CHAPTER VII

SUMMARY OF CHAPTERS, FINDINGS, SUGGESTIONS AND CONCLUSION
7.1 Summary of the Chapters

The thesis has been presented in seven chapters. A summary of each chapter has been given below.

Chapter I is the introductory chapter. In the introductory chapter we have given a brief description of agricultural and various other allied activities in Assam giving emphasis on animal husbandry. We have narrated in detail about piggery. We have discussed the various breeds and systems of rearing relating to piggery. We have also highlighted research on growth of pigs, role of nutrients and nutrient requirement for satisfactory growth of pigs, selection and improvement of pigs, growth and carcass traits, processing of various pork products etc. The study also comprises the comprehensive piggery development programme in India along with the review of similar works done by earlier researchers. On the basis of the research works done on piggery by earlier researchers we have argued that our research work is expected to add something new in the area of research on piggery.

Piggery in Assam, its economic importance and generation of employment have been discussed in greater details. After a discussion on the above mentioned aspects the research topic undertaken has been stated. The objectives of the study, research queries, review of literature, methodology of the study, relevance of the study, periodicity of the study,
limitation of the study and chapter planning have been highlighted.

**In chapter II** a brief discussion of the socio-economic status of Assam relating to pig farming has been made.

**In chapter III** a threadbare discussion has been made in respect of the present position of the pig farming in Assam. Various types of pig farms are available in Assam. These are: the farms that produce only pork, the farms that produce only piglets and the farms that produce both.

We have analyzed the trend in pig population in Assam and India during the various livestock census years from 1951 – 2003. In Assam no census has been carried out after 2003. The study displays the state wise total number of Indigenous and Crossbreed pigs and their comparative growth rates in the years 1997 and 2003. We have discussed the concentration of pig population in rural and urban areas in Assam. We have also made a discussion on pork and pork products. We have found that Assam got 3rd position relating to pork production in various states of India in the year 2008.

**In chapter IV** We have discussed about the requisites of scientific pig farming. It describes the nature of model farming like a) only pig farming b) Fish-cum-pig farming and c) Duck- cum-Fish-cum-pig farming. It also explains the requisites of a commercial farm. The fixed capital and working capital has been are defined relating to a viable project.

**Chapter V** is confined to the discussion on various problems in pig
farming. These are feeds, good quality piglets, marketing feeding to its products, pig marketing, and slaughter house. It also comprises the brief discussion on financial problem, diseases of pig, managerial problems and technical problems etc.

We have elucidated its various aspects leading to its demand, economic importance and employment opportunities. It also reveals the present incentives to develop the piggery sector in Assam, supply of piglets, supply of pig food, its health care, financial assistance, insurance coverage etc. The chapter also describes about the National Credit Fund for Woman, Technical guidance and training in respect of pig farming, role of Assam Livestock and Poultry Corporation (ALPCO), role of Assam Agricultural University (AAU)) etc.

**Chapter VI** is the core chapter of the thesis. We have prepared a detailed report on pig population of Assam during the livestock census years and extract a statistical view point on it. Taking the data of various meat production of Assam for the last twenty years (1987-2008). We have studied the production, its requirement and its shortfall. We have made an analytical study based on the data of pork production of Assam for the last twenty years using the different statistical models, and have forecasted on certain aspects relating to pig enterprise in Assam.

Regarding Primary data, we have made various analyses in respect of input and output of piggery enterprise and the economic feasibility of the
enterprise with various statistical tools and techniques. We have also discussed the advantages of pig farming over other livestock farming. A comparative study of production of meat from Indigenous and Crossbreed pig is also included in this chapter.

7.2 Findings

In chapter III it has been observed that the state of Assam ranked 2\textsuperscript{nd} in the country in the year 2003 with a total pig population of 1.54 million which was about 11.39 per cent of country's total pig population of 13.52 million. But so far as the growth rate is concerned in the 2003 Assam occupied the 3\textsuperscript{rd} rank while Gujarat and West Bengal occupied the 1\textsuperscript{st} and the 2\textsuperscript{nd} rank respectively.

It has been found that total pig population in Assam rose up to 15.43 lakh in 2003 from about 3.26 lakh in 1962, the increase being more than 4 times in 41 years. It has also been found that piggery has gradually spread to the urban areas.

In 2006, India produced 238 thousand tones of pork whereas the North Eastern Region (NER) alone produced 69.99 thousand tones which constitute 30.04 per cent of the total pork production in the country. Bihar ranked 1\textsuperscript{st} in pork production with 22.75 per cent of the country's total pork production followed by West Bengal (13.67 per cent), Nagaland (13.16 per
Assam got 6th rank in India and it ranked 3rd in the NER so far as pork production was concerned. But, in 2008 Assam got 4th rank in India and 1st rank in the NER.

It has been observed that the production of pork in Assam had been increasing during 1995 to 2008. Under this present trend of pork production and consumption, we may conclude that pork will be the most widely produced and consumed meat in the incoming years.

Based on secondary data, in chapter VI it is seen that the increments of pig population of Assam vary from -0.61 lakh to +4.61 lakh during various livestock census years over their previous years in the intercensus period (1961-2003). It has been observed that a 3rd degree polynomial regression model fits the data most efficiently. The estimated 3rd degree polynomial model is \( Y_t = 5.1901 + 0.1702t' + 0.0087t'^2 + 0.0003t'^3 \) with \( R^2 = 0.98 \), where \( t' = t - t_0 \), \( t = \text{year}, t_0 = 1982 \).

This estimated model explains the growth of pig population in Assam. Under the present trend of growth of pig population during the period 1961 to 2003 (intercensus period) the expected pig population in the state is estimated at 30.29 lakh for the year 2015.

It has been observed that the total meat production in the state gradually increased from the year 1996 onwards. It is found that a 3rd degree polynomial regression model fits the data most efficiently. The estimated 3rd
degree polynomial regression model is \( Y_t = 14.5695 + 0.34988 t' + 0.0400 t'^2 + 0.0047 t'^3 \) with \( R^2 = 0.98 \) where, \( t' = t - t_0, \ t = \text{year}, t_0 = 1996. \)

This estimated model explains the present performance of meat production in the state. Under the present trend of meat production during the period 1987 to 2008 the expected meat production in the state is estimated at 69.96 thousand tones for the year 2015.

Almost 90 per cent of the state’s population consume meat. The production of meat during 2007-08 is 29.90 thousand tones which fulfilled only 10.40 percent of state’s minimum meat requirement. Consequently there was a shortage of about 257.49 thousand tones of meat in the state. So, a huge amount of fund gets drained out from the state every year on account of importing large number of animals for meat purpose to the state to meet the shortfall of requirement. In this case, a linear model is found to be suitable. The estimated linear model is \( Y_t = 240.2999 + 2.3950 t' \),

\[
\text{where}\quad t' = t - t_0, \quad t = \text{year}, t_0 = 1996.
\]

It is expected that under the present trend the meat requirement in Assam would be 285.80 thousand tones in 2015.

It has already been found that pork production in Assam has been increasing over the years. It has been observed that a 3rd degree polynomial regression model fits the data most efficiently. The estimated 3rd degree polynomial model is \( Y_t = 4.21413 + 0.06126 t' + 0.01978 t'^2 + 0.0030 t'^3 \) with \( R^2 = 0.983 \), where \( t' = t - t_0, \ t = \text{year}, t_0 = 1996. \)
This estimated model explains the present performance of pork production in the state. Under the present trend of pork production during the period 1987 to 2008 the expected pork production in the state is estimated at 33.17 thousand tones for the year 2015.

*All the findings as narrated above relate to our objective no1 which is: ‘To examine the present position of pork production in Assam’.*

*In chapter V* it is seen that the government breeding farms fail to supply the required number of quality piglets to the farmers of the state. So, the farmers of the state largely have to depend on quality piglets produced in the adjoining states like Meghalaya, Nagaland etc.

The study reveals that a good number of unemployed youths in the state are now -a-days taking pig farming as their occupation. This is going to help solve the precarious unemployment problem of the state to a certain extent.

It is also observed that many pig farmers donot follow the guidelines of scientific farming properly. Many farmers are unable to get the benefits of loan and subsidy partially or fully. Many pig farmers have opined that the Assam Livestock and Poultry Corporation Limited (ALPO) should screen the loan application thoroughly so that only the deserving persons get the benefits. Again, it is observed that the loan and other incentives are not properly utilized by the farmers. They stop their activities after rearing a few batches of pigs. As a results, efforts made by the
government and other financial agencies to increase pig production in the state by encouraging pig farmers have failed to yield the desired results.

It is also observed that the economic condition of the pig farmers in Assam may be improved further through the adoption of proper scientific pig farming.

The overall educational level of pig farmers is found to be satisfactory. Only a small percentage of pig farmers are found to have little ability to judge the performance of their farms on income and expenditure basis as they do not keep proper record of their income and expenditure.

Earlier, there were some restrictions among a section of Hindus regarding consumption and rearing of pigs. As such, household pig rearing and pig farming were limited and remained as a subsidiary occupation to the tribal, tea garden workers and other backward classes. Gradually things have changed. People are becoming aware of immense nutritional and economic benefits of pig products and consequently pig farming has been accepted as a profitable economic activity by all sections of the society irrespective of caste and creed which is undoubtedly a step in the positive direction.

These findings relate to the objective no.2 which is: ‘To analyze the problems and prospects of pork production in Assam in general and Kamrup district in particular.’
So far as the findings based on primary data are concerned as incorporated in Chapter VI, we find from the partial regression coefficients in the estimated multiple regression model that “Farm size” has the largest coefficient, being statistically significant. It indicates the highest contribution of farm size to the growth in pork production in comparison to the other inputs. Next to farm size only cost of piglet is found to be statistically significant. Other inputs are not found statistically significant on the basis of condition index variables cost of piglet($X_2$), cost of feed($X_3$) and cost of labour ($X_4$) have been removed and finally new regression models namely linear, quadratic and cubic have been run. Here linear model is found to be suitable to estimate the pork production with respect to farm size. The estimated linear model is $Y_t = 2.287 + 73.49X_i$.

Where $Y_t =$ pork production, $X_i =$ farm size

These findings relate to the objective no.3 which is: ‘To study the impact of the factors like farm size, piglets, feed etc. on the cost of pork production’.

The findings of the present study indicate that the share of variable cost and fixed cost in total cost of production are 93.30 per cent and 6.70 per cent respectively. So far as the variable cost is concerned, the cost of piglets constitutes the largest proportion at 58.60 per cent of the total cost. The
expenditures on purchase of feed, labour and medicine are 20.10 per cent, 12.66 per cent and 1.94 per cent respectively. The cost of production for pork is found to be Rs 15.28 per kg.

As expected the total cost made up of variable cost and fixed cost has a strong positive co-relation (co-relation co-efficient value being of 0.99) with farm size. Regression analysis indicates that a linear model to represent cost function is the most appropriate one. The estimated linear regression model is, \( C(X_{i1}) = 1648.38 + 1075.10X_{i1} \). This estimated model reveals that if we want to increase the size of the farm by one pig the additional money required to maintain the farm is Rs\((1075.10 + 11.57) = Rs 1086.67\), during the rearing period of 8 months.

The income of a farm depends on the volume of meat production and Price of meat. Again, meat production depends on farm size. The minimum economic farm size of piggery is found to be 4.

The major sources of return from piggery enterprise as a whole are pork and empty gunny bags. It is observed that the pork (pig meat) is the most important source of income in piggery enterprise accounting for about 99.52 per cent of total income. The income from gunny bags is only 0.48 per cent of total income.

Karl Pearson’s co-efficient of co-relation value of 0.99 shows a very high co-relation between income and farm size.

Pig-feed price ratio (i.e., the ratio between average price per pig
and average cost of feed per pig) is 2.92 which indicate a high level of positive return. Cost benefit ratio for pig farming is found as 0.19 which indicates that the existing system of pig farming in the state is economically viable.

*These findings relate to the objective no.4 which is: ‘To study the economic feasibility of pig farming.’*

Based on secondary data, in chapter VI it is clear that pork production is more than that of goat and poultry meat in Assam. The number of kids born to a she goat varies from 1 to 3 but the litter size of pig usually varies from 6 to 12 in Assam.

The average body weight of broiler at the age of 2 months is found to be 1.806 kg. in Assam whereas the average body weight of pure breed pig at 3 months is 12 kg. and in case of goat, at the age of 2 months, the average weight is 4.4 kg. It is observed that production of pig meat is higher than that of goat and poultry meat. We can thereby arrived at the conclusion that among the goats, poultry and pigs, pigs are the most prolific with 6-12 piglets in every litter. They are fast growing and attain a weight of about 12 kg. in 2 months time. We have also found that a pig attains a weight ranging from 65 kg to 70 kg. in 6-8 months time.

*These findings relate to the objective no.5 which is: ‘To examine the advantages of pig farming over other livestock farming in relation to meat production.’*
In chapter VI, based on secondary data it is also found that crossbreed pigs are capable of producing more amount of meat than the indigenous ones under both farm and traditional conditions.

This finding relate to the objective no.6 which is: 'To make a comparative study of the production of meat of crossbreed and indigenous pigs'.

7.3 Suggestion

The contribution of pig to our economy is now widely recognized, realizing that animal protein is important in counterpoising our nutritional needs and consumptions of pork has been gaining popularity in our state over the last two decades. Based on our various research findings and observations we forward the following suggestions and recommendations for improvement of piggery in Assam in general and the district of Kamrup in particular.

1) The pig farmers in the state should be made aware of the situation that progress of pig farming is very much essential for the economic development of the farmer community as well as the of Assam. So the Government should arrange for extensive publicity in respect of economic benefits and the importance of pork products as food item in daily life.

2) Training should be imparted to the intending youths by deputing
them to other states of India to make them aware of the modern and scientific/technological ways and means to extract more economic benefit from pig farming. The NGOs should build one’s own confidence in taking pig farming as a primary occupation.

3) The steps taken by the Government and NGOs for growing awareness of the people regarding necessity of pig farming is yet to improve. The Government should arrange land on lease or subsidy to the landless pig farmers so that rural farmers can invest the lion share of their capital in farming. In case of urban areas also Government should render all necessary help to the willing pig farmers.

4) A section of the caste Hindus are still hesitating to rear pig and to take pork or pork products due to their religious orthodoxy. However, with the passage of time, there has been curiosity to take up pig farming and to take pork and pork products. This is surely an encouraging trend. Government should take sufficient steps to motivate all sections of the people to take up pig farming a means of livelihood.

5) Government should take necessary step to establish some breeding farms so that the entrepreneurs may easily get varieties of piglets like Hampshire, Saddle back, Large black and Yorkshire as climatic conditions of Assam are conducive for rearing these varieties.

6) Piggery co-operatives should be formed to help the farmers in marketing their products. They should supply piglets and feeds to the
farmers at a reasonable price.

7) All the farmers are to be ensured with remunerative prices for their pork products through co-operatives.

8) Like other animals, disease is a common factor in pig farming and it requires proper attention. Concerned department should take up prompt treatment of sick pigs or piglets to reduce economic loss.

9) A farmer should always be encouraged to take loan from the banking sector and not from the private sources. The process for getting loan from the bank should be simplified so that the needy farmers can avail loan easily which will also encourage the unemployed youths to come forward for taking piggery as their means of livelihood.

10) It becomes a common practice to many of the beneficiaries who either do not utilize the loan properly in farming or stop their activities after rearing a few batches of pigs which is most unfortunate. So efforts should be made by different financial agencies to increase the pig production by encouraging private entrepreneurs with follow up action. While the loans are issued, the following measures should be taken:

   a) The loan should be issued to a dedicated farmer only.

   b) Proper utilization of loan should be ensured regularly.

11) The farmers should be made aware of the benefits of the insurances of the pigs by various media and NGOs.

12) At present there is lack of modernized slaughter houses. Modern
scientific principle should be applied in processing, preservation, packaging and transportation of pork and pork products.

13) The Government must introduce compulsory quality control at all stages through a central agency which can verify the quality of processed products for exportation.

14) By modernizing the slaughter houses and with proper training in collection and better training and utilization of by-products, the returns from pork production can be increased.

15) To capture the market of this region the quality of the pork product should be good, price should be reasonable and packing should be attractive.

16) A marketing network for pork and pork products should be developed by maintaining proper cold chain.

19) Pig farming should be geared up on commercial basis in all the North-East States and these should be linked up with the meat processing plants.

20) Conditions of the existing butcher’s shops should be improved and licensing of butchers’ shops according to the required physical facilities should be done mandatory.

21) Compulsory inspection of meat and meat animals should be done by qualified veterinary doctors.

22) If necessary strict rules and regulations should be enforced after
reviewing the existing rules and regulations relating to the trade in meat in general and pork in particular.

23) The Govt. should form an apex body to look after all the activities related to trade in pork in particular and meat in general.

24) Awareness on purchasing of quality meat should be done through mass communication media and organizing seminar, workshop etc. among the consumers.

25) Butchers should also be trained about the hygienic slaughters, and packaging of pork.

26) Extensive research works may be conducted on different aspects of pig farming. Studies relating to the different constraints in pig farming are essential.

7.4 Conclusion

The major thrust of mankind has been on the search for food for survival. Plants and animals have been utilized as food since pre-historic time. Of late the livestock industry has shown the ability to sustain itself as a profitable industry. The contribution of the livestock to our society is now widely recognized. Realizing that animal protein is important in meeting our nutritional needs, consumption of livestock products has been gaining popularity in our country over the last two decades and pork is taking the lion’s share in it.
In Assam pig farming was confined as a traditional profession of only the tribal people until a few years ago. In the old days, pig rearing was considered as a back-yard household occupation of the families who consumed pork and took pig rearing as subsidiary source of income. But now-a-days pig farming has been accepted as a profitable business in the entire state of Assam by almost all sections of people. It can certainly be opined that pig farming, besides contributing to the state’s economy at present, has also provided job opportunities to a number of unemployed persons.

As about 90 per cent of the people of Assam are non-vegetarian in the north-eastern region, the low production of the quantity of meat could not meet the total requirement. Hence we need additional meat production which could be counterpoised with pork only with the growing demands. So, it is very much essential to develop the piggery sector with a view to increasing the piggery and thereby pork and to strengthen the state’s economy.

Pig plays an important role in increasing meat production which is an important economic characteristic essentially required to overcome the protein deficiency problem of the people to a great extent. Pork surpasses the meat of other animals with respect to various nutrients. Pig has high productivity in comparison to other animals. Also the piggery sector and its allied activities have tremendous potentialities to generate employment.
Besides farming, lots of other avenues for employment are there, such as its feeds unit, equipment manufacturers, pharmaceuticals trading, etc. Thus, piggery provides a rewarding vocation to a wide range of rural as well as urban people.

Now-a-days traditional practices which require a lot of grassland area are found to be no more viable under present circumstances. With the rapid growth of population, the per capita land holding of state has reduced to a great extent and consequently the piggery sector requires improved scientific method to enhance viability.

The pig farmers of Assam have to face various problems in scientific pig farming regarding finance, resources, managerial and technical issues. A certain amount of money is required in scientific farming. The Government and different financial institutions have been forwarding their helping hands in this regard, but it is not sufficient and readily available to the farmers. So, to improve the financial condition, the Government should arrange more facilities for financial assistance to the pig farmers.

It is found that Assam and its neighbouring states have the highest percentage of meat consumers among the other states of the country. The National Institute of Nutrition has suggested that as per standard requirement of meat, the minimum requirement of meat in Assam in 2007-08 was 287390 tones. But, in that year the state hardly produced only 29900 tones of meat or 10.40 percent of the total need. So, it is required to take
immediate measures to enhance the production of pigs and pig products in the region.

The present marketing system in Assam is still in the traditional position. The pork reaches to the consumer through different intermediaries' viz. wholesalers, commission agents, retailers, vendors, etc. who are involved in transporting the pig products from producers to consumers. Involvement of more intermediaries affects the pork pricing due to profit margin they take. Sufficient care should certainly be taken so that, the performance of the agent is improved for the greater interest of the consumers. With a view to lowering the cost involved in feeding pigs some locally available ingredients like hotel and kitchen waste, fruit factory waste and water hyacinth can be fed to pigs.

The important hurdle that is found in pig farming is the non-availability of good quality piglets. The manager of the farm has to take sufficient care in selecting proper breed and subsequently the good quality piglets to enhance the production and to meet up the consumers' demand. In Assam the private agencies have captured the piglet market. So, the Government should take sufficient care to produce piglets so that the farmers are not affected.

Labourers are also another important problem for scientific farming. Though unskilled labourers are available in Assam, there is shortage of skilled labourers. Hence, it is essential to create trained personnel for this
sector.

The development of pig sector is most important in the state from the economic point of view. Government efforts are there to develop this sector. It provides incentives in cash and kind, training and piglets at subsidized rate. But, these are found to be inadequate compared to its requirements. The government subsidy is not sufficient. As a result, many needy farmers are often deprived of it. Government should take appropriate steps in distributing the incentives timely.

Meat and meat products have been known as a source of human food since time immemorial. Man has realized that animals serve as a machine to convert inedible materials and agricultural byproducts into a valuable food that is meat. Now-a-days, pork shares the major part of meat and Government should take proper initiative for pig production.

The important pig diseases are swine fever, swine pox, pig influenza, anthrax, tuberculosis, foot and mouth disease, gastroenteritis, brucellosis, tapeworm infestation, skin diseases, worms and nutritional disorders etc. which may cause huge loss to a farm. Proper treatment should be given in order to avoid large scale loss of pig. Deworming of pigs should be done one to two weeks before breeding and one week before farrowing. Piglets should also be dewormed at the time of weaning and one month after weaning.

To comprehend the idea of economic viability of scientific farming
a statistical analysis has been made using both primary and secondary data.

Though an increasing trend of pork production is observed in the state, it is not sufficient to meet up the actual requirement of the state. Pig production is highly influenced by the farm size. It is also found that scientific pig farming is economically viable and a reliable and dependable source of income. The farm size and profit realization shows that a farm size of four pigs is necessary to maintain a family with minimum expenditure.

Lastly, it can be concluded that pig farming may be adopted by a farmer as a source of income which will improve his financial condition along with strengthening the economy of the state. Moreover, this will address the unemployment problem in the state to a greater extent.