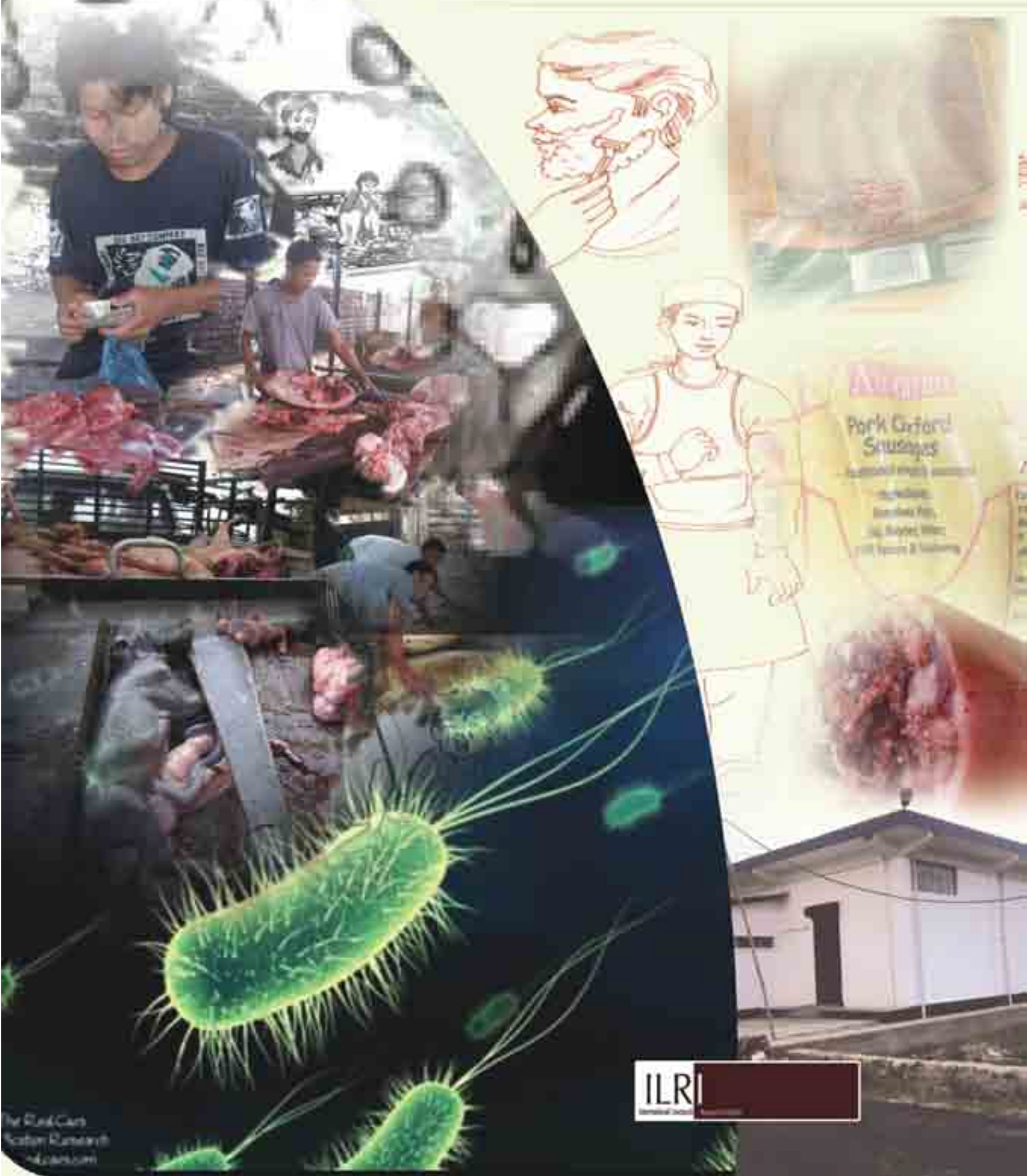




TRAINING MANUAL ON HYGIENIC PORK PRODUCTION AND MARKETING



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ILRI

INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE

TRAINING MANUAL ON HYGIENIC PORK PRODUCTION AND MARKETING

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U. K. Sangma, IAS
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Message

I am glad to know that International Livestock Research Institute (ILRI), an international institute of repute, headquartered at Nairobi, Kenya is going to publish three training manuals on pig sub-sector to train pig producers, veterinary first aid practitioner and pork traders respectively to improve the efficiency and productivity of pig production and marketing systems. Pigs play an important role in supporting the livelihood of tribal communities along with satisfying much needed animal protein and various socio-religious obligations. I sincerely feel that there is need of some technical interventions to transform the subsistence production systems to market oriented production systems and ensure better economic return and better health of the pig keepers as well as pork consumers.

I hope ILRI's training manuals will help in building the capacity of the target groups in order to bring desired changes in pig production and marketing systems.

I take this opportunity to congratulate ILRI for this initiative and convey my heartiest best wishes for release of the manuals and right utilization of the same by all relevant departments, organizations, individuals in the country in general and North Eastern region in particular.



(U K Sangma)

L. H. Thangi Mannen, IAS
Commissioner & Secretary



Department of Veterinary & AH and Sericulture
Government of Nagaland
Nagaland, Kohima, India

25th May 2010

Message

ILRI, had recently conducted a risk assessment study in the pork value chain in Nagaland, which had revealed some vital health risk issues at all levels of production, slaughter, handling and consumption. These risk factors would also be similar and prevalent in all the other North Eastern States as well. Thus this aspect enquires to be addressed and key points of interventions be taken up for improvement of hygiene and food safety. My deepest appreciation to ILRI for this timely intervention in bringing out this "Training Manual on Hygienic Pork Production and Marketing". The training program would, I am sure address the many deficiencies in the pork value chain that is so vital to our health and well being.

(L.H. Thangi Mannen)

Mohan Lal Brahma

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Foreword

There is no denying the fact that pig flesh which is popularly called "pork" is the choice of meat among the meat eaters in the entire North East region barring a few places in Assam and Tripura. Deeply rooted in the ancient customs and traditions, the indigenous population of North East India has made pig rearing and consumption an integral part of their socio-economic behaviour. The NE region is the leader in pig production and consumption in the country and the demand and price of pork are ever increasing. Despite higher demand, pork trading still remains unhygienic and unscientific posing health risk to the large pork eating population. There is little or no government infrastructure for humane and hygienic slaughter and selling of pork leaving the meat inspection and quality control mechanisms mostly useless. Also, there is a general lack of awareness among the pig slaughterers, transporters and retailers on the concept of maintenance of cleanliness and hygiene in slaughter and selling places. Under this backdrop, one simple and easier way of improving the quality of pork is to update the knowledge of pig slaughterers, transporters and retailers on simple clean and hygienic practices. For this to become achievable, ILRI has made a commendable effort to come out with a substantial training manual on "Hygienic Pork Production and Marketing" for pork retailers and slaughterers.

I truly appreciate and commend Dr. Rameswar Deka, Special Project Scientist of International Livestock Research Institute (ILRI)-Guwahati for conceptualising the idea of such a valuable training manual which is expected to serve as a perfect guide book for the trainers of pork retailers and slaughterers. The publication of this training manual is timely and need-based. I am sure, the readers, trainers and trainees will be highly benefited from this manual which explains simple steps of clean and hygienic practices pertaining to pork production.



(Mohan Lal Brahma)

Preface

Food safety is of increasing concern as the importance of food-borne diseases is realized, especially in developing countries. In North East and Central India, there is little or no infrastructure for organized slaughter of pigs in urban or rural areas. Livestock is mainly slaughtered in public places with inadequate physical facilities and without taking care of cleanliness and hygiene. Many meat stalls are located near busy roads, open drains or dirty places with inadequate infrastructure for handling and selling meat. The importance of personal hygiene on the part of meat handlers and retailers is also largely overlooked or underestimated. Pre- or post-mortem inspection is rarely carried out, mainly because of the absence of functional slaughter houses, inadequate manpower and poor coordination amongst the implementing agencies.

Given the importance of building the capacity of the market actors involved in the pork value chain to handle meat in a hygienic manner, ILRI has designed this training manual. The manual is meant to be used by resource persons for imparting training to pig transporters, pig slaughterers and pork retailers operating throughout the country. With minor modification in certain topics it may be used for imparting training to those involved in handling other meats as well. The manual includes a plan of the training sessions, guidance notes for trainers including the session objectives, time allocation and short and simple descriptions of the content in bullet point form, along with some photographs and illustrations. There is also a simple evaluation form that can be used before and after the training programme.

It is assumed that the user of the manual will have some understanding of the hygienic production and marketing of meat and be familiar with participatory approaches for delivering training. While delivering the training, the user should supplement the content with different local examples to make the training sessions relevant.

It is expected that the manual will help in building knowledge and awareness amongst meat handlers about the hygienic production and selling of meat. Adoption of clean and hygiene practices would ensure better quality meat with less microbial load, resulting in lower incidence of food borne diseases and better health for meat consumers. Trained handlers might expect greater confidence from customers in the quality of their products. Relevant authorities may consider it advisable to make the training a prerequisite for the issuing of licenses for selling of meat (pork).

We wish to continually update the manual and we therefore encourage users to actively provide feedback on the content, including suggestions on how it can be improved so that we may continue to ensure that it is current and relevant.

Dr. Purvi Mehta Bhatt
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Acknowledgment

We express our immense gratitude and thanks to Dr. Mohan Lal Brahma, Vice-Chancellor, Kokrajhar University, Kokrajhar, Dr. Mineswar Hazarika, Professor, Department of Livestock Products Technology, College of Veterinary Science, Khanapara, Guwahati, Dr. Arun Sarma, Senior Veterinary Officer, Guwahati Municipal Corporation, Guwahati and Dr. Basanta Deka, Associate Professor, Handique Girls' College, Guwahati for carefully reviewing the manual and incorporating their valuable suggestions.

Our sincere thanks also goes to Dr. Apurba Bora, Veterinary Assistant Surgeon, Department of Animal Husbandry and Veterinary, Khanapara and Dr. S.K. Laskar, Associate Professor, Department of Livestock Products Technology, C.V.Sc., Khanapara, for sharing their knowledge and experience with us while preparing the manual.

We are grateful to the National Agricultural Innovation Project (NAIP) being implemented by ILRI and its partners in Mon District of Nagaland which gave us the opportunity to experience and understand the small traders' need, expectation, level of understanding, useful methods of training and the requirement for follow up support through participatory approaches.

At last but not the least, we would like to extend our sincere thanks to many pig slaughterers and pork retailers in Assam and Nagaland who contributed immensely during the time of training need assessment and field testing of the training manual.

Ramewar Deka
Iain. A. Wright

Index

Sl. No.	Session	Page
1.	Introduction of the Participants–	1
2.	Importance of Hygienic Pork Production and Marketing–	2
3.	Rules and Regulation Governing Slaughter and Selling Practices, Transportation of Live Pigs and Importance of Ante-mortem, Post-mortem Inspection.–	7
4.	Field Visit–	16
5.	Minimum Hygienic and Clean Practices that need to be Adopted in Slaughterhouse/Meat Retailing Outlet.–	17
6.	Standard Process of Slaughtering Pigs–	23
7.	Preservation, Packaging and Value Addition of Porks–	32
8.	Construction of a Hygienic Slaughter House and Entrepreneurship Skills Required to Run the Business Successfully.–	40
9.	Bibliography–	51

Proposed Training Schedule

Day	Session	Topic	Time (in minutes)
1st	1	Introduction of the Participants	90
		Lunch Break	30
	2	Importance of Hygienic Pork Production and Marketing	90
2nd	3	Rules and Regulation Governing Slaughter and Selling Practices, Transportation of Live Pigs and Importance of Ante-mortem, Post-mortem Inspection.	90
		Lunch Break	30
	4	Field Visit	180
3rd	5	Minimum Hygienic and Clean Practices to be Adopted in Slaughterhouse/Meat Retailing Outlet	90
		Lunch Break	30
	6	Standard Process of Slaughtering Pigs	90
4th	7	Preservation, Packaging and Value Addition of Pork	90
		Lunch Break	30
	8	Construction of a Hygienic Slaughter House and Entrepreneurship Skills Required to run the Business Successfully.	90
	9	Post-training Feedback and Valedictory Session	30

Note: The above schedule is prepared keeping in mind the time convenient for the pig slaughterer/retailer. They can spare time during mid-day after completion of morning operation and before starting the evening operation say from 11.30 am – 3.00 pm. Therefore, only two sessions have been planned on each day.

Classroom training	: 11 hours
Field Visit	: 3 hours
Lunch break	: 2 hours
Total time	: 16 hours
Total days	: 4 days

Some technical terms used in the manual:

Boar	: a male pig
Sow	: an adult female pig
Piglet	: the young ones of the pig
Viscera	: internal organs
Offal	: the internal organs of an animal used as food
Bloating	: cause something to swell with gas/fluid
Frothing	: mass of small bubbles in liquid
Adulteration	: make something poorer in quality by adding another substance

List of figures:

Fig 1	: Carcass kept in an open area, on banana leaf
Fig 2	: Unhygienic practices of the pork retailer
Fig 3	: Bacteria
Fig 4	: Virus
Fig 5	: Round worms of pig
Fig 6	: Consequences of loading only a few pigs for transportation
Fig 7	: Pigs should not be transported during hot sunny hours of the day
Fig 8	: Consequences of a sudden stop of an overloaded truck
Fig 9	: Pigs should not be unloaded inhumanly
Fig 10	: Pigs slaughtered at advanced state of pregnancy
Fig 11	: Common sources of contamination of meat
Fig 12	: Un-cleaned utensils invite flies and germs
Fig 13	: Retail outlet with no infrastructure
Fig 14	: Personal cleanliness and hygienic measures
Fig 15	: Photograph of heart puncturing with a long iron rod
Fig 16	: Mechanical stunning with a knocker
Fig 17	: Mechanical stunning at the field
Fig 18	: Severing the arteries of pig for the purpose of bleeding

Fig 19	: Singeing with a hand held torch
Fig 20	: Scalding with hot water in field condition
Fig 21	: Manual evisceration at the field
Fig 22	: Butchery cut in field condition
Fig 23	: Various wholesale cuts of pig
Fig 24	: Various retail cuts of pig
Fig 25	: Pork oxford sausages
Fig 26	: Pork Salami
Fig 27	: Pork Sausages
Fig 28	: Pork Cocktail Sausages
Fig 29	: A suggested meat retail shop

DAY1

Registration of the participants

Session 1:

Introduction of the Participants.

1.1. Facilitator

Key resource person of the training will facilitate the course and bridge linkages between the sessions.

1.2. Session Objectives

At the end of the session, participants should be able to

- know each other and their background,
- understand the purpose and objectives of the training,
- understand the length of experience of the participants on hygienic pork production and marketing,
- set the ground rules for the training.

1.3 . Training Methods/Guides

- **Welcome address:** Organizer/facilitator will welcome the participants and explain the objectives of the training.
- **Self-introduction:**Facilitator will ask the participants to state their name, address, and years of experience on pork selling.
- **Expectation from the training:**Facilitator will ask the participants to explain their expectation(s) from the training and the facilitator will write down the key points in a flip chart/white board/black board in order to revisit the same at the end of the training.
- **Pre-training feedback:** Facilitator will distribute the feedback form (Annexure) amongst the participants and ask them to put tick marks in the boxes under the "Before Training" column. After the evaluation, he will collect the forms and use the same at the end of the training to put tick marks in the "After Training" column in order to compare the differences of knowledge before and after the training.
- **Ground rules:** Facilitator will ask the participants what general behavior (e.g.,No one should use mobile phone during the training sessions, should not leave the session half-way,etc.),they expect to experience in order to run the training smoothly and effectively, he will list all suggestions in a flip chart and post the flipcharts where it is visible throughout the training.

Session 2:

Importance of Hygienic Pork Production and Marketing

A qualified veterinarian.

2.1. Resource Person

2.2. Session Objectives

By the end of the session, the participants will be able to understand the importance of hygienic pork production and marketing.

2.3. Training methods

- Interactive discussion with the participant.
- Group exercise

2.4. Contents

Key discussion points

Slaughter places and practices need not essentially be sophisticated or expensive but they should maintain some basic hygienic requirements in the process of pork production and marketing to ensure better health of the consumers.

2.4.1. Importance of hygienic pork production and selling

- Pork is an important source of animal protein which helps in the normal growth and development of human body and mind.
- Meat is an effective medium for growth of germs which cause diseases. Germs multiply quickly in dirt, especially where blood and fatty substances are available.
- Poor hygiene in slaughtering and selling increases the germs/microbial load in meat and cause diseases
- Zoonotic diseases which affects both human and animal, e.g. tuberculosis, brucellosis, influenza, etc., are increasingly being reported. Effective measures need to be taken in advance to prevent these diseases.
- Diseases like cysticercosis, diarrhea, food poisoning, allergic, high blood pressure are commonly reported by consumers. In such situations food safety becomes an important issue.
- The residue of medicines remaining in pigs undergoing treatment is harmful for human.
- The worms inside the body of pigs such as round worm, tape worm, etc., are responsible for many human diseases like cysticercosis and candidiasis. Pigs

- can also act as carriers of dangerous diseases like Japanese encephalitis.
- With the growth in income and education, consumers have become more quality conscious and are ready to pay for quality.
- Regulatory mechanism of municipalities and other government agencies have become more stringent to meet the food safety norms.
- Supermarket, departmental store, good quality stalls are rapidly expanding their market. Big investors have started investing in retail outlets of food items including fruits, vegetables and animal products which may pose a threat to traditional meat sellers in near future.
- Imported meat and meat products is gradually replacing the fresh meat market.

Most pork consumers cook pork thoroughly before eating, reducing the chances of exposure to some health risk but it cannot eliminate all the health risks as many germs produce toxin (poison) which cannot be destroyed in cooking temperature may cause disease.



Fig 1: Carcass kept in an open area, on banana leaf

2.4.2. What are germs (bacteria/virus)?

Germs are tiny living things that cannot be seen with naked eye. It is visible only with the help of a microscope. A tip of a needle may contain several million germs.

Germs are present in almost all living bodies and their surroundings, i.e. soil, air and water, especially, if they contain dirt.

Germs multiply very quickly and they may cause disease. However, all types of germs are not harmful to the living being.

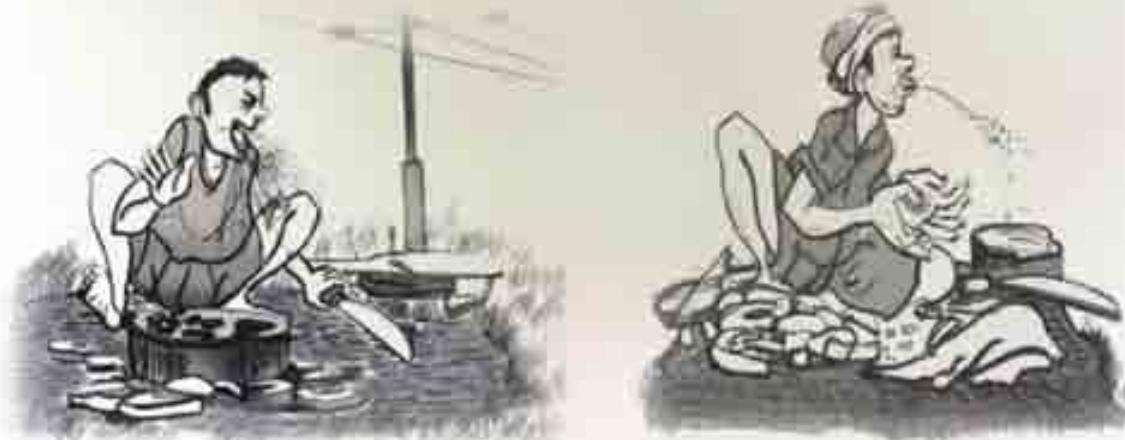


Fig 2: Unhygienic practices of the pork retailer



Fig 3: Bacteria

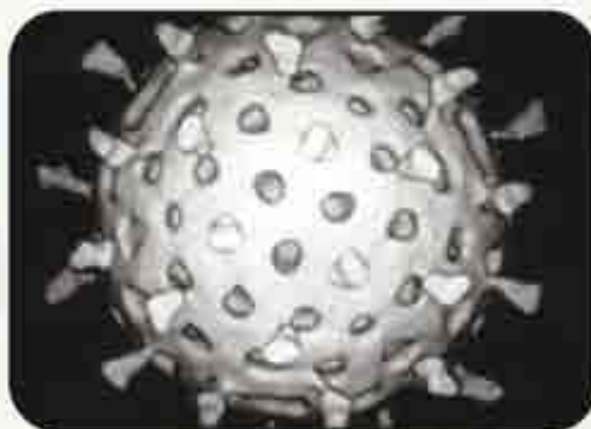


Fig 4: Virus

2.4.3. What is parasite?

This is an organism that lives on or consumes food from the host animal.

It is of two types: Ecto-parasite which live outside the body of the host, e.g. lice, ticks, etc. and Endo-parasite which live inside the host's body, e.g. Tapeworm, hookworm, ascaris, etc.

It can be seen with the naked eyes and it mainly resides inside the body in the form of eggs or adult parasites (worms).

If eggs/worms are passed to human body through consumption of pork from affected pig, it can cause disease to humans.

Some visible signs of pig affected with parasites are appearance of cotton seed like follicle in the muscle, beneath the tongue, eye lids, etc.

2.4.4. Where do germs come from to the meat and meat products?

The pigs reared under unhygienic and unscientific condition may carry germs, parasites, etc.

The slaughter animal may get affected through direct and indirect contacts with the diseased pig during the time of transportation, stocking and slaughtering.

The carcass may get contaminated from animal's skin, gut contents, faecal material, contaminated equipment, water and dirt in the surrounding environment. The extent of contamination of the carcass/meat depends on the hygiene and sanitation practices adopted during the process of slaughtering, selling, storage and handling.



Fig 5: Round worms of pig

2.4.5. How germs are transmitted ?

Germs are mainly transmitted through,

Ingestion of undercooked meat of infected animals, direct/indirect contact, inhalation, and mosquito bites, etc.

Contaminated utensils, slaughter place and water used for slaughtering the animal.

Close/direct contact of the slaughterers with the diseased animal, open wound, body discharge (urine, faeces, saliva, foetus, etc.) and infected body parts.

Contaminated vehicle used for transportation of meat/ meat products and packaging materials.

Poor hygiene and sanitation increase the microbial load (germs) in the pork consumption of which causes several human diseases.

Better hygiene and sanitation increase the shelf-life and the keeping quality of pork.

2.4.7. Group Exercise

Participants will be divided into small groups (4/5 participants in each) and each group will be asked to write down the most important positive or negative changes that took place in the last 10 years in pork production and handling. If the participants are not interested to write the points, they can explain the changes and facilitator may write down the points in the chart paper. Finally, the facilitator will draw the inferences and conclusions, and explain the importance of pork business.

DAY2

Session 3:

Rules and Regulation Governing Slaughter and Selling Practices, Transportation of Live Pigs and Importance of Ante-mortem, Post-mortem Inspection

3.1. Resource person

Animal Health Inspector or Veterinary Officer under Municipal Corporation/Town Committee.

3.2. Session objectives

By the end of the session, the participants will have a clear idea of the mode of transportation of pigs and ante-mortem, post-mortem inspection along with the prevailing rules and regulations governing slaughter and selling practices of live pigs.

3.3. Training methods

Participatory discussion with the help of illustrations.

3.4. Content

3.4.1. Laws/bylaws and regulations related to slaughter house

Meat shops and slaughter houses are regulated by the laws and bylaws of the Municipal Corporation/Municipal Council/Town Committee of respective place. Some general laws/bylaws governing the meat shops/slaughterhouse are stated here. However, these may vary from place to place.

3.4.1.1. License

- Every person who adopts any trade shall have to take a license. "License" means a formal written permission granted to person/persons for carrying out business in the market or in slaughter houses. Application for a trade license has to be done within one month from the date of opening the shop.
- Provisional license for ordinary trades may be issued immediately on the receipt of duly filled up application form and the payment of license fees.

On submission of necessary documents and physical verification, such provisional license may be made regular. In case of delay, penalty may be imposed or the shop may be closed.

- Validity of trade license is only for one year. If license is not renewed in due time, penalty may be realized with the license fee.
- Application for a trade license should be submitted with the prescribed documents within one month from the date of opening the shop.

License Fees

It varies from place to place.

Conditions for license

- The flooring should be clean, drainage effective, ventilation proper, lighting adequate and supply of water wholesome. There must be provision for repairing.
- The sale of animal, fish and vegetable in the same stall is prohibited.
- The licensee shall ensure the absence of rats and other rodents in the premises.

Directions

- No person shall store, sell animal, fish, vegetables or any article on the approaches, foot-paths within the municipal market and shall in no way obstruct, put hurdles in free movement of people visiting the market.
- No person shall hawk any article in such market without the permission from the Commissioner.
- No person shall use any weight, scale or measure except such standard weights, scales and measures as prescribed from time to time by the government.
- No trader or person shall throw or deposit any article on the road or path or on the drain or in any way obstruct free flow of drain and/or surrounding the municipal market.
- No person shall obstruct or hinder or put hurdles to any staff engaged in cleaning of the drains, interior paths and open spaces in-between the rooms stall or shed in a municipal market.
- No persons shall carry any meat in a market unless it is properly covered.

3.4.1.2. Prevention of Cruelty to Animals (Slaughter House) Rules, 2001

The following are the key clauses of regulation.

- No person shall slaughter any animal within a municipal area except in a

- slaughter house recognized or licensed by the concerned authority.
- No diseased animal, three or more-months pregnant animals or animals without being certified by a veterinary doctor shall be allowed to be slaughtered.
- Materials used for construction of slaughter house shall be impervious and easily cleanable, and the floor shall be non-absorbent and non-slippery.
- No person who has not attained the age of 18 years shall be employed in any manner in a slaughter house.
- The Animal Welfare Board of India or any personal Welfare Organization authorized by it may inspect any slaughter house without notice to the owner or person in charge of it any time during working hours to ensure that the provisions of these rules are being complied with. They may also send its report to Animal Welfare Board of India as well as to the Municipal Corporation for appropriate action including initiation of legal proceedings if any, in the event of violation of any provisions of these rules.

3.4.1.3. Prevention of Food Adulteration Act, 1956

Under this act, the following activities are considered unlawful:

- if the article contains any other substance which destroys the nature, substance or quality and is not of the quality it represents to be;
- if any inferior or cheaper substance is substituted to the article making it harmful for health;
- if the article had been prepared, packed or kept in unhygienic condition whereby it has become contaminated or injurious to health;
- if the article is obtained from a diseased animal, or is insect-infested or is rotten or is unfit for human consumption;
- if any coloring matter other than that prescribed is used or if the amount of the matter exceeds the prescribed limit, and
- if the article contains any prohibited preservative or permitted preservative in excess of the prescribed limits.

3.4.1.4. Food Safety and Standard Act, 2006

- The act lays down standards for food and regulates its manufacture, storage, distribution, and sale and import to ensure availability of safe and wholesome food for human consumption.
- No article of food shall contain insecticide or pesticide residues, veterinary drugs residues, antibiotic residues, solvent residues, pharmacologically active substances and microbiological counts in excess of such tolerance limits as may be specified by regulations.

- No article of food shall contain any contaminant, naturally occurring toxic substances, toxins, hormones, or heavy metals in excess quantity.

3.4.1.5. Regulation Associated with Transportation of Pig/Pork

When pigs are to be transported to another state, the transporter should check into and comply with the state regulations in respect of health certificates and permits. Knowledge of and compliance with such regulations well in advance of transportation will avoid problems and reduce unexpected expenses and costly delays.

Loading and unloading should be inspected by official veterinarian. Proper vaccination and health check-up or soundness certificate should be obtained either from local body/Municipal Corporation or from veterinary check post.

The traders should obtain trade license for supply of livestock from Municipal Corporation.

For carrying the meat through the city or entering into the city one has to obtain a road permit from the Deputy Commissioner.

3.4.2. Transportation of Live Pigs for Slaughter Purpose

3.4.2.1. Points to be considered while buying the stock for slaughtering

The animal to be slaughtered should not be

- suffering from any contagious or infectious disease,
- under treatment,
- pregnant,
- too young or too old.

3.4.2.2. Points to be considered during transportation of live pigs for slaughter

Improper handling of pig prior to and during transportation may result in excessive shrinkage, wound, injury, occasional death and dissatisfied customer.

During the process of transportation, following precautions should be taken.

- Transporter should clean, and change the bedding materials (sand, straw, etc.). Generally pigs are transported with about 1 inch (2.5 cm) sand-bed in summer. In winter straw is placed on top of the sand-bed.
- The animals should be transported in vehicles designed for livestock transport.

Care should be taken to properly load the pigs. Below-capacity loading can be just as dangerous as over-loading. Partition should be used in trucks or train bogeys which are not fully loaded to keep the animals closer together.

- Breaking of journey is an important factor in transportation of pigs. Halting time and place should be finalized and organized before starting the journey. Any last minute hassles should be avoided.
- Animals should be fed and watered properly prior to loading. Pigs should be either fed lightly or should be fed 12 hours before loading depending on the distance, temperature and treatment upon arrival.
- Pigs that are over-fed or watered in excess at the time of loading defecate and urinate excessively. As a result, the floor becomes dirty and slippery and the animals feel uncomfortable. Such pigs shrink heavily and present an unattractive appearance when unloaded.
- Efforts should be made to keep the pigs quiet. Hot, excited animals experience more shrinkage and are more prone to injury or death.
- Transporter should never lose temper and should never hurry. The animals should not be beaten with objects such as pipes, sticks, canes or forks; instead a flat, wide slapper or something like broom should be used.
- When mixed loads (consisting of pig, cattle, goat, etc.) are placed in the same truck or train bogey, each class of animals should be partitioned separately. Further, boar, sow, piglet, diseased pig should be properly partitioned.

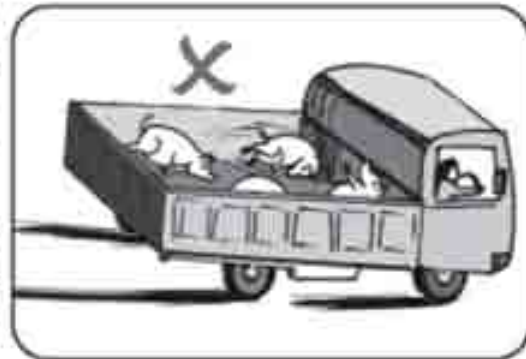


Fig 6: Consequences of loading only a few pigs in a truck for transportation

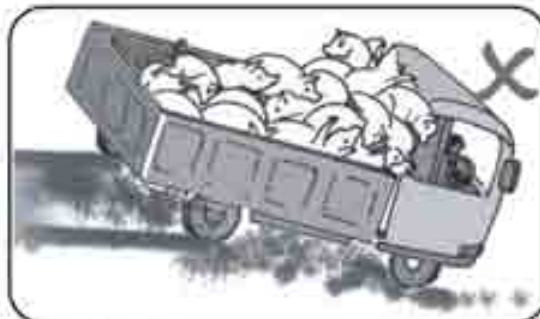


Fig 7: Consequences of a sudden stop of an overloaded truck



Fig 8: Pigs shall not be transported during hot sunny hours of the day

- Transportation of animals in too hot or too cold environment should be avoided. In such weather, shrinkage and death losses are higher than in normal weather. Animals should be transported preferably at night or in the evening. If required, the sand-bed should be made wet during hot weather.
- The truck is to be driven carefully, slowed down on sharp turns. Sudden stops are to be avoided. Trucks should be covered to protect the pigs from the sun during the summer and cold during the winter.
- Protruding nails, bolts and sharp objects in truck or train should be removed.
- Unloading should be done slowly and carefully. Pigs must not be dropped on the ground. The truck should be slowly and squarely positioned against the unloading dock.



Fig 9: Pigs should not be unloaded in humanly

3.4.3. Importance of Ante-mortem/Post-mortem Inspection

Slaughterhouse

Slaughterhouse or abattoir means any premise that is approved and registered by the controlling authority in which animals are slaughtered and dressed for human consumption.

Slaughterhouse may be fully mechanized or manually-operated with simple infrastructure facilities for hygienic slaughter of animal.

In small towns and cities, fully mechanized slaughter house may not be feasible or economically viable. Therefore, there should be at least a building with the facilities of running potable water, good drainage system, electricity, approach road, weighing balance and shed for resting of animals as well as ante-mortem and post-mortem inspection.

Meat Inspection

In almost every town and city in India, there is an Animal Health Inspector or Veterinary Officer under the Town Committee/Municipal Council/Municipal Corporation, who is responsible for inspection of slaughtered animal/carcass and certifies the same as fit for human consumption.

For this purpose, Meat Inspector/Veterinary Officer is supposed to conduct ante-mortem and post-mortem inspection of animals/carcass in the slaughter house.

3.4.3.1 Ante-mortem Inspection

Why ante-mortem inspection is important?

It is important because after the slaughtering, it is difficult to diagnose certain disease/symptom/health status of slaughtered pigs.

It helps in suspecting/diagnosing the diseases which are communicable from animal to man (e.g. anthrax, rabies, glanders, etc.) and those that are highly contagious among animals (e.g. swine fever, foot and mouth disease etc.).

Helps in separation of animals that are in advanced state of pregnancy or in early lactation.

Provides safeguard to the health of butchers and other food handlers.

Mitigate or minimize acts of unnecessary cruelty to the affected animal, wastage of time and resources (labour, water, electricity, etc.).



Fig 10: Pigs slaughtered at advanced state of pregnancy

The following conditions of the animal can be detected at ante-mortem inspection.

- Bleeding through natural orifices (mouth, nostrils, external genitalia)
 - Frothing through mouth
 - Discharge from nostrils and respiratory trouble
 - Restlessness
 - Fever
 - Bloating
 - Tumors
 - Fracture
 - Wound
 - Abrasion, bruising, cut, etc.
 - Yellowish colour of urine and mucous membrane of eye (indicating jaundice)
 - Consistency of udder (hot and hard in mastitis)
 - Hydrophobia, tendency to attack, hypertension (in case of rabies)
 - Purulent and pussy discharge from genitalia (reproductive disorder)
 - Lameness, abortion in female, vesicles in tongue and foot (in case of FMD)
- The above conditions are more or less indicative of some diseases, which contaminate the meat in some way. For example; an animal having a wound may spread the germs to meat making it unfit for consumption.

3.4.3.2. Post-mortem Inspection

Post-mortem examination is made at the time of slaughter and includes a careful examination of the carcass and the viscera (internal organs).

Certain changes in meat can be observed by the pig slaughterers themselves. For example,

- discolouration of organs such as discolouration of liver indicates jaundice;
- visible growth like tumour, abscess, etc.;
- visible nodules in different organs (in case of tuberculosis);
- measles or cotton seed-like follicle in pork (in case of cysticercosis);
- cystic stage of parasite;
- change of colour and consistency of fat, meat, etc., and
- oozing out of blood from natural orifice (in case of anthrax).

Based on the disease condition, total or partial condemnation of the carcass is required after the post-mortem examination. In such case, pig slaughterers need to extend full cooperation to the veterinary officer. To have a basic idea in which pork may be condemned is stated in the table below.

Table: Some conditions and diseases found at postmortem examination and their judgment

Disease condition	Important features observed	Judgment	Remarks
Abscess	Pus-filled tumour-like growth	If localized, then condemn the affected part & if generalized, then total condemnation is necessary.	Common in pig and other animals
Bruising		Usually partial condemnation.	Affects all the domesticated animals
Foot and Mouth disease (FMD)	Vesicle formation on tongue and feet.	Although it is not necessary but total condemnation is recommended to have total control of the disease. If partial, then head, feet, stomach and intestine should be condemned.	Affects all the domesticated animals
Mastitis	Hard udder occurs in lactating animals	In case of acute and septic infection total condemnation is necessary.	Affects all the lactating female animals.
Pneumonia	Normal softness of lung tissue is lost, becomes hardened.	In case of acute and septic infection total condemnation and in chronic case, condemnation of the lung only is necessary.	Occur in all animals.
Tuberculosis	Nodule in lung, liver and muscle.	If localized, the affected parts are rejected, and if the disease has spread, the whole carcass should be condemned.	Affects all the animals.
Taeniasolium	Measly pork (extensive invasion of muscle, giving the pork measly appearance)	Efficient freezing and heating of meat is necessary. The cyst is destroyed while freezing at 14-18° F for 4 days. Cooking also destroys it. If none of the methods are available, the carcass is condemned.	The cystic stage is <i>Cysticercus cellulosae</i> , mainly found in pig

Session 4:

Field Visit

The sites for field visit may be selected by adopting the following approaches.

- The best local slaughter or retail outlet from among the participants is selected.
- The best government/private slaughter or retail outlet is selected.
- The best slaughter/selling and preservation practice of the place is selected.

Note: The facilitator will explain the good and bad practices seen in the field and describe the consequences of such practices

Session 5:

Minimum Clean and Hygienic Practices to be adopted in Slaughterhouse/Meat Retailing Outlet

5.1. Resource person

Animal Health Inspector/Veterinary Officer under Municipal Corporation

5.2. Session Objectives

By the end of the session, the participants should have a fair idea about the clean and hygienic practices that need to be followed in slaughter house/ retail outlet.

5.3. Training method

Interactive discussion with the help of illustrations and photographs.

5.4 Contents

Contamination of meat

Contaminations can occur in many ways, e.g. butcher's hand, knife, meat cutting timber block, skin of animal, internal organs, soil, water, air, environment (dust, dirt, roadside, drain), floor, faeces, urine, utensils, dirty cloths, fly, etc.

5.4.1. Some potential sources of contamination during slaughtering

- The equipment/utensils used for each operation from slaughter to consumption (slaughtering, selling, transportation, washing, cooking and consumption) may transmit germs if these are not cleaned properly.
- Time between the last meal (feed taken) by the pigs and the slaughter time affects the fullness of the stomach. A full stomach poses a higher risk of puncture during dressing and contamination of carcass.
- When the animals are extremely fatigued or exhausted at the time of slaughter, bleeding remains incomplete, and the germs from the gut or intestine enter into the blood stream more rapidly and contaminate the meat of the exhausted animals.
- Dirty clothing and hand of the workers and poor physical facilities in the stall are potential sources of contamination.
- The contaminated water used for washing carcasses and equipment contain many germs.

- De-hairing (mechanical removal of the hair by plucking) after scalding is a source of re-contamination after removing the germs through scalding.
- Polishing the carcass with stainless steel scrapers or nylon brushes contribute spreading of the germs.

These sources suggest that the use of proper sanitation is the best approach to limit microbial contamination.



Fig11: Common sources of contamination of meat

5.4.2. Minimum Clean and Hygienic Practices

Cleaning and disinfection of utensils

- Step 1: Manually remove all the pieces of meat, hair, etc. from the utensils.
- Step 2: The utensils should be dipped in hot water (a hot water jar/electric heating rod may be kept).
- Step 3: The utensils are cleaned with soap solution or antiseptic solution like Dettol, Lysol, cresol, etc.
- Step 4: The utensils should be washed thoroughly with clean water.
- Step 5: The utensils should be dried by hanging on a hanger or with a clean piece of cloth

Cleaning and disinfection of wooden block used for cutting meat

- Step 1: The upper surface of the wooden block is removed to remove the meat particles or residues of meat of the previous day adhered to the crevices of the wooden block. This is important as meat is a very good media for growth and multiplication of germs.
- Step 2: The surface of the wooden block is washed with warm water.
- Step 3: The wooden block is dried with a clean piece of cloth.



Cleaning and disinfection of slaughter and selling place

Fig 12: Un-cleaned utensils invite flies and germs

- The floor and adjoining walls should be thoroughly cleaned after each day's operation.
- The drain should be properly flushed with ample water.
- The fridge, if any, should be cleaned especially if it contains any leftover meat.
- The platform should be covered with an aluminum sheet or big food grade plastic or steel sheet.

Cleaning and disposal of Offal

- Step 1: The offal should be collected immediately after slaughtering of the animal.
- Step 2: The offal is washed with normal tap water.
- Step 3: The contents of the intestine are squeezed out and the intestine is washed with normal tap water.
- Step 4: The contents of the stomach are discarded and the stomach is washed with tap water. Scalded at 40-45° C to remove the first lining, i.e. the mucous membrane of the stomach. Again the stomach is washed properly.
- Step 5: The offal is drained out or buried in a place away from the residential area.



Fig 13: Retail outlet with no infrastructure

Personal health and hygiene of the pig slaughterers/meat retailers

- One should not handle the meat while suffering from diseases like flu, cough, cold, tuberculosis, asthma, skin diseases, etc.
- One should wear musk, apron and cap during the time of handling meat.
- One should not smoke, spit, eat tobacco, beetle nut, etc. near the meat.
- One should not expose an open wound to a meat area (wound if any should be treated and bandaged properly).
- One should frequently wash hands with soap solution and dry them with a towel.
- One should properly and frequently trim nails, hairs and beard.
- One should wear clean clothes and preferably keep two pairs of clothes for work.
- One should take maximum care to avoid any contamination from chappals.



Fig 14: Personal cleanliness and hygienic measures

5.4.3. Factors associated with preparation of wholesome meat

To produce wholesome meat, following factors should be considered.

- Animals should be given sufficient rest before slaughter. The amount of time required for rest for every animal is dependent on the climate, distance of travel, method of transport and general health of the animal. Ample drinking water should be available to them.
- The recommended time between the last meal and slaughter time should be about 16 to 24 hours. One hour before slaughter, they may be given very little to eat.
- Pigs intended for immediate slaughter, without a rest period, are sprayed with water to accelerate cooling.
- Slaughtering should be done without causing excitement to the animals. Slaughter should not be done in presence of other live animals.
- Skilled and trained slaughterer should be assigned to perform the job of evisceration to avoid carcass contamination from the intestinal content.
- All clean operations like dressing of carcass should be separated from unclean operations like cleaning of stomachs or guts, so as to prevent contamination of the carcasses.
- The carcass should be examined (post-mortem inspection) to detect, remove, condemn and destroy all diseased or unfit part for human consumption.
- While separating the condemned portion, great care should be taken to ensure that edible portion of the carcass do not get contaminated.
- Strict hygienic condition should be adopted during transportation of the meat from the slaughterhouse to the market for sale.
- Personal hygiene of all those engaged in slaughtering, dressing and handling of the meat and the meat products is equally important.
- All personnel engaged in handling meat or meat products should undergo periodic medical examination. If this is not practicable, at least persons during their illness should not be permitted to handle meat products at any stage.
- All equipment's used to process meat must be kept thoroughly cleaned and disinfected before use.
- Meat and meat products should be stored in fly-proof containers/envi-

ment, and if these are to be kept for a long time before their sale they must be refrigerated, especially during summer.

- Splitting the carcass/meat on the ground or getting contact with unclean clothes, hooks or containers cause contamination of the carcass/meat and this should be avoided.

Session 6:

Standard Process of Slaughtering Pigs

6.1. Resource person

A veterinarian (meat science specialist)/Veterinary Officer (Municipal Corporation)

6.2. Session objectives

At the end of the session, the participants should be able to understand different steps of human slaughter methods of pigs.

6.3. Training methods

Participatory discussion with the help of illustrations and experience sharing.

6.4. Content

6.4.1. Traditional slaughter methods

Making the animal unconscious by hammering on the head.

Controlling the animal and severing the vein/throat.

Direct heart puncturing with a long iron rod through a tapering point.



Fig 15: Photograph of manual heart puncturing with an iron rod

6.4.2. Humane slaughter method

It means the animals should be slaughtered without giving pain. While animal is slaughtered following criteria should be followed:

- Animals must not be treated cruelly.
- Animals must not be unnecessarily stressed.
- Bleeding should be rapid and complete.
- Damage to the carcass must be minimal.
- Slaughter method should be hygienic, economical and safe for the slaughterers.

6.4.3. Steps of slaughter

STUNNING (making the animal unconscious)



BLEEDING (severing the anterior venacava at the base of the neck)



HOISTING (hanging the animal in upside down position at the rail)



SCALDING (pouring hot water over the carcass for removal of hair)



SCRAPPING (removing hair with a knife, it should not be done on floor which may lead to microbial contamination)



SINGEING (burning of the remaining short hairs of the carcass)



EVISCERATION (removing the internal organs of the carcass)



CUTTING OF MEAT (cutting as per the consumers' choice and market behavior)



GRADE (grading of meat according to consumers' choice and preference)



CHILL (storing of meat by freezing if it is not sold immediately)

Flow chart 6.4.3a: Process of pig slaughter

6.4.3.1. Stunning

To avoid the risk of cruelty, animals must be stunned or made unconscious before they are actually killed by bleeding. Unconsciousness makes vein puncturing for bleeding much easier for the operator. The animal must be unconscious long enough for vein puncturing.

Different types of stunning methods are:

Electrical stunning,
Gaseous stunning and
Mechanical stunning or knocker.

For stunning, a direct blow can be made on the skull. The blow must be dealt with force, so that the skull is immediately smashed, causing instantaneous unconsciousness. Drugs cannot be used to induce unconsciousness in animals for slaughter since unacceptable residues would remain in the meat which is harmful for human consumption.

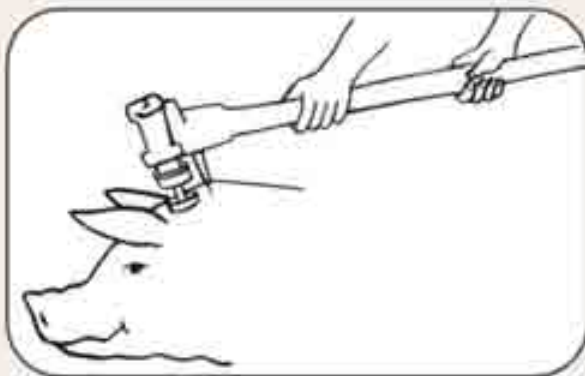


Fig 16: Mechanical Stunning with a knocker



Fig 17: Mechanical stunning at the field

6.4.3.2. Bleeding

The objective of bleeding is to kill the animal with minimal damage to the carcass and to remove blood as quickly as possible since blood is an ideal medium for the growth of germs.

Pigs are usually bled by puncturing the major blood vessels (anterior venacava), at the base of the neck with long whole knife through which blood oozes out. It may be desirable to scrape away any dirt and hair from breast-bone to throat.

The sticking point for pigs is in the centre of the neck, just in front of the breast-bone. Care must be taken not to puncture the chest cavity, or it will be filled with blood. To reduce contamination by the scalding tank water, the cut should be as small as possible.

The Proper Way of Puncturing

- The point of the knife is inserted at an angle of about 45° about 2 inches (5 cm) in front of the breast-bone, immediately over the middle line.
- An incision is made down towards the jaw with the knife penetrating to a depth of 5 to 6 inch (12 to 15 cm), depending on the size of the pig.
- If the knife is punctured repeatedly due to inaccurate puncturing, large area of body part will be damaged and bleeding would be incomplete because of clotting.

Incomplete bleeding increases the amount of residual blood in the carcass which makes the meat unduly dark in colour and the fat streaked with blood.



Fig 18: Severing the arteries of pig for the purpose of bleeding

6.4.3.3. Hoisting

After puncturing the vein, the pig should be hoisted on a hanging stand made out of strong wood/concrete post and an iron rod with a strong iron hanger. This will facilitate easy and complete bleeding. If it is not possible, pig should be placed in a flat aluminum or stainless steel tray.

6.4.3.4. Scalding and De-hairing of Pigs

- Scalding in water at around 60°C for about six minutes loosens the hair. After this, hair can be easily removed with a clean cloth. At low temperature hair is not loosened and at high temperature the skin gets cooked and it is difficult to remove hairs.
- To check the effectiveness of scalding the skin is rubbed with the thumb to see if hair comes off easily. To reduce contamination, scalding water should be changed frequently and bleeding should be fully completed before immersion.
- De-hairing is done with a specially formed scraper (bell scraper or knife). If the scalding is effective all the hair can be removed by this manual method.
- Singeing (burning) removes any remaining hairs and leaves an attractive clean appearance. It may be done with a hand-held gas torch.
- After singeing, black deposits and singed hairs are scraped off and the carcass is thoroughly cleaned before evisceration begins.



Fig 19: Singeing with a hand held torch

Fig 20: Scalding with hot water at the field

6.4.3.5. Evisceration

Care must be taken in all the operations not to puncture the internal organs, especially the intestine. One way to prevent such contamination is to seal off the rectum with a plastic bag immediately after it is freed from the carcass.

After cutting the skin and body along the middle line, the pelvis is cut through and the bladder and sexual organs are removed.

In males, the foreskin must not be punctured as the contents are a serious source of contamination. All these organs are considered inedible.

The abdominal and thoracic viscera are removed intact. Contact with the floor or standing platform should be avoided.

The kidneys are usually removed after the carcass has been split down the backbone. The head is usually left on until after chilling.

6.4.3.6. Cutting and grading of pork

Preference towards different parts of the carcass, e.g. lean, fat, etc. varies from consumers to consumers. Accordingly, demand for different parts varies. For instance some parts like ham, loin, bacon have more demand in market (as these are meaty parts) than those of snout, head, extremity (bony parts), etc.



Fig 21: Manual evisceration at the field

The cuts having more meaty part are termed as costly cuts. These are ham or leg part, loin (back muscle, parallel to vertebra) and belly area/bacon



Fig 22: Butchery cut in field condition.

6.4.4. Different popular cuts of pork

6.4.4.1. Wholesale cuts

Bigger pork-cuts for selling at wholesale prices are

Ham

Loin

Bacon

Boston butt

Picnic and

Jowl

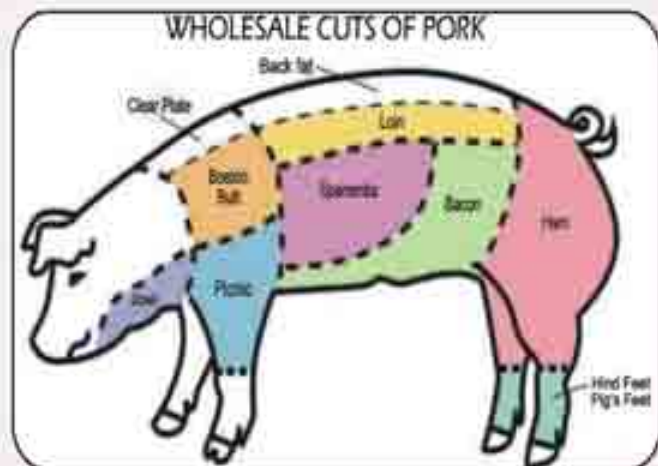


Fig 23: Various wholesale cuts of pig
(Courtesy: www.tomfridaysmarket.com/porkcuts.jpg)

6.4.4.2. Retail cuts

The following are smaller pork-cuts for selling at retail prices.

Ham

- Half ham (butt end)
- Half ham (shank end)
- Ham butt slice
- Centre ham slice
- Fresh ham (roast)
- Rolled fresh ham roast

Loin

- Boneless loin roast
- Pork tender loin
- Canadian style bacon
- Loin chop
- Sir loin roast
- Blade loin roast
- Loin roast (centre cut)
- Crown pork roast
- Rib pork chop
- French rib chop
- Butterfly chop.

Boston butt

- Smoked shoulder butt
- Blade porks
- Boston butt
- Rolled boston butt

Picnic

- Fresh picnic shoulder
- Smoked picnic shoulder
- Cushion picnic shoulder
- Rolled picnic shoulder
- Fresh shoulder hock
- Arm pork steak

Jowl

- Jowl bacon square

Bacon

- Bacon
- Salt pork

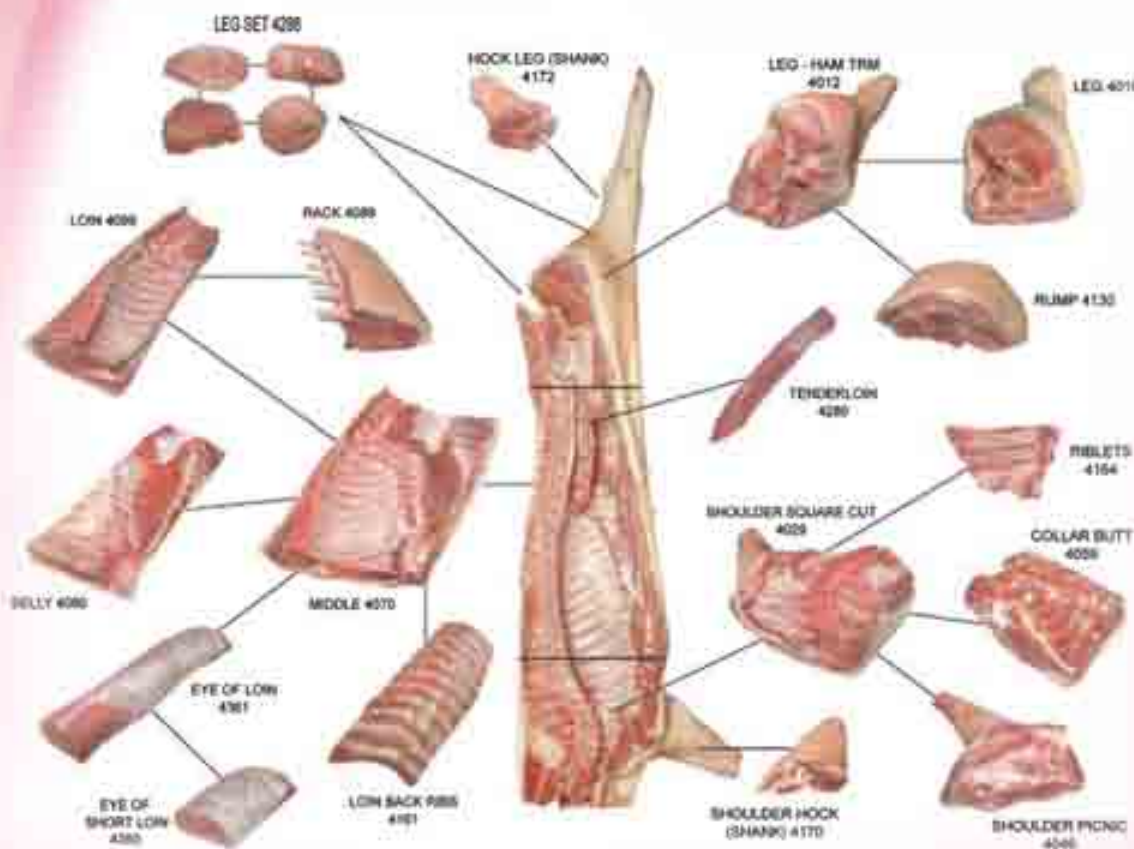


Fig 24: Various retail cuts of pig (courtesy: www.joseph-morris.co.uk/cuts/pork%20cuts.jpeg)

Note: All the above steps are thoroughly followed in a scientific slaughterhouse. Small pig slaughterer may not be in a position to follow all these steps but the principle of cleanliness and hygiene must be followed both in the slaughterhouse and selling place.

6.4.5. Dressing percentage of meat yield

Dressing percentage is a comparison of the carcass yield in relation to the live weight and is calculated as follows:

$$\text{Dressing \%} = \frac{\text{Weight of the dressed carcass}}{\text{Weight of the live animal}} \times 100$$

Dressing percentage is influenced by the stage of maturity, degree of finish, breed and intestinal content of the animal. Dressing percentage ranges from 45-70 in meat animals. As the animal grow older, proportion of muscle and bone decreases and fat increases.

Table: Dressing percentage and composition of different livestock carcasses

Species	Dressing %	Composition of carcasses			
		Meat%	Fat%	Bone%	Skin%
Goat	43-52	55-65	3-6	20-32	-
Sheep	40-50	55-67	3-8	20-30	-
Pig	70-75	40-50	30-40	10-15	-
Buffalo	43-54	65-70	5-10	20-24	-
Broiler	70	52	6	30	12
Duck	65	34	18	38	10

Source: Handbook of Animal Husbandry

DAY 4

Session 7:

Preservation, Packaging and Value Addition of Pork

7.1. Resource person

A meat science specialist.

7.2. Session objectives

At the end of the session, the participants should have a fair idea about different preservation methods; packaging materials used and value addition of pork.

7.3. Training methods

Participatory discussion with the help of field examples/experience.

7.4 Content

7.4.1 Preservation of meat

Meat spoilage mainly occurs because of the following four factors:

- (a) Natural process of gradual breakdown of the meat,
- (b) Small number of initial germs, which multiply rapidly and become dominant through improper handling and storage of the meat/meat products,
- (c) The temperature at which the pork is kept/stored, and
- (d) Type of packaging materials used.

If all the four factors are optimized then microbial load present in the freshly cut surfaces is minimum and ensures a longer shelf-life of pork.

Meat which is handled most frequently has much larger chance to be contaminated by microbial load. Therefore, meat should be sold immediately after slaughter; otherwise the quality of meat gets deteriorated rapidly resulting in significant economic loss.

7.4.1.1. Some common methods of preserving meat Icing

- Meat is stored in a thermo cool box with ice. This method is useful to preserve the meat for short duration.

Smoking

- Meat is stored on a bamboo basket/mat hanging it over an oven throughout the day and night. This is a cost-effective method of meat preservation and

it is commonly practiced by the tribal people in NE India. They find smoked meat tastier than the fresh meat.

- Smoking permits formaldehyde and phenolic compounds to accumulate on the surface of the meat. This, together with surface drying gradually, prevents microbial growth.

Refrigerating

Meat is stored in domestic refrigeration at the interval of temperature from 0 to 4°C. At such temperatures microbial growth is inhibited. Decrease in temperature towards freezing point increases the shelf-life of meat while increase in temperature reduces the shelf-life of meat. However in the case of cooked meat and sausage, a somewhat higher temperature is required. This method is useful for smaller quantity of meat.

To reduce spoilage of meat in the refrigerator, following recommendations should be followed:

- Meat should be handled in smaller quantities.
- The refrigerator should be opened less frequently and for shorter durations.
- The refrigerator should not be over-loaded beyond the recommended capacity.
- The chamber should be periodically cleaned. When the meat is found to be spoiled the fridge should be cleaned as soon as possible.
- The desired level of temperature should be maintained with a minimum of fluctuation.
- A power back up should be kept in the event of power failures.

Freezing/Cold Storage

- A scientific slaughterhouse (abattoir) includes a cold storage room (a big room with the provision to adjust the temperature at lower level) to store meat for a longer time. This is not applicable to smaller slaughterer.
- Meat freezes at (-) 1.6°C, but for storage purposes, (-) 18°C is considered to be the critical temperature. At this temperature, microbial growth, enzymatic and chemical changes are largely reduced. Meat could be preserved for longer duration at freezing temperature.

Thermal Processing

Meat/meat products are canned and preserved through thermal or heat application.

Exclusion of air

Meat is packed in a vacuum or in inert gases like nitrogen or carbon dioxide.

Use of some locally available preservatives

- Meat is boiled by adding jeera powder, dhania powder, ginger and turmeric powder to increase the shelf-life of the meat.
- Meat is also preserved with the use of some easily available preservatives like vinegar, organic acid, salt, turmeric powder, etc.

7.4.1.2. Why is thawing required?

Refrigerated or frozen meat becomes harder. To bring down the meat to normal structure it should be thawed. It means that it should be brought down to normal temperature by adding normal water. It is suggested that carcass be thawed at 4°C to 6°C in hanging position without any covering. Thawing is considered complete when the temperature of the meat is about 0-1°C. Thawed meat deteriorates quickly and must be kept at about 10°C, and consumed as soon as possible.

7.4.1.3. How to avoid the condition of water-pork (pale, soft exudative pork)?

Under this condition, meat becomes watery, assumes a pale, unattractive colour and lacks flavor. Watery pork generally affects the leg and loin. Watery pork is a serious problem if pork is to be sold fresh because of the amount of drip which causes weight loss (up to 10%). Many factors are associated with this condition, e.g., high environmental temperature, rough ante-mortem handling, fighting, inefficient slaughtering technique and poor handling of carcasses.

To improve such a condition, animal must be given proper rest before slaughter, they should be handled gently and quietly, loading and unloading should be stress-free, water should be provided adequately and the carcass must be refrigerated immediately to ensure rapid reduction in temperature.

7.4.2. Packaging of Meat & Meat Products

Packaging preserves products from dehydration, physical changes, microbial contaminations, dust, and from other environmental factors which affect quality and nutrition. Good packaging is important for greater consumer satisfaction and increased demand. Meat packaging should be clean, attractive, durable and impermeable to flavor and odour. Fresh meat requires presence of oxygen to maintain colour for consumers' satisfaction with minimum loss of water. However, frozen or processed products require more sophisticated and extensive packaging to store for much longer periods. Vacuum packaging of meat and meat products is widely practiced commercially. Meat retailers generally use

newspaper or ordinary polythene for packaging of meat. Such practice poses risk to health and reduces the quality of meat. Meat should not be packaged with papers (specially printed paper) or ordinary polythene. It should be packed only in food grade polythene which is available in the market.

7.4.2.1. Category of packaging films

Packaging films can be subdivided into:

- Cellulose films,
- Plastic films and
- Aluminium foil.

They can either be used as mono films or as two or more different films laminated together. These materials differ in:

- Oxygen permeability,
- Water vapour barrier,
- Resistance to hot and cold temperatures and
- Mechanical strength

7.4.2.2. Characteristics of a good packaging material

- Mouldable and pliable at low temperature
- Flavorless and tasteless
- Transparent
- High wet strength
- Resistance to tearing
- Adaptable to labeling
- Attractive
- Low price

7.4.2.3. Characteristic of packaging materials required for wrapping fresh, frozen and cured meat

For fresh meat

- Transparent
- Highly permeable to oxygen to give bright red or pink colour to meat through formation of oxymoglobin
- Moisture-proof, grease-proof, flexible and durable at refrigerated temperature

For frozen meat

- Must be oxygen-impermeable to minimize rancidity (production of off-flavour

and odours) and freezer-burn (elimination of moisture from the surface of meat leaving white patches)

- Moisture-proof and impermeable to flavor and odour
- Durable at refrigerated temperature

For cured meat

- Non-transparent as light may damage cured products. Vacuum packaging reduces the detrimental effect of light.
- Must be impermeable to oxygen
- Strong and flexible, grease-proof and impermeable to odours.

7.4.2.4. Packaging Material Available in the Market

There are varieties of packaging materials available in the market. Some are:

- Food-grade polythene bags: Low Density Bags (LDB), cost about Rs.130/- per kg while High Density Bags (HDB), cost about Rs.120/- per kg.
- Foils: Aluminum foil or thin aluminum sheet used for packaging meat and meat products.

7.4.3. Value Addition of Pork

The process of preparing higher-value item from a lower-value product is called value addition. Example is preparation of sausage from intestine of the pig which is a waste product. Preparation of meat products refer to all processes utilized in converting fresh meat into products through the processes like smoking, cooking, curing, canning, freezing, dehydration and use of additives, chemicals and enzymes. The purpose of processing meat to meat products is primarily for preservation of meat by inhibiting or preventing spoilage, improving the palatability and providing various products based on the taste and requirement of the consumers, and thus to increase the profit margin per kg of meat. A variety of non-meat materials are incorporated in the products as binders, extenders or fillers to improve cooking yields, slicing, flavour and to reduce formulation cost.

If large quantity of pork remains unsold or if more price per kg of pork is expected, pork retailers can go for preparation of value-added products from meat. Some items are:

- Minced meat/ Keema,
- Pork pickle,
- Patties,
- Sandwich,
- Momo,
- Cutlet,

- Samosa,
- Pork roll,
- Sausage,
- Nugget,
- Salami,
- Ham and
- Bacon

Apart from these, some other pork products are prepared in the scientific slaughterhouses which are mainly available in the departmental stores and grocery shops.

7.4.4. Different processed pork products available in the market

Meat processing plants prepare several meat products to sell (mainly in the departmental store). Some of these meat products can be taken with little boiling/cooking. These are known as ready-to-eat products (RTE), some are ready- to-cook (RTC) products.

- Sausages
- Salami
- Bacon-cured smoked pork product, made from the belly part of pig
- Meat spread/ paste
- Hamburger
- Canned(tin) product—lunchoun pork product
- Ham
- Meat/ pork curry
- Tandoori
- Cooked smoked pork (pork + bamboo shoot extract)
- Roasting

Some pig producers carry the intestine and other leftover of the slaughterhouse after cutting them into small pieces and boiling them with other ingredients to feed the pigs.



Fig 25: Pork Oxford Sausages



Fig 26: Pork Salami



Fig 27: Pork Sausages



Fig 28: Pork Cocktail Sausages

7.4.5. Byproducts

Profit from meat-animals considerably depend on return from byproducts as meat forms only 70% of live body weight while byproduct forms remaining 30%.

7.4.5.1. Bristles/Hair

Under conventional slaughtering method, many of the pig slaughterers pluck the hair instead of scalding or burning it.

About 70-100 gm of hair is obtained from each mature pig which give an income of Rs.30.00 to Rs. 40.00 per pig. Pig hair has good demand in the market and some traders visit the slaughter places from time to time for buying of hairs. Each kg of hair cost about Rs.350.00 to Rs.450.00 in the open market.

- Good quality of hair is obtained during the months of September to October, especially from the pig reared in relatively cooler place.
- Bristles are used for manufacturing brass, carpet, cushioning materials, etc.

7.4.5.2 Hooves and teeth

Hooves and teeth are also sold in the market. Hooves trader visits the slaughter place and buy all these by products. Hooves are mainly used for preparation of hoof meal while teeth are used as decorative item.

7.4.5.3 Blood

Large quantities of blood available at slaughterhouses is generally either wasted or cheaply utilized as fertilizer or in small quantities as animal feed. About 2-3 kg of blood is obtained from a pig. Blood is also used as a meal for feeding livestock. In such cases, care should be taken not to contaminate the blood with dirt, floor washing, etc. For use of blood as fertilizer all the available blood is collected in drums and transported within 6 hours for further processing.

7.4.5.4 Offal

Offals are those internal organs which are not sold along with the meat but have nutritional value either for human or animal consumption. Various value-added byproducts can be prepared from offal.

Session 8:

Credit Linkages, Construction of Hygienic Slaughterhouse and Entrepreneurship Skill for Successful Business

8.1. Resource person

A veterinary Officer of Municipal Corporation/ Town committee.

8.2. Session objectives

At the end of the session, participants should have clear idea about the minimum requirements for the construction of a hygienic meat stall and the entrepreneurship skills required to run the business successfully.

8.3. Training methods

Participatory discussion

8.4. Contents

8.4.1. Credit schemes

8.4.1.1. Micro credit schemes

What is micro-credit?

- Small amount of credit (no specific limit but generally varies from Rs.5000/- to Rs. 25,000.00 for an individual and Rs.20,000/- to Rs.4,00,0000/- for self-help groups (SHGs) offered by micro-credit lending institutions/NGOs with little or no paper work.
- The loan is meant for taking up any income generating activity (e.g. livestock and poultry rearing, livestock trading, cottage milk processing, etc.).
- Repayment process by individual to NGOs is quite flexible. Repayment may be on daily/weekly/fortnightly/ormonthly basis. However repayment procedure by NGOs to bank/ financial institution may be on monthly/ quarterly basis.

Need for micro-credit

- Poor people depend on local money lenders to meet small credit needs. But these lenders charge very high interest rates (5-10% per month or 60-120% per year). Micro-credit ensures abolition of exploitation by money lenders.
- Poor people donot understand the complexities involved in formal lending

from the commercial banks. They hesitate to approach the banks to meet their credit needs. The loan disbursement system under micro-credit is simpler and smallholders' friendly.

- Commercial banks are not interested to extend small loans as this involves higher operation costs. Therefore, poor rural people remain outside the formal money-lending system. Micro-credit institutions play a positive role for smallholders.

Benefits of micro-credit

- Individual borrower need not approach any bank or financial institution.
- They need not submit any collateral security or mortgage to bank.
- Legal hassles are absent.
- Paper work is very little.
- Repayment procedure is simple.
- Borrowers can avail locally from an NGO in a short time.
- Interest rate is much lower (about 16-24% per annum) than the private money lenders.

8.4.1.2. Financing of Joint Liability Group (JLG) by State Bank of India (SBI)

- Joint Liability Group (JLGs) is another model for providing credit to those who remained uncovered by formal financial institutions.
- A group approach can be successfully adopted by banks to reach tenant farmers and farmers with small land holdings without proper revenue records. The mechanism of JLG would enable us to extend credit on the basis of mutual guarantee provided by the members of JLG. It would also reduce transaction costs of both bank and borrowers and help in loan recovery.

General features of JLG

- A Joint Liability Group (JLG) is an informal group comprising preferably of 4 to 10 individuals coming together for the purposes of availing bank loan either singly or through the group mechanism against mutual guarantee.
- The JLG members would offer a joint undertaking to the bank that enables them to avail loans.
- The management of the JLG is to be kept simple with little or no financial administration within the group.

Loan limit

Considering that the loan is to be granted against the mutual guarantee offered by the group, maximum amount of loan may be restricted to Rs. 50,000.00 per individual.

Rate of interest

As applicable to the SHGs.

Margin and security norms

No collaterals may be insisted upon against the loans to JLGs. It may, however, be ensured that the mutual guarantees offered by the JLG members are kept on record. Margins as per the usual norms may be applied.

8.4.1.3. State Bank of India's (SBI) loan for piggery

This is a scheme for supporting commercial pig farm.

Purpose of loan

Loan is offered for construction of shed, purchase of piglet, feed and equipment, etc.

Eligibility

- Individual farmer who are experienced in rearing pig and marketing of pork.
- Applicant's age should be less than 65 years.

Loan amount : Depending upon the project cost or the requirement of the farmer.

Margin : 15-25%

Period of loan : 5-6 years

Moratorium period : 6 months to one year

Repayment : Half yearly installments

8.4.2. Construction of Hygienic Slaughter House

A Slaughterhouse does not necessarily need to have an expensive infrastructure and capital investment but certain basic hygienic and clean practices should be maintained to ensure a better health for workers and consumers.

8.4.2.1. Following points should be considered for construction of a hygienic Slaughter House

- The slaughter place should be located a bit away from the residential area.
- Approach road and surrounding should be clean and free from water logging.
- The platform where slaughtering is performed should be separate and elevated.

- The floor and wall should preferably be of concrete with white colour tiles or marbles for easy cleaning.
- There should be hanging facility of stainless steel, and for dressing of carcass.
- There should be the facility of potable running water.
- There should be proper and efficient drainage system.
- There should be electric supply.

8.4.2.2. Following points should be considered for the construction of a hygienic meatretail outlet

- The place should be little away from road side/residence/open drain.
- Meat should be cut and displayed in a raised platform. On the top of the platform, there should be stainless steel basket to keep cut pieces of meat. The meat should not be in any case displayed on bamboo mat or wooden platform, as it contains innumerable meat pieces of leftover meat and blood clot. It is almost impossible to thoroughly clean the bamboo mat.
- The shed should preferably be of concrete with white colour tiles on the floor and wall for easy cleaning.
- There should be adequate ventilation for circulation of air and the ventilator should be covered with fly/rodent/bird proof net/ glass.
- There should be sufficient electric light available in the stall and an electric rod to warm the water for cleaning the utensils.
- There should be sufficient potable water and space for cleaning.
- The drainage system should be efficient.
- There should be a domestic refrigerator or freezer for preservation of leftover meat.
- The carcass should be covered with food-grade transparent polythene to avoid contamination from dust, flies, etc.
- There should preferably be platform type balance to weigh the meat.

8.4.2.3. Layout of a small improved meatretail outlet

The layout is designed on the basis of recommendations of different agencies like Bureau of Indian Standard (BIS, 1973), (BIS 1989) and Meat and Food products Order (MFPO, 1973).

Illustration of the three categories

Considering the economic status of the butchers, three categories of butcher shops are suggested.

First category

A very simple design with two rooms having the floor space of 9 sq. meter per room and height 3.5 meter.

- Facilities like fly-proof net, concrete elevated platform, hanging facility of carcasses, water drainage, etc. should be installed.
- Walls of the slaughter room should be provided with wire-netting for easy circulation of fresh air and light if there is no electricity.
- Potable water should be available.
- In absence of electric power this type business house should be closed after sunset.

Second category

This category of butcher shop is recommended for middle class butchers with better financial condition.

- The house should be constructed with semi-permanent building materials.
- The roof should be corrugated iron (C.I.) sheets.
- Bird-proof and fly-proof wire-netting or glass covering with proper ventilation should be fitted at the walls.
- Two rooms having floor space of 9 sq. m for each room.
- Half-wall (1.25 m) of the slaughter and meat selling room should be fitted with tiles.
- The top of the slaughter and meat selling counter should be fitted with fly-proof net.
- Facilities for sufficient light and fan are necessary.
- Meat-cutting floor (the elevated raised platform) should be made up of mosaic vitrified tiles or marble with internal drainage facility for flow of water from the carcass. Meat should be kept in a steel/ aluminum tray or refrigerator.
- Provision for running water is a necessity. The house should be constructed with semi-permanent building materials.
- The roof should be corrugated iron (C.I.) sheets.
- Bird-proof and fly-proof wire netting or glass covering with proper ventilation should be fitted at the walls.
- Two rooms having floor space of 9 sq. m for each room.
- Half-wall (1.25 m) of the slaughter and meat selling room should be fitted with tiles.
- The top of the slaughter and meat selling counter should be fitted with fly-proof net.

- Facilities for sufficient light and fan are necessary.
- Meat-cutting floor (the elevated raised platform) should be made up of mosaic vitrified tiles or marble with internal drainage facility for flow of water from the carcass. Meat should be kept in a steel/aluminum tray or refrigerator.
- Provision for running water is a necessity.

Third category

An improved butcher shop with the following physical facilities should be affordable by the butcher with better financial status or receiving loan from the government or other agencies.

- Two rooms of 3m×3m×3.4m size.
- One room of 2m×3m×3.4m size for lair or resting of animals.
- Running water facility.
- Wash basin in the slaughter and meat selling counter.
- Fan, light and electric rod with a water jar for sterilizing the knives.
- Refrigerator/Deep freeze.
- Platform-type digital weighing balance.
- Deboning and mince-meat preparation facility.
- Half-wall (1.25 m) of both the slaughter and meat selling counter fitted with tiles.
- Marble-top platform with big steel or aluminum tray.
- Front wall of the sale counter with glass fittings.
- Meat preparation room (slaughter room) with wire-netting, full wall of lair with timber-framed cement plaster.
- 1.5m veranda in the front.
- Adequate drainage and disposal facilities.
- A rack to keep of the processed meat products like canned meat etc.
- A cloth hanger with apron, towel and musk.
- Top refrigerator for preservation.
- Carcass hanging facility etc.

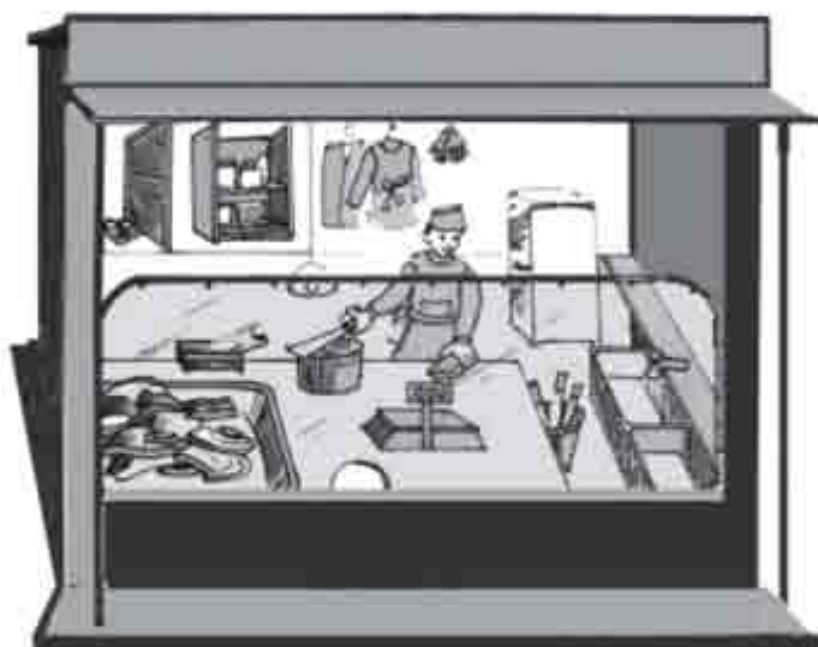


Fig 29: A suggested meat retail shop

8.4.2.4. Important things to be kept in mind in establishing a meat stall

- The floor should be thoroughly cleaned every day after closing the business with disinfectant solution.
- The wooden block should be cleaned thoroughly before and after starting the business by scrubbing the surface and washing it with hot water as the timber block, used for cutting meat contains particles of meat, blood, water, fat, etc. which provide nutrition-rich environment for growth of microbes.
- Pieces of meat and dirty water should not be allowed to settle anywhere on the floor as it provides good environment for growth and multiplication of microbes.
- Surrounding of the butcher's shop should be kept dry and clean. Stagnation of dirty water should be avoided.
- The drainage system from the butchers shop should be concrete.
- There must be a source of potable water near the butcher's shop; otherwise provision should be made for storing water for repeated cleaning of utensils and floor. Under no circumstances dirty water should be used for cleaning the meat, utensils and the floor.
- The sharp utensils, used for cutting meat should be cleaned thoroughly (including the handle) using soft detergents or hot water or both.
- The meat handlers should not chew tobacco/ beetle nuts and should not smoke during the time of business.

8.4.3. Entrepreneurship skills

8.4.3.1. Key skills required for running the business successfully

- Good behavior and personal communication skill.
- Pleasant bargaining capability.
- Pleasing body language with friendly approach.
- Clean dress.
- Honesty in financial dealing.
- Honesty in weighing of meat/meat products.
- Selling of good quality meat.
- Use of quality packaging materials.
- Maintenance of cleanliness in and around the stall.
- Possessing municipality license and road permit.
- Honest work relationship with the pig suppliers, bankers and other stakeholders.

8.4.3.2. Managing and Resolving Conflict

In business some degree of conflict is unavoidable. However, since any business is full of opportunities, conflicts should be resolved without stress and frustration. A few ground rules may be helpful.

- Interactions should be respectful, even when feeling may be frustrating or hurting. Avoiding putdowns, name calling, interruptions, etc. helps to prevent conflict escalation.
- Controlling emotion is very rewarding. Outburst of anger is always counter-productive.
- Conflicting points should be avoided or minimized by planned negotiation, mediation or other formalized process.
- Willingness to understand and acknowledge is a surer path to resolve problems without being tense.
- Communications should be honest and open.
- Concerns should be expressed in constructive manner.
- Any blame game should be avoided and the focus should be on future solutions.

Solutions should satisfy all concerned with the particular problem.

ANNEXURE-1

The following evaluation form can be used before and after the training for evaluating the knowledge of the participants and effectiveness of the training.

Sl.no	Subject	Knowledge(Use of tick mark)				Usefulness of the learning(Use tick mark)		
		Before Training		After Training		Very useful	Useful	Not useful
1	Importance of hygienic pork production and selling							
2	Brief idea of what germs and parasite are							
3	Knowledge on how germs are transmitted							
4	Knowledge on how pigs are to be transported for Slaughter purpose							
5	Importance of ante-mortem,post-mortem inspection							
6	Knowledge on some conditions of diseases that can be detected at ante-mortem/post-mortem inspection							
7	Basic knowledge regarding the rules and regulation governing slaughter and selling practices							
8	Minimum clean and hygienic practices that need to be adopted in slaughterhouse/meat-retailing outlet							

9	Knowledge on cleaning and disinfection of utensils/wooden block							
10	Knowledge on cleaning and disinfection of the slaughter/selling place							
11	Knowledge on some potential source of contamination							
12	Knowledge on personal health and hygiene of the pig slaughterer/meat retailer							
13	Knowledge on factors associated with preparation of wholesome meat							
14	Knowledge on the standard/humane process of slaughtering							
15	Knowledge on the various method of preservation of meat							
16	Knowledge on packaging of meat products							
17	Knowledge on value addition of pork							
18	Knowledge on construction of a hygienic slaughter house							
19	Knowledge on entrepreneurship skills required for operating the business successfully							
20	Knowledge on managing and resolving conflicts							
TOTAL								
Give marks out of 10								

Content of the training manual	
Resource Person	
Teaching method	
Venue and logistics	
Food	

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