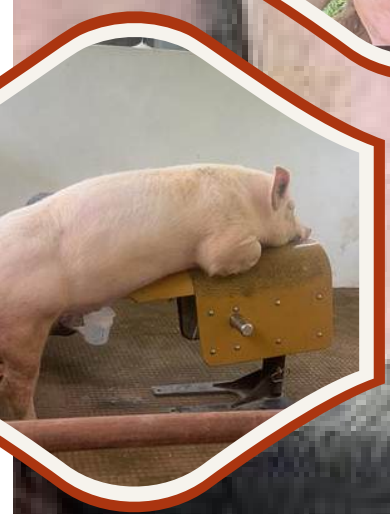
STUDY ON IMPACT OF BOAR SEMEN STATION UNDER SOCIETY FOR CLIMATE RESILIENT AGRICULTURE IN MIZORAM (SCRAM)



COLLEGE OF VETERINARY SCIENCES & ANIMAL HUSBANDRY
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FOREWORD

Pigs are the most lucrative livestock in Mizoram state, almost every family has at least one or two pigs to supplement their income or for consumption. Almost every family raises them in their backyards. Pig farming is one of the cash sources of income for subsistence farmers and also affects the purchasing power of families. Boar semen stations are specialized facilities dedicated to the collection, processing, storage, and distribution of boar semen for artificial insemination (AI) in pigs. These stations play a pivotal role in modern pig farming by enabling genetic improvement, enhancing reproductive efficiency, and controlling the spread of diseases. Moreover, it plays a crucial role in producing quality boar semen for artificial insemination.

To bridge the gap of this needs, Boar Semen Stations under the Fostering Climate Resilient Upland Farming System in the Northeast (FOCUS), Mizoram, were established in four location i.e. Kolasib, Serchhip, Mamit, and Champhai districts, among 11 districts of Mizoram. The establishment of these Boar Semen Stations is a stepping stone for the pig producers. The ultimate objective of this establishment under FOCUS is to achieve sustainability in pig farming, thereby, limiting the various constraints faced by the pig farming in regards to reproductive performance and to have a superior germplasm in the near future.

This study “Impact Studies on Boar Semen Station” provides the status of pig farmers and impact of Artificial Insemination in comparison to Natural service on the productive performance and profitability of the pig farmers of Kolasib and Mamit districts in State of Mizoram. The results depict comparative assessment of the various socio-economic attributes of the farmers and performance of pig farms before and after Artificial Insemination between these two districts.

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It is a great pleasure and honor to deliver this study on "**Impact Study on Boar Semen Station**" on behalf of College of Veterinary Sciences & Animal Husbandry, Central Agricultural University (Imphal), Selesih, Aizawl, Mizoram to Society under Department of Agriculture- Society for Climate Resilient Agriculture in Mizoram (SCRAM), Govt. of Mizoram.

With profound gratitude and great humility, I extend my gratefulness to all the associated member who contributed to the study**Dr. Saidur Rahman**, Professor and Head, Dept. of Veterinary & Animal Husbandry Extension Education, **Dr. Jitendra Kumar**, Assistant professor, AGB Department, **Dr. Nancy Laldinpuii**, Assistant professor, Extension Department of C.V.Sc. & AH , Selesih, Aizawl, Mizoram andMr(s). Lalchhanhimi, Research Associate of the project. I also extend my sincere thanks to **Dr. David Lalthlamuana**, Manager, Boar Semen Station, Mamit District and Dr. **Vanlalhriatpuia**, Manager, Boar semen station Kolasib district who continually and convincingly conveyed a spirit of adventure of the research and providing all necessary information for the study.

I offer my sincere thanks to **Dr. Lalnuntluangi Hmar**, Dean, College of Veterinary Sciences & Animals Husbandry, Central Agricultural University (Imphal), Selesih, Aizawl, Mizoram for her inspiration and encouragement and allowing to conduct the study.

I also express my deepest gratitude **Dr. Suzzane Malsawmthangi**, Technical officer (Vety) and all staff of FOCUS for all necessary help throughout the study and moral support till completion of project.I am honour to acknowledge the warm and kind hospitality of the piggery farmers in the two district of study who have provided the needed information and their help during the course of the study.

Lastly, I would like to express my deepest gratitude to **Chief Executive Officer**, SCRAM & State Project Director, FOCUS-Mizoram for entrusting us with the project and providing funds to undertake the assignment.

Dr. Lalhumliana Tochhawng
Assistant Professor & PI of Project
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ABBREVIATIONS

AI	Artificial insemination
AICPR	All India Coordinated Research Project
ASF	African Swine Fever
ATMA	Agriculture Technology Management Agency
BOD	Biological Oxygen Demand
CSF	Classical Swine Fever
FOCUS	Fostering Climate Resilient Upland Farming System
Ha	Hectare
ICAR	Indian Council of Agricultural Research
KVK	Krishi Vigyan Kendra
MPCE	Monthly per capita expenditure
NB	Natural Breeding
NLM	National Livestock Mission
NMPS	National Mission for Protein Supplement
NS	Natural Service
PRRS	Porcine Reproductive and Respiratory Syndrome
RKVY	Rashtriya Krishi Vikas Yojana
SCRAM	Society for Climate Resilient Agriculture in Mizoram
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
VFA	Veterinary Field Assistance
VO	Veterinary Officer

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EXECUTIVE SUMMARY

Executive Summary

The Fostering Climate Resilient Upland Farming System in the Northeast (FOCUS), Mizoram was started on January, 2018 as a Society under Department of Agriculture- Society for Climate Resilient Agriculture in Mizoram (SCRAM). FOCUS Project recognized that Artificial Insemination is the key in pig reproduction and therefore establish Boar Semen Stations in four (4) districts viz. Kolasib, Serchhip, Mamit and Champhai districts to cater the needs of the pig farmers.

The Impact Assessment conducted focused on comparing the impact Artificial Insemination to Natural breeding emphasizing primary data collection from pig farmers of Mamit and Kolasib districts of the State. The study involved interactions with beneficiaries and stakeholders to gather perspectives on the effectiveness of the interventions. The situational analysis of before and after the intervention of the Project in regards to the Boar Semen Station is not systematically captured and no such measurement has been undertaken to analyze the impact. However, monthly report on number of pigs inseminated with the Artificial Insemination Success Rate (%) has been recorded. The study was conducted by preparing a baseline indicating the level of improvement before the project intervention i.e. traditional practices of natural insemination by the farmers and comparing the AI success rate, litter size of the sow, cost effectiveness etc. in order to provide a significant outcome for the study. The study revealed a positive impact of Artificial Insemination on the livelihood and performance of pig production despite a sharp decline in pig production due to the African Swine Fever (ASF). It is observed that the intervention has significantly helped in increasing pig herd size, annual income and reduced the cost of breeding services. The intervention has improved the performance of pig production in the pig farms in parameters like the conception rate, herd size, litter size per sow, mortality rate, age of piglet at weaning, no. of litters weaned/sow and average weight of piglet at birth which are crucial for sustainability of pig farms in the state. The project has strengthened food security and livelihoods of the farmers. Major constraints in regards to AI services includes Less number of choice of boar from the Boar Semen station, Difficulty in pregnancy diagnosis, Lack of credit facilities, Lack of subsidies for AI and poor communication facilities

Recommendations & Way Forward

- **Scaling Up of the Intervention**: To maximize impact, the intervention should be scaled up to cover maximum pig farmers of the state.
- **Policy Support:** Policy support at the state and national levels is crucial to ensure the sustainability of project interventions and to attract further investment in this sector to make it more economically viable and competitive.
- **Capacity Building Programme:** Awareness /sensitization programme about the benefit of the AI, training especially on various reproduction characteristics and capacity-building programs on scientific pig farming for the piggery farmers and community members are essential to enhance the benefits of the project.
- **Monitoring and Evaluation:** A robust monitoring and evaluation framework should be established to continuously assess quality of the semen, storage facilities and laboratory; and skills of inseminators for better impact of project interventions.
- **ICT tools/software for data recording:** ICT tools/software can be utilized to keep the records of farmers as well as the pigs for effective monitoring and evaluation of the project intervention.
- **Community-Based Management:** Success of any intervention rely on the community's acceptance to the intervention. Involvement of community and promoting community participation is crucial for long-term sustainability project.

The Impact Assessment on Artificial Insemination through Boar Semen Station in these two districts i.e Mamit and Kolasib highlighted the significance of AI in improving the piggery sector in the state which is intrinsically woven with its culture, tradition and livelihood of the people in Mizoram.

INTRODUCTION

1. Introduction

There are 9.06 million pigs in India overall, as per the 20thLivestock Census, with roughly 90% of them from rural areas and only about 10% from urban areas. Pigs contribute about 1.7% per cent of India's total livestock. Of all the pig population, 79% is indigenous/nondescript animals, and 21% is exotic/cross-bred animals. The North-Eastern (NE) states of India account for over 47% of the Indian pig population. From the total meat production in India, pork production contributes nearly 5% and the annual meat production in India in 2019-20 is 8.6 MT. A positive growth at 5.98% is seen in pork production during 2019-20. However, the total pig population in the 20thLivestock census 2019 decreased by 12% over the previous livestock census (2012) (Thomas *et al*., 2021). Pig rearing is a significant source of income for the tribal population in India's North-Eastern area, and it is closely associated with the region's socio-cultural fabric. People in this area consume over 75% of the country's pork production (Khan and Bisht, 2020). Around 90% of the pigs in India are raised by smallholder farmers with low resources and use them as a key source of their income and dietary protein, unlike other livestock sectors the pig sector is neither well-developed nor suitably organized in India (Misha *et al*., 2022).

The 20th Livestock Census 2019 shows that Mizoram has 0.29 million pig population. Piggery or pig farming is a popular form of animal rearing in Mizo society, from time immemorial and is vital to livelihood of the small farmers. Pigs are the most lucrative livestock in the state, almost every family has at least one or two pigs to supplement their income or for consumption. Majority of farmers raise them in their backyards in confinement structure made of woods and bamboo on an elevated platform. The majority of farmer rear pigs that are cross-bred. All of the farmers practiced stall feeding and fed their pigs kitchen waste with certain weeds after boiling, but only half of them fed concentrate feeds (Rahman *et al*., 2008). Pig farming is one of the cash sources of income for subsistence farmers and also affects the purchasing power of families (Vanlalmalsawma *et al*., 2021).

Because of the growing human population, there is a constant demand for pork. To reduce its negative environmental effects, pig farming needs to be competitive, efficient, and sustainable. There is argument to keep fewer breed able animals to produce more numbers of

piglets (FAO 2003). In India, pig rearing is still done on traditional manner with low productivity (Singh *et al.* 2019a). Artificial insemination (AI) is the best reproductive technology available in the current scenario for enhancing the efficiency of pig production in a sustainable way (Singh *et al.,* 2019b). The Artificial insemination (AI) is the method in which semen is collected from the male, processed in the laboratory and deposited artificially into female reproductive tract. Since the late 1940s, artificial insemination has been a commonly used technique in breeding programs for the development of livestock (Singh et al., 2014). The ability to gather, prepare, store, and implant spermatozoa into the reproductive system of female animals has made this feasible. For the majority of domestic livestock species, the technology has been standardized with species-specific modifications. This is being widely used in cattle, buffalo, sheep, goat and pig in all over the world. AI in pig is widely used on commercial scale in the countries with intensive pig rearing (Maes *et al.,* 2011). It is being used in more than 90% pig in Western Europe (Gerrits *et al.,* 2005). In India, hardly 1 to 2% of breed able pigs are covered by AI. Introduction of new germplasm over a short period of time, extensive use of superior boars, disease control and extensive record keeping are some of the benefits of artificial insemination over the natural breeding (Singh *et al.,* 2018). Furrowing rate of 86% and litter size of 14 piglets had been reported by use of AI in pig (Yeste *et al.,* 2014; Singh *et al.,* 2018). It is a relatively simple, cost effective with a lot of potential for resource poor pig farmers. AI in pig involve use of freshly diluted liquid semen, transported on same day of collection or stored at 17ºC for three to ten days before use depending upon the extender (Singh *et al.,* 2018a). Nowadays, two to three billion spermatozoa are employed in each AI dosage because of the pig's lengthy uterine horn and prolonged ovulation.

In NEH region, tribal farmers generally keep one boar for 4–5 villages for breeding purpose and they have to transport female pig at the time of oestrus which further adds cost to the farmers (Singh *et al.,* 2019b). For all the above mentioned felt needs, artificial insemination is the easiest way to improve the local germplasm in the shortest way with very low input costs. Compared with natural mating, artificial insemination is the better way to introduce superior genes into sow herds, with a minimal risk of disease. The genetic selection programme in pig based on AI helped in improving economic traits such as growth rate, higher feed conversion efficiency, carcass trait, mothering ability and litter size. AI in pig is widely practiced throughout the world and is a very useful tool to introduce superior genes into sow herds, with minimal risk

for disease transmission (Maes *et al.*, 2011, Knox 2016). Initially AI was more focused on to improve breeding management and preventing the spread of venereal diseases rather than a mean to accelerate genetic progress. Artificial insemination coupled with oestrus synchronization is very useful in planned and controlled breeding. Artificial insemination also helps in avoiding inbreeding due to repeated use of same boar in natural mating. It will also eliminate the need of keeping boar at every farm or household for breeding purpose which will lower the cost of production (Singh *et al.*, 2019b). Also, AI helps in better maintenance of record at the farm. Semen from a single ejaculate can be used for breeding 10 to 20 females. With the availability of long-term extenders, AI in pig has been adopted on a wider scale (Knox 2016). Long term extender could be of immense help in country like India having hilly terrain, sparsely located pig population in NEH region, and less-developed transportation systems. In addition to the above-mentioned benefit, AI helps in control of venereal diseases. It will allow maintenance of close nucleus herd and therefore prevent entry of diseases. AI allows better maintenance of record and save the labour involved in natural mating.

AI of swine was initiated by Ivanow in Russia in the early 1900s. More than 90% of sows are bred by AI in Western Europe (Gerrits *et al.*, 2005). In the USA too, more than 70% pigs were bred through AI in the year 2000. Despite the world scenario, AI in pig in India has not yet received adequate attention due to lack of awareness among the farmers, policy makers and there are inadequate infrastructure facilities at field level (Singh *et al.*, 2019d). AI in pigs in India has mostly been just at an academic interest level until recently. National Research Centre on Pigs (NRCP), Rani, Guwahati successfully introduced AI technology at field level in Assam. Artificial insemination in Nagaland is being undertaken successfully under ICAR Mega Seed Project on Pig (Singh 2018). Recently, there is a renewed impetus under AICRP on pig breeding for adoption of AI at farm level. However, except for North East India, there are no reports of using AI in pig at field level. Non availability of basic infrastructure support like electricity, distilled water, BOD incubator at the field levels are the specific reasons for non-adoption of AI in pig. Also, lack of technical knowledge at the field level poses a major hindrance for spread of this technology. Singh (2018) recorded furrowing rate of 89.48% in farmer's field in Nagaland with average litter size of 10.06 with the use of AI. AI in pig has immense potential in empowering the tribal farmers and developing them into potential entrepreneur (Singh *et al.*, 2017). ICAR Nagaland has carried out a total of around 2500 inseminations from 2013 till 2019

and produced around 20000 piglets of improved germplasm. The average litter size has increased from 7.15 to 10.21 as compared to natural mating. The furrowing rate has also stayed at an average of around 80% through this period. The cost of AI is also 1/10th of the cost of natural service in Nagaland. Due to limit on storage time of liquid boar semen, adoption rate of AI is higher in districts near to ICAR farm in Nagaland (Singh *et al.*, 2019b). In Mizoram, pigs farming cooperative societies are carrying out AI extensively and are becoming an enormous success. It is also the first state in the country to start AI programmed. ICAR Umiam is also carrying out AI in pig in Meghalaya. However, In India, hardly 1–2% of breed able pigs are bred through artificial insemination. Kadirvel *et al.,* (2012) observed the following benefits of AI for tribal farmers', viz. timely availability of superior germplasm for breeding, economical in comparison to natural breeding and prevention of inbreeding. In addition to genetic improvement of nondescript local pigs, AI can help in overcoming breeding constraints faced by tribal farmers who practices low input backyard pig farming. There is urgent need to take up this technology to the farmers.

Boar semen stations are specialized facilities dedicated to the collection, processing, storage, and distribution of boar semen for artificial insemination (AI) in pigs. These stations play a pivotal role in modern pig farming by enabling genetic improvement, enhancing reproductive efficiency, and controlling the spread of diseases. Moreover it plays a crucial role in producing quality boar semen for artificial insemination. This facility also serves as a training centre for technicians in artificial insemination. There is need to develop the basic infrastructure at ground level for adoption of AI in India. Establishment of satellite AI centre in remote areas in collaboration with main boar station is the need of hour.

Boar Semen Station In Mizoram

The regional Boar Semen Station in Mizoram was established in the year 2013 under RKVY (NMPS) located at AH &Vety farm complex Selesih, Aizawl and started functioning in the year 2014.In Mizoram, the establishment of boar semen stations has significantly improved pig farming practices. Although these establishments have a great impact, the set up in the state could not carter the needs of the piggery farming in the whole state of Mizoram especially the other district beyond Aizawl due to various reasons.

Boar Semen Station under FOCUS

To bridge the gap of this needs, Boar Semen Stations under FOCUS were built in four location i.e. Kolasib, Serchhip, Mamit, and Champhai districts, among 11 districts of Mizoram. AH &Vety Department, Govt. of Mizoram started civil construction of all the structures in coordination with the National Livestock Mission (NLM), which accounts for 61.70% of the project's total cost. FOCUS provided material equipment, propulsion costs, salaries for technical and non-technical staff, and other operating costs, making up 38.30% of the overall cost. The establishment of the Boar Semen Station is a fortunate development for both the Department of AH &Vety and the piggery producers. Pig producers employed breeding boars for reproduction when Artificial Insemination was not available, which is a time- and money-consuming process that is associated with the risk of contracting diseases. The ultimate objective of this establishment under FOCUS is to achieve sustainability in pig farming thereby limiting the various constraints faced by the pig farming in regards reproductive performance and to have a superior germplasm in the near future.

Boar Semen Station- Kolasib

The Boar Semen Station in Kolasib started functioning under the project since April,2021 serving farmers from different villages within the district by providing timely Artificial Insemination with superior semen quality. Primary data obtained from the records of Boar semen station in Kolasib reveals that a total of 5071 AI were performed from inception i.e April, 2021 till June, 2024. A total of 23402 piglets were conceived through AI of which 11943 were male and 11459 were female piglets. The success rate of conception from inception till June, 2024 was calculated to be 67.08 %. It may also be noted that there was outbreak of ASF in the district which also affected the boar semen station and therefore no AI were performed during April, 2022 - December 2022 leading to complete halt of the Boar Semen Station which remain closed for 7 months. No piglet were conceived through AI during August, 2022 to April, 2023. The total revenue generated during the financial year April, 2023 - March 2024 was Rs. 7,27,290.00

Figure 1: Kolasib Boar semen station

The following observation were recorded during investigation

1. Breeds maintained : Large white Yorkshire
2. No. of Boars maintained: 4 nos. (2 year of age – 2 and 1 year of age - 2)
3. Average no. of collection of semen/boar/week : 1.5 time/week/boar
4. Average number of insemination carried out per sow : 1
5. No. of sperm per dose : >3 billion count
6. Average volume of diluted semen dose: 60 ml
7. Type of insemination performed: performed: single
8. Type of cathedral used : Golden pig
9. Average fee collected for single dose: Rs. 1000

The major constraints on part of the boar semen station, Kolasib were late reports from the farmers and the prevailing ASF cases in the district. Late reports from the farmers led to untimely insemination of semen through AI thereby affecting the outcome of success rates. This issues might be addressed through awareness and training programme among the pig farmers in the district. Other constraints perceived were non functioning of the photometer for semen count and semen viability and absence of proper sterilization in the semen processing unit.

Boar Semen Station- Mamit

Boar Semen Station in Mamit was established in 9th November, 2021. Due to unavailability of breed able Boar, AI started functioning from 16th March, 2023. A total of 449 AI were conducted from March, 2023 till May, 2024 and 2589 piglets were conceived through AI. The low AI performance in the district may be attributed to ASF disease outbreak from March, 2023-September, 2023 where only few AI were performed during the period. The success rate of conception from inception till June, 2024 is calculated to be 63.07 %. This centre has 5 inseminators (2 for Zawlnuam block and 3 for Mamit block).

The following observation were recorded during investigation

1. Breeds maintained : Large white Yorkshire
2. No. of Boars Maintained: 2 nos. (3 year of age – 1 and 1.5 year of age - 1)
3. Average no. of collection of semen/boar/week : 2 time/week/boar
4. Average number of insemination carried out per sow : 1
5. No. of sperm per dose : >3 billion count
6. Average volume of diluted semen dose: 60 ml
7. Type of insemination performed: performed: single
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Main constraints of the boar semen station in Mamit is the poor power supply to the semen processing unit as the solar power supply was not functioning during the period of study and the prevailing ASF cases in the district. Other constraints includes awareness for the farmers about AI centre and timely detection of heat for AI, improper fencing for bio-security measures and lack of equipment such as semen analyzing microscope for semen evaluation.

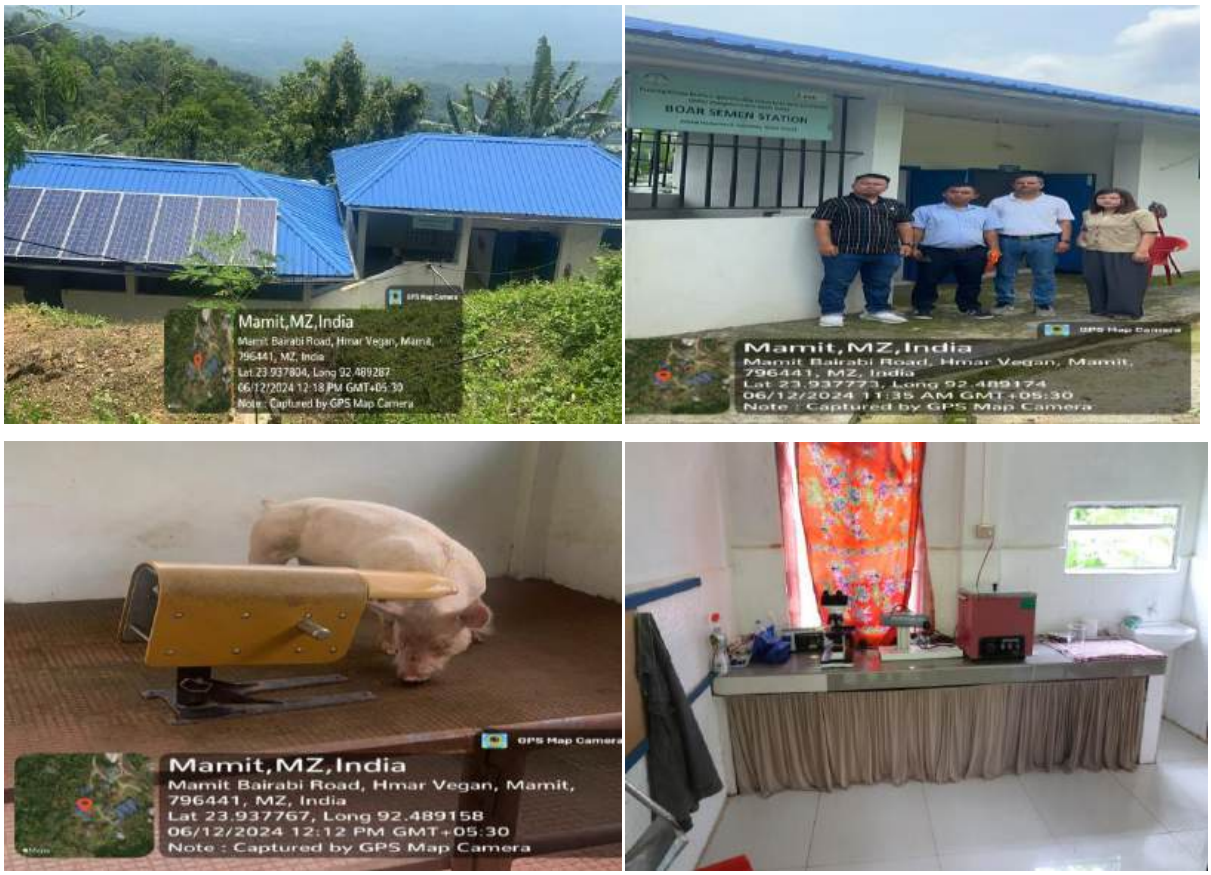

Figure 2 : Mamit Boar semen station

Objectives of the Impact Assessment study

The study was conducted to with the following specific objectives

1. To study the socio-economic, personal and psychological impact on the farmers
2. To study the success rate of conception (%) as perceived by pig farmers
3. To study the growth rate and weaning age of the piglets
4. To understand the Existing pig rearing practices followed by the pig farmers
5. To elicit the constraints of AI in pig farming in the study area

Limitation of the study

The African Swine Fever (ASF) outbreak which was still prevalent in the state of Mizoram during the study period had a significant influence on the piggery farmers, who suffered enormous losses. This, in turn, made the farmers skeptical to meet unknown people and staff of the veterinary department and expose their farms for fear of spread of the ASF in their farms which resulted in difficulty of primary data collection during interview schedule collection. However all effort were taken to make this study as comprehensive as possible.

change, with the summer temperature crossing 30 degrees Celsius and winter temperatures varying from 7 to 22 °C (45 to 72 °F). Mizoram receives rainfall averages about 100 inches (2500mm) annually, with most brought by the southwest monsoon (which blows from May to September).

2.2.2 A brief description of Mamit District

Mamit is the 4th largest district in Mizoram. The district is bounded on the north by Hailakandi district of Assam state, on the west by North Tripura district of Tripura state and Bangladesh, on the south by Lunglei district and on the east by Kolasib and Aizawl districts. According to the 2011 Census of India, Mamit has a population of 86,364. The district occupies an area of 3025.75 sq. km. There are four Rural Development Blocks i.e., West Phaileng, Reiek, Zawlnuam and Kawrtethawveng.

2.2.3 A brief description of Kolasib District

Kolasib is a town located in the northern part of Mizoram.The district is bounded on the north and northwest by Hailakandi district of Assam state, on the west by Mamit district, on the south and east by Aizawl district and on the northeast by Cachar district of Assam State. It is located 52.6 miles (84 km) south of the state capital Aizawl. The district occupies an area of 1382.51 sq. km (533.79 sq mi). As of the 2011 Census of India, Kolasib has a population of 83,955. There are two Rural Development Blocks i.e., Thingdawl and Tlangnuam.

2.2.4 A brief description of Mizoram

Mizoram's population is almost entirely comprised of Scheduled Tribes. The majority of the population is Tibeto-Burman, and they speak Mizo, a dialect that is closely related to or similar to that of the region. "Highlanders" is the local term for these communities, which they are referred to as Mizo. According the 2011 census, the state total population is 10,97,206, with 5,55,339 males and females 5,41,867. This shows a 23.48 per cent increase from the 2001 census; Mizoram remains the second least populated state in India. The state has a higher sex ratio than the national average of 940, with 976 women for every 1000 men. There are 52 people living per square kilometer. Over one-third of Mizoram's population resides in the district of Aizawl, home to the capital. The percentage of Mizoram's population that lives in urban areas is 52.00%, which is higher than the national average. Mizoram had the second-

METHODOLOGY

2. Approach and methodology adopted for this study

The investigation has been organized under the sub-heads given below:

2.1 Study location

2.2 Description of the study area

2.3 Sampling procedure

2.4 Parameters studied

2.5 Method of Data Collection

2.6 Data Processing and Statistical Analysis

2.1 Study Location

The planned research was conducted in the state of Mizoram. The study was conducted in purposively selected two districts of Mizoram, namely, Mamit and Kolasib district. These two districts had been chosen based on the term of references highlighted by Society for Climate Resilient Agriculture in Mizoram (SCRAM)

2.2 Description of the study area

Mizoram is one of the seven states in India's North Eastern region. It is the fifth smallest state in India with 21,087 km^2 (8,142 sq m). It extends from Latitude 21°58' & 24°35'N and Longitude 92°15' & 93°29'E (Economic Survey of Mizoram, 2021-2022). Within India's northeast region, it is the southernmost landlocked state, sharing borders with three of the Seven Sisters States, namely Tripura, Assam and Manipur. The state is also sandwiched between Myanmar in the east and south and Bangladesh in the west. Mizoram is gifted with vast forests resources including a variety of flora and fauna. According to the Forest Survey of India, 2021 the forest cover percentage of Mizoram is 84.53% and has the highest forest cover as a percentage of the total geographical area.

2.2.1 Climatic pattern of the state:

The climate in Mizoram is pleasant; moderately hot during summer and extreme cold is unusual during winter. During summer it is relatively cool with the temperature ranging from 20-29 °C (68 to 84 °F), there is a gradual increase in the temperature resulting from climate

change, with the summer temperature crossing 30 degrees Celsius and winter temperatures varying from 7 to 22 °C (45 to 72 °F). Mizoram receives rainfall averages about 100 inches (2500mm) annually, with most brought by the southwest monsoon (which blows from May to September).

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highest literacy rate in all of India in 2011 with 91.33 per cent, higher than the 74.04 per cent national average.

Figure 3: Map of Mizoram

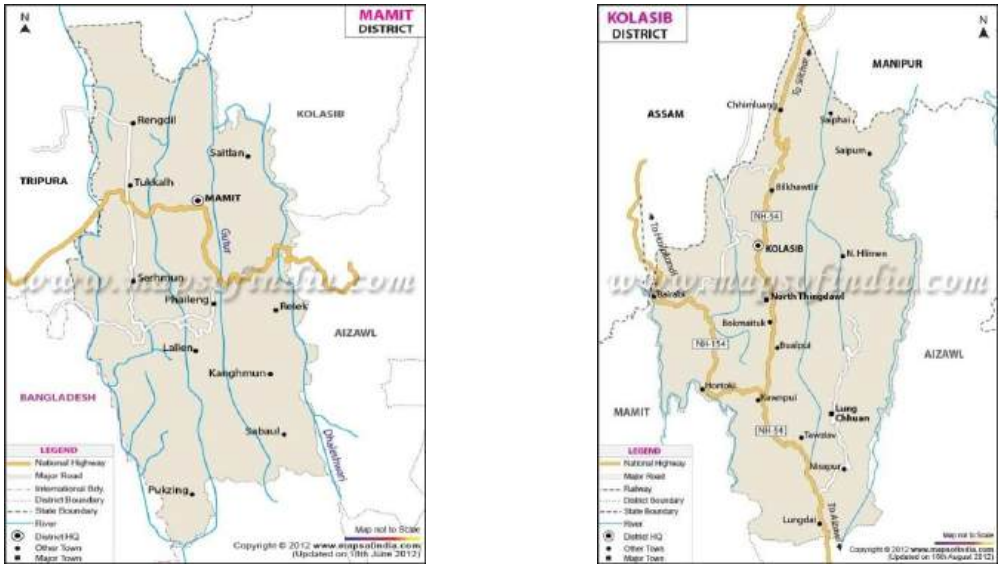

Figure 4: Map of the study area

2.3 Sampling Procedure

The study was conducted purposively in selected two districts of the state as per the terms of references provided by FOCUS, namely Mamit and Kolasib. The selection of villages and farmers were obtained from the primary data recorded by the boar semen station in the district. Other information in relation to the study areas were gathered through consultation Department of Veterinary and Animal Husbandry officials and In charge, Boar Semen Stations officials. Sample households were subsequently selected randomly. A list was prepared based on discussions with the Village Chairperson, Veterinary Field Assistants and Livestock Service Providers of the concerned villages. A total of 300 sample households were interviewed from both districts (150 from Mamit and 150 from Kolasib district) using a structured interview schedule.

List of Villages:

District	Village	Household
Mamit	Mamit	95
	Zawlnuam	20
	Rengdil	5
	Dapchhuah	4
	Tuidam	8
	Kawrthah	8
	Kanhmun	10
Kolasib	Kolasib	115
	Buhchangphai	2
	Thingdawl	15
	Bilkhawthlir	2
	Bairabi	4
	Rengtekawn	6
	Pangbalkawn	6

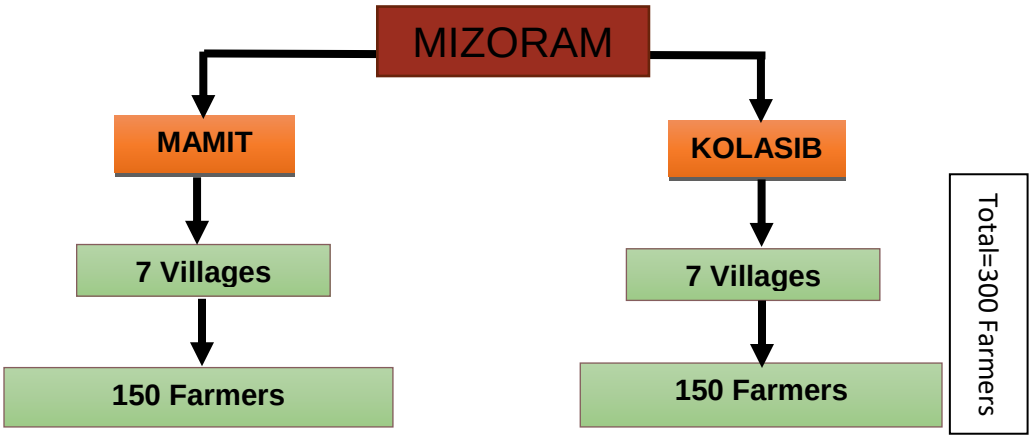

Figure 5: Schematic representation of sample plan in two districts of Mizoram.

2.4 Socio economic personal, psychological and other parameters

Parameters given below were studied and recorded as per specific objectives.

2.4.1 Socio-economic profile of the pig farmers

Information on the socio-economic status of piggery farmers was collected by interviewing the farmers from the two selected districts. The list of variables used for the study is mentioned below:

Table 1 :Socio-economic Variables

Sl.No.	Variables
1	Age
2	Gender
3	Family size
4	Family type
5	Educational Qualification
6	Farming Experience
7	Total Operational landholding
8	Occupational status of the farmer
9	Training
10	Extension Contact
11	Annual income
12	Herd size
13	Economic motivation
14	Attitude towards pig farming

2.4.1.1 Age

Age is the number of years an individual has lived. The age of the respondent at the time of investigation was recorded by direct questioning. The categorization of the age of the respondent was done by following the Census Report 1981, Government of India.

Sl.No	Category	Age
1	Young	Upto 35 years
2	Middle	36-50 years
3	Old	Above 50 years

2.4.1.2 Gender

The socially constructed characteristics of women and men, such as norms, roles and relationships within and between groups of women and men, are referred to as gender. The respondents were put into two categories, namely male and female.

2.4.1.3 Family Size

The size of a family is determined by how many people are currently living together. The families were categorized in accordance with Majunder (2020) classification.

Category	Members
Small	Below 5
Medium	6-9
Large	Above 9

2.4.1.4 Family type

Family is the group defined by sex relationship sufficient precise and enduring to provide for the procurement and upbringing of children. In the present study, family refers to whether it is nuclear or joint family system in the respondent's family. A family was considered as nuclear when it consisted of husband, wife and unmarried children. A joint family consisted of other blood relatives also.

The scoring patterns develop by Pareek and Trivedi (1964) in their "socio-economic status scale-rural" was followed to quantify the family type of the livestock owners.

Nuclear family – 1
Joint family – 2

2.4.1.5 Educational Qualification

It refers to the respondent's formal education-based qualifications.

Category	Years of Schooling	Score
Illiterate	No formal education	1
Functionally literate	No formal education	2
Primary School	1-5	3
Middle School	6-8	4
High School	9-10	5
Higher Secondary	11-12	6
Graduate and above	Above 12	7

2.4.1.6 Farming experience

Farming experience refers to the total number of years the pig farmer was involved in pig farming. The respondents were categorized into the following three groups using the mean and SD.

Category	Years
Low	Up to 7 years
Medium	7-23 years
High	Above 23 years

2.4.1.7 Total Operational land holding

Land is one of the most significant and vital scarcity elements in production. It referred to the whole area of land owned and operated for agricultural purposes by a single family. The respondents were classified into landless, marginal, small, semi-medium and large as per government classification.

Sl. No	Category	Size of land holding
1	Landless	Landless
2	Marginal	Below 1 ha
3	Small	1-2 ha
4	Semi-medium	2-4 ha
5	Medium	4-10 ha
6	Large	10 ha or above

2.4.1.8 Occupational status of the farmer

Occupation is a way to earn a living. It is a method of generating income for farmers. The type of income-generating operations conducted by respondents is highlighted by occupation status, which also determines the extent to which farmers are involved in farm activities. It was measured by direct questioning at the time of interview.

Sl.No	Categories
1	Pig farming as sole occupation
2	Pig farming + Agricultural labourer
3	Pig farming + Business/Government servant

2.4.1.9 Training

Training is a structured activity with the goal of transferring knowledge and skills to modify trainees' attitudes and behaviors and improve their performance in order to produce

competent conducts. It refers to whether the farmers have received any training on improved piggery farming practices during the last five years.

2.4.1.10 Extension Contact

Extension contact refers to the pig farmer's closeness and frequency of meeting with the extension worker such as Veterinary Officer (VO), Veterinary Field Assistant (VFA), KVK, ATMA and others. The respondents were classified into three categories i.e. low, medium and high extension contact using mean and SD. Four points continuum viz., Regularly, Occasionally, Rarely and Never with a scoring of 4,3,2,1 was used to measure the frequency of contact with the extension agent.

Sl. No.	Extension personnel	Daily	Biweekly	Weekly	Monthly	Rarely	Never
		5	4	3	2	1	0
1	Neighbours/friends						
2	V.O						
3	VFA						
4	KVK						
5	ATMA						

2.4.1.11 Annual income

It refers to the respondent household's annual income from pig farming and other sources. The respondents were categorized into low, medium and high-income groups based on poverty line and average monthly per capita expenditure (MPCE).

Category		Income (in ₹)
Low		<69,300
Medium		69,300 – 1,06,950.6
High		>1,06,950.6

2.4.1.12 Herd size

It refers to the total number of pigs (Sow, Piglet, Fattener and Gilt) owned by the household. This was measured by direct questioning.

2.4.1.13 Economic Motivation

Economic motivation was operationalized in terms of profit maximization and relative value placed by a farmer on economic ends. The scale developed by Supe (19690 was followed with modification.

The scale consisted of six statements of which the first five were positive and the last one negative. These items were rated on a five-point continuum which ranged from strongly agree to strongly disagree. The following scoring procedure was followed.

Response	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Positive items	7	5	4	3	1
Negative items	1	3	4	5	7

The scores obtained for each statement were summed up to get the total score. The maximum score one could obtain was 42, while the minimum was six. Further the respondents were categorized into low, medium, and high level by using mean and standard deviation.

2.4.1.14 Attitude towards AI in pig

It is proposed that an "attitude is the mental state of readiness" (Allport, 1935). It is the learned predispositions towards various aspects of our environment. They may be positive or negatively directed towards certain aspect of AI in pig farming. Farmers attitude towards AI was explored using Diekman *et al.,* (2009) with modification.

A schedule was developed to measure the attitude of the pig farmers towards Artificial Insemination practice in pig. The scale consists of 8 statements. The statement was rated in three-point response categories ranging from agree to disagree.

There were 5 positive statements and 5 negative statements in the scale. The scores obtained for each statement were summed up to get the total score. The maximum score one could obtain was 42, while the minimum was six. Further the respondents were categorized into low, medium, and high level by using mean and standard deviation.

2.4.1.15 Cost of AI and cost of natural breeding

The average monetary expenses incurred for performance of AI and Natural breeding were taken into consideration and documented.

2.4.2 Success rate of conception

Success rate of conception was measured using the following Index

$$\text{Conception success rate} = \frac{\text{No of conception}}{\text{Total No. of Services}} \times 100$$

2.4.3 Growth rate and weaning age

$$\text{Pre-weaning mortality\%} = \frac{\text{number born alive} - \text{number weaned} \times 100}{\text{Number born alive}}$$

Furrowing rate: The percentage of sows that furrow to a given number of matings.

$$\text{Litters per sow a year} = \left\{\frac{\text{Total litters furrowed in a time period} \times 12}{\text{Average number of sows over the same time period}}\right\} \Big/ \text{number of months.}$$

Weaning age = age at weaning in days

Other Production parameters

The different production parameters in relation to Artificial Insemination, Litter index, Growth performance such as total number of AI performed, number of conceived through AI, Litter size, weaning to next mating, age at weaning, piglet mortality, litter weaned/sow, litter/sow/year, weight at 1st week, weight at weaning and weight at marketing of fattener were taken and similar data were compared with natural breeding.

2.4.4. Existing management practices in pig farming

Recommended pig farming practices in the subject area of housing, feeding, breeding, health and disease management practices were selected in consultation with subject matter specialized, field veterinarians and relevant literature.

2.4.5 Constraints as perceived by the Piggery Farmers

Constraints faced by the piggery farmers were identified by open ended questions. The selected items were divided into the following heads: Health care, economic, breeding and other miscellaneous constraints. The respondent response was taken against each of the practice on four points continuum with scores of 4, 3, 2 and 1 respectively. Respondents were asked to rank these listed constraints. The order of the merits given by the respondents was changed into ranks using the following formula:

$$\text{Percent position} = \frac{100\,(R_{ij}-0.50)}{N_j}$$

Where R_{ij} = Rank given for the i^{th}item by j^{th} individual

N_j= Numbers of items ranked by j^{th} individual

The per cent position of each rank was converted into scores (Garrett,1981). For each item, the scores of individual respondents were added together and divided by the total number of respondents. The mean scores for all the items were ranked by arranging in descending order.

2. Socio-economic, personal and psychological impact of Artificial Insemination through Boar semen station

To assess the impact of Artificial Insemination, data was ascertained from Before AI intervention and after AI intervention.

2.5. Method of Data Collection

For data collection, personal interview and observation method was employed to collect data from the respondents. Secondary data was collected from the Boar semen station of the respective districts.

2.6 Data Processing and Statistical Analysis

The collected data were scored, complied, tabulated using frequency, mean, standard deviation and subjected to various appropriate statistical tools such as Statistical Package for Social Sciences (SPSS version 17), Microsoft Excel, etc. to draw the logical conclusions.

Figure 6 :Processing of Boar semen

RESULTS AND DISCUSSION

3. Analysis of socio-economic,personal and psychological impact

3.1. Socio-economic personal and psychological profile of the farmers

The following presents the results obtained from the respondents' socio-economic profile:

3.1.1. Age

Age is one important aspect influencing a person's exposure, experience, thinking and decision- making abilities as well as their degree of maturity. Table 2 data reveals that majority of the respondents (50.66%) are in the middle age group between 36-50 years, followed by the old age group (32.66%) and the young age group (16.66%).

Table 2: Age of the respondents

Category	District		Total (N=300)
	Mamit (n=150)	Kolasib (n=150)	
Young (Up to 35 years)	40 (26.66)	10 (6.66)	50 (16.66)
Middle (36-50 years)	70 (46.66)	82 (54.66)	152 (50.66)
Old (Above 50 years)	40 (26.66)	58 (38.66)	98 (32.66)

**Figures in parenthesis indicates percentage

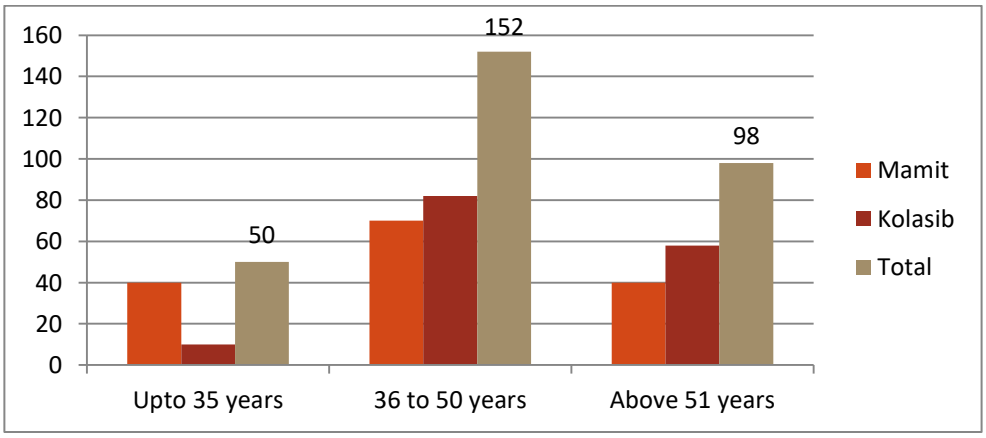

Figure 7 Age-wise distribution of the respondents

3.1.2. Gender

The data revealed that majority (54%) of the respondents were male while 41.00 per cent were female. This suggests that men were more involved than women when it comes to piggery farming which may be due to labour intensity of the farming system.

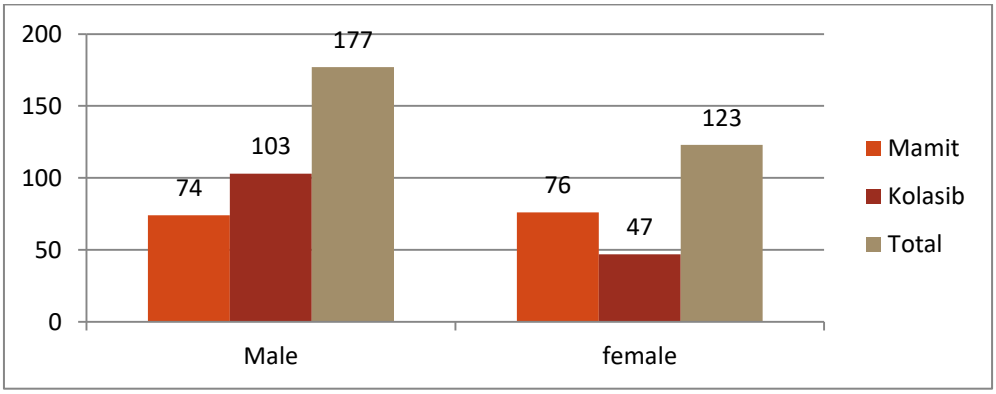

Figure 8: Frequency distribution of gender of the respondents

3.1.3 Family Size

A family size influences numerous factors including the amount of labour a family can provide, annual income and so forth. Table 3 shows that majority (77%) of the respondents had medium sized family of 4-5 members in a family followed by large (19.66%) and small (3.33%) sized family respectively.

Table 3: Family size of the respondents

Family Size	Districts		Total (N=300)
	Mamit (n=150)	Kolasib (n=150)	
Small (<3 member)	5 (3.33)	5 (3.33)	10 (3.33)
Medium (4-5 members)	101 (67.33)	130 (86.66)	231 (77.00)
Large (>5 members)	44 (29.33)	15 (10)	59 (19.66)

**Figures in parenthesis indicates percentage

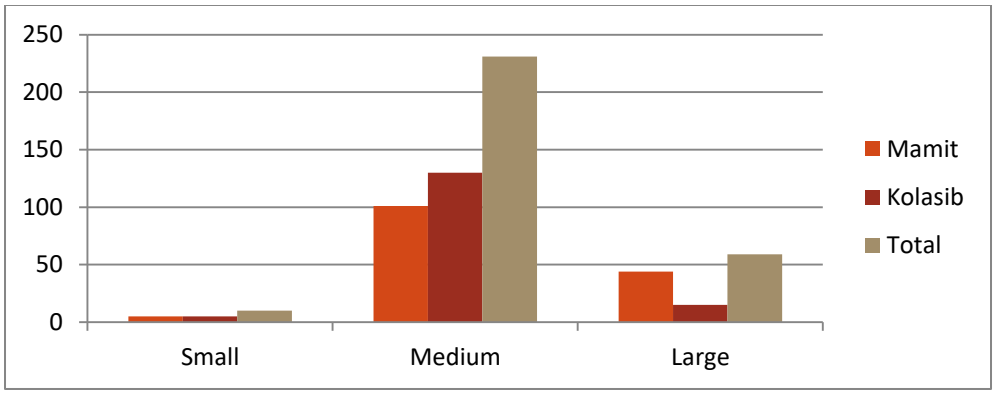

Figure 9: Frequency distribution of family size of the respondents

3.1.4. Family type

The data in table 4 showed that an overwhelming percentage of the family are of nuclear type (98.66%) in both the district.

Table 4: Family type of the respondents

Family type	Districts		Total (N=300)
	Mamit(n=150)	Kolasib (n=150)	
Nuclear	149 (99.33)	147 (98.00)	296 (98.66)
Joint	1 (0.66)	3 (2.00)	4 (1.33)

**Figures in parenthesis indicates percentage

3.1.5 Educational Qualification

Education level has been considered a key component of a society's socio-economic progress. From the data obtained, majority of the respondents were educated upto high school (34 %) which was followed by higher secondary (21.33%) and middle school (18.33%). The high literacy of the state may be attributed to the results obtained.

Table 5: Educational qualification of the respondents

Education	Districts		Total (N=300)
	Mamit (n=150)	Kolasib (n=150)	
Illiterate	0	0	(2)
Functionally literate	2 (1.33)	19 (12.66)	19 (6.33)
Primary school	0	25 (16.66)	25 (8.33)
Middle school	21 (14.00)	34 (22.66)	55 (18.33)
High school	62 (41.33)	40 (26.66)	102 (34.00)
Higher secondary	41 (27.33)	23 (15.33)	64 (21.33)
Graduate and above	24 (16.00)	9 (5.83)	29 (9.66)

**Figures in parenthesis indicates percentage

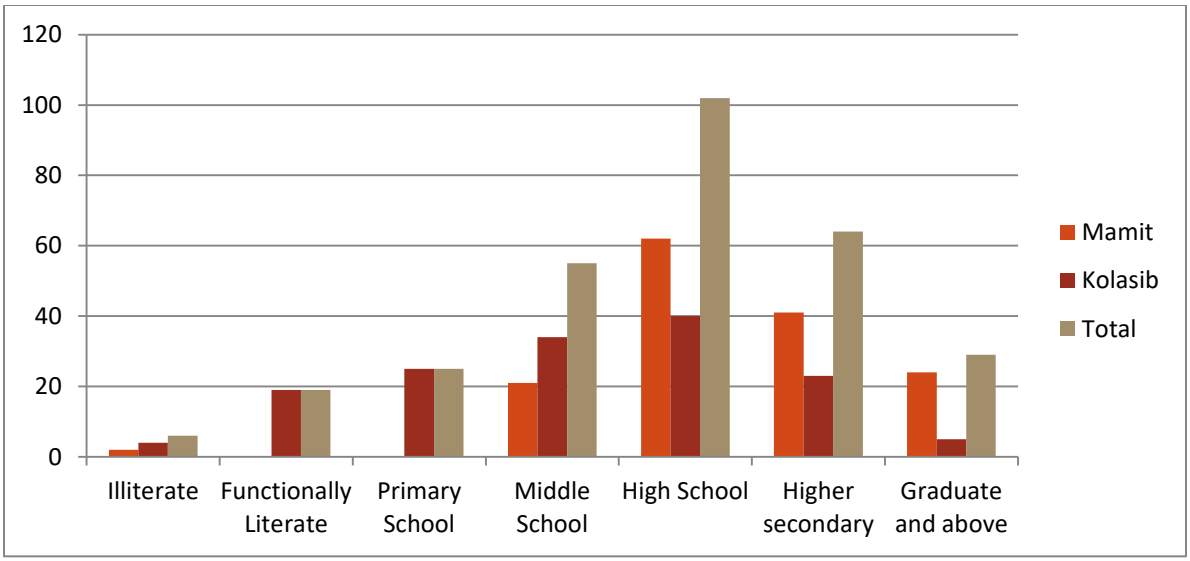

Figure 10: Frequency distribution of educational qualification of the respondents

3.1.6 Farming experience

The data in Table 6 showed that 44 per cent of the respondents were rearing pig for 6-19 years followed by up to 6 years (37.33%) while the remaining 18.66 per cent had long farming experience above 19 years. This indicates that pig farming plays a vital role in the livelihood of the mizo society.

Table 6:Farming experience of the respondents

Farming experience	District Mamit (n=150)	Farming experience	District Kolasib (n=150)	Total (N=300)
Low (Upto 6)	96 (64.00)	**Low (Upto 7)**	16 (10.67)	112 (37.33)
Medium (6-19)	25(16.67)	**Medium (7-19)**	107 (71.330	132 (44.00)
High(Above 19)	29(19.33)	**High(Above 19)**	27 (18.00)	56 (18.66)

** Figures in parenthesis indicate percentage

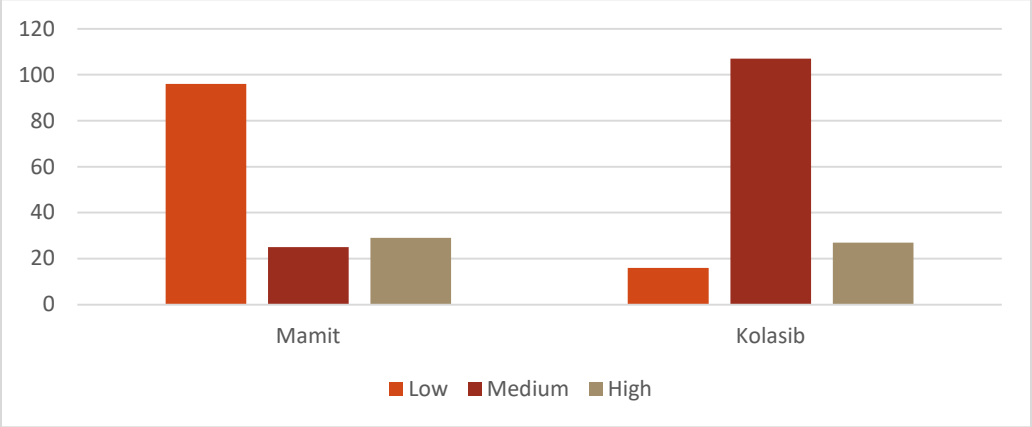

Figure 11: Frequency distribution of farming experience of the respondents

3.1.7 Land holding of the farmers

Pooled sample indicated that majority of the farmers were small farmers having 1-2 hectares (54%) of land followed by marginal farmers having below 1 hectare of land.

Table 7: Land holding of the respondents

Land holding	Districts		Pooled (N=300)
	Mamit (n=150)	Kolasib (n=150)	
Marginal (Below 1 ha)	105 (70.00)	57 (38.00)	162 (54.00)
Small (1-2 ha)	41 (27.33)	65 (43.33)	106 (35.33)
Semi-medium(2-4 ha)	4 (2.66)	28 (18.66)	32 (10.66)

**Figures in parenthesis indicates percentage

3.1.8 Occupational status of the farmer

Occupation refers to the main source of income. The data in Table 8 showed that majority (37.33%) of the respondents had taken up piggery faming with agriculture, (31.66%) of the respondents were engaged in piggery farming alone while (31.00%) of the respondents practiced piggery farming along with other activities such as shops, daily labour, Government services etc. The observation on piggery opted as the main source of income indicates a good market of pork and piglets, high and fast return of investment and profitable nature of pig farming.

Table 8: Occupational status of the respondents

Source of livelihood	Districts		Pooled (N=300)
	Mamit(n=150)	Kolasib(n=150)	
Only piggery farming	59 (39.33)	36 (24.00)	95 (31.66)
Piggery farming+Agricultural activities	44 (29.33)	68 (45.33)	112 (37.33)
Piggery farming + Others	47 (31.33)	46 (30.66)	93 (31.00)

**Figures in parenthesis indicates percentage

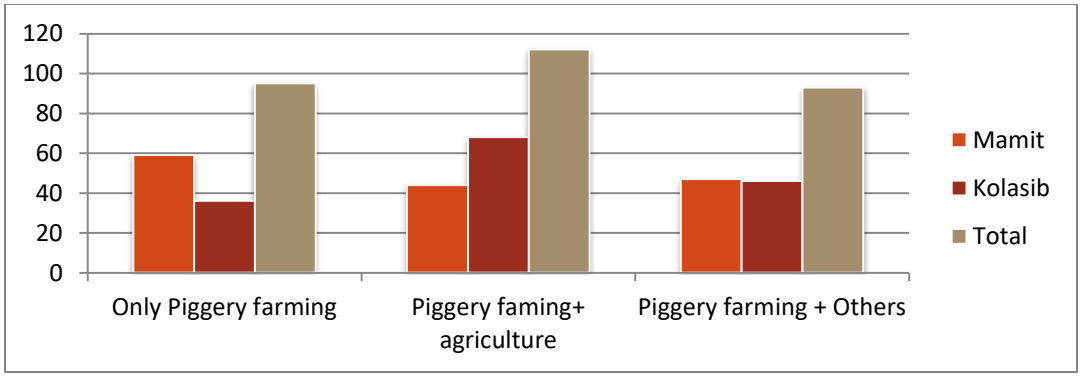

Figure 12: Frequency distribution of occupation of the respondents

3.1.9 Training programme

Training of the respondents received was based on last two years from the date of interview. It was observed that only 32.00% of the farmers received training while the remain 68% of the farmers did not receive any training.

Table 9: Training participation of the respondents

Participation in training programme	Districts		Total (N=300)
	Mamit(n=`150)	Kolasib (n=150)	
Yes	52 (34.66)	44 (29.33)	96 (32.00)
No	98 (65.33)	106 (70.66)	204 (68)

**Figures in parenthesis indicates percentage

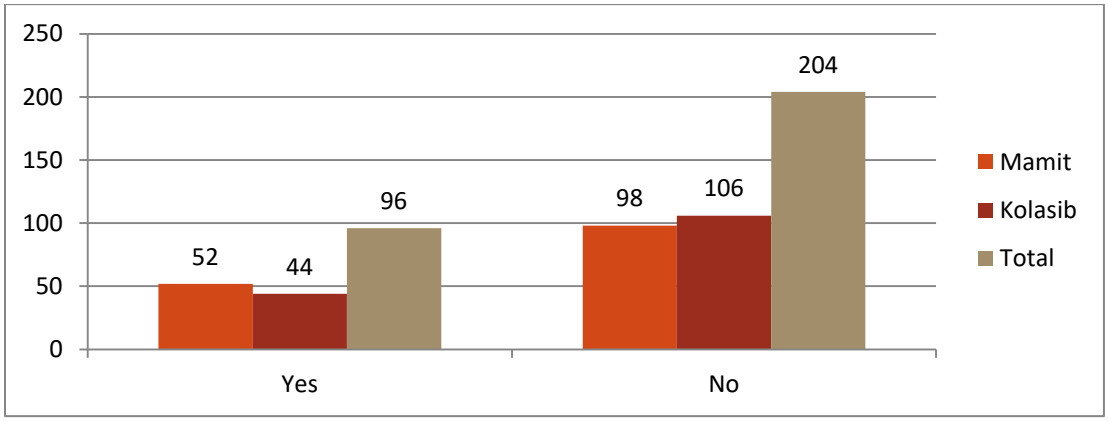

Figure 13: Frequency distribution of farmers participation in training programme

3.1.10 Extension contacts

Extension contact is the term used to describe the familiarity and regularity with which respondents communicate with agents such as neighbours or friends, veterinary officer (VO), Veterinary Field assistant (VFA), KVK, ATMA etc in order to obtain information..Majority of the respondents (52%) were found to have low level of extension contact with functionaries. Data analysis reveals that most of the pig farmers contacted para veterinarians for associated problems in regards to pig farming.

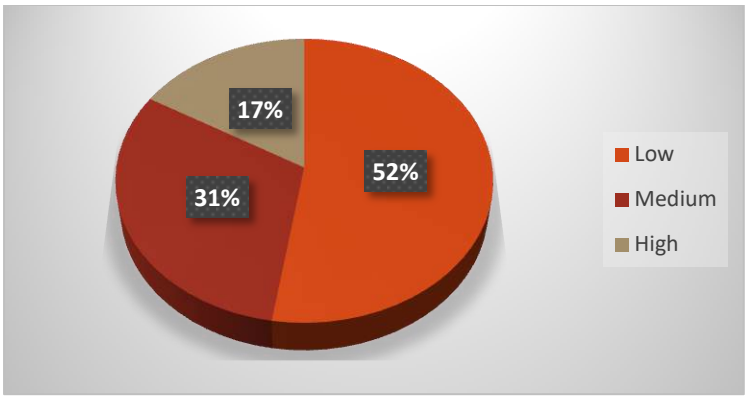

Figure 14: Extension contacts of the respondents

3.1.11 Annual Income of the respondents

It is evident from table 10 that majority of the farmers had medium level of income (84.33 %) having a yearly income between ₹71215- ₹211477. Farmers earning below ₹ 71215 were 3.33 % and 12.33 % had and annual income of more than ₹2,11,477.

Table10: Income of the respondents

Category	Mamit (n=150)	Kolasib (n=150)	TOTAL (N=300)
Low (Below 71215)	5(3.33)	5(3.33)	10 (3.33)
Medium (71215 – 211477)	133(88.67)	120 (80.00)	253(84.33)
High (Above 211477)	12(8.00)	25(16.66)	37 (12.33)

**Figures in parenthesis indicates percentage

3.1.12 Pig Herd Size of the respondents

The total numbers of pigs reared by the farmers were recorded and classified as sow, piglet, fattener and gilt. From the table, it could be observed that the farmers were having on an average 2.05 numbers of sow, 18.75 numbers of piglets and 0.63 fatteners.

The farmers of Kolasib district were having more number of pig in comparison to farmers of Mamit district. This may be attributed to the early establishment of Boar semen Station in Kolasib than Mamit.

Table 11: Average herd size of the farmers according to the type of pigs

Type of pigs	Mamit (n=150)	Kolasib (n=150)	Pooled (N=300)
Sows	1.61	2.48	2.05
Piglet	10.62	26.89	18.75
Fattener	0.98	0.29	0.63
Gilt	0.14	0.94	0.54

3.1.13 Economic motivation

Table12: Economic and attitude of the farmers towards AI

Variables	Districts	Mean	SD	Low	Medium	High
Economic motivation	**Mamit (n=150)**	13.16	1.50	4 (2.66)	128(85.33)	18(12.00)
	Kolasib (n=150)	12	1.8	4 (2.66)	130(86.66)	16(10.66)
	TOTAL (N=300)	12.58	1.65	8 (2.66)	258(86.00)	34(11.33)
Attitude towards AI in pig	**Mamit (n=150)**	21	2.8	11(7.33)	87 (58.00)	52 (34.66)
	Kolasib (n=150)	20.84	1.77	15(10.00)	92 (61.33)	43 (28.66)
	TOTAL (N=300)	20.92	2.285	26(8.66)	179 (59.66)	95 (31.66)

**Figures in parenthesis indicates percentage

Table12 reveals that majority of the respondents had medium (86.00%) to high level (11.33%) of economic motivation towards Artificial Insemination. This indicates that the pig farmers aspired AI to increase their income than his/her present situation.

3.1.14 Attitude towards AI in pig

It is observed from the table 12 that majority of the pig farmer had medium (59.66%) level of favorable attitude and 31.66% of the farmers had high level of favorable attitude towards AI in pig. The favorable attitude towards AI may be cost reduction compared to natural service (NS), ease of services, disease control, reduction of inbreeding associated problems and disease control measures than the traditional method. From the observation it could be stated that up scaling of AI center in other districts of Mizoram might bring a more holistic improvement to piggery sector as a whole as most of the farmers have positive attitude towards AI.

3.2 Socio- Economic impact of AI

3.2.1Pig Herd Size

The total number of pigs reared by the farmers before and after intervention of AI were recorded and classified. From the table 13, it could be observed that herd size in piglet increased from 9.19 to 18.75 and sow from 1.21 to 2.05 in sow after AI intervention. There were

negligible differences in fattener and gilt. The high rise of piglet may be attributed to the prevailing ASF where pig farmers found difficulty in sale of piglet and also rearing of breed able sow added advantages for services to sow through to AI. Significant differences were observed in Kolasib district where more farmers reared higher number of sow and piglet as compared to before the establishment of Boar Semen station.

Table 13: Average herd size of the farmers before and after AI

Type of pigs	Mamit (n=150)		Kolasib (n=150)		Total (N=300)		p-value
	Before AI	After AI	Before AI	After AI	Before AI	After AI	
Sows	1.55 ±0.84	1.61± 0.78	0.88±0.79	2.48±1.17	1.21±0.88	2.05±1.08	0.001
Piglet	9.38 ±2.90	10.62±2.04	9.01±4.69	26.89±8.96	9.19±4.91	18.75±8.14	0.001

3.2.2 Annual income of farmers before and After AI

The average total net income significantly ($P < 0.001$) higher in artificially inseminated farming household than the Natural breeding household (₹ 172553.33 and ₹ 89111.17)

Table: 14 Annual Income of farmers before and after AI

Particulars	Mamit(n=150)	Kolasib(n=150)	Total (N=300)	p-value
Income before intervention	106646.67±55478.593	71575.67±71136.635	89111.17 ±66061.037	0.001
Income after intervention	129473.33±78721.448	215633.33±94660.195	172553.33 ±97033.786	

However, with the intervention of AI, the low-income group reduces to 3.33% and the high-income group increases to 12.33% while the medium income group also increases to 84.00% from 64.00%. This indicates that farmers earning was increase due to AI center establishment in the districts. Respondents having higher level of income were more in Kolasib district than Mamit district. This reveals that the intervention of Boar Semen station has significantly impacted the income of the pig farmers.

3.2.3 Benefit Cost Ratio (B:C Ratio)

From the table it could be conferred that benefit cost ratio is higher due to intervention where mean indicates 1.89 before intervention to 2.48 after intervention. Average net income was found to be Rs. 1,06,646 and Rs. 1,11,341 before AI intervention and Rs. 1,29,474 and Rs. 2,15,633 after AI intervention for Mamit and Kolasib district respectively.

Table 15: B:C Ratio

Particulars		Mamit(n=150)	Kolasib(n=150)	Mean
Average cost of production	Before AI	44330	26781	35555.5
	After AI	66190	96250	81220
Average net income	Before AI	106646	111341	108993.5
	After AI	129474	215633	172553.5
B:C ratio	Before AI	1.98	1.81	1.89
	After AI	2.59	2.38	2.48

Higher net income and B:C ratio was observed in Kolasib district as compared to Mamit district. The higher B:C ratio in Kolasib district may be due to earlier establishment of Boar semen station in Kolasib as compared to Mamit district. The higher net income from the two districts may be attributed to favorable attitude and economic benefits towards AI thereby leading to increase in farm size which ultimately results in higher income of the pig farmers.

3.2.4 Cost of AI and Cost of Natural breeding

From table 16 the average cost of natural service by using boar was found to be ₹ 2812.00 which was reduced to ₹1274.00 after the service provided under AI. The net average saving was found to be ₹1538. Reductions of cost of services have greatly enhanced the income of the farmers through AI and it motivated the farmers to adopt AI in their farms.

Table16: Cost of AI &NB

Particulars	**Mamit (n=150)**	**p-value**	**Kolasib (n=150)**	**p-value**	**Total (N=300)**	**p-value**
Breeding Practices	Mean±SD	0.001	Mean±SD	0.001	Mean±SD	0.001
AI	1507.33±673.177		1040.67±150.211		1274.00±540.089	
NB	3610.00±687.545		2014.00±137.098		2812.00±940.143	

Table 17: AI parameters in sow

Parameters	Mean ± SD				TOTAL (N=300)		P value
	Mamit (n=150)		Kolasib (n=150)				
Total AI performed in the farm	1.59		4.76				
	AI	**NB**	**AI**	**NB**	**AI**	**NB**	
Conceived	1.66 ±1.14	1.27±0.46	2.88±1.07	1.07±0.43	2.07±1.16	1.36±0.49	0.001
Litter size/sow at birth	10.74±2.09	9.36±2.85	10.98±2.36	6±2.14	10.86±2.22	7.68±2.8	0.001
Average days from weaning to next mating of sow	26.70 ±5.53	26.88 ±5.34	23.50±5.70	23.69±14.02	25.10±5.83	25.28±11.36	0.357
Abortion	0.11	0.13	0.46	0.48	0.28	0.30	0.0
Still born piglets	0.91 ±0. 66	1.38±0.85	0.56±0.17	0.88±0.26	0.62±0.45	0.97±0.22	0.001
Sex of piglet through AI							
Male	5.51		5.1		5.30		
Female	5.21		5.76		5.48		

Table 18: Litter index of the piglets

Litter index	Mean				TOTAL (N=300)		P value
	Mamit(n=150)		Kolasib(n=150)				
	AI	NB	AI	NB	AI	NB	
Age of piglet at weaning (days)	56.66 ±5.78	54.36±12.49	47.5±4.36	38.3±19.02	52.08±6.87	46.33±17.86	0.001
Average piglet mortality (%)	0.63±	4.31	8.78	6.79	4.70	5.55	0.001
No. of litters weaned/sow (number)	10.44±1.98	9.10±2.91	10.06±2.59	5.33±4.51	10.25±2.31	7.21±4.23	0.001
Average no of litters/sow/year (number)	14.20±6.42	12.83±4.96	17.96±5.44	7.56±6.97	16.08±5.80	10.20±5.47	0.001

Table 19: Growth performance of the piglet

Growth performance	Mean±SD				Total Mean (N=300)		P value
	Mamit (n=150)		Kolasib (n=150)				
	AI	NB	AI	NB	AI	NB	
Average weight of piglet (kg)	0.58±0.12	0.62±0.13	0.59±0.14	0.46±0.27	0.59±0.13	0.54±0.23	0.006
Average weight at marketing fattener pigs (kg)	102.23±52.97	100.61±53.18	119.33±51.44	117.23±52.32	110.78±51.11	108.92±52.61	0.675
Average weight at first week of age (kg)	1.03±0.33		1.12±0.32		1.42±0.37		0.223
Average weight at weaning (kg)	9.69		11.03		10.36		0.386

3.3 Impact of AI on Performance of Pig production

Table 17 shows that an average of 1.59 and 4.76 AI were performed in the respondents' farm. Results indicates that the number of conception of piglet increase from 1.36 to 2.07 and found to be significant ($p < 0.001$) indicating a better response through AI than NB. Litter size/sow at birth also highlight a higher rate of new born through AI where the average of 10.86 piglets were obtained through AI while 7.68 piglets were obtained in NB and is significant ($p < 0.001$) . Similar to no changes were observed in average days of weaning to next mating, abortion and still birth encountered.

3.3.1. Litter index

Data from table 18 reveals that number of litter weaned/sow and the average number of litter/sow/years increased from 7.21 and 10.88 to 10.25 and 15.39 respectively with AI. Slight differences could be observed in average age at weaning. The average pig mortality and average age of marketing fatteners remained the same in both. The better age at weaning may be attributed to the fact that AI is performed with a superior-quality boar where NB involves only the boar that the present locally leading to inbreeding problems thereby effecting the growth indices of piglet.

3.3.2 Growth performance

In regards to growth performance between AI and NB, from the data the average weight of piglet shows differences where weight of piglet at birth in AI is 0.59 kg while 0.54 kg was recorded for NB which is significant ($p = <0006$). This indicates that the piglets conceived through AI were relatively larger than those born through NS. This may be due to super quality boar maintained in Boar Semen station than indiscriminate breeding followed by use of any/single available boar in the villages.

3.4 Success rate of conception

From the table 20, it can be concluded that 67.19 success rate of AI is achieved from total sample size. The high success rate may be attributed to better quality boar, better semen management and timely insemination procedures followed by Boar Semen Station.

Table 20: Success rate of conception

District	No. of service	No. of conception	Total service	Total conception	Total Success rate of conception
Mamit	239	144	954	594	67.19
Kolasib	715	450			

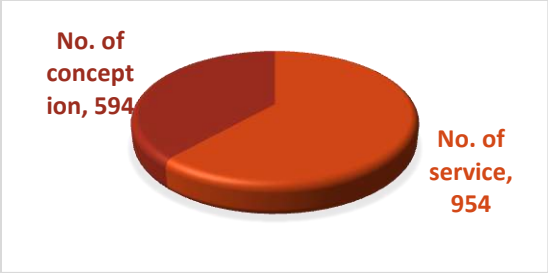

Figure 15: Pooled success rate of conception

3.4.1 Growth rate and weaning age of the piglet

3.4.1.1 Pre-weaning mortality%

It is evident from the table 21 that pre weaning mortality in both the districts is 5.61% which is average mortality per cent (5%) that is usually taken into consideration.

Table21: Pre-weaning mortality of piglets

District	Number born alive	Number weaned	Total number born alive	Total number weaned	Pooled Pre-weaning mortality%
Mamit	1611	1566	3259	3076	5.61
Kolasib	1648	1510			

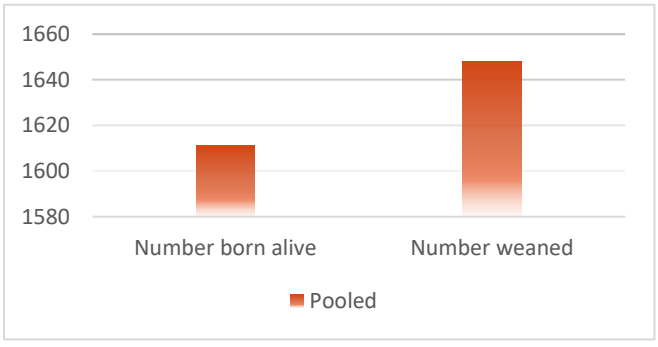

Figure 16: Pre-weaning mortality % of piglet

3.4.1.2 Furrowing rate: The percentage of sows that farrow to a given number of matings.

Table 22: Furrowing and weaning age of piglet

District	No. of service	No. of conception	Average mortality	Total furrowed	Weaning age
Mamit	239	144	5	234	56.66
Kolasib	715	450	99	616	47.5

From table 22, it can be observed that there is 56.00% furrowing rate and the average age at weaning is 47-56 days.

3.5. Existing piggery farming practices

The results of the study pertaining to piggery farming practices followed by the dairy farmers are presented under the following subheads:

3.5.1 Housing

Table 23 showed that construction of pig sty with galvanized sheet roofing was adopted by majority of the respondents (98.66%) and the rest 1.33 per cent of the respondents used silpaulin type of roofing. Majority of the respondents (55.33%) adopted wood+ cement type of flooring, 38 per cent followed wood flooring and only 6.66 per cent of the respondents adopted cement type of flooring. Majority of the respondents (79.00%) had not followed scientific recommended space flooring and only 21 per cent followed recommended space flooring. Vast majority of the respondents' (87.33%) pigsty have access to electricity with only 12.66 per cent not having access to electricity in their pig sty. 95.00% of the respondents received their pigs locally, 29 per cent from the Veterinary department and only 4.33 per cent from other sources.

Table 23: Adoption of housing technologies by the respondents

Housing	Mamit(n=150)	Kolasib(n=150)	Total (N=300)
Roofing			
Galvanized sheet	150 (100.00)	146 (97.33)	296 (98.66)
Hutches	0	0	0
Silpaulin	0	4 (2.66.00)	4 (1.33)
Flooring			
Wood	88 (58.66)	26 (17.33)	114 (38.00)
Cement	4 (2.66)	16 (10.66)	20 (6.66)
Wood+Cement	58 (38.66)	108 (72.00)	166 (55.33)

Scientific Space Requirement			
Yes	26 (17.33)	37 (24.66)	63 (21.00)
No	124 (82.66)	113 (75.33)	237 (79.00)
Electric facility			
Yes	134 (89.33)	128 (85.33)	262 (87.33)
No	16 (10.66)	22 (14.66)	38 (12.66)
Piglet Source			
Local	144 (96.00)	141(94.00)	285 (95.00)
Veterinary Department	2(1.33)	85(56.66)	87(29.00)
Others	4 (2.66)	9 (6.00)	13(4.33)

**Figures in parenthesis indicates percentage

3.5.2 Feeding and watering

The performance of the farm mostly depends on how the farmers are managing the feeding practices in the farm. Stall feeding was followed by the cent per cent of the farmers and 72% of them gave kitchen waste to the pigs with low quantity of concentrated feed (maximum one kg). They mixed the kitchen waste with locally available weeds and boiled it before providing to the pigs. Feeds were given twice daily, in morning and evening, by the majority (97.33%) of the farmers.

All the farmers were following stall feeding practices because owing to terrain of the land and restriction of open grazing laid by village council. Due to high cost of concentrate feeds and low purchasing power on part of farmers, the farmers usually feed a mixture of kitchen waste, boiled rice and available weeds and plants.

Table 24: Feeding and watering adopted by the respondents

Feeding and watering	**Mamit(n=150)**	**Kolasib(n=150)**	**Total (N=300)**
Water source			
Borehole	2 (1.33)	0	2 (0.66)
PHE	147 (98.00)	144 (96.00)	291 (97.00)
Stream River	1 (0.66)	6 (4.00)	7 (2.33)
River	2 (1.33)	3 (2.00)	5 (1.66)
Rainwater	17 (11.33)	0	17 (5.66)
Frequency			
Nil	0	0	0
Once	9 (6.00)	15 (10.00)	24 (8.00)
Once every 2 days	4 (2.66)	13 (8.66)	17 (5.66)
Two times a day	137 (91.33)	122 (81.33)	259 (86.33)
Feed/Ration			
Concentrate	58 (38.66)	57 (38.00)	115 (38.33)

Kitchen waste	80 (53.33)	136 (90.66)	216 (72.00)
Boiled rice	26 (17.33)	11 (7.33)	37 (12.33)
Weed+Plants	86 (57.33)	20 (13.33)	106 (35.33)
Concentrate+ boiled rice	56 (37.33)	116 (77.33)	172 (57.33)
Others	11 (7.33)	1 (0.66)	12 (4.00)
Feeding frequency			
Once	0	0	0
Two times	150 (100)	142 (94.66)	292 (97.33)
Three times	0	6 (4	6 (2)
Method of feeding			
Stall feed	150 (100)	150 (100)	300 (100)
Scavenging	0	0	0
Others	0	0	0

**Figures in parenthesis indicates percentage

3.5.3 Breeding

Breeding is one of the most important aspects for better productivity of the animals. Eight distinct breeding practices followed by the farmers were studied. The majority (74%) farmers were rearing cross-bred pigs in the farms. Majority (50.66%) of the farmers followed both artificial insemination practices and natural breeding practices while 48.66% of the farmers practice Artificial Insemination. It is seen that 84.00 % of the farmers practice AI in Kolasib district and 86.00 % practice both artificial insemination and natural breeding practices in Mamit district. The majority of farmers (67.66%) provide once service to their sows for conception and majority of them (63.33%) inseminated the sow after 3rd day of onset of heat. Nearly half of the respondents (43.66%) followed mating of sow in a month after weaning of piglets.

The farmers opined that better growth performance, healthier than indigenous one, large litter size, low mortality rate, high back fat thickness was found in the cross-bred sows and for these reasons farmers preferred to rear cross-bred in their farms. On the other hand, the advantages of artificial insemination were cheap, easily available, good progeny and reduction of cost of rearing breeding boars.

Table 25: Breeding system practice by the respondents

Breeding	Mamit (n=150)	Kolasib (n=150)	TOTAL (N=300)
Breed			
Local	25 (16.66)	135 (90.00)	160 (53.33)
Pure	4 (2.66)	5 (3.33)	9 (3.00)
Cross	121 (80.66)	101 (67.33)	222 (74.00)
Breeding adopted			
Natural service only	1 (0.66)	1 (0.66)	2 (0.66)
AI only	20 (13.33)	126 (84.00)	146 (48.66)
Both	129 (86.00)	23 (15.33)	152 (50.66)
No. of service performed/sow			
One time	88 (58.66)	115 (76.66)	203 (67.66)
Two times	59 (39.33)	38 (25.33)	97 (32.33)
Three times	2 (1.33)	1 (0.66)	3 (1.00)
4 or more times	0	0	0
Time of insemination			
Onset of heat detection	0	0	0
Within 24 hours	0	0	0
After 2 days	0	17 (11.33)	17 (5.66)
After 3 days	117 (78.00)	73 (48.66)	190 (63.33)
After 4 or more days	32 (22.00)	60 (40.00)	93 (31.00)
Serving of sow after weaning			
1 week	0	0	0
15-20 days	28 (18.66)	23 (15.33)	51 (17.00)
1 month	65 (43.33)	20 (13.33)	131(43.66)
2-3 months	55(36.66)	26 (17.33)	81 (27.00)
Above 3 months	15 (10.00)	21 (14.00)	36 (12.00)

**Figures in parenthesis indicates percentage

3.5.4 Commonly disease encountered in farm

It was observed in the study area that all the pig farmers gave due attention to health of their pigs and took care of it. As the farmers could not identify the viral disease apart from ASF, no farmers could conclude the dead of pig in regards to viral disease. ASF was encountered by 44% of the respondents. Piglet anemia and piglet diarrhea were encountered by 8% and 44% of the farmers respectively.

Table 26: Commonly disease encountered by the respondents

Sl No.	Disease	Districts		TOTAL (N=300)
		Mamit (n=150)	Kolasib (n=150)	
1.	PRRS	2 (1.33)	0	2(0.66)
2.	CSF	2(1.33)	0	2(0.66)
3.	ASF	37 (24.66)	24(16.00)	44 (14.66)
4.	Piglet anemia	16(10.66)	8 (5.33)	24 (8.00)
5.	Piglet diarrhoea	70 (46.66)	62 (41.33)	132 (44.00)
6.	No known disease encountered	56 (37.33)	26 (17.33)	82 (27.33)

**Figures in parenthesis indicates percentage

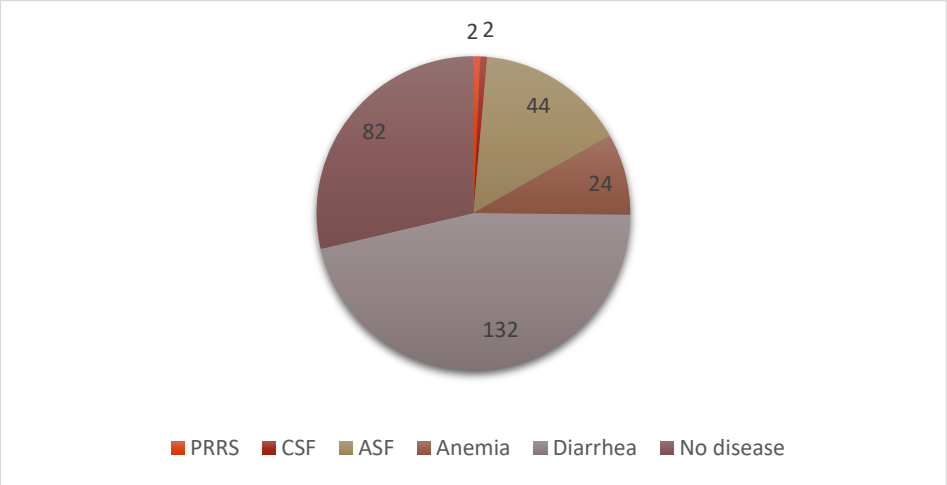

Figure 17: Disease encountered by the respondents

3.5.5 Health and disease management plan

Table 27 shows that majority 95% and 94% of the pig farmers follow vaccination schedule and de-worm their pigs regularly. 78% of the farmers practice iron injection for new born piglets. In regard to isolation of sick animals and bio-security measures, a meager 81.33% and 71.33% of the farmers did not isolate sick animals and failed to follow bio-security measures respectively. The reason for this may be due to the rearing pattern of pig where most farmers reared pig as backyard venture with limited space availability which results in problems to follow bio-security measures.

Table 27: Health and disease management plan of the respondents

Criteria	Districts						TOTAL (N=300)		
	Mamit (n=150)			Kolasib(n=150)					
	Regularly	Occasional	Never	Regularly	Occasional	Never	Regularly	Occasional	Never
Vaccination	137 (91.33)	13 (8.66)	-	148 (98.66)	-	2 (1.33)	285 (95.00)	13 (4.33)	2 (0.66)
Deworming	135 (90.00)	15 (10.00)	-	147 (98)	1 (0.66)	2 (1.33)	282 (94.00)	16 (5.33)	2 (0.66)
Isolation of disease animals	1 (0.66)	23 (15.33)	126 (84)	10 (6.66)	32 (21.33)	118 (10.66)	11 (3.66)	55 (18.33)	244 (81.33)
Use of Ectoparasites	27 (18.00)	122 (81.33)	-	113 (75.33)	35 (23.33)	2 (1.33)	140 (46.66)	157 (52.33)	2 (0.66)
Iron injection	114 (76.00)	31 (20.66)	5 (3.33)	120 (80.00)	26 (17.33)	4 (2.66)	234 (78.00)	57 (19.00)	9 (3.00)
Use of water sanitizer	5 (3.33)	23 (15.33)	122 (81.33)	8 (5.33)	11 (7.33)	131 (87.33)	13 (4.33)	34 (22.66)	253 (84.33)
Bio-security measures	8 (5.33)	36 (24.00)	106 (70.66)	10 (6.66)	29 (19.33)	111 (74.00)	18 (6.00)	65 (43.33)	217 (72.33)
Veterinary treatment/advice	8 (5.33)	44 (29.33)	98 (65.33)	10 (6.66)	18 (12.00)	122 (81.33)	18 (6.00)	62 (20.66)	220 (73.33)

**Figures in parenthesis indicates percentage

3.6. Constraints Perceived by the Piggery Farmers

The study was conducted to identify the constraints perceived by famers about artificial insemination. Interview scheduled under various categories such as technological constraints, managemental constraint, socio economic constraints, and institutional constraints revealed the farmers' perceived restrictions. The farmer's final rankings for the different constraints were shown in the tables. The percentage positions of each farmer's perceived constraints are converted from rank order, and the resulting scores are arranged in accordance with Garrett (1981).

3.6.1 Technological Constraints

Table 28: Technological Constraints in Relation to AI

Sl no	Technological constraints	MEAN SCORE	RANK
1.	Less number of choice of boar in the boar semen station	64.10	I.
2.	High incidence of repeat breeding cases	59.64	II.
3.	Delay in getting AI	55.2	III.
4.	Distance to AI centre	52.1	IV.
5.	Lower number of piglets through AI	47.63	V.
6	Failure of conception through AI	45.33	VI.
7	Unfriendly nature of staff from AI center	41.22	VII.
8	Lack of technical guidance/training	38.66	VIII.
9	Complexity involved in maintaining cross bred pigs	33.12	IX.
10	Competition among farmers to obtain AI services	32.54	X.
11	Lack of inseminators when needed to perform AI at the right time	31.27	XI.
12	Difficulty in obtaining semen for AI	21.68	XII.

Among the various technological constraints less number of choice in the boar semen station was rank first with a mean score of 64.10 which was followed by high incidence of repeat breeding cases with mean score of 59.64. Observations and conversation with the pig farmers stated that only Large White Yorkshire was reared in the boar semen station while

some of the farmers opted for pig such as Hamshire and Large Black breeds of pigs due to color of the pigs. This was followed by delay in getting AI (55.2), distance to AI centre (52.1) and so forth.

3.6.2 Managemental Constraints

Table 29: Managemental Constraints in relation to AI

Sl. No	Managemental Constraints	MEAN SCORE	RANK
1	Difficulty in pregnancy diagnosis	57.34	**I**
2	Difficulty to follow bio-security measures in farms when done by AI staff	53.65	**II**
3	High incidence of diseases in cross bred animals	45.48	**III**
4	Difficulty if detection of heat in sow	44.23	**IV**
5	Higher rate of pregnancy related problems through AI	38.72	**V**
6	Overall cost of maintaining cross bred pigs is very high	37.36	**VI**
7	Difficulty in care of new born piglets	35.28	**VII**
8	Difficulty in maintaining records	14.66	**VIII**

The managemental constraints table 29 revealed that difficulty in pregnancy diagnosis with a mean score of 57.34 was ranked as most severe constraints in managemental constraints. This indicates that farmers are unable to know whether the sow is pregnant wherein false pregnancy leads to losses on part of farmers. Difficulty to follow bio-security measures in farms when done by AI staff was ranked 2nd with a mean score of 53.65. this may be attributed to prevailing ASF outbreak in the state, and fear of VFA treating and inseminating at the same time. The other constraints listed are high incidence of diseases in cross bred animal (45.48), difficulty in detection of heat (44.23), Higher rate of pregnancy related problems through AI (38.72) and so on. Record keeping is a not a constraints felt by most farmers and most farmers fail to keep record as the farm size is not large.

3.6.3 Socio economic constraints

Table 30: Socio economic constraints in relation to AI

Sl. No	Socio economic constraints	MEAN SCORE	RANK
1	Lack of credit facilities	73.36	**I**
2	Lack of subsidies for AI	64.68	**II**
3	Non availability of trained labour	58.65	**III**
4	Uneconomical nature for performing AI	37.35	**IV**
5	High cost of consultation fees	32.67	**V**
6	Higher capital investments	29.62	**VI**
7	Programme not consistent with needs	11.22	**VII**

It was revealed from the table 30that Lack of credit facilities was the major socio-economic constraints perceived by the piggery farmers with a mean score of 73.36 and was ranked first. Lack of subsidies for AI was rank second with a mean score of 64.68 followed by non-availability of trained labour (58.65). The finding indicates that the farmers are economically weak and requires support from financial institutions to increase their farm size and also to uplift the burden of keeping piglets for extended period of time due to ASF during the study. Although AI is comparatively cheaper compared to Natural Service, the resource poor farmers still find difficulty in payment of services especially those farmers whose location are far from the centre, as they have to pay expenses of inseminator travel fees.

3.6.4 Institutional constraints

Table 31: Institutional constraints in relation to AI

Sl. No	Institutional constraints	MEAN SCORE	RANK
1	Poor communication facilities	53.40	**I**
2	Unawareness of supplies and services offered by semen station	40.67	**II**
3	Non availability of timely medical care	38.78	**III**
4	Lack of proper care in treatment by veterinarians/para veterinarians	37.65	**IV**
5	Lack of motivating agencies	32.45	**V**
6	Limited training facilities/programmes	30.69	**VI**
7	Non availability of pig insurance agencies/schemes	31.34	**VII**
8	Non cooperation from the AI centres	21.98	**VIII**
9	Problem of favoritism in providing AI for rearing pigs	20.34	**IX**

Poor communication facilities for transportation with a mean score of 53.40 was ranked as the most serious constraints among the institutional constraints which is followed by Unawareness of supplies and services offered by semen station with a mean score of 40.67. Non availability of timely medical care and Lack of proper care in treatment by veterinarians/para veterinarians were ranked 3rd and 4th respectively. Poor communication particularly in monsoon season poses a great problems in transportation which may be the factor for the outcome.

Figure 18 : Interview with the farmers

Figure 19: Farmer's pig Farm

Figure 20 : AI performed in farmer's field

SUMMARY AND CONCLUSION

4. Summary and Conclusion

The livestock and animal husbandry sectors are critical for rural livelihood and national economic growth. Pigs are among the most important livestock species. Pigs, when compared to other livestock species, have a high potential to contribute to farmers faster economic returns. In addition, it has enormous potential to guarantee the less fortunate sections of society both financial and nutritional security. The raising of livestock is deeply rooted in the Mizoram people's culture. Pigs rearing and livestock keeping have a long history that can be linked to the earlier periods of Mizo History.

In India, pig rearing is still done on traditional manner with low productivity. Artificial insemination (AI) is the best reproductive technology available in the current scenario for enhancing the efficiency of pig production in a sustainable way. Introduction of new germplasm over a short period of time, extensive use of superior boars, disease control and extensive record keeping are some of the benefits of artificial insemination over the natural breeding. The following objectives for the study "Boar Semen Station in Mizoram" were proposed:

1. To study the socio-economic, personal and psychological impact on the farmers
2. To study the success rate of conception (%) as perceived by pig farmers
3. To study the growth rate and weaning age of the piglets
4. To understand the Existing pig rearing practices followed by the pig farmers
5. To assess the impact of Boar semen station on pig production parameter
6. To elicit the constraints of AI in pig farming in the state

The study was conducted in two purposively selected districts of Mizoram; Kolasib and Mamit. From the two districts, 7 villages each were randomly selected. 150 farmers were selected from each districts thereby making the total sample size of 300 farmers. Data were collected by personal interview of the respondents and observation method. A structured interview was prepared covering all the objectives under the study.

4.1 Salient features

- The average age of the respondents was 47.5 years and majority (50.66 %) of the pig farmers belonged to middle age group (between 36-50 years), educated uptohigh school level and having farming experience of 7 to 19 years
- Family size was found to range from 5-9 members with 98.66% of the respondents having nuclear type family

- Majority of the respondents (54%) had marginal land holding (below 1 hectare).
- Among the pig farmers, majority (37.33%) of the respondents had pig farming and agriculture as their main occupation.
- It was observed that 68 per cent of the respondents did not receive training in piggery farming in the last 2 years with low level of extension contact
- Majority of the respondents (84.33%) had medium level of annual income (₹71215 - ₹211477) after intervention of AI.
- The total average herd size of the respondents in piglets and sow increases after AI intervention from 9.19 to 18.75 and 1.21 to 2.05 respectively.
- Majority of the respondents had medium (86%) to high level (11.33%) of economic motivation towards Artificial Insemination.
- Majority of the pig farmer had medium (59.66%) and high level (31.66%) of favorable attitude towards AI in pig.
- The average saving in terms of mating was found to be Rs. 1538 through AI when compared with Natural service.
- The success rate of conception through AI is 67.19%.
- Pre-weaning mortality in both the districts is 5.61%.
- Furrowing rate of piglet is 56.00% and age at weaning is 47-56 days.
- Majority of the respondents (98.66%) adopted galvanized sheet roofing,55.33 per cent 808adopted wood+ cement type of flooring. Majority (79.00%) of the respondents do not follow scientific recommended space flooring. 87.33 per cent of the respondents have access to electricity in their pig sty and 95 per cent of the respondents received their pig locally.
- It was observed that all farmers' practices stall feeding and 72 per cent of the respondents gave kitchen waste along with concentrated feed.
- Majority (74%) farmers were rearing cross-bred pigs. Artificial insemination and natural breeding practices were followed by majority (50.66%) of the respondents.
- 44% of the respondents encountered ASF, Piglet anemia(8%) and piglet diarrhoea (44%).
- It was observed that majority 95% and 94% of the pig farmers vaccinated and deworm their pigs regularly. 78% of the respondents practice iron injection.
- The findings showed that mean litter size/sow at birth with AI have higher piglets(10.86) than NB(7.68)

- ❖ Average number of litter/sow/years increased from 7.21 and 10.88 to 10.25 and 15.39 respectively with AI.
- ❖ The average weight of piglet at birth in AI is 1.42 kg while 1.11 kg was recorded in NB.

4.2 Conclusion

- ❖ The finding clearly indicated that the income of the piggery farmers increased due to establishment of the Boar Semen station which may be attributed to reduction in cost of insemination, ease of obtaining AI services and disease control measures.
- ❖ Conception rate, herd size, litter size per sow, Age of piglet at weaning, Average piglet mortality, No. of litters weaned/sow and average weight of piglet at birth shows positive outcome which indicates that there is marked increase due to AI intervention than the traditional method of Natural service.
- ❖ Major constraints in regards to AI services includes Less number of choice of boar from theBoar Semen station, Difficulty in pregnancy diagnosis, Lack of credit facilities, Lack of subsidies for AI and poor communication facilities.

4.3 Area of recommendation

- ➢ **Scaling Up of the Intervention**: To maximize impact, the intervention should be scaled up to cover maximum pig farmers of the state.
- ➢ **Policy Support:**Policy support at the state and national levels is crucial to ensure the sustainability of project interventions and to attract further investment this sector to make it more economically viable and competitive.
- ➢ **Capacity Building Programme:** Awareness /sensitization programme about the benefit of the AI, training and capacity-building programs for piggery farmers on scientific pig farming and community members are essential to enhance the benefits of the project.
- ➢ **Monitoring and Evaluation:** A robust monitoring and evaluation framework should be established to continuously assess quality of the semen, storage facilities and laboratory; and skills of inseminators for better the impact of project interventions.
- ➢ **ICT tools/software for data recording:** ICT tools/software can be utilised to keep the records of farmers as well as the pigs for effective monitoring and evaluation of the project intervention.
- ➢ **Community-Based Management:** Success of any intervention rely on the community's acceptance to the intervention. Involvement of community and promoting community participation is crucial for long-term sustainability project.

REFERENCE

REFERENCES

20th Livestock census (2019). Government of India, Ministry of Agriculture, Department of Animal Husbandry, Dairying And Fisheries, KrishiBhawan, New Delhi.

Economic Survey of Mizoram (2021-2022). Planning and Programme Implementation Department.Government of Mizoram.

FAO 2003.BruinsmaJelle, editor. World agriculture: towards 2015/2030. A FAO perspective. ISBN: 92 5 104835 5, www.fao.org/3/a-y4252e. pdf.

Garrett, H. E. (1981). Statistics in Psychology and Education. Bombay: Vakils, Feffer and Simons Pvt. Ltd Bombay.

Gerrits R, Lunney J, Johnson A, Pursel V, Kraeling R, Rohrer G and Dobrinsky J. 2005. Perspectives for artificial insemination and genomics to improve global swine populations.Theriogenology 63: 283–99.

Kadirvel G, Kumaresan A, Das A, Bujarbaruah K M, Subramanian V V and Ngachan S V. 2012. Artificial insemination of pigs reared under smallholder production system in northeastern India: success rate, genetic improvement, and monetary benefit. Tropical Animal Health Production.DOI 10.1007/s11250-012-0277-z.

Khan, S., and Bisht, D. (2020). African Swine Fever (ASF): A Threat to Indian Pig Farming.*VigyanVarta.*,**1**(1): 37-39.

Knox R V. 2016. Artificial insemination in pigs today.Theriogenology 85: 83–93.

Maes D, Lopez R A, Rijsselaere T, Vyt P and Van S A. 2011. Artificial Insemination in Pigs, Artificial Insemination in Farm Animals, Dr. MiladManafi (Ed.), ISBN: 978-953-307-312-5, InTech, Available from: http: //www.intechopen.com/books/artificial-insemination-in-farmanimals/artificialinsemination-in-pigs.

Maes D, Nauwynck H, Rijsselaere T, Mateusen B, Vyt P, de Kruif A and Van Soom A. 2008. Diseases in swine transmitted by artificial insemination: An overview. Theriogenology 70:1337–45.

Misha, M. M., Mohan, N. H., and Gupta, V. K. (2022).Uplifting the Piggery Sector in India: Role of EAS.*AESA*BLOG: 173.

Rahman, S., Barthakur,S., Kalita, G. (2008). Pig production and management system in Aizawl District of Mizoram, India. *Livestock Research for Rural Development*, **20**(9).

Roche, C. (1999). 'Impact Assessment for Development Agencies: Learning to Value Change.Development Guidelines, Oxford, Oxfam.

Singh M, Ghosh S K, Prasad J K, Kumar A, Tripathi R P, Bhure S K and Srivastava N. 2014. Seminal PDC-109 protein vis-a-vis cholesterol content and freezability of buffalo Spermatozoa. Animal Reproduction Science 144: 22–29.

Singh M, Mollier R T, Ngullie E, Sharma Ph.R and Rajkhowa D.J. 2017. Artificial Insemination technology in pig empowered the tribal farmer of Nagaland. www.kiran.nic.in/ AI-Pig_Nagaland.html

Singh M, Patra M K, R. TalimoaMollier, EbibeniNgullie, and Rajkhowa D J. 2019b. Artificial Insemination in Pig: producing quality piglets in Nagaland. Indian farming 69(07): 31–32.

Singh M, Patra M K, R. TalimoaMollier, EbibeniNgullie, and Rajkhowa D J. 2019b. Artificial Insemination in Pig:Technology for producing quality piglets in Nagaland. Indian farming 69(07): 31–32.

Singh M, R. TalimoaMolier, VeliluEpao and D.J. Rajkhowa. 2018a. Naga Lima NungAkMelaZuntsuAsoshiYimyaTasenka (Artificial Insemination in pigs: a new way for rapid scaling-up of pig production in Nagaland- in Ao tribe dialect). RCN/EF/AS/2018/01 by ICAR Nagaland Centre.

Singh M, R. TalimoaMollier and Romen Sharma. 2019d. Comparative reproductive performance in cervical and post cervical artificial insemination (PCAI) with liquid boar semen in Rani pig in Nagaland. International Symposium on Global perspectives to enhance livestock fertility through modern reproductive techniques for doubling farmer's income organized by department of Veterinary Gynaecology and Obstetrics, Veterinary College and Research Institute, Namakkal, TANUVAS, from 18 to 20 December 2019. Page 93.

Singh M, Sharma P R, Mollier R T, Ngullie E, Baisyha S K and Rajkhowa D J. 2019a. Tribal farmers' traditional knowledge and practices of pig farming in Nagaland. Indian Journal of Animal Sciences 89(3): 329–33.

Singh M. 2018. Performance of AI conducted at farm and field level in Nagaland in Annual report of AICRP on Pig and Mega Seed Project of Pig 2017–18. pp. 112.

Thomas, V., Singh, V and Gupta, V. K. (2021). Current status and development prospects of India's pig industry. *Indian J Anim Sci.*,**91**(4): 255-268.

Yeste M, Estrada E, Pinart E, Bonet S, Miró J and Rodríguez-Gil J E. 2014. The improving effect of reduced glutathione on boar sperm cryotolerance is related with the intrinsic ejaculate freezability. Cryobiology 68: 251–61.

APPENDIX

APPENDIX I

Questionnaire for the survey of the Project-
"Study on impact of Boar Semen station in Mizoram" 2024

Survey Period : June-July, 2024
Survey Area : Mizoram (Mamit and Kolasib Districts)

Section A : PROFILE OF THE FARMER

1) Name of the farmer
_____

2) Name of the village and District
_____

3) Mobile number
_____

4) Age
   a) Upto 35 years
   b) 36 -50 years
   c) Above 50 years

5) Sex
   a) Male
   b) Female

6) Family size
   a) Less than 3 members
   b) 4-5 members
   c) More than 5 members

7) Family type
   a) Nuclear
   b) Joint

8) Education Status
   a) Illiterate
   b) Functionally literate
   c) Primary School
   d) Middle School
   e) High School (HSLC)
   f) Higher Sec. School (HSSLC)
   g) Graduate and above

9) Occupation status
   a) Piggery farming
   b) Piggery cum agricultural labourer
   c) Piggery farming + others

10) Farming experience
   a) Upto 6 years
   b) 6-19 years
   c) Above 19 years

11) Total land holding
   a) Marginal (Below 1 ha)
   b) Small (1-2 ha)
   c) Small-medium (2-4 ha)

12) Did you received training in piggery farming?
   a) Yes
   b) No

13) Extension contact

Sl. No.	Extension personnel	Daily	Biweekly	Weekly	Monthly	Rarely	Never
		5	4	3	2	1	0
1	Neighbours/Friends						
2	V.O						
3	VFA						
4	KVK						
5	ATMA						
6	Any other (Specify)						

14) Average cost of performance of AI _____

15) Average cost of Natural Breeding _____

16) Average cost of production per sow per year (Rs.) _____

17) Annual income

Sl. No.	Type of livestock	Number of livestock		Yield: No. of piglet		Price		GrossIncome	
		Before AI	After AI	Before AI	After AI	Before AI	After AI	Before AI	After AI
	Sow								
	Piglet								
	Fattener								
	Gilt								
								Total NetIncome	
								Total Gross Income	
								Cost of Production	
								Total NetIncome	
								B:C ratio	

SECTION – B: PRODUCTION PARAMETERS

1) AI parameters in sow

Criteria	Answer
Total number of AI performed in the farm	
Number of AI performed/sow	
Total Number of conceived through AI	
Number of conceived/sow through Natural service (NS)	
Average litter size per sow at birth through AI	
Average litter size per sow at birth Natural service (NS)	
Average days from weaning to next mating of sow when performing AI	
Average days from weaning to next mating of sow when performing Natural service (NS)	
No. of abortion through AI	
No. of abortion through Natural service (NS)	
No. of still birth through AI	
No. of still birth through Natural service (NS)	
Sex of piglet through AI/furrowing Male : Female	

2) Litter index

Criteria	Answer
Age of piglets at weaning (days) through AI	
Age of piglets at weaning (days) through Natural service (NS)	
Average piglet mortality % (death/furrowing) through AI	
Average piglet mortality % (death/furrowing) through Natural service (NS)	
Average age at marketing fattener pigs conceived through AI	
Average age at marketing fattener pigs conceived through Natural service (NS)	
Number of litters weaned per sow through AI	
Number of litters weaned per sow through Natural service (NS)	
Average number of litters/sow/year through AI	
Average number of litters/sow/year through Natural service (NS)	

3) Growth performance

Criteria	Answer
Average weight of piglet conceived through AI at birth	
Average weight of piglet conceived through Natural service (NS) at birth	
Average Weight at first week of age	
Average weight at weaning	
Average weight at marketing fattener pigs conceived through AI	
Average weight at marketing fattener pigs conceived through Natural service (NS)	

SECTION C: OPERATIONAL MANAGEMENT PRACTICES

1) Housing

a) What is the type of roofing material adopted in your sty?
   i. Galvanized sheet
   ii. Hutches
   iii. Silpaulin
   iv. Others

b) What is the type of floor material adopted in your animal shed?
   i. Wood
   ii. Cement
   iii. Wood + Cement
   iv. Others

c) Do you follow scientific recommendation space requirement for your animals?
   i. Yes
   ii. No

d) Electricity facility?
   i. Present
   ii. Not present

e) Source of piglet?
   i. Local
   ii. Veterinary Department
   iii. Other

2) Feeding and watering

a) What are your water sources for pig production?
   i. Borehole
   ii. Pipe supply (PHE)
   iii. Stream
   iv. River
   v. Rainwater

b) How frequently do you supply water to your pigs?
   i. Nil
   ii. Once a day
   iii. Once every 2 days
   iv. Two times a day

c) What type of feed/ration do you give to your pigs?
   i. Concentrate
   ii. Kitchen waste
   iii. Boiled rice
   iv. Weed and plants
   v. Concentrate and boiled rice
   vi. Others

d) How many times in a day do you feed your pigs?
   i. Once a day
   ii. Two times a day
   iii. Three times a day

e) Method of feeding practice adopted?
   i. Stall feed
   ii. Scavenging
   iii. Others

3) Breeding

a) Which breed do you keep?
   i. Local
   ii. Pure
   iii. Cross

b) What is the breeding practice adopted in your farm?
   i. Natural service only
   ii. Artificial insemination only
   iii. Both

c) Number of service performed for pregnancy?
   i. One time
   ii. Two times
   iii. Three times
   iv. Four or more times

d) At what time do you inseminate after heat detection?
   i. Onset of heat detection
   ii. Within 24 hours after onset of heat
   iii. After 2 days
   iv. After 3 days
   v. After 4 days or more

e) At what time do you allow the sow to serve after furrowing?
   i. 1 week
   ii. 15-20 days
   iii. 1 month
   iv. 2-3 months
   v. Above 3 months

f) Average age at first mating of gilt?

   _____

g) Commonly occurring disease in your farm?

PRRS	CSF	ASF	Piglet anemia	Piglet diarrhea	No known disease

4. Health and disease management plan

Criteria	ALWAYS	SOMETIMES	NO
a) Animals are vaccinated against Swine Fever			
b) Deworming of pigs is done			
c) Isolation of diseased animals is practiced			
d) Use of ectoparasiticides			
e) Iron injection is provided to the piglets			
f) Use of water sanitizer			
g) Bio-security measures			
h) Do you follow veterinary treatment/advice when animal is sick?			

SECTION D : SOCIO-PSYCOLOGICAL CHARACTERS

1) Economic Motivation

Sl. No	**Statements**	**SA**	**A**	**UD**	**DA**	**SDA**
1.	A farmer should work towards larger yield through AI					
2.	The most successful farmer is one who makes the most profit					
3.	A farmer should try AI which may earn him more money					
4.	Farmer should rear exotic breed to increase profit in comparison to indigenous breeds					
5.	It is difficult for farmers children to make good start unless pig enterprise provide them with economic assistance					
6.	A farmer must earn his living but most important thing in lifew cannot be defined in economic terms					

2) Attitude towars AI in pig

Sl. No	**Statements**	**SA**	**A**	**UD**	**DA**	**SDA**
1.	AI technique should be initiated for profitable pig farming					
2.	AI improves socio-economic conditions					
3.	AI in pig is regularly is not needed					
4.	In pig farming, Ai regularly is good practice					
5.	Breed quality is not required in pig farming					
6.	Pig farming is not a toll to alleviate poverty					
7.	Environment plays a vital role in pig farming					
8.	Ai in comparision to natural service have no effect on pig husbandry					

SA- Strongly Agreed, A- Agree, UD- Undecided, DA- Disagree, SDA- Strongly Disagree

SECTION E: CONSTRAINTS PERCEIVED BY FARMERS FOR ARTIFICIAL INSEMINATION

Sl no	CONSTRAINTS	Level of Constraints			
		MC	C	LC	NC
A	**Technological Constraints**				
1	Complexity involved in maintaining cross bred pigs				
2	Unfriendly nature of staff from AI center				
3	Lack of technical guidance/training				
4	Failure of conception through AI				
5	Lack of inseminators when needed to perform AI at the right time				
6	Difficulty in obtaining semen for AI				
7	Distance to AI centre				
8	Competition among farmers to obtain AI services				
9	Delay in getting AI				
10	High incidence of repeat breeding cases				
11	Lower number of piglets through AI				
12	Less number of choice of boar in the boar semen station				
B	**Managemental Constraints**				
1	High incidence of diseases in cross bred animals				
2	Difficulty in maintaining records				
3	Difficulty if detection of heat in sow				
4	Overall cost of maintaining cross bred pigs is very high				
5	Difficulty in pregnancy diagnosis				
6	Higher rate of pregnancy related problems through AI				
7	Difficulty in care of new born piglets				
8	Difficulty to follow bio-security measures in farms when done by AI staff				
C	**Socio economic constraints**				
1	Lack of subsidies for AI				
2	Uneconomical nature for performing AI				
3	High cost of consultation fees				
4	Lack of credit facilities				
5	Higher capital investments				
6	Programme not consistent with needs				
7	High labour cost				
8	Non availability of trained labour				
D	**Institutional constraints**				
1	Unawareness of supplies and services offered by semen station				
2	Non availability of pig insurance agencies/schemes				
3	Limited training facilities/programmes				
4	Lack of motivating agencies				
5	Non cooperation from the AI centres				
6	Problem of favouritism in providing AI for rearing pigs				
7	Non availability of timely medical care				
8	Lack of proper care in treatment by veterinarians/para veterinarians				
9	Poor communication facilities				

MC- More Serious Constraint, C-Constraint, LC-Less Serious Constraint, NC- Not a Constraint

APPENDIX II

LIST OF FARMERS

LIST OF FARMERS, MAMIT					
NAME	**MOBILE NO.**	**LOCALITY**	**NAME**	**MOBILE NO.**	**LOCALITY**
Lalchawimawii	8132982011	Sabual N	Liansangi	8729818838	Dinthar
MS Dawngliana Rokhum	9366271275	Hmar veng	Lalparmawii	9615777119	Bazar Veng
Lalzidingi	9612883715	Charkawn	Lalrosiami	6009231856	Mizo Veng
Lalthansanga	8414093910	Dinthar	Lalnunziri	9383013066	Zawlnuam
VL Hmangaihzuali	8974981842	Vaubekawn	Remsiampuii	9612248473	Zawlnuam
Lalzamlovi	8974321819	Field Veng	Janet Kawlni	8731006375	High School
Lawmsangzuali	9612181052	Dinthar	Lalnunfeli	7630810954	Bawrai
Lalrinngheta	8732064322	Kanhmun	Zorinpuii	8837449181	Zampui
Roneihengi	9362934556	Kawrthah	Zara	9862358774	Phaizau
Lalrengpuii	9383317043	Tuidam	Lalremruata	8730840241	Kanhmun
Sangkimi	8132813579	Vaubekawn	Lalramliana	9362376493	Phaizau
Luta	8974304448	Zawlnuam	Lalhmingmawii	8414050207	Kawrthah
Lalrawngbawli	9612466601	Field Veng	Duata	8730928812	Kanhmun
H Lalrosanga	9862688732	Hmunsam	Khumi	9612379980	Zawlnuam
H Vanlalthuama	9362376783	Luangpawl	Pc ramthanmawia	6909014624	Zawlnuam
Thanmawii	8974966138	Bazar veng	Hosana	9863928097	Tuidam
Vala	8415844695	Dinthar	Elisanga	9862860330	Highway
Zairemmawia	6009942871	Tuidam	Vanlalhmuaka	8731099752	Venghlun
Samuel Lalengmawia	8414959527	Lungsir	Lalduhsaki	8413854279	Vengthar
Ramenga	8413881904	Kawrthah	Lalliankima	9383012723	Venglai
Mami	8787827546	Rengdil	Lalbiakthanga	7085414481	Bazar Veng
C Thankimi	8414099951	Bazar veng	Lalhmunsiami	7630978815	Zawlnuam
VL Hluti	6009970289	Lungsir	P.C Lalfamkima	7577975925	Lungni
Laltei	7628972175	Kawrthah	Kapthangi	8731005638	Zawlnuam
C Lalthantluanga	9612833806	Thuampui	Rebeki	9366008937	Dapchhuah
Laldawngliani	8974104853	Vaubekawn	Lalrinsanga	9366580243	Rengdil
Bva	9612564679	Kawrthah	Lalramnghaka	9612622373	Zawlnuam
K Lalramluahzela	8131970199	Kanhmun	Lalzawmliana	6009263149	Bazar Veng
Kapthanga	8415844692	Vengthar	Thangliana	8415063920	Rengdil
Lalfakawmi	8413854081	Lungsir	Rebec Zothanpuii	8415839905	Tuidam
Monica	8798760019	Luangpawl	Sangpuii	9862017049	Phaizau
Lalmawia	8974712410	Dinthar	Zonunmawii	7628025772	Dinthar
Lalsangzeli	9774055930	Vaubekawn	T.sailo	8974739714	Zawlnuam
Lalbiaktlinga	8730928812	Kanhmun	Sanga	9862640743	Dinthar
Rohmingthanga	8730804478	Hmunsam	Zarmawii	9612853028	Dinthar
Lalzamliani	9612559201	Venghlun	Jenny	9863884086	Dapchhuah
Lalrosanga Sailo	7005074806	Bazar Veng	R Vanlalsiama	8011466544	Rengdil
Lalmuankima	8414010322	Dinthar	Lalfakzuala	8974708906	Dinthar
Lalnunthangi	8414098817	Hmunsam	Sawma	9612100461	Bazar Veng

NAME	MOBILE NO.	LOCALITY	NAME	MOBILE NO.	LOCALITY
Zarmawii	7628025772	Dinthar	Lalnunpuia	8837096973	Tuidam
Lalthlamuani	8974712410	Dinthar	Sanga	8119072250	Dinthar
Hannah	8239846481	Dinthar	Lalthuamliani	9366271275	Venghlun
Lalthlamuanpuii	7085530650	Zawlnuam	Lalrinmuana	8259981491	Dinthar
Madangi	9863418608	Luangpawl	Autea	9436155098	Highway
Lalroliana	9862631401	Dinthar	Vanlalchhuangi	9436366583	Dinthar
Lalremsangi	8974428021	Bazar veng	Lalchhandama	8731099752	Venghluna
Zothansangi	9366123943	High School	Kananmawii	6909712637	Zawlnuam
Bawih Bawihi	8837385843	Cherkawn	Lalthafamkima	8974330604	Dinthar
Lalbiakzuala	8974138396	Rengdil	Lalrinnunga	8131935293	Kawrthah
F.Lianhmingthanga	8974215058	Kawrthah	Melody	9612584193	Venghlun
Andy Lalrinfela	6909587951	Hmunsam	Lalramthara	9612833806	Zawlnuam
Zaihmingthanga	8974304448	Zawlnuam	H Thangsailova	9612178125	Zawlnuam
Lianhlupuii	9366841814	Venghlun	Khawpuimawii	8729874555	Zawlnuam
Lalthanpuia	6009932851	Bungthuam	Lallawmkimi	9862566209	Dinthar
Lalramsangi	9383015989	Tuidam	Remruatpuia	8730840241	Kanhmun
Lalrinfela	8416007391	Kanhmun	C. Lalthantluanga	9612833806	Zawlnuam
Huangzahnemi	8974900703	Venghlun	Rosangpuii	7629058193	Zawlnuam
Lalbiaknunga	8415845464	Tuidam	Lalrinfeli	8974804383	Nalzawl
Andrew Laltanpuia	9362378327	Dinthar	Lalrinawmi	9862979304	Mizo Veng
Lalhuthangi	9362599183	Bethel Veng	Lalrohlupuii	9774722560	Bethel Veng
Malsawmhlua	9774190089	Field veng	V. Lalnunhlua	9612060365	Vaubekawn
Rosangpuii	6909355186	Lungpawl	Lalrinkimi Royte	9862753463	Bethel Veng
B Lalmuanpuii	9774352058	Field veng	Lalhmachhuani	9362933850	Field veng
Sangthansiama	9362934679	Vaubekawn	Lalnunfeli	9366683427	Bazar Veng
Lalrinsanga	8414808177	Venghlun	Lalremsanga	8732063127	Bethel Veng
K.Elly	9862860330	Highway	Abraham	9863418608	Dapchhuah
Kapthankima	6009473241	Kawthah	Lalthahnemi	8132831669	Zawlnuam
Lalrinsanga	8730206127	Venghlun	Vanlalringa	8729830483	Tuidam
Lalhuthangi	8414099951	Bethel veng	Lalsangzeli	9774055930	Dinthar
Joshua Lalrinngheta	9612584193	Venghlun	Lalnunthara	8575516049	Bethel Veng
Lalduhzuali	8798760226	Field eng	Lalpianruali	9862611635	Venghlun
Lalnunziri	9383013066	Zawlnuam	Lalnunpari	8974567981	Field Veng
H Vanlalthanga	9612184717	Vengpui	H.D Lallianpuii	8414086488	Venghlun
Lalkroshlua	8259911147	Venghlun	H.D Saikapthanga	7005205972	Hmunsam
K Malsawma	9366683215	Bazar Veng	Lalthlamuani	9612063652	Venghlun

LIST OF FARMERS, KOLASIB					
NAME	**MOBILE NO.**	**LOCALITY**	**NAME**	**MOBILE NO.**	**LOCALITY**
James Lalsangzuala	8787739828	Electric Veng	Hmasawni	9856055471	Vengthar
HT Laltlanthanga	8787438047	Saipum	K Zothansanga	6009047728	Hmar Veng
C Para	9612689180	New Builum	T Lalrindika	7005485996	Venglai
Kapzauvi	9612643094	Bairabi	Lalduhawma	8974964151	Khuangpuilam
Vanhmingliani	8974351877	Diakkawn	Lalmalsawma	9774376410	Khuangpuilam
Lalduhawma	9862713919	Venglai	Lalnunpari	9862233234	Khuangpuilam
P Lalthlamuana	7641933459	Electric Veng	Lalthianghlima	8787748968	Pangbalkawn
Lalruatsanga	8132813379	Rengtekawn	Kapchhuana	8575671096	Hmarveng
Vanlalchhanhimi	9612248215	Diakkawn	Pachhunga	9612034338	Project veng
Lalchhuanmawia	9366162101	Bukuannei	Parsanga	9233781609	Venglai
Lalrinfela	6009340984	Vengthar	R Romawia	8014113532	College Veng
Lalsangpuii	8729948268	Thingdawl	Ralaithanga	9862928600	Tumpui
Vanlalhruaia	8787614825	Diakkawn	Hmangaihsanga	8413810618	Thingdawl
Elizabeth Lalhlimpuii	9862673299	Venglai east	H Hmingmawii	8794787336	Tuitha Veng
Lalremruati	9360307282	Thingdawl	RC Zodinpuia	9862419151	Tumpui
Liamkima	7005816149	Kawnpui	Nubuangi	9366280491	N Diakkawn
K Lalrinmawia	9862320446	KVK	Ramchuhthanga	6009419233	Pangbalkawn
Lalnunzawmi	6009634474	Venglai East	Lalringliana	8837474942	Hebrou
Lalbiakhlua	7005460956	Tumpui	Laldinthari	8258866012	Bairabi
Lalrammawia	9862121925	Vengthar	Lalremruata	8787832883	Venglai
Ramtharzauva	9774436898	Hmar Veng	Lalhmunsanga	8837009411	Hmarveng
Lalremmawii	6909240979	Crossing	Alex Zohmingthanga	7640984139	Saidan
Lalrinawma	9862567341	Vengthar	C Vanlalruati	9862931030	Diakkawn
Helen Lalrinmawii	9366545144	Thingdawl	Lalbiaknemi	9612209704	College Veng
F Lalsangluri	8974241657	Thingdawl	Lalrinawmi	9862537130	College Veng
Saimawia Sailo	7628972335	Venglai	K Lalhmangaiha	9863045516	Thingdawl
Lalthakima	8258837945	Tumpui	Lalrinthanga	8257902462	Saidan
Laldinsanga	7005204763	Galili	Lalengzami	9774430144	Diakkawn
Lalrindika	8974125477	Bilkhawthlir	Joseph Lalhmangaihzuala	7629865208	UPC Mual
Zarzoa	9366636751	Challui Veng	R Malsawmtluanga	8794608135	Kawnpui
Lalawmpuii	8732036527	Diakkawn	C Lalsangluaia	9774992858	Hmar Veng
VL Hmangaihsanga	8131834149	Diakkawn	Lalnunzovi	7627985760	Bairabi N
K Lalduhawma	6009177958	Thingdawl	Ramthanzauva	9774436898	Hmarveng
J Saitawna	9383313873	Electric Veng	Ginzalala	9863482404	Vengthar
Buanlungthanga	9863972800	Rengtekawn	Lalmalsawmkima	8787440933	Hmarveng
Chawngthankima	9774421416	Electric Veng	Lallianchhungi	7005566746	College Veng
Lalhminghlui	7005443025	Saidan	Laltlanliani	9612132367	Khuangpuilam
Lalramliana	8974140276	College Veng	Lizzy Lalhluni	8729945418	N Diakkawn

NAME	MOBILE NO.	LOCALITY	NAME	MOBILE NO.	LOCALITY
Khuanghluna	9866443401	Bilkhawthkir	Lalramhlimpuia	9862016795	Diakkawn
Vanlalchhungi	9366830623	Buhchangphai	R Sangpuia	8974976872	Thingdawl
Lalrini	8974963943	Venglai	Lalruatkimi	9774436898	Hmarveng
Lalhriatpuia	8731007139	Diakkawn	Laltlanmawia	8787347068	Hmarveng
F Lalmuankima	9862381474	Venglai	Lalsangliani	6009430263	Tumpui
Lalpuia	9862116246	Meidum	Obed Laltlansanga	7041843904	Bairabi
C Vanlalruata	9366124763	Vengthar	Malsawmkima	8974793418	Saidan
Lalhruailiana	7005716172	Pangbalkawn	Lalpekhlua	9366748298	Saihapui K
Joseph Lalremliana	8415053237	Project veng	Lalramhlua	9862792532	Diakkawn
PC Malsawmtluangi	9612051015	Venglai	Lalbiaksangi	7005587257	Project veng
RK Vanrammawia	9366182426	Hmarveng	Lalhminghluna	9459354106	Salem
Saitawna	9383313873	Electric Veng	Lalhrezuali	8794532903	Hmarveng
Vanlalengi	9862439374	Tumpui	Lalhriati	8413992269	Thingdawl
Zalianthanga	9863240822	Hmarveng	Lalrinliana	8259825372	Vengthar
Vanlalthlanga	9612137966	Venglai East	Casper Lalmuanawma	6009721503	Meidum
VL Rawna	7005487054	Hmarveng	TC Lalthanzama	6009097231	Phaisen
Lalthianghlimi	9612140707	Thingdawl	E Lalmuanawmi	7630977421	Vengthar
Lallawmkima	9774390448	Electric Veng	Vanlalsiama	9366737569	Saidan
Zarpuia	9612320126	KVK Kolasib	Lalramliana	8974676998	N Diakkawn
Lalnunhlima	9714322199	Venglai	Lalrinzuala	9774179470	Thingdawl
Daniel Ralte	8837323459	Project veng	F Vanlalpeka	9436158770	Project Veng
Laltlanhlua	6009196565	Thingdawl	Lalrinzuala	8257801453	N Diakkawn
K Lalrochama	9862335370	Hmarveng	C Laltanpuia	9862286580	Vengthar
PC Lallawmkima	7005233612	Buhchangphai	Chawngthantluanga	9862379585	Diakkawn
PC Lalchawimawia	9774755872	Venglai	Remthanga	7628874475	Pangbalkawn
HB Laltanpuia	7005937334	N Diakkawn	Lalbiakchama	9366158904	Project Veng
PC Lalthlamuana	8415913349	Tumpui	Vanlalliana	9863108413	Thingdawl
PL Thianga	9612550638	Rengtekawn	E Lalpawlliana	9612440847	Saidan
Lalduhsangi	9366185332	Venglai	RK Vela	9862311229	Vengkai
Lalzapi	9862771045	Diakkawn	Lalchhuangkima	9863854651	Thingdawl
Lalngura	7085417291	Saidan	Lalduhkima	8837215723	Tuitha
K Luna	7005126104	New Builum	Lalduhawma	7005860704	Pangbalkawn
Lalbiakzuali	9366524912	Thingdawl	Lalnipuii	9862506959	W Diakkawn
Lalhniangpuii	9862628760	Hmarveng	Vanlalfinga	9612317525	College Veng
Thangthahlei	8798915063	Rengtekawn	Lalrinpuii	9862337856	College Veng
Jonathan VL Hriatpuia	8787777856	Project veng	Lalremsiami	8974677290	Tumpui
HP Pahlira	6009873908	Hmarveng	R Zosangliana	8731840030	Electric Veng

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