare the feed by boiling the vegetation and other feeds mixing them while cooking, starting in the morning and feeding them after they are done with the mixing. The respondents who are full time farmers collect some vegetation during noon and collecting other feed stuff available locally. The other pig rearers who does other jobs usually feed the pigs twice a day and will boil the feed by night. Cleaning are also done while feeding when the pigs are busy eating.

3.5.2 Management of Pregnant Sows

Once the gilt/sow has been successfully served, conception may occur. The gestation period is usually 114 days (3 months, 3 weeks and 3 days). All sows are to be checked periodically so as to detect any one that has returned to oestrous (main reproductive cycle) so that they can be served again. The sows are to be kept in small groups to ensure that they all have access to adequate feed. The feeds are to be well fortified in order to meet the needs of both the dam and foetuses. Feeding of green leaves and vegetable is particularly important. Heat stress has been recognised to be a major source of embryo losses especially during early pregnancy. It is therefore important that pregnant sows should be shielded from extremes of heat especially during the hottest months of the year through the provision of shades and wallows.

3.5.3 Farrowing and Care of Newborn Piglets

The most critical period in the life cycle of a pig is from birth to weaning(Rea,1993). On the average, about two pigs per litter are lost during this period. Poor management is the major contributing factor, although the actual cause may be crushing, bleeding from the navel, anaemia, starvation or disease. Good care and management in the farrowing quarters has a major influence on the number of live born piglets that are weaned and on how well they perform in later stages of production.The pregnant animals are to be de-wormed 2-3 weeks prior to farrowing to reduce the possibility of the dam passing worms to the new born piglets. Also the sow should be in the farrowing unit 4 to 5days prior to the expected farrowing time to allow for adjustment to the environment. Studies suggest that constipation in the sow must be avoided at all cost as this interferes with farrowing process. Supplements of bran and green stuff during the last week of pregnancy are recommended.

When the pregnant sow is about to farrow, farmers watch for signs like increased restlessness as opposed to the peaceful animal of late pregnancy and making of nest by arranging necessary bedding. Management is especially critical since most baby-pig losses occur during the first 72 hours after birth. Studies have recommended that for sows farrowing under confinement conditions, each farrowing should be supervised by a trained stocks man, in case of any farrowing problem such as delayed farrowing and still-births.

3.5.4 Weaning

Weaning is the practice of separating the young pigs from their mother. It usually exerts stress on the young. Weaning is normally accomplished when pigs are from 6-9 weeks of age, when they should be capable of subsisting on solid feeds and fending for themselves. Body weight and health condition are better criteria than age per se. Exotic breeds are to be weaned at weights of 5-6kg. It must be emphasized that superior

management, rigid environment control and continuous attention to minute details are essential for success in this phase of growth.

Other changes should be gradually effected at weaning. The ration is not to be abruptly change, but for a few days, continue feeding creep feed mixed with weaner ration and then finally eliminate the creep feed completely at about two weeks after weaning.

3.5.5 Record Keeping

The keeping of proper records is absolutely essential for the success of any pig enterprise. It gives a clear picture of the type of operations, so that the exact point of success can be measured. Therefore, a good record of the number of pigs in herd, feed utilization, mortality, medication and sales, should be kept. Also on reproduction, details of boar performance, sow productivity, weaners growth and grower/finisher efficiency should be recorded

3.6 Discussion on management of pig production

Table 3.9 Farming and Management of Pig Production in Mizoram

Criteria		District			Total
		Aizawl	Lunglei	Kolasib	
Number of pigs bred in the farm	1-10	179	184	85	448
		91.8%	92.5%	42.7%	75.5%
	11-20	8	9	63	80
		4.1%	4.5%	31.7%	13.5%
	21-50	4	6	30	40
		2.1%	3.0%	15.1%	6.7%
51-100	4	0	15	19	
	2.1%	0.0%	7.5%	3.2%	
101-250	0	0	6	6	
	0.0%	0.0%	3.0%	1.0%	
Time spent for farming in a day	less than two hours	93	55	91	239
		47.7%	27.6%	45.7%	40.3%
	2-5hours	90	121	58	269
		46.2%	60.8%	29.1%	45.4%
	5-10 hours	5	14	49	68
		2.6%	7.0%	24.6%	11.5%
	more than 10 hours	7	9	1	17
		3.6%	4.5%	.5%	2.9%
Feeds used for rearing the Pigs	Kitchen waste	8	40	101	149
		4.1%	20.1%	50.8%	25.1%
	Feeds	8	10	48	66
		4.1%	5.0%	24.1%	11.1%
Kitchen waste and Feeds	28	78	29	135	

		14.4%	39.2%	14.6%	22.8%
	Vegetation	36	27	4	67
		18.5%	13.6%	2.0%	11.3%
	Vegetation, feeds and kitchen waste	115	44	17	176
		59.0%	22.1%	8.5%	29.7%
Feeds used for rearing the Pigs	Kitchen waste	8	40	101	149
		4.1%	20.1%	50.8%	25.1%
	Feeds	8	10	48	66
		4.1%	5.0%	24.1%	11.1%
	Kitchen waste and Feeds	28	78	29	135
		14.4%	39.2%	14.6%	22.8%
Vegetation	36	27	4	67	
	18.5%	13.6%	2.0%	11.3%	
	Vegetation, feeds and kitchen waste	115	44	17	176
		59.0%	22.1%	8.5%	29.7%
Number of feeding per day	Twice	170	179	152	501
		87.2%	89.9%	76.4%	84.5%
	Thrice	25	20	47	92
		12.8%	10.1%	23.6%	15.5%
Boiling of feeds	Yes	185	195	188	568
		94.9%	98.0%	94.5%	95.8%
	No	10	4	11	25
		5.1%	2.0%	5.5%	4.2%
Waste Management	Planned	129	146	57	332
		66.2%	73.4%	28.6%	56.0%
	Unplanned	66	53	142	261
		33.8%	26.6%	71.4%	44.0%

Source: Sample survey

It has been said that pig keeping is a part of the tradition of the Mizo, partial engagement in pig keeping is another reason that attributes to the type of farming in Mizoram. The sizes of the farms are quite small due to the fact that majority of the farmers are keeping their pigs as a backyard venture or substitute activity for additional income. The study finds that 75.5 percent of the respondents keep their pig to clear up the kitchen waste and rear usually less than 10 pigs, at 92.5 percent Lunglei has the highest concentration of farms having less number of pigs followed by Aizawl at 91.8 percent and Kolasib at 42.7 percent. The study also finds that there were substantial number of midsize farmers in the state viz., 13.5 percent of the farmers keep 11 to 20 pigs, and 6.7 percent keep 21 to 50 pigs. Big farms which rears more than 20 pigs requires extensive maintenance and intensive care. A very small number representing 1 percent of farmers keep more than 100 pigs. It was observed that the highest number of pigs in a farm was about 250 live pigs among the respondents. The Government has also appointed these big farms as piglet multiplication centres as well. There were few

farms as much as 3.2 percent who keeps 50 to 100 pigs and they too have their plans to expand to larger units.

Pigs require intensive care and other activities for their productivity. The time that the farmers give to the pigs makes a difference in their growth and health. Farming hours or time spent for farming are as follows, highest among the sample 45.2 percent spends 2 to 5 hours looking after the farm. A large percent resulting as much as 40.3 percent spends less than 2 hours per day. There are 3.1 percent of the farmers who spends more than 10 hours due to their large farm. The sample also shows that 11.5 percent spends 5 to 10 hours in the farm. Larger the farms, more time were estimated to be spent for care and looking after the production. Majority of the small farms were observed to spend less time for farming which consisted of mere preparation of feeds and feeding of pigs.

Feeding is as important element in pig farming to produce meat or breeds. The sample study shows that the farmers do feed twice in a day and 94.9 percent boil their feeds. Boiling is carried out to soften the feeds. Feed supply from the market could be quite expensive for the lower income group farmers. The most common practice in pig rearing in Mizoram is feeding of kitchen waste while 25 percent of the farmers extensively make use of it. There are some farmers who have the opinion that use of readymade feeds from the market is more economical than boiling the feeds prepared from vegetation and kitchen waste. From the sample survey, 11.1 percent uses only the readymade feeds purchased from the market. According to the farmers, these readymade feeds give the highest growth rate. On the other hand, there are 11.3 percent farmers who practice the method of boiling green leaves and other vegetation as feeds which is convenient in the rural areas. There survey also finds that 22.8 percent uses both kitchen waste and feeds, while 29.7 percent utilise a mixture available feeds, vegetation and kitchen waste. It was also observed that around 2 to 3.5 kilograms of dry feeds were given to adult pigs in a day. The kitchen waste feeding practice

is very common and economical as well. The respondents who use readymade feeds have shared their difficulties in the availability, high price and stocking of the feeds. It was also observed that the larger farms have been utilising readymade feeds prior to the smaller farms who can manage with kitchen waste and other vegetation.

A well-constructed sty is a crucial factor of hygienic farming of pigs. Most of the sties were constructed with a small or little elevation levelling the slope of the land. It was found that 76.5 percent of the pig sties were constructed using bamboo and wood which are the most abundant materials found in the region. There are some village farmers who builds with mud and other available convenient materials which are represented by 11.8 percent. In the more urban areas, there are small farmers who uses better materials like concrete and mortar for the construction of the sty. It was also found that 1.9 percent uses concrete and wood with other conveniences. Most of the farmers use the waste products as manures for crops and vegetation which is shown by the result that 56 percent of the farms claimed to utilise the waste as manure, fertilizers, etc. for the crops.

3.7 Feeds and Feeding

Feeds and nutrition for weaned pigs, regardless of age, should be thoroughly reviewed on a regular basis to ensure success of your weaning age program (Goodband et. al. 2005). Properly designed nutritional programs and feed budgets cannot, by themselves, ensure a successful nursery program. It's important when moving to an older pig at weaning that nutritional feeding strategies can be modified to maintain growth performance targets and decrease feed cost per pig.

3.7.1 Nutrients Required by Pigs

a). Water: Next to air, water is the most vital nutrient for life. It should be supplied clean and daily. Most feeds and feeding stuffs especially green leaves, contain appreciable quantities of water. 65 percent of the pig's body is water. Water is of particular importance to pig production in the tropics as the pig requires water to enable it maintain body temperature. Lack of water quickly leads to a rise in body temperature and death. Also sub-optimal amount of water will have a major effect on food intake and pig performance

b). Energy: Energy can be defined as the capacity to do work. It provides the driving force for all the biochemical reactions that go on in the body. The energy requirement of the pig is usually given in terms of Digestible Energy or Metabolisable Energy (Ikani and Dafwang 1995). Energy is measured in Kilo calories (Kcal) or Megajoule (Mj). The bulk of energy in pig rations is supplied by carbohydrates which are the major components of cereal grains such as maize, guinea com, millet and root crops such as yams, cassava and potato. Fats contain higher levels of energy than carbohydrates. Fats commonly used in pig rations include palm oil, groundnut oil, soyabean oil and tallow.

c). Lipids: Although fats are used primarily as energy sources, it has been known that the pig has a requirement for one essential fatty acid; linolenic acid. However, the requirement is so small that it can be met in normal rations formulated to meet required energy standards are generally more expensive.

d). Protein: Provides the primary blocks for building the animal's body, i.e., meat, collagen, hair and nails. Protein is usually broken down into amino acids by the body and these are the actual building blocks. Out of the twenty known amino acids, ten are described as essential because the pig's body cannot synthesize them internally and therefore they must be supplied in the diet. Of these, Lysine and Methionine have been found to be the most limiting in practical

rations (Goodband et. al., 2014). The synthetic products are available commercially and can be added in pig rations directly to overcome any deficiencies. Because protein sources are expensive, they are often the most limiting in commercial feeds. The most commonly used protein containing feedstuffs in India are: Groundnut cake, soyabean (full fat), soyabean meat, cottonseed cake, palm kernel meal and blood meal.

e). Minerals: These are the nutrients found in bones. They also perform extremely diverse functions in the body ranging from structural formations to regulatory functions in most body tissues. There are 13 essential inorganic elements known to be required by the pig. The minerals that must be provided for in practical pig rations in sizeable quantities are calcium, phosphorus, sodium and chlorine. Iron is very important to the piglet. So much so that it has to be injected directly, even if the piglet does have access to iron in the soil. Bonemeal, oyster shell and limestone are the most common sources of Calcium and Phosphorus in pig rations.

f). Vitamins: These are organic compounds required in small amounts for normal growth, reproduction and health maintenance. Vitamins A,D, E and K are fat soluble while the B vitamins are water soluble. Common sources of vitamins for swine include green leaves and vegetables.

3.7.2 Feedstuffs

Most ordinary feedstuffs contain more than one nutrient. Knowledge of feedstuffs locally available to the farmer or pig feed producer is therefore most useful. Because it is very important to cut down on cost of feeds, there is constant search for cheaper sources of alternative feedstuffs to the conventional ingredients. The growth rate on feed made from low quality feedstuffs is often less than that obtained on feeds formulated from conventional ingredients.

Livestock keeping is embedded to the culture as it is an integral part of the people of Mizoram, amongst which pig is the most favourite and the most demanded product. During the recent years, there has been a very stagnant level of supply within the area. The reason leading to the shortage of supply can be credited to the rise in population, increase in the purchasing power of the people. Another stagnating factor is the availability of the pigs to large extent and at a reasonable price, which are imported from the Myanmar border at Zokhawthar at the far east corner Champhai. The change in lifestyle and more migrants to urban area are akin to the people with more intension to have more economic activities. Majority of the respondents had been supplementing their income with the pig farming and are generating income.

It was observed that majority of the farms are small in size and consist of people with lower level of income having tendency to invest more in the field. There were large number of respondents who keep farming as part time or backyard venture. These groups are rearing the pigs as more domestic consumption and to earn a side income. They are not serious about full time production and management of the pig production. Therefore, these are the groups which could contribute to the filling up of the gap in supply. Awareness in the investment opportunities and profitability is essential for enhancing the production as early as possible, to tackle the demand and minimising the gap of supply. The productivity of the rearing system results in the selection of the breeds and availability of stocks when required.

The sources of stock purchase clearly shows the evidence of imports of live swine from the Myanmar border which is bought at lower price. The farmers on the other hand prefers to pay for the cheaper piglets because of convenience and availability at larger unit, keeping the local and exotic cross breeds away which are available in the locality. In order to enhance production, control of imports is required at certain level, but it has become the need to import from Burma, despite of the threats. The people must be given more awareness about

the value of the local exotic breeds of swine initiated by the Government, rather than the Burmese pigs. The Government on the other line could have been more active in controlling the imports to protect the local products and to increase production which further could increase the economic activity. The study also concludes that the average income of the respondents is approximately Rs. 35,400. There are farmers (5.9 percent) who earns more than Rs. 2,50,000 from pig rearing alone. Therefore it can be concluded that indigenous pig production in Mizoram could encourage economic activity.

In Mizoram, the production has been blocked or slowed due to several reasons. The first is: the beginner farmer or pig producer who wants to expand must take stock of the market needs of his environment and the level of resources available to him to decide which of these enterprises to invest in as well as the level of investment.

a) Household Farming: Though majority of the household keep pigs in or near the backyard, the system of raising has more or less been the same as of the olden days. A small sty, that would hold up one or two pigs at or near the house is very common practice of the people, while there are only few farmers who are engaged in large scale production or farming. Majority of these households, who are referred to as farmers keep one or two pigs or lesser in number, this practice of the people as partially engaging in the farming as a mere additional activity of the household, or otherwise they keep the pigs to eat up the kitchen waste in a purposeful disposal of their waste. Now-a-days, there are some localities in the city of Aizawl that banned rearing of pigs in their area, though these localities bear the higher population that consumes pork. And from the observation of the sample study, majority of the farmers are of the lower income group, who have a very low power input in the farming. One suggestion could arise here, i.e. investment by the higher income people which would give more input in the production. Like in the developed and other developing countries, the

farmers of Mizoram also practice the intensive or confined method of rearing pigs. The shortage of supply has always been a drastic problem faced since long back.

b). Imports : The Myanmar border pig import is another one reason for the stagnation of the local production of pig. Animals and livestock keeping is a vital element in the national economy as well as in the socio economic development of a budding country like India, where majority of the average citizen are engaged in agriculture, and thus, generating gainful employment in the rural and sub urban areas. India has the largest livestock population in the world (Government of India Planning Commission, 11th Five Year Plan Report). Agriculture is the main source of income of the people living in rural areas and livestock is a sub sector of agriculture. Pig farming is one fundamental element of the farmers’ economic activity in the North Eastern region in India. The North Eastern region has a ample population of pig i.e., 24.63 percent of total pig population of India is in North Eastern states. Around 50 percent of the India’s pork is consumed in North Eastern Region alone (Mazumder, et al, 2012).

According to Kumaresan et. al. (2009), pork is the major meat consumed in the state of Mizoram and contribution of pork to the total meat consumed is as high as 71percent. Pork is the most favourite meat amongst the local residents (Mizo), but in the recent years the supply of pork has been short. This may be due to the rise in population and economy which increases the demand as well. There are very few people who have ventured into pig rearing in order to fill up the gap of short supply. Earlier queues never existed for purchase of pork, but now-a-days queues are more prevalent. This indicates the short supply of meat. The following table No 3.10 highlights the meat scenario in Mizoram.

Table 3.10 Estimated Meat Production in Mizoram (in tonnes)

Year	Cattle	Buffalo	Goats	Pigs	Poultry	Mithun	Total
2012 - 13	3416	101	67	6892	1561	39	12037
2013 - 14	3458.995	96.841	67.824	6925.252	1593.838	46.387	12189.137
2014 - 15	3587	110	69	7038	1669	52	12525

Source: Economic survey 2016

Table 3.10 lays out the average estimate of the production of meat in Mizoram for the year 2013 to 2015. Amongst the livestock pig is the largest being reared and that the demand being the highest.

3.8 Discussion

However, in the recent decade, the swine population has declined to approximately 12 million head from a high of 14 million in 2003, as indicated by the 17th Livestock Census of India. The major reason for this decline may be due to animal disease outbreaks, many occasions in the news have highlighted the outbreak of diseases. Some of the news have headlined the same issues; Indiatimes.com June 2016 have highlighted that Porcine Reproductive and Respiratory Syndrome (PRRS) has killed at least 3,500 pigs in Mizoram between April and June this year, the state animal husbandry and veterinary department officials said on Friday. In the newspaper, India Express's website dated April,2016 "Pigs at Mizoram Village Suffering from Greasy Pig Disease" . K. Lalnghinglova, Secretary, Animal Husbandry and Veterinary, at India Today 2016 stated that "the disease that left more than a thousand pigs in the Mizoram-Myanmar border Champhai district has been identified as Porcine Reproductive and Respiratory Syndrome (PRRS)". Bhattacharjee (2016) have reported to the Telegraph India that "The Mizoram government has sounded an alert in the wake of the outbreak of an communicable disease among pigs in Champhai district". According to the World Organisation for Animal Health (WOAH), PRRS can manifest as lowered farrowing rates (a measure of sow herd reproductive performance), a marked rise increase in abortions, stillborn, mummified and weak live born piglets, and deaths. It can also lead to severe respiratory disease and can result in high death rates in suckling and weaned pigs. In some herds, the infection is asymptomatic.

3.9 Conclusion

In Mizoram, there has been a huge demand gap of meat as per the recommendation of the Indian Council of Medical Research (ICMR), the majority of the livestock is occupied by the swine at 73.35 percent, and the meat production comprising 69.33 percent of the total meat production during the year 2014 to 2015 (Economic Survey 2014-15). Mizoram today, due to huge supply shortage is experiencing unorganised import of livestock from the border region of Myanmar. There are many instances where reports of swine flu and other diseases that are the outcome from importing of livestock. The outcome is therefore the worst for the economy, forcing the people to source their way of supplementing the supply leading to import, either from the neighbouring territories.

Pig rearing in Mizoram are mostly non commercial, but are in confinement at the backyard of the household. At 94 percent majority of the pig rearers claim that they have a sty for the pigs. The study also shows that 82.4 respondents claims that their sows farrows twice a year which is very productive. People keep pigs to eat up their kitchen waste and in turn will give economic return and extra saving for the household. The survey observed that households have utilised their backyard and other convenient places in their compound for the erection of the sty. It also shows that there are 53 percent of the farmers have used available wood in their premises for construction of the pig sty. 23 percent of the farmers have used bamboo with wood and other available materials mud tin etc. The major purpose of pig rearing is meat, there are two phases of pig production: (1) sow farms (breeding and rearing) and (2) fattening farms (growing and finishing). It is clearly observed that in Mizoram, the major concern for farming pig is meat where majority of the respondents' activity opt for meat production and fattening. The farmers gave the opinion that they are not able to purchase the piglets whenever they require. It was found that majority of the farmers opt for the Burmese pigs and the source of stock (piglets) purchase from these street vendors. The data shows that the care practices in

Mizoram are acceptable for survival of the piglets. Though majority of the respondents have pig keeping as part time, it was found that the breeds are quite productive. It can be assumed that if more time is allocated to the care practices, productivity in aspects of farrowing can be at higher level. It has been said that pig keeping is a part of the culture of the Mizos, partial engagement in pig keeping is another reason that attributes to the type of farming in Mizoram. The study finds that there are variances in the duration of rearing pigs.

It was observed that there has been discrepancy in the farming due to engagement in other activities. The study also finds some big farms which are at the nascent stages of development. Most of the farmers use the waste products as manures for crops and vegetation which is shown by the result that 56 percent of the farms claimed to utilise the waste as manure, fertilizers, etc..for the crops. It was also observed that the higher income earners were from the large farms whose efforts were more intensive and have their farming as main occupation. The income made from pig keeping was quite substantial as majority of the respondents have it as a supplementary income earning activity along with other occupation.

Chapter 4

Government's Role in Development of Piggeries in Mizoram

4.1 Introduction

The 11th 5-year Plan of the Planning Commission of India has clearly reported that livestock sector is an important sub-sector of the agriculture in Indian economy. This sector also forms an important livelihood activity for most of the farmers, supporting agriculture in the form of critical inputs, contributing to the health and nutrition of the household, supplementing incomes, offering employment opportunities, and finally being a dependable source of income in times of need. It acts as a supplementary and complementary source of income. Livestock is also important as a part of agriculture diversification and income enhancement. The Government of India is aware of these attributions, thus it gives crucial importance to it. As per 19th Livestock Census, 2012 (GOI, 2014) India's livestock sector is one of the largest in the world with a holding of 11.6% of world livestock population. The total output worth was higher than the value of food grains. Developing schemes and missions, government also pays due importance to the livestock sector since this sector have dominated integral component of India's agricultural and rural economy since time immemorial. Livestock have deep connections to other agriculture products as they possess the ability to supply energy for crop production. The advances in bio-chemical and mechanical technologies, however, have weakened the synergy between livestock and crops. Livestock are now more valued as source of food and contribute over one-fourth to the agricultural gross domestic product and engage about 9 percent of the agricultural labour force. The livestock sector has been growing faster than crop sector; however, in recent years, the growth both in livestock production and productivity has decelerate considerably (Report of the Working Group on Animal Husbandry & Dairying, 12th Five Year Plan, 2012-17)), on addition the Government of India, Ministry of Agriculture Department of Animal Husbandry, Dairying & Fisheries clearly laid

down the National Livestock Policy 2013, for the development of livestock which includes pig production.

4.2 Department of Animal Husbandry, Dairy and Fisheries (Government of India)

Department of Animal Husbandry Dairying & Fisheries (DADF) is one of the departments in the Ministry of Agriculture and came into existence viz., 1st February, 1991, by converting two divisions of the Department of Agriculture and Cooperation namely Animal Husbandry and Dairy Development into a separate Department. The Fisheries Division of the Department of Agriculture and Cooperation and a part of the Ministry of Food Processing Industries were later transferred to this Department w.e.f. 10th October, 1997.

The department is responsible for matters relating to livestock production, preservation, protection from disease and improvement of stocks and dairy development, and also for matters relating to the Delhi Milk Scheme and the National Dairy Development Board. It also looks after all matters pertaining to fishing and fisheries inland and marine.

The department advises state governments/union territories in the formulation of policies and programmes in the field of animal husbandry, dairy development and fisheries. The main thrust areas are:

- a) Development of requisite infrastructure in States/UTs for improving productivity,
- b) Preservation and protection of livestock through provision of health care,
- c) Strengthening of central livestock farms (cattle, sheep and poultry) for development of superior germplasm for distribution to states and,
- d) Expansion of aquaculture in fresh and brackish water, and welfare of fisher-folk etc.

The Department of Animal Husbandry Dairying & Fisheries, Government of India has the following divisions:

- a) National Livestock Mission
- b) Cattle and Dairy Development
- c) Fisheries
- d) International Cooperation
- e) Administration I
- f) Cash Section
- g) Livestock Health
- h) Statistics Divisions

Under the National Livestock Mission(NLM), high importance has been given to piggery and thus Piggery Development-National Guidelines for formulation of State Pig Breeding Policy has been laid down with a proper Piggery Development-Bio security guidelines for piggery. The National Livestock Mission is discussed below.

4.2.1 National Livestock Mission

National Livestock Mission (NLM) is an initiative of the Ministry of Agriculture and Farmers Welfare and has commenced from 2014-15. The Mission was designed to cover all the activities required to ensure quantitative and qualitative improvement in livestock production systems and capacity building of all stakeholders. The Mission cover everything relevant to improvement of livestock productivity and support projects and initiatives required for that purpose subject. This Mission was formulated with the objective of sustainable development of livestock sector, focusing on improving availability of quality feed and fodder.

NLM has 4 sub-missions as follows:

a) The Sub-Mission on Fodder and Feed Development addresses the problems of scarcity of animal feed resources, in order to give a push to the livestock sector making it a

competitive enterprise for India, and also to harness its export potential. The major objective is to reduce the deficit to nil.

b) Sub-Mission on Livestock Development has provisions for productivity enhancement, entrepreneurship development and employment generation (bankable projects), strengthening of infrastructure of state farms with respect to modernization, automation and bio-security, conservation of threatened breeds, minor livestock development, rural slaughter houses, fallen animals and livestock insurance.

c) Sub-Mission on Pig Development in North-Eastern Region: There has been persistent demand from the North Eastern States seeking support for all round development of piggery in the region. For the first time, under NLM a sub-mission on pig development in north-Eastern Region is provided wherein Government of India would support the state piggery farms, and importation of germplasm so that eventually the masses get the benefit as it is linked to livelihood and contributes in providing protein-rich food in 8 states of the NER.

d) Sub-Mission on Skill Development, Technology Transfer and Extension: The extension machinery at field level for livestock activities is very weak. As a result, farmers were not able to adopt the technologies developed by research institutions. The emergence of new technologies and practices require linkages between stakeholders and this sub-mission enable a wider outreach to the farmers. All the states, including NER states could avail the benefits of the multiple components and the flexibility of choosing them under NLM for a sustainable livestock development.

National Bank for Agriculture and Rural Development (NABARD) is the subsidy channelizing agency under Entrepreneurship Development and Employment Generation (EDEG) component of National Livestock Mission. This includes:

- a) Poultry Venture Capital Fund (PVCF)
- b) Integrated Development of Small Ruminants and Rabbit (IDSRR)
- c) Pig Development (PD)
- d) Salvaging and Rearing of Male Buffalo Calves (SRMBC)

4.2.1.1 Sub-Mission on Pig Development in the NER (North Eastern Region)

a) Component (I)- (Strengthening of State Pig Breeding Farms)

There are 60 pig breeding farms in the north eastern states under the Government sector. During a review made in the Department 2011-12, it was learnt that not only these farms are poor in infrastructure in terms of pig sheds and related facilities, their rearing capacity is also quite low and the breeding stock old and deteriorated. Therefore, it was proposed to make a thorough assessment of the pig breeding infrastructure in the Government sector and strengthen their infrastructure so as to enable each one of them to rear a minimum strength of 100 breeding sows. These farms act as multiplication centres and receive their breeding stocks from large farms running a scientific breeding programme, e.g., University Pig Farms, and National Research Centre for Pigs, etc. These farms also conduct training for pig farmers so that scientific pig management practices can be inculcated into progressive farmers.

b) Component (II)- (Import of Germplasm)

Average carcass weight of pigs in the North Eastern Region varies widely from 41 kilos in Assam to 137 kilos in Mizoram. This wide variation reflects the need for genetic upgradation. Since the population which is to be genetically upgraded is large (above 4 million) and the breeding stocks in state pig breeding farms are old and deteriorated, import

of germplasm has become unavoidable. However, import of live animals poses relatively higher risk of ingress of diseases. Therefore, it would be prudent to have a mix of semen, embryos and live animals while importing germplasm. A committee of experts was constituted to assess the requirement of germplasm and to what proportion each form of germplasm, i.e., semen, embryos and live animals are to be imported. For requirement of a single state, the state would follow the advice of the expert committee and import the stock. If more than one state are importing, the Mission Directorate would guide the import process so as to harmonize the requirement and ensure delivery of quality product.

c) Component (III)-(Support to Breeding Programmes)

As has been the experience in the past, import of germplasm with high potential is no guarantee to higher performance unless a proper breeding programme is implemented. Therefore, the sub-mission support breeding programmes to be implemented by selected organizations both in Government and Semi-government sector that provide breeding materials for the multiplication herds either in the Government sector or private entrepreneurs supported under National Mission for Protein Supplements (NMPS). Performance of the animals in such breeding programmes may be analysed scientifically for constant improvement in performance and a proper animal identification and performance recording system to be followed. The operational cost of running the breeding programmes may be supported under the sub-mission. The idea is to create an institutional structure with three tiers where the farmer produces piglets and sells the same, the state breeding farms produce and supply the breeding stock for the farmers, and specialized breeding farms with scientific programmes produce and supply breeding material for the multiplication farms. Once this structure is firmly established, this would create room for further specialized pig breeding operations in the country in which participation of private sector may be expected.

d) Component (IV) - (Propagation of Reproductive Technologies)

There is an acute shortage in the country of quality breeding boars in the North Eastern Region, because of difficult terrain; it is cumbersome and expensive to adopt natural mating with boars of improved quality. Improvement of stock in such circumstances can happen if artificial insemination is adopted as a mainstream programme. Therefore, this component of the sub-mission support training of functionaries in artificial insemination technology; and assist the state government and other multiplication farms in setting up artificial insemination centres. This component also support import of embryos and setting up embryo transfer facilities in organizations implementing a scientific breeding programme to supply breeding stock to the multiplication farms.

e) Component (V) -(Health Cover)

Under this programme, the state government are encouraged to take vaccination programmes to protect the stock against Classical Swine Fever (CSF) and Foot and Mouth Diseases (FMD). Control of parasites of the neonates (Ascaris) also is covered under the programme. For remaining diseases, the state may be encouraged to avail of the assistance available under mainstream schemes of livestock health.

Besides these sub missions- states can avail assistance for pig slaughter house under component “Establishment of Rural Slaughter Houses” of National Livestock Mission implemented by DADF or “Setting / Modernization / Expansion of Abattoirs” of “National Mission on Food Processing” (NMFP) of implemented by Ministry of Food Processing Industries. There is no doubt that the Government has a clear notion of the demand for pork and the other products of swine. The intensity of the demand is ever rising, especially in the North Eastern states where majority of the population are meat eaters. It can be said that pig

is the most important livestock of this region and majority of tribal people consume pork. The NE region holds a sizeable population of pig i.e., around 24 percent of the total pig population of India. It has been estimated that roughly 50 percent of the country's pork is consumed in the North Eastern India alone. One major factor to this could be the religious aspects of the majority of the other mainland India.

4.3 Development of Piggeries at National Level

The Government of India had constituted National Commission on Farmers in 2004 under the chairmanship of Dr. M.S Swaminathan. Based on the recommendations made by the Commission in its Revised Draft National Policy for Farmers and the comments and suggestions received from various stakeholders, the government formulated the "National Policy for Farmers, 2007". The policy, among other things, aims to improve the economic viability of farmers by substantially improving the net income of farmers in addition to improving productivity, profitability, land, water and support services and provide appropriate price policy and risk management measures. The policy also defines livestock rearers amongst other farmers who are actively engaged in the economic and/or livelihood activity of growing crops and producing other primary agricultural commodities. The livestock rearing section was removed from the policy and was further developed and included in "The National Livestock Policy, 2013". This policy has been formulated to have a framework for improving productivity of the livestock sector in a sustainable manner, taking into account the provisions of the National Policy of Farmers, 2007 and the recommendations of the stakeholders, including the States.

4.3.1 The National Livestock Policy 2013

The National Livestock Policy aims at increasing livestock productivity and production in a sustainable manner, while protecting the environment, preserving animal bio-diversity,

ensuring bio-security and farmers' livelihood. The policy focussed on areas which have direct concern areas for piggery are laid down below:

a) Breeding Policy for Pig: This focuses on improving growth, prolificacy, quality and quantity of meat produced, survivability and utilization of low cost locally available feed and management conditions. While efforts continue to conserve some of the meritorious indigenous breeds of pigs in their defined local tracts, crossbreeding with high yielding, disease resistant exotic breeds are encouraged, with maximum 50percent level of exotic germplasm in crossbreeding.

b) Meat : The main emphasis on small ruminants and pigs to improve nutrition, genetics, breeding strategies and health cover to increase prolificacy, carcass weights, and reduce mortality leading to improvement in quality and quantity of meat and skin. Selection of breeding stocks through large scale screening involving farmers flocks are taken as a national programme. The farmers were encouraged to be organized as cooperatives or farmers' producers' organization for better access to inputs and marketing.

c) Feed and Balanced Ration: The main focus here was quality of compound feed which is extremely important for enhancing production and productivity as well as farm economics. Standards for compound feed for various species of livestock were developed, including cattle, buffalo, pigs, sheep, goats and camels and balanced ration with locally available ingredients. Quality of packaged balanced feeds was regulated in accordance with Bureau of Indian Standards (BIS). Use of special feed supplements and area specific mineral mixtures and ration balancing were promoted.

d) Compound Feed and Balanced Ration: The livestock and poultry owners by then were educated about the benefits of quality feed, balanced ration, bypass protein and bypass fat. Feed quality standards were to be strengthened. Quality of packaged balanced feeds was

regulated in accordance with BIS standards. Use of special feed supplements and area specific mineral mixtures and ration balancing were promoted.

e) Meat Production and Processing: The unorganized slaughter some time may cause environmental and public health problems, apart from often being cruel. The slaughter houses, meat production and processing units were located keeping in view environmental, social and logistic requirements. Creation of necessary infrastructure for meat production facilities in rural areas were promoted as forward linkage for animal producers. Integrated modern abattoirs were encouraged taking into account the legal regulatory provisions for production of quality meat, to ensure zero environmental pollution, minimize wastage of byproducts, utilize edible and inedible byproducts, prevent undue cruelty to animals and promotion of use of humane methods of slaughter. Synchronization of the regulatory mechanism for quality meat production with global health standards for domestic consumption as well as for export purposes were adopted.

4.3.2 Institutional Mechanism for Implementation

The states may review and prepare their respective livestock and breeding policies taking into account the National Livestock Policy to suit the local needs. The Department of Animal Husbandry, Dairying and Fisheries provided necessary assistance to states in this regard, if required by the concerned state government. Constitution of National Steering Committee with representatives of the States and UTs, cooperatives, reputed NGO and private sector stake holders to facilitate implementation and operation of the policy, review and advice on changes in policy was made as and when necessary. Expert Committees were constituted to advice on research needs and application of recommendations on various aspects of livestock production, livestock health and control of different diseases, nutrition, management, marketing and mitigation of impact of climate change etc.

4.4 National Bank for Agriculture and Rural Development (NABARD)

NABARD was set up as an apex Development Bank with a mandate for facilitating credit flow for promotion and growth of agriculture, small-scale industries, cottage and village industries, handicrafts and other rural crafts. At the instance of Central Government, Reserve Bank of India (RBI) constituted a committee to review the arrangements for institutional credit for agriculture and rural development (CRAFICARD) on 30 March 1979, under the Chairmanship of Shri B. Sivaraman, former member of Planning Commission, Government of India to review the arrangements for institutional credit for agriculture and rural development. The Committee, in its interim report, submitted on 28 November 1979, felt the need for a new organisational device for providing undivided attention, forceful direction and pointed focus to the credit problems arising out of integrated rural development and recommended the formation of National Bank for Agriculture and Rural Development (NABARD). The Parliament, through Act, 61 of 1981, approved the setting up of NABARD. The bank came into existence on 12 July 1982 by transferring the agricultural credit functions of RBI and refinance functions of the then Agricultural Refinance and Development Corporation (ARDC). NABARD was dedicated to the service of the nation by the late Prime Minister Smt. Indira Gandhi on 05 November 1982. It also has the mandate to support all other allied economic activities in rural areas, promote integrated and sustainable rural development and secure prosperity of rural areas. In discharging its role as a facilitator for rural prosperity NABARD is entrusted with:

- a) Providing refinance to lending institutions in rural areas
- b) Bringing about or promoting institutional development and
- c) Evaluating, monitoring and inspecting the client banks

Besides this pivotal role, NABARD also:

- a) Acts as a coordinator in the operations of rural credit institutions

- b) Extends assistance to the government, the Reserve Bank of India and other organizations in matters relating to rural development
- c) Offers training and research facilities for banks, cooperatives and organizations working in the field of rural development
- d) Helps the state governments in reaching their targets of providing assistance to eligible institutions in agriculture and rural development
- e) Acts as regulator for cooperative banks and Regional Rural Banks (RRB)

4.4.1 Mission

Promoting sustainable and equitable agriculture and rural development through effective credit support, related services, institution building and other innovative initiatives. In pursuing this mission, NABARD focuses its activities on:

Credit functions : involving preparation of potential-linked credit plans annually for all districts of the country for identification of credit potential, monitoring the flow of ground level rural credit, issuing policy and operational guidelines to rural financing institutions and providing credit facilities to eligible institutions under various programmes.

Development functions : concerning reinforcement of the credit functions and making credit more productive.

Supervisory functions : ensuring the proper functioning of cooperative banks and regional rural banks.

4.4.2 Objectives

NABARD was established in as per the Preamble to the Act, "for providing credit for the promotion of agriculture, small scale industries, cottage and village industries, handicrafts and other rural crafts and other allied economic activities in rural areas with a view to promoting IRDP and gaining prosperity of rural areas and for matters associated therewith in incidental thereto".

The main objectives of the NABARD as stated in the statement of objectives while placing the bill before the Lok Sabha were categorized as under :

- a) The National Bank be an apex organisation in respect of all matters relating to policy, planning operational aspects in the field of credit for promotion of Agriculture, Small Scale Industries, Cottage and Village Industries, Handicrafts and other rural crafts and other allied economic activities in rural areas.
- b) The Bank serve as a refinancing institution for institutional credit such as long-term, short-term for the promotion of activities in the rural areas.
- c) The Bank also provide direct lending to any institution as may approved by the Central Government.
- d) The Bank have organic links with the Reserve Bank and maintain a close link within.

4.4.3 Major activities

The major objective includes preparing of potential linked credit plans for identification of exploitable potentials under agriculture and other activities available for development through bank credit. It refinance banks for extending loans for investment and production purpose in rural areas. NABARD provides loans to State Government/Non Government Organizations (NGOs)/Panchayati Raj Institutions (PRIs) for developing rural infrastructure. The main role of NABARD is to extend formal banking services to the unreached rural poor by evolving a supplementary credit delivery strategy in a cost effective manner by promoting Self Help Groups (SHGs) Promoting participatory watershed development for enhancing productivity and profitability of rainfed agriculture in a sustainable manner.

4.4.4 Role and Functions

NABARD is an apex institution accredited with all matters concerning policy, planning and operations in the field of credit for agriculture and other economic activities in rural areas.

- It is an apex refinancing agency for the institutions providing investment and production credit for promoting the various developmental activities in rural areas.
- It takes measures towards institution building for improving absorptive capacity of the credit delivery system, including monitoring, formulation of rehabilitation schemes, restructuring of credit institutions, training of personnel, etc.
- It co-ordinates the rural financing activities of all the institutions engaged in developmental work at the field level and maintains liaison with Government of India, State Governments, Reserve Bank of India and other national level institutions concerned with policy formulation.
- It prepares, on annual basis, rural credit plans for all districts in the country; these plans form the base for annual credit plans of all rural financial institutions.
- It undertakes monitoring and evaluation of projects refinanced by it.
- It promotes research in the fields of rural banking, agriculture and rural development

4.4.5 Central Sector Scheme on “Pig Development”

Pigs are generally reared by the poorest of the rural population. These animals have wide adaptability to suit different agro-climatic conditions and thus, its rearing can play an important role in improving socio-economic status of weaker sections. Pig farming as a commercial venture is yet to be adopted in the country. Those attracted by its potential face constraints like insufficient good quality stock, non-availability of balanced feed at economic prices and absence of organized markets. There are few licensed pig slaughter houses in the country and most of the slaughter in rural/urban areas is done in a clandestine manner.

Keeping this in view, it has been decided by Government of India to launch a Central sector scheme on “Pig Development” with a total outlay of Rs.73.55 crore during the remaining XI Five Year Plan period (2010-11 & 2011-12). The scheme aims at encouraging commercial

pig rearing by farmers to improve performance of native breed through cross breeding. The scheme has following four components :

(i) Pig Breeding Farm : Under this component 25 percent of the outlay (33 and 1/3 percent in NE States including Sikkim and hilly areas) as back ended capital subsidy would be provided for rearing of 20 sows and 4 boars subject to a ceiling of Rs.1.50 lakh per unit (Rs.2.00 lakh in NE States including Sikkim and hilly areas) for which an indicative unit cost of Rs.6.00 lakh has been provided.

(ii) Pig rearing and Fattening Unit : Under this component 25 percent of the outlay (33 and 1/3 percent in NE States including Sikkim and hilly areas) as back ended capital subsidy would be provided for rearing of 3 sows and 1 boar subject to a ceiling of Rs.19,000/- per unit (Rs.25,300/- in NE States including Sikkim and hilly areas) for which an indicative unit cost of Rs.0.76 lakh would be provided.

(iii) Retail Outlets : Under this component 25 percent of the outlay (33 and 1/3 percent in NE States including Sikkim and hilly areas) as back ended capital subsidy would be provided for establishment of a retail outlet subject to a ceiling of Rs.2.50 lakh per unit (Rs.3.33 lakh in NE States including Sikkim and hilly areas). Loan can be sanctioned with an indicative unit cost of Rs.10.00 lakh per unit.

(iv) Facilities for Live markets : Under this component 50 percent of the outlay as back ended and capital subsidy would be provided for creating facilities for live markets subject to a ceiling of Rs.2.50 lakh per unit.

The Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India, is the focal department for operating the scheme. NABARD is administering the capital subsidy and monitoring the progress of the scheme besides providing refinance support to the eligible financing institutions for the term loan extended under the scheme. The extent and interest rate on refinance is as per instructions issued by

NABARD from time to time. The implementation of the scheme shall is monitored by the Central Monitoring Committee (CMC) on a half yearly basis at National level. The State Level Sanctioning and Monitoring Committee (SLSMC) already constituted for implementation of other Government Sponsored Schemes of Animal Husbandry Sector sanctions capital subsidy for the projects and review the progress on a quarterly basis at the State level. NABARD releases capital subsidy subject to availability of funds from Government of India. The Animal Husbandry Department may also be approached for popularising the scheme and mobilising applications from prospective promoters.

Table 4.1 Yearly fund released by NABARD in Mizoram (Amount in Rs.)

	2011-12	2012-13	2013-14	2014- 15	2015-16	2016-17
Pig breeding	58,00,000	42,19,960	NA	188,84,500	NA	NA
Pig rearing	81,86,000	36,73,550	NA	171,97,390	NA	NA

Source : NABARD Mizoram May(2017)

In Mizoram, according to the interview with the officials of NABARD office, Aizawl Branch, who stated that about 90 percent majority of the funds are being released through the Mizoram Co-Operative Apex Bank and the Mizoram Rural Bank. From Table 4.1 it can be observed that lots of activities are carried out in favour of the development of the pig production and development in Mizoram.

NABARD had laid down certain guidelines for the implementation of central sector scheme on pig development. Pig farming as a commercial venture is yet to be adopted in the country. Those attracted by its potential face constraints like insufficient high quality stock, non-availability of balanced feed at economical prices and absence of organized markets. Licensed pig slaughter houses are few in number and most of slaughter in rural / urban areas is done in clandestine manner. The meat reaches consumers without passing through any organized market and if these constraints can be removed, then pig farming has the potential to yield significant economic and social gains.

Objectives of the Scheme

NABARD encourages commercial pig rearing by farmers/labourers to improve production performance of native breed through cross breeding by using selected animals of high performing breeds and by providing incentives in terms of capital subsidy for ensuring the viability of the pig breeding, rearing and related activities.

The scheme was implemented during the remaining XI plan period (2010-11 & 2011-12) throughout the country. However the proposals received from other than these districts/ States can also be considered for providing subsidy assistance under the scheme. All producing companies, partnership firms, corporations, NGOs, SHGs, JLGs (Joint Liability Group), cooperatives and individual entrepreneurs are eligible for the scheme.

4.5 Animal Husbandry and Veterinary Department, Government of Mizoram

The Department of Animal Husbandry and Veterinary(AH& Vety Dept) is one of the oldest and most potential Departments of the Government of Mizoram. On May 1890, it became a fully fledged Government office of the Deputy Commissioners, started functioning in Mizoram which was manned by Captain Brown. All the Government services except Civil Surgeon and Commandant and Assam Rifles were under the direct control and supervision of the District Commissioner. In regards to Veterinary and Animal Husbandry services, Dr. Khumi Angami was the first Veterinary Doctor to join in Mizoram. He was attached to D.C. office North Block in October 1917. After a year and some month, he was replaced by Dr. Hucha Savino Angami who remained in Mizoram for five and half years. In 1920, the first Veterinary Dispensary building and Doctor's quarter were constructed at the site of the present Presbyterian Church at Chhing Veng, Aizawl. The first Mizo appointee under AH & Vey Department was Mr. Tuahsanga who was appointed as grade IV during 1920. He worked in this capacity with the only Veterinary Doctor H.S. Angami.

The department is one of the major contributors in the state economic development with a significant share in state gross domestic product. The Department of Animal Husbandry and Veterinary is entrusted with the responsibility of all aspect of livestock and poultry Development, like, production, processing and marketing of livestock and poultry and their products through augmentation of production of milk, meat, eggs and wool. Animal health care service and prevention of animal diseases is a priority for maintenance of a healthy stock for optimum production. Creation of suitable infrastructure for breeding, feeding and management of livestock and poultry, processing of milk, meat and eggs and marketing of livestock and livestock products is also given due importance. Besides, the Department is engaged in providing the required training and extension support to livestock producers so as to promote scientific rearing of livestock and poultry amongst them with consequent generation of employment avenues in the rural areas.

To bring about a developmental change in livestock and poultry sector, a number of programmes and infrastructure development were undertaken by the Government where the activities of the Department were mainly centered round the following broad objectives:-

1. Providing protection to livestock and poultry from the ravages of diseases through treatments and preventive vaccinations.
2. Introducing improved breeding techniques for upgrading the local stock.
3. Ensuring better animal husbandry practices through adoption of extension and research.
4. Building up of adequate technical and professional man-power through education and training.
5. Encouraging setting of livestock and poultry industries.

The department has taken several initiatives for improving the status of livestock farming in the state. In order to achieve its objectives, the New Land Use Policy had also made a co-operative efforts along with the department to offer the beneficiaries to opt for different trade under the AH & Vety sector. The project had also made financial as well as physical assistance to the beneficiaries for effectively and profitably carrying out the trade. During the fourth quarter of the project, a total of two hundred and twenty one beneficiaries involved in dairy farming, cattle farming, poultry farming and piggery were directly interviewed to assess the trade performance and its impacts in improving their standard of living.

4.6 New Land Use Policy (NLUP) of Mizoram

The Government of India has funded the NLUP, a project of the Government of Mizoram. The NLUP had decided to assist its beneficiaries with the sum of rupees one lakh in order to increase pork meat production within the state. With the financial assistance, it was claimed that hundred percent of the beneficiaries conveyed having prepared or repaired the furrowing pen for the pigs. Electrification was also provided for the shelter for the animals. The financial assistance for preparation of grazing grounds and land development for fodder cultivation was also provided by the project but such activities had not been undertaken by cent percent of the beneficiaries. This may be due to the fact that the supply of such foddors were not limited with the beneficiaries as they used to collect such foddors from the jungle and used to feed their piglets and their kitchen waste. However, the beneficiaries assured that such activities would have to be undertaken shortly for the purpose of kitchen gardening to support the vegetable demand of their family. The beneficiaries were also assisted financially for purchasing two female piglets and three male piglets. All the beneficiaries had made full use of the fund received for the purchase of such piglets.

4.6.1 History NLUP in Mizoram

The mainly agrarian Mizo population has an age-old practice of farming by which each family would clear a patch of jungle by cutting down whatever is growing in that patch and later burning whatever has been cut down after they have dried on the ground. The ashes left behind thus become the fertilizer and this cleared and burnt patch of land is used for the cultivation of the main staple rice and other subsidiary crops such as tobacco, cotton, chilli and vegetables.

The problem with this slash and burn method of farming, also called *jhum* cultivation or *jhumming*, is that once the produce are harvested, the land becomes barren and cannot be reused until a decade or so has passed. So a new patch of land has to be cleared and burnt year after year. This type of farming system is not only destructive for the environment, but also highly unprofitable and labour consuming - as one can barely harvest a year's supply of crops for one's use. As a result of this and the growing population, Mizoram's lands have slowly lost their fertility and wooded areas over the decades to an alarming degree. This resulted in drying up of springs and rivers and depletion of underground water reserves and loss of precious fertile top soil.

It was not as if there had been no attempt to control land use in Mizoram. The Government of India first initiated such a move during the 1st Five Year Plan (1951-56). The Village Council Act of 1953, through which Village Councils were given wide ranging powers for the management of land, was the first empowerment of a local Government for land management in Mizoram. Then there came the Lushai Hills District (Jhumming) Regulation Act of 1954. Post 1972, after Mizoram was accorded the status of Union Territory, the various Mizoram Government had tried to control the prevailing traditional jhum cultivation until 1984 when the idea of a New Land Use Policy was conceived by the then Congress ministry.

4.6.2 Main aims and objectives of NLUP

The NLUP, in its final shape and structure, is a versatile and encompassing mechanism for a stable state economy, environment protection and land reforms and reclamation. The broad and primary aims and objectives are as follows:

Provide sustainable income to farming families who comprise nearly three-fourths of the total population of Mizoram by weaning them away from the destructive and unprofitable shifting cultivation practice

- Provide urban poor with livelihoods by encouraging small scale industries and petty trades
- Converging schemes funded by the Government of India (Centrally Sponsored Schemes) to NLUP for better utilization of funds and avoidance of duplication of works
- Land reclamation and forestation by introducing permanent farming systems and land reforms
- Environment protection and restoration through various means such as expansion of rain catchment areas for recharging rivers, springs and underground water, encouraging rearing of domestic animals and poultry for increased meat production to discourage hunting to protect the fauna etc.

4.6.3: Ultimate Objective

The ultimate objective of the NLUP is a happy, self sufficient and prosperous population living in a healthy natural environment where both humans and the animal kingdom live side by side without infringing on each others' area thus providing a rich and buoyant bio-

diversity and at the same time contributing towards the fight against global warming. One among the long-term objectives worth mentioning is Mizoram becoming eligible for carbon financing under the Clean Development Mechanism of the Kyoto Protocol. Initiatives are being taken to link up with Government of India's Green Programme to reach this objective.

4.6.4 Funding of NLUP

When first conceived, NLUP beneficiaries were to receive a sum of Rs 1,00,000/-, and if necessary more, as a start up for commencement of a sustainable form of livelihood from one-time sanction of funds from the Government of India. When the Government of India was first approached with a detailed project report in 2009, it was realized that with a few modifications and reshaping of the DPR, the NLUP could be a pilot project that, if implemented successfully in Mizoram, could be introduced as a centrally sponsored Government of India scheme in other states too.

As a result of this, a new and improved DPR was prepared by the NIB with the Mizoram State Planning Board playing a crucial part in the preparation. It took more than 10 months and not less than 16 meetings at the highest Government of India levels for the new DPR to be approved by the Cabinet Committee on Economic Affairs (CCEA). Finally, the CCEA, chaired by the Prime Minister, in its meeting held in August 2010 approved a total outlay of Rs 2,873.13 crores for the NLUP Project for five years.

Out of this total outlay, the Central Government would provide Rs. 2,526.98 crores while the remaining amount of Rs. 346.15 crores would come from the beneficiaries as their contribution. The beneficiaries, however, were not expected to give their contribution in monetary form, but in the form of physical labour that would be put in by them to make their trades successful. The funds from the Central Government would constitute funds through

Centrally Sponsored Schemes (about 35 percent of the total outlay) and Additional Central Assistance to States.

The NLUP funds would be incorporated into the annual budget of the Government of Mizoram and credited into the account of the State Exchequer. After approval from the State Planning Board and State Finance Department, the funds would finally be credited into the NIB account from which line departments would be given their share of the funds for disbursement to the beneficiaries or expenses for infrastructure development under the Infrastructure Component.

With the sanction of Rs 234.82 crores from Additional Central Assistance for the first year of the implementation of the NLUP Project 2010 - 11, the NLUP Project was officially launched by the Chief Minister of Mizoram on January 14, 2011 and since then, the Government of Mizoram has decided to commemorate January 14 as “*Kuthnathawktute Ni*” or Farmers’ Day each year.

4.6.5 Implementation Process of the NLUP

4.6.5.1 NLUP Boards and Committees

Though a joint Central and State Government project, the implementation of NLUP is directly under the control of the NLUP Implementing Board (NIB). The NIB is a Government society endowed with wide ranging financial autonomy and instituted solely for the purpose of the NLUP project which is in direct contact with the participating Government Departments. The NIB, however, has to get approval for any decision it makes from the NLUP Apex Board headed by the Chief Minister. As a result, there are two State-level bodies that control the project – apart from the State Government which controls the fund flow between the Government of India and the NIB – The New Land Use Policy Apex Board and

The New Land Use Policy Implementing Board. Under these State boards, District Implementing Committees under the Deputy Commissioners/District Collectors are formed in the eight districts of Mizoram. Each village under these districts again has a NLUP Village Implementing Committee headed by the Village Council President. These NLUP Village Committees are primarily responsible for selecting beneficiaries and facilitating Government officials in distributing funds to the beneficiaries.

4.6.5.2 Beneficiary families

To implement the project, the first task was to select the eligible families from the two-lakh plus families of the State. The services of the Young Mizo Association and the Mizoram University were obtained for this purpose and more than 1,65,000 families were selected as eligible families from an eligibility criteria drawn up by the NIB. Those families with regular and sufficient income from the Government and public or private sectors were ineligible to become beneficiaries as well as those families running businesses or having steady income from other sources. Because of limitations to the funding, a final tally of 1,20,000 beneficiary families were selected from the total eligible families to be covered in three phases.

4.6.5.3 Participant Departments and Trades

Since NLUP is a project primarily to provide sustainable form of livelihood to beneficiaries, a trade needs to be selected for such livelihood and each beneficiary family is allotted one trade from their choice of a Participant Department. Most of these trades can be found in the agriculture and allied fields for the rural population as a result of which the Agriculture, Horticulture, Fishery, Soil & Water Conservation, A H & Veterinary, Sericulture and Environment & Forests departments were selected to become participating departments or line-departments as they are called by the NIB. For those beneficiaries located in urban areas, the Industries department was selected as another line-department, bringing the total of line-

departments to eight. The following are the number of trades available for selection by beneficiary families in a department –

1. Agriculture Department - 4 (four) trades
2. Horticulture Department - 9 (nine) trades
3. Sericulture Department - 1 (one) trade
4. Fishery Department - 1 (one) trade
5. Environment & Forests Department - 1 (one) trade
6. Soil & Water Conservation Department - 3 (three) trades
7. AH & Veterinary Department - 4 (four) trades
8. Industry Department - 30 (thirty) trades

Progress and achievements under the AH & Veterinary Department

Animal Husbandry and Veterinary Department is one of the implementing Department of New Land Use Policy. The main objective of NLUP in respect of Animal Husbandry & Veterinary Department is to create sustainable livelihood through introduction of improved technology and improved breed of livestock and poultry. Reports of achievements have been experienced by the respondents. The physical and financial target and achievement may be summarized as below:

Table 4.2 Physical and Financial Target and achievement of NLUP

Sl. No.	Phase wise operation	Physical		Financial (Rs.in Lakhs)	
		Target	Achievement	Target	Achievement
1	Phase 1	5,200	9,923	9,090.63	9,092.63
2	Phase 2	4,500	12,879	1,3122.1	8,008.68
3	Phase 3	9,536	9,536	9,701.1	953.6
4	Phase 4	4,709	4,709	4,796.1	470.9
Total		23,945	37,047	36,709.93	18,525.81

Source : Economic Survey Mizoram 2014- 15

The above table 4.2 shows the physical and financial targets and achievements of NLUP in Mizoram. It shows that the expected number of beneficiaries on completion of the project is

37,047. The financial achievement in phase 2,3and 4 are less than the target shown in the table. This implies that some of the projects are still going during the time of the Economic survey.

The expected number of beneficiaries on completion of NLUP is 37047.

Table 4.3 Trades under Animal Husbandry and Veterinary sector in NLUP

Sl. No.	Trades	Phase			
		1st Phase	2nd Phase	3rd Phase	4th Phase
1	Dairy Farming	949	374	254	134
2	Piggery Farming	5,330	7,006	5,453	2,753
3	Mithun Farming	1,856	1,141	603	327
4	Poultry Farming	1,788	4,358	3,226	1,495
Total		9,923	12,879	9,536	4,709

Source: Economic Survey Mizoram 2015- 16

This Department, with a total cumulative allocation target of 9,919 beneficiary families for the years 2010-11 and 2011-12, successfully reached it's target with an expenditure of Rs 6,179.40 lakhs. Another Rs. 442.00 lakhs was expended by this Department under the Infrastructure Component. The above table shows that here are currently 20,382 NLUP beneficiaries under the piggery trade as on 17th March 2017. The number of these beneficiaries keeps changing because of some elimination and re-inclusion of some applicants who once were not in the list, some of these attributes as discussed by the departments' official was referring to political involvements in the operational level.

4.7 Cooperation Department, Government of Mizoram

The first cooperative named "The Aizawl Trading Cooperative Society Ltd." was registered in 1949 in Assam and the first Cooperative Sub-Divisional Office was established in 1951 at Aizawl which was upgraded as a District Office on 3.1.1956.

After attaining the status of Union Territory in 1972 and consequently, full pledged statehood in 1986, more new Civil Administrative Districts have also been commissioned so that developmental works can be done more effectively. With the commissioning of new Administrative District, the Department of Cooperation also opened one new District Offices at Serchhip in addition to Aizawl East, Aizawl West, Lunglei, Saiha, Champhai and Kolasib District Office.

After 52 years of Cooperative Movement in the State, there are at present 1,369 functioning Cooperative Societies including 11 (eleven) State Level Cooperative Societies in various categories. In order to make the Cooperative Movement in Mizoram more effective, the Mizoram Cooperative Societies Act, 2006 was prepared in line with the then Mizoram Cooperative Societies Rules.

With the adoption of Cooperation as an instruments of economic planning and as the cooperative activities has been emerging in the mind of rural and urban poor in the changed scenario of National Policy and with the economic liberalization of trades and industries with fiscal reforms and infusions of new technology, processing industries and allied activities, the cooperative movement in Mizoram has been trying its level best to make much headways and to bring socio-economic progresses and activities under the fold of Cooperative Movement with a view to save weaker sections. The Mizoram Cooperative Societies Act, 2012 was made and came into force w.e.f. 9.16.2013.

In order to provide legal protection to the common interest of Cooperative members and functioning Cooperative Institutions under the Mizoram Cooperative Societies Act, 2006, the Registrar of Cooperative Societies of Mizoram has been assigned a vital role of supervision of the working of all the registered cooperative societies in the whole State of Mizoram.

4.7.1 Piggery Cooperative Societies in Mizoram

Likewise in 1989 the Mizoram Pig Producers' Cooperative Federation (PIGFED) Ltd. and was registered under Cooperative Act on 6th June 1989. Currently there are 118 numbers of Primary Pig Producers' Cooperative Societies affiliated under the Federation. The main objective of the Federation is to promote and facilitate the operation of the Primary Pig Producers' Cooperative Societies affiliated to it. PIGFED coordinates their activities so as to improve their economic conditions by implementing scientific way of pig rearing. The Federation has its Head Office at Republic Vengthlang, Aizawl, Mizoram. The structure and organization of the Federation is as follows:

a) **Annual General Assembly:** This meeting is normally held once in a year is vested with the power to have supreme authority of the Federation subject to the Act, rules and bye-laws which are in force. The purview of the Annual General Meeting are listed in sub section 1 to sub section 11 of section 12 of the PIGFED bye-law which can be obtained from head office.

b) **Board of Directors :** Headed by Chairman, the board of directors is elected in the Annual General Assembly. The Board of Directors consists of 9 members elected from the member society, six (6) members nominated by the State Government, one nominated member representing financial institution and the Managing Director of the Federation as ex-officio member. The Board of Directors is acquainted with the power to decide the policies of the Federation. Powers, responsibilities and function of Board of Directors are given in PIGFED Bye-law Section 19.0 to Section 22.0

c) **Chairman :** The Chairman is vested with a power to have overall control supervision on the administration, business and general affairs of the Federation and to preside over the meeting of General Body and Board of Directors. The detailed functions of Chairman can be seen in the PIGFED bye-law sub section 1 of Section 22.

Powers & Duties of Officers and employees :

a) Managing Director : The Managing Director is appointed by State Government with the approval of Board of Directors. The Managing Director is vested with the power to have general control over the administration, management, finance and business of the Federation. Detailed duties and responsibilities can be seen in Sub section 1 to Sub Section 2.18 of section 23 of the PIGFED bye-law.

b) Manager, Feed Division : Manager, Feed Division look after the day to day working of the Feed Plant, sourcing of feed ingredients, feed storage, feed formulation and manufacturing of pig feed. The Manager is responsible to maintain quality of feed produce and to ensure continuous availability of pig feed. The Manager is also responsible for maintaining stock register of feed ingredients and finished feeds.

c) Manager, Farm Division : The manager is responsible to look after the day to day management of Base Pig Breeding Farm, Thenzawl. The Manager is responsible to keep animal stock register, feed register, death register, animal sale register and individual animal record. The entire farm establishment is look after by the Manager

d) L.D.C: Under the supervision of Managing Director the clerical staff deals with the works and file allotted to them. They are in charge of maintaining all records such as office order, memorandum and important documents. They are also responsible for keeping stock register, sale register, asset register, individual society records etc.

e) Peon/ Chowkidar :The Chowkidar is responsible for guarding the office equipments, furniture and other properties, and is also responsible for guarding the feed godown, and sale outlet. Peon is responsible for attending and responds the duties required by the Management from time to time.

All matters requiring decisions regarding policies and direction of the federation are initiated by the dealing assistant and put up to Managing Director and the Managing Director convene the meeting of Board of Directors. All matters requiring decisions by the general body meeting are placed in the annual general assembly by the board of directors. All these decision are taken, taking into account Act, Rules & Regulation, and Bye-laws which are in force.

The PIGFED is bound by Mizoram Cooperative societies Act, 1991 and Rules, 1996 and Bye-laws of the Federation which predetermined time frame and procedure for execution of works and disposal of file by all concerned staff and officers.

Apart from Acts, Rules, Regulation and Bye-laws the PIGFED has it own service rules, maintenance of the following documents are also carried out by the staff:

- a) Proceedings of Annual General Assembly;
- b) Declaration of Election Officer with regard to election to Board of Directors;
- c) Annual Report;
- d) Beneficiary list and register for GIA;
- e) Share holder list;
- f) Asset register;
- g) Stock register for animal and feed;
- h) Sale register for animal and feed;
- i) Minutes of the PIGFED Board of Directors.

The composition of Board of Directors reveals all the information contained in the minutes of the meeting of Board of Directors is likely to conflict with the public interest, only those matters that not likely conflict with the larger public interest are circulated to all primary societies. A monthly remuneration received by it of its officers and employees, including the

system of compensation are provided in its regulations. All subsidy programme are executed after the budget is approved by Annual General Body meeting by involving primary cooperative societies.

Details in respect of information, available to or held by it reduce in electronic form:

a) Base Pig Breeding Farm, Thenzawl foundation laying programme.

b) Commissioning of Base Pig Breeding Farm.

c) Proceedings of Annual General Assembly.

d) Entrepreneurship Training.

The position of PIGFED during the past six years years is like the following table.

Table 4.4 Financial Position of PIGFED 2011- 2015

		2011-12	2012-13	2013-14	2014-15
1	Paid up share capital:				
	a) Government	12,25,000	12,25,000	NA	Rs. 12,25,000
	b) Cooperative Societies	5,93,550	6,27,550	Rs. 6,83,550	Rs. 7,72,550
2	No. of affiliated Coop. Societies	NA	NA	158	164
3	Business Turnover	47,89,405	52,49,270	Rs. 76,22,551	Rs.109,92,816
4	Operating Profit/Loss	Rs.22,57,499 (N/Loss)	Rs.4,43,195 (N/Loss)	Rs. 3,26,387 (N/Loss)	Rs.4,50,943 (N/Loss)
5	Accumulated Profit	60,18,760	55,75,564	Rs. 51,24,621	Rs.47,98,233
6	Audit Classification	'C' Class	'C' Class	'C' Class	'C' Class

Source: Economic survey 2014- 15

The above table shows that the paid up capital share for the cooperatives has increased to Rs. 7,72,550 in 2015-15 from Rs. 5,93,550 in 2011-12. The table also shows that the business turnover has increased to Rs. 10,992,818 in 2014- 15 from Rs. 47,89,405 in in 2011- 12. The net loss of the cooperative is reduced to Rs.4,50,943 in 2014-15 from Rs. 22,57,499 in 2011-12. PIGFED was registered on the 6th June, 1989 and is now comprises of 154 Primary

Piggery Cooperative Societies. The process for strengthening the piggery development programme rests with PIGFED and is now running a pig breeding farm at Thenzawl which produces quality and high breed types of piglet. The average profit earned has been recorded to be Rs.49,61,427 and business turnover of around Rs. 93,07,683 annually over these years.

Table 4.5 Number of Piggery Societies in Mizoram

Sl. No	Year	No. of Societies	No. of members	Paid up Share Capital (Rs. In lakh)	Business turnover (Rs. In lakh)	No. of societies running on profit
1	2007-08	NA	NA	6.27	9.48	NA
2	2008-09	NA	NA	NA	NA	NA
3	2009-10	227	5,896	NA	NA	NA
5	2010-11	228	4,141	11.11	6499	129
6	2011-12	244	6,140	42.26	81.73	134
7	2012-13	242	5,545	53.95	103.04	150
8	2013-14	NA	NA	NA	NA	NA
9	2014-15	244	6,140	53.95	103.04	150

Source: Cooperatoin Department Mizoram

The main objectives of PIGFED Ltd. are promoting and facilitation for operation of primary Pig Producers' Cooperative Societies affiliated to it by coordinating their activities and supplying requisite inputs and technical guidance for scientific pig rearing by their members and undertaking processing and marketing of pork and other piggery products. The present paid up share capital of the Federation stood at Rs. 53.9 lakhs. The business turnover have rose from Rs. 9.48 lakhs in 2007 to Rs. 103.04 lakhs in 2015 with revenue making societies of around 150 societies. This show that there has been a rising trend in the development of piggery societies which stands for the development of the piggery industry.

Table 4.6 Retail and wholsale Price of Pork (Base Year: 1999-2000=100)

	Unit	2006 - 07	2007 - 08	2008 - 09	2009 - 10	2010- 11	2011 -12	2012 - 13	2013- 14	2014 -15
Retail price	Kg	102.5	122	145	158	162.1	174	189	210	244
Wholsale price	Qtls.	8000	12250	14000	14333	16200	19000	22400	25000	NA

Source: Economic Survey Mizoram 2014-15

Retail Price indicates price which the consumer pays when buying pork from butchers and retailer as processed meat. Movement of retail prices of pork purchased by the people shows a more or less upward trend thereby causing a higher cost of income and living. However, the current price of the fresh pork in Mizoram is Rs. 250 per kg as of Dec 2016 . There has been a constant rise in the price of the pork and other pig products in Mizoram.

Table 4.7 Status of the respondents availing and not availing Government aids

Govt aid Status		District			Total
		Aizawl	Lunglei	Kolasib	
Availed	Count	27	34	23	88
	% within Sample	32.1%	40.5%	31.4%	100.0%
	% within District	13.8%	17.1%	13.6%	14.9%
Not applied	Count	164	155	171	490
	% within sample	33.5%	31.6%	34.9%	100.0%
	% within District	84.1%	77.9%	85.9%	82.6%
Applied but not receive	Count	4	10	1	15
	% within sample	26.7%	66.7%	6.7%	100.0%
	% within District	2.1%	5.0%	0.5%	2.5%
Total	Count	195	199	199	593
	% within sample	32.9%	33.6%	33.6%	100.0%
	% within District	100.0%	100.0%	100.0%	100.0%

Source: Sample survey

The survey sample shows that there are 82.6 percent among the sample respondents have not applied and are mostly not concerned with the Governmental aids. Under this category there are 34.9 percent (171 respondents) from Kolasib, 33.5 percent from Aizawl and 31.6 percent from Lunglei as well. This can be assumed that majority of the sample respondents have been doing for household activity and are not aiming for commercial production. The study also shows that there are 14.9 percent of the respondents have applied and avail Governmental aids which are mostly NLUP and a little portion were of the NABARD piggery schemes. Among those, Lunglei has the highest respondents (40 percent) followed by Aizawl and Kolasib districts by 32.1 percent and 31.4 percent respectively. And finally there are 2.5 percent who have applied but has not receive the aids. The major factor to the high rate of the

ondifferent to the Governmental aids in the field of piggery could have been attributed to the fact that these farmers are practicing pig keeping for the sake of tradition and extra earnings.

Table 4.8 Opinion on Conduciveness of Pig Allied Policies of the Government

Responses		District			Total
		Aizawl	Lunglei	Kolasib	
Satisfied	Count	44	95	33	172
	% Within sample	25.6%	55.2%	19.2%	100.0%
	% Within District	22.6%	47.7%	16.6%	29.0%
Not satisfied	Count	23	5	1	29
	% Within sample	79.3%	17.2%	3.4%	100.0%
	% Within District	11.8%	2.5%	0.5%	4.9%
Others	Count	128	99	165	392
	% Within sample	32.7%	25.3%	42.1%	100.0%
	% Within District	65.6%	49.7%	82.9%	66.1%
Total	Count	195	199	199	593
	% Within sample	32.9%	33.6%	33.6%	100.0%
	% Within District	100.0%	100.0%	100.0%	100.0%

Source: Sample Survey

The study sample shows that majority of the respondents were satisfied with the schemes that were available to them represented by 95 respondents from Lunglei district, 44 respondents from Aizawl and 33 respondents from Kolasib. But on the other hand, not all the respondents have thought on the availability of the policies and schemes available in the state. These portions of the respondents were quite high 66.1 percent (392 respondents), where Kolasib district comprise 165 respondents, Aizawl 128 respondents and 99 respondents at Lunglei. The sample also shows that there are minimal percentage of the respondents (4.9 percent) were not satisfied on the services of the government.

The following table 4.9 shows the tabulation of the status of the respondents in relation to the membership of piggery allied societies. The data shows that there are only 29.5 percent of the respondents have registered to the allied piggery societies, leaving behind 70.5 percent

respondents who have not engaged themselves to such memberships. The members of these societies have claimed to avail some subsidies in the feeds at times. Aizawl and Lunglei districts have 44 percent and 41.1 percent respondents and Kolasib district with 14.9 percent who claims to have acquired memberships in the piggery societies. These respondents have also disclosed their problems in acquiring feeds as per their requirements, and they try find solutions on their own.

4.8 Testing of Hypothesis 2

Hypothesis 2

The pig farming policies of the government is not significantly conducive in the select districts of Mizoram.

Analysis:

The cross tabulation table 4.9 brings together all two variables and displays the relationship between them in a single table. Every column in the crosstab corresponds to a category of the independent variable, and each row corresponds to a category in the dependent variable. Hence, the dependent variable goes on the left, and the independent variable goes on the top. Each cell represents a unique combination of categories from each of the variables. For example, in the table above, 44 represents the respondents who are in the category who finds pig farming policies conducive towards growth and respondents from select district.

Table 4.9 Crosstabulation of Pig Farming Policies and Responses In Select Districts of Mizoram

District		Do you find the Pig Farming Policies helpful?		Total
		Yes	No	
Aizawl	Count	44	23	67
	% within District	65.70%	34.30%	100.00%
Lunglei	Count	95	5	100
	% within District	95.00%	5.00%	100.00%
Kolasib	Count	33	1	34
	% within District	97.10%	2.90%	100.00%
Total	Count	172	29	201
	% within District	85.60%	14.40%	100.00%

Source: Sample survey

The table shows that majority of the respondents are from category who feels that government policies are helpful for pig farming as denoted by 44 respondents (65.70 percent) in Aizawl district, 95 respondents (95.00 percent) in Lunglei district and 33 respondents (97.10 percent) in Kolasib district respectively. Overall from the three select districts, the category of farmers who feels that government policies are helpful consist of 172 out of total 201 respondents comprising of 85.60 percent.

Table 4.10 Chi-Square Tests of Pig Farming Policies and Responses in Select Districts of Mizoram

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.324 ^a	2	0.000
Likelihood Ratio	30.974	2	0.000
Linear-by-Linear Association	25.057	1	0.000
N of Valid Cases	201		

Source: Sample survey

From the table 4.10 it can be seen that Pearson Chi-square is equal to 32.324 at 2 degrees of freedom, where p value is 0.000 and is less than the alpha value of 0.05. Since the p value is less than 0.05, the null hypothesis is rejected. It means that there is statistically significant that government policies are conducive for pig farming in the three select districts under study. The research hypothesis that the pig farming policies of the government is not significantly conducive in the select districts of Mizoram is rejected.

Table 4.10(a) Symmetric Measures

	Value	Approx. Sig.
Cramer's V	0.401	0.000
N of Valid Cases	201	

Source: Sample survey

Phi and Cramer's V are both tests of the strength of association or test of effectiveness of the variables. Since the crosstab involves a nominal variable and an ordinal variable, the appropriate measure of association is Cramer's V. The calculated value from Cramer's V

is found to be 0.401 and using the standards that between 0.3 to 0.5 is high effect, it can be concluded that the effect size on the variables is highly effective. From the above table, it can be seen that the strength of effectiveness between the variables is very strong as represented by 40 percent.

Table 4.11 Membership status of Pig Farming Society

Membership Status		District			Total
		Aizawl	Lunglei	Kolasib	
Yes	Count	77	72	26	175
	% Within Sample	44.0%	41.1%	14.9%	100.0%
	% Within District	39.5%	36.2%	13.1%	29.5%
No	Count	118	127	173	418
	% Within Sample	28.2%	30.4%	41.4%	100.0%
	% Within District	60.5%	63.8%	86.9%	70.5%
Total	Count	195	199	199	593
	% Within Sample	32.9%	33.6%	33.6%	100.0%
	% Within District	100.0%	100.0%	100.0%	100.0%

Source: Sample Survey

The Department of Cooperation Mizoram in fulfilling one of their objective, “to promote co-operative farming in agriculture, horticulture and allied activities like piggery, dairy, poultry, fishery, sericulture etc.” have released the budgeted amount per year as 81 percent in 2012-13, 83 percent in 2013-14, 85 percent in 2014-15, 87 percent in 2015-2016 respectively for the promotion of Cooperatives Societies in sector like agriculture, horticulture and allied activities as per the report of the same department. In 2014-15, this also shows a positive effort at the department level, claiming that the government has played a vital role in the respective department for the development of piggery and the like industries. Several number of relative provisions were developed and enacted to enhance the growth of piggery in the state and in the national level.

4.9 Testing of Hypothesis 4

Hypothesis 4 : There is no significant association between joining of collective associations and income from pig farming in the select districts of Mizoram.

Analysis :

The above hypothesis is tested through a layered chi square test to assess the association between joining of collective associations and income generated from pig farming with control variables of select districts. The following table shows the partial cross tabulation tables of select districts Aizawl, Lunglei and Kolasib along with the total of the three select districts.

Table 4.12 Cross tabulation of Joining a farming association and Income category from pig farming layered by Select Districts of Mizoram

District			Have you Joined any Farming Society?				Total	Column %
			Yes	Column %	No	Column %		
Aizawl	Income from Pig Farming	Low	43	55.8%	84	71.2%	127	65.1%
		Middle	30	39.0%	32	27.1%	62	31.8%
		High	4	5.2%	2	1.7%	6	3.1%
	Total	77	100.0%	118	100.0%	195	100.0%	
Lunglei	Income from Pig Farming	Low	47	65.3%	97	76.4%	144	72.4%
		Middle	24	33.3%	30	23.6%	54	27.1%
		High	1	1.4%	0	0.0%	1	0.5%
	Total	72	100.0%	127	100.0%	199	100.0%	
Kolasib	Income from Pig Farming	Low	12	46.2%	93	53.8%	105	52.8%
		Middle	13	50.0%	80	46.2%	93	46.7%
		High	1	3.8%	0	0.0%	1	0.5%
	Total	26	100.0%	173	100.0%	199	100.0%	
Total	Income from Pig Farming	Low	102	58.3%	274	65.6%	376	63.4%
		Middle	67	38.3%	142	34.0%	209	35.2%
		High	6	3.4%	2	0.5%	8	1.3%
	Total	175	100.0%	418	100.0%	593	100.0%	

Source: Sample survey

The above partial cross tabulation of Aizawl district shows that out of 127 respondents who earns low income from pig farming 84 respondents are not associated with a farming collective organisation while 43 respondents have joined a collective association. The table also shows that among the middle income earners from pig farming the respondents are approximately equally divided as 30 respondents have joined the collective organisation and 32 have not joined. Finally among the high income earners out of 6 respondents' majority 4 have joined the collective organisation while 2 have not joined the organisations. It can be inferred that overall 118 respondents have not joined any form of farm collective organisation while 77 respondents have joined some form of farm collective organisation. Among the farmers who have joined some form of farming organisation seems to benefit from not joining some form of organisation. This is reflected by middle income earners showing 30 out of 62 respondents and high income earners 4 out of 6 respondents. The chi-square test in table 4.12 shows that the calculated value is 5.594 at 2 degrees of freedom and the p value is 0.061. Since the calculated value is more than 0.05, the null hypothesis is accepted. In order to assess the insignificance degree, Cramer's V is calculated and for Aizawl district it is found to be 0.169 which is more than 0.10 and it can be inferred that the strength of association between the variables is moderate as represented by 16.9 percent.

The partial table of Lunglei district also shows similar pattern where among the low income earners of pig farming is characterised by majority of the respondents 97 out of 144 who have not joined any form of organisation related to farming while 47 have joined some form of organisation. Among the middle income earners, 30 respondents out of total 54 respondents have not joined some form of organisation while 24 have joined. In the category of high income earners it is only 1 respondents who have joined some form of organisation. The chi-square value is found to be 4.143 with 2 degrees of freedom and the p value is 0.126. Since

the p value is more than 0.05, the null hypothesis is accepted meaning there is no significant association among the variables under study in Lunglei district.

The partial table of Kolasib district shows that majority of the respondents have not joined some form of farming collaborative organisations as shown by 173 respondents not joining and 26 respondents joining some form of associations out of the total respondents of 199. Low and middle income earning category is characterise by 53.8 percent and 46.2 percent respondents respectively who have not joined some associations. The Pearson Chi-square is found to be 6.970 for 2 degrees of freedom and the calculated p value is 0.031 which is less than alpha value of 0.05. Since the calculated p value is less than alpha value, the null hypothesis is rejected meaning there is significant association among the variables of income earned from pig farming and joining of some farming associations. Further, Cramer's V shows 0.187 meaning there is moderate degree of association among the variables.

Overall for the total of the select districts shows that out of 593 respondents, 418 respondents have not joined some form of farming association while a smaller portion of the respondents viz., 175 have joined some form of associations. Among the high income earning categories, it is the farmers who have joined some associations are majority viz., 6 respondents over 2 respondents who operate independently. The Pearson Chi-square for the total districts is found to be 9.636 for 2 degrees of freedom and the calculated p value is 0.008. Since the calculated p value 0.008 is less than the alpha value 0.05, the null hypothesis is rejected. It means there is some association among the income from pig farming and joining of some farming associations. Further in order to assess the degree of association, the Cramer's V is looked into and it is found that the value is 0.127 meaning it explains about 12.7 percent of the association. This value is found to be between the standards of 0.1 and 0.3 which shows moderate associations between the variables.

Table 4.13 Chi-Square Tests of Joining a farming association and Income category from pig farming layered by Select Districts of Mizoram

District		Value	Df	Asymp. Sig. (2-sided)
Aizawl	Pearson Chi-Square	5.594 ^b	2	0.061
	Likelihood Ratio	5.535	2	0.063
	Linear-by-Linear Association	5.541	1	0.019
	N of Valid Cases	195		
Lunglei	Pearson Chi-Square	4.143 ^c	2	0.126
	Likelihood Ratio	4.382	2	0.112
	Linear-by-Linear Association	3.359	1	0.067
	N of Valid Cases	199		
Kolasib	Pearson Chi-Square	6.970 ^d	2	0.031
	Likelihood Ratio	4.394	2	0.111
	Linear-by-Linear Association	1.136	1	0.287
	N of Valid Cases	199		
Total	Pearson Chi-Square	9.636 ^a	2	0.008
	Likelihood Ratio	8.731	2	0.013
	Linear-by-Linear Association	4.896	1	0.027
	N of Valid Cases	593		

Source: Sample survey

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 2.36.

b. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.37.

c. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .36.

d. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .13.

By consolidating all the partial tables it can be inferred that Spearman's chi-square is 0.008 which is less than 0.05 and thus the null hypothesis is rejected. It may also be observed that there is association between the income earned from farming and channel of distribution by the farmers. By going further ahead into the tools of the degree of association by analysing the Cramer's V which shows the strength of association also finds that the value is 0.147 from the table 4.14, which is more than 0.10 and it can be inferred that the strength of association between the variables is very moderate as represented by 14.7 percent.

Table 4.13 (a) Symmetric Measures

District		Value	Approx. Sig.
Aizawl	Cramer's V	0.169	0.061
	N of Valid Cases	195	
Lunglei	Cramer's V	0.144	0.126
	N of Valid Cases	199	
Kolasib	Cramer's V	0.187	0.031
	N of Valid Cases	199	
Total	Cramer's V	0.127	0.008
	N of Valid Cases	593	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Source: Sample survey

4.10 Conclusion

The Government of India is aware of the fact that livestock is also important as a part of agriculture diversification and income enhancement, thus it gives crucial importance to it. The livestock sector has been growing faster than crop sector; however, in recent years, the growth both in livestock production and productivity has decelerate considerably (Report of the Working Group on Animal Husbandry & Dairying, 12th Five Year Plan, 2012-17), on addition the Government of India, Ministry of Agriculture Department of Animal Husbandry, Dairying & Fisheries clearly laid down the National Livestock Policy 2013, for the development of livestock which includes pig production. Department of Animal Husbandry Dairying & Fisheries (DADF) is one of the departments in the Ministry of Agriculture and came into existence w.e.f. 1st February, 1991, by converting two divisions of the Department of Agriculture and Cooperation namely Animal Husbandry and Dairy Development into a separate Department. Under which, National Livestock Mission, high importance has been given to piggery and thus Piggery Development-National Guidelines for formulation of State Pig Breeding Policy has been laid down with a proper Piggery Development-Bio security guidelines for piggery.

Then the National Livestock Policy comes in 2013 whose one of its focus area is pig breeding policy. This focuses on improving growth, prolificacy, quality and quantity of meat produced, survivability and utilization of low cost locally available feed and management conditions. While efforts continue to conserve some of the meritorious indigenous breeds of pigs in their defined local tracts, crossbreeding with high yielding, disease resistant exotic breeds are encouraged, with maximum 50% level of exotic germplasm in crossbreeding.

The Department of Animal Husbandry, Dairying and Fisheries provided necessary assistance to states in this regard, if required by the concerned state government. Constitution of National Steering Committee with representatives of the States and UTs, cooperatives, reputed NGO and private sector stake holders to facilitate implementation and operation of the policy, review and advice on changes in policy was made as and when necessary. Expert Committees were constituted to advice on research needs and application of recommendations on various aspects of livestock production, livestock health and control of different diseases, nutrition, management, marketing and mitigation of impact of climate change etc. NABARD was set up as an apex development bank with a mandate for facilitating credit flow for promotion and development of agriculture, small-scale industries, cottage and village industries, handicrafts and other rural crafts.

The Department of Animal Husbandry and Veterinary (AH& Vety Dept) is one of the oldest and most potential Departments of the Government of Mizoram. On May 1890, it became a fully fledged Government office of the Deputy Commissioners, started functioning in Mizoram which was manned by Captain Brown. The department has taken several initiatives for improving the status of livestock farming in the state. In order to achieve its objectives, the New Land Use Policy had also made a co-operative efforts along with the department to

offer the beneficiaries to opt for different trade under the AH & Vety sector. Animal Husbandry and Veterinary Department is one of the implementing Department of New Land Use Policy. The main objective of NLUP in respect of Animal Husbandry & Veterinary Department is to create sustainable livelihood through introduction of improved technology and improved breed of livestock and poultry.

The Mizoram Pig Producers' Cooperative Federation (PIGFED) Ltd. was established in 1989. At present there are 118 numbers. of Primary Pig Producers' Cooperative Societies affiliated under the Federation. The main objective of the Federation is to promote and facilitate the operation of the Primary Pig Producers' Cooperative Societies affiliated to it by coordinating their activities so as to improve their economic conditions by implementing scientific way of pig rearing.

Though there are schemes for the upliftment of piggery in Mizoram, the sample respondents showed 82.6 percent having not applied for such schemes(Table 4.7). The study also shows that there are 14.9 percent of the respondents have applied and avail Governmental aids which are mostly NLUP and a little portion were of the NABARD piggery schemes(Table 4.7). The study sample shows that majority of the respondents were satisfied with the schemes that were available to them represented by 95 respondents from Lunglei district, 44 respondents from Aizawl and 33 respondents from Kolasib. But on the other hand, not all the respondents have thought on the availability of the policies and schemes available in the state.

The research hypothesis that the pig farming policies of the government is not significantly conducive in the select districts of Mizoram is rejected. It means that is there is statistically significant that government policies are conducive for pig farming in the three select districts under study. Overall for the total of the select districts shows that out of 593 respondents, 418

respondents have not joined some form of farming association while a smaller portion of the respondents viz., 175 have joined some form of associations. The hypothesis that there is no significant association between joining of collective associations and income from pig farming in the select districts of Mizoram is accepted (Table 4.13)

From the tests and findings above it can be assumed that the farmers can have higher prospect if they pay more attention in commercializing their firms and make use of societies and associations to uplift the pig production in Mizoram.

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Chapter 5

Marketing of Pigs in Mizoram

5.1 Introduction

According to the academic definition of The Chartered Institute of Marketing, marketing is the management process responsible for identifying, anticipating and satisfying consumer requirements profitably. Marketing is an important aspect of any livestock production system. It gives a mechanism whereby producers (farmers) exchange their livestock and livestock products for monetary value. This revenue is reused for another cycle in procuring the livestock and for acquiring goods and services that are not produce themselves, as a means to sustain their livelihood. Marketing is that branch of knowledge which involves a systematic, critical and action-oriented study relating to fulfillment of human aspirations. It studies and analyses the manner and methods in which the phenomena of aspirations originate, evolve, form, develop, heighten, accentuate and get fulfilled. In the business sense, marketing basically involves relating the needs and desires of people with the producers' products or services.

5.1.1 Marketing: Definition and Concept

The American Marketing Association (July 2013) defines marketing as “the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners and society at large”. Marketing is those activities that a company carries out to acquire customers and maintain a relationship with them. Even the small tasks like writing thank-you letters, playing golf with a prospective client, returning calls promptly and meeting with a past client for coffee can be thought as marketing. The ultimate goal of marketing is to match a company's products and services to the people’s needs and wants,

thereby ensuring profitability. According to Kotler (1980), "Marketing is a human activity directed at satisfying needs and wants through exchange processes." Marketing (management) is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives. Consequently, exchange is the core concept of the discipline of marketing, which incorporates a contractual, communication and value-creating process. Marketing pertains to the interactive process that requires developing, pricing, placing and promoting goods, ideas or services in order to facilitate exchanges between customers and sellers to satisfy the needs and wants of consumers. Thus, at the very center of the marketing process is satisfying the needs and wants of customers.

Needs, wants and demands are a part of basic marketing principles, though they are three simple words, they hold a very complex meaning behind them along with a huge differentiation factor (Bhasin, 2016). Product can be differentiated on the basis of whether it satisfies a customer's needs, wants or demands. Needs are the vital items required for human continued existence. Human needs are an indispensable concept underlying the marketing process because needs are translated into consumer wants. Human needs are often described as a state of real or perceived deprivation. Basic human needs capture one of three forms: physical, social and individual. Physical needs are vital for survival and comprise food, clothing, warmth and safety. Social needs revolve around the aspiration for belonging and affection. Individual needs include desires for knowledge and self-expression, through items such as clothing choices. Wants are needs that are shaped by both sophisticated influences and individual preferences, often described as goods, ideas and services that fulfill the needs of an individual consumer. The wants of individuals change as both society and technology change. The purpose of marketing is to convert these

generic needs into wants for specific goods, ideas or services. Demand is created when wants are supported by an individual consumer's ability to purchase the goods, ideas or services in question. Marketing attempts at collaborating the three components namely people, their desire to buy and their capacity to buy, creating value for the people and so on. On the contrary, these products or services in turn creates value for the customers, adding comfort and conveniences as well. McNair(1980)has defined marketing, as "the creation and delivery of a standard of living".Producer tries to know the customers' needs and plan the production accordingly. Thus, adding convenience to the consumer leads to improvement in the standard of living. The daily activities and habits of individuals are the core elements that pump up the drive for certain wants and values. Marketing is the ongoing process of moving people closer to making a decision to purchase, use, follow or conform to someone else's products, services or values. Simply, if it doesn't facilitate a "sale" then it's not marketing. Kotler (1953) defined "Marketing is the set of human activities directed at facilitating and communicating executives". Changing social values have led to the consumerism movement which is a social force within the environment designed to aid and protect buyers by exerting legal, moral and economic pressures on business. Drucker (1973)defines "marketing as that satisfy individual and social values, needs and wants be it through producing goods, supplying services, posturing innovations or creating satisfaction". Hansen (1953) looks at marketing as "The process of discovering and translating consumer needs and wants into product and service specifications, creating demand for products and services, and then in-turn expanding the demand". In general, marketing activities are related with identifying the particular interest of the target market. Conforming to this, Cundiff (1982) views marketing as "a managerial process by which products are matched with markets".

These definitions highlight marketing as a system designed to offer something of value for the benefit of both the organization and the market. In other words, marketing is performed with the twin objectives of making profit for the firm and satisfaction for the consumers (Hise, et.al.1979). But in more recent times, marketing is mainly concerned with exploring and analyzing consumer wants and meeting them. Marketing is a social and managerial process by which individuals and groups obtain what they need through exchanging products and values with others.

The term marketing concept holds that achieving organizational goals depends on knowing the needs and wants of target markets and delivering the desired satisfactions. It proposes that in order to satisfy its organizational objectives, an organization should anticipate the needs and wants of consumers and satisfy these more effectively than competitors. Marketing is used to identify the customer, to satisfy the customer, and to keep the customer. With the customer as the main focus of its activities, it can be concluded that marketing management is one of the major components of business management functions. In marketing a number of sub activities are performed, along with the activities like identification of demand, research, market segmentation, product development, launching of products, modification of products, deletion of products, product design, pricing, different types of pricing, promotion of products and services, sales promotion, personal selling, publicity, public relations, advertising, distribution of products and services, consumer behaviour and many other activities. The marketing activities are divided into four areas which are product, pricing, promotion and placement which are referred as the 4Ps of marketing.

5.2 Marketing Mix

Marketing mix is an important strategic tool used by the marketing professionals for formulating strategies for the customers. Kotler (2000) indicated that the 4Ps represent the sellers' view of the marketing tools available for influencing buyers. From the buyers' point of view, each marketing tool is designed to deliver benefit to the customers. Lauter (1990) suggested that the seller's 4Ps (product, price, place and promotion) correspond to the customer's four Cs that include: customer solution, cost, convenience and communication. Drucker (1999) noted that marketers use numerous tools to elicit response from the target markets. These tools include: Place, Price, Products and Promotions also referred to as 4Ps of marketing (McCarthy, 1996). The study tries to analyse the pig marketing in Mizoram from the perspective of 4Ps viz., product, price, place and promotion.

5.2.1 Product

A product as defined by Armstrong and Kotler (2006) is anything that can be offered to a market for attention, acquisition, use or consumption that might satisfy a want or need. Ferrell (2005) opines that the product is the core of the marketing mix strategy where retailers can offer unique attributes that differentiates their product from their competitors. According to Borden (1984), product is characterized by quality, design, features, brand name and sizes.

As for services, according to Hirankitti, Mechinda, and Manjing (2009) the product offer in respect of services can be explained based in two components: (a) The core service which represents the core benefit; (b) The secondary services which represent both the tangible and augmented product levels. The latter can be best understood in terms of the manner of delivery of the particular service.

Pig farming is one of the common venture in Mizoram. It is said that most of the household in urban and rural areas have some place designated for pig rearing. The production process of pig has been discussed in detail in chapter 3. In this chapter, the products and by-products are discussed.

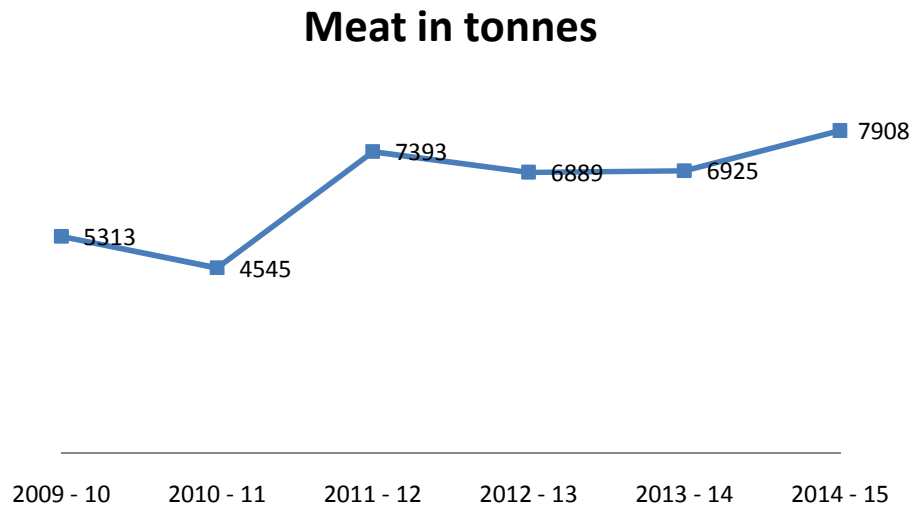
Livestock are the primary needs and wants for human existence. Among the livestock, pork is the most widely consumed meat in the world. People consume various pork products, such as bacon, sausage and pork chops; Mizoram pig market majorette is the meat as pork and live swine. The product market can be separated into two which are meat and the live animals. In the meat market, fresh meat is the most common form and some parts of the meat which are smoked, adding some value and sold at a little higher price than the fresh meat. The smoked meat can even be stored for a longer period of time. There are few processing farms which cater to a small portion of the market in the form of sausage and frozen meat. Most of the frozen meat comes from other states as there are very little processing carried out in the state. These processed sausage meat are mostly sold in the retail stores with other essential commodities.

The product can be segregated into two sections viz., meat and its by-products, and the live animal.

5.2.1.1 Meat and its by-products

- a) **Meat** :Pork is the culinary name for meat from a domestic pig. Fresh pork is the most popular form of meat in Mizoram, it is also smoked to add some flavor and value for selling. Smoked by firewood is also used as one of the major method for preservation and it also add taste to the meat.

Fig. 5.1 Estimated Meat production trend (in tonnes) in Mizoram



Source: Economic Survey Mizoram (2015- 16)

Pork occupies the highest quantity of production with 56.81 percent followed by beef with a share of 28.38 percent of the total meat production in the year 2015-16. The above figure shows the meat production in Mizoram has been stagnant during the period 2012 to 2015 while the consumption increases with the rising human population.

Fig. 5.2 Pork at allocated stalls in Bara Bazar, Aizawl



Source: Survey photo

b) By-products

In addition to pork, several valuable products come from swine (USDA, 2012). These include insulin for the regulation of diabetes, valves for human heart surgery, suede for shoes and clothing, and gelatin for foods and non-food uses. Swine by-products are also important parts of products such as water filters, insulation, rubber, antifreeze, certain plastics, floor waxes, crayons, chalk, adhesives and fertilizer, by-products like lard which is fat from pig abdomen, is used in shaving creams, soaps, make-up, baked goods and other foods (Wagstaff 2015).

Due to the consumption pattern of the Mizos, all the parts of pig are valuable. Therefore, the dressing percentage is very high (80 percent) as compared to 60-65 percent in other parts of the world. (Govt of Mizoram Notification 2017) However, the more meaty portions usually fetch higher prices e.g., the leg and the chump chop. In Mizoram, pork is further processed into the following products:

Fig. 5.3 Cured/Smoked pork (Bara Bazar, Aizawl)



Source: Survey photo

- i. Cured Pork- These constitute the bacons and hams which are preserved by smoking. Smoked meat is popular among the consumers of pork in Mizoram. It is an easy process of preserving the meat. Further this process increase the shelf-life of the product.
- ii. Sausages and Pies - These are derived mainly from trimmings and offal that are left after cutting up whole parts. It is one of the most preferred parts of the pork meat.
- iii. Pig Skin –The skin are processed into leather and surgical strings. However, there is no facility for processing in Mizoram. The skin are dried and then consumed in many forms.

5.2.1.3 Live animal

The live animal product can be categorised to three categories:

- a) Full grown animal: one of the major categories of live animal is full grown pig. Full grown pig are usually sold for meat at an age of 8 months to one year where the pig becomes fully grown. The farmers practice the fattening of pigs to the maximum which they claimed to have high marketable value, and the selling of these fattened ones are easier than those skinny ones.
- b) Piglets: Another category of live animal is the market of piglets. Piglets are usually sold at around 3 months from the birth for rearing by the farms. The farmers usually sell these piglets to other farms for different purposes.
- c) Breeding: The third category of live animal is where the pigs are sold at several ages, these pigs are sold for rearing purpose.

Table 5.1 Product market profile of pigs in Mizoram

Particulars	Responses	Frequency	Percent
Farming Society	Joined	138	22.4
	No	442	77.6
Demand for storage	Yes	78	13.2
	No	515	86.8
Processing of meat for sale	Yes	75	12.9
	No	507	87.1
Average quantity of meat sold in a week	Below 100kgs	19	3.2
	100-200kgs	22	3.7
	300-400kgs	5	0.8
	400-500kgs	4	0.7
	Above 500kgs	543	91.6
Piglets sold in a year	Below 10	64	20.4
	10-20	134	42.7
	20-30	82	26.1
	30-40	15	4.8
	Above 40	10	6.1

Source: Sample Survey

Majority of the pig market in Mizoram can be claimed to comprise of meat and the piglet bazaar. Pork is the major item in the market and the sample shows that there are 87.1 percent of the producers do not practice further processing of the meat for reselling, while there are 12.9 percent respondents in the market who sells and prepare smoked meat for preservation and for taste enhancement. The main motive of the sellers can be said that “it adds value to the meat”, and can be sold at higher price than the non-smoked. Likewise, there is a very little requirement for cold storage and there are only 13.2 percent of the respondents who require extra storage for their produce. Most of the farmers are able to sell their piglets proving that there is a ready market for the piglets. On the other hand, there are ready markets for the meat and piglets, there has been scarcity of these in the market recently. Maximum of the sales occurs in the festive seasons as pork is usually the main dish in the feast. There are few markets where the butchers have their stalls demarcated areas. These butchers however sells quite a large amount of meat in a week, the sample shows 91.6 percent of these butchers sells more than 500kgs of meat in a week, one supporting fact is that most of the families buys meat and pork for consumption. There are 23.9 percent of the farmers who sells their pig to other farms, which are usually bought for rearing purposes.

5.2.2 Price

According to Kotler, Armstrong, Wong, and Saunders (2008), price is the amount of money charged for a product or service, or the total values that consumers exchange for the benefits of having or using the product or service. Due to the intangible nature of services, price becomes a crucial quality indicator where other information is not lacking or absent (Zeithaml, 1981). Price is considered as the most important measurement of repurchase intentions (Oh, 2000;

Parasuraman and Grewal, 2000). It has been proven that customers usually buy products on the basis of price rather than other attributes (Peter & Donnelly, 2007).

According to the newspaper reports (Telegraph, 2010), meat prices in Mizoram markets are always inflated and these do not reflect the market conditions. The Mizoram government, in order to control the prices of animal products and agriculture produce, passed the State Agriculture Produce Marketing (Development And Regulation) Bill, 2010. Selling of piglets and pork is not a major problem in Mizoram as pork is the staple food for the Mizos and it is sold throughout the state. Usually it is seen that despite rearing of pigs by majority of the population, demand for pork exceeds supply. In the absence of organized piggery infrastructure, there is monopoly of private traders leading to misery of the consumer who are exploited by the pig traders/butchers to fetch poor quality meat at an exorbitantly high price. As of October 2016, the retail rate of pork is Rs.250/- per kg. Farmers sell pigs of size 40 inches of pigs (measured round the chest) at a price of Rs.18,500/-(approx) and size 50 inches at a price of Rs.30,000/-(approx). The local butchers have developed a mechanism to calculate the weight of pigs depending on the chest size measure of pigs and the price of the pig is usually negotiated.

The survey also observed that the price of servicing is Rs. 5,000/- and artificial insemination is Rs.3,500/-. Majority of the respondents at 79.6 percent are satisfied with the price of the pig and the meat. The data also shows 20.2 percent are not satisfied with the pricing, these groups of people are generally the larger producers and they suggest the prices of the products are increased to some extent.

Table 5.2 Prices (as on October 2016) of Pig, By products and Service in Mizoram.

Particulars	Unit	Amount in Rs.
Live Pig	40" (round the chest)	18,500
	50" (round the chest)	30,000
Piglet	Per unit	5,000

Pork	Per Kg	250/ Kg
Smoked Pork	Per 5 or 6 pieces	250/5pieces
Artificial Insemination		3,500
Manual Servicing		5,000

Source: Sample survey

5.2.3 Place (Distribution)

Place is defined by Armstrong and Kotler (2006) as a set of interdependent organizations that caters to the process of making a product available to the consumers. Hirankitti et al., (2009) considers place as the ease of access which potential customer associates to a service such as location and distribution. The strategy of place needs effective distribution of the firm's products among the channels of marketing like wholesalers or retailers (Berman, 1996). Place decisions needs attention, because of the importance of the product and consumption occurring at the same time and place and that provides all information of customer, competition, promotion action, and marketing task. Attention is required as how it can deliver the product at the right time and place, and which channel should be used to deliver the product (Copley, 2004).

Piglets are mainly sold right out of the farm's premises where the buyers have to approach on their own convenience. With this reference it can be said that the place of the farm is where the sale of piglets usually happen. Pork on the other hand, meat is sold in the market at specified stalls. When in times of scarcity, the buyers are often seen in queue to catch their turn for buying their share. Pork is also sold at the local places where the locally sourced pigs are favoured by the buyers, this is also the premises where individual farmers slaughters and sells. Table 5.3 shows 66.3 percent who does not use extra effort to transport their produce, which shows the convenience selling of meat at the local streets at large.

Table 5.3 Opinion on the Pig Product Market in Mizoram

		District Address			Total
		Aizawl	Lunglei	Kolasib	
The local market is enough	Count	101	147	178	425
	% within Sample	23.5%	34.6%	41.9%	100.0%
	% within District	51.8%	73.9%	89.4%	71.9%
Needs improvement	Count	12	27	11	50
	% within Sample	24.0%	54.0%	22.0%	100.0%
	% within District	6.2%	13.6%	5.5%	8.4%
Not good	Count	78	2	1	81
	% within Sample	96.3%	2.5%	1.2%	100.0%
	% within District	40.0%	1.0%	.5%	13.7%
There should be a new plan	Count	5	23	8	36
	% within Sample	13.9%	63.9%	22.2%	100.0%
	% within District	2.6%	11.6%	4.0%	6.1%

Source: Sample survey

During the survey, the opinion of the respondents towards the market system was observed. It can be seen that the respondents have less idea about the concept of new form of marketing system as the data shows that 71.9 percent responses that claimed that the local market is sufficient. The sample shows that 23.5 percent (101 respondents) are from Aizawl district, 34.6 percent from Lunglei and 41.9 percent from Kolasib district respectively. The sample respondents at a very low rate, 6.1 percent who have been thinking of and wants to enter into new meat markets. These new ideas are mostly regarding the control of import of pigs and large scale of production. There are 8.4 percent and 13.7 percent respondents from the sample who finds that the current pig market is not sufficient for Mizoram and these respondents mostly ants to diminished the import of pigs and they have opined that this will enhanced the growth of production of pigs in Mizoram.

Table 5.4 Distance of Pig market from the respondents in Mizoram

Distance		District Address			Total
		Aizawl	Lunglei	Kolasib	
Below 2 kms	Count	97	149	192	437
	% within Sample	22.0%	34.1%	43.9%	100.0%
	% within District	49.5%	74.9%	96.5%	73.9%

2-3 kms	Count	80	13	2	95
	% within Sample	84.2%	13.7%	2.1%	100.0%
	% within District	41.0%	6.5%	1.0%	16.0%
3-4 kms	Count	16	23	0	39
	% within Sample	41.0%	59.0%	0.0%	100.0%
	% within District	8.2%	11.6%	0.0%	6.6%
4-5kms	Count	1	0	1	2
	% within Sample	50.0%	0.0%	50.0%	100.0%
	% within District	0.5%	0.0%	0.5%	0.3%
above 5kms	Count	2	13	4	19
	% within Sample	10.5%	68.4%	21.1%	100.0%
	% within District	1.0%	6.5%	2.0%	3.2%

Source: Sample survey

The sample also shows that majority 73.9 percent of the respondents have local market as near as below 2 kms which is quite convenient for the general transportation of the products. Aizawl district have 22.0 percent Lunglei has 34.1 percent and Kolasib district have 43.9 percent which can be concluded that the meat market is more near in the rural than in the urban areas. The sample also reveals that there are very minimal cases where the farmers have to travel more than 2 kilometers to sell their pigs.

Table 5.5 Transportation used by the respondents in Mizoram

Means of transport		District Address			Total
		Aizawl	Lunglei	Kolasib	
Hired Public carrier	Count	31	83	43	154
	% within Sample	18.2%	53.9%	27.9%	100.0%
	% within District	15.4%	41.7%	22.1%	26.5%
Own Vehicle	Count	14	22	10	46
	% within Sample	30.4%	47.8%	21.7%	100.0%
	% within District	7.2%	11.1%	5.0%	7.8%
Others	Count	151	94	145	390
	% within Sample	38.7%	24.1%	37.2%	100.0%
	% within District	77.4%	47.2%	72.9%	65.8%

Source: Sample survey

The study attempts at finding the transportation of the respondents in dealing their pigs, it was observed that there are 26.5 percent of the pig producers who use public convenience for transport of their produce to the market and there are 65.8 percent respondents who happened to sell their produce at their place itself and also sells them at the local market and often slaughter the produce themselves as well. Kolasib and Aizawl districts shows a very high percentages at 38.7 and 37.2 percentages respectively and Lunglei district shows 24.1 percent of the respondents as well. The study also shows that there are few percentage of the respondents who claimed to have use their own vehicle to transport their pigs (7.8 percent). This is a clear indication that the farms are not self-sufficient with their own vehicles for conveniences and that these farms are still in the lower income sector of the economy.

Table 5.6 Method of Selling Pigs

Selling of Pigs		District Address			Total
		Aizawl	Lunglei	Kolasib	
To other farms	Count	11	12	119	142
	% within Sample	7.7%	8.5%	83.8%	100.0%
	% within District Address	5.6%	6.0%	59.8%	23.9%
To the butcher	Count	173	140	54	367
	% within Sample	47.1%	38.1%	14.7%	100.0%
	% within District Address	88.7%	70.4%	27.1%	61.9%
Self slaughter and sell	Count	9	42	18	69
	% within Sample	13.0%	60.9%	26.1%	100.0%
	% within District Address	4.6%	21.1%	9.0%	11.6%
Others	Count	2	5	8	15
	% within Sample	13.3%	33.3%	53.3%	100.0%
	% within District Address	1.0%	2.5%	4.0%	2.5%

Source: Sample survey

The producers in the pig market of Mizoram were interviewed for gathering information regarding how they sell the live animals. In Aizawl district, majority of the producers i.e, 88.7 percent sold their produce to the butchers. This shows that the main motive of the production is meat since there are only 5.6 percent sells to other farms which can be treated as they sold piglets for re-production or breeding purpose. The table shows that there are only 2 percent who retain their produce for rearing them in their farm. There are 70.4 percent respondents in Lunglei who claims to sell their produce to butchers only, the data also shows that there are 21.1 percent who does the slaughtering and sells themselves. The increase in this self slaughtering at Lunglei district could be assumed that there are many respondents from the rural areas who have no other option. On the other hand in Kolasib district data finds 59.8 percent who sells their pigs to other farms, 27.1 and percent to the butchers and 9 percent slaughtered themselves and 4 percent who retains their own produce for re-production respectively. Some of the variation in these proportion could result from fact that the traders from the urban areas have sourced the market requirement from the neighboring rural areas as well.

Table 5.7 Availability of Ready Market for the piglets

Availability of ready Market for the piglets		District Address			Total
		Aizawl	Lunglei	Kolasib	
Available	Count	138	114	183	435
	% within Sample	31.7%	26.2%	42.1%	100.0%
	% within District	70.8%	57.3%	92.0%	73.4%
Not Available	Count	15	6	4	25
	% within Sample	60.0%	24.0%	16.0%	100.0%
	% within District	7.7%	3.0%	2.0%	4.2%
Others	Count	42	79	12	133
	% within Sample	31.6%	59.4%	9.0%	100.0%
	% within District	21.5%	39.7%	6.0%	22.4%

Source: Sample survey

Table 5.8 Regular channel of selling pigs

Regular channel of selling the Pig		District Address			Total
		Aizawl	Lunglei	Kolasib	
Yes	Count	36	31	80	147
	% within Sample	24.5%	21.1%	54.4%	100.0%
	% within District	18.5%	15.6%	40.2%	24.8%
No	Count	159	168	119	446
	% within Sample	35.7%	37.7%	26.7%	100.0%
	% within District	81.5%	84.4%	59.8%	75.2%

Source: Sample survey

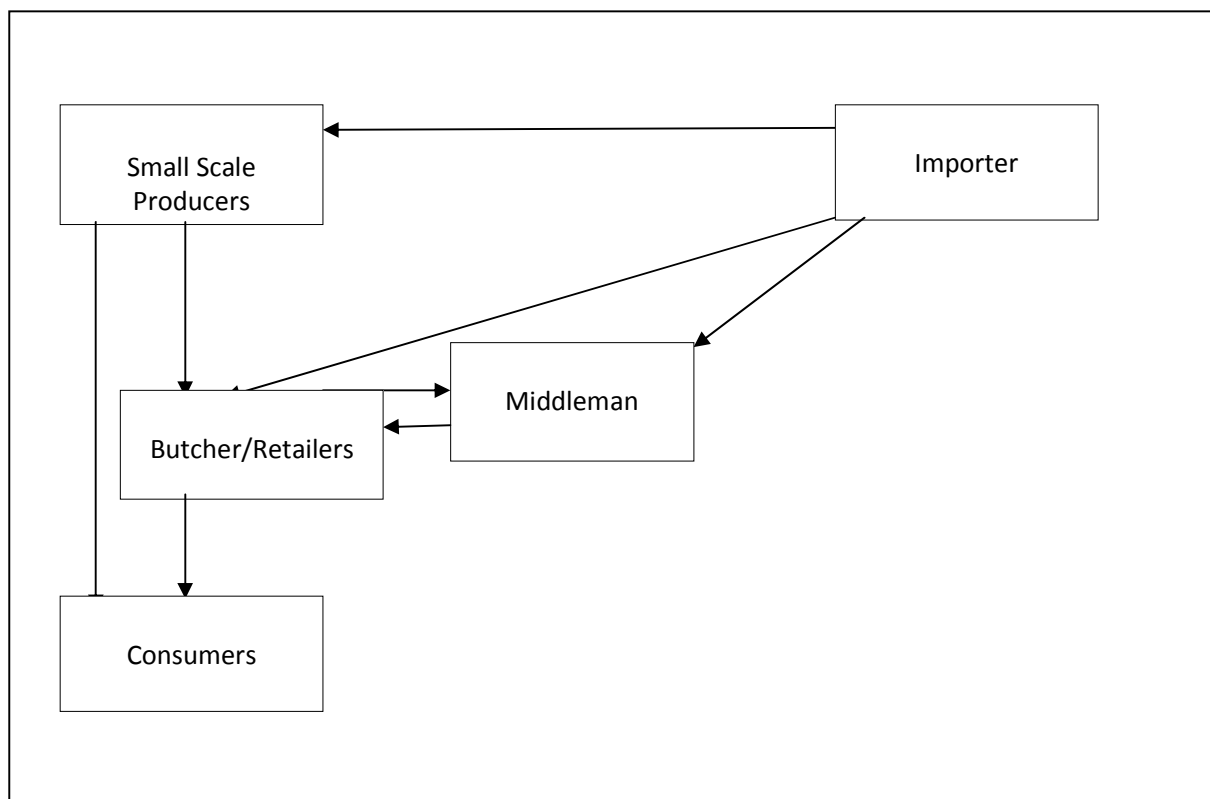
These regular producers and sellers do have their ways of channeling to the market, but the larger producers only have claimed to have regular channel of selling in the market, as denoted by the sample survey 72.5 percent of the producers have no regular channel of selling their animals which can be concluded that the farmers usually sells their produce on convenience which is usually available at the local disposals either on every Fridays and Saturdays. Despite the fact that the pig market in Mizoram remains un organized, there are 24.8 percent representing 147 respondents amongst the selected districts, who claimed to have regular channel for disposing their produce to the market. Thus it was also observed that majority of these regular channels were confined to the meat retailers, especially the processed meat sellers (*Vawksa rep zuar*).

5.2.3 Marketing channels

A marketing channel is a set of practices or activities necessary to transfer the ownership of goods, and to move goods, from the point of production to the point of consumption. It consists of all the institutions and all the marketing activities in the marketing process. Marketing channels are the ways that goods and services are made available for use by the consumers. All goods route through channels of distribution and the marketing will depend on the way goods are

distributed. The route that the product takes on its way from production to the consumer is important because a marketer must decide which route or channel is best for the particular product (Blunt, 2016). The description of the major marketing channels depends on the coordination of the major marketing participants. Marketing channels can be described through various combinations of market participants who promote the exchange of goods from sellers to buyers. The pig market in Mizoram is not that well organized or systematic one. Although some regulations are made for the meat, the pricing of the live animals is dependent on the producer and time factor of the life cycle of the pigs which are sold at certain life stages. The marketing channel for pig livestock is illustrated as in figure 5.4

Figure 5.4 Marketing Channels of Pigs in Mizoram



Source: Adapted from Oakeley, 1996b

a). Producers to Producers: producers are farmers or pig rearers who sell piglets and medium grown pigs and are not strictly intermediaries. They sell to the other farmers who are principally farmers (pig rearers) who fatten the piglets and medium grown pigs till they become full grown. These farmers buy the piglets which are grown by few months because they do not require to take intensive care for their survival. These groups of piglet producers focused on their production costs and the market for a reference price. Buying is on the basis of their price expectations in the market whereby they will sell later after fattening. These farmers have to develop risk-taking strategies and knowledge of local and temporal supply conditions of full grown pigs in the local market. This is necessary to leverage the price uncertainty due to the long time lag between purchase and sale. Large numbers of live pigs are normally bought to economize on the travel time and operational expenses. Despite their production costs, pricing is regulated by the local authorities for the butchers. The group of producers who focuses on fattening for meat are careful about the market conditions and the risk involved like disease outbreaks, new regulations on pricing, health checks etc.

b). Producers to Middlemen: Often practiced in the study area with limited numbers of animals, it is the most important link between producers and markets. Its importance stems from the fact that producers take risk of the transport costs associated with taking the live animals to market outlets. These traders, therefore, act in accordance with this role in the marketing chain both more economically and more effectively. It is the most important link between producers and the sellers.

c). Producer to Consumers: Bounded by tradition, this type of exchange between producers and consumers are found in rural and sub-urban areas. Cultural, social values and festivals are the

major factors accounting for this type of sale. During social occasions like wedding, anniversaries and church ceremonials, the hosting party or the household would then rely on either farmers or traders to meet this demand. Direct sales to consumer increases in winter season when most of the weddings take place. December is the time for celebration of Christmas and New Year. In Mizoram, where majority of the population are Christian, occasions hosted by a church would lead to slaughter of animals to feed a crowd of approximately 800 to 1500 persons and in such cases, the animals are usually purchased directly from producers. In addition, every wedding requires the participation of many households from the village and surrounding areas joining the feast, along with friends from remote areas. As local tradition requires every guest to present the groom with a gift, close relatives often bring live animals to bear some of the expenditure of the wedding. This type of transaction is closely connected to social, cultural and tradition, and so is not fixed in terms of time or place. The current population and traditions suggests that this type of sale and slaughter of animals will remain unchanged.

d). Producers to Meat Retailers: Some of the producers are also meat retailers who rears the pigs, slaughter and sells the meat in the local market acting as butchers. They also often buy large chunk of meat from the slaughtered animal and then process them as smoked pork which is sold more expensive than the fresh meat. Meat retailers from urban areas usually carry out such activities.

This type of channel has become less prevalent especially in the urban areas of Mizoram while it is still practiced in villages. Earlier, this was a practice in the past, but since most cities have developed rules regarding rearing of pigs in congested urban areas; the practice is less prevalent now-a-days. The government of Mizoram has erected a new slaughter house and all meat

retailers are required to have all animals slaughtered and verified by doctors appointed by the Government authorities, therefore, this type of distribution is diminishing day by day.

e). Importers to other channels: Due to the low production and increase in high demand, some regular livestock producers have to resort to other means. They are buying pigs from the neighboring countries like Myanmar and Bangladesh. Despite the efforts from the government to increase the pig production, it was observed that Mizoram has been largely dependent on import for the supply of pigs. Documenting with these are the outbreak of swine diseases in the state on many occasions and the state has to control the import of pigs from Myanmar. The Telegraph (May 6, 2016) stated that “Mizoram has banned the import of pigs from Myanmar” . (May 2016) Lalbiakhsangi, District Magistrate of Mizoram-Bangladesh India Today - Tripura border district Mamit recently also issued an order prohibiting import of chicken, bird, duck and egg from Bangladesh and Tripura state due to reported prevalence of Bird Flu or Avian Influenza in Bangladesh. The study observed that there has been a huge import of live pigs from Myanmar through the Indo-Myanmar border at Zokhawthar (Champhai district). Some large scale livestock producers who buy the short fall have been able to develop direct exchange channels from Myanmar. There are some pure importers who buy from Myanmar to sell to other channels viz., producers, retailers and middlemen. These importers have strong financial support and are able to import in large scale from Myanmar. During the interview, it was observed that some of the dominant players claim that about 60 to 70 percent of the animals come from Myanmar region for the market of Mizoram.

The livestock marketing mechanisms in domestic trading are largely similar throughout Mizoram. Animals usually enter the marketing chain when producers sell either to traders in livestock market, and/or to traders in the villages. Farmers interviewed indicated that the vast

majority of animal sales takes place in locations owned by dominant players in markets. Importers involved in the cross-border trade with Myanmar makes good money as one among the respondents made a statement that they made transaction of about Rs. 4 crores during the year 2012 and 2013, but small traders are not able to compete as they do not have the capital to do business as importers.

5.2.4 Promotion

Promotion is one of the elements of marketing mix (McCarthy, 1996) among other elements like product, price, and place, which are the 4Ps of marketing. Marketing mix decision are made with the objective of influencing the trade channels as well as the final consumer and in return the sales. Promotion brings an interactive dialogue between an organization and its customers and it takes place during the pre-selling, selling, consuming and post-consumption stage. Such promotional elements include: sales promotion, advertising, sales force, public relation and direct selling. It is defined as sales promotion, advertising, personal selling, public relations and direct marketing (Borden, 1984). According to Lovelock, Patterson and Walker (1998) promotion is decision of how best to relate the product to the target market and how to persuade them to buy it. A communication program is important in marketing strategies because it plays three vital roles: providing needed information and advice, persuading target customers of the merits of a specific product, and encouraging them to take action at specific times (Lovelock and Wright, 2002). Activities that cater to promotion are advertising, sales promotions, personal selling and publicity; they can all influence consumer's way of thinking, their emotions, their experience as well as their purchasing. Communications are devised by marketers in such a way that it (a) offer consistent messages about their products and (b) are placed in media that consumers in the target

market are likely to use (Munusamy and Hoo,2008). Promotion is a selling technique; to succeed in any marketing program, it should be involved with communication (promotion). Promotion is important as it provides information, advice, and persuades the target market. It guides and teaches the customer to take action at a specific time and how they can use the product and get beneficial result from it. The product advertisement can be delivered by individual salespeople, T.V, radio, internet, magazine, press, and all types of media.

The marketing of pigs or promotion of pig market is a rare phenomenon in Mizoram, since the demand is not at par with the supply i.e., production of pig is very low within Mizoram. However, in the earlier days or in the rural areas, “Tagging of papers” in the road side where it is easily visible for the passer by, notifying the slaughter of pigs in the local area used to be carried out, through this, the other members of the village who are the target audience came to know about the pigs to be slaughtered and sold.

Fig. 5 .5 Street tagging of pigs to be slaughtered locally



Source : Survey photo

Word of mouth (WOM) generally refers to the information gained through interpersonal communication with friends and family relating to organizations and their offerings (Bhatnagar et al. 2001). Word of mouth from the relatives and friends of the farmers to slaughter their pig is also a common promotion method used in Mizoram. Word of mouth is one of the fundamental means of distribution. Word of mouth can influence others' views, thoughts and their decisions. If word of mouth power is utilized correctly, it could market any product/services for the long time (Ahmad et al. 2014). During the survey, it was also found from general discussion with the respondents that the word of mouth referencing has been widely used as a form of sales promotion in the rural areas and even still to some extent practiced in the urban area within Mizoram.

These are some shops with specialized in selling smoked meat located at various Localities (*Veng*). These shop are identified by the hanging signboards with words like “*Vawksa rep kanneireng e*”, “*Vawksa rep a awm*”, meaning “Smoked pork is available”. These shops also sell fresh meat and other by products like lard, fried skin etc. The numbers of such shops are not in abundance.

Fig 5.6 Smoked Pork at display in Bara Bazar (Aizawl)



Source: Survey Photo

Fig 5.7 Meat Shop



Source: Survey photo

In the recent years, some of the entrepreneurs have established modern meat shops at certain places in Aizawl hoping to evolve with a better marketing standard and to have a systematic way of supplying the market with fresh and healthy meat. The meat sold at these shops are both in the form of fresh and frozen form. The prevailing system of selling at the butchers places located in the markets tends to be more comfortable by the people. Also the customers were able to make choice of meat portion which they wanted to buy in comparing to the modern meat shop where most of the meat was chunk of meat pre-cut. Due to the high demand, there are often times when non certified pigs are slaughtered resulting in the supply of poor quality meat to the customers. This is also often related with import of the live animals which brings infected ones and spreading the same. Thus, it can be concluded that there is a very high necessity for the promotion of the pig and pork market in Mizoram.

5.3 Traders and their vital role

The importance of traders in the traditional production systems emerges when there are serious market infrastructure constraints. Livestock trade in Mizoram is characterized by import of live swine and transportation of live pig through long distances between the areas of production and major outlet markets. Due to the far distances, transport costs for livestock become an important components of the price. Market facilities such as fences, pens, and public services in livestock markets are also poor. Watering and feeding facilities represent another constraint in outlet markets. As Mittendorf (1993) stated that “A major cause of marketing problems often lies in defective infrastructure, particularly roads and transport services. It has been estimated that more than half the higher costs in Africa in comparison with those in Asia are due to inadequate marketing infrastructure”.

The role of importers in existing conditions is unique and vital for the continuity of such production. Their presence saves producers' time, cost of transport and risks, and makes cash readily available on demand. Although producers do not rely entirely on the market information provided to them by the traders, traders remain one of the most important sources of information on demand and prices in the area.

5.4 Livestock outlet markets in Mizoram

Livestock markets can be described as places which require the presence of a seller(s) and buyer(s) who are willing to make the transaction of ownership of an animal from one to another (Safah, 1997). The subsistence of outlet markets is strongly associated to the population, and so livestock markets in Mizoram are found more in cities. Markets operate daily from early morning till evening with a peak days at Saturdays and Fridays for meat.

Pig farming is a common enterprise among the rural and urban areas of Mizoram. As mentioned in the earlier chapters, every household is keen to keep at least a few pigs in their backyard. According to Bhusan (1999), Mizos are known for their expertise in pig rearing. But pig farmers in the rural areas find it hard to market hogs as transportation is a problem as they usually tie up the hog's hind legs and drive it to the market on foot which is cumbersome and many farmers try to avoid going to the urban market. The different markets used by them are described as follows:

- a) **Bara Bazaar:** This is the main market in the capital, Aizawl which is located at the city center. The hogs are sold directly to the butchers or retail dealers. These retailers and dealers transport them by mini trucks to the destined markets. Very few farmers can afford to raise and transport these animals, leaving marginal farmers to take this effort to come to Bara Bazaar.

- b) **Town Markets:** Most of the town in Mizoram has a small, conveniently-located market for selling meat. Small marginal farmers bring their live or slaughtered hogs to this market on foot. Here they may get good prices for their pork because the demand is high and supply is insufficient.
- c) **Local Markets:** Villages and towns have small local weekly market. These markets are owned either by village authorities or by co-operatives. Local marginal farmers are able to sell their hogs here directly without any middleman or permanent shop in the market place. The market operates on a first come, first right of sale basis on payment of very small fees. However, the prices are generally lower than at the markets mentioned earlier, unless hogs are in short supply.
- d) **Roadside Markets:** Besides the local markets, there are many farmers who slaughter and sell pork on the roadside to passers-by on a direct sale basis. Farmers are in a good position to make profit in this system. Although there are some customers who are finicky about buying pork from the roadside, these markets do a brisk business.
- e) **Hog dealers:** These are independent operators who buy hogs from farmers, both rural and urban, and sell pork to consumers, pork shops or other marketing agencies. Some of them run permanent shop at the market of Aizawl or other towns. These operators mainly use mini trucks and pickup trucks to transport their animals from their pig yard to the market.

Hogs are primarily sold as fresh pork. The need for a proper marketing channel is needed, especially for the small and marginal farmers. Despite the market today is very less organized, some efforts has been made in this direction by some hog farmers, along with district or state pig

co-operative societies. The marketing system of pork is primitive and insufficient in relation to the value and demand in the state. Despite the high consumption of pork and pork products in Mizoram, there is no visible organized market, bacon industry, packing plant etc. in the state. Hygienic market conditions and development of full fledged meat processing industry would definitely upgrade the pork market industry.

5.5 Transportation and marketing costs

Roads and trucks for transportation has enabled the marketing to be more efficient by reducing the marketing costs and thus mortality and weight losses, and shortening the time for livestock to market among primary and regional and domestic livestock markets. Movement of animals on foot for marketing purposes is rare within the state and has become insignificant in recent years. Aizawl district's pig population comprises of about 31 percent and about 60 percent of the meat consumed in the district comes from pig (Anonymous 2002-03). During the sample survey, it was observed that traders and brokers, and even private butchers are searching far as reachable by vehicle in a day from the capital city Aizawl just to collect pigs from the village farmers. This indicate supply shortage in the urban areas of Mizoram. When large number of pigs is found, then all available vehicles ranging from small pickup trucks to larger trucks were employed to transfer the live pigs. However, in the local market, it was observed that the traders used road transport for moving the livestock from market to market and from producers to the market.

5.6 Testing of Hypothesis 3

Hypothesis 3: There is no significant association between selection of distribution channels to the income from pig farming in the select districts of Mizoram.

Analysis:

A chi square test was performed to assess the association between the selection of distribution channels and income earned from pig farming with control variable of select districts. The following table shows the partial cross tabulation tables of select districts Aizawl, Lunglei and Kolasib along with the total of the three select districts.

Table 5.9 Cross tabulation of Mode of selling Pig and Income category from pig farming layered by Select Districts of Mizoram

District			Method of selling pigs							Total	Column %	
			Other farms	Column %	Local Butcher	Column %	Slaughter and Sell	Column %	Others			Column %
Aizawl	Income from Pig Farming	Poor	8	72.7%	115	66.5%	3	33.3%	1	50.0%	127	65.10%
		Middle	2	18.2%	54	31.2%	6	66.7%	0	0.0%	62	31.80%
		Well to do	1	9.1%	4	2.3%	0	0.0%	1	50.0%	6	3.10%
	Total		11	100.0%	173	100.0%	9	100.0%	2	100.0%	195	100.00%
Lunglei	Income from Pig Farming	Low	7	58.3%	105	75.0%	29	69.0%	3	60.0%	144	72.40%
		Middle	5	41.7%	34	24.3%	13	31.0%	2	40.0%	54	27.10%
		High	0	0.0%	1	0.7%	0	0.0%	0	0.0%	1	0.50%
	Total		12	100.0%	140	100.0%	42	100.0%	5	100.0%	199	100.00%
Kolasib	Income from Pig Farming	Low	56	47.1%	37	68.5%	10	55.6%	2	25.0%	105	52.80%
		Middle	62	52.1%	17	31.5%	8	44.4%	6	75.0%	93	46.70%
		High	1	0.8%	0	0.0%	0	0.0%	0	0.0%	1	0.50%
	Total		119	100.0%	54	100.0%	18	100.0%	8	100.0%	199	100.00%
Total	Income from Pig Farming	Low	71	50.0%	257	70.0%	42	60.9%	6	40.0%	376	63.40%
		Middle	69	48.6%	105	28.6%	27	39.1%	8	53.3%	209	35.20%
		High	2	1.4%	5	1.4%	0	0.0%	1	6.7%	8	1.30%
	Total		142	100.0%	367	100.0%	69	100.0%	15	100.0%	593	100.00%

Source: Sample survey

The above partial cross tabulation of Aizawl district shows that among those who sell directly to other farms are 8 respondents (72.7 percent) who earns low incomes followed by 2 respondents selling by medium income earners and lastly 1 respondent by high income earner. Selling to local butchers are the largest with 115 respondents followed by 54 respondents selling by middle income earners and 4 by high income earners. The total numbers of farmers who slaughter the animals and sell personally are 9 out of which 6 are middle income earners while 3 are low

income earners. Others categories are like supplying for occasions or self consumption etc. accounts very less where only 2 respondents are present. It can be concluded that in Aizawl, most the farmers are low income earners who are supplying through selling to other farms and to local butchers. The chi-square test in table 5.10 shows that the p value is 0.001 which is less than 0.05 meaning the test statistics is rejected. It also seems to suggests that there is no significance in the association between the categories of income earners and the method of distribution of products in Aizawl district. Cramer's V which shows the strength of association also find that the value is 0.001 from the table 5.11, which is less than 0.10 and it can be inferred that the strength of association between the variables is very weak as represented by 1 percent.

Similarly, the partial cross tabulation for Lunglei district also shows that majority of the pigs are sold by low income earning farmers and middle income earning farmers. The distribution channels also shows a change on pattern whereby most are sold to local butchers followed by butchering and selling personally. Lunglei district is a developing market but most of the products are sold by low earning farmers as reflected by 195 respondents who mostly sells to the butcher for local markets. The high earning farmers is very low i.e., 1 respondent who sells it in the market. The chi-square table shows that the p value of Lunglei district is 0.817 which is more 0.05 meaning the test is significant, hence the null hypothesis is accepted. It also can be inferred that there is no significance association between the pig farmers income category and the type of distribution of the product in Lunglei district. From Cramer's V which shows the strength of association also find that the value is 0.817 from the table 5.11, which is more than 0.50 and it can be inferred that the strength of association between the variables is very insignificant as represented by 81.7 percent.

Similarly, the partial cross tabulation for Kolasib district also shows that majority of the pigs are sold by the low earning farmers and middle income earning farmers to a large extent. This is reflected by 105 respondents who belong to low income group and 93 respondents from middle income group. The low income earners mostly sold to other farms, local butchers, personally selling to a large extent as shown by 56 respondents, 37 respondents who sell to local butchers and 10 for personal business. The middle income earners in Kolasib are largely selling through to other farms who may sell it to cities like Aizawl and Lunglei. This is shown by 62 respondents who sell by the middle income earners. The high earning farmer is very low i.e., 1 respondent who sells it in the other farms.. The chi square table shows that the p value of Kolasib district is 0.127 which is more 0.05 meaning the test is significant, hence the null hypothesis is accepted. It also can be inferred that there is significance association between the pig farmers income category and the type of distribution of the product in Kolasib district. From Cramer's V which shows the strength of association also find that the value is 0.127 from the table 5.11, which is more than 0.10 and it can be inferred that the strength of association between the variables is moderate as represented by 12.7 percent.

Table 5.10 Chi-Square Tests of selling Pig and Income category from pig farming layered by Select Districts of Mizoram

District		Value	df	Asymp. Sig. (2-sided)
Aizawl	Pearson Chi-Square	22.561 ^b	6	0.001
	Likelihood Ratio	12.037	6	0.061
	Linear-by-Linear Association	3.288	1	0.070
	N of Valid Cases	195		
Lunglei	Pearson Chi-Square	2.935 ^c	6	0.817
	Likelihood Ratio	3.08	6	0.799
	Linear-by-Linear Association	0.039	1	0.843
	N of Valid Cases	199		

Kolasib	Pearson Chi-Square	9.951 ^d	6	0.127
	Likelihood Ratio	10.512	6	0.105
	Linear-by-Linear Association	0.338	1	0.561
	N of Valid Cases	199		
Total	Pearson Chi-Square	25.456 ^a	6	0.000
	Likelihood Ratio	24.627	6	0.000
	Linear-by-Linear Association	1.332	1	0.248
	N of Valid Cases	593		

Source: Sample survey

- a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .20.
- b. 7 cells (58.3%) have expected count less than 5. The minimum expected count is .06.
- c. 7 cells (58.3%) have expected count less than 5. The minimum expected count is .03.
- d. 6 cells (50.0%) have expected count less than 5. The minimum expected count is .04.

By consolidating all the partial tables it can be inferred that Spearman's chi-square is 0.008 which is less than 0.05 and thus the null hypothesis is rejected. It may also be observed that there is association between the income earned from farming and channel of distribution by the farmers. By going further ahead into the tools of the degree of association by analysing the Cramer's V which shows the strength of association also finds that the value is 0.147 from the table 5.10(a), which is more than 0.10 and it can be inferred that the strength of association between the variables is very moderate as represented by 14.7 percent.

Table 5.10(a) Symmetric Measures

District		Value	Approx. Sig.
Aizawl	Cramer's V	0.241	0.001
	N of Valid Cases	195	
Lunglei	Cramer's V	0.086	0.817
	N of Valid Cases	199	
Kolasib	Cramer's V	0.158	0.127
	N of Valid Cases	199	
Total	Cramer's V	0.147	0.000
	N of Valid Cases	593	

Source: Sample survey

5.7 Conclusion

Marketing mix is one element for marketing that can never be neglected. A company does everything to acquire customers and maintain a relationship with them. Efficient market should ensure remunerative prices but this is not so in the case of livestock marketing in India, as it is not at all organised on economic lines. Marketing is a human activity directed at satisfying needs and wants through exchange processes. It includes all actions designed to generate and facilitate any replace intended to satisfy human needs or wants, marketing occurs when people decide to satisfy needs and wants through exchange. Pork being most favoured and highly demanded in Mizoram although with features of low production, needs less effort to sell. The livestock is sold at the individual level or in markets where the prices are controlled by the traders, brokers and even some by the money lenders, having no consideration in the input or the real value of cost of rearing the animal. The condition of the pig marketing is still very poor among the livestock marketing, as the swine rearers are not only small in numbers, but also scattered over a large area. Being a weaker society, majority of them acquired comparatively low literacy, economically weak and eventually not in the position to retain their productivity over a period of time. In marketing a lot of sub activities are performed, along with the activities like identification of demand, research, market segmentation, product development, launching of products, modification of products, deletion of products, product design, pricing, different types of pricing, promotion of products and services, sales promotion, personal selling, publicity, public relations, adverting, distribution of products and services, consumer behaviour and many other activities. The marketing activities were discussed in terms of 4Ps of marketing.

Due to the eating habit of the Mizos, all the parts are valuable meat, as shown by dressing percentage 80 percent in Mizoram in comparison to 60- 65 percent in the world including the

head and trotters. In Mizoram, pork is further processed into the following products: cured, sausages and pies, pig skin. The product market can be separated into two which are meat and the live animals. Pig is sold throughout the state. Usually it is seen that despite rearing of pigs by majority of the population, demand for pork exceeds supply. As of October 2016 the retail rate of pork is Rs.250/- per kg. The pigs are usually market when they reach the expected price of approximately Rs.19,000/- to Rs.30,000/- and the piglets at Rs.5,000/-. Piglets are mainly sold right out of the farm's premises where the buyers approach on their own convenience. Pork on the other hand, which is the most favored meat is sold in the market at specified stalls. During times of scarcity, the buyers are often to be seen in queue to catch their turn for buying. Pork is also sold in convenience at the local places where the locally sourced pigs are favoured by the buyers, in which where individual farmers slaughters and sells themselves or often hire butchers to do the selling.

The study shows that the respondents were quite satisfied in the current form of market. It was also observed that the channels of marketing includes producers, middlemen, consumers, retailers and importers and their combinations that represent the marketing channels of pigs in Mizoram. Pork and by products require very less effort to sell as there is a huge demand. The market places of pigs in Mizoram includes Bara Bazar at Aizawl, town market at all the towns, roadside market, hog dealers who often sells at convenient places and times. Although there is a huge scope in the market of pigs in the state, the players in the market are of the lower economic background. They find difficulty in transporting the live animals to the market places. The study concludes that there is a need to have a formal channel of logistics to transport the product from rural to urban areas where the demand of the product is higher.

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Chapter 6

Summary of Major Findings, Suggestions and Conclusions

6.1.Introduction

This chapter consist of summary of major findings and recommendations for the stakeholders of pig farming viz., Government, pig farmers, retailers and so on. The major findings discussed in earlier chapters are briefly presented here. The following section consists of chapter wise summary of findings . Based on these findings, major recommendations of the study are also presented.

6.2 Chapter wise summary of findings

6.2.1 Introduction

This chapter deals with the evolution of pig production in Mizoram, tracing from the worlds pig production, India and to finally to Mizoram. The chapter describes about the need of protein food requirements as per the FOA recommendation. The chapter discusses about the lack of supply of pork in Mizoram and the nature of pig production in general. The chapter also deals with Literature survey on the production and marketing of pigs from various sources. On the basis of these literatures, research design of the study has been described. The design consists of objectives, hypothesis and the sampling design of the study. The study is primarily focused on three select districts ogf Mizoram viz., Aizawl, Lunglei and Kolasib. Pre tested questionnaire was used to collect the data and respondents . All together 593 respondents were found to be suitable for data analysis (95.4 percent male 4.6 percent female). The study also comprises the production process as well as marketing carried out by the pig producers at the ground level. On

the basis of the literature survey and works carried out by earlier researchers a research gap was found and expects to make a contribution in the literature relating to piggery in Mizoram. The chapter also includes the importance of the study as well as the limitations of the work carried out.

6.2.2 Piggery in Mizoram and its contribution to economy

Chapter 2 deals with the socio economic indicators of Mizoram consisting of income, livestock census, sartorial indicators like industries banking, education, roads, transport and communication etc. The select indicators suggest improvements and increase in consumption of goods and supplies and development of economies in Mizoram. Chapter 2 also deals with piggery in Mizoram and its economic implications as well as employment status in Mizoram. The chapter also explores employment and income generated through piggery in terms of district wise.

6.2.3 Pig Production and Management System in Mizoram

This chapter consist of pig production system in Mizoram. The chapter explains about te pig management systems like housing and equipments consisting of site selection, flooring of the pig sty wall and roofing as well as the equipments and space requirement for pig production. The chapter also explores the types of breeds available in Mizoram as well as the process of production starting from the selection of breeding till slaughter or sell of the pig.

6.2.4 Government's Role in Development of Piggeries in Mizoram

Chapter 4 explores the Governments (both central and state) to develop piggery in Mizoram. The chapter studies various government departments like the Department of Animal Husbandry

Dairy and fisheries Government of India, NABARD, Animal Husbandry and Veterinary Dept. Government of Mizoram. Apart from this, policies of the Government like National Livestock Mission and its subsequent sub-missions sub-mission on pig development on North Eastern region, central sector schemes on pig development as well as New land Use policy NLUP Mizoram. These policies and schemes were analyzed and finding were presented. Data analysis relating to the Governments' role in piggeries was carried out and presented in this chapter.

6.2.5 Marketing of Pigs in Mizoram

This chapter consists of issue related to marketing of pigs in Mizoram . Although the corporate type of marketing is not available, most of the marketing is carried out through traditional method as well as some modern method by the retailers and, producers. The chapter also includes presentations of meat data as well as its by products like bacon sausages, dried meat, smoked. This chapter studies marketing on the basis of 4ps of marketing vis., product, price, place and promotion. This chapter also analyses the various forms of marketing practiced by the pig producers in Mizoram.

6.3 Summary of Findings

6.3.1 Introduction

- Livestock is symbolic to wealth and power across civilizations for centuries. As per 19th Livestock census, 2012 (GOI, 2014) India is blessed with various type of livestock. Its livestock sector is one of the largest in the world. It has 56.7 percent of world's buffaloes, 12.5 percent cattle, 20.4 percent small ruminants, 2.4 percent camel, 1.4 percent equine, 1.5 percent pigs and 3.1 percent poultry. The importance of livestock in Indian agriculture is well recognized. The growth of demand for animal products has arisen from

the growth of population, urbanization and rising income in the developing countries (FAO, 2003).

- Livestock is the source of income for the small scale farmers and acts as an insurance against crop failures and unforeseen calamities. The importance of livestock goes beyond its food production function (BIRTHAL et al, 2002).
- Animal farming has a special significance as it plays an important role in improving the socio-economic development of the weaker sections of the society.
- Livestock plays a significant role in the economy of Mizoram as majority of the population engages in the crop production, which is still traditional. Piggery holds a unique position and pork accounted for the highest quantity with 56.19 percent, as pig rearing is considered to be the most popular encouraging and appropriate livestock enterprise (Mizoram Economic Survey 2015-16). Amongst the livestock animal reared, pig is most significantly reared in every household as an additional economic activity. Pig farming is one of the main sources of income for the subsistence farmers as well as determining the family's purchasing power.
- Pork is also considered to be the most favored meat amongst the Mizos. Unstable income from crop production and other sources is absorbed by the income from the livestock and piggery is one of the leading supplementary activity. It generates an uninterrupted stream of income and employment and reduces seasonality in livelihood patterns particularly of the rural poor (BIRTHAL and ALI, 2005).
- Like most of the tribal communities, animal agriculture or animal keeping has been intact with their culture. Still then, with the rising population and other reasons in Mizoram, there is a very low supply of livestock especially in the case of pork, chicken, beef, etc. in

the north east region of India. If, there could be enough supply of the same, the livestock contribution to agriculture could have an impact in the national GDP. The study finds that changing lifestyle and growth in per capita income directly or indirectly urge the rise in the consumption demand of the people.

6.3.2 Piggery in Mizoram and Its Contribution to Economy

- According to the Mizoram Economic Survey, the economy of Mizoram was floating to growth at the rate of 8.46 percent during 2014-15 financial year with base year 2004-05 which was significantly higher than projected national growth at 7.4 percent (Mizoram Economic Survey 2014-15). The study finds that NER has a sizeable population of pig i.e., around 24 percent of the total pig population in India. It has been estimated that around 50 percent of the country's pork is consumed in north eastern hill region alone (ICAR, 2011).
- The study finds that pig is the most important livestock in the state and plays a major role in the livelihood of the small farmers. The records of the Animal Husbandry and Veterinary Department shows the popularity and importance of the swine. The study finds that Rearing of animals have an important role as crop production is still traditional in Mizoram.
- The study observed that there are three types of employment that are generated from piggery. These were categorized as: (i) The category of pig farmers who owns the farm and land. (ii)The category of pig farmers who owns large farms and (iii) is another category of employment who finds opportunity in the market consisting of butchers brokers or retailers.

- It was also found that several household assets and properties like television, refrigerators, vehicles etc. were bought from the money they earned from piggery (Table. 2.15). The study also observed that majority of the respondents have made use of the income from pig for purchasing properties to a great extent. The study also shows that majority of the farmers are having low family income and are practicing non commercial piggery (Table 2.10).
- The study also finds that amongst the various livestock species, piggery is most potential source of meat production and more efficient feed converters after the broiler.

6.3.3 Pig Production and Management System in Mizoram

- The north eastern part of the country produces majority of the Indian pork production representing only 7 percent of the country's animal protein sources.
- There has been a demand gap of meat as per the recommendation of the Indian Council of Medical Research (ICMR), which recommends meat consumption per annum is 10.95 kgs while average consumption in India is still below 5 kg/cap/year (FAO, 2012).
- Majority of the livestock consist of swine (73.35 percent), and the meat production comprises 69.33 percent of the total meat production during the year 2014-15 (Economic Survey of Mizoram, 2014-15).
- The study also finds that due to huge supply shortage in Mizoram, unorganised import of livestock from the border region of Myanmar is happening frequently, there are many instances where reports of swine flu and other diseases that are the outcome from importing of livestock.

- Pig rearing in Mizoram is mostly based on household activity, confined at the backyard of the household. At 94 percent (Table 3.1) majority of the pig rearers claim that they have a sty for the pigs. Respondents claim that they keep pigs to feed their kitchen waste and in turn will provide economic return and extra savings for the household.
- The survey observed that households have utilize their backyard and other convenient places in their compound for the erection of the sty. There are 53 percent of the farmers who have used available wood in their premises for construction of the pig sty. The study also finds that 23 percent of the farmers have used bamboo with wood and other available materials like mud tin etc. (Table 3.1).
- The study finds that major purpose of pig rearing is meat and the two phases of pig production comprises : (1) sow farms (breeding and rearing) and (2) fattening farms (growing and finishing). It was observed that in Mizoram, the major concern for farming pig is meat where majority of the respondents' activity opt for meat production and fattening.
- It was found that majority of the farmers (47.4 percent) opt for the Burmese pigs and the source of stock (piglets) purchase from these street vendors (Table 3.4). The data shows that the care practices in Mizoram are acceptable for survival of the piglets. Though majority of the respondents have pig keeping as part time, it was found that the breeds are quite productive.
- It was observed that there has been inconsistency in the farming due to engagement in other activities as 40.3 percent of the farmers spends less than 2hours and 45.4 percent spends 2- 5 hours (Table 3.9). Some big farms which are at the nascent stages of development were also observed during the data collection.

- Most of the farmers use the waste products as manures for crops and vegetation which is shown by the result that 56 percent of the farms claimed to utilize the waste as manure, fertilizers, etc. for the crops (Table 2.10). It was also observed that the higher income earners were from the large farms whose efforts were more intensive and have their farming as main occupation.

6.3.3 Government's Role in Development of Piggeries in Mizoram

- The study finds that Department of Animal Husbandry Dairying & Fisheries (DADF) is one of the Departments in the Ministry of Agriculture (Government of India) and came into existence w.e.f. 1st February, 1991, by converting two divisions of the Department of Agriculture and Cooperation namely Animal Husbandry and Dairy Development into a separate department.
- The department is responsible for matters relating to livestock production, preservation, protection from disease and improvement of stocks and dairy development, and also for matters relating to the Delhi Milk Scheme and the National Dairy Development Board. The department advises state governments/union territories in the formulation of policies and programmes in the field of animal husbandry, dairy development and fisheries.
- Under the National Livestock Mission a huge importance has been given to piggery and thus Piggery Development-National Guidelines for formulation of State Pig Breeding Policy has been laid down with a proper Piggery Development-Biosecurity guidelines for piggery. (commenced from 2014-15), the mission was designed to cover all the activities required to ensure quantitative and qualitative improvement in livestock production systems and capacity building of all stakeholders.

- The Government of India had constituted National Commission on Farmers in 2004 under the chairmanship of Dr. M.S. Swaminathan. Based on the recommendations made by the Commission in its Revised Draft National Policy for Farmers and the comments and suggestions received from various stakeholders, the government formulated the "National Policy for Farmers, 2007". The policy, among other things, aims to improve the economic viability of farmers by substantially improving the net income of farmers in addition to improving productivity, profitability, land, water and support services and provide appropriate price policy and risk management measures.
- The livestock rearing section was removed from the policy and was further developed and included in "The National Livestock Policy, 2013". This policy has been formulated to have a framework for improving productivity of the livestock sector in a sustainable manner, taking into account the provisions of the National Policy of Farmers, 2007 and the recommendations of the stakeholders, including the states.
- The National Livestock Policy (NLP) aims at increasing livestock productivity and production in a sustainable manner, while protecting the environment, preserving animal bio-diversity, ensuring bio-security and farmers' livelihood. The policy focussed on areas which have direct concern areas for piggery. NABARD was entrusted for implementing the NLP.
- NABARD was set up as an apex Development Bank with a mandate for facilitating credit flow for promotion and development of agriculture, small-scale industries, cottage and village industries, handicrafts and other rural crafts. The Parliament, through Act,61 of 1981, approved the setting up of NABARD.

- There are hardly any licensed pig slaughterhouses in the country and most of the slaughter in rural / urban areas is done in a clandestine manner (Govt. of India Pig Development subsidy scheme, 2012). Keeping this in view, it has been decided by Government of India to launch a Central sector scheme on “Pig Development” with a total outlay of Rs.73.55 crore during the remaining XI Five Year Plan period (2010-11 & 2011-12). The scheme aims at encouraging commercial pig rearing by farmers to improve performance of native breed through cross breeding. The scheme has following four components :

(i) Pig Breeding Farm : Under this component 25 percent of the outlay (33 1/3 percent in NE States including Sikkim and hilly areas) as back ended capital subsidy would be provided for rearing of 20 Sows and 4 Boars subject to a ceiling of Rs.1.50 lakh per unit (Rs.2.00 lakh in NE States including Sikkim and hilly areas) for which an indicative unit cost of Rs.6.00 lakh has been provided.

(ii) Pig rearing & fattening unit : Under this component 25 percent of the outlay (33.33 percent in NE States including Sikkim and hilly areas) as back ended capital subsidy would be provided for rearing of 3 sows and 1 boar subject to a ceiling of Rs.19,000/- per unit (Rs.25,300/- in NE States including Sikkim and hilly areas) for which an indicative unit cost of Rs.0.76 lakh would be provided.

(iii) Retail Outlets : Under this component 25 percent of the outlay (33 .33 percent in NE States including Sikkim and hilly areas) as back ended capital subsidy would be provided for establishment of a retail outlet subject to a ceiling of Rs.2.50 lakh per unit (Rs.3.33 lakh in NE States including Sikkim and hilly areas). Loan can be sanctioned with an indicative unit cost of Rs.10.00 lakh per unit.

(iv) Facilities for live markets : Under this component 50 percent of the outlay as back ended capital subsidy would be provided for creating facilities for live markets subject to a ceiling of Rs.2.50 lakh per unit.

- The Department of Animal Husbandry and Veterinary is one of the oldest and most potential Departments of the Government of Mizoram. On May 1890, it became a fully fledged Government office of the Deputy Commissioner's started functioning in Mizoram which was manned by Captain Brown. All the Government services except civil surgeon and commandant and Assam Rifles were under the direct control and supervision of the District Commissioner. In regards to Veterinary and Animal Husbandry services, Dr. Khumi Angami was the first Veterinary Doctor to join in Mizoram.
- Study finds that the department has taken several initiatives for improving the status of livestock farming in the state. In order to achieve its objectives, the New Land Use Policy had also made a co-operative efforts along with the department to offer the beneficiaries to opt for different trade under the AH & Vety sector.
- Since NLUP is a project primarily to provide sustainable form of livelihood to beneficiaries, a trade needs to be selected for such livelihood and each beneficiary family is allotted one trade from their choice of a participant department. There are several trades available for selection by beneficiary families in different departments, Piggery is one among the four trades in AH&Vety department under Governmentt of Mizoram.
- This Department, with a total cumulative allocation target of 9,919 beneficiary families for the years 2010-11 and 2011-12, successfully reached it's target with an expenditure

of Rs 6,179.40 lakhs. Another Rs 442.00 lakhs was expended by this Department under the Infrastructure Component.

- There are currently 20382 NLUP beneficiaries under the piggery trade as on 17/03/2017(Animal husbandary and Veterinary department Mizoram). The number of these beneficiaries keeps changing because of some elimination and re-inclusion of some applicants who once were not in the list, some of these attributes as discussed by the departments' official was referring to political involvements in the operational level.
- The first Cooperative named “The Aizawl Trading Cooperative Society Ltd.” was registered in 1949 and the first Cooperative Sub-Divisional Office was established in 1951 at Aizawl which was upgraded as a District Office on 3.1.1956. In order to provide legal protection to the common interest of cooperative members and functioning cooperative institutions under the Mizoram cooperative societies Act, 2006, the Registrar of Cooperative Societies of Mizoram has been assigned a vital role of supervision of the working of all the registered cooperative societies in the whole state of Mizoram.
- Likewise the Mizoram Pig Producers' Cooperative Federation (PIGFED) Ltd. was established in 1988. It was registered under Cooperative Act on 6th June 1989.
- At present there are 118 numbers of Primary Pig Producers' Cooperative Societies affiliated under the Federation. The main objective of the Federation is to promote and facilitate the operation of the Primary Pig Producers' Cooperative Societies affiliated to it by coordinating their activities so as to improve their economic conditions by

implementing scientific way of pig rearing. PIGFED is now comprises of 154 Primary Piggery Cooperative Societies.

- The process for strengthening the piggery development programme rests with PIGFED and is now running a pig breeding farm at Thenzawl which produces quality and high breed types of piglet. The average profit earned has been recorded to be Rs. 49,61,427 and business turnover of around Rs. 93,07,683 annually over these years.
- The main objectives of PIGFED Ltd. are to promote and facilitate the operation of primary Pig Producers' Cooperative Societies affiliated to it by coordinating their activities and supplying requisite inputs and technical guidance for scientific pig rearing by their members and undertaking processing and marketing of pork and other piggery products. The business turnover have rose from Rs 9.48 lakhs in 2007 to Rs. 103.04 lakhs in 2015 with profit making societies of around 150 societies. This show that there has been a trendin rise of the development of piggery societies which stands for the development of the piggery industry.

6.3.4 Marketing of Pigs in Mizoram

- Marketing is an important aspect of any livestock production system. It gives a mechanism whereby producers of the farmers exchange their livestock and livestock products for monetary value. This revenue is reused for another cycle in procuring the livestock and for acquiring goods and services that they do not produce themselves, as a means to sustain their livelihood. The study tries to analyse the pig marketing in Mizoram from the perspective of 4Ps viz., product, price, place and promotion.

- The study finds that in Mizoram, people consume various pork products, such as bacon, sausage and pork chops; Mizoram pig market majorette is the meat as pork and live swine. The product market can be separated into two categories which are meat and the live animals.
- Study finds that in the meat market, fresh meat is the most common form and some parts of the meat which are smoked, adding some value and sold at a little higher price than the fresh meat. The smoked meat can even be stored for a longer period of time.
- The product can be segregated into two sections viz., meat as its by-products and the live animal. In Mizoram, pork is further processed into the following products:
 - a) Cured Pork- These constitute the bacons and hams which are preserved by smoking. Smoked meat is popular among the consumers of pork in Mizoram. It is an easy process of preserving the meat. Further this process increase the shelf-life of the product.
 - b) Sausages and Pies - These are derived mainly from trimmings and offal that are left after cutting up whole parts. It is one of the most preferred parts of the pork meat.
 - c) Pig Skin –The skin are processed into leather and surgical strings. However, there is no facility for processing pig skin in the state. The skin are dried and then consumed in many forms.
- Study finds that the live animal product can be categorised to three categories:
 - a) Full grown animal:
 - b) Piglets:

c) Breeding:

- Majority of the pig market in Mizoram can be claimed to comprise of meat and the piglet bazaar. Pork is the major item in the market and the sample shows that there are 87.4 percent of the producers do not practice further processing of the meat for reselling, while there are 12.6 percent (Table 5.1) respondents in the market who sell and prepare smoked meat for preservation and for taste enhancement.
- As of October 2016, the retail rate of pork is Rs.250/- per kg. Farmers sell pigs of size 40 inches of pigs (measured round the chest) at a price of Rs.18,500/-(approx) and size 50 inches at a price of Rs.30,000/-(approx). The local butchers have developed a mechanism to calculate the weight of pigs depending on the chest size measure of pigs and the price of the pig is usually negotiated.
- The survey also observed that the price of servicing is Rs. 5,000/- and the price of artificial insemination is Rs.3,500/-(Table 5.2). Majority of the respondents at 79.6 percent are satisfied with the price of the pig and the meat. The data also shows 20.2 percent are not satisfied with the pricing, these groups of people are generally the larger producers and they suggest the prices of the products are increased to some extent.
- Piglets are mainly sold right out of the farm's premises where the buyers have to approach on their own convenience. With this reference it can be said that the place of the farm is where the sale of piglets usually happen.
- Pork on the other hand, which is the most favored meat is sold in the market at specified stalls. When in times of scarcity, the buyers are often to be seen in line to catch their turn for buying their share.

- Pork is also sold in convenience at the local places where the locally sourced pigs are favoured by the buyers, this is also the premises where individual farmers slaughters and sells the meat.
- The data also shows that majority 73.9 percent of the respondents that local market are as near as below 2 kms (Table 5.4) which is quite convenient for the general transportation of the products.
- The study attempted to find the transportation cost of the respondents while selling their products, it was observed that there are 26.5 percent of the pig producers who use public convenience for transport of their produce to the market and there are 65.8 percent (Table. 5.8) respondents who happened to sell their produce at their place itself and also sells them at the local market and often slaughter the produce by themselves as well.
- In Aizawl district, majority of the producers i.e, 88.7 percent sold their produce to the butchers. This shows that the main motive of the production is meat since there are only 5.6 percent sells to other farms which can be treated as they sold piglets for re–production or breeding purpose. The study shows that there are only 2 percent (Table No. 5.6) who retain their produce for rearing them in their farm. There are 70.4 percent respondents in Lunglei who claims to sell their produce to butchers only, the data also shows that there are 21.1 percent who does the slaughtering and sells by themselves.
- Pig farming is a common enterprise among the rural and urban areas of Mizoram. As mentioned in the earlier chapters, every household is keen to keep at least few pigs in their backyard. The different markets used by the farmers are Bara Bazar, Town Markets, Local Markets, Roadside Markets, Hog dealers

- It was observed that traders and brokers, and even private butchers are searching far as reachable by vehicle in a day from the capital city Aizawl just to collect pigs from the village farmers.

6.4 Suggestions

6.4.1 For the Farmers

- Sourcing of feed (readymade) is a major problem for the large and mid-size farms, thus a proper plan for sourcing of feeds will prove essential.
- It was observed that majority of the farms are found to be household family practice, and very less commercial farms. If more commercial level farms are encourage amongst the farmers, the production and productivity of pigs in Mizoram is likely to improve.
- Since the pig farmers of the state are not able to produce to fill the gap of the demand of the people, large import is taking place. Therefore the farmers need the capacity to expand to commercial level, this will motivate the farmers.
- The current management system of the production of pigs is traditional and with more technologies like vaccine and more advanced facilities like feeds etc., will improve production and quality.
- Most farmers seems to hesitate to visit institutions like NABARD and other institutions that can help out with the financial problems. There is a need of awareness of funds available and training at these institutions.

6.4.2 For the Government and Policy makers

- The study observed that majority of the respondents were of the lower income groups of the society and that they have been farming pigs as part of their household activity (non-commercial), this is assumed to be one of the low ratio of supply to the demand of pigs. The study recommends that if there could be more awareness program, more investment may come up.
- The capital for pig farming is quite low in comparison to other meat production like *mithun*. This can attract unemployed youth to venture into pig farming and thus generate employment if proper awareness are taken up. As the sector grows, there may be further employment generations in terms of marketing and transportation from production site to markets. Of which it is felt that more of awareness in the profitability and the scope of piggery amongst the youth and especially to the higher income level of the community who are expected to have more investment power. Eventually, this will help in serving the economy of the state in many ways.
- There are many farmers who are unaware of the facilities that are available for them, i.e, financial aids which can be availed through financial institutions like NABARD, KVIC, commercial banks etc. of different ways, which could be made useful to them. If more awareness is made in this regards, it is believed to have significant impact to the pig production level.
- Sourcing of readymade feed is costly and very difficult for the farmer, which they claimed essential for the growth and expansion of pig producing farms. If the government can take up role in sourcing cheap and efficient feeds, it will help the farmers in rising the production of pigs.

- The potential domestic pig farmers (who possess commercial piggery facilities) in the state should be given awareness of the situation that progress of pig farming is very much essential for the economic development of the farmers as well as the of Mizoram.
- Inclusion of members representing the real farmers(Eg. PIGFED)members, while framing policies will improve efficiency of the policies regarding piggery
- There study observed 70.5 percent of the total sample farmers have not availed membership of any farming society. Activities in the society will help improve awareness and improvement of advance farming facilities for increased production. Therefore, famers may be encouraged to join farming communities.

6.4.3 Retailers

- Majority of the meat purchased are from street vendors without proper shields from insects and are prone to unhealthy meat. It is a crucial moment to startup with clean and healthier meat shop infrastructures.
- There are few vendors with proper facilities for fresh meat retail shops, more of these shops may be initiated.
- Smoked pork is the most popular processed meat for pig, the study suggest to set up proper dedicated facilities for the same.
- The movement of live pigs is quite unorganized, the study could not identify any retailer union or such body providing such activity. The study recommends the retailers to form unions, this may enhance the scope for proper movement of pigs and improvement in the retailing activities.

6.4.4 Others

- There are huge investment opportunities in the farms as well as in the feed manufacturing. It will be a good move for mature and upcoming entrepreneurs to consider investing in this area.

6.5 Future Research areas

- The study has observed that the reason for stagnant growth of commercial farmers is the problem with sourcing of feeds, Studies focusing on the improvement in this area is essential.
- Studies concerning the consumption pattern of the meat would be a good move for encouraging investment in commercial distribution of the meat in a systematic way.
- Comparative study of pig production with regions having similar topography in the NER will be a good effort.

6.6 Conclusions

Amongst the North Eastern Region of India where an estimate of around 50 percent of the country's pork is consumed, Mizoram is a state where majority of the population are acclaimed to favour pork over other meat. Majority of the livestock in Mizoram is occupied by the swine at 73.35 percent. Due to the high demand of pigs and its by products, there is a huge supply shortage and the state is experiencing unorganised import of livestock from the border regions of Myanmar and Bangladesh. There are many instances where reports of swine flu and other diseases that are the outcome from importing of livestock. Pig rearing in Mizoram are mostly non commercial, and are in confinement at the backyard of the household.

There are some farms with commercial prospect which are at the nascent stages of development. The study also observed the problems of these farms were mainly the non availability of feed and other feed stuff. This also lead the farmers to have a low tendency to enlarge their farms.

The role of Government is very vital in the development of piggery in Mizoram. The Government of India has given due importance for the development of piggery. AH&Vety department have been entrusted by the the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India, for the development of Livestock and has also played a huge role in the piggery sector. With the Governments' Piggery development schemes under NABARD, NLUP etc. The study observed that there is an abundant availability for marketing of the pig and piglets. Majority of the respondents have also made use of the income from pig for purchasing properties to a great extend.

The study concludes that, with a ready market available in Mizoram and that proper supply of feed is of vital importance for the development of commercial pig production. And also more commercial farms take up the production challenges with the schemes and policies that are available for them which will be a certain starting point to fill the demand gap with profitable income.

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Questionnaire

A Study on Production and Marketing of Pigs in Mizoram

(The Questionnaire is prepared for a Ph.D thesis at Mizoram University. The data collected from the questionnaire will remain Confidential and will not be divulged to any other third party. Please answer the question by putting tick(✓)mark in the appropriate box and if necessary on the space provided.)

Thanking You.

Vanlalmalsawma

Ph.D Scholar

Dept. of Management

Mizoram University, Aizawl.

Schedule 1 – Identification

1. District _____
2. Village/ Ward No. _____
3. Name of the Farmer _____
3.a) Sex Male Female
4. Age _____ Years.
5. Marital Status:
 Married Unmarried Divorced.
6. Educational Qualification:

 Illiterate Under Matric Matric
 Intermediate Graduate Post Graduate
 Others (specify) : _____

Schedule 2 – Socio Economic Conditions

7. Type of Family: Nuclear Joint
 Others(specify): _____
8. Are supports from your family: Fully Partially

9. Family composition: Male_____ Female_____ Chilren_____ Total_____

10. Income of the family (Monthly):

- a) ₹ 2000 and below
- b) ₹ 2001 - ₹ 5000
- c) ₹ 5001 - ₹ 10000
- d) ₹ 10001 - ₹ 15000
- e) ₹ 15001 - ₹ 20000
- f) ₹ 20001 - ₹ 30000
- g) ₹ 30001 - ₹ 50000
- h) ₹ 50001 - ₹ 100000
- i) ₹ 100001 - ₹ 250000
- j) ₹ 250001 and above

11. What are the sources of your Income:

- Farm Only Farm and Pig Rearing Farm + Business
- Farm + Govt. Job Farm + Pig Rearing + Govt. Job
- Any Other (Specify)

12. What was your status before and taking pig farming?

- Unemployed Student Other business

Any other (specify)_____

13. What is your income from Pig Farming:

- a) ₹ 2000 and below
- b) ₹ 2001 - ₹ 5000
- c) ₹ 5001 - ₹ 10000

- d) ₹ 10001 - ₹ 15000
- e) ₹ 15001 - ₹ 20000
- f) ₹ 20001 - ₹ 30000
- g) ₹ 30001 - ₹ 50000
- h) ₹ 50001 - ₹ 100000
- i) ₹ 100001 - ₹ 250000
- j) ₹ 250001 and above

14. Have you able to buy items like Tv, Fridge, Two- wheeler, Four wheeler from the income earned from Pig Farming? Yes No

If yes, then what itams have been Purchaseed?: _____

Schedule 3- Production

15. How long have you been in Pig Farming?

- Less than 1 year. 2-5 Years 5-10 Years
- More than 10 Years

16. How many hours do you spend on Pig Farming in a day?.

- Less than 2 hours 2- 5 hours 5- 10 hours
- More than 10 hours

17. What is the main purpose of your Pig Farm?

- Meat Production Reproduction Both
- Any Other : _____

18. What is the size of your Pig Farm.?

- 1- 10 pigs 11- 20 pigs 21- 50 pigs

51- 100 pigs 101- 250 pigs 250 and above

19. What are the number of pigs?:

Male Female Total

20. What are the number of pigs kept for breeding

21. What are the number of pigs kept for meat

22. What is the type of rearing followed in your Farm?.

Intensive Confined Semi- Intensive

Any other: _____

23. What is the type of material used for the Sty?:

Bamboo and wood Wood only Mud and others

Concrete Concrete and wood

Any Other _____

24. What are the types of breed reared in the Farm?:

Indigineous Cross Breed Mixed

Any other (specify) _____

25. What are the feeds used for rearing?

Kitchen waste Feeds

Kitchen waste + Feeds Vegetation

26. How is the waste managed?.

Planned Unplanned

27. Do you have sufficient supply of water and poor?

Yes No Any other (Specify)

28. How do you transport raw materials and end products?.

- Owned transport Other transport network
 Any Other (specify)_____

29. From where the stocks are purchased?.

- Reliable breeder Nearest Farm
 Government Farm Any other (specify)_____

30. What is the average age of the stocks purchased?.

- Less than 2 months 2- 3 months 4 and above

31. Do you offer breeding service: Yes No

32. What is the size of the Litters at Birth at the Farm?

- Less than 5 5- 8 Above 8

33. What is the size of the litter at winning at the Farm?

- Less than 4 4-6 Above 6

34. What is the number of furrowing in a year?:

- Once Twice

35. What is the quantity of feed supplied?: Per day Kg. Per Feed Kg.

36. Do you boil your feeds?

- Yes No

37. How many times do you feed per day?:

- Twice (Morning & Evening) Thrice (Morning, Noon, Evening)

38. Do you use vaccination

- Yes No

39. Any infection encountered.

- (a) _____
(b) _____
(c) _____

40. Do you wean the piglets within two months:

Yes No

41. Do you castrate the male pigs?.

Yes No

42. Do you take special care for pregnant sows?

Yes No

43. Do you take special care for sow after farrowing?

Yes No

44. How often do you clean the pigsty

Daily After 2 days Once in a week

45. Are there any employed workers in the Farm?.

Yes, Please Specify below. No

Regular : _____ Hourly Basis : _____

Others : _____

46. Have you availed any Governmental financial aids or subsidies?

Yes(specify)

 No Applied but no response. Not Applied

47. Is the Governmental policies for pig farming conducive to pig farming?

Yes (specify)

No (Please specify)

48. If there is any suggestion on the policies and plans of the Government?:

49. Have you joined any Membership of a Farming Society or Group in the interest of the farm?:

Yes (Please specify)

No (Please specify)

50. What do you feel about the meat market? Mark at least two:

The local market practice is enough

Needs Improvement

Not Good

There should be a new Plan

Any Comments: _____

Schedule 4- Marketing

51. Are you satisfied regarding the Pricing of Meat and Litters?

Yes

No

If No, any Reason:

52. How far is the market place from the farm?

Below 2 Kms

2 to 3Kms

3 to 4 Kms

4 to 5 Kms

Above 5 Kms

53. What is the mode of transporting to the Market:

Hired Public carrier. (How much per usage). ₹ My own Vehicle

Others Please specify: _____

54. Do you process the meat for selling?

Yes

No

If yes (please specify): _____

55. Is there any demand for storage facility?

Yes

No

Please Specify: _____

If yes Please specify: _____

56. What is the value of demand for the processed meat?

Very High

- High
- Average (same as un processed)
- Low
- Others, Please Specify_____

57. What is the average Quantity of meat sold in a week:?

- Below 100 Kgs.
- 100 to 200 Kgs.
- 200 to 300 Kgs.
- 300 to 400 Kgs.
- 400 to 500 Kgs.
- Above 500 Kgs Please specify_____

58. Do you have any regular channel of selling the Meat?

- Yes No

If Yes Please Specify_____

59. What is the number of Piglets sold in a Year.

- Below 10 10 to 20 20 to 30
- 30 to 40 Above 40

60. Is there a ready market for the Piglets?.

- Yes No

Any comment _____

61. What is the average weight of the Pig when ready to be sold for meat?

Kgs. Or (_____)

62. What is the number of Pigs sold for meat in a day?

Pigs

63. How do you sell the Pigs ?

To other farms To the Butcher
 Slaughter and sell Myself Others, Please Specify

(_____)

64. What is the total cost of selling one Pig when not sold through others?

₹ Please comment how its been done:

65. Have you ever run short of supply when there is more demand?

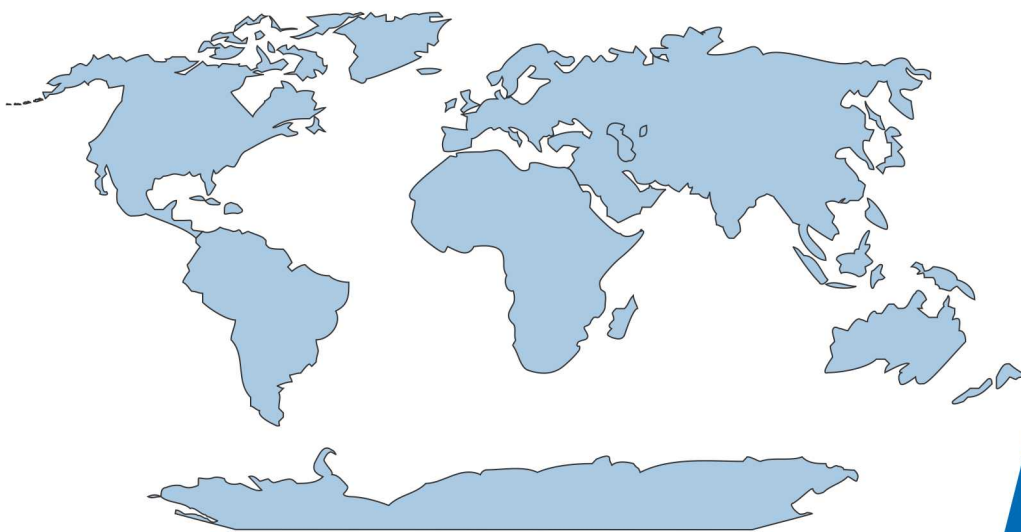
Yes No Sometimes Frequently

66. In which month of the year the demand of meat is more or highest?

Any comment:

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INDIGENOUS PIG PRODUCTION IN RURAL AREAS OF MIZORAM

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ABSTRACT

Livestock keeping is embedded to the culture it is an integral part of the people of Mizoram, amongst which pig is the most favourite and the highest demand but with a very low level of supply within the area. Especially in the rural areas where 48.49 percent(Economic survey Mizoram 2012 - 2013) of the population dwells where pig keeping is akin to their household activity as a supplementary to their agricultural yields. Despite the productivity of the farms in Mizoram, the reason leading to the shortage of supply can be credited to the rise in population, increasing in the economy raising the buying power of the people. Largely availability of Burmese piglets at lower rate in the market and at the streets, knocking out the chances of local and the exotic breeds and apparently the small sized farms causes low production. In order to enhance production, control of imports at certain level is essential. With more awareness in the investment opportunities and the development factor in this sector by the higher capacity income group and people with more potential could be a vital factor. The awareness of such and the like facilities is again an essential element from the Government. The people must be given more awareness about the current situation stating the importance of giving importance to value the local Pigs rather than the Burmese pigs. When higher level educated people get engagement in pig production sector, there is a much prospect of rising the swine production as well as income with higher education, more awareness and scope in this matter would be very much advisable.

Keywords: pig farming, piglets, farrowing, weaning, feeds

1. INTRODUCTION

Animals and livestock keeping is a crucial element in the national economy as well as in the socio economic development of a developing country like India, where majority of the population are engaged in agriculture, and thus, generating gainful employment in the rural and sub urban areas. India has the largest livestock population in the world (Government of India Planning Commission, 11th Five Year Plan Report). Agriculture is the main source of income of the people living in rural areas and livestock is a sub sector of agriculture. Pig farming is one vital element of the farmers' economic activity in the North Eastern region in India. The North Eastern region has a sizeable population of pig i.e., 24.63 percent of total pig population of India is in North Eastern states. Around 50 percent of the country's pork is consumed in North Eastern Region alone (Mazumder, et al, 2012).

Mizoram characterised with its hilly terrain and with a population of about 10 lakhs lies within the tropics between latitude 21.19^o C to 24.35^o C north and longitude 92.15^o C to 93.29^o C east. The mountain ranges slopes from north to south direction on the ground. The slopes are steep on all sides and the elevation ranges from 40 metres to 2157 metres. Pig rearing in Mizoram is very common and is attributed to culture as well. The livestock population as per the *Animal Husbandry & Veterinary Department Mizoram*, Pigs constitute the largest group followed by Cattle; 73 percent and 9.62 percent respectively. The major by product of livestock is meat in Mizoram. Majority of the population are meat eaters which add to the value of rearing pig at their backyard. However livestock keeping has been akin to the history of the people and often the wealth of the kings are related with the number of livestock in the kingdom.

According to Kumaresan et. al. (2008), pork is the major meat consumed in the state of Mizoram and contribution of pork to the total meat consumed is as high as 71percent. Pork is the most favourite meat amongst the local residents (Mizo), but in the recent years the supply of pork has been short. This may be due to the rise in population and economy which increases the demand as well. There are very few people who have ventured into pig rearing in order to fill up the gap of short supply. Earlier queues never existed for purchase of pork, but now-a-days queues are more prevalent. This indicates the short supply of meat.

2. THE PROBLEM OF THE STUDY

The big issue is that, the demand is rapidly increasing as population and income increases. Not only that, the economic development of the people and changing lifestyle of the people also attribute to the rise in consumption of pork .While on the other hand the production level is in a stagnant position, and when remained untapped will cause the market to impose import from various available sources, this will bring about availability of unhealthy meat and spread of diseases as well. There has been a huge demand gap of meat as per

the recommendation of the Indian Council of Medical Research (ICMR)¹, the majority of the livestock is occupied by the swine at 73.35 percent, and the meat production comprising 56.18 percent of the total meat production during the year 2011 to 2013(economic survey 2012-2013). Mizoram today, due to huge supply shortage is experiencing unorganised import of livestock from the border region of Myanmar. There are many instances where reports of swine flu and other diseases that are the outcome from importing of livestock. The outcome is therefore the worst for the economy, forcing the people to source their way of supplementing the supply leading to import, either from the neighbouring territories. Since Mizoram is located in the Far East bordering Burma/ Myanmar and Bangladesh in the south west region. Thus the short supply of production has lead to import of livestock from neighbouring countries like Myanmar and Bangladesh. This has even lead to the dangers of spreading swine flu and other hazards.

The Indian Council of Medical Research (ICMR) has recommended daily allowance of meat as 34grams per day. The economic survey Mizoram 2012- 2013 lays out the demand gap to be 807 tonnes of meat in Mizoram as per the recommendation. However, this is just a recommendation as per the other parts of India. In fact Mizoram is a part of the North East India where majority of the pork in India is consumed, and at a very large extent it could be assumed that more quantity of pork could be consumed per capita in Mizoram where majority of the people are not restricted by religious beliefs.

3. LITERATURE REVIEW

Kathleen Jenks (2007) on her essay Pigs in History, Religion, Culture and Art states that the pig has a long history of connection with humans. The paper discusses the properties of pork and states that it contains protein, fat, niacin, zinc, phosphorus, and other crucial minerals.

A. Kumerasan, et. al. (2009) studied the production system of 320 rural pig rearing households in the north east India. The study found that majority of the pigs are reared in intensive system and fed with home made cooked feed (kitchen waste and locally available plants). It was also found that the smallholder resource driven pig production is economically viable and sustainable at household level and there is enough scope to improve the smallholder resource driven pig production system.

A Kumaresan et. al. (2006) undertook a study to assess the growth performance of Hampshire, Large White Yorkshire and Mizo local pigs under field conditions in Mizoram. Piglets (45: 8 males and 7 females of each breed) were selected randomly in and around Kolasib district of Mizoram. The existing local methods of housing, feeding and other management practices were recorded. From this study, it was inferred that Hampshire and Large White Yorkshire pigs gain significantly higher body weight than the Mizo local pigs under field conditions in Mizoram.

S. Rahaman et. al. (2008) studied the production and management system followed by the farmers in Mizoram which was concentrated in Aizawl. The study revealed traditional method of feeding kitchen waste. They also used either traditional or allopathic medicines to deworm the pigs. The study also found that the pigs are marketed at the age of 1 year when they gained the body weight of 90 kg or more.

Saidur Rahahman (2007) studied to identify the factors that influences adoption of pig production technology in pig farmers. A total 100 numbers of the farmers were selected for the study and five different factors namely, housing, breeding, feeding, health care and general care and management practices. The study revealed that 81 percent of the farmers adopted improved technology on breeding and 63 percent of them adopted health care practices at higher level in their farms. The percentage of respondents in adopting improved technology on housing and feeding practices were very low. The study also found that the adoptions of improved technologies were associated with age, education, operational land holding, farm size, income from piggery, social participation, extension contact, farming experience, farm education exposure, scientific orientation, knowledge level, training and financial help received.

From the above studies extracted, there is a clear indication of the connection of pig with the human existence and the by products that are use to satisfy the human needs. The production economy is resulted from the culture and the feeding of household waste. The breeds reared and the adoption of technology in the farm have a far reaching effect on the productivity of the farms. There has not been an attempt to assess the education of the farmers and the incumbent productivity and performance . There arises in the need to find out the relevance

¹ Indian Council of Medical Research recommendation meat consumption per annum is 10.95 kgs .

of education and its contribution to farmers and other attributes for the farms and farming activity of the pig rearers.

4. OBJECTIVE OF THE STUDY

- a) To study the pig production in Mizoram
- b) To examine the income generated from the pig production

5. METHODOLOGY

The study was carried out in three selected districts Aizawl, Lunglei and Kolasib of the eight districts of Mizoram, in India during February to September 2013. The data was collected through questionnaire from the pig rearers, interviews along with questionnaire were held with most of the respondent farmers far as possible. Convenient random sampling was used for the data collection. The data was collected through reference method whereby one farmer will refer to another and so on. In this process varied sizes of farms were covered. The data were analysed by using software like SPSS.

6. DATA ANALYSIS

• BREEDS:

Breeds and breeding management is an important factor contributing to the productivity and efficiency of the input in the farm. To a large extent, the rural pig rearers are very cautious in selecting breeds and management of stocks in their venture. There are over 90 recognized breeds and an estimated 230 varieties of pigs in the world. According to the *Animal Husbandry & Veterinary Department* of Mizoram's training manual for pig farmers, there are around 60 good breeds in the world and about 20 of them are imported to India to test their performances. Out of these 20 imported breeds about 6 exotic breeds have been imported to Mizoram for the development of the pig production. Some of the well known breeds used for production in Mizoram are as follows:

- a) **Large White Yorkshire:** These breeds are distinguished by their picturesque bearing, erect ears, slightly dished face, white colour, pink skin and long deep sides. They have been well known for bacon production. The sows are known for large litters and heavy milk production. An adult male reaches 270 to 360 kgs and adult female reaches 250 to 360 kgs.
- b) **Middle White Yorkshire:** The Middle White is a breed of domestic pig native to the United Kingdom. It originated in Yorkshire roughly around the same time as the Large White. Its name comes from the fact that it was between the size of the Large White and the now-extinct Small White. An adult male reaches 220 to 300 kgs and adult female reaches 250 to 360 kgs.
- c) **Hampshire:** The Hampshire pig is a domestic swine breed characterized by erect ears and a black body with a whitish band around the middle, covering the front legs.
- d) **Berkshire:** Berkshire pigs are a rare breed of pig originating from the English county of Berkshire. A very attractive medium sized pig with prick ears, white socks, a white blaze and a white tip to the tail, otherwise totally black. An adult male reaches 275 to 375 kgs and adult female reaches 200 to 290 kgs.
- e) **Landrace:** This breed is of medium to large breed of domestic pig, white in colour, with long bodies, fine hair, long snouts, and heavy, drooping ears. They are bred for pork production.
- f) **Duroc:** Duroc pig is an older breed of American domestic pig that forms the basis for many mixed-breed commercial hogs. Duroc pigs are red, large-framed, medium length, and muscular, with partially drooping ears, and tend to be one of the least aggressive of all the swine breeds. They also have an excellent rate of gain. Adult male can be 400 kgs and female reaches 350kgs.
- g) **Local:** Small in size and usually pot bellied, hairy and black in colour with long face and short ears. These pigs are reported to have an early maturity and are named upon the tribe rearing it. These pigs are sturdy and would survive without much care especially in feeding and disease management.

Breeds selection is a crucial activity and would determine the productivity of the pig. The sample data shows that the pig rearers preferred cross breed pigs which comprise the highest 37.6 percent of the sample. This can be a convenient breeding service practiced as per availability by the farmers. The farmers prefer those pigs with higher farrowing capacity. The sample data also find that Burmese imported pigs comprises 24.8 percent. The exotic breeds which are initiated by the Government and comprise 23.3 percent and lastly the Mizo local pigs are at 14.3 percent. These local pigs are known for rich taste meat and it is a

favourite among some of the people. Although the demand for local pig is high due to its small size, the farmers are not opting it for breeding in their venture, the low productivity tends to be the disadvantages of the farmers' investment.

Table No. 1: Farmers Preferences on Variables of Production

SI No.	Criteria	Category	Frequency	Percentage
1.	Purpose	Meat	324	54.6
		Reproduction/ Breeding	54	9.1
		Both Meat & Production	210	35.4
2.	Breeds	Trade	5	.8
		Exotic	138	23.3
		Cross	223	37.6
		Burma imported	147	24.8
		Local Pigs	85	14.3
3.	Source of Piglets	Reliable breeder	153	25.8
		Nearest farm	133	22.4
		Govt. Farm	26	4.4
		Others	281	47.4
4.	Age of stock Purchase	< (2 months)	136	22.9
		2-3months	367	61.9
		4 months and above	84	14.2
		Self sufficient(inbreeding)	6	1.0
5	Breeding service	Yes	113	19.1
		No	480	80.9
6.	Farrowing per year	Once	82	17.6
		Twice	384	82.4
7.	Litters at Birth per pig	less than 5	24	7.8
		5-8	97	31.5
		Above8	187	60.0
8.	Litters at Weaning	less than 4	35	11.2
		4-6	103	33.1
		above 6	173	55.6

Source: Sample survey

The major purpose of pig rearing is meat, there are two phases of pig production: (1) sow farms (breeding and rearing) and (2) fattening farms (growing and finishing). It is clearly observed that in Mizoram, the major concern for farming pig is meat where majority of the respondents' activity opt for meat production and fattening, resulting 54.6 percent of the farmers keep their pig for the purpose of meat production and 9.1 percent of them keep them for reproduction and 35.4 percent keep for both purposes as shown in Table no. 1. Lastly there are a small portion of players 0.8 percent who does it only for trade.

The productivity of pigs is determined by the breed selection and availability of good breed. During the data collection, the farmers gave the opinion that they are not able to purchase the piglets whenever they require. It was found that majority of the farmers opt for the Burmese pigs and the source of stock (piglets) purchase from these street vendors which is represented by 47.4 percent. The above table no. 1 shows that 25.8 percent of the farmers have purchased from a reliable breeder at their region, 22.4 percent buys from nearest farm on convenience and 4.4 percent from Government farm. The second highest purchase of stocks (piglets) is from the reliable breeders. There are very little number of Government farms that are at the reach of the majority of the farmers, that only 4.4 percent of the farmers do avail their piglets from the most convenient Burmese vendors at 47.4 percent of the sample.

Weaning large litters, having an appropriate size and weight is a key factor for a profitable herd. There are some pig keepers represented by 14.2 percent who buy pigs at older age i.e., at or after 4 months with the assumption that these pigs have high rate of growth and some of them will be sold in the market. It was also found that majority 61.9 percent of the litters when bought are 2 to 3 months of age and 22.9 percent are purchased at the age below 2 months. There are also farms which are self sufficient which is represented by 1 percent who provide stock(piglets) from their own farm. Only 19.1 percent of the farmers keep male pig for servicing.

Farrowing is another name for giving birth after a normal gestation. A productive sow usually farrows twice in a year, the study shows that 82.4 percent of the sows in the farm farrows twice in a year and are quite reproductive where 60 percent of the average litters per sow is above 8. The table also shows that 31.5 percent of the sample farrows between 5 to 8 litters per farrowing, it was also observed that some sows give birth up to 17 litters and these farmers do engage more than the others in caring the pigs. There are some responses where 7.8 percent of the sample produces less than 5 litters per farrowing, the attributes of this group of low rate of output per sow resulted from the rearing of local pigs.

Weaning is the taking away of piglets from the mother on or after two months. Cross breeding among the exotic breed are found to give large litters till the time of weaning. It was also found that 55.6 percent at weaning time were above 6 months and 33.1 percent were 4 to 6 months and 11.2 percent were below 4 months. It was observed that the breed reared does have a substantial impact in the size of the litters at birth and weaning. The data shows that the care practices in Mizoram are acceptable for survival of the piglets. Though majority of the respondents have pig keeping as part time, it was found that the breeds are quite productive. It can be assumed that if more time is allocated to the care practices, productivity in aspects of farrowing can be at higher level.

Table No. 2: Farming and Management of Pig Production

Sl.No.	Criteria	Category	Frequency	Percent
1.	Duration of Farming	<(1 year)	68	11.5
		2-5yrs	261	44.0
		5-10 yrs	167	28.2
		>(10 years)	97	16.4
2.	Farm size	1-10	448	75.5
		11-20	80	13.5
		21-50	40	6.7
		51-100	19	3.2
		>(100)	6	1.0
3.	Daily engagement	less than two hours	239	40.3
		2-5hours	268	45.2
		5-10 hours	68	11.5
		more than 10 hours	18	3.1
4.	Feeds	Kitchen waste	149	25.1
		Feeds	66	11.1
		Kitchen waste and Feeds	135	22.8
		Vegetation	67	11.3
		Vegetation, feeds and kitchen waste	176	29.7
5.	Feeds in a day	Twice	501	84.5
		Thrice	92	15.5
6.	Boiling of feeds	yes	563	94.9
		no	30	5.0
7.	Sty	Bamboo and wood	138	23.3
		Wood Only	315	53.2
		Mud and others	70	11.8
		Concrete	11	1.9
		Concrete and wood	43	7.3

		Others	16	2.7
8.	Waste management	Planned	332	56.0
		Unplanned	261	44.0

Source: Sample survey

It has been said that pig keeping is a part of the culture of the Mizos, partial engagement in pig keeping is another reason that attributes to the type of farming in Mizoram. The study finds that there are variances in the duration of rearing pigs. The study shows that 44 percent of the respondents have been keeping pig for 2 to 5 years, and 28.2 percent are keeping for 5 to 10 years. A substantial 16.4 percent of the respondents have been keeping pigs for more than 10 years and 11.5 percent below 1 year. It was observed that the diversity in the duration of farming is attributed to be the breakdown of families into smaller nuclear families. It was observed that there has been inconsistency in the farming due to engagement in other activities. The study also finds some big farms which are at the nascent stages of development.

The sizes of the farms are quite small due to the fact that majority of the farmers are keeping their pigs as a backyard venture or substitute activity for additional income. The study finds that 75.5 percent of the respondents keep their pig to clear up the kitchen waste and rear usually less than 10 pigs. The study also finds that there were substantial number of midsize farmers in the state viz., 13.5 percent of the farmers keep 11 to 20 pigs, and 6.7 percent keep 21 to 50 pigs. Big farms which rears more than 20 pigs requires extensive maintenance and intensive care. A very small number representing 1 percent of farmers keep more than 100 pigs. It was observed that the highest number of pigs in a farm was about 250 live pigs among the sample size. The Government has also appointed these big farms as piglet multiplication centre as well. There were few farms as much as 3.2 percent who keeps 50 to 100 pigs and they too have their plans to expand to larger units.

Pigs require intensive care and other activities for their productivity. The time that the farmers give to the pigs makes a difference in their growth and health. Farming hours or time spent for farming are as follows, highest among the sample 45.2 percent spends 2 to 5 hours looking after the farm. A large percent resulting as much as 40.3 percent spends less than 2 hours per day. There are 3.1 percent of the farmers who spends more than 10 hours due to their large farm. The sample also shows that 11.5 percent spends 5 to 10 hours in the farm. Larger the farms, more time were estimated to be spent for care and looking after the production. Majority of the small farms were observed to spend less time for farming which consisted of mere preparation of feeds and feeding of pigs.

Feeding is as important element in pig farming to produce meat or breeds. The sample study shows that the farmers do feed twice in a day and 94.9 percent boil their feeds. Boiling is carried out to soften the feeds. Feed supply from the market could be quite expensive for the lower income group farmers. The most common practice in pig rearing in Mizoram is feeding of kitchen waste while 25 percent of the farmers extensively make use of it. There are some farmers who have the opinion that use of readymade feeds from the market is more economical than boiling the feeds prepared from vegetation and kitchen waste. From the sample survey, 11.1 percent uses only the readymade feeds purchased from the market. According to the farmers, these readymade feeds gives the highest growth rate. On the other hand there are 11.3 percent farmers who practices the method of boiling green leaves and other vegetation as feeds which is convenient in the rural areas. There survey also finds that 22.8 percent uses both kitchen waste and feeds, while 29.7 percent utilise a mixture of available feeds, vegetation and kitchen waste. It was also observed that around 2 to 3.5 kilograms of dry feeds were given to adult pigs in a day. The kitchen waste feeding practice is very common and economical as well. The respondents who use readymade feeds have shared their difficulties in the availability, high price and stocking of the feeds. It was also observed that the larger farms have been utilising readymade feeds prior to the smaller farms who can manage with kitchen waste and other vegetation.

A well constructed sty is a crucial factor of hygienic farming of pigs. Most of the sties were constructed with a small or little elevation levelling the slope of the land. It was found that 76.5 percent of the pig sties were constructed using bamboo and wood which are the most abundant materials found in the region. There are some village farmers who builds with mud and other available convenient materials which are represented by 11.8 percent. In the more urban areas, there are small farmers who uses better materials like concrete and mortar for the construction of the sty. It was also found that 1.9 percent uses concrete and wood with other conveniences. Most of the farmers use the waste products as manures for crops and vegetation which is shown by the result that 56 percent of the farms claimed to utilise the waste as manure, fertilizers, etc.. for the crops.

Table No.3. Demographic Profile of the Pig Farmers

SI No.	Criteria	Category	Frequency	Percentage
1.	Age Group	18 to 29	42	7.1
		30 to 49	308	51.9
		50 to 69	217	36.6
		70 & above	26	4.4
2.	Education	Illiterate	14	2.3
		Under Matric	361	60.9
		Matric	153	25.8
		Intermediate	25	4.2
		Graduate	32	5.4
		Post Graduate	8	1.3
3.	Sources of income	Pig Only	116	19.6
		Farm +Pig	136	22.9
		Pig + Business	221	37.2
		Pig + Govt. Job	70	11.8
		Farm + Pig + Govt. Job	50	8.4
4.	Revenue from pig farming	Below Rs. 15000	61	10.3
		Rs. 15000-20000	69	11.6
		Rs. 20000-25000	89	15.0
		Rs. 25000- 30000	104	17.5
		Rs. 30000-35000	56	9.4
		Rs. 35000-40000	22	3.7
		Rs. 40000-45000	36	6.1
		Rs. 50000-100000	49	8.3
		Rs. 100001-250000	72	12.1
		Rs. 250000 and above	35	5.9

Source: Sample survey

The above table no. 3 shows the demographic profile of the farmers who rear pigs in Mizoram. The study finds that majority of the farmers are in the age-group of 30-49 who are young adults. The second largest group falls in the category of age group between 50 to 69 which is represented by 36.6 percent. This group is the group who have the experience of life and highly motivated to achieve more. The study also found that there are small number of youths in the farming too, at 7.1 percent of the sample in the age group 18 to 29. They are doing as much to support their low income. Lastly the age group 70 to 100 is represented by 4.4 percent of the total. This group are doing the farming to spend some time as well as to supplement the family income.

Majority of pig rearers in Mizoram can be estimated to have a literacy level under matric. From the sample, 61 percent of the farmers are having some literacy below matriculation standard which means that they have some basic education. It was also seen that 25.8 percent of the sample respondents has passed class ten, 4.2 percent were at intermediate and 5.8 percent graduated level. The lowest group is post graduate farmers which was represented by 1.3 percent.

The farmers were queried about their purpose of pig rearing. Out of the total, 116 respondents representing 19.6 percent said that they are primarily engaged in the swine production. These fulltime farmers are working hard so that their earnings are as par with some Government employees earning. The farmers are self employed in their farm and according to their response they had been earning quite substantially in comparison to the national and state per capita income which are estimated to Rs 61,564/- and Rs. 54,689 /- respectively (Economic Survey, 2013). There are also some farmers whose income is higher than government employees. There are 22.9 percent respondents who does pig keeping along with other agro-based farming. 37.2 percent of

the respondents carry on with other business like hotels, stores, etc., while 11.8 percent of the farmers are with some governmental jobs. Finally the respondents who does farming of pigs, along with government jobs as well as some forms of business is represented by 8.4 percent of the respondents.

Mizoram state's per capita income is estimated at Rs 54,689/- in 2012 while the national per capita income during the same period is estimated to be Rs 61,564/- (Economic Survey, 2012-13). Pig rearing is economic activity due to the fulfilling of demand and supply of pigs which may be in the form of piglets, meat, etc. Those who are engaged in pig rearing are more or less self employed and are generating revenue for the state.

An attempt was made to assess the income from pig rearing from the respondents through a questionnaire. In order to assess the income from pig rearing, the results are classified in categories so as to keep the confidentiality of the respondents. It was observed that maximum farmers representing 17.5 percent made an income from pigs as much as Rs. 25,000 to 30,000 per annum. 15 percent of the respondents earns about Rs. 20,000 to 25,000. There are 12.1 percent of the farmers who earns Rs.1,00,000-2,50,000 , small sized farms whose earnings range Rs.15,000-20,000 were at 11.6 percent while 10.3 percent of farmers earns below Rs. 15,000. The table no. 3 also shows 9.4 percent of the respondents were earning between Rs. 30,000 and 35,000 . It was also observed that 8.3 percent respondents were earnings at lower rate at Rs. 50,000-1,00,000, consequently Rs. 40,000-45,000 by 6.1 percent respondents. The highest income category could be found in more than Rs. 2,50,000 and above was earned by 5.9 percent of the respondents and while a small category of Rs.35,000-40,000 by 3.7 percent respectively. The study finds that the higher income earners were from the large farms whose efforts were more intensive and have their farming as main occupation. The income made from pig keeping was quite substantial as majority of the respondents have it as a supplementary income earning activity along with other occupation.

CONCLUSIONS

Livestock keeping is embedded to the culture it is an integral part of the people of Mizoram, amongst which pig is the most favourite and the most demanded product. During the recent years, there has been a very stagnant level of supply within the area. The reason leading to the shortage of supply can be credited to the rise in population, increase in the purchasing power of the people. Another stagnating factor is the availability of the Burmese pigs at a large extent and at a reasonable price, which are imported from the Myanmar border at Zokhawthar at the Far East corner Champhai. The change in lifestyle and more migrants to urban area are akin to the people with more intension to have more economic activities. Majority of the respondents had been supplementing their income with the pig farming and are generating income.

It was observed that majority of the farms are small in size and consist of people with lower level of income having a tendency to invest more in the field. There were large number of respondents who keep farming as part time or backyard venture. These groups are rearing the pigs as more domestic consumption and to earn a side income. They are not serious about full time production and management of the pig production. Therefore, these are the groups which could contribute to the filling up of the gap in supply. Awareness in the investment opportunities and profitability is essential for enhancing the production as early as possible, to tackle the demand and minimising the gap of supply. The productivity of the rearing system results in the selection of the breeds and availability of stocks when required.

The sources of stock purchase clearly shows the evidence of imports of live swine from the Myanmar border which is bought at lower price. The farmers on the other hand prefers to pay for the cheaper piglets because of convenience and availability at larger unit, keeping the local and exotic cross breeds away which are available in the locality. In order to enhance production, control of imports are required at certain level, but it has become the need to import from Burma, despite of the threats. The people must be given more awareness about the value of the local exotic breeds of swine initiated by the Government, rather than the Burmese pigs. The Government on the other line could have been more active in controlling the imports to protect the local products and to increase production which further could increase the economic activity. The study also concludes that the average income of the respondents is approx Rs. 35,400. There are farmers (5.9 percent) who earns more than Rs. 2,50,000 from pig rearing alone. Therefore it can be concluded that indigenous pig production in Mizoram could encourage economic activity.

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Abstract of the Thesis

**“A STUDY ON PRODUCTION AND MARKETING OF PIGS IN
MIZORAM”**

THESIS SUBMITTED IN FULFILLMENT OF THE DEGREE OF
DOCTOR OF PHILOSOPHY IN MANAGEMENT

By
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1. INTRODUCTION

Pig rearing is an important economic activity in the eastern states of India and particularly among the tribal communities (Rangnekar, 2006). Animal farming has a special significance as it plays an important role in improving the socio-economic development of the weaker sections of the society. Livestock is the source of income for the small scale farmers and acts as an insurance against crop failures and unforeseen calamities. It provides draught animal power and organic manure for crop production.

Located in the north eastern part of India, Mizoram is a mountainous region with a population of about 11 lakhs (Economic Survey of Mizoram, 2016) and it lies within the tropics between latitude 21.19⁰ to 24.35⁰ north and longitude 92.15⁰ to 93.29⁰ east. The entire state is broken into countless broken hills locally called as “*Tlang*” with sharp and pointed hill tops. The hills are covered with dense vegetation and bamboo forests are common, due to this rough terrain, growth of industries is difficult. As crop production is still follows traditional method, livestock plays an important role in this hilly state. Livestock rearing is an incumbent part of the people in Mizoram. Amongst the livestock animal reared, pig is most significantly reared in every household as an additional economic activity.

The number of livestock owned by the families in the rural areas of Mizoram often is referred as an indicator of wealth of the village. The history of livestock keeping and pig rearing could be traced back to Mizo folklore. According to the officials of Animal Husbandry and Veterinary Department, Government of Mizoram, commonly cited reasons for the increase in meat consumption are due to changing dietary preferences towards meat, poultry and milk being associated with the increase of disposable income and rapid urbanization in the state.

Studies find that improving the local market system could enhance the benefit of smallholder farmers (Tadesse, et. al., 2013). According to Gausi, et. al. (2004), small animal farmers have propensity to pay no attention to new technology even if it appears to be better than their

current practices due to market barriers. Study of the pig marketing system may lead to innovations, interventions, or opportunities to educate as well as increase the marketing efficiencies and improve product quality, which ultimately increase profitability of farmers (Levy, 2014).

1.2 Problem Statement

According to the 18th Quinquennial Livestock Census-2007 (Animal Husbandry and Veterinary Department of Mizoram), pig is the largest livestock reared in Mizoram. The census also shows that the highest rate of growth in its population, and the crossbred population consist 90 percent where the indigenous pig accounts for only 10 percent of the total pig population. Although studies has been carried out in the field of production, it is felt that still there is further need for study in the process of marketing and production from the managerial point of view.

Pork is one of the most supported meats among the Mizos where more than 85 percent eat meat. Every family either rich or poor makes an effort to have meat at least once in a week. The demand of pork meat is ever rising and the cost of pork, as of April 2016, is Rs.250/- per kilogram and is still increasing. Since the local production is not at par with the demand in the market, it forces the marketers to indulge to import from the neighboring country Myanmar (formerly known as Burma), as well as from some of the neighboring state (Assam). This results in the outflow of the economy from the state. Since, the topography of the land in Mizoram is quite different from other states, a unique method or practice for production may be explored. It is also felt that if the state could produce more meat than current consumption, then it will create a viable path for exports.

Although there are few studies conducted in general, on production of pigs in north east India, there is limited information in relation to marketing practices, production and management practices, performance and limiting factors of pig production in Mizoram. It is

also perceived that the results of the present research will be utilized by different stakeholders to mainstream the production and marketing system as a trail to uplift the livelihoods of small farmers. Therefore, in view of the above mentioned facts, the present study is planned with the general and specific objectives.

1.3 Literature Review

Several studies have been conducted regarding pig farming and pig management. Some of the literature reviews are presented in the following. The reviews are presented under two sub-headings viz., production of pigs and marketing of pigs.

1.3.1 Production of Pigs

Nguyen, et. al. (2010), states that the pig makes a major contribution to the world's meat supply. Within the global context, it constitutes the most important source of meat (40 percent), followed by cattle (29 percent). It is expected that pig meat will remain the single most important meat source, hence, playing a pivotal role, particularly in the case of meat production in Asia.

Njuki et. al. (2010) in their work "Pig Production, Management and Marketing in the North East Indian State of Nagaland" found that the ownership of small livestock characteristic of the sample is mirrored in the ownership of livestock by women saying that women mainly owned poultry and pigs .In Kohima, women owned poultry, pigs, dogs and cattle although they were more likely to own poultry and pigs than dogs and cattle. The study also found that improvement of housing, adoption of improved breeds and improvement of feeding practices which are the key interventions of the project have been shown to have a positive impact on productivity as measured by number of piglets per sow.

Kumerasan, et. al. (2009) studied the production system of 320 rural pig rearing households in the north east India. The study found that majority of the livestock are reared in intensive system and fed with home made and cooked feed (kitchen waste and locally available plants). It was also found that the smallholder resource driven pig production is economically practical and sustainable at household level and there is adequate scope to develop the smallholder resource driven pig production system.

According to Kumar et. al., (2007), the productivity of animal is very low in north east region (NER) compared to other parts of the country. While increasing farm-level production and productivity will require more improved animals, improved fodder/feed technology, and better access to livestock services, smallholders' access to reliable markets to absorb more milk at remunerative prices is also a critical constraint. Organized marketing of livestock in the NER remains relatively insignificant, despite efforts in the past to develop and promote collective market mechanisms.

Rahahman (2007) studied to identify the factors that influence adoption of pig production technology in pig farmers. A total 100 numbers of the farmers were selected for the sample and five different factors which are, housing, breeding, feeding, health care and general care and management practices. The study revealed that 81 of the farmers adopted improved technology on breeding and 63 of them adopted health care practices at higher level in their farms. The age of respondents in adopting improved technology on housing and feeding practices were very low. The study also found that the adoptions of improved technologies were connected with age, education, operational land holding, farm size, income from piggery, social participation, extension contact, farming experience, farm education exposure, scientific orientation, knowledge level, training and financial help received.

Feroze et. al., (2010) found that the meat production in recognized sector has also gone up by 63% in NE region between the period of 2000-01 and 2005-06 which is significantly higher

than the increase in all India level. Though all the states in the region have witnessed increase in meat production but the increase in Nagaland and Assam is significant which may be due to their large livestock base and people's preference for meat.

1.3.2 Marketing of Pigs

Feroze et. al. (2010) stated that absence of organized marketing channels in NER is one of the major constraints faced by livestock sector of the region. Only a few cooperative milk plants are working in the region. Only three per cent of the total marketed milk and milk products is handled by organized sector, both cooperative and private in Assam. Thus, the traditional market is the only option available in the region to market the indigenous as well as processed milk products.

According to Deka et. al. (2007) as elsewhere in the NE, pork consumption and pig production in Assam is strongly associated with tribal (ST) communities. Tribal communities have a high per capita consumption of pork whereas consumption is very low in the predominant general community.

Singh (1997) reported that, the live animal market of the Guwahati city was operated 6 days in a week, the goats from village markets of neighboring places being sold by households were brought for the city market. They also identified sixteen channels for marketing of live animals from producer to consumer with and without the involvement of middle man.

Sarma (1999) reported that the hygienic and other conditions of butcher shops available in the market area of Guwahati city are far from the satisfaction and that the butchers have aligned and are mostly below the minimum requirement as prescribed by the BIS (1973). There are small number of butcher shops that have some facilities but are maintained in very poor condition. Hazarika (1993) reported that the hygienic status of butcher shops were very poor and primitive in nature.

1.4 Research Gap

Literature study finds that studies have been conducted regarding the production of pigs in Mizoram by Kumerasan, et. al. (2009). These studies focused primarily on the methods of production system but leaves out issues related after production. Apart from production, management of piggery is also focussed by some of the researchers in Aizawl (Rahaman et. al., 2008). These studies also primarily revolve in the process of getting good piglets and the management of production but the post production process is not studied. Very few literature is found regarding production and marketing of pigs specifically for Mizoram state although some literature can be found about other countries and states. Therefore, the study finds a research gap in the area especially for marketing of pigs and production process in Mizoram.

1.5 Scope of the Study

The importance of livestock sector have been experienced by nations and the economics can be paired along the contributions of this sector. There are several sub-sectors of livestock which produces milk, meat, eggs etc. The study is focused on piggery and its production and marketing. There are Government interventions and policies which shapes the growth of this sector. The purview of the study is on the four Ps of Marketing viz., product, price, place and promotion. The first P-Product is covered under the area of study “Production of pigs”. This focuses on the production process of pigs. The other 3 Ps viz., price, place and promotion are covered under the area of study “Marketing of pigs”. The research also includes areas of government policies in improvement of the production as well as the management system of the pig production. For the study purpose three districts i.e., Aizawl, Lunglei and Kolasib has been selected with the assumption that these areas represent pig production in large scale in Mizoram.

1.6 Terminologies used

The terms pig, swine, hog, bovine, boar etc. are used in interchanged mode during the process of writing the thesis. The meat of the pig is also sometimes used interchangeably as pork and pig meat. Apart from this, in the thesis, the term pig production is also synonymously used as pig farming.

1.7 Objectives of the study

The entire study is based on the following objectives:

1. To examine the role of pig production in the economy of Mizoram
2. To study the production and management systems of the pigs in the state
3. To examine the performance of pig production in the select districts of Mizoram
4. To analyse the governments' policies towards piggeries in Mizoram
5. To study the process of marketing of pigs in Mizoram

1.8 Hypotheses

1. There is no significant difference on income generation through pig farming in select districts of Mizoram.
2. The pig farming policies of the government is not significantly conducive in the select districts of Mizoram.
3. There is no significant association between selection of distribution channels to the income from pig farming in the select districts of Mizoram.
4. There is no significant association between joining of collective associations and income from pig farming in the select districts of Mizoram.

1.9 Research Methodology

1.9.1 Description of the Study Area

The study was undertaken in three major districts of Mizoram, viz., Aizawl, Lunglei and Kolasib representing Urban, Semi-Urban and Rural agro-ecologies, respectively. The selection of study areas was based on their proximity, pig population, pig fattening, marketing and pork utilization.

Aizawl is located at north of tropic of cancer in the northern part of Mizoram and its average altitude of 1,132 meters above sea level. The area receives a bimodal rainfall with a long rainy season occurring from June to September and annual rainfall of 2,564 millimeter and average temperature of 20.6°C (climate-data.org).

Lunglei district is found at the southern side of Mizoram and bounded by Mamit District and Aizawl districts in the north and by Bangladesh on the west. The district is bound by Lawngthlai on south and on the south-east by Saiha Districts. It is found at an average altitude of 722 meters above sea level. The district is laid out in an area of 4,538 sq. km. Its average annual rainfall is 3435 mm.

Kolasib district is spread over an area of 1382.51 sq. km. It is bounded by Assam on the north and north west, by Mamit district on the west side and by Aizawl district in the south and east. It has a bimodal rainfall pattern, having a main rainy season from May to October. The annual average rainfall and temperature are 2919 mm and 24.7°C respectively.

1.9.2. Sampling and Data Collection Procedure

The data required for the study has been collected from both primary and secondary sources. Primary data was collected from the pig farmers directly in referential mode. Preset structured questionnaire was the main tool for interviewing and the source of primary data. The secondary data were collected from various sources including Animal Husbandry and Veterinary Department of Mizoram, libraries, journals, newspapers and websites.

1.9.2.1. Determination of the sample size

Population: The population of the study are the farmers who rear pigs in Mizoram state. The population is derived from the total number of household of 2,22,853 (Census of India, 2011). Economic survey also states that 60 percent of the household are involve in agricultural activities which includes jhum cultivation and animal rearing. These household figure is multiplied by 60 percent as representing the household and commercial farmers (Economic Survey, 2011-12) resulting into 1,33,711.

Sample Design: The sample units of the study are the pig farmers who are residents of Mizoram. The sample size is 598 rounding up to 600 respondents which has been derived from a confidence level of 95 percent using a confidence interval of 4 percent from the population of 1,33,711 of Mizoram. The sample is calculated by using the following formula.

$$\text{Sample size} = \frac{Z^2 * (p) * (1-p)}{c^2}$$

where:

Z = Z value (e.g. 1.96 for 95% confidence level)

p= percentage picking a choice, expressed as decimal (.5 used for sample size needed)

c = confidence interval, expressed as decimal (e.g., .04 = ±4)

The above sample size calculation is modified by using correction with finite population.

$$\text{New Sample Size} = \frac{\text{Sample size}}{1 + \frac{\text{ss}-1}{\text{pop}}}$$

where, pop = population

Convenient sampling technique was employed to select study sites and pig farmers. Firstly, three districts namely Aizawl, Lunglei and Kolasib were selected based on the availability of pig farms. These districts have been selected as they are the largest producers of pigs in Mizoram. Secondly, the pig farmers were identified on the reference of the suppliers from the local markets of the select districts. A total of 600 household pig farmers were purposively selected and divided into three equal groups of 200 farmers among the three

select districts. The sample of 200 each from the three (3) districts is considered to be adequate as per sample selection procedure.

1.9.2.2. Data collection procedure

The data were collected using structured questionnaire. The questionnaire was translated into local language and pre-tested before the actual data collection process to prove the appropriateness and clarity of the questions. The questions were re-framed in such a way that the farmers can understand and respond easily. The questionnaire was administered to the pig producers by the researcher. Based on the questionnaire interview, the following major information was gathered.

- Socio-economic profile pertaining to age, gender, family size, educational level, farming experience in years, source of income and wealth status were accessed.

- Farm characteristics with regard to type of breed, sources of labour, working hour, herd size and source of foundation stock were collected.

- Healthcare practices with respect to vaccination, prevalent diseases etc. and factors affecting pig production were gathered.

- Feed regarding feed types, feed sources, amount of feed offered and body condition scores of pigs were gathered.

- Pig sty construction in terms of design, materials and types were collected.

- Pig performance parameters concerning age at farrowing, farrowing rate, litter size (at birth and weaning), weaning (age), marketing etc. were collected.

- Marketing practices in relation to types of buyers, main product sold ways of buying, sources of market information, reasons of buying, selling place, methods of price estimation, average selling price of live pig and pork, pig value chain, marketing channels and marketing constraints were gathered.

The study also includes interviews of the Animal Husbandry and Veterinary Department (Government of Mizoram) officials regarding the government's role in the development of piggeries in order to assess their performance.

1.9.2.3. Periodicity of the Study:

The study is based on both primary and secondary data. Primary data were collected over the period from 2012 to 2014. Most of the farms were visited more than once. Figures in respect of three years 2012, 2013 and 2014 were taken from each farm. Hence, so far as periodicity of primary data is concerned, it relates to the period 2012 to 2014. For the secondary data, the periodicity of study in respect of different parameters is not uniform. For example, for the pig population in Mizoram, the periodicity of study is 2007 to 2016 (Census figures of pig population for the subsequent periods were not available). Again, so far as meat production in Mizoram is from various sources, and the periodicity of study is from 2007 to 2016.

1.9.2.4. Statistical Data Analysis

Data collected through questionnaire were analyzed by Chi-square and descriptive statistics of statistical package for social sciences (SPSS). Chi-square was used to analyze the following parameters: gender, educational level, source of income, policy perspectives, wealth status, sources of labour and collective associations. Purposes of pig rearing, types of pig operations, pig value chains and pig marketing channels were analyzed by descriptive statistics.

1.10 Limitations of the study

The study deals with the production and marketing aspects of the pig in Mizoram. The study is based on both primary data and secondary data. The limitations of primary data are mainly due to inherent improper response of the respondents. As the study is based on secondary data, it is subject to the limitations of secondary data. The limitations of the study are as follows:

1. The sample was selected only from three districts i.e., Aizawl, Lunglei and Kolasib. Generalisations made on the basis of these three districts may not represent a true picture of pig production in Mizoram.
2. The questionnaire consisted of 66 questions which may be tiresome for the respondents and their responses might have lost enthusiasm in their replies.
3. The pig market is highly unorganised and collection of data through referencing mode might have missed out some of the relevant farmers.
4. The competitors mainly import of pig from Myanmar border in Champhai district was not included in the area of study.

1.11 Chapterisation

The research is divided into six chapters, they are as follows:

Chapter 1. Introduction

The first chapter deals with the evolution of pig production in Mizoram, tracing from the worlds pig production, India and to finally to Mizoram. The chapter discusses about the lack of supply of pork in Mizoram and the nature of pig production in general. The chapter also deals with Literature survey on the production and marketing of pigs from various sources. On the basis of these literatures, research design of the study has been described. The design consists of objectives, hypothesis and the sampling design of the study. The study also comprises the production process as well as marketing carried out by the pig producers at the ground level. On the basis of the literature survey and works carried out by earlier researchers a research gap was found and expects to make a contribution in the literature relating to piggery in Mizoram. The chapter also includes the importance of the study as well as the limitations of the work carried out.

Chapter 2. Piggery in Mizoram and Its Contribution to Economy

The second chapter deals with the socio economic indicators of Mizoram consisting of income, livestock census, sartorial indicators like industries banking, education, roads, transport and communication etc. The select indicators suggest improvements and increase in consumption of goods and supplies and development of economies in Mizoram. This chapter also deals with piggery in Mizoram and its economic implications as well as employment status in Mizoram. The chapter also explores employment and income generated through piggery in terms of district wise.

Chapter 3. Pig Production and Management System in Mizoram

This chapter consist of pig production system in Mizoram. The chapter explains about te pig management systems like housing and equipments consisting of site selection, flooring of the pig sty wall and roofing as well as the equipments and space requirement for pig production. The chapter also explores the types of breeds available in Mizoram as well as the process of production starting from the selection of breeding till slaughter or sell of the pig.

Chapter 4. Government's Role in Development of Piggeries in Mizoram

The fourth chapter consists of issue related to marketing of pigs in Mizoram. Although the corporate type of marketing is not available, most of the marketing is carried out through traditional method as well as some modern method by the retailers and, producers. The chapter also includes presentations of meat data as well as its by products like bacon sausages, dried meat, smoked. This chapter studies marketing on the basis of 4ps of marketing vis., product, price, place and promotion. This chapter also analyses the various forms of marketing practiced by the pig producers in Mizoram.

Chapter 5. Marketing of Pigs in Mizoram

The fifth chapter explores the Governments (both central and state) to develop piggery in Mizoram. The chapter studies various government departments like the Department of

Animal Husbandry Dairy and fisheries Government of India, NABARD, Animal Husbandry and Veterinary Dept. Government of Mizoram. Apart from this, policies of the Government like National Livestock Mission and its subsequent sub-missions sub-mission on pig development on North Eastern region, central sector schemes on pig development as well as New Land Use Policy (NLUP) Mizoram. These policies and schemes were analyzed and findings were presented. Data analysis relating to the Governments' role in piggeries was carried out and presented in this chapter.

Chapter 6. Summary of Major Findings, Suggestions and Conclusions

The final chapter shows the summary of the findings and suggestion which were inferred from the findings of the study.

Some major findings

- Livestock is symbolic to wealth and power across civilizations for centuries. As per 19th Livestock census, 2012 (GOI, 2014) India is blessed with various type of livestock. Its livestock sector is one of the largest in the world. It has 56.7 percent of world's buffaloes, 12.5 percent cattle, 20.4 percent small ruminants, 2.4 percent camel, 1.4 percent equine, 1.5 percent pigs and 3.1 percent poultry. The importance of livestock in Indian agriculture is well recognized. The growth of demand for animal products has arisen from the growth of population, urbanization and rising income in the developing countries (FAO, 2003).
- Livestock is the source of income for the small scale farmers and acts as an insurance against crop failures and unforeseen calamities. The importance of livestock goes beyond its food production function (Birthal et al, 2002). It provides draught power and organic manure for crop production. Pig rearing is an important economic activity in the eastern states of the India and particularly among the tribal communities (Rangnekar, 2006). Animal farming has a special significance as it plays an important

role in improving the socio-economic development of the weaker sections of the society.

- Livestock plays a significant role in the economy of Mizoram as majority of the population engages in the crop production, which is still traditional. Piggery holds a unique position and pork accounted for the highest quantity with 56.19 percent, as pig rearing is considered to be the most popular encouraging and appropriate livestock enterprise (Mizoram Economic Survey 2015-16). Amongst the livestock animal reared, pig is most significantly reared in every household as an additional economic activity. Pig farming is one of the main sources of income for the subsistence farmers as well as determining the family's purchasing power.
- Pork is also considered to be the most favored meat amongst the Mizos. Unstable income from crop production and other sources is absorbed by the income from the livestock and piggery is one of the leading supplementary activity. It generates an uninterrupted stream of income and employment and reduces seasonality in livelihood patterns particularly of the rural poor (Birthal and Ali, 2005).
- Like most of the tribal communities, animal agriculture or animal keeping has been intact with their culture. Still then, with the rising population and other reasons in Mizoram, there is a very low supply of livestock especially in the case of pork, chicken, beef, etc. in the north east region of India. If, there could be enough supply of the same, the livestock contribution to agriculture could have an impact in the national GDP. The study finds that changing lifestyle and growth in per capita income directly or indirectly urge the rise in the consumption demand of the people.
- According to the Mizoram Economic Survey, the economy of Mizoram was floating to growth at the rate of 8.46 percent during 2014-15 financial year with base year 2004-05 which was significantly higher than projected national growth at 7.4

percent(Mizoram Economic Survey 2014-15). The study finds that NER has a sizeable population of pig i.e., around 24 percent of the total pig population in India. It has been estimated that around 50 percent of the country's pork is consumed in north eastern hill region alone (ICAR, 2011)

- The study finds that pig is the most important livestock in the state and plays a major role in the livelihood of the small farmers. The records of the Animal Husbandry and Veterinary Department shows the popularity and importance of the swine. The study finds that Rearing of animals have an important role as crop production is still traditional in Mizoram.
- The study observed that there are three types of employment that are generated from piggery. These were categorized as: (i) The category of pig farmers who owns the farm and land. (ii)The category of pig farmers who owns large farms and (iii) is another category of employment who finds opportunity in the market consisting of butchers brokers or retailers.
- It was also finds that several household assets and properties like television, refrigerators, vehicles etc. were bought from the money they earned from piggery (Table. 2.15). The study also observed that majority of the respondents have made use of the income from pig for purchasing properties to a great extent. They study also shows that majority of the farmers are having low family income and are practicing non commercial piggery (Table 2.10).
- The study also finds that amongst the various livestock species, piggery is most potential source of meat production and more efficient feed converters after the broiler.

- The north eastern part of the country produces majority of the Indian pork production representing only 7 percent of the country's animal protein sources.
- There has been a demand gap of meat as per the recommendation of the Indian Council of Medical Research (ICMR), which recommends meat consumption per annum is 10.95 kgs while average consumption in India is still below 5 kg/cap/year(FAO, 2012).
- Majority of the livestock consist of swine (73.35 percent), and the meat production comprises 69.33 percent of the total meat production during the year 2014-15 (Economic Survey of Mizoram, 2014-15).
- The study also finds that due to huge supply shortage in Mizoram, unorganised import of livestock from the border region of Myanmar is happening frequently, there are many instances where reports of swine flu and other diseases that are the outcome from importing of livestock.
- Pig rearing in Mizoram is mostly based on household activity, confined at the backyard of the household. At 94 percent (Table 3.1) majority of the pig rearers claim that they have a sty for the pigs. Respondents claim that they keep pigs to feed their kitchen waste and in turn will provide economic return and extra savings for the household.
- The survey observed that households have utilize their backyard and other convenient places in their compound for the erection of the sty. There are 53 percent of the farmers who have used available wood in their premises for construction of the pig sty. The study also finds that 23 percent of the farmers have used bamboo with wood and other available materials like mud tin etc(Table 3.1).
- The study finds that major purpose of pig rearing is meat and the two phases of pig production comprises : (1) sow farms (breeding and rearing) and (2) fattening farms (growing and finishing). It was observed that in Mizoram, the major concern for

farming pig is meat where majority of the respondents' activity opt for meat production and fattening.

- It was found that majority of the farmers (47.4 percent) opt for the Burmese pigs and the source of stock (piglets) purchase from these street vendors (Table 3.4). The data shows that the care practices in Mizoram are acceptable for survival of the piglets. Though majority of the respondents have pig keeping as part time, it was found that the breeds are quite productive.
- It was observed that there has been inconsistency in the farming due to engagement in other activities as 40.3 percent of the farmers spends less than 2 hours and 45.4 percent spends 2- 5 hours (Table 3.9). some big farms which are at the nascent stages of development were also observed during the data collection.
- Most of the farmers use the waste products as manures for crops and vegetation which is shown by the result that 56 percent of the farms claimed to utilize the waste as manure, fertilizers, etc. for the crops (Table 2.10). It was also observed that the higher income earners were from the large farms whose efforts were more intensive and have their farming as main occupation.
- The study finds that Department of Animal Husbandry Dairying & Fisheries (DADF) is one of the Departments in the Ministry of Agriculture (Government of India) and came into existence w.e.f. 1st February, 1991, by converting two divisions of the Department of Agriculture and Cooperation namely Animal Husbandry and Dairy Development into a separate department.
- The department is responsible for matters relating to livestock production, preservation, protection from disease and improvement of stocks and dairy development, and also for matters relating to the Delhi Milk Scheme and the National

Dairy Development Board. The department advises state governments/union territories in the formulation of policies and programmes in the field of animal husbandry, dairy development and fisheries.

- Under the National Livestock Mission a huge importance has been given to piggery and thus Piggery Development-National Guidelines for formulation of State Pig Breeding Policy has been laid down with a proper Piggery Development-Biosecurity guidelines for piggery (commenced from 2014-15), the mission was designed to cover all the activities required to ensure quantitative and qualitative improvement in livestock production systems and capacity building of all stakeholders.
- The Government of India had constituted National Commission on Farmers in 2004 under the chairmanship of Dr. M.S. Swaminathan. Based on the recommendations made by the Commission in its Revised Draft National Policy for Farmers and the comments and suggestions received from various stakeholders, the government formulated the "National Policy for Farmers, 2007". The policy, among other things, aims to improve the economic viability of farmers by substantially improving the net income of farmers in addition to improving productivity, profitability, land, water and support services and provide appropriate price policy and risk management measures.
- The livestock rearing section was removed from the policy and was further developed and included in "The National Livestock Policy, 2013". This policy has been formulated to have a framework for improving productivity of the livestock sector in a sustainable manner, taking into account the provisions of the National Policy of Farmers, 2007 and the recommendations of the stakeholders, including the states.
- The National Livestock Policy (NLP) aims at increasing livestock productivity and production in a sustainable manner, while protecting the environment, preserving

animal bio-diversity, ensuring bio-security and farmers' livelihood. The policy focussed on areas which have direct concern areas for piggery. NABARD was entrusted for implementing the NLP.

- NABARD was set up as an apex Development Bank with a mandate for facilitating credit flow for promotion and development of agriculture, small-scale industries, cottage and village industries, handicrafts and other rural crafts. The Parliament, through Act,61 of 1981, approved the setting up of NABARD.
- There are hardly any licensed pig slaughterhouses in the country and most of the slaughter in rural / urban areas is done in a clandestine manner(Govt. of India Pig Development subsidy scheme, 2012)Keeping this in view, it has been decided by Government of India to launch a Central sector scheme on “Pig Development” with a total outlay of Rs.73.55 crore during the remaining XI Five Year Plan period (2010-11 & 2011-12). The scheme aims at encouraging commercial pig rearing by farmers to improve performance of native breed through cross breeding. The scheme has following four components :
 - (i) Pig Breeding Farm : Under this component 25percent of the outlay (33 1/3percent in NE States including Sikkim and hilly areas) as back ended capital subsidy would be provided for rearing of 20 Sows and 4 Boars subject to a ceiling of Rs.1.50 lakh per unit(Rs.2.00 lakh in NE States including Sikkim and hilly areas) for which an indicative unit cost of Rs.6.00 lakh has been provided.
 - (ii) Pig rearing & fattening unit : Under this component 25 percent of the outlay (33.33percent in NE States including Sikkim and hilly areas) as back ended capital subsidy would be provided for rearing of 3 sows and 1 boar subject to a ceiling of Rs.19,000/- per unit (Rs.25,300/- in NE States including Sikkim and hilly areas) for which an indicative unit cost of Rs.0.76 lakh would be provided.

(iii) Retail Outlets : Under this component 25 percent of the outlay (33 .33 percent in NE States including Sikkim and hilly areas) as back ended capital subsidy would be provided for establishment of a retail outlet subject to a ceiling of Rs.2.50 lakh per unit (Rs.3.33 lakh in NE States including Sikkim and hilly areas). Loan can be sanctioned with an indicative unit cost of Rs.10.00 lakh per unit.

(iv) Facilities for live markets : Under this component 50 percent of the outlay as back ended capital subsidy would be provided for creating facilities for live markets subject to a ceiling of Rs.2.50 lakh per unit.

- The Department of Animal Husbandry and Veterinary is one of the oldest and most potential Departments of the Government of Mizoram. On May 1890, it became a fully fledged Government office of the Deputy Commissioner's started functioning in Mizoram which was manned by Captain Brown. All the Government services except civil surgeon and commandant and Assam Rifles were under the direct control and supervision of the District Commissioner. In regards to Veterinary and Animal Husbandry services, Dr. Khumi Angami was the first Veterinary Doctor to join in Mizoram.
- Study finds that the department has taken several initiatives for improving the status of livestock farming in the state. In order to achieve its objectives, the New Land Use Policy had also made a co-operative efforts along with the department to offer the beneficiaries to opt for different trade under the AH & Vety sector.
- Since NLUP is a project primarily to provide sustainable form of livelihood to beneficiaries, a trade needs to be selected for such livelihood and each beneficiary family is allotted one trade from their choice of a participant department. There are several trades available for selection by beneficiary families in different departments,

Piggery is one among the four trades in AH&Vety department under Governmentt of Mizoram.

- This Department, with a total cumulative allocation target of 9,919 beneficiary families for the years 2010-11 and 2011-12, successfully reached it's target with an expenditure of Rs 6,179.40 lakhs. Another Rs 442.00 lakhs was expended by this Department under the Infrastructure Component.
- There are currently 20382 NLUP beneficiaries under the piggery trade as on 17/03/2017(Animal husbandary and Veterinary department Mizoram). The number of these beneficiaries keeps changing because of some elimination and re-inclusion of some applicants who once were not in the list, some of these attributes as discussed by the departments' official was referring to political involvements in the operational level.
- The first Cooperative named "The Aizawl Trading Cooperative Society Ltd." was registered in 1949 and the first Cooperative Sub-Divisional Office was established in 1951 at Aizawl which was upgraded as a District Office on 3.1.1956. In order to provide legal protection to the common interest of cooperative members and functioning cooperative institutions under the Mizoram cooperative societies Act, 2006, the Registrar of Cooperative Societies of Mizoram has been assigned a vital role of supervision of the working of all the registered cooperative societies in the whole state of Mizoram.
- Likewise the Mizoram Pig Producers' Cooperative Federation (PIGFED) Ltd. was established in 1988. It was registered under Cooperative Act on 6th June 1989.
- At present there are 118 numbers of Primary Pig Producers' Cooperative Societies affiliated under the Federation. The main objective of the Federation is to promote and

facilitate the operation of the Primary Pig Producers' Cooperative Societies affiliated to it by coordinating their activities so as to improve their economic conditions by implementing scientific way of pig rearing. PIGFED is now comprises of 154 Primary Piggery Cooperative Societies.

- The process for strengthening the piggery development programme rests with PIGFED and is now running a pig breeding farm at Thenzawl which produces quality and high breed types of piglet. The average profit earned has been recorded to be Rs. 49,61,427 and business turnover of around Rs. 93,07,683 annually over these years.
- The main objectives of PIGFED Ltd. are to promote and facilitate the operation of primary Pig Producers' Cooperative Societies affiliated to it by coordinating their activities and supplying requisite inputs and technical guidance for scientific pig rearing by their members and undertaking processing and marketing of pork and other piggery products. The business turnover have rose from Rs 9.48 lakhs in 2007 to Rs. 103.04 lakhs in 2015 with profit making societies of around 150 societies. This show that there has been a trend in rise of the development of piggery societies which stands for the development of the piggery industry.
- Marketing is an important aspect of any livestock production system. It gives a mechanism whereby producers of the farmers exchange their livestock and livestock products for monetary value. This revenue is reused for another cycle in procuring the livestock and for acquiring goods and services that they do not produce themselves, as a means to sustain their livelihood. The study tries to analyse the pig marketing in Mizoram from the perspective of 4Ps viz., product, price, place and promotion.
- The study finds that in Mizoram, people consume various pork products, such as bacon, sausage and pork chops; Mizoram pig market majorette is the meat as pork and

live swine. The product market can be separated into two categories which are meat and the live animals.

- Study finds that in the meat market, fresh meat is the most common form and some parts of the meat which are smoked, adding some value and sold at a little higher price than the fresh meat. The smoked meat can even be stored for a longer period of time.
- The product can be segregated into two sections viz., meat as its by-products and the live animal. In Mizoram, pork is further processed into the following products:
 - a) Cured Pork- These constitute the bacons and hams which are preserved by smoking. Smoked meat is popular among the consumers of pork in Mizoram. It is an easy process of preserving the meat. Further this process increase the shelf-life of the product.
 - b) Sausages and Pies - These are derived mainly from trimmings and offal that are left after cutting up whole parts. It is one of the most preferred parts of the pork meat.
 - c) Pig Skin –The skin are processed into leather and surgical strings. However, there is no facility for processing pig skin in the state. The skin are dried and then consumed in many forms.
- Study finds that the live animal product can be categorised to three categories:
 - a) Full grown animal:
 - b) Piglets:
 - c) Breeding:
- Majority of the pig market in Mizoram can be claimed to comprise of meat and the piglet bazaar. Pork is the major item in the market and the sample shows that there

are 87.4 percent of the producers do not practice further processing of the meat for reselling, while there are 12.6 percent (Table 5.1) respondents in the market who sell and prepare smoked meat for preservation and for taste enhancement.

- As of October 2016, the retail rate of pork is Rs.250/- per kg. Farmers sell pigs of size 40 inches of pigs (measured round the chest) at a price of Rs.18,500/-(approx) and size 50 inches at a price of Rs.30,000/-(approx). The local butchers have developed a mechanism to calculate the weight of pigs depending on the chest size measure of pigs and the price of the pig is usually negotiated.
- The survey also observed that the price of servicing is Rs. 5,000/- and the price of artificial insemination is Rs.3,500/-(Table 5.2). Majority of the respondents at 79.6 percent are satisfied with the price of the pig and the meat. The data also shows 20.2 percent are not satisfied with the pricing, these groups of people are generally the larger producers and they suggest the prices of the products are increased to some extent.
- Piglets are mainly sold right out of the farm's premises where the buyers have to approach on their own convenience. With this reference it can be said that the place of the farm is where the sale of piglets usually happen.
- Pork on the other hand, which is the most favored meat is sold in the market at specified stalls. When in times of scarcity, the buyers are often to be seen in line to catch their turn for buying their share.
- Pork is also sold in convenience at the local places where the locally sourced pigs are favoured by the buyers, this is also the premises where individual farmers slaughter and sell the meat.

- The data also shows that majority 73.9 percent of the respondents that local market are as near as below 2 kms (Table 5.4) which is quite convenient for the general transportation of the products.
- The study attempted to find the transportation cost of the respondents while selling their products, it was observed that there are 26.5 percent of the pig producers who use public convenience for transport of their produce to the market and there are 65.8 percent (Table. 5.8) respondents who happened to sell their produce at their place itself and also sells them at the local market and often slaughter the produce by themselves as well.
- In Aizawl district, majority of the producers i.e, 88.7 percent sold their produce to the butchers. This shows that the main motive of the production is meat since there are only 5.6 percent sells to other farms which can be treated as they sold piglets for re-production or breeding purpose. The study shows that there are only 2 percent (Table No. 5.6) who retain their produce for rearing them in their farm. There are 70.4 percent respondents in Lunglei who claims to sell their produce to butchers only, the data also shows that there are 21.1 percent who does the slaughtering and sells by themselves.
- Pig farming is a common enterprise among the rural and urban areas of Mizoram. As mentioned in the earlier chapters, every household is keen to keep at least few pigs in their backyard. The different markets used by the farmers are Bara Bazar, Town Markets, Local Markets, Roadside Markets, Hog dealers
- It was observed that traders and brokers, and even private butchers are searching far as reachable by vehicle in a day from the capital city Aizawl just to collect pigs from the village farmers.

1.12 Suggestions

For the Farmers

- Sourcing of feed (readymade) is a major problem for the large and mid-size farms, thus a proper plan for sourcing of feeds will prove essential.
- It was observed that majority of the farms are found to be household family practice, and very less commercial farms. If more commercial level farms are encourage amongst the farmers, the production and productivity of pigs in Mizoram is likely to improve.
- Since the pig farmers of the state are not able to produce to fill the gap of the demand of the people, large import is taking place. Therefore the farmers need the capacity to expand to commercial level, this will motivate the farmers.
- The current management system of the production of pigs is traditional and with more technologies like vaccine and more advanced facilities like feeds etc., will improve production and quality.
- Most farmers seems to hesitate to visit institutions like NABARD and other institutions that can help out with the financial problems. There is a need of awareness of funds available and training at these institutions.

For the Government

- The study observed that majority of the respondents were of the lower income groups of the society and that they have been farming pigs as part of their household activity (non- commercial), this is assumed to be one of the low ratio of supply to the demand of pigs. The study recommends that if there could be more awareness program, more investment may come up.
- The capital for pig farming is quite low in comparison to other meat production like mithun. This can attract unemployed youth to venture into pig farming and thus

generate employment if proper awareness are taken up. As the sector grows, there may be further employment generations in terms of marketing and transportation from production site to markets. Of which it is felt that more of awareness in the profitability and the scope of piggery amongst the youth and especially to the higher income level of the community who are expected to have more investment power. Eventually, this will help in serving the economy of the state in many ways.

- There are many farmers who are unaware of the facilities that are available for them, i.e, financial aids which can be availed through financial institutions like NABARD, KVIC, commercial banks etc. of different ways, which could be made useful to them. If more awareness is made in this regards, it is believed to have significant impact to the pig production level.
- Sourcing of readymade feed is costly and very difficult for the farmer, which they claimed essential for the growth and expansion of pig producing farms. If the government can take up role in sourcing cheap and efficient feeds, it will help the farmers in rising the production of pigs.

Policy makers

- The potential domestic pig farmers (who posses commercial piggery facilities) in the state should be given awareness of the situation that progress of pig farming is very much essential for the economic development of the farmers as well as the of Mizoram.
- Inclusion of members representing the real farmers(Eg. PIGFED)members, while framing policies will improve efficiency of the policies regarding piggery
- There study observed 70.5 percent of the total sample farmers have not availed membership of any farming society. Activities in the society will help improve

awareness and improvement of advance farming facilities for increased production. Therefore, famers may be encouraged to join farming communities.

Retailers

- Majority of the meat purchased are from street vendors without proper shields from insects and are prone to unhealthy meat. It is a crucial moment to startup with clean and healthier meat shop infrastructures.
- There are few vendors with proper facilities for fresh meat retail shops, more of these shops may be initiated.
- Smoked pork is the most popular processed meat for pig, the study suggest to set up proper dedicated facilities for the same.
- The movement of live pigs is quite unorganized, the study could not identify any retailer union or such body providing such activity. The study recommends the retailers to form unions, this may enhance the scope for proper movement of pigs and improvement in the retailing activities.

Others

There are huge investment opportunities in the farms as well as in the feed manufacturing. It will be a good move for mature and upcoming entrepreneurs to consider investing in this area.

Conclusion

Amongt the North Eastern Region of India where an estimate of around 50 percent of the country's pork is consumed, Mizoram is a state where majority of the population are acclaimed to favour pork over other meat. Majority of the livestock in Mizoram is occupied by the swine at 73.35 percent. Due to the high demand of pigs and its by products, there is a huge supply shortage and the state is experiencing unorganised import of livestock from the border regions of Myanmar and Bangladesh. There are many instances where reports of

swine flu and other diseases that are the outcome from importing of livestock. Pig rearing in Mizoram are mostly non commercial, and are in confinement at the backyard of the household. There are some farms with commercial prospect which are at the nascent stages of development. The study also observed the problems of these farms were mainly the non availability of feed and other feed stuff. This also lead the farmers to have a low tendency to enlarge their farms.

The role of Government is very vital in the development of piggery in Mizoram. The Government of India has given due importance for the development of piggery. AH&Vety department have been entrusted by the The Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India, for the development of Livestock and has also played a huge role in the piggery sector. With the Governments' Piggery development schemes under NABARD, NLUP etc. The study observed that there is an abundant availability for marketing of the pig and piglets. Majority of the respondents have also made use of the income from pig for purchasing properties to a great extend.

The study concludes that, with a ready market available in Mizoram and that proper supply of feed is of vital importance for the development of commercial pig production. And also more commercial farms take up the production challenges with the schemes and policies that are available for them which will be a certain starting point to fill the demand gap with profitable income.

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