Manual of

Trainer's Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Indian Council of Agricultural Research
New Delhi, India
www.icar.org.in

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Printed : July, 2013

Project Director, DKMA : Dr Rameshwar Singh
Chief Production Officer : Dr V K Bharti
Technical Officer : Ashok Shastri

Published by
Directorate of Knowledge Management in Agriculture (DKMA)
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan-I
PUSA, New Delhi. 110 012

Printed at
M/s Royal Offset Printers A-89/1, Naraina Industrial Area, Phase I, New Delhi 110 028

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SECRETARY & DIRECTOR GENERAL

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कृषि अनुसंधन और शिक्षा विभाग एवं
भारतीय कृषि अनुसंधन परिषद
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Foreword

Technology development has been appreciated to support the nation's food and nutritional security. However, there has been a lag in the development of human resources commensurate with the growing knowledge acquisition, skill requirements, etc. Eventually, mentoring becomes very relevant across the stakeholders in the agricultural sector.

The Indian Council of Agricultural Research (ICAR) and the Department of Animal Husbandry, Dairying and Fisheries (DAHDF), Ministry of Agriculture have taken up the responsibility of skill and protocol development to facilitate the platform on human resources. In this regard, the Animal Science Division of ICAR has identified a few niche areas-livestock feeding, health, quality fortification and management aimed at improving the skills of trainers. A holistic effort has been put in place to document the present training manual.

I am happy that the DAHDF and the ICAR have come together to lay the canopy of such human resource development programme in agricultural sector.

(S. AYYAPPAN)

Dated : 20th June, 2013
New Delhi

भाकृअनुप
ICAR

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उपमहानिदेशक (पशु विज्ञान)
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Preface

Livestock sector is an important subsector of Indian agricultural economy providing livelihood support to the rural population. The share of livestock to agriculture has increased from 14% to nearly 30% in last decade. Sustaining an annual growth rate of nearly 4% this sector also provides asset creation, employment opportunities and financial security to the livestock owners.

With assured and manifold contributions from the animal husbandry sector, the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture Gol and ICAR have decided to translate the identified refined technologies targeted for the livestock entrepreneurs through the officers, who train the middle rung extension and field officers, Hence, the Animal Science Division of the ICAR identified the institutes for transfer of knowhow of significance transferable technologies on livestock feeding health, quality fortification and management, etc, application of which y livestock owners will provide profitable returns as well as improve livestock productivity at large. These salient embodiments have been amalgamated with realistic agro-ecological situation and garnished in this document.

I extend my gratitude to Dr. S. Ayyappan, Secretary (DARE) & DG, ICAR for the farsightedness and vision for the initiating the Trainers Training Programme which is essential for fanning the ultimate spread to technologies. I am grateful to Shri. G.C. Pati, Secretary, DAHDF, Government to India who provided the impetus to realize this programme. I appreciate their initiative for leading towards a newer and more meaningful dimension of the department and upliftment of farming community, at large. I appreciate the endeavours of the Directors of the contributing research institutes. I acknowledge Dr. C.S. Prasad, Director, National Institute of Animal Nutrition and Physiology, Bangalore for his keen interest in coordinating this program.

I am certain that the thought enshrined in this manual following implementation shall bring about effect a 'see-change' in rural landscape with power and prosperity.

(K.M.L. Pathak)

Contents

INDIAN VETERINARY RESEARCH INSTITUTE

Izatnagar, Uttar Pradesh

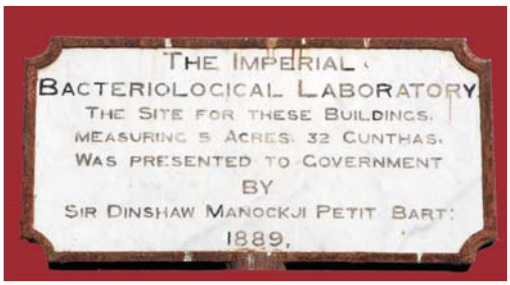
Year of Establishment: 1889

Regional Stations/Campuses **:** Mukteswar (1893)
Palampur (1959)
Eastern Regional Station, Kolkata (1970)
Southern Regional Station, Bangalore (1971)
Srinagar (1973-Functional till 1992)
HSADL, Bhopal (1998)

IVRI Campus, Izatnagar

THE Indian Veterinary Research Institute (IVRI), originally known as Imperial Bacteriological Laboratory, had its genesis on December 9, 1889 at Pune. It was later relocated to Mukteswar in Kumaon Hills of Uttar Pradesh (now Uttarakhand) in 1893 to facilitate segregation and quarantine of highly contagious organisms. The Izatnagar Campus, came into existence in 1913 as the necessity for expansion was felt. In 1925, the former Imperial Bacteriological Laboratory was redesignated as Imperial Veterinary Research Institute. Biological Products Section was

established first followed by other sections. Animal Nutrition Division and the Poultry Research Division were established in the year 1936 and 1938, respectively. To deal with the fundamental problems connected with animal production, breeding and management, a core Animal Genetics Section was created in 1944. By the dawn of Independence in 1947, the institute had already served the Nation for full 57 years, and the name of institute was changed to Indian Veterinary Research Institute. The institute was conferred the Deemed to be University status in 1983 by University Grants Commission, Govt. of India.



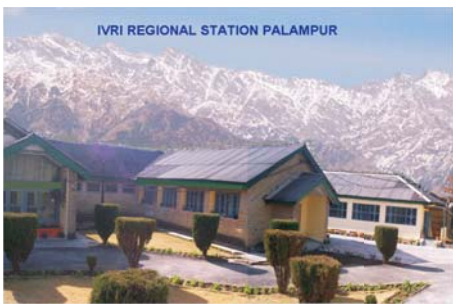
Plaque of Imperial Bacteriological laboratory


Historical visit of Robert Koch in 1897

A Centre for Wildlife Conservation Management and Disease Surveillance, and Krishi Vigyan Kendra were established in 1984 and 1986, respectively. Communication and Computer Centres were created in the year 1986 to provide the necessary support in teaching, training and research. The National Biotechnology Centre (now Division of Veterinary Biotechnology and Immunology), Agricultural Research Information System (ARIS) Cell and a Centre for Animal Disease Research and Diagnosis (CADRAD) were established in 1986.


IVRI Campus, Mukteswar

Regional Station at Palampur and Eastern Regional Station at Kolkata, were established in the years 1959 and 1970, respectively to cater to the needs in the respective regions.



IVRI Regional Station, Palampur


IVRI Regional Station, Kolkata

IVRI Campus, Bangalore

High Security Animal Disease Laboratory, Bhopal

Bangalore campus of IVRI came into existence in 1971 to cater the need of FMD vaccine production in the country. A P2 facility for FMD vaccine quality control was created in 2001 at Animal Experimental Station, Yelhanka at Bangalore Campus. A sheep lungworm vaccine production centre was established at Srinagar (J&K) in the year 1973.

A High Security Animal Disease Laboratory (HSADL) with biosafety level- 3+ containment facility at Bhopal was established in 1998 and dedicated to the nation in 2000. This laboratory achieved the distinction as an OIE approved Referral Laboratory for Highly Pathogenic Avian Influenza diagnosis in the year 2009, which is the seventh such referral lab in the world and the third in the whole of Asia after Japan and China.

Global Rinderpest Eradication Commemoration Pillar
Mukteshwar-Kumaon, Nainital, Uttarakhand

Trainer's Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Calf rearing and management

Feature of training : Advanced management and health care practices in calves

Potential areas of application : Dairy farming

Target group : Farmers/ livestock owners/ entrepreneurs

Duration of training : 5 days (Two trainings per year)

Intake capacity : 10

Training outcome : Improved care and management of calves, leading to better health and productivity

Course contents

S.No.	Contents	Theory	Practical
1	Management and feeding of newly born calf	T	-
2	Importance of colostrum for health of calf	T	-
3	Housing, feeding, health management of calves from 0-3 months of age	T	T
4	Feeding strategies of calves to save precious milk (calf milk replacers)	T	-
5	Advances in heifer management	T	-

Name of the training programme : Udder care and mastitis control

Feature of training : Early diagnosis of mastitis in subclinical cases and preventive care

Potential areas of application : Dairy farming and industry

Target group : Veterinary officers/ livestock owners/ industry

Duration of training : 5 days (Two trainings per year)

Intake capacity : 10

Training outcome : Early diagnosis of mastitis, hence improved health and reduced economic loss

Course contents

S.No.	Contents	Theory	Practical
1	Assessing the udder health	T	P
2	Milk examination for evaluating mastitis via somatic cell count and total bacterial count	T	P
3	Mastitis: its etiology, epidemiology, types and pathology	T	-
4	Preventive and therapeutic approaches to manage mastitis	T	P
5	Utility of post milking teat dip based on a novel herbal formulation for prevention of sub-clinical mastitis	T	P

Name of the training programme : Serological and molecular diagnostic tests for livestock diseases

Feature of training : Hands-on training on diagnostic tests

Potential areas of application : Disease diagnosis

Target group : Veterinary officers/ scientists/ business establishments

Duration of training : 5 days

Intake capacity : 10

Training outcome : Expertise in lab diagnosis of important animal diseases

Course contents

S.No.	Contents	Theory	Practical
1	Introduction to the various diagnostic techniques	T	-
2	Isolation and culturing of microbes	T	P
3	Serological tests-ELISA, dot blot for diagnosis of diseases	T	P
4	Molecular tests for diagnosis of diseases	T	-

Name of the training programme : Vaccine development for livestock diseases

Feature of training : Hands-on training on vaccine development

Potential areas of application : Vaccine development

Target group : Veterinary officers/ Scientists/ Business establishments

Duration of training : 5 days

Intake capacity : 10

Training outcome : Know-how on vaccine development process

Course contents

S.No.	Contents	Theory	Practical
1	Introduction to the vaccinology	T	-
2	Conventional methods of vaccine development	T	P
3	Advances in vaccine development/new generation vaccines	T	P
4	Testing of safety, potency and efficacy of vaccines	T	P

Name of the training programme : Artificial Insemination (AI) in cattle and buffaloes

Feature of training : Technique and benefits of AI

Potential areas of application : Improvement in the genetic potential of inferior animals

Target group : Veterinary officers/ livestock owners/ industry

Duration of training : 5 days (Two trainings per year)

Intake capacity : 10

Training outcome : Proper estrus detection and insemination leading to improved reproductive performance

Course contents

S.No.	Contents	Theory	Practical
1	Methods of estrus (heat) detection	**T**	**P**
2	Augmentation of estrus detection efficiency in buffaloes and its comparison with cattle	**T**	-
3	Estrus symchronization	**T**	**P**
4	Practical demonstration of detecting ideal time of breeding	-	**P**

Name of the training programme : Urea molasses mineral block (UMMB)

Feature of training : Preparation and use of UMMB blocks for animal feeding

Potential areas of application : Feed supplementation for ruminants

Target group : Agricultural Industry/ business establishments/ entrepreneurs

Duration of training : 5 days (Two trainings per year)

Intake capacity : 10

Training outcome : Improvement in nutrient availability for ruminants

Course contents

S.No.	Contents	Theory	Practical
1	Importance of micro-nutrients for ruminants	**T**	-
2	Purpose of feeding UMMB	**T**	-
3	Effects on productivity of livestock	**T**	-
4	Nutrient interaction with physiological functions	**T**	-
5	Preparation/ manufacturing of UMMB	-	**P**
6	Economic aspects of feeding UMMB	**T**	**P**

Name of the training programme : Health care management

Feature of training : Practical approaches for the health care management of livestock

Potential areas of application : Livestock management

Target group : Agricultural Industry / business establishments/ entrepreneurs/ livestock owners

Duration of training : 5 days (Two trainings per year)

Intake capacity : 10

Training outcome : Development of health calendar

Course contents

S.No.	Contents	Theory	Practical
1	Utility of health calendar including vaccination and deworming.	T	-
2	Examination of health status of animals	T	P
3	Vaccination against important diseases – time frequency, type of vaccine, dose etc.	T	P
4	Deworming in animals – time frequency, type of dewormer, dose etc.	T	-

Name of the training programme : Enrichment of straws

Feature of training : Methods and benefits of straw enrichment

Potential areas of application : Feeding of dairy animals

Target group : Agricultural Industry/ business establishments/ entrepreneurs/ livestock owners

Duration of training : 5 days (Two trainings per year)

Intake capacity : 10

Training outcome : Improvement of palatability, digestibility and nutrient utilization in livestock

Course contents

S.No.	Contents	Theory	Practical
1	Methods of treatment of straws and stovers.	T	P
2	Effect of treatment on nutrient utilization.	T	-
3	Growth performance and milk production on feeding treated straws	T	-
4	Economic return due to urea amoniation and feeding to the animals	T	-

Name of the training programme	:	Enrichment of straws
Feature of training	:	Methods and benefits of straw enrichment
Potential areas of application	:	Feeding of dairy animals
Target group	:	Agricultural Industry/ business establishments/ entrepreneurs/ livestock owners
Duration of training	:	5 days (Two trainings per year)
Intake capacity	:	10
Training outcome	:	Improvement of palatability, digestibility and nutrient utilization in livestock

Course contents

S.No.	Contents	Theory	Practical
1	Types of feeds and fodders for the ruminants	T	P
2	Chemical composition and nutrient availability from these feeds	T	-
3	Techniques for chemical analysis of conventional feed ingredients	T	P
4	Toxic principles present in different feed ingredients	T	-
5	Analyses of toxic principles and quality control of feeds and feed ingredients for the ruminants	T	P

NATIONAL DAIRY RESEARCH INSTITUTE

Karnal, Haryana

Year of Establishment	:	***1923 as Imperial Institute of Animal Husbandry and Dairying at Bangalore***
		1955 as National Dairy Research Institute, Karnal
Regional Stations	:	Southern Regional Station, Bangalore (1923)
		Eastern Regional Station, Kalyani, West Bengal (1964)

NATIONAL Dairy Research Institute (NDRI) is the premier institution of dairying in Asia. The Institute has its origin from Imperial Institute of Animal Husbandry and Dairying, which was established in Bangalore in 1923. In 1936, the Institute was expanded and renamed as Imperial Dairy Institute. In 1955, its headquarter was shifted to Karnal and was renamed as National Dairy Research Institute. The Southern Regional Station at Bangalore and the Eastern Regional Station at Kalyani in West Bengal are providing region specific R&D support for dairy development. For further strengthening of academic programmes of human resource development, status of Deemed University was grantred to the Institute in 1989. The Institute undertakes research, teaching and extension activities towards dairy development in the country. It also conducts basic and applied research with the objective to enhance animal productivity, develop new products and practices for the benefit of millions of farmers and consumers. Over more than eight decades

of its existence, the Institute has shown remarkable development and expertise in different areas of Dairy Production, Processing, Management and Human Resource Development.

Improved germplasm for Enhancing Animal Production and Productivity

Karan Fries Cattle

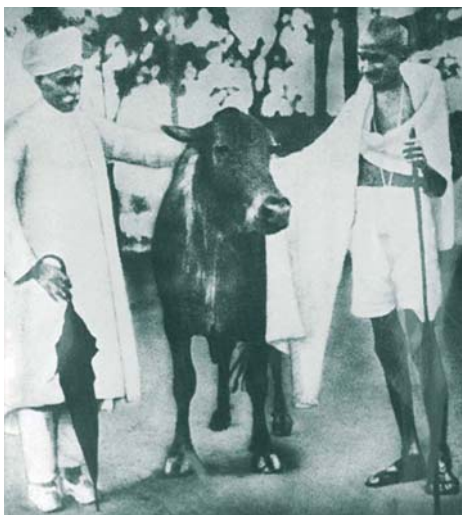
The Karan Fries was developed by crossing Holstein Friesian with Tharparkar. The Karan Fries is a high milk producing breed and is especially suited for northern and north western regions of the country. The average age at first calving is 32-34 months and 305 day lactation yield is about 4000 kg.

Karan Fries cow

Karan Swiss Cattle

The Karan Swiss was developed by crossing Brown Swiss with Sahiwal. The Karan Swiss is good milk producing animal and especially suited for eastern, central and the coastal regions of the country. The average age at first calving is 34 months and 305 day lactation yield is about 3400-3600 kg.

Karan Swiss cow



The Cherished Reminiscence from the Mist of History: Rastrapita Mahatma Gandhi & Pandit Madan Mohan Malviya at SRS NDRI, Bangalore in 1927

Smt. Indira Gandhi with crossbred cow at NDRI, Karnal in 1970

❑

Trainer's Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Balanced stall feeding practices for bovines

Feature of training : To provide feed & fodder, matching to production status of animals

Potential areas of application : Animal nutrition

Target group : 10 days (Two per year)

Duration of training : 15

Intake capacity : To provide required nutrients for enhancing production & productivity

Training outcome : Improved care and management of calves, leading to better health and productivity

Course contents

S.No.	Contents	Theory	Practical
1	Role of nutrition in growth, reproduction and production of dairy animals	T	-
2	Balance feeding for heifers, pregnant and milking cows and buffaloes	T	P
3	Importance and formulation of area specific mineral mixture	T	P
4	Feeding of mineral mixture and UMMB in animals	T	P
5	Importance of feeding of by-pass protein and fats in dairy animals	T	-
6	Best feeding practices of cows and buffaloes (milking, pregnant heifers etc.)	T	P
7	Importance of deworming of adult dairy animals	T	P
8	Importance of vaccination and health management	T	P
9	Enrichment of straws (urea treatment)	T	P
10	Fodder block silage making	T	P

Name of the training programme : Training on Artificial Insemination (AI) and pregnancy diagnosis (PD) of cattle and buffaloes

Feature of training : Advanced methods for AI and PD

Potential areas of application : Artificial Insemination

Target group : Veterinarians/ un-employed graduate youth/ inseminators/ entrepreneurs

Duration of training : 10 days (two per year)

Intake capacity : 10

Training outcome : Improved success rate of AI in country

Course contents

S.No.	Contents	Theory	Practical
1	Breeds of dairy cattle and buffalo	T	P
2	Identification and performance dairy cattle and buffalo	T	P
3	Selection and management of male and female animals for AI	T	P
4	Oestrous symptoms diagnosis in cattle and buffalo	T	P
5	Hygiene management while performing AI and PD	T	P
6	A.I and PD in cattle	T	P
7	A.I and PD in Buffalo	T	P
8	Database including computerization of farm records	T	P

- Training for 10 days as requested by DADF, Ministry of Agriculture , GOI.

Name of the training programme : Semen production, evaluation and cryopreservation Techniques

Feature of training : Good laboratory practices for semen preservation

Potential areas of application : Artificial Insemination

Target group : Officers of semen production station/ veterinarians

Duration of training : 10 days (Four per year)

Intake capacity : 10

Learning outcome : Production of good quality semen for getting better fertility rate

Course contents

S.No.	Contents	Theory	Practical
1	Breeds of dairy cattle and buffalo	T	P
2	Identification of quality dairy bulls	T	P
3	Management of young bulls	T	P
4	Management of breeding bulls	T	P
5	Preparation of AV and Dilutor	T	P
6	Semen collection technique	T	P
7	Hygiene management for semen collection, evaluation and cryopreservation	T	P
8	Semen processing and preservation	T	P
9	Database management of semen records	T	P
10	Awareness about sexed semen technology	T	-

Name of the training programme : Management of infertility and other reproductive disorders of bovines

Feature of training : How to reduce infertility problems

Potential areas of application : Infertility & reproductive disorder

Target group : Veterinarians/ AI workers/ progressive farmers

Duration of training : 10 days (Four per year)

Intake capacity : 15

Training outcome : Use of knowledge for improving fertility and productivity of dairy animals

Course contents

S.No.	Contents	Theory	Practical
1	Breeds of dairy cattle and buffalo	T	P
2	Management of Adult Female dairy animals	T	P
3	Infertility problems in dairy animals	T	P
4	Practices (Estrus Synchronization and Fixed time A.I) for improving reproduction efficiency	T	P
5	Management for reducing reproductive disorders	T	P
6	Management of reproductive records, software demonstration of reproduction data management	T	P

Name of the training programme : Cattle and buffalo calf and heifer rearing

Feature of training : Good livestock production practices (GLP)

Potential areas of application : Organized and small dairy farm

Target group : Farm manager/ stockman/ progressive farmers/ veterinarians

Duration of training : 10 days (Four per year)

Intake capacity : 15

Training outcome : Help in reducing calf mortality and age of puberty in heifers

Course contents

S.No.	Contents	Theory	Practical
1	Breeds of dairy cattle and buffalo	T	P
2	Scientific housing for dairy calves and heifers	T	P
3	Cleanliness and sanitation of dairy premises	T	P
4	Management of calf at birth and disinfecting navel cord etc	T	P
5	Colostrum feeding and feeding practices for growing calves including milk replacer technique	T	P
6	Prevention of calf diseases	T	P
7	Control of calf mortality	T	P
8	Management and Feeding practices for heifers	T	P
9	Prevention and control of diseases in heifers	T	P

Name of the training programme : Udder care for mastitis control and management

Feature of training : Keeping udder healthy

Potential areas of application : Animal health

Target group : Farm manager/ veterinarians/ stockman

Duration of training : 10 days (four per year)

Intake capacity : 10

Learning outcome : Help in reducing the incidence of mastitis

Course contents

S.No.	Contents	Theory	Practical
1	Awareness about economic losses due to mastitis in dairy animals	T	-
2	Identification of types of udders in dairy animals	T	P
3	Follow up Practices for clean milk production	T	P
4	Prevention and control of microbial contamination in milk	T	P
5	Milk : Composition, physical and chemical properties	T	P
6	Analysis of milk quality	T	P
7	Sanitation of milking utensils	T	P
8	Use of advance milking system- machine milking	T	P
9	Adoption of dry cow therapy	T	P
10	Management of mastitis animals	T	P

Name of the training programme : Chemical and microbiological quality assessment and safety standards in dairy products

Feature of training : How to provide safe and quality assured dairy food

Potential areas of application : Quality assurance of dairy products

Target group : Milk processors co-operative officers

Duration of training : 10 days (Three per year)

Intake capacity : 15-20

Training outcome : Quality assured dairy food

Course contents

S.No.	Contents	Theory	Practical
1	Determination of major constituents in milk and milk products	T	P
2	Fatty acid profile of milk-fat using GLC	T	P
3	Mineral analysis in milk and milk products by Atomic Absorption Spectroscopy	T	P
4	Detection of neutralizers & adulterants in milk	T	P
5	Chemical analysis of ghee	T	P
6	Determination of whey protein nitrogen index (WPNI) of milk powders	T	P

S.No.	Contents	Theory	Practical
7	Cholesterol estimation of ghee using diagnostic kit	T	P
8	Electrophoretic separation of milk proteins and its application	T	P
9	Antioxidant potential of milk and fruit based beverages	T	P
10	Instrumentation in analysis of milk and milk product	T	-
11	Biochemical Activities of dairy Microbes	T	P
12	Microbiological criteria for dairy products	T	P
13	Conventional and rapid routine tests for assessing the hygiene quality of milk	T	P
14	Conventional and rapid routine tests for assessing the microbiological safety of milk	T	P
15	Basic concepts on food hygiene and sanitation – personnel, equipment & environment	T	P
16	Bio-preservation techniques and shelf life study of dairy products	T	P
17	Preservation of bacterial culture	T	P
18	Basic introduction to molecular biology techniques - PCR based tools for monitoring	T	P
19	Testing of non-microbial contaminants in milk	T	P
20	Quality & food safety management system	T	P

Name of the training programme : Good Management practices in dairy plant

Feature of training : To impart training for best management of dairy plant

Potential areas of application : Organized & un-organized dairy farmers

Target group : Dairy plant owner, plant managers

Duration of training : 6 days (Two per year)

Intake capacity : 15

Training outcome : Energy time and labour efficient dairy plant

Course contents

S.No.	Contents	Theory	Practical
1	Needs for material management in the dairy industry	T	-
2	Characterization and appraisal of indian dairy sector	T	-
3	Inventory management and its techniques	T	P
4	Purchase management – systems, forecasting & buyer-seller relationship	T	P
5	Warehousing and stores management	T	P
6	Supply management in dairy sector is the appropriate regulation method	T	P
7	Supply shain management – case study	T	-
8	Environmental Issues in dairy processing	T	P
9	Impact of risks and uncertainties on supply chain - A dairy industry perspective	T	P
10	Value chain and its implications in indian dairy sector	T	P

Name of the training programme : Composite dairy products as health foods

Feature of training : How to enhance the nutritional value and quality of dairy foods

Potential areas of application : To enhance nutraceutical value of milk and dairy products

Target group : Graduate entrepreneurs, dairy industry/ Milk processing co-operative officers

Duration of training : 15 days (Four per year)

Intake capacity : 15-20

Training outcome : Help in reducing malnutrition in and consumer will get quality assured dairy food

Course contents

S.No.	Contents	Theory	Practical
1	Overview of Composite Dairy Foods	T	-
2	Prospects of value addition of dairy products through functional ingredients	T	-
3	Developments in fiber, herbs fortified dairy products	T	P
4	Technologies for milk-cereal/millet based composite foods	T	-

S.No.	Contents	Theory	Practical
5	Scope of under-utilized fruits for developing composite dairy foods	T	-
6	Extrusion processing technology for composite dairy products	T	P
7	Developments in fermented milk-fruit-based composite dairy foods	T	P
8	Technological developments in functional cheeses	T	P
9	Micronutrients fortification of milk & milk products	T	P
10	Microencapsulation techniques for the delivery of bioactive components in milk & milk products	T	P
11	Specialized processed foods for metabolic disorders	T	P
12	Technological developments in functional fat-rich dairy products	T	-
13	Developments in nanocomposite films for shelf-life extension of processed dairy products	T	-
14	Developments in cholesterol reduced dairy products	T	P
15	Regulatory aspects of traditional dairy products	T	-
16	Technology of paneer and paneer variants	T	P
17	Technological innovations in the manufacture of dahi and misti dahi	T	P
18	Developments in the production of chhana and chhana based sweets	T	P
19	Developments in the dietetic traditional milk sweets and desserts	T	P
20	Mechanization in ghee and khoa making	T	P

NATIONAL BUREAU OF ANIMAL GENETIC RESOURCES

Karnal, Haryana

Year of Establishment: 1984

National Bureau of Animal Genetic Resources and National Institute of Animal Genetics were established on 21st September, 1984 with a mission to protect and conserve indigenous farm animal genetic resources for sustainable utilization and livelihood security. These twin Institutes started at Southern Regional Station of National Dairy Research Institute Bangalore and were shifted in 1985 at NDRI Karnal before shifting to its own campus at Makrampur, Karnal in 1994. The Institute of Animal Genetics and Bureau were merged in 1995 to function as a single unit as National Bureau of Animal Genetic Resources (NBAGR). The National Bureau of Animal Genetic Resources, Karnal is the Nodal organization in the country that undertakes the responsibility of Identification, evaluation, characterization, conservation and sustainable utilization of livestock and poultry genetic resources of the country and their documentation.

National GeneBank

National Animal Gene Bank has been established at the Bureau with the objective of maintaining the indigenous livestock biodiversity of the country. A total of 97,835 deep frozen semen doses belonging to 257 breeding males (Bulls/Rams/Bucks/Stallions) from 31 breeds comprising of seven livestock species have been preserved at National Genebank for posterity. The semen of Amritmahal, Dangi, Gir, Hariana, Kangayam, Kankrej, Kherigarh, Krishan Valley, Ongole, Ponwar, Punganur, Rathi,

Red Sindhi, Sahiwal, Tharparkar and Vechur breeds of cattle, Bhadawari, Jaffarabadi, Murrah, Nilli-Ravi, Pandharpuri, Surti, Tarai riverine and Assamese swamp buffalo, Black Bengal and Chegu goat, Garole sheep, Marwari and Zanskari horse, Jaiselmeri camel and Arunachali yak is available. The Animal Gene Bank has also collection of genomic DNA from more than 130 breeds of livestock and poultry. There is a buffalo mammary gland cDNA/EST library also.

Trainer's Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme	:	Characterization, conservation and sustainable utilization of indigenous Animal Genetic Resources of India
Feature of training	:	The training program will train the trainers on how to conduct survey to characterize, conserve and sustainable development of the indigenous animal genetic resources. It will highlight the status and importance of our genetic resources and assessment of breeds for conservation. It will also help in developing skills on sustainable development programs of different species, genetic characterization, conservation tools, value addition, data computerization and analysis.
Potential areas of application	:	Evaluation, conservation and utilization of farm AnGR
Target group	:	The training program is for the faculty of research and training institutions, State Agricultural Animal Science and Veterinary Universities, and Agriculture and Veterinary colleges in the country at the level of Assistant/ Associate Professor/ Research Scholar . It is expected after undergoing the training program the faculty will develop human resources and skill up gradation of the state animal husbandry department officers on characterization and conservation of indigenous AnGR
Duration of training	:	10 days
Intake capacity	:	15-20
Training outcome	:	Skilled human resource that will be able to understand importance of indigenous AnGR of the country. They will create awareness about conservation and utilization of AnGR among the livestock keepers and other stake holders, help in characterization, registration, conservation and sustainable development of farm animal genetic resources

Course contents

S.No.	Contents	Theory	Practical
1.	Animal Genetic Resources of India and their conservation	T	-
2.	Network Project on Animal Genetic Resources (AnGR) of India	T	-
3.	Application of cytogenetic techniques in animal breeding	T	P
4.	Survey methodology for characterization and indicators of conservation in livestock	T	P
5.	Genetic characterization of animal genetic resources by DNA markers	T	P
6.	Development of breed descriptors	T	P
7.	Procedures and approaches for registration of livestock breeds	T	P
8.	Creation of data bases for characterization and conservation	T	P
9.	Status and characterization of cattle generic resources of India	T	-
10.	Genetic improvement programs in Dairy cattle	T	-
11.	Status of A1/A2 allele in milk of indigenous cattle breeds	T	-
12.	Conservation and sustainable utilization of endangered breeds of cattle	T	-
13.	Use of statistical software	T	P
14.	Ex-situ conservation of farm animals	T	-
15.	Conservation of Livestock involving non government organizations(NGO)	T	-
16.	DNA based parentage testing	T	P
17.	Use of reproductive biotechnological tools in conservation of livestock	T	-
18.	Prioritizing of livestock breeds for conservation based on DNA markers	T	-
19.	Practical aspects of semen freezing, storage and utilization	T	P
20.	Conservation and sustainable utilization of buffalo breeds of India	T	-
21.	Genetic improvement programs in buffaloes in India	T	-
22.	National project on cattle and buffalo breeding	T	-
23.	Application of Marker Assisted Selection (MAS) in conservation and utilization of farm animals	T	-
24.	Status and characterization of sheep genetic resources of India	T	-
25.	Conservation and sustainable utilization of sheep breeds of India	T	-
26.	Present status of equines in India and breeds needed conservation	T	-
27.	Camel genetic resources of India and breeds needed conservation	T	-
28.	Status and characterization of goat generic resources of India	T	-
29.	Conservation and sustainable utilization of goat breeds of India	T	-
30.	Conservation of livestock in gaushala	T	-

S.No.	Contents	Theory	Practical
31.	Status and characterization of poultry genetic resources of India and their conservation	T	-
32.	Status and characterization of mithun generic resources of India	T	-
33.	Conservation and management of yak genetic resources of India	T	-
34.	Role of different stakeholders and NGOs in conservation and sustainable development	T	P

NATIONAL INSTITUTE OF ANIMAL NUTRITION AND PHYSIOLOGY

Bangalore

Year of Establishment: 1995

THE National Institute of Animal Nutrition and Physiology is a premier institute under the aegis of Indian Council of Agricultural Research, New Delhi engaged in basic and fundamental research on physiological and nutritional problems related to biophysical translation of nutrients for productive functions. The research work carried out and contemplated holds key in providing solutions to the existing and emerging problems in livestock production and productivity in the country by understanding the mechanisms at cellular and molecular level. The institute has come out with several feasible and farmer friendly technologies like area specific mineral mixture, national feed resource database, complete feed block, feeding of areca sheath and fortified azolla, caprine and ovine meneral mixtures, garlic for low cholesterol eggs and red spectrum for enhancing egg production as legacies for policy framers and farmers. Some of them have been widely adopted in the field and a few have been commercialized.

❑

Trainer's Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Feed resources and ration balancing for dairy cattle

Feature of training : Identifying potential locally available feed resources. Use of combination of feeds for meeting the requirement. Balancing the ration by strategically supplementing the available feed resources (protein, energy, area specific mineral mixture)

Potential areas of application : Where feed shortage is there. Farmer is not feeding as per needs of animals. Cost of supplement is high. Scope for enhancing milk production potential exists

Target group : Progressive farmers, extension workers, field veterinary officers, dairy co-operative officials

Duration of training : 7 days

Intake capacity : 15-20

Training outcome : Improved feeding practices in dairy farming leading to higher productivity and better economic returns

Course contents

S.No.	Contents	Theory	Practical
1	Feed and fodder resources for dairy cattle.	T	-
2	Alternate and non conventional feed resources.	T	-
3	Nutrient requirement for dairy cattle	T	-
4	Area-specific mineral mixture.	T	-
5	Strategic supplementation approach.	T	-
6	Feed technology and its application.	T	P
7	Feed quality and its assessment.	T	P
8	Strategies for improving milk production.	T	P
9	Least cost ration formulation	T	P

Name of the training programme : Value addition of feed and fodder for dairy cattle

Feature of training : Nutritive value of common feed resources & approaches for their better utilization. Improving the quality of crop residues. Enhancing the bioavailability of nutrients. Improving the efficiency of utililization of nutrients by enhanced availability of energy

Potential areas of application : 1. Where crop residues are the major source. 2. Quality of feed is poor. 3. Fodder availability is there during certain periods only

Target group : Progressive farmers, extension workers, field officers

Duration of training : 7 days

Intake capacity : 15-20

Training outcome : Improved feed management practices in dairy farming leading to better utilization of available resources and economic feeding

Course contents

S.No.	Contents	Theory	Practical
1	Probiotics, prebiotics and enzymes– as feed supplement	T	-
2	By-pass nutrients for dairy cattle	T	-
3	Area-specific mineral mixture	T	-
4	Improving poor quality roughages	T	P
5	Urea molasses licks	T	P
6	Azolla cultivation	T	P
7	Total mixed ration and complete feed block preparation	T	P
8	Silage preparation	T	P

Name of the training programme	:	Impact of Abiotic stress on production & reproduction parameters in livestock
Feature of training	:	Understanding the climatic variables of abiotic stress in livestock. Strategy for sustenance and augmentation of production in stressful condition. Preparation of THI database. Methane production potential and strategies to ameliorate methane production
Potential areas of application	:	Each and every livestock farm of the country to create a nationwide robust database and to correlate production parameters with climatic stress in terms of it's effect on production, reproduction and health of livestock for framing policies and strategies like – animal breeding program, feeding and management, drought-flood and other natural calamity related disaster management, etc
Target group	:	Extension workers, field Veterinary officers, dairy co-operative officials and executives.
Duration of training	:	7 days
Intake capacity	:	15-20
Training outcome	:	Improved management practices to alleviate climatic stress for improving production, reproduction and health of livestock leading to better utilization of available resources andhigher economic return from animal husbandry sector

Course contents

S.No.	Contents	Theory	Practical
1	Climatic variables of abiotic stress in livestock	T	-
2	Importance of THI and agro-climatic data management	T	-
3	Feeding and management to cope up with climatic stress	T	-
4	Effect of climatic stress on production, reproduction and health of livestock	T	-
5	Nutritional stress and its management during scarcity	T	-

S.No.	Contents	Theory	Practical
6	Shelter management	T	-
7	Natural disaster and remedial measures	T	-
8	Distress signal and animal welfare measures	T	-
9	Stress indicators	T	-
10	Physiological parameters	-	P
11	Data recording, calculation of THI and data management	-	P
12	Development of Database on THI	-	P
13	Strategic feeding and diet combination to ameliorate enteric methane production	-	P

Name of the training programme : Enhancing reproductive efficiency in livestock

Feature of training : Improving reproductive efficiency through nutritional and physiological approaches Effective pregnancy diagnosis Accurate and faster semen evaluation techniques Nutrient supplementation (limiting nutrients-micro nutrients, amino acids, energy)

Potential areas of application : Poor reproductive efficiency Repeat breeding and anoestrus condition Low conception rate. Early embryonic mortality

Target group : Veterinary Officers, dairy co-operative officials and extension staff, livestock health inspectors

Duration of training : 7 days

Intake capacity : 15-20

Training outcome : Optimizing milk production through better reproductive management of dairy animals

Course contents

S.No.	Contents	Theory	Practical
1	Diagnosis and treatment of infertile cows and buffaloes	T	P
2	Insemination techniques	T	P
3	Pregnancy diagnosis methods	T	P
4	Semen evaluation technique and fertility testing for bulls	T	P
5	Preservation of semen	T	P
6	Nutrient balancing for improving reproductive performances, stress amelioration (feeding and management)	T	-
7	Area-specific mineral mixture	T	-

CENTRAL INSTITUTE FOR RESEARCH ON GOATS

Makhdoom, Farah-Mathura, Uttar Pradesh

Year of Establishment: 1979

THE Central Institute for Research on Goats (CIRG) was established with a vision to develop poor man's cow- the goat, as a source of livelihood security, poverty alleviation and employment generation for the smallholders. The institute is located between two famous cities, Mathura (22 Km) and Agra (32 Km) in the village Makhdoom of Mathura district at about 1.3 km from National Highway No. 2 on the bank of river Yamuna. CIRG is mandated to undertake research, training and extension education programmes for improving milk, meat and fiber production in goats and to develop processing technologies.

Trainer's Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Artificial Insemination in goats

Feature of training : This training will focus on technique of artificial insemination in goats which will help to improve reproduction efficiency in goats to the veterinarians, Para Vets. and other professionals

Potential areas of application : Enhancement of reproductive efficiency and conservation of indigenous breeds of goat

Target group : Field veterinarian, Para Vets., Vet. Students and livestock keepers

Duration of training : 10 days

Intake capacity : 20

Training outcome : Practical training on AI in goats, besides semen collection, preservation, oestrus synchronization and pregnancy diagnosis

Course contents

S.No.	Contents	Theory	Practical
1.	Reproductive characteristics of goat breeds in India	T	-
2.	Semen collection and evaluation	T	P
3.	Dilution of semen	T	P
4.	Preservation of liquid semen	T	P
5.	Cryo-preservation of semen	T	P
6.	Thawing and post thaw evaluation of semen	T	P
7.	Oestrus induction and synchronization	T	P
8.	Oestrus detection	T	P
9.	Selection of does for AI and practice on morbid genital tract and live animals	T	P
10.	Factor influencing AI success rate	T	-
11.	Pregnancy diagnosis	T	P

Name of the training programme : Management and prevention of goat diseases

Feature of training :
1. This training will focus on recent approaches and latest techniques of disease identification, confirmation, management and prevention of economical important goat diseases
2. Provide information on nutrient requirement of goats, feeding management and general management in different physiological states and systems of rearing

Potential areas of application :
1. Disease monitoring, identification, diagnosis and better management for increasing economics of goat farming in India
2. Better and area specific strategies for goat nutrition, feeding management in different production systems

Target group : Field veterinarian, Para Vets., Vet. Students and livestock keepers

Duration of training : 2 weeks

Intake capacity : 20

Training outcome :
1. Better management of diseases and outbreaks
2. Feeding plan and feed resource development for different rearing systems
3. Formulation of economic feed

Course contents

S.No.	Contents	Theory	Practical
1.	Physical body condition scores in normal physiological and clinical condition of goats	T	-
2.	Identification of the disease, clinical condition at field and farm level	T	P
3.	Common and economically important goat diseases	T	-
4.	Common field tests for the diagnosis of infectious and non infectious diseases of small ruminants a) Feacal examination for parasitic diseases; b) Blood examination; c) Sero diagnosis.	T	P

S.No.	Contents	Theory	Practical
5.	Post mortem technique and diagnosis a) Post mortem technique; b) Collection of morbid material; c) Dispatch of material.	T	P
6.	Advanced molecular and serological diagnosis of common diseases a) ELISA; b) PCR; c) RT-PCR.	T	P
7.	Implementation of animal health calendar	T	-
8.	General health management	T	P
9.	Farm Hygiene management and disposal of wasteful products	T	P
10.	New approaches for management of diseases by chemotherapy	T	-
11.	Management of goat diseases by indigenous technical knowledge	T	P
12.	Training on Vaccination/Deworming /Dipping etc.	T	P
13.	Nutrition under different goat rearing systems	T	-
14.	Feed formulation for goats of different age groups	-	P
15.	Agroforestry development conservation and utilization of feed for goats	T	-
16.	Techniques for complete feed formulation, processing and storage of feed	-	P
17.	Different production systems of goat farming	T	-
18.	Different types of goat house and low cost shelter managements	-	P
19.	New approaches and techniques in reproduction management in goats	-	P
20.	New appliances for feeding and watering for goats	-	P

Name of the training programme : Genetic selection of superior animals and breeding programmes for goat Improvement

Feature of training : It will provide a practical approach for selection of superior animal for breeding

Potential areas of application : Genetic selection and breeding of animal for optimum milk and meat production

Target group : Technical staff and livestock extension officers.

Duration of training : 10 days

Intake capacity : 20

Training outcome : Knowledge of better goat selection, breeding strategies and proper record keeping

Course contents

S.No.	Contents	Theory	Practical
1.	Goat genetic resources of the country	T	-
2.	Breeding strategies for different regions	T	-
3.	Major breeding projects and their impact on breed improvement	T	P
4.	Animal identification technique	T	P
5.	Selection of superior animals for breeding and presentation of data on production and reproduction performance	T	P
6.	Field performance recording	T	P
7.	Management of livestock production and research data	T	P
8.	Use of Statistical techniques in genetic evaluation	T	P
9.	Management of breeding stock and their sustainable use	T	P
10.	Impact assessment of breeding programme	T	P

Name of the training programme : Feed resource development for goat production

Feature of training : Training on feed resource development in different pasture system, conservation and utilization of feed

Potential areas of application : Pasture development for optimum goat production

Target group : Farmers and technical staff

Duration of training : 5 days

Intake capacity : 20

Training outcome : Participants will learn different approaches in agroforestry development, pasture and silvi-pasture, techniques of conservation of fodder and best utilization of feed by goats

Course contents

S.No.	Contents	Theory	Practical
1.	Goat feed resources	T	P
2.	Agroforestry development for goat feed	T	P
3.	Pasture and Silvi-pasture development	T	P
4.	Rain fed fodder crop production	T	P
5.	Irrigated Fodder crop Production	T	P
6.	Conservation of fodder and utilization of feed	T	P

Name of the training programme : Value chain and quality evaluation of animal products

Feature of training : Practical information on importance of goat products on human health, functional goat products, preparation of goat products and quality evaluation

Potential areas of application : Development of different value added goat products

Target group : Veterinarians, technical staff, meat inspectors

Duration of training : 10 days

Intake capacity : 15

Training outcome : The participant will learn the process of preparation of different value added products, functional goat products and quality evaluation.

Course contents

S.No.	Contents	Theory	Practical
1.	Overview and opportunity in value-addition especially in goat products.	T	-
2.	Development of different value-added goat products.	T	P
3.	Goat meat and milk and their products and their impact on human health.	T	P
4.	Present concept and knowledge of functional goat products (meat and milk).	T	-
5.	Modification in fatty acids, cholesterol and sodium chloride in meat and meat products.	T	P

S.No.	Contents	Theory	Practical
6.	Design and development of nuts based functional goat products.	T	P
7.	Fresh goat meat quality evaluation through modern technologies.	T	P
8.	Quality evaluation of different goat products such as fatty acid profile, omega 3 fatty acids, conjugated linoleic acid, cholesterol, dietary fibres, energy estimation, colour analysis etc.	-	P

Name of the training programme : Formulation and preparation of complete feeds for goats

Feature of training : Practical training on formulation and preparation of complete feed by using common feed resources in different areas

Potential areas of application : Complete goat feed formulation and its preparation by farmers and entrepreneurs

Target group : Goat farmers, professionals engaged in feed industry

Duration of training : 5 days

Intake capacity : 10

Training outcome : The participants will learn effective use of feed resources for development and preparation of complete feed for better production

Course contents

S.No.	Contents	Theory	Practical
1.	Basics of goat nutrition	T	-
2.	Complete feed technology	T	P
3.	Advantage of complete feed	T	-
4.	Composition of complete feed	T	P
5.	Processing for the preparation of complete feed	T	P
6.	Storage of feed	T	P

Name of the training programme : Preparation of various products from goat milk

Feature of training : Training will focus on practical exposure on preparation of different hygienic goat milk products

Potential areas of application : Preparation of different milk and value added products by the farmers

Target group : Farmers, technical staff, women doing entrepreneurs, self help groups

Duration of training : 5 days

Intake capacity : 10

Training outcome : The participants will learn hand-on-procedure for different goat milk products

Course contents

S.No.	Contents	Theory	Practical
1.	Preparation of paneer	T	P
2.	Preparation of cheese	T	P
3.	Preparation of shrikhand	T	P
4.	Preparation of chhanna & rasogolla	T	P
5.	Preparation of flavoured milk & yoghurt (dahi)	T	P

Name of the training programme : Importance and formulation of area specific mineral mixture for livestock

Feature of training : This training will provide the information on importance of area specific mineral mixture and its formulation for goats

Potential areas of application : Preparation of area specific mineral mixture by farmers and related Industry professionals

Target group : Veterinary professionals and technical staff engaged in feed industries

Duration of training : 5 days

Intake capacity : 10

Training outcome : The participants will learn the importance of area specific mineral mixture, procurement of raw material and formulation of mineral mixture

Course contents

S.No.	Contents	Theory	Practical
1.	Importance of the area specific mineral mixture to the livestock.	T	-
2.	Availability of minerals to the livestock through feed.	T	-
3.	Organic and inorganic minerals and their bioavailability.	T	-
4.	Selection and procurement of raw material for formulation of mineral mixture.	T	P
5.	Requirements of different minerals by the livestock at different stage of roduction.	T	-
6.	Formulation and preparation of organic and inorganic area specific mineral mixture.	-	P
7.	Demonstration on use of mineral mixture	-	P

Name of the training programme : Management of goat genetic resource for conservation

Feature of training : Comprehensive knowledge on selection of goats, breeding programme, management, identification technique, record keeping and marketing of breeding stock

Potential areas of application : Management of goats for optimum production and conservation of different goat breeds

Target group : Farmers and technical staff

Duration of training : 5 days

Intake capacity : 20

Training outcome : Participants will learn the basics of selection of goats for breeding, their management practices, recording keeping and marketing

Course contents

S.No.	Contents	Theory	Practical
1.	Characteristics of various goat breeds of the country	T	P
2.	Selection of goats for breeding	T	P
3.	Breeding programme for different regions	T	-
4.	Reproductive, feeding and space management of breeding goats	-	P
5.	Animal Identification techniques	-	P
6.	Field Performance recording	-	P
7.	Farm Records and Record Keeping	-	P
8.	Breeding management i.e. heat detection, breeding, kidding and kid management	T	P
9.	Markets and Marketing of Breeding stock	T	-

Name of the training programme : Low cost housing and appliances for goats

Feature of training : Practical training on design and construction of low-cost house and other appliances for goats

Potential areas of application : Goat Rearing by commercial farmers

Target group : Commercial farmers, extension workers and technical staff

Duration of training : 5 days

Intake capacity : 20

Training outcome : The participants will learn the different ways of shelter management, design and layout of goat housing; feeding and watering devices

Course contents

S.No.	Contents	Theory	Practical
1.	Shelter management of goats	T	-
2.	Design and layout plan of different types of goat houses	T	P
3.	Importance and design of feeding devices	T	P
4.	Importance and design of watering devices	T	P
5.	Common practices in housing management	T	P

Name of the training programme : Intensive Management of goats for meat production

Feature of training : This will provide practical training on different approaches for intensive management of goat for chevon production

Potential areas of application : Commercial goat farming

Target group : Goat farmers and entrepreneurs

Duration of training : 5 days

Intake capacity : 20

Training outcome : The participant will learn the approaches for intensive management of goats for goat meat production

Course contents

S.No.	Contents	Theory	Practical
1.	Different systems of management of goats	T	-
2.	Economic importance of intensive management	T	-
3.	Nutrient requirement and feed formulation for goats under intensive management	T	P
4.	Feeding management of kids reared for meat production under intensive system	T	P
5.	Meat evaluation techniques	T	P
6.	General managemental practices (breeding, health and shelter)	-	P

Name of the training programme : Diagnosis of common parasites in goats and newer approach to their control

Feature of training : The training programme would help to improve the diagnostic skill of the veterinarian and para veterinary staff

Potential areas of application : For field diagnosis of the diseases and for monitoring and surveillance of these disease for strategic planning of control measures

Target group : Field veterinarian and paramedical staff, farm managers and entrepreneurs

Duration of training : 5 days

Intake capacity : 15

Training outcome : It would provide the trainers acquaintance of parasitic problems in goat, their threat potential and diagnosis and planning of their management

Course contents

S.No.	Contents	Theory	Practical
1.	Parasitic diseases of goats and their impact on goat production	T	P
	Common flat worm infections in goats in India		
2	Common cestode and metacestode infections in goats with their impact on production.	T	P
	Parasitic gastroenteritis (PGE) in goats in India.		
3	Coccidian infections in goats with impact on production.	T	P
	Problem of anthelmintic resistance and its management.		
4	Haemoprotozoan infection in goats.	T	P
	Arthropod infections and pest management in goats.		
5	Parasitic zoonosis special reference to goat as source	T	P
	Introduction to alternative therapies for parasitic controls		

Name of the training programme : Commercial goat farming

Feature of training : This training will provide complete informantion scientific goat rearing practices such as goat breeds of India, housing and managemental system, nutrition and health management, project formulation and marketing

Potential areas of application : Commercial goat farming

Target group : Goat farmers, veterinary extension workers, bank/ insurance officers and technical staff

Duration of training : 10 days

Intake capacity : 30-50

Training outcome : Improved goat rearing practices for better economic returns

Course contents

S.No.	Contents	Theory	Practical
1.	Population dynamics of goat breed in India and their contribution in economy	T	-
2.	Goat Breeding policies	T	-
3.	Goat Genetic resources of India	T	-
4.	Modern approaches and advantages of different animal production systems	T	-
5.	Better and low cost shelter managements	T	P
6.	New goat feeding and watering devices	T	P
7.	Emerging and prevalent Infectious disease in Goat and containment	T	P
8.	Approaches for management of parasitic infestation in animals.	T	P
9.	Vaccines and vaccination in goat	T	P
10.	Implementation of annual goat health calendar	T	P
11.	Feed resource development for goat production	T	P
12.	Goat feed formulation for intensive goat arming	T	P
13.	Basics of Goat nutrition, low cost feeding and importance of Area specific mineral mixture	P	T
14.	Reproduction management for augmentation of goat production	T	P
15.	Techniques and approaches for augmentation of male fertility in animals	T	-
17.	Preparation of milk and meat product	-	P
18.	Importance of Goat milk and value additions	-	P
20.	Newer techniques of value addition in meat	T	P
21	Economics, Commercialization and entrepreneurship in India	T	P
22.	Effective and economic marketing of goat and products	T	-
23	Project formulation	T	P

CENTRAL SHEEP AND WOOL RESEARCH INSTITUTE

Avikanagar, Rajasthan

Year of Establishment: 1962

Regional Stations : Northern Temperate Regional Station Garsa, Kullu, Himachal Pradesh (1963)

Southern Regional Research Centre, Mannavanur Kodai Kanal Dindigal, Tamil Nadu (1965)

Arid Region Campus, Beechwal, Bikaner, Rajasthan (1974)

CENTRAL Sheep and Wool Research Institute (CSWRI) is a premier institution, mandated to conduct basic and applied research on all aspects viz., breeding, reproduction, nutrition, health, wool and meat production and product utilization. The campus is spread over an area of 1510 hectare. It has three regional research centres in different agroclimatic zones of the country to develop region specific technologies. The institute has well developed sheep production units having quality germplasm of indigenous sheep breeds.

Establishment of elite flocks

The institute has well developed sheep flocks of Malpura (750), Chokla (550), Avikalin (350), Patanwadi (100), Patanwadi crosses (200), Garole (40), Kendrapada (100) and Garole crosses (300) for genetic improvement and other technology development. In addition a unit of broiler rabbit having strength of 350 rabbits of Soviet Chinchilla, White Giant, Grey Giant, Black Brown and Dutch genotype is being also maintained.

Bharat merino flock at SRRC, Mannavanur

Improved germplasm developed

Malpura, a promising breed for mutton production

Malpura, an indigenous sheep for mutton has been improved through intensive selection. Body weight at six month of age has been improved from 13.84 kg in 1974-75 to 25.74 kg in 2010-11. High genetic merit rams are being supplied to the farmers for genetic improvement of animals in the breed tract. The improvement in the farmer's flock was 7.63 and 14.92 per cent at 6 month's body weight and in first six monthly greasy fleece yield (GFY), respectively.

Malpura Ram

Chokla, best carpet wool breed

Chokla sheep has been improved through intensive selection for fine carpet wool production. It produces 2.4 kg wool per annum with average fiber diameter of around 30m and medullation of around 30%. The staple length of more than 6.0 cm makes it ideally suitable for carpet.

Chokla ram

Prolific sheep

Highly prolific sheep were created by introgression of *FecB* gene from Garole sheep into the non-prolific and large sized mutton breed Malpura. In GMM crosses multiple births has reached to 40% as compared to single births in Malpura. Increased prolificacy will boost the total mutton production in the country.

Prolific crossbred ewe with triplet

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Sheep breeding technology for enhancing prolificacy and mutton production

Feature of training : Sheep breeding techniques

Potential areas of application : Trained personal will apply the knowledge in field conditions for the benefit of farmers and also other persons

Target group : Veterinary officers

Duration of training : 10 days

Intake capacity : 10

Training outcome : Trained personals to improve the sheep production under farm and field area

Course contents

S.No.	Contents	Theory	Practical
1.	Introduction to sheep breeding and sheep breeds of India	T	-
2.	Sheep breed improvement programmes and present scenario	T	-
3.	Sector visit for hands on experience on various sheep breeds aintained at Avikanagar	-	P
4.	Production of prolific sheep for enhancing ewe productivity efficiency	T	-
5.	Selection and breeding programme to enhance prolificacy using prolific Garole/ Kendrapara sheep inheritance.	T	-
6.	Development of Triple cross for prolificacy, higher body weight and survivability.	T	-
7.	Sector visit for hands on experience on sheep management practices	-	P
8.	Marker assisted selection for *FecB* gene	T	-
9.	Blood collection and DNA Isolation from sheep blood	-	P
10.	Information about different prolific sheep breeds	T	-
11.	PCR amplification of *FecB gene*	-	P
12.	Genotyping for *FecB* gene using RFLP	-	P
13.	Scientific data recording in the farm	T	-
14.	Importance of pedigree and record maintenance	T	-
15.	Field visit to demonstrate individual animal identification and performance recording in farmer flock	-	P

S.No.	Contents	Theory	Practical
16.	Introduction to methods of genetic analysis of breeding data	T	-
17.	Concepts of variability/ variance/ covariance/ heritability/ repeatability, *etc*.	T	-
18.	Aids to selection and methods of selection	T	-
19.	Introduction to software for breeding data analysis	-	P
20.	Genetic analysis of breeding data and interpretation using software packages.	-	P

Name of the training programme : Skill development in sheep breeding technology for enhancing mutton production

Feature of training : Sheep breeding techniques

Potential areas of application : Trained personal will apply the knowledge in field conditions for the benefit of farmers and also other persons

Target group : Para vets

Duration of training : 7 days

Intake capacity : 15

Training outcome : Trained personals to improve sheep production under farm and field area

Course contents

S.No.	Contents	Theory	Practical
1	Introduction to sheep breeding	T	-
2	Introduction to sheep breeds of India	T	-
3	History of sheep breed improvement programmes	T	-
4	Breed characteristics of different native and upgraded germplasm e.g. Malpura, Chokla, Magra, Marwari, GMM P	-	P
5	Production of prolific sheep for enhancing ewe productivity efficiency	T	-
6	Selection and breeding programme to enhance prolificacy using prolific Garole/ Kendrapara sheep inheritance	T	-
7	Development of Triple cross for prolificacy, higher body weight and survivability	T	-
8	Sector visit for prolific sheep	-	P
9	Overview of management practices in the sheep farm	T	-

S.No.	Contents	Theory	Practical
10	Management of ewes during advanced pregnancy and at lambing	T	-
11	Management of the lambs till weaning	T	-
12	Sector visit for hands on experience of sheep management practices	-	P
13	Concepts of Inbreeding, Outbreeding and their pros and cons in sheep breeding	T	-
14	Identification of oestrous and preparation and execution of mating plan	T	-
15	Record keeping and digitalisation of breeding data	-	P
16	Importance of scientific data recording in the farm	T	-
17	Importance of pedigree and record maintenance	T	-
18	Selection of breeding animals in the farm	T	-
19	Field visit to demonstrate individual animal identification and performance recording in farmer's flock	-	P
20	Importance of sheep health for profitable sheep husbandry practices	T	-
21	Nutritional interventions for better management of the sheep farm	T	-

Name of the training programme : Sheep nutrition and forage management for improving sheep production

Feature of training : Sheep nutrition management

Potential areas of application : Trained personal will apply the knowledge in field conditions for the benefit of farmers and also other persons

Target group : Para veterinarian, farm manager

Duration of training : 10 days

Intake capacity : 15

Training outcome : Development of knowledge about nutritional requirements of sheep for optimum production

Course contents

S.No.	Contents	Theory	Practical
1.	Prospects of sheep production for augmenting rural prosperity	T	-
2.	Introduction to sheep nutrition	T	-
3.	Feed and fodder resources availability, requirement and strategy for meeting the shortage	T	-

S.No.	Contents	Theory	Practical
4.	Preparation of concentrate mixture	-	P
5.	Macro- Nutrients and its importance in sheep nutrition	T	-
6.	Micro-Nutrients and its importance in sheep nutrition	T	-
7.	Advances in feed and fodder resource utilization for sheep	T	-
8.	Rangeland improvement and management for optimum biomass production for sheep	T	-
9.	Preparation of complete feed block	-	P
10.	Nutrition and feeding of sheep under different production systems	T	-
11	Improved pasture establishment and management in semi-arid regions	T	-
12.	Nutrition and feeding of sheep under different physiological stages	T	-
13.	Nutrition and feeding management of sheep for mutton production	T	-
14.	Preparation of complete diets for feeding of mutton producing lambs	-	P
15.	Crop rotations for round the year green fodder supply	T	-
16.	Importance of minerals in sheep nutrition	T	-
17.	Economic fat lamb production	T	-
18.	Feeding of lambs during pre and post-weaning phase	T	-
19.	Assessment of feed intake in grazing sheep	-	P
20.	Strategic supplementation to meet requirement of nutrients for sustainable sheep production.	T	-
21.	Feeding of sheep during feed scarcity	T	-
22.	Agro-horti-pasture system development establishment and management	T	-
23.	Collection of pasture samples from grazing sheep	-	P
24.	Preparation of mineral mixture	-	P
25.	Anti-nutritional factors in feeds and fodders for sheep and their amelioration	T	-
26.	Newer feed resources in sheep feeding	T	-
27.	Developing silvi-pasture system on sloppy degraded lands	T	-
28.	Assessment of digestibility of nutrients in sheep	-	P
29.	Top feed resources.	-	P
30.	Usefulness of top feed resources in sheep feeding	T	-
31.	Processing of sheep meat for value addition	T	-
32.	Grassland and pasture management systems in arid region	T	-
33.	Seed production technology for fodder crops	T	-
34.	Feeding practices for various class of sheep adopted at farm	-	P
35.	Scarcity feeds and their feeding	-	P
36.	Agro forestry systems for semi-arid tropics	T	-

S.No.	Contents	Theory	Practical
37.	Nutrition and feeding of sheep on different types of pastures and silvi-pastures	T	-
38.	Package of practices for seasonal (Rabi and Kharif) fodder crops	T	-
39.	Feeding strategies for improving meat and milk production in sheep	T	-
40.	Fodder tree seed and sapling plantation techniques	-	P
41.	Annual and perennial legumes as mixed pasture for quality forage	T	-
42.	Nutrition and feeding management of sheep for wool production	T	-
43.	Feed and fodder production from problematic soils	T	-
44.	Transferable technologies for sheep improvement	T	-
45.	Pasture establishing techniques	-	P
46.	Spot identification of grasses, legumes and fodder tree seeds	-	P

Name of the training programme : Oestrus synchronization and Artificial Insemination in sheep

Feature of training : Artificial Insemination in sheep

Potential areas of application : Trained personal will apply the knowledge in field conditions for the benefit of farmers and also other persons

Target group : Para vets

Duration of training : 7 days

Intake capacity : 10

Training outcome : Production of elite livestock for optimizing production

Course contents

S.No.	Contents	Theory	Practical
1.	Introduction on practical aspects of artificial insemination	T	-
2.	Reproductive organs and their physiological functions	T	-
3.	Oestrous cycle and its control	T	-
4.	Artificial insemination using fresh and frozen semen	T	-
5.	Factors affecting artificial insemination programme	T	-
6.	Disease transmission through artificial insemination	T	-
7.	Care and management of rams and inseminated ewes	T	-

S.No.	Contents	Theory	Practical
8.	Establishment of artificial insemination laboratory	-	P
9.	Visit to Institute's research laboratories and sheep sectors	-	P
10.	Preparation of artificial vagina	-	P
11.	Preparation of semen dilutors	-	P
12.	Semen collection from donor rams	-	P
13.	Subjective evaluation of semen quality	-	P
14.	Semen collection and dilution	-	P
15.	Short-term preservation of semen	-	P
16.	Oestrus synchronization using vaginal sponges	-	P
17.	Detection of oestrus by teaser rams	-	P
18.	Semen collection, evaluation, dilution and artificial insemination with liquid semen	-	P
19.	Pregnancy diagnosis using ultrasound	-	P

Name of the training programme : Artificial Insemination and Embryo Transfer Technology (ETT) in sheep

Feature of training : Artificial Insemination in sheep

Potential areas of application : Trained personal will apply the knowledge in field conditions for the benefit of farmers and also other persons

Target group : Veterinary officers

Duration of training : 10 days

Intake capacity : 10

Training outcome : Production of elite livestock for optimizing production

Course contents

S.No.	Contents	Theory	Practical
1.	Introduction on practical aspects of artificial insemination and embryo transfer technology	T	-
2.	Reproductive organs and their physiological functions	T	-
3.	Overview of AI and ETT in sheep	T	-
4.	Oestrous synchronization and superovulation in sheep	T	-

S.No.	Contents	Theory	Practical
5.	Disease transmission through semen and embryo	T	-
6.	Care and management of rams, recipient and donor ewes	T	-
7.	Factors influencing success of AI and embryo transfer in sheep	T	-
8.	Establishment of AI and embryo technology laboratory	-	P
9.	Visit to Institute's research laboratories and sheep sectors	-	P
10.	Ram semen collection and processing	-	P
11	Subjective and objective evaluation of semen quality	-	P
12.	Preparation of semen dilutors	-	P
13.	Short-term preservation of semen	-	P
14.	Cryo-preservation of ram semen	-	P
15.	Artificial insemination in ewes	-	P
16.	Synchronization of oestrus in ewes	-	P
17.	Detection of oestrus by teaser rams	-	P
18.	Pregnancy diagnosis of ewes by ultrasonography	-	P
19.	Sterilization of glassware and preparation of solutions/ media	-	P
20.	Laparoscopic assessment of superovulatory response in donors	-	P
21.	Surgical embryo collection from donors	-	P
22.	Searching and grading of sheep embryos	-	P
23.	Laparoscope aided embryo transfer in recipients	-	P

Name of the training programme : Biotechnological tools in sheep production

Feature of training : Biotech tools in sheep production

Potential areas of application : Trained personal will apply the knowledge for the benefit of farmers and also other persons

Target group : Graduates in biological science

Duration of training : 15 days

Intake capacity : 10

Training outcome : Creating human resource with knowledge for use in improving sheep production

Course contents

S.No.	Contents	Theory	Practical
1.	Introduction to recent advances in biotechnology	T	-
2.	Genomic DNA isolation- Principle and practice	T	-
.3.	Electrophoresis - Principle and types	T	-
4.	Polymerase Chain Reaction and its application for characterization of breeds	T	-
5.	Molecular markers	T	-
6.	Molecular method of disease diagnostics	T	-
7.	Molecular markers for genetic variability	T	-
8.	RFLP and data analysis	T	-
9.	Designing of PCR Primers	T	-
10.	Bioinformatics tools and its application	T	-
11.	Restriction enzyme digestion	T	-
12.	DNA Cloning and expression vectors	T	-
13.	Recombinant technology- An introduction	T	-
14.	Gene Cloning/ PCR Cloning	T	-
15.	Animal genetic resources characterization based on field survey	T	-
16.	Genotype of prolific animals	T	-
20	Lab visit and operation of different equipments	-	P
21.	Good laboratory practices	-	P
22.	Reagent (stock and working solutions) and buffer preparation	-	P
24.	Collection and storage of samples for DNA markers	-	P
25	Isolation of Genomic DNA from blood, wool samples	-	P
26.	Extraction of rotavirus from faecal samples	-	P
28.	Determination of quality and quantity of DNA	-	P
29.	Agarose gel electrophoresis	-	P
30.	Polymerase chain reaction	-	P
32.	Restriction Fragment Length Polymorphism reaction for characterization of breeds	-	P
33.	Primer designing	-	P
34.	Restriction digestion, preparation of Plasmid DNA and cloning in plasmid vector	-	-
35.	Plasmid isolation from recombinant clones	-	-
36.	PCR of recombinant plasmid DNA	-	-
37.	Identification of FecB gene/wool fiber	-	-
38.	Nucleotide sequence and data analysis	-	P

Name of the training programme : Sheep health management technologies for veterinarians

Feature of training : Sheep health management

Potential areas of application : Trained personal will apply the knowledge in field conditions for benefit of farmers and also other persons

Target group : Veterinary Officers

Duration of training : 7 days

Intake capacity : 15

Training outcome : Prevention of production losses due to disease

Course contents

S.No.	Contents	Theory	Practical
1.	Diagnosis of bacterial and viral diseases	T	-
2.	Management of digestive and hepatic system diseases	T	-
3.	Epidemiology of gastrointestinal nematodes of small ruminants	T	-
4.	Management of anthelmintic resistance in nematode parasites	T	-
5.	Necropsy as a tool for disease diagnosis	T	-
6.	Sustainable worm management in small ruminants	T	-
7.	Alternative control methods for GIN	T	-
8.	Metabolic and non-specific diseases and their management	T	-
9.	Formulation of planned flock health programme	T	-
10.	ELISA and PCR techniques in disease diagnosis	-	P
11.	General necropsy procedures	-	P
12.	Microbial diseases and their diagnosis	-	P
13.	Diagnosis of parasitic diseases and detection of anthelmintic resistance	-	P
14.	DDIS applications for disease data management	-	P
15.	Immunodiffusion tests for disease diagnosis	-	P
16.	Collection, preservation and dispatch of samples for diagnosis	-	P
17.	Forecasting model for ovine haemonchosis	-	P
18.	TST approach for worm management	-	P
19.	Preparation of smears and examination for disease diagnosis	-	P
20.	Antibiotic sensitivity assay	-	P
21.	Evaluation of hepatic functions	-	P

Name of the training programme : Skill development in sheep health management

Feature of training : Sheep health techniques

Potential areas of application : Trained personal will apply the knowledge in field conditions for benefit of farmers and also other persons

Target group : Para vet

Duration of training : 7 days

Intake capacity : 15

Training outcome : Prevention of production losses due to disease

Course contents

S.No.	Contents	Theory	Practical
1.	Basics of clinical examination	T	-
2.	Precaution and methods during sampling from animals	T	-
3.	Vaccination schedule of animal	T	-
4.	Importance of sterilization, decontamination procedure	T	-
5.	Importance of personal hygiene in relation to zoonotic diseases	T	-
6.	Methods of control for external and internal parasite	T	-
7.	Recording of data and importance of health calendar for sheep	T	-
8.	Collection of blood/ serum and other clinical samples	-	P
9.	Preservation and transportation of samples for laboratory diagnosis	-	P
10.	Veterinary care of new born animals	-	P
11.	Practical on sterilization, decontamination/disinfection	-	P
12.	Practical on general health examination on live animal, selection and preparation of sites of drug/vaccine administration	-	P
13.	Practical demonstration on control of parasite	-	P
14.	Preparation of smears and staining for various microbes	-	P
15.	Preparation of faecal samples for parasitic examination	-	P

Name of the training programme : Quality evaluation of wool and speciality hair fibres

Feature of training : Quality of wool and other animal fibres

Potential areas of application : Trained personal will apply the knowledge in field conditions for the benefit of farmers and also other persons

Target group : Graduates engaged in wool processing and marketing

Duration of training : 7 days

Intake capacity : 10

Training outcome : Development value added products from wool and other animal fibres for economic growth of farmers

Course contents

S.No.	Contents	Theory	Practical
1.	Status of wool production and utilization	T	-
2.	Sorting and Grading of wool	T	-
3.	Physical properties and their importance in processing of wool	T	-
4.	Evaluation of fibre diameter, medullation, staple length and staple crimp	T	-
5.	Chemistry of wool	T	-
6	Estimation of Scouring yield, vegetable matter content and clean wool yield of wool	T	-
7.	Fibre analysis of Speciallity hairs i.e. Angora , Pashmina etc.	T	-
8.	Identification of fibre using PCR Base technique	T	-
9.	Wool sorting	-	P
10.	Subjective evaluation of wool	-	P
11.	Grading of wool	-	P
12.	Measurement of fibre diameter and medullation on projection microscope	-	P
13.	Measurement of staple length and staple crimp	-	P
14.	Estimation of scouring yield	-	P
15.	Estimation vegetable matter content in wool	-	P
16	Carbonization and estimation of clean wool yield	-	P
17.	Chemical Test for fibre identification	-	P
17.	UV / Alkaline solubility test	-	P
18.	DNA extraction from fibre	-	P
19.	PCR amplification	-	P

Name of the training programme	:	Skill development on processing of wool and other animal fibres for handloom and handicraft product manufacturing
Feature of training	:	Wool processing techniques
Potential areas of application	:	Trained personal will apply the knowledge in field conditions for the benefit of farmers and also other persons
Target group	:	Artisans, progressive e farmers, SHG members
Duration of training	:	10 days
Intake capacity	:	10
Training outcome	:	Development value added products from wool and other animal fibres for economic growth of farmers

Course contents

S.No.	Contents	Theory	Practical
1.	Pre-spinning process and spinning of woolen yarn on Charkha	T	-
2.	Preparatory process for weaving viz. winding, warping etc.	T	-
3	Handloom weaving viz.primary and auxiliary motions in weaving	T	-
4.	Felting of wool	T	-
5.	Blanket weaving and finishing	T	-
6.	Shawl weaving and finishing	T	-
7.	Development of woolen handicrafts	T	-
8.	Demonstration of yarn spinning on spinning wheel and Ambar charkha.	-	P
9.	Practice to spin yarn on charkhas	-	P
10.	Demonstration of preparatory process	-	P
11.	Practice to weave fabric on handloom.	-	P
12.	Demonstration of felt making (Handmade/ machine made felt)	-	P
13.	Demonstration of blanket weaving	-	P
14.	Demonstration of shawl weaving	-	P
15.	Demonstration and practice to developing handicrafts	-	P
16.	Field visit to Tonk/ Jaipur for Namda and handicraft making units	-	P

CENTRAL INSTITUTE FOR RESEARCH ON BUFFALOES

Hisar, Haryana

Year of Establishment: 1985

Sub campus: Nabha, Punjab (1987)

CENTRAL Institute for Research on Buffaloes (CIRB) was established at Hisar Haryana to undertake research on all aspects of buffalo production including milk, meat and draft. A sub campus of the institute was established in 1987 at Nabha by acquiring 588 acres of land and other facilities from the Government of Punjab. The Institute has done significant work in buffalo improvement both at institute herds as well as in farmer's herds through institute based research programmes and Net Work project on buffalo improvement.

Improved germplasm developed

Twenty-two top ranking progeny tested Murrah bulls produced for elite mating and production of bull calves and progeny tested buffalo bull semen have become available for breed improvement in the country. More than 50,000 frozen semen doses from progeny tested bulls are available in the semen bank of CIRB. A total of 493 Murrah bulls of high genetic merit have been supplied to various developmental agencies and village panchayats in 12 States of the country for increasing milk production through genetic improvement in farmers buffaloes.

Progeny tested murrah bull

Establishment of elite murrah herd

A high pedigreed herd of Murrah buffaloes has been established at Hisar with current herd size of about 500 animals. 305 day or less lactation milk yield increased from 1500 kg during 1992-93 to 2374 kg during 2011- 2012.

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Lay inseminators training

Feature of training : To train lay man inseminators for better AI services.

Potential areas of application : To prepare and train farmers for AI technique for providing on the spot services in field and greater proliferation of superior germplasm

Target group : Educated unemployed rural youths

Duration of training : 21 days

Intake capacity : 20

Training outcome : Awareness about reproductive functions, fertility and practical knowledge of AI

Course contents

S.No.	Contents	Theory	Practical
1.	**Importance of buffalo husbandry:** Buffalo breeds and their distribution, importance of reproduction, advantages & disadvantages of artificial insemination	T	-
2.	**Reproductive organs structure and function: Male**: Structure and functions of male reproductive organs. Selection and care of breeding bull. Semen collection and its processing	T	-
3.	**Frozen Semen production**: Semen evaluation, semen cryopreservation, semen thawing for AI, transportation and maintenance of frozen semen under field condition	-	P
4.	**Reproductive organs structure and function: Female:** Structure and functions of female reproductive organs. Estrus, estrous cycle, ovulation and fertility. Estrus symptoms and estrus detection. Estrus induction/ synchronization. Hands on training of genitalia palpation on abattoir genitalia. Examination of reproductive organs and ovaries through rectal palpation, ultrasound examination of ovaries and organs	T	P
5.	**Per-rectal palpation:** Practice in abattoir genitalia & live animals for genitalia palpation, AI & regnancy diagnosis. Pregnancy confirmation using ultrasound	-	P
6.	**Insemination**: AI equipment, technique, Precautions during AI, gun loading and AI procedure	-	P

S.No.	Contents	Theory	Practical
7.	**Feeding management:** Nutrition for efficient reproduction, mineral nutrition and its role in reproduction, feeding requirement for growth, lactation and pregnancy. Preparation of balance feed, complete feed block, hay and Silage	T	-
8.	Buffalo management for efficient reproduction and milk production, Round the year green folder production, housing options; care of udder and clean milk production, colostrum feeding and calf management	T	-
9.	**Health management:** communicable diseases, their symptoms, control and vaccination; first aid medications for general use. Major reproductive problems, their causes and treatment.Blood sample collection for different types of tests	T	P
10.	**Government policies:** Government schemes, funds raising for dairy, Bank's loan, **Record keeping:** Importance of record keeping, types of records, formats of record keeping. Analysis of records	T	P
11.	**Exposure visits:** Visits to semen labs, bull production centers and progressive farmers	-	P

Name of the training programme : Technical staff training in Animal Husbandry

Feature of training : To enhance the techno-managerial competence of participants

Potential areas of application : To acquaint the participants on latest developments in buffalo/ dairy husbandry practices.

Target group : Technical staff from the state departments of animal husbandry; dairy entrepreneurs, progressive farmers, graduates.

Duration of training : 21 days

Intake capacity : 20

Training outcome : Personnel with knowledge of modern scientific technologies for improving productivity in buffaloes

Course contents

S.No.	Contents	Theory	Practical
1.	**Buffalo and its Importance:** Population, distribution and contribution of buffalo to Indian economy through milk/meat production. Types and breeds of buffalo	T	-
2.	**Buffalo reproduction management:** Reproductive organs structure and function; Estrus detection aids, ovulation time in relation to estrus and AI, Hormonal protocols for estrus synchronization & fixed time AI	T	-
3.	**Ultrasonography in fertility management:** Follicular dynamics, detection of ovulation, luteal characteristics, early embryonic and fetal development, determining fetal age and sex in utero	-	P
4.	**Frozen semen production and AI:** Importance of Bull in herd and its selection, AI technology, frozen semen production and evaluation, transportation and maintenance; AI equipment, technique and recautions	T	P
5.	**Feeding management:** Colostrum feeding and calf survival; Mineral nutrition and its role in reproduction, Formulation of Area specific mineral mixture, nutrition for efficient reproduction in different categories. Round the year green folder production. Concentrate ingredients and feed formulations; Silage making. Complete feed blocks. Urea molasses mineral blocks (UMMB)	T	P
6.	**Clean milk production:** Milking machines / parlours. Detection and prevention of mastitis. Detection of detergent and urea in milk.	T	-
7.	**Health management:** Detection, control and prevention of infectious diseases, vaccination schedule, control of reproductive disorders	T	-
8.	**Commercial dairying:** Government schemes and projects for developing dairy farming, Availability of bank loans and subsidies, Insurance of livestock	T	-
9.	**Record keeping:** Importance and types of records, formats for record keeping for management, nutrition, reproduction, health and sale/ purchase	-	P
10.	**Exposure visits:** Visits to organized dairy farms, Semen production centers and progressive farmers	-	P

CENTRAL AVIAN RESEARCH INSTITUTE

Izatnagar, Uttar Pradesh

***Year of Establishment*: 1979**

Regional Centre : Bhubaneswar (1992)

CENTRAL Avian Research Institute (CARI) was established at Izatnagar (U.P.) on November 2, 1979 as a premier Institute in the field of poultry research, education, extension and training in India for promoting productivity and profitability of Indian Poultry Industry. Later, a regional centre of the Institute was also established in Bhubaneswar in the year 1992. The Institute has played a pioneering role in transforming backyard poultry farming into a several billion rupee ago-industry.

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Poultry hatchery operation

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Poultry hatchery operation

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Prospects of hatchery industry in india	T	-
2	Hatchery planning and layout	T	-
3	Factors affecting fertility and hatchability	T	-
4	Major events in the development of chicken embryos	T	-
5	Selection, fumigation and candling of hatching eggs	-	P
6	Incubation and hatchery management	-	P
7	Hatchery machine operation	-	P
8	Setting and transfer of hatching eggs at hatchery	-	P
9	Hygienic management of hatchery operation	-	P
10	Sexing of day old chicks at hatchery	-	P
11	Handling and management of hatchlings	-	P

Name of the training programme : Quail production

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Quail production

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6 -20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Status of quail production in India	T	-
2	Different varieties of quails/breeding practices	T	-
3	Nutrient requirement and feeding of quails	T	-
4	Common diseases and their control in quails	T	-
5	Bio-security measures in quail farm	T	-
6	Economics of quail production	T	-
7	Marketing of quails	T	-
8	Incubation & hatchery management	-	P
9	Quail houses	-	P
10	Farm appliances and equipments	-	P
11	Management of quail chicks and layers	-	P
12	Management of quail broilers	-	P
13	Breeder flock management	-	P

Name of the training programme : Broiler production

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Broiler production

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Present status of broiler industry in India	T	-
2	Modern breeds/strains of meat type chickens	T	-
3	Broiler breeding practices	-	-
4	Nutrient requirement and feeding of broiler stocks	T	-
5	Types of broiler houses	T	-
6	Common diseases of broilers and their control	T	-
7	Economics and marketing of broiler production	T	-
8	Management of broiler breeding/commercial flocks	-	P
9	Farm appliances and equipments for broilers	-	P
10	Artificial insemination in broiler breeding	-	P
11	Incubation and hatchery management	-	P
12	Farm appliances and equipments for broilers	-	P

Name of the training programme : Guinea fowl production

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Guinea fowl production

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Status of guinea fowl farming in India	T	-
2	Guinea fowl varieties	-	-
3	Nutrient requirement and feeding of guinea fowl	T	-
4	Common diseases and control in guinea fowl	T	-
5	Economics of guinea fowl production and project planning	T	-
6	Incubation & Hatchery management	-	P
7	Management of guinea fowl chicks, growers & layers	-	P
8	Management of breeder guinea fowl	-	P
9	Record keeping in guinea fowl production	-	P

Name of the training programme : Layer production

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Layer production

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Status of layer industry in India.	T	-
2	Modern breeds breeds/strains & production of commercial stocks of layer chicken	T	-
3	Nutrient requirement and feeding of egg type chicken	T	-
4	Common diseases in layers and their control	T	-
5	Bio-security and health management	T	-

S.No.	Contents	Theory	Practical
6	Economics of layer production and project planning	T	-
7	Farm equipments & appliances for egg types chicken production	-	P
8	Incubation & hatching of eggs	-	P
9	Management of chicks, growers & layers	-	P
10	Management of breeding stock record keeping	-	P

Name of the training programme : Poultry diseases and bio-security measures

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Prevention & control of poultry diseases

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Present status of poultry diseases in India	T	-
2	Viral diseases of poultry and its control	T	-
3	Bacterial diseases of poultry and its control	T	-
4	Parasitic diseases of poultry and its control	T	-
5	Fungal diseases of poultry and its control	T	-
6	Vitamin and mineral deficiency diseases in poultry	T	-
7	Zoonotic diseases of poultry	T	-
8	Important drugs for poultry	T	-
9	Mycotoxicosis in poultry and control	T	-

S.No.	Contents	Theory	Practical
10	Hatchery operation and sanitation	-	P
11	Embryonic abnormalities in poultry	-	P
12	Ante-mortem & Post-mortem examination of poultry	-	P
13	Bio-safety and bio-security measures in poultry farms	-	P

Name of the training programme : Poultry entrepreneurial development and project formulation

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Entrepreneurial development in poultry production

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Poultry entrepreneurship in India: An overview	T	-
2	Perspective of successful entrepreneur	T	-
3	Project planning and its elements	T	-
4	Developments in diversified poultry farming	T	-
5	Feed plant management	T	-
6	Production planning and marketing of poultry products	T	-
7	Poultry project formulation	T	-
8	Sources of finance for poultry business	T	-
9	Farming and record keeping	T	-
10	Developments in poultry processing technology	T	-

S.No.	Contents	Theory	Practical
11	Cost effective housing systems for poultry	T	-
12	Emerging diseases of poultry and their control	T	-
13	Product branding, advertisement and sales promotion	T	-
14	Hatchery management	-	P
15	Development in broiler, layer, quail, guinea fowl & turkey farming and record keeping	-	P
16	Feed plant operation, management & feed compounding	-	P
17	Health, disease & bio-safety	-	P
18	Cost benefit analysis of poultry production	-	P

Name of the training programme : Poultry feeding and quality control

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Feed formulation, quality control & feeding management

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Poultry nutrition and feeding-present status, problems & future prospects	T	-
2	Principles of poultry nutrition	T	-
3	Nutrient requirements and feed formulation for poultry	T	-
4	Non-conventional poultry feedstuffs	T	-
5	Implications of antinutritional factors and mycotoxins in poultry production	T	-

S.No.	Contents	Theory	Practical
6	Feed compounding and storage practices	T	-
7	Recent advances in protein and amino acid nutrition	T	-
8	Efficacies of feed additives and enzyme supplementation	T	-
9	Economic feed formulation quality control of poultry feeds – Principles and applications	T	-
10	Nutrition and Feeding of diversified poultry species	T	-
11	Designer eggs and meat production through dietary approaches	T	-
12	Quality control of feed ingredients/mixed feed	T	-
13	Nutrient requirements and feed formulation for poultry	T	-
14	Determination of proximate principles in feedstuffs	T	-
15	Premixing and feed compounding	-	P
16	Fibre and protein assay through fibretech and kjeltech systems	-	P
17	Measurement of energy value in feedstuffs	-	P
18	NIR spectroscopy for feedstuff evaluation	-	P
19	Using computer software for feed compounding	-	P
20	Atomic absorption spectrometry for mineral analysis	-	P

Name of the training programme : Poultry processing & products technology

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Primary and further processing of poultry products for value addition

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Current status of poultry processing in India	T	-
2	Design and layout of poultry	T	-
3	Processing unit and its sanitation	T	-
4	Nutritive value of poultry egg and meat	T	-
5	Factors influencing poultry egg and meat quality	T	-
6	Packaging and marketing of fresh and processed poultry products	T	-
7	Technologies for value added egg and meat products	T	-
8	Indian standards for poultry products	T	-
9	Quality assurance of poultry products under WTO	T	-
10	Principles of meat cookery and sensory quality of poultry meat	T	-
11	Pesticide residues in poultry egg and meat	T	-
12	Design and layout of poultry processing unit and its sanitation	-	P
13	Dressing, grading and packaging of poultry	-	P
14	Ante and post mortem inspection of poultry	-	P
15	Preservation of poultry meat	-	P
16	Curing and smoking of poultry egg and meat	-	P
17	Preparation of poultry meat emulsion	-	P
18	Processing and utilization of poultry by-products	-	P
19	Tenderization of meat from culled poultry	-	P
20	Microbiological quality evaluation of fresh and processed poultry products	-	P

Name of the training programme : Backyard poultry farming

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Promotion of village poultry production

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Rural poultry production- current status, constraints and their remedial measures	T	-
2	Breeds of native chicken and their characteristics	T	-
3	Conservation and utilization of native chicken	T	-
4	Developments in production of evolved desi chicken varieties (egg/meat/ dual types)	T	-
5	Prospects of free-range poultry farming	T	-
6	Supplementary feeding of desi birds under free-range and semi-intensive system	T	-
7	Improved scavenging chicken production	T	-
8	Management practices for backyard poultry	T	-
9	Low cost houses for village poultry	T	-
10	Disease and vaccination schedule for rural poultry	T	-
11	Development of disease resistant birds for backyard poultry production	T	-
12	Extension strategies for promoting backyard poultry	T	-
13	Nutritive value of desi eggs and meat	T	-
14	Strategies for promoting backyard poultry in a bio-secure manner	T	-
15	Rearing & management practices for backyard poultry farming	-	P
16	Supplementary feeding of desi birds under free-range and semi-intensive system	-	P
17	Design & construction of low cost houses for village poultry	-	P
18	Disease and vaccination schedule for rural poultry	-	P
19	Visit to small holder poultry units	-	P

Name of the training programme : Turkey production

Feature of training : The trainees will be exposed to recent advances in relevant area

Potential areas of application : Turkey farming

Target group : Veterinary officers/ technical personnel of various departments/ institutions including public/ private organizations, big & small entrepreneurs/ farmers

Duration of training : 12 days

Intake capacity : 6-20

Training outcome : Skill development in recent advances in relevant area

Course contents

S.No.	Contents	Theory	Practical
1	Status and prospects of turkey farming in India	T	-
2	Nutrient requirement and feeding of turkey	T	-
3	Common diseases and control in turkey	T	-
4	Value added meat products from turkey	T	-
5	Record keeping	T	-
6	Economics of turkey production and project planning	T	-
7	Incubation & hatching	-	P
8	Management of turkey poults, growers & layers	-	P
9	Management of breeding stock	-	P
10	Disease and bio-safety practices	-	P
11	Record keeping for profitable turkey production	-	P

*The institute has limited lodging/boarding facility. However, if appropriate lodging/boarding facility is made available in the form of New Training hostel to house the trainees, the intake capacity may be increased to 20 or even more.

PROJECT DIRECTORATE ON POULTRY

Hyderabad, Andhra Pradesh

Year of Establishment: 1988

THE Directorate was set up as a coordinating unit of All India Coordinated Research Project (AICRP) on Poultry in 1970 at Izatnagar, Uttar Pradesh and was elevated as a full-fledged Project Directorate in 1988 and shifted to Hyderabad, with the objectives to coordinate research at AICRP centers located across the country and conduct research on the development and improvement of chicken lines for commercial and rural poultry production. The ongoing research programmes at PDP are focused on research in the areas of poultry breeding, molecular genetics, applied nutrition, immunomodulation, disease diagnosis and health management.

Improved Germplasm

Vanaraja

A dual-purpose poultry variety developed for free range poultry farming in rural and tribal areas. These birds feed on kitchen waste, natural vegetation and insects like country birds and do not require any commercial feed. They are hardy and suited for rearing under harsh conditions. The birds have multi colored feathers and lay brown eggs with an adult body weight of 1.8 to 2.0 Kg for males at 12 weeks of age. The annual egg production is about 100-110 eggs in free range conditions. The variety

Vanaraja

is very popular among the rural and tribal people throughout the country. About 27 lakhs of *Vanaraja* chicks were distributed across the different states of the country from Jammu and Kashmir to Andaman & Nicobari Islands and Arunachal Pradesh to Gujarat. In addition, 1.72 lakhs of parents were also supplied for different Government institutions which in turn might have produced about 1.0 crore commercial *Vanaraja* chicks and distributed among the farmers in their respective areas. A unit of 20 birds will provide a subsidiary income of Rs. 4000-5000 for the family per year.

Gramapriya

A layer type variety developed for free range farming in rural and tribal areas. It has coloured plumage and lays brown sizable eggs. These birds feed on kitchen waste, natural vegetation and insects like native chicken and do not require expensive inputs in the form of feed but supplementation of minimal calcium sources (shell grit, stone grit and lime stone) is beneficial during laying phase. The body weight of males at 12 weeks ranges from 1.2 to 1.5 Kg. The annual egg production is about 160-180 eggs under field conditions in farmers backyards. The male bird's meat is tender and suitable for traditional *tandoori* preparations. About 24 lakhs of *Gramapriya* birds were distributed to the farmers. In addition, 1 lakh parents of *Gramapriya* (which in turn have produced about 70 lakhs of commercial chicks) were supplied to the CPDOs and government agencies. A unit of 20 birds will provide a subsidiary income of Rs. 6000-7000 for the family.

Gramapriya

Krishibro

A multi coloured broiler developed for small scale intensive farming in rural areas. The birds are known for their organoleptic qualities of the meat, which is close to that of country birds. These birds are well adapted for harsh climatic conditions, economical and perform well under low plane of nutrition and they fetch a premium price like country birds. The birds weigh about 2.0 Kg at seven weeks with feed conversion ratio of 2.1. About 6 lakhs of Krishibro birds have been distributed for smale scale intensive farming. Promising broiler variants of Krishibro (B-77, IBL80, IBB-83 & IBI-91) and layers crosses (ILI-80, ILM-90 & ILR-90) have been developed at different AICRP centers.

Krishibro

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme	:	Managing backyard poultry in a biosecured Manner
Feature of training	:	1. To provide the key knowledge and skills to identify biosecurity risks to backyard poultry and to control them. 2. To train trainers on various aspects of management of poultry health and biosecurity in rural/ backyard poultry.
Potential areas of application	:	Backyard poultry poultry and commercial poultry farms.
Target group	:	Veterinarians working in government institutions, NGOs, KVKs, state departments, ICAR institutions etc., dealing with poultry
Duration of training	:	7 days
Intake capacity	:	20
Training outcome	:	By the end of the training programme, the percipients should be able to - 1. Understand the positive benefits of bioseurity to backyard poultry 2. Describe the important pathogens of poultry and how they spread 3. List Understanding of control measures and how and where they are applied 4. Perform a biosecurity risk analysis for backyard poultry 5. Develop a simple , cost effective biosecurity risk management plan 6. Impart training to backyard poultry keepers on application of biosecurity measures

Course contents

S.No.	Contents	Theory	Practical
1	Structure of rural/ backyard poultry population, constraints of backyard poultry production	T	-
2	Disease risks for rural/ backyard poultry, Interaction of host, pathogenic agent and environment, common sources of infectious agents, means of disease transmission spread	T	-
3	Common bacterial and fungal diseases	T	-
4	Common viral and parasitic diseases	T	-
5	Nutritional deficiency, toxic and management related diseases	T	-
6	Principles of disease diagnosis, clinical and necropsy examination	T	P
7	Principles of disease control, concepts and tools of biosecurity: isolation, traffic conrol and hygiene; benefits of biosecurity	T	P
8	Flock health care and monitoring, good management and husbandry practices	T	P
9	Disposal of bird mortalities, rodent pest management	T	P
10	Disinfectants, cleaning and disinfection procedures: routine and during outbreaks	T	P
11	Antimicrobials, principles of preventive and curative medication, deworming procedures	T	P
12	Principles of vaccination: vaccines, vaccination procedures, monitoring of vaccine response, design and implementation of vaccination and medication programs	T	P
13	Evaluation	-	-

PROJECT DIRECTORATE ON CATTLE

Meerut Cantt, Uttar Pradesh

Year of Establishment: 1987

PROJECT Directorate on Cattle (PDC) was established at Meerut on November 3, 1987 to monitor, coordinate and support all research and development activities for cattle improvement, by upgrading the status of earstwhile. All India Coordinated Research Project (AICRP) on Cattle where it was concluded that Holstein Friesian exotic breed with exotic inheritance of 50 - 62.5 % was the ideal choice for producing crossbred cattle in most regions of the country. It was proposed to develop a new cattle breed "Frieswal" having 62.5% HF inheritance and capable of producing 4000 litres of milk with 4% butter fat in a mature lactation of 300 days by utilizing a large population of HF x Sahiwal available at different Military Farms of the country. Subsequently, keeping in view the importance of indigenous breeds known for their adaptability and disease resistance qualities, Indigenous Breeds Project (IBP) was initiated in the year 1989 in collaboration with the SAUs, State Govt. and Non-Government Organizations to conserve and improve the Indigenous breeds. Similarly, Field Progeny Testing (FPT) project was undertaken in 1991 to bring genetic improvement in HF crossbred cattle in farmers' herd. The Directorate is also undertaking basic research work related to cattle husbandry at farm and field level.

Germplasm Developed

Development of a new cattle breed "Frieswal"

Frieswal project was initiated in 1989 when Military Farms had a population of 2305 HF x Sahiwal crossbred with very low to very high Friesian inheritance. With the systematic breeding, the level of exotic inheritance was stabilized at around 62.5%. The population of Frieswal cows has increased to 16714 at the end of year 2011. The average milk yield in 300 days which was 2774 kg in year 1989 has now improved to 3273 kg in 2011.

Frieswal bull

The mature lactation milk yield has reached to the level of 3612 kg in fourth lactation. Age at first calving has been reduced from1126 days in 1985 to 969 days. Average peak yield of Frieswal has also crossed 15 kg. A total of 90 Frieswal bulls have so far been evaluated through progeny testing at various Military Farms spread over different agro-climatic conditions of the country. The dam's best lactation yield of majority of these bulls ranges from 4000 to 6000 kg, the highest value being 8073 kg in a lactation of 387 days. Detailed information with respect to progeny tested bulls are available in recently published Sire Directory.

Frieswal cow

Production of high quality cryopreserved semen

Superior quality frozen semen of meritorious crossbred (Frieswal) bulls of high production indices, is being made available to different govt and non-Govt agencies for genetic improvement of crossbred cattle. Till date, 22,988,46 frozen semen doses of Frieswal semen have been produced out of which 9,93,131 doses have been distributed to different Military Farms. Besides this a total of 1,71,627 doses of Frieswal semen have also been sold to para vets, farmers, SAUs, State Animal Husbandry departments and NGOs. Presently, the Directorate has more than 9.57 lakh doses of frozen semen of 138 Frieswal bulls in its gene bank for use under various cattle development programmes.

Doses of Frieswal semen

Genetic improvement of Indigenous cattle breeds

Genetic improvement of Hariana, Ongole, Sahiwal, Gir and Kankrej indigenous cattle breeds has been undertaken for progeny testing of bulls for production of superior germplasm for utilization in cattle development programs in the country.

Through sustained efforts, the average first lactation milk yield and peak yield in Hariana cows increased to 1066.22 kg and 6.44 kg, respectively. A total of 60 Hariana bulls were used under test mating in 7 sets, with the production of 2217 daughters. 33 Hariana bulls have been evaluated for their genetic merit based on first lactation yield of their daughters.

Sixty five (65) Ongole bulls have so far been used under test mating in 8 sets and 3410 daughters have so far been produced. 32 Ongole bulls have been evaluated on their genetic merit based on first lactation yield of their daughters. Draft studies of Ongole bulls using single harness plough with digital dynamometer showed that draught power varied from 0.52 to 0.63 H.P.

A total of 15 Kankrej bulls have been selected on the basis of their dams' milk yield which ranged from 2934 to 4200 lit. The first set of 8 bulls has been inducted for test mating under the programme.

Six Gir bulls have also been inducted in the first set with the production of 6534 doses of frozen semen of which 3780 had been used during the programme.

Seven Sahiwal bulls have been inducted in the first set and 1418 inseminations have been carried out that resulted in production of 93 daughters.

Kankrej Cow

Gir Bull

Gir Cow

Improvement of field cattle through progeny testing programme

The crossbred field cattle in different agro-climatic zones of the country are being improved through utilization of the semen from high quality breeding bulls under the Field Progeny Testing programme of the Directorate. The programme is being implemented in collaboration with Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana, Kerala

Veterinary and Animal Sciences University (KVASU), Mannuthy and Bharatiya Agro Industry Foundation (BAIF), Urulikanchan, Pune.

In Field Progeny Testing Programme, 211 bulls have so far been used at GADVASU unit in 10 sets. Overall conception rate is 43.5 %. The milk yield has increased from 2697 kg in first set to 3388 kg in the progenies of 8th set. At KVASU unit, 150 bulls in 9 sets have so far been evaluated for their progeny performance. The overall conception rate has reached to 44.10% during current set (11th set)**.** The milk yield of the progenies has increased from 1958 kg in 1st set to 2567 kg in 8th set. At BAIF Urulikanchan, 187 bulls have so far been used in 9 sets with an overall conception rate of 42 % and an average 305 days milk yield of the progenies being 2930 kg in 1st set has improved to 2991 kg.

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Production, processing and handling of quality bovine frozen semen

Feature of training :
1. Harvesting of quality germplasm
2. Processing & cryopreservation
3. Handling of frozen semen doses

Potential areas of application :
1. Germplasm production centres
2. Artificial inseminations for genetic improvement in cattle

Target group : Persons engaged at semen stations
Field level workers involved in AI (paravets)

Duration of training : One week

Intake capacity : 15

Training outcome :
1. Development of skill in production of quality male germplasm
2. Maintenance and handling of germplasm for keeping optimum quality and fertility

Course contents

S.No.	Contents	Theory	Practical
1.	Selection of bull and harvesting of quality germplasm	T	P
2.	Handling of Semen during processing, preservation and packaging	T	-
3.	Evaluation of semen quality for optimum freezability and fertility	T	-
4.	Semen evaluation, processing, packaging and identification of semen straws	-	P
5.	Breeding soundness evaluation of bull	T	P
6.	Introduction to various types of cryo vessels- maintenance and up-keep	T	-
7.	Demonstration of cryo vessel management	-	P
8.	Semen thawing	T	P

S.No.	Contents	Theory	Practical
9.	Heat detection and artificial insemination in dairy cattle	T	-
10.	Nutritional interventions of bulls and cows for optimum reproduction	T	-
11.	Housing and management of dairy cattle bull	T	P
12.	Frozen semen and livestock health	T	-
13.	Handling of liquid nitrogen	-	P
14.	Quality control and fertility tests (in vitro) of frozen bovine semen	T	P
15.	Maintenance of laboratory hygiene and bio- safety in germplasm production	T	P

Name of the training programme : Genetic markers based approaches for improving cattle production

Feature of training : Biotechnological and bioinformatics tools and techniques for cattle genomic research

Potential areas of application : Trained personal will acquire hands-on training on the basic molecular as well as bioinformatics tools related to functional genomic research for cattle improvement

Target group : Assistant professors/ Research scholars

Duration of training : 10 days

Intake capacity : 10-15

Training outcome : Creation of trained personals in the field of advanced molecular genetic studies for improvement of cattle production

Course contents

S.No.	Contents	Theory	Practical
1.	Cattle genetic resources in India: Conservation and utilization	T	-
2	Genomic selection towards livestock improvement: Current perspectives and challenges	T	-
3	Extraction of genomic DNA from biological samples and their quantification	-	P
4	Basic bioinformatics tools for primer designing, analysis and interpretation of DNA sequences, submission of nucleotide sequence to gene bank	-	P
5	In-vitro amplification of DNA, gel electrophoresis and gel documentation, DNA quality and quantity detection.	-	P
6	Molecular markers and their application in livestock research	T	-
7	Application of molecular markers in breeding for disease resistance	T	-
8	Hands on training on PCR-RFLP interpretation of results	-	P
9	Demonstration of Single Strand Conformation Polymorphism technique	-	P
10	Demonstration of microsatellite genotyping data	-	P
11	Microarray Data Analysis for gene expression studies in Livestock Improvement	T	-
12	Microarray probe designing and data interpretation	-	P
13	SNP array based prediction of molecular breeding value	T	P
14	Intellectual property and germplasm management	T	
15	Genome annotation in cattle genetic research	T	P
16	Bioinformatics tools in function genome analysis of livestock	T	P
17	RNA isolation and cDNA synthesis	-	P
18	Analysis of gene expression using real time PCR; Designing of RT-PCR primers and probes	T	P
19	Biomarkers for improving semen quality in livestock	T	-
20	SDS PAGE analysis of proteins	-	P
21	Western blot analysis for detecting antigen antibody reactivity	-	P
22	Transcriptome data analysis	T	P
23	Weighted gene expression network analysis using transcriptome data	T	P
24	Examination and evaluation	-	-
25	Feed-back from trainees	-	-

PROJECT DIRECTORATE ON FOOT AND MOUTH DISEASE

Mukteswar, Nainital, Uttarakhand

Year of Establishment: 2000

In order to strengthen the research activity on FMD, an integrated "All India Co-ordinated Research Project for FMD virus typing" was initiated in 1968 by ICAR with a Central Laboratory at Mukteswar and three Regional Centres located at Hisar, Hyderabad and Calcutta. Subsequently the scope of this project was expanded in July, 1971 to All India Co-ordinated Research Project for Epidemiological studies on Foot-and-Mouth disease with increased outlay and inputs in terms of laboratory space, experimental animal shed facility, scientific manpower, four additional Regional Centres and Epidemiological Units for extensive FMD surveillance throughout the country. In the successive years the activity of the project was expanded by incorporating several regional centers and network units up to 8th plan. During 9th Five Year plan period (1997-2002) in July 2000, the project has been upgraded to a Project Directorate functioning with the Central Laboratory at Mukteswar, 8 Regional Centers and 15 Network Units distributed in all the states in the country.

PDFMD is working with a mission of active epidemiological surveillance through regularly monitoring antigenicity and genomic make up of Foot and Mouth Disease virus strains responsible for disease outbreaks, to provide training in diagnosis and epidemiology, and to develop technologies for making country free from FMD. The vision of the institute is to make India free from Foot and Mouth Disease.

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Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Collection, processing, preservation and transport of clinical materials and serum samples for the diagnosis of FMD.

Feature of training : Collection, preservation and dispatch of clinical samples from outbreaks of FMD

Potential areas of application : Confirmatory diagnosis of FMD and retrieval of FMD virus for further studies and its use in vaccine

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 5 days

Intake capacity : 10

Training outcome : Skilled manpower development for proper sampling of clinical materials will Help in FMD diagnosis

Course contents

S.No.	Contents	Theory	Practical
1	Introduction to FMD with symptoms and pathogenesis	T	-
2	Collection, storage and transport of clinical and serum samples in the face of out breaks	T	P
3	Processing, barcoding and preservation of clinical samples	T	P
4	Processing, barcoding and preservation of serum samples	T	P
5	Use of clinical and serum samples in diagnosis of FMD	T	P

Name of the training programme : Sandwich ELISA for serotyping of FMD virus

Feature of training : Hands on Training of sandwich ELISA for diagnosis and serotype detection of FMD

Potential areas of application : Confirmatory diagnosis of FMD

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 5 days

Intake capacity : 10

Training outcome : Development of skilled human resources on FMD serotyping using sandwich ELISA

Course contents

S.No.	Contents	Theory	Practical
1.	Principles of FMD diagnosis	T	-
2.	Principles and procedure of sandwich ELISA	T	P
3.	FMDV serotyping using sandwich ELISA	T	P
4.	FMDV serotyping using sandwich ELISA hands on training	-	P
5.	Result interpretation and trouble shooting	T	P

Name of the training programme : Isolation and Identification of FMD virus in cell culture

Feature of training : Hands on training on isolation and identification of FMD virus in cell culture

Potential areas of application : Confirmatory diagnosis of FMD and further use of FMD virus in research. Diagnosis and vaccine production

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 7 days

Intake capacity : 6

Training outcome : To learn the procedure of isolating FMD virus in cell culture for further downstream application

Course contents

S.No.	Contents	Theory	Practical
1.	Basic Principles of cell culture and biosafety norms to be followed in the laboratory	T	-
2.	Handling of the healthy mammalian cell line susceptible for FMDV and hands on training	T	P
3.	Preparation of 10% PBS suspension for clinical materials and its infection into cell line and hands on training	T	P
4.	Studies on cytopathic effect of FMD Virus	-	P
5.	Harvesting and serial passage	-	P
6.	Identification of FMD Virus by ELISA	-	P
7.	Result analysis and troubleshooting	T	-

Name of the training programme : Multiplex PCR for diagnosis and serotyping of FMD virus

Feature of training : Hands on Training of multiplex PCR (mPCR)

Potential areas of application : Confirmatory diagnosis FMD

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 5 days

Intake capacity : 6

Training outcome : Development of human resources for FMD virus serotyping using multiplex PCR in ELISA negative clinical samples

Course contents

S.No.	Contents	Theory	Practical
1.	Principles of FMD diagnosis	T	-
2.	Use of Multiplex PCR in FMD diagnosis	T	-
3.	RNA extraction from the clinical samples for use in multiplex PCR	-	P
4.	Reverse transcription and mPCR of extracted RNA	-	P
5.	Hands on training on FMDV serotyping using multiplex PCR	-	P
6.	Result interpretation and trouble shooting	T	-

Name of the training programme : LAMP Assay for diagnosis of FMD

Feature of training : Hands on training on FMD-LAMP assay for pen side diagnosis

Potential areas of application : Diagnosis of FMD at farmer's door step

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 4 days

Intake capacity : 6

Training outcome : Rapid and user friendly FMD diagnosis at field level

Course contents

S.No.	Contents	Theory	Practical
1.	Overview of molecular diagnostic techniques for FMD diagnosis	T	-
2.	Principles of FMD-LAMP assay	T	-
3.	FMD diagnosis using FMD-LAMP assay- Demo	-	P
4.	FMD diagnosis using FMD-LAMP assay hands on training	-	P
5.	FMD diagnosis using FMD-LAMP assay hands on training	-	P
6.	Result interpretation and trouble shooting	T	P

Name of the training programme : LPB-ELISA for determination of Vaccinal and herd Immunity with retrospective diagnosis of FMD

Feature of training : Liquid phase blocking ELISA (LPB-ELISA) and its use in the assessment of vaccinal and herd immunity with retrospective diagnosis of FMD

Potential areas of application : FMD diagnosis, sero - surveillance and Monitoring of vaccinal immunity

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 4 days

Intake capacity : 6

Training outcome : Development of skilled man powers for their use in the FMD diagnostic laboratories, and vaccine manufacturing industries

Course contents

S.No.	Contents	Theory	Practical
1.	Principles and procedure of LPB ELISA and their use in FMD sero surveillance and assessment of vaccinal immunity	T	-
2.	Hands on training on LPB ELISA for FMD type O virus	-	P
3.	Hands on training on LPB ELISA for FMD type A virus	-	P
4.	Hands on training on LPB ELISA for FMD type Asia 1 virus	-	P
5.	Estimation of antibody titers in serum samples against FMD serotypes O, A and Asia1	T	P
6.	Result interpretation and trouble shooting	T	-

Name of the training programme : DIVA- ELISA for differentiation of vaccinated from infected animals

Feature of training : Hands on training on DIVA- ELISA for differentiation of vaccinated from infected animals

Potential areas of application : FMD surveillance and monitoring

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 4 days

Intake capacity : 10

Training outcome : To learn 3AB3 DIVA- ELISA technique for FMD serosurveillance and detection of FMD Virus carrier animals

Course contents

S.No.	Contents	Theory	Practical
1.	Principle and protocol DIVA ELISA in FMD	T	-
2.	Demonstration of DIVA-ELISA test.	-	P
3.	Hands on training of DIVA-ELISA test.	-	P
4.	Result interpretation and troubleshooting	T	-

Name of the training programme : DIVA Panel testing for detection of FMD free animals

Feature of training : Hands on training on DIVA Panel- ELISA for differentiation of vaccinated from infected animals

Potential areas of application : FMD surveillance and monitoring and certification of FMD free animals

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 6 days

Intake capacity : 10

Training outcome : To learn DIVA-ELISA technique for FMD serosurveillance and its use in certification of FMD free animals for export

Course contents

S.No.	Contents	Theory	Practical
1.	Introduction of differentiation of infected from vaccinated animals	T	-
2.	Demonstration of Multiple NSP DIVA panel assay against 2C, 3D, 3ABC non structural proteins	T	P
3.	Hands on training of Multiple NSP DIVA panel assay for 2C, 3D, 3ABC non structural proteins	-	P
4.	Results interpretation	T	-

Name of the training programme	:	Nucleotide sequencing of FMD virus isolates for molecular epidemiology
Feature of training	:	Hands on training on nucleotide sequencing
Potential areas of application	:	Molecular epidemiology of FMD
Target group	:	Scientists/ SAU faculty/ Field veterinary officers
Duration of training	:	5 days
Intake capacity	:	6
Training outcome	:	Deducing nucleotide sequence of FMD virus for molecular epidemiology and tracking of FMD virus movement

Course contents

S.No.	Contents	Theory	Practical
1.	Principle underlying nucleotide sequencing	T	-
2.	Demo and hands on training on RT-PCR.	-	P
3.	Demo and hands on training on Gel purification and sequencing reaction.	-	P
4.	Gel electrophoresis in automatic genetic analyzer. Demo and hands on training.	-	P
5.	Result interpretation and troubleshooting	T	P

Name of the training programme	:	Two-dimensional Micro Neutralization Test (2D-MNT) for vaccine matching exercise
Feature of training	:	Hands on training on determination of antigenic relationship of field viruses by 2D-MNT with the vaccine virus strain
Potential areas of application	:	FMD Vaccine matching exercise to evaluate the efficacy of vaccine
Target group	:	Scientists/ SAU faculty/ field veterinary officers

Duration of training : 10 days

Intake capacity : 6

Training outcome : To study antigenic relationship of field viruses with the vaccine strain and evaluation of vaccine candidate virus

Course contents

S.No.	Contents	Theory	Practical
1.	Principle of 2D-MNT and its application in FMD	T	-
2.	Protocol for virus titration, demo and hands of training	T	P
3.	Cell culture of FMD Virus susceptible cell lines	-	P
4.	Infection of healthy cell lines with FMD virus	-	P
5.	Hands on training on virus titration and protocol of 2D- MNT	T	P
6.	Result analysis for virus titration and demo on 2D-MNT	-	P
7.	Hands on training on 2D-MNT	-	P
8.	Hands on training and result analysis of demo on 2D-MNT	-	P
9.	Repeat of hands on training on 2D-MNT and result interpretation of 2D- MNT	-	P
10.	Result analysis, interpretation and troubleshooting	T	-

Name of the training programme : LPB ELISA for antigenic comparison of FMD virus serotypes O, A and Asia1

Feature of training : Hands on training on determination of antigenic relationship of field viruses by LPBE

Potential areas of application : FMD vaccine matching exercise

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 5 days

Intake capacity : 6

Training outcome : Development of skilled human resources to study antigenic relationship of field viruses with the vaccine strain and use in vaccine industry

Course contents

S.No.	Contents	Theory	Practical
1.	Introduction of antibody titration against FMDV	T	-
2.	Demonstration of LPB ELISA for antigenic comparison	T	P
3.	Hands on training of LPB ELISA for antigenic comparison	-	P
4.	Estimation of titers	T	-
5.	Antigenic comparison of FMDV serotypes O, A, Asia1	T	P

Name of the training programme : Production of sero typing ELISA kit

Feature of training : Production of FMD virus serotyping kit for confirmatory diagnosis

Potential areas of application : Production of FMD diagnostic reagents/kits for commercial purposes

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 10 days

Intake capacity : 6

Training outcome : Skilled manpower will be developed for vaccine and diagnostic industry and entrepreneurs and production oflarge scale diagnostic kits will help in better diagnosis of FMD with export potential

Course contents

S.No.	Contents	Theory	Practical
1.	Procedure for antigen preparation for serotypes O, A and Asia1	T	-
2.	Production of inactivated antigens ELISA for serotypes O, A and Asia 1 for positive control	T	P
3.	Procedure for serum preparation for serotypes O, A and Asia1	T	-
4.	Raising of hyper immune serum against serotypes of O,A and Asia 1 in rabbit and guneapigs	T	P
5.	Titration of the serum antibodies raised in gunea pigs and rabbits	T	P
6.	Freezdrying of hyper immune serum	T	P
7.	Optimization of ELISA test protocol using checker boards	T	P
8.	Assembly of the kit with standard protocol	T	P
9.	Validation of Serotyping ELISA kit	-	P

Name of the training programme : Production of LPB ELISA kit

Feature of training : Production of LPB ELISA kit for estimation of antibody

Potential areas of application : Production of FMD diagnostic reagents/kits for commercial purposes

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 10 days

Intake capacity : 4

Training outcome : Skilled manpower will be developed for vaccine and diagnostic industry and entrepreneurs and production of large scale diagnostic kits will help in better diagnosis of FMD with export potential

Course contents

S.No.	Contents	Theory	Practical
1.	Procedure for antigen preparation for serotypes O, A and Asia1	T	-
2.	Production of inactivated antigens ELISA for Serotypes O, A and Asia 1 for positive control	T	P
3.	Procedure for serum preparation for serotypes O, A and Asia1	T	-
4.	Raising of hyper immune serum against serotypes of O,A and Asia 1 in rabbit and guneapigs	T	P
5.	Titration of the serum antibodies raised in gunea pigs and rabbits	T	P
6.	Freez drying of hyper immune serum	T	P
7.	Optimization of ELISA test protocol using checker boards	T	P
8.	Assembly of the kit with standard protocol	T	P
9.	Validation of LPB ELISA kit	-	P

Name of the training programme : Production of 3AB3 DIVA-ELISA kit

Feature of training : Hands on training on production of 3AB3 DIVA-ELISA kit

Potential areas of application : Production of FMD diagnostic reagents/ kits

Target group : Scientists/ SAU faculty/ field veterinary officers

Duration of training : 10 days

Intake capacity : 4

Training outcome : To produce and optimize the 3AB3 DIVA-ELISA Kit

Course contents

S.No.	Contents	Theory	Practical
1.	Introduction of concept, principle & procedure for production of 3AB3 DIVA- ELISA Kit	T	-
2.	Inoculationn& induction of recombinant bacterial clone	-	P
3.	To check expression of r3AB3 protein on SDS-PAGE & western blot	-	P
4.	Metal affinity purification of r3AB3 protein	-	P
5.	Checkerboard titration, to fix the concentration of r3AB3 protein for coating single ELISA plate	-	P
6.	Freeze drying and checking of reactivity of r3AB3 protein	-	P

PROJECT DIRECTORATE ON ANIMAL DISEASE MONITORING AND SURVEILLANCE

Hebbal, Bangalore

Year of Establishment: 2000

INDIA has the world's largest livestock population distributed in different geo-agro-climatic conditions, management, migratory, health care and zoo-sanitary practices. Animal health is the backbone of the rapidly growing livestock industry. Further, the current magnitude of animal disease situation in the country is a matter of concern due to considerable economic losses. Establishment of early warning surveillance systems, preparing for, investigating and responding to priority animal diseases is very much critical in reducing morbidity and mortality in vulnerable livestock populations, keeping in view of protection of animal health security. Delay in the detection of outbreaks and inadequate preparedness and response aggravates the impact of spread of diseases, leading to increased numbers of cases, increased duration of epidemics, excess mortality and the potential for spread to other areas nationally, regionally, or globally. As there is no organized disease reporting, monitoring, surveillance and forecasting system for a planned approach to livestock health care and production in the country, the Indian Council of Agricultural Research (ICAR) initiated All India Co-ordinated Research Project on Animal Disease Monitoring and Surveillance(AICRP-ADMAS) in the 7th five year plan and became fully functional during the last quarter of 1987 with the establishment of four Regional Research Units (RRUs), located at Bengaluru, Hyderabad, Pune, and Ludhiana. The Central Coordinating Unit (CCU) was established at the Institute of Animal Health and Veterinary Biologicals, Bangalore

to coordinate research activities of the regional units. ADMAS was further strengthened in the 8th plan with support of ICAR and European Union by giving the responsibility of the National Project on Rinderpest Eradication (NPRE) involving the participation of 32 state level diagnostic/ disease investigation laboratories. Later, realizing the impact of animal disease monitoring and surveillance on our entire livestock sector and to give a boost, ICAR upgraded this project to an independent institute status on 1st April, 2000 (during the IX plan) as – "**Project Directorate on Animal Disease Monitoring and Surveillance (PD_ADMAS)"** with ten AICRP_ADMAS centres. The Directorate got further impetus with addition of five more collaborating units in the 10th plan. In XI plan Guwahati Centre in Assam has been included as a collaborating unit of AICRP, ADMAS. In the XII plan it is proposed to rename as **National Institute for Veterinary Epidemiology and Disease Informatics (NIVEDI)** with 31 AICRP centres.

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Epidemiology, diagnosis and control of the haemoprotozoan parasitic diseases

Feature of training : Theory lecture and hands on practical classes field visits

Potential areas of application : Epidemiological study and surveillance programme of the parasitic diseases

Target group : Field veterinary officers

Duration of training : 10 days

Intake capacity : 15

Training outcome :
1. Better surveillance of the disease
2. Better control of the disease
3. Better production
4. Better income of the farmer

Course contents

S.No.	Contents	Theory	Practical
1.	The disease pattern of major haemoprotozoan parasitic diseases of the large and small ruminants	T	-
2.	Role of vectors in the transmission of the haemoprotozoan diseases	T	-
3.	Climate change and its effect on different geographical parameters	T	-
4.	Vector dynamics and its role in disease pattern	T	-
5.	Advanced technique for identification of the parasite	T	-
6.	Identification, isolation and maintenance of the parasite *in vivo* and *in vitro*	T	P
7.	Diagnosis of the parasite by serological test using recombinant antigen	T	P
8.	Diagnosis of the parasite by PCR technique	T	P
9.	Control strategies of the diseases	T	-
10.	Risk analysis of the diseases	T	-
11.	Economic losses due to diseases	T	-
12.	Field visit	-	P

Name of the training programme	:	Recent approaches for the diagnosis and monitoring of Leptospirosis
Feature of training	:	Theory lecture and hands on practical classes Field visits
Potential areas of application	:	Monitoring and surveillance of animal diseases
Target group	:	Field veterinarians/ officers from Disease Investigation Laboratories
Duration of training	:	10 days
Intake capacity	:	15
Training outcome	:	1. Better disease diagnosis and monitoring. 2. Improved methods for diagnosis of bovine leptospirosis

Course contents

S.No.	Contents	Theory	Practical
1.	*Overview on leptospirosis:*		
	• The disease pattern of Leptospirosis in large and small animals, as well as human.	T	-
	• Cultural characters, biochemical test, Isolation and maintenance of the leptospira invitro.	T	-
	• Conventional and point of care diagnostics for Leptospirosis.	T	-
	• Safety precaution, preparation of glassware and culture media. Culturing and sub culturing of leptospirosis.	-	P
2.	*Conventional diagnostic approaches*		
	• Dark field examination and staining of leptospirosis	T	-
	• Discussion of Control strategies and risk factors of leptospira	T	-
	• Dark field examination and staining of leptospirosis.	-	P
3.	*Microscopic agglutination test (MAT)*		
	• Panel of Leptospira Antigen preparation and microscopic agglutination test (MAT)	T	-
	• Antigen preparation and microscopic agglutination test (MAT)	-	P
4.	*Molecular diagnosis*		
	• Extraction of DNA from clinical samples (Blood/Plasma/ serum/urine) and PCR for diagnosis of Leptospirosis.	T	P
	• Application of PCR techniques for differentiation of leptospiral species	T	P
5.	*Molecular typing*		
	• Differentiation of leptospiral species by rpoB and LipL41 gene based sequence analysis.	T	P
	• Molecular typing of leptospiral strains	T	P

S.No.	Contents	Theory	Practical
6.	*Recombinant antigen based Diagnosis* • Molecular targets (recombinant proteins) for development of improved diagnostics. • Monitoring of bovine leptospirosis: Recombinant antigen based indirect ELISA for bovine leptospirosis. • Transformation and cloning techniques • Colony PCR and selection of clone.	 T T - -	 - - P P
7.	*Socio-Economic impact* • Economic impact of Lepospirosis in animals and Human. • Recombinant antigen based indirect ELISA for bovine leptospirosis. Hands on training demonstration.	 T -	 - P
8.	*Epidemiology* • Epidemiology of bovine Leptospirosis in India • Use of epidemiological tools for epidemiology of Leptospirosis. • Random sampling technique • Sero monitoring. • Random sample collection methods, Epidemiological Mapping, Disease Pattern etc.,	 T T T T T	 - - - - -
9.	*Recent Molecular diagnostic techniques* • Upcoming diagnostics and advanced technique for identification of leptospirosis and Field Visit-for collection of samples procedure. • Filed visit	 T -	 - P

Name of the training programme : Veterinary Epidemiology training for field veterinarians

Feature of training : Theory lecture and hands on practical classes Field visits

Potential areas of application : Surveillance and monitoring of livestock diseases. Disease outbreak investigation. Sampling and basic laboratory techniques. Epidemiological data recording, presentation and analysis

Target group : Field veterinary officers, Field disease investigation officers, and diagnostic officers

Duration of training : 10 days

Intake capacity : 15

Training outcome : Better diagnosis, surveillance and monitoring. Improved methods for control of livestock diseases. Improved epidemiological and analytical capabilities

Course contents

S.No.	Contents	Theory	Practical
1.	Introduction to epidemiology	T	-
2.	Role of epidemiology in disease control	T	-
3.	Sampling techniques, preservation and transportation	T	-
4.	Specimen management in the field	T	-
5.	Pen side diagnosis: Post-mortem examination and immunodiagnostics	T	P
6.	Role of laboratory in the Field and disease diagnostic tests	T	-
7.	Art and science of disease outbreak investigation	T	-
8.	Strategies for control of livestock and poultry diseases	T	-
9.	Questionnaire design and epidemiological data collection	T	-
10.	Field reports: Documentation and communication	T	-
11.	Introduction to disease surveillance and surveillance systems	T	-
12.	Field visits	-	P

NATIONAL RESEARCH CENTRE ON CAMEL

Bikaner, Rajasthan

Year of Establishment: 1984

CONSIDERING the importance of camel in the socio-economic development of arid and semi-arid zones, Government of India established a Project Directorate on Camel at Bikaner on July 5, 1984 transferring the physical facilities (149 camels of Bikaneri breed and around 824 ha land) of erstwhile Camel Breeding Farm of Sukhadia University, Udaipur. It was upgraded to National Research Centre on Camel (NRCC) on September 20, 1995. Initially, NRCC started with the mandate of developing infrastructure facilities for conservation and preservation of existing breed of camel and generate scientific and technical information. With terms of a shift towards mechanization, the NRCC has taken up issue with an aim of restoration of cultural, economic and aesthetic value of camel in rural life if Indian desert. It is a premier institute for research and development of camel and provide leadership through basic and applied multi-disciplinary research and training and also acts as a national repository of information on camel and to collaborate with national and international agencies for camel research and development.

Establishment of elite herd

Since the distribution of dromedaries (one-humped camel) in India is confined to North-West dry desert, the NRCC is mainly focussing on basic and applied aspect of one-humped

Bikaneri camel

Jaisalmeri camel

Kachchhi camel

Mewari camel

camel. For this an elite herd of 355 animals of Indian camel breeds comprising of Bikaneri, Jaisalmeri, Kachchhi and Mewari has been established at Bikaner following continuous selection for last two decades and true to the type animals are maintained in the camel herd. The Bikaneri, Kachchhi and Mewari have been found to be good milch breeds while the Jaisalmeri breed is excellent for racing.

For genetic improvement of camels in the breeding tract of various breeds elite 102 male camels have so far been distributed in the field to improve the farmers' animals.

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Breed Identification and performance recording in camel

Feature of training : Major camel breeds, phenotypic characters, Performance recording, maintenance of production records, performance analysis, molecular characterisation and data analysis.

Potential areas of application : To maintain pure line breed and to avoid inbreeding for better performance.

Target group : Veterinary officers, extension workers, scientists/ University teachers, students, camel keepers

Duration of training : During every January month of the year (for 4 years), each program of 5 days

Intake capacity : 15

Learning outcome : Conservation of pure breeds of camel

Course contents

S.No.	Contents	Theory	Practical
1.	Description camel breeds and various phenotypic characters	T	-
2.	Performance recording, maintenance, performance analysis	T	-
3.	Molecular characterisation and data analysis using various softwares	T	-
4.	Identification of different breeds	-	P
5.	Method of performance recording	-	P
6.	Tools of molecular characterisation and data analysis	-	P

Name of the training programme	:	Urea molasses multi-nutrient Block (UMMB) production and utilization
Feature of training	:	Importance of UMMB as supplementary feed in animals for optimization of production, reproduction health performance, practical demonstration and training for mixing, block making, briquetting, drying-preparation of UMMB, feeding of UMMB/mixtures to camel and precautions to be taken care while feeding to other animals, storage and transport of UMMB, procedure of licensing for getting molasses from excise dept. and its procurement from sugar factories
Potential areas of application	:	Supplementary feeding for balancing ration.
Target group	:	Veterinary officers, extension workers, scientists/ University teachers, students, camel keepers
Duration of training	:	During every Oct-November months of the year (for 4 years), each program of 5 days
Intake capacity	:	15
Learning outcome	:	To prepare UMMB and it's quality maintenance, storages, transport and use for better performance of camel

Course contents

S.No.	Contents	Theory	Practical
1.	Quality analysis and assurance of various ingredients to be used in UMMB	T	-
2.	UMMB as supplementary feed in animals for optimization of production, reproduction health performance	T	-
3.	Mixing, block making, briquetting, drying-preparation of UMMB	T	-
4.	Feeding of UMMB/mixtures to camel and precautions to be taken care while feeding to other animals	T	-
5.	Storage and transport of UMMB, Procedure of licensing for getting molasses from Excise Dept. and its procurement from sugar factories	T	-

S.No.	Contents	Theory	Practical
6.	Practical demonstration for mixing, block making, briquetting, drying-preparation of UMMB,	-	P
7.	Feeding of UMMB/mixtures to various groups of camels and guidelines while feeding to other animals	-	P
8.	Quality analysis of various ingredients to be used in UMMB and UMMB as a final product.	-	P

Name of the training programme : Complete fodder block making and enrichment

Feature of training : Identification of coarse fodder available in arid, Importance of urea treatment of cereal straw, practical demonstration of urea treatment of wheat and bajra straw, feeding precautions. Use of urea treated straw in compact fodder block, practical training of preparation of complete feed blocks/pellets.

Potential areas of application : Feeding camels under semi intensive and intensive system

Target group : Veterinary officers, extension workers, scientists/ University teachers, students, camel keepers

Duration of training : During every Sept-Oct months of the year (for 4 years), each program of 5 days

Intake capacity : 15

Learning outcome : To utilize coarse fodder and other ingredients to make complete feed block for better performance of animals.

Course contents

S.No.	Contents	Theory	Practical
1.	Identification of nonconventional feeds ,Nutritional quality examination of various feeds and fodders	T	-
2.	Importance of urea treatment of cereal straw, Urea treatment of wheat and bajra straw in arid region	T	-
3.	Feeding precautions. Feeding of treated straws to camel/cattle/buffalo/ sheep/goat	T	-
4.	Use of urea treated straw in compact fodder block	T	-
5.	Practical demonstration of urea treatment of different straws/coarse fodders like wheat and bajra straw in arid region	-	P
6.	Identification and processing of different ingredients— Grinding, pulverising , mixing,compacting, pelleting etc	-	P
7.	Method of compact fodder block making	-	P
8.	Processes involved in pelleting of complete feeds	-	P

Name of the training programme : Testing the quality of feed and feed ingredients

Feature of training : Physical examination of feed and feed and ingredients, proximate composition analysis, Estimation of important anti-nutritional factors/ principles in feed and fodder, precautions in preserving feed and fodder, Storage of feed ingredients and processed feeds.

Potential areas of application : Selection of quality feeds

Target group : Veterinary officers, extension workers, scientists/ University teachers, students, camel keepers

Duration of training : During every Oct-November months of the year (for 4 years), each program of 5 days

Intake capacity : 15

Learning outcome : To know nutritional quality of various type of feed ingredients and it's preservation, storages etc

Course contents

S.No.	Contents	Theory	Practical
1.	Proximate composition analysis	T	-
2.	Impact of anti-nutritional factors/principles in feed and fodder on animal production and health, safe levels of anti nutritional factors in various feeds and fodders	T	-
3.	Precautions in preserving feed and fodder	T	-
4.	Storage of feed ingredients and processed feeds	T	-
5.	Physical examination of feed and feed and ingredients, methods of nutritional analysis	-	P
6.	Estimation of important anti-nutritional factors/principles in feed and fodder	-	P
7.	Preservation of feed and fodder, storage of feed ingredients and processed feeds	-	P

Name of the training programme : Production of Area Specific Mineral Mixture (ASMM)

Feature of training : Importance and requirement of minerals in diet of camel for optimization of production, reproduction and health performance, practical demonstration and testing of formulation and mixing for preparation of ASMM in complete feed pellets, quality assurance of various ingredients to be used in ASMM, feeding of ASMM to camels according to requirement, packing, storage and transport of ASMM

Potential areas of application : To prepare mineral mixture as per area and production function need.

Target group : Veterinary officers, extension workers, scientists/ University teachers, students, camel keepers

Duration of training : During every July-August Months of the year (for 4 years), each program of 5 days

Intake capacity : 15

Learning outcome : To know about ASMM and it's application to avoid nutritional deficiency etc

Course contents

S.No.	Contents	Theory	Practical
1.	Importance and requirement of minerals in diet of camel for optimization of production, reproduction and health performance	T	-
2.	Various mineral sources and its availability in mineral compounds	T	-
3.	Quality assurance of various ingredients to be used in ASMM	T	-
4.	Feeding of ASMM to camels according to requirement	T	-
5.	Packing, storage and transport of ASMM	T	-
6.	Practical demonstration and mixing of different ingredients in the formulation for preparation of ASMM, Importance and requirement of minerals in diet of camel for optimization of production, reproduction and health performance	-	P
7.	Testing quality of various ingredients to be used in ASMM	-	P
8.	Feeding of ASMM to camels as per requirement	-	P
9.	Packing, storage and transport of ASMM	-	P

Name of the training programme : Artificial insemination in camel using liquid semen

Feature of training : Detection of rut in camels, handling of camel in rut, collection of semen from breeding males, semen evaluation and processing, preservation and transport of liquid semen, examination of females for breeding, artificial insemination using liquid extended semen, pregnancy diagnosis in camel

Potential areas of application : Semen collection, evaluation and preparation of female camels for breeding

Target group : Veterinary officers, extension workers, scientists/ University teachers, students, camel keepers

Duration of training : During every December-January months of the year (for 4 years), each program of 5 days

Intake capacity : 15

Learning outcome : To increase reproduction efficiency during non-seasonal period

Course contents

S.No.	Contents	Theory	Practical
1.	Anatomy of reproductive organs of male and female camel, reproduction behavior of camels	T	-
2.	Importance of AI in camel and problems associated with AI in camel	T	-
3.	Assisted reproductive technologies in camel and its significance to improve fertility	T	-
4.	Examination of females for breeding	-	P
5.	Artificial insemination using liquid extended semen	-	P
6.	Pregnancy diagnosis in camel	-	P
7.	Practical of rut detection in camels, handling of camel in rut	-	P
8.	Collection of semen from breeding males, Semen evaluation and processing, Preservation and transport of liquid semen	-	P

Name of the training programme : Camel milking and camel milk products preparation and quality control

Feature of training : Management of milking camels, camel milking & clean milk production, rapid platform tests, basic dairy operations, preparation of different camel milk products, storage and preservation of milk and milk products, sensory evaluation of dairy products, quality assurance in dairy processing, cleaning and sanitations of dairy equipments and utensils etc

Potential areas of application : To popularise the camel milk and its products

Target group : Farmers/ entrepreneurs with 10+2 science (must be engaged in milk production/collection/ processing) and also Veterinary officers, extension workers, scientists/ University teachers, students, camel keepers

Duration of training : During every April-May months of the year (for 4 years), each program of 10 days

Intake capacity : 15

Learning outcome : To make value added camel milk products for better utilization of camel milk

Course contents

S.No.	Contents	Theory	Practical
1.	Importance of camel milk compared to other livestock milk, world status of camel milk use and marketing	T	-
2.	Basic dairy operations, rapid platform tests to detect quality milk, Principles of quality tests	T	-
3.	Camel milking & clean milk production, various international and national standards for accepted quality of milk	T	-
4.	Principles of preparation of different camel milk products, storage and preservation of milk and milk products	T	-
5.	Management of milking camels, camel milking & clean milk production, Rapid platform tests	-	P
6.	Quality assurance in dairy processing, cleaning and sanitations of dairy equipments and utensils etc.	-	P
7.	Preparation of different camel milk products	-	P
8.	Storage and preservation of milk and milk products,sensory evaluation of dairy products	-	P

Name of the training programme : Udder care and management of mastitis in camels

Feature of training : Diagnostic techniques in camel mastitis (mainly by cultural examination, somatic cell count, pH etc.), Identification of causative agents of mastitis, treatment- antibiogram preparation, therapeutics with antibiotics; antioxidants etc., different types of mastitis in camels and its management, udder care specially during peri-parturient period, production of wholesome camel milk and its nutritional value

Potential areas of application : Promote camel as a dairy animal.

Target group : Veterinary officers, extension workers, scientists/ University teachers, students, camel keepers

Duration of training : During every Oct-May-June months of the year (for 4 years), each program of 10 days

Intake capacity : 15

Learning outcome : To know about management of mastitis to increase milk production

Course contents

S.No.	Contents	Theory	Practical
1.	Importance of production of wholesome camel milk and its nutritional value	T	-
2.	Mastitis in camels and its management, udder care specially during peri-parturient and post parturient period	T	-
3.	Diagnostic techniques in camel mastitis	T	-
4.	Identification of causative agents of mastitis	T	-
5.	Decision of Treatment of mastitis - Antibiogram preparation, therapeutics with antibiotics; antioxidants etc.	T	-
6.	Practical of diagnostic techniques in camel mastitis (by cultural physical examination, CMT, somatic cell count, pH etc.), identification of causative agents of mastitis	-	P
7.	Treatment- Antibiogram preparation, therapeutics with antibiotics; antioxidants etc	-	P
8.	Types of mastitis in camels and its management, udder care specially during peri and post parturient period	-	P

NATIONAL RESEARCH CENTRE ON EQUINES

Hisar, Haryana

Year of Establishment: 1985

Sub-Campus : Equine Production Campus of NRCE at Bikaner (1989)

NRCE, Hisar

EPC, Bikaner

Equine Production Campus, Bikaner

Derisory equine health and production technology support available in the past in the country caused considerable catastrophic effect on the equine production programmes that prompted the ICAR for the establishment of a premier species- oriented institute exclusively for development of equines in India. As such, the National Research Centre on Equines (NRCE) came into existence at Hisar for conducting research on equine health and production. Subsequently, realization of the need for improving the technologies for optimization of reproduction and work performance of the equines in order to uplift the socio-economic status of poor equine owners, led to establishment of a sub-campus – known as Equine Production Campus – at Bikaner (Rajasthan).

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Equine husbandry and management: Basics for equine owners

Feature of training : Basic equine husbandry and management practices covering feeding, stabling, foot care, bedding, housing and conditioning of the horse

Potential areas of application : Equine husbandry and health and production management practices

Target group : Equine owners and equine breeders

Duration of training : 8 days

Intake capacity : 20

Learning outcome : Broaden existing knowledge of equine owners with scientific equine husbandry and management practices

Course contents

S.No.	Contents	Theory	Practical
1.	Horse psychology and handling	T	P
2.	Conformation	T	P
3.	Buying a horse	T	P
4.	The digestive system and principles of feeding and watering	T	P
5.	Feed, fodder and pasture management	T	P
6.	Stabling and bedding, clipping, trimming, plaiting and grooming	T	P
7.	The foot care and shoeing	T	P
8.	Exercise and conditioning	T	P
9.	Clinical examination of mare & stallion for soundness	T	P
10.	First aid in equines	T	P
11.	Managing a horse enterprise	T	P
12.	Awareness about equine welfare issues	T	-
13.	Farm biosecurity	T	P
14.	Health record, registration and passport, etc.	T	P
15.	Equine energy in various operations including Agriculture	T	P
16.	Equine dung composting including vermi-composting	T	P

Name of the training programme : Improved equine production through cryopreservation of semen, Artificial Insemination and pregnancy diagnosis in equines

Feature of training : To upgrade the knowledge of the Veterinary officers/ livestock development officers of state deptt. of agriculture/ Animal Husbandry in the area of cryopreservation of semen, artificial insemination and pregnancy diagnosis in equines

Potential areas of application : Cryopreservation of semen, Artificial Insemination and pregnancy diagnosis in equines

Target group : Veterinary officers/ livestock development officers of state dept. of Agriculture/ Animal Husbandry

Duration of training : 8 days

Intake capacity : 20

Learning outcome : Knowledge and skill enhancement with hands on training in cryopreservation of semen, artificial insemination and pregnancy diagnosis in equines

Course contents

S.No.	Contents	Theory	Practical
1.	Worldwide present scenario of artificial insemination in equines.	T	-
2.	Physiology of pregnancy & pregnancy diagnosis in mare. Sexual behaviour of male and female horses	T	P
3.	• Serum based techniques for pregnancy diagnosis and their importance in equids • Artificial control of equine reproductive cycle and role of prostaglandin in equine reproduction	T	P
4.	• Endocrine control of oestrus cycle, follicular growth and ovulation in equines • Causes of infertility in equids	T	P
5.	• Hygiene management for semen production, evaluation and cryopreservation • Evaluation of stallion semen for artificial insemination	T	P

S.No.	Contents	Theory	Practical
6.	• Recent advances in cryopreservation and artificial insemination in equines • The influence of age, frequency of collection and season on equine semen production and its freezability	T	P
7.	• Factors involved in cryopreservation of semen in equids. • Microbial causes of equine abortions-their diagnosis and control	T	P
8.	Role of ultrasonography as a diagnostic tool in equine reproduction	T	P
9.	Technique of artificial insemination & pregnancy diagnosis in equines	T	P

Name of the training programme : Advance diagnostic techniques in equine clinical practices

Feature of training : To upgrade the knowledge of the Veterinary officers/ livestock development officers of state dept. of Agriculture/ Animal Husbandry with advance diagnostic techniques in equine clinical practices

Potential areas of application : Advance diagnostic techniques in equine clinical practices

Target group : Veterinary officers/ livestock development officers of state dept. of Agriculture/ Animal Husbandry

Duration of training : 8 days

Intake capacity : 20

Learning outcome : Know how of advance diagnostic techniques in equine clinical practices with hands on training in disease diagnosis and treatment

Course contents

S.No.	Contents	Theory	Practical
1.	Equine Diseases in India: Present scenario	T	-
2.	Important viral diseases in equines and their diagnosis and control	T	P
3.	Important bacterial diseases in equines and their diagnosis and control	T	P
4.	Important parasitic diseases in equines and their diagnosis and control		
5.	Diagnosis of nutritional deficiency diseases in equines and their management.	T	P
6.	Management of colic and lameness.	T	P
7.	Biosecurity measures for infectious disease management	T	P
8.	Diagnosis and management of reproductive disorders in equines.	T	P
9.	Clinical diagnosis of infectious and non –infectious diseases in equines	T	P
10.	Clinical pathology in disease management	T	P

NATIONAL RESEARCH CENTRE ON PIG

Rani, Guwahati, Assam

Year of Establishment: 2002

PIG rearing is one of the most important occupation of rural society especially the tribal masses of India. It has largely remained under nomadic system of rearing (scavenging) with the weaker sections of the society both as a source of income and a choice of meat for consumption. The bulk of the pig population in India is indigenous type with low growth rate and productivity. In order to improve the performance of indigenous pigs, ICAR has initiated AICRP on Pig in the year 1971. The review committee of AICRP on Pig in the year 1990 felt the necessity for establishing a full-fledged institute and recommended the establishment of National Research Centre on Pig preferably in the North Eastern part of the country where 40% of country's pig population is distributed. The National Research Centre on Pig was established in 2002 and started functioning from 2005 from private premises in Guwahati before permanently shifting to the main campus in the year 2009 after completion of the laboratory cum administrative building. The institute has the responsibility for overall development of the piggery sector in the country for excellence in pig production, health and product processing through innovative research and to provide technology backstopping for enhanced pork production, employment generation and poverty reduction among socially and economically weaker sections through the medium of pig husbandry.

Improved Germplasm

Two phenotypically different strains of indigenous pigs viz. Ghungroo and Niang Megha were collected from their breeding tracts and characterized genetically to establish their morphological, morphometrical, cytogenetic and DNA profile as per FAO recommended microsatellite loci. The productive and reproductive traits of these breeds were to facilitate and register them as first indigenous pig breeds of India.

Ghungroo

The Ghungroo pig is from Dooar's Valley of eastern sub-Himalayan region mainly in the Siliguri and Darjeeling districts of West Bengal. These are medium sized animals with compact body conformation. The typical body colour is black but white spots on forehead and other parts of body are not uncommon. The face is broad and flattened with slightly upwardly curved snout. Ears are large and heart shaped resembling those of an elephant. The head is prominent with bright eyes in males and little dull in females. Fore-quarters are light and hind-quarters heavy. Legs are small and stout. Body is covered with thick, coarse and long hairy coat. Tail is long, reaching below hock with long bristles. Average body weight at birth is around 1.0 Kg and 106.00 Kg at 1 year of age in both sexes. High prolificacy, fast growth, consumers' preference and adaptability to low management inputs are some of the outstanding characteristics of the breed. Pork of this breed under normal free range management is lean with less intramuscular fat. The average litter size at birth is about 12.

Ghungroo

Ghungroo sow with piglets

Improved variety of crossbred pig

An improved variety of crossbred pig was developed by crossing Ghungroo (indigenous) with Hampshire (exotic) breed. The crossbred pig is found to have superior growth rate, litter size at birth and weaning and feed conversion efficiency. This variety has been propagated in farmers' field through Institute Village Linking Programme (IVLP) programme.

Crossbred sow with piglets

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Artificial insemination in pigs

Feature of training : The training comprises of all aspects of intricacies involved in artificial insemination in pigs. Institute has standardized management and training of boars for semen collection over a dummy by gloved hand method. Also, standardized the semen collection, evaluation, preparation of extenders, dilution and preservation. Artificial Insemination studies in pigs have been undertaken widely in the institute and neighboring areas. Transfer of semen for AI in the field has been standardized for transporting to long distances.

Potential areas of application : State Animal Husbandry departments. ICAR institutes/ SAUs Pig farmers

Target group : Scientists, Assistant/ Associate professors/ Veterinary Asstt. Surgeons, Technical persons associated with pig farms

Duration of training : 10 days

Intake capacity : 15 persons

Learning outcome : The trainees will be exposed to training of boars for semen collection, preparation of extenders, dilution and preservation.

Course contents

S.No.	Contents	Theory	Practical
1.	Identification of breeds	T	-
2.	Breeding techniques	T	-
3.	Selection of boars	T	-
4.	Housing and management of boars	T	-
5.	Nutrition of breeding boars	T	-
6.	Training of boars for semen collection	T	-
7.	Semen evaluation: different techniques	T	-

S.No.	Contents	Theory	Practical
8.	Preparation of semen extender for preservation of semen, dilution of semen and packaging	T	-
9.	Transfer & transportation of semen for AI	T	-
10.	Physiology of reproduction in sow/gilts along with sign of heat	T	-
11.	Synchronization of estrus	T	-
12.	Determination of right time for AI	T	-
13.	Management of Pregnancy and nutrition	T	-
14.	Attention for parturition	T	-
15.	Care of neonates, agalactia and artificial lactation	T	-
16.	Weaning of piglets , service at weaning heat, infertility management	T	-
17.	Practical on identification techniques of breeds	T	P
18.	Breeding technique practical	-	P
19.	Selection criteria for boars	-	P
20.	Housing and management of boars	-	P
21.	Nutrition of breeding boars	-	P
22.	Training of boars for semen collection	-	P
23.	Semen evaluation: different techniques	-	P
24.	Preparation of semen extender for preservation of semen, dilution of semen and packaging	-	P
25.	Transfer & transportation of semen for AI	-	P
26.	Physiology of reproduction in sow/gilts	-	P
27.	Synchonization of estrus	-	P
28.	Determination of right time for AI	-	P
29.	Management of pregnancy and nutrition	-	P
30.	Attention for parturition	-	P
31.	Care of neonates, agalactia and artificial lactation	-	P
32.	Weaning of piglets , service at heat, infertility management	-	P

Name of the training programme	:	Clean pork production and value addition
Feature of training	:	The pig slaughter house cum pork processing plant has a capacity of slaughtering 10 pigs per day and is serving as a demonstration centre for the farmers and entrepreneurs.The state-of the-art slaughter house is equipped with all essential equipments required to ensure hygienic slaughter operations. Refined/ standardized the technologies for processing an array of value added pork products viz. frankfurters, hot dogs, salami, ham, cocktails, kababs, kofta, pork momo, pickles etc
Potential areas of application	:	State Animal husbandry departments. ICAR institutes/ SAUs Entrepreneurs in pork processing
Target group	:	Scientists, Assistant/ Associate professors, Technical persons associated with pork processing plants
Duration of training	:	10 days
Intake capacity	:	15 persons
Learning outcome	:	The trainees will be exposed to hygienic pig slaughter and processing of value added pork products

Course contents

S.No.	Contents	Theory	Practical
1.	Pig slaughter and processing	T	-
2.	Briefing of slaughter operations	T	-
3.	Introduction to value addition	T	-
4.	Processing of pork sausages	T	-
5.	Hygienic pig slaughter operations- II	T	-
6.	Meat quality assessment	T	-
7.	Parameters of emulsion quality	T	-
8.	Introduction to the grading of pork carcass	T	-
9.	Abattoir hygiene	T	-
10.	Meat inspection	T	-

S.No.	Contents	Theory	Practical
11.	Value addition	T	-
12.	Introduction to the GMP for meat plants	T	-
13.	Record keeping in meat plants	T	-
14.	Demonstration of hygienic pig slaughter - I	-	P
15.	Demonstration of methods for carcass quality assessment	-	P
16.	Practical session on meat quality assessment -I	-	P
17.	Demonstration of processing of pork sausages	-	p
18.	Demonstration of hygienic pig slaughter operations- II	-	P
19.	Practical session on meat quality assessment -II	-	P
20.	Practical session on different parameters of emulsion quality	-	P
21.	Practical session on microbiological assessment of pork	-	P
22.	Demonstration of hygienic pig slaughter operations- III	-	P
23.	Practical session on ante-mortem and post mortem inspection	-	P
24.	Hands on training on processing of pork sausages- II	-	P
25.	Quality management systems in abattoirs	-	P
26.	Record management	-	P

Name of the training programme : Scientific pig production practices

Feature of training : Genetic improvement of indigenous pigs through conventional and molecular means for increasing production and productivity and upgrading through suitable exotic breeds. Institute is assessing the nutrient requirement by different categories of pigs and balancing the ration accordingly with conventional/ non-conventional feed resources as per the agro-eco systems. Institute has developed suitable of pig health management protocols

Potential areas of application : State Animal Husbandry departments. ICAR institutes/ SAUs/ pig farmers

Target group : Scientists, Assistant/ Associate professors/ Farm managers working in state deptt., technical persons associated with pig farms

Duration of training : 10 days

Intake capacity : 15 persons

Learning outcome : The trainees will be exposed to hygienic pig slaughter and processing of value added pork products

Course contents

S.No.	Contents	Theory	Practical
1.	Introduction and importance of pig rearing	T	-
2.	Different housing systems for pig	T	-
3.	Selection of animals	T	-
4.	Handling and holding of pigs, identification & castration of male pigs	T	-
5.	Breeding in pigs- selection of breeding stock, breeding traits & age and weight at first service	T	-
6.	Farm cleaning, disinfection of farm and demonstration of good management practices followed in the pig farm	T	-
7.	Pig nutrition, feeding of new born piglets, weaners, growers, finisher pigs feeding of pregnant sows & farrowing sows	T	-
8.	Unconventional feed resources for pigs	T	-
9.	Methods for detection of heat and AI in pigs	T	-
10.	Management of new born, weaner, dry, pregnant pigs	T	-
11.	Common diseases in pigs (bacterial, viral, fungal, parasitic), treatment and control measures.	T	-
12.	Health calendar for pig and bios-ecurity measures	T	-
13.	Formulation of ration for different categories of pigs with conventional and non-conventional feed resources	T	-
14.	Visit to pig farm	-	P
15.	Practical on housing systems	-	P
16.	Indicators of selection	-	P
17.	Handling and holding of pigs, identification & castration of male pigs	-	P

S.No.	Contents	Theory	Practical
18.	Breeding in pigs- selection of breeding stock, breeding traits	-	P
19.	Farm cleaning, disinfection of farm and demonstration of good management practices followed in the pig farm	-	P
20.	Feed mixing and distribution	-	P
21.	Unconventional feed resources for pigs	-	P
22.	Methods for detection of heat and AI in pigs	-	P
23.	Management of new born, weaner, dry, pregnant pigs	-	P
24.	Bio-security measures in farm	-	P
25.	Treatment protocols for pig farm	-	P
26.	Formulation of ration for different categories of pigs	-	P

NATIONAL RESEARCH CENTRE ON MITHUN

Jharnapani, Nagaland

Year of Establishment: 1988

MITHUN, a rare bovine species of the North-eastern Hill Region (NEHR) is mainly found in four different States of India viz., Arunachal Pradesh, Nagaland, Manipur and Mizoram. With an aim to identify, evaluate and characterize the mithun germplasm available in the country, the National Research Centre on Mithun was established to conserve, improve and propagate mithun for meat, milk as well as hide through organized research and extension activities and also to act as repository of germplasm and information on Mithun.

Development of improved germplasm

NRC mithun has collected the typical animals of all the four strains (Arunchali, Nagaland, Manipuri and Mizoram) based on each of the states where mithun is found.

Arunachali mithun

Arunachali mithun

These mithuns are distributed in different districts of Arunachal Pradesh. The animals have massive, deep body conformation showing great variation in colour and phenotypes. The adult body weight vary from 450 to 600 kg in male and 350-400 kg in females.

Nagaland mithun

These are free ranging woodland animals distributed in several districts of Nagaland state. The animal has a massive, well built and sturdy body, with predominantly black or brown colour and white stockings. The body weight varies from 400-500 kg in males and 350-400 kg in females.

Nagaland mithun

Manipuri mithun

These are phenotypically similar to Nagaland type mithuns. However, they possess larger colour variations. The animals are distributed in jungles in the hilly terrain of the state. The relative body size is smaller weighing around 400-500 kg in males and 300-400 kg in females.

Manipuri mithun

Mizoram mithun

There is a small population of mithun in Mizoram distributed in upper hilly terrain of the state bordering Manipur. The animals are having heavy built and are mostly black or brown colour. The horns are more flatter than those of other strains.

Mizorum mithun

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Training on "Recent advances on mithun farming practices"

Feature of training : Skill upgradation

Potential areas of application : Mithun management

Target group : State VHO/VAS

Duration of training : 7 days

Intake capacity : 25

Learning outcome : Knowledge up gradation of participants and exposure to newer technologies

Course contents

S.No.	Contents	Theory	Practical
1. 2.	*Feed technology:* Different feeds and fodders and their evaluation techniques. Identification of feeds and fodders, Evaluation of nutritive quality	T	 P
3. 4.	*Disease control:* Important diseases, etiology and its control Diagnostic techniques and treatment procedure	T	 P
5. 6.	*Improving reproductive capacity:* Physiology of reproduction and its manipulation for higher reproductive efficiency Semen collection and preservation, estrus synchronization and AI	T	 P
7. 8.	*Value addition of mithun products:* Milk, meat and hides and its value added products, techniques of value addition to different mithun products Processing of milk, meat and hide and its packaging	T	 P
9. 10.	*Breeding Management :* Breed characterization, Breeding techniques Age determination through dentition, etc.	T	 P

Name of the training programme : Training on basic aspects of first aid, treatment and vaccination

Feature of training : Health improvement

Potential areas of application : Mithun health care

Target group : Para-veterinarians, rural youth, mithun farmers

Duration of training : One training for 3 days, and two trainings for 5 days each

Intake capacity : 25 participants in each

Learning outcome : Skill development for first aid and vaccination

Course contents

S.No.	Contents	Theory	Practical
1.	*Common Diseases:* Prevalence, Etiology, Sign & Symptoms, Lesions, Differential diagnosis and Treatment	T	
2.	Hands on training for taking various parameter for health assessment		P
1.	*Primary prophylactic health care:* Vaccination Schedule	T	
2.	Vaccination via different routes		P
1.	*Immunization:* Immunity and health	T	
2.	Field exposure and vaccination		P
1.	*Common parasites and deworming:* Common parasites and deworming schedule	T	
2.	Hands on training for various routes of administration		P

Name of the training programme : Training on scientific mithun farming practices and value addition to mithun products

Feature of training : Improving productivity and income/ Skill development for efficient management

Potential areas of application : Mithun management and value addition

Target group	:	Master trainers, State Vety. & AH Staff, SMS of KVKs/ SMS of KVKs and ATMAs facilitator
Duration of training	:	Two trainings for 7 Days each/ 4 Days
Intake capacity	:	25 participants in each
Learning outcome	:	Better mithun management and increased return/ knowledge up gradation of participants and exposure to newer technologies

Course contents

S.No.	Contents	Theory	Practical
1. 2.	*Feeding management of Mithun:* Feeds and Nutritional value and computation of TMR Computation of ration for different category and stages of anima	T	P
3. 4.	*Range management:* Common range fodders and trees Assessment of nutritional value of range fodders and its propagation	T	P
5. 6.	*Breeding Management:* Breed characterization, Breeding techniques, Estrus synchronization, AI, Age determination through dentition, etc. Semen collection and preservation, estrus synchronization, AI	T	P
7. 8.	*Disease Prevention and Control:* Common diseases and their control Diagnostic techniques and treatments	T	P
9. 10.	*Economics of Mithun farming:* Economic parameters for assessment of productivity Calculation of value of inputs and return. Developing bankable projects	T	P
11. 12	*Products technology:* Products of mithun origin and its preservation and value addition Processing of milk meat and hide	T	P

NATIONAL RESEARCH CENTRE ON YAK

Dirang, Arunachal Pradesh

Year of Establishment: 1989

ICAR established the National Research Centre on Yak (NRCY) at Dirang in West Kameng district of Arunachal Pradesh to make an in-depth study on traditional yak rearing and to formulate future plans, strategies and programmes for overall improvement and sustainable development of yak husbandry in India. In April, 2009 a state-of-the-art laboratory-cum-office building was inaugurated and presently full-fledged activities of this centre has been initiated. Since the last couple of decades, this centre has been conducting comprehensive research in the areas related to yak in genetics & breeding, nutrition, physiology, reproduction, health, management, product technologies and extension.

Germplasm identified

Indian yaks have been categorized into five distinct types namely, Common type, Bisonian type, Bare back yak, Hairy forehead and White yak.

Common Type

Common type yaks are comparatively smaller in size. These animals are apparently mild and docile in nature and are predominantly milch type animal. They constitute about 60% of yak population in Arunachal Pradesh.

Indian yak

Bisonian type

These animals have bison like horns and dorsal ridge. Head is thick and blunt, shoulders are well developed. Muzzle and nostrils are comparatively thick. These yaks are larger than common type and hair on the forehead are curled. Most of the animals are white, black or of mixed colours. These animals are predominantly of draught type.

Bisonian yak

Bare back type

These are heavy animals, comparatively larger in length. They have little hair on the back but drooping hair on all the sides almost touching the ground. Bare back are dual type, have good milking temperament and also possess character of draught. Around 14% of yaks are of this type in Arunachal Pradesh. Polled or horned characters show no particular trend. Some of the animals are humped which unlike cattle gradually descends from peak at third and fourth thoracic vertebrae.

Bare back type yak

Hairy forehead type

These animals have long bushy hair on forehead that even cover the eyes. The remaining features of yaks are of common type. These animals are similar to long hair forehead type found in other parts of Himalayas.

Hairy forehead type

White Yaks

Pure white yaks with black or brown eyes are also found in limited numbers. These animals are very popular amongst tourists. Yaks are used for rides at places of tourist attraction by local farmers for attracting tourists. The white coat of long hairy fibers is used for making various items including chawars.

White yak

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Scientific feeding and management practices for yak and yak hybrids

Feature of training : Skill up gradation to mitigate issues on feed scarcity during winter seasons

Potential areas of application : Nutritional intervention of yak management during hungry gap of seasons

Target group : Yak farmers

Duration of training : 2 days

Intake capacity : 25

Learning outcome : Stability of productivity of yak in winter season

Course contents

S.No.	Contents	Theory	Practical
1.	Feeding of calves	T	-
2.	Preparation of concentrate mixture	T	P
3.	Importance of balance ration for increased productivity	T	-
4.	Importance of bypass nutrient for yak production	T	-
5.	Fodder production	T	P

Name of the training programme : Importance of colostrum feeding to yak calves

Feature of training : Skill up gradation to reduce calf mortality and more production of healthy disease free yak calves

Potential areas of application : Production of disease free healthy calves

Target group : Yak farmers

Duration of training : 2 days

Intake capacity : 25

Learning outcome : Increase in yak herd size as a consequence of reduced calf mortality

Course contents

S.No.	Contents	Theory	Practical
1	Definition of colostrum and its importance on calf rearing in high altitude	T	-
2	Composition of colostrum	-	-
3	Duration of colostrum feeding to yak calves : An important managerial practice of yak husbandry	T	P
4	Beneficial effect of colostrum feeding to prevent diseases responsible for neonatal mortality	T	-
5	Preparation of artificial colostrum	T	P

Name of the training programme : Transmission of bacterial, viral and parasitic diseases of yak and its prevention

Feature of training : To build up consciousness about transmission pattern and bionomics of common diseases of yak

Potential areas of application : Reduced rate of abortion, conjunctivitis, respiratory disorder and production of healthy disease free yak herd

Target group : Yak farmers

Duration of training : 2 days

Intake capacity : 25

Learning outcome : Production of disease free yak calves through scientific health management

Course contents

S.No.	Contents	Theory	Practical
1.	A brief overview of transmission of diseases of yaks	T	-
2.	Pathogenic effects of the diseases and its complications	T	-
3.	Precautionary measures to control infectious viral, bacterial and parasitic diseases	T	-
4.	Treatment and vaccination schedule of common bacterial, viral and parasitic diseases	T	-
5.	Predicted profitability index through disease control	T	-

Name of the training programme : Importance of artificial insemination on yak husbandry

Feature of training : To build up consciousness about importance of artificial insemination

Potential areas of application : Improved production of yak through induction of superior germplasm

Target group : Veterinary professional

Duration of training : 3 days

Intake capacity : 25

Learning outcome : Improved production of yak and control of sexually transmitted diseases

Course contents

S.No.	Contents	Theory	Practical
1.	Importance of artificial insemination in yak	T	-
2.	Bull selection: using molecular genetics technique changing paradigm technology rapidly	T	-
3.	Scientific management of breeding yak bulls	T	-
4.	Nutritional management of breeding yak bulls	T	-
5.	Breeding soundness examination of yak bulls	T	P
6.	Semen collection, evaluation and cryopreservation	T	P
7.	Recent advances of semen preservation	T	P
8.	Evaluation of *in vitro* characters of spermatozoa for artificial insemination and *in vitro* fertilization	T	-
9.	Artificial insemination in yak using frozen semen	T	P
10.	Importance of frozen semen in reproductive biotechnology	T	-
11.	Biotechnological advances in animal reproduction	T	P

Name of the training programme : Common health problems of yak and their first aid care

Feature of training : To build up cognisance about common diseases of yak, their clinical symptoms and first aid care

Potential areas of application : Better yak health management

Target group : Yak farmer

Duration of training : 1 days

Intake capacity : 25

Learning outcome : Reduction of morbidity and mortality of yak due to viral, bacterial and parasitic diseases

Course contents

S.No.	Contents	Theory	Practical
1.	Common viral diseases of yak	T	-
2.	Common bacterial and rickettsial diseases of yak	T	-
3.	Common parasitic diseases of yak	T	-
4.	Treatment of clinical cases of bacterial, rickettsial and parasitic diseases of yak	T	-
5.	Vaccination against viral and bacterial diseases and its importance	T	-

Name of the training programme : Importance of zoonotic diseases in yak tracts of India

Feature of training : Awareness about emerging and re-emerging zoonotic diseases

Potential areas of application : Health management of yak farmers

Target group : Yak farmers and school children

Duration of training : 1 days

Intake capacity : 60

Learning outcome : Reduction of morbidity and mortality due to zoonotic diseases

Course contents

S.No.	Contents	Theory	Practical
1.	A preliminary understanding of zoonotic diseases	T	-
2.	Common zoonotic diseases of yak tracts and their mode of transmission	T	-
3.	Maintenance of general health hygiene to combat zoonotic diseases	T	-
4.	Treatment of zoonotic diseases	T	-
5.	Film show on viral, bacterial, parasitic and mycotic zoonotic diseases	T	-

Name of the training programme : Disease Management of high altitude animals

Feature of training : Awareness about consummate package of practices for disease management of yaks

Potential areas of application : Complete package of disease management through scientific intervention

Target group : Yak farmers

Duration of training : 3 days

Intake capacity : 25

Learning outcome : Awareness about consummate package of practices for disease management of yaks

Course contents

S.No.	Contents	Theory	Practical
1.	Common diseases occurring in Animals leaving in High Altitudes	T	-
2.	*In situ* and *ex situ* conservation of yak germplasm	T	-
3.	Nutritional/ health supplements/ requirement for improving overall growth performance in animals	T	-
4.	Major reproductive disorders in high altitude animals	T	-
5.	Scientific calf raising for highland animals	T	-
6.	Common Bacterial diseases in high altitude animals	T	-
7.	Common infectious diseases responsible for infertility in high altitude animal	T	-
8.	Vaccination schedules in animals	T	-

Name of the training programme : Capsule training programme on yak milk and hair products for tribal women

Feature of training : Hands on training of production of value added products

Potential areas of application : Improvement of post harvest technology

Target group : Women yak farmer

Duration of training : 01 days

Intake capacity : 25

Learning outcome : Income generation through selling value added products

Course contents

S.No.	Contents	Theory	Practical
1.	Scientific management of yak	T	-
2.	Production of clean milk	T	-
3.	Demonstration on use of yak coarse hair for making carpet, doormat, woollen caps, *chawar* and ropes	T	-
4.	Practical demonstration of value addition of yak hair products by blending with sheep and rabbit hairs	T	-
5.	Practical demonstration on preparation of functional paneer and ghee	T	-

Name of the training programme : Scientific dairy farming in high altitude

Feature of training : To bring dairying as an instrument of change for yak farmers for better milk production

Potential areas of application : Improved dairy management through scientific intervention

Target group : Farmers of yak tracts of India

Duration of training : 2 days

Intake capacity : 25

Learning outcome : Income generation through selling milk and its by products

Course contents

S.No.	Contents	Theory	Practical
1.	Role of dairying in the rural development	T	-
2.	Common dairy breeds suitable for highland	T	-
3.	Care and management of dairy calves	T	-
4.	Scientific housing systems of dairy cattle	T	-
5.	Repeat breeding in dairy cattle: A cause of concern	T	-
6.	Common diseases of dairy cattle and its prevention	T	-

NATIONAL RESEARCH CENTRE ON MEAT

Hyderabad, Andhra Pradesh

Year of Establishment : 1999

THE National Research Center on Meat was conceptualized in the year 1986 at IVRI Campus, Izatnagar with a view to conduct research in the frontier areas of meat science and technology and to develop human resource for the fast growing meat sector. The Centre has begun functioning since 1999 at Hyderabad in its sister institutes of ICAR – initially Project Directorate on Poultry and subsequently from Central Research Institute for Dryland Agriculture. The Centre has developed its new campus with well equipped laboratories and is now functioning from April, 2007 at the new premise located at Chengicherla, Hyderabad.

Training Programme for Skill and Entrepreneurship Development in Animal Husbandry

Name of the training programme : Safety issues in slaughterhouse and meat processing plant

Feature of training : Ante mortem and postmortem inspection, introduction to meat quality, microbiology and chemical contaminants including residues, GMP and HACCP issues

Potential areas of application : Slaughter house, any meat processing plant

Target group : Veterinarians and Health Officers of Municipal Corpn. and Meat Quality control personnel

Duration of training : 6 days

Intake capacity : 20

Learning outcome : Awareness in meat food safety, hands-on-training on meat quality and safety parameters

Course contents

S.No.	Contents	Theory	Practical
1	Rules and regulations pertaining to meat sector and transportation of animals	T	-
2	Animal welfare issue and impact on meat quality	T	-
3	Proper handling of animals during transportation and slaughter	T	-
4	Effect of stunning, slaughter and dressing on meat quality	T	-
5	Importance of ante mortem and post mortem inspection	T	-
6	Concept of HACCP, GMP and public health significance	T	-
7	Importance of chilling and freezing of meat	T	-
8	Packaging in preservation and proper presentation of meat	T	-
9	Different cooking methods and Importance of cooking in meat safety	-	P
10	Effect of stress on meat quality	-	P
11	Handling of animals	-	P
12	Application of stunning and humane slaughter	-	P
13	Techniques for slaughter, dressing and fabrication of carcass	-	P
14	Procedures for ante mortem and post-mortem inspection Sampling procedure	-	P

S.No.	Contents	Theory	Practical
15	Estimation of chemical residues	-	P
16	Microbiological techniques	-	P
17	Carcass chilling	-	P
18	Evaluation of meat quality	-	P
19	Packaging techniques	-	P
20	Temperature monitoring for safety to consumer	-	P
21	Sensory evaluation of meat and meat products	-	P

Notes

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