



NDRI

National Dairy Research Institute

Karnal

Courses

1. Dairy Production in Tropics
2. Frozen Semen Technology and Artificial Insemination
3. Breeding Strategies for Genetic Improvement of Farm Animals
4. Animal Tissue Culture Technology
5. Application of Genetic Techniques for Improvement of Farm Animals
6. Endocrine Techniques for Improvement of Reproduction in Buffaloes
7. Technology of Milk and Milk Products
8. Technology of Cheese & Fermented Milk Products
9. Technology of Traditional Indian Dairy Products
10. Technology of Dairy By-Products including Membrane Technology
11. Technology of Value added and Functional Dairy Foods
12. Sensory Evaluation of Milk and Milk Products
13. Whey Utilization
14. Manufacture of Ice cream & Frozen Desserts
15. Dairy Food Plant Design and Layout

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The National Dairy Research Institute metamorphosed from erstwhile Imperial Institute for Animal Husbandry and Dairying which was established in 1923 at Bangalore. In 1955, it was shifted to Karnal at the location formerly called Central Cattle Breeding Farm. The Institute is the premier organization providing R&D support for dairy development programmes of the nation.

Post-graduate Education

National Dairy Research Institute (NDRI) is a deemed-to-be University since 1989. It awards MSc and PhD degrees in different disciplines of dairy science.

Training Programmes

The Institute organizes refresher and short-term training courses in various areas of dairy science for the benefit of teachers, research and extension scientists working in public and private sector organizations. During the last two decades several training courses have been organized by the Institute in which the scientists received training in advanced areas of dairy technology. The Institute also organizes international training programmes in various subjects.

1.

Dairy Production in Tropics

The production faculty consists of three divisions, i.e. Dairy Cattle Breeding, Dairy Cattle Physiology and Dairy Cattle Nutrition. A well established animal farm has 1,500 dairy animals with modern management facilities. In addition, Institute has also a forage farm and animal breeding complex which houses the bull calves and bulls required for reproduction management.

Training Programme

This course is designed to impart training to dairy farmers and entrepreneurs in scientific dairy production methods and exchange ideas for improvement of animals in tropics.

Faculty

The faculty consists of 25 scientists who have obtained advanced training in different areas of animal production.

Course Director	: Dr P K Nagpaul
Duration	: 3 months (1 November 2009 to 30 January 2010)
Course fee per trainee	: US \$ 2,500 per trainee (exclusive of boarding and lodging)
No. of trainees per course	: 20
Eligibility	: Diploma/Graduates in Animal Sciences/Veterinary Sciences/ Agriculture Science with knowledge of written and spoken english

Course Contents

- Dairy herd management practices at NDRI herd Karnal (practicals)
- Breeds of indigenous dairy animals and their production performance
- Management of neonates and young calves up to six months of age
- Management practices for heifers, pregnant animals, down calves and dry animals, scientific management inputs for new born calves and pregnant animals
- Housing and shelter management for all categories of dairy animals in tropics
- Ecological sustainability of milk production system in tropics, factors affecting the profitability of dairy enterprise

- Advances in tissue culture techniques
- Epizootic bacterial and viral diseases and their control
- Calendar for herd health programmes, environmental stress and its effect on milk production, environmental pollution control and waste management
- Farm machinery and power, animal behaviours and welfare studies, farming system and IVLP projects study in villages
- Feed and fodder distribution and computation of ration
- Handling and treatment of sick animals, clean milk production, process of hand and machine milking, optimum schemes for progeny testing programme
- Use of computers in managing farm and field data
- Maintenance of livestock records, physical variation to increase milk production in dairy animals
- Draft animal power and its measurement and utilization
- Farming practices at NDRI forage farm
- Handling of bulls for artificial insemination, semen collection and evaluation
- Freezing techniques in semen preservation
- Recent advances in embryo biotechnology techniques, breeding strategies for increasing milk production in the tropics
- Genetic markers and their importance

2.

Frozen Semen Technology and Artificial Insemination

Training Programme

The course is for imparting training to the scientists, officers working with frozen semen stations, artificial insemination, reproduction management and allied technologies.

Faculty

The faculty comprises of 20 scientists who have obtained advanced training in different areas of the concerned subject. The Artificial Breeding Complex has all basic and state of the art facilities in the area of research in semen biotechnology.

There is livestock farm having 1,200 dairy animals and 120 young and adult bulls managed separately for quality semen production and progeny testing programme.

Course Director	: Dr V S Raina
Duration	: 4 weeks (1-30 December 2009)
Course fee	: US \$ 1,500 per trainee (exclusive of boarding and lodging charges)
No. of trainees per course	: 20
Eligibility	: Diploma/Graduate in Animal Sciences/Veterinary Science/Animal Husbandry with knowledge of written and spoken english

Course Contents

- Frozen semen bank activities
 - Management of bull
 - Semen collection
 - Standard semen evaluation
 - Preparation of different buffer
 - Processing for cryo-preservation
 - Computer controlled freezing
 - Quality assessment of frozen semen
 - Utilization of frozen semen
- Artificial insemination
 - Heat detection in cattle and buffaloes
 - A.I in cattle and buffaloes
 - Pregnancy diagnosis
 - Reproductive management
 - Reproductive record management
 - Management of breeding efficiency
- Special test for semen evaluation
 - Sperm concentration and motility
 - Non-eosinophilic count
 - Hypo-osmotic swelling test (HOST)
 - Acrosome integrity
 - Cervical mucus penetration test
 - *In-vitro* fertility test
 - Bacteriological evaluation of semen
 - Quality assessment of frozen semen
- Management of frozen semen bank
 - Maintenance of record in frozen
 - Planning of semen bank
 - Care and handling of semen and liquid nitrogen
 - Care and maintenance of equipment

3. Breeding Strategies for Genetic Improvement of Farm Animals

Training Programme

This course provides the latest methods of genetic evaluation and formulation of optimum breeding plans for genetic improvement of dairy animals under organized farms and farmer herds conditions.

Faculty

The Dairy Cattle Breeding Division has been recognized as a Centre for Advance Studies (CAS) by the Indian Council of Agricultural Research (ICAR). It undertakes research on various aspects and coordinates the breeding and management activities of the institute herd (having more than 1,500 heads) maintaining two indigenous cattle breeds, viz Sahiwal and Tharparkar, two synthetic crossbred strains of cattle, viz Karan Swiss and Karan Fries, Murrah buffaloes and a flock of crossbred goats. The division also has an artificial breeding complex involved in production, processing, preservation and distribution of quality semen. The faculty consists of 20 scientists who have obtained advanced training in different areas of animal breeding, genetics and livestock production and management.

Course Director : Dr B K Joshi

Duration : 6 weeks (1 October 1 to 15 November 2009)

Course fee : US \$ 2,000 per trainee (exclusive of boarding and lodging)

No. of trainees per course : 10

Eligibility : Officials actively engaged in research, teaching and training activities for development and improvement of farm animals

Course Contents

- Current status of farm animal genetic resources, genetic and non-genetic factors affecting growth, production and reproduction characteristics
- Evaluation of genetic parameters
- Selection of young bulls for progeny testing
- Estimation of breeding value of bulls and cows using different statistical models, i.e. BLUP, Animal model etc., for selection of elite animals and their faster use for multiplication of germplasm
- Semen production, processing and cryo-preservation
- Evaluation of seminal characteristics of bulls
- Selection of breeding bulls using fertility index
- Improvement of reproductive efficiency of farm animals
- Nucleus breeding schemes (with or without MOET) vis-a-vis conventional breeding schemes
- Multivariate animals models for estimation of genetic parameters
- Conservation and utilization of farm animal genetic resources
- Performance recording systems of farm animals under field conditions
- Application of computers for animal data management and analysis
- Various mating systems and their implications in improvement of dairy animals
- Development of optimum breeding plans for genetic improvement of farm animals

4. Animal Tissue Culture Technology

Training Programme

The course will provide on-bench practical training to teachers/technical workers/students in various aspects of culture of cells, tissue and organs and its applications in animal improvement programme.

Faculty

Well qualified, experienced, motivated scientist of the Institute constitute the faculty.

Course Director : Dr Archana Verma

Duration : 6 weeks (1 September to 15 October 2009)

Course fee : US \$ 2,000 per trainee (exclusive of boarding and lodging)

No. of trainees per course : 20

Eligibility : Graduate in Life Science with knowledge of written and spoken english

Course Contents

- Design and layout of tissue culture laboratory, basic equipment and reagents required, general laboratory rules and procedure
- Analytical techniques in tissue culture, advances in microscopy and photography, aseptic techniques and culture environment
- Isolation and characterization of cell, manipulation and microsurgery at cellular level, somatic cell genetics and gene mapping, safety and biohazards
- *In-vitro* cell/tissue culture system, preparation of sterilized tissue culture media
- Lymphocyte and bone marrow cell culture, culture of mammalian gametes and embryos
- Production of hybridomas, fibroblast culture
- Cloning of mammalian cell lines, separation and characterization of cell lines, culture of mammary gland tissue, recording and documentation of observation

5. Application of Genetic Techniques for Improvement of Farm Animals

Training Programme

The course will provide hands-on training for various genetic techniques and its applications in livestock improvement programme to teachers/technical workers/students.

Faculty

Well qualified, experienced, motivated scientist of the Institute constitute the faculty.

Course Director : Dr I D Gupta

Duration : 8 weeks (1 October to 30 November 2009)

Course fee : US \$ 2,500 per trainee (exclusive of boarding and lodging)

No. of trainees per course : 20

Eligibility : Graduate in Life Science with knowledge of written and spoken English

Course Contents

- The genome organization
- Cytogenetics of farm animals
- C, G, NOR, SCE and RE banding of chromosomes, karyotypic analysis, gene expression and regulation
- DNA polymorphism in farm animals
- Isolation of genomic DNA, restriction fragment length polymorphism
- *In-vitro* amplification of DNA (PCR), gene cloning and gene mapping
- Genetics of fertility, molecular markers, marker assisted selection, transgenic animal production

6. Endocrine Techniques for Improvement of Reproduction in Buffaloes

The training program is designed to provide “hands on” training to participants on hormone analysis using radioimmunoassay and enzymeimmunoassay procedures.

In addition, lectures will also be given on practical aspects for enhancing fertility in buffaloes.

Faculty

The facilities for the estimation of protein & steroid hormones by RIA & EIA procedures are available in the Division of Dairy Cattle Physiology. Highly qualified and trained scientists & technicians are available for imparting training in specialized areas. The Division has been extending facilities for hormone assays to scientists belonging to other organizations & universities within the country. Training in these areas have also been imparted to Indian & Foreign students.

Course Director : H.D. (DCP)

Duration : 4 weeks

Course fee : US \$ 1,000 per trainee

No. of trainees per course : 10

Accommodation : Will be provided on cost at the International Hostel of the Institute

Eligibility : Graduate in Animal Science/ Veterinary Science with basic knowledge of Reproductive Physiology

Course Contents

Hormone assay procedure – radioimmunoassay (RIA) and enzymeimmunoassay (EIA), their merits and demerits.

- Training on steroid and protein hormone estimation by RIA and EIA,
- Titer determination,
- Standard curve plot and tracer preparation.

Endocrine biotechniques for fertility improvement, Pregnancy/ non-pregnancy diagnosis by

- Progesterone determination
- Pregnancy confirmation by oestrone sulphate determination in milk

- progesterone determination in body fluids for estrus confirmation
- Cyclicity monitoring, identify animals with cystic ovarian disorders
- Embryo transfer monitoring
- Parturition induction
- Oestrus synchronization
- Interferon alpha and recognition of pregnancy
- Antisera production and purification.

7. Technology of Milk and Milk Products

Infrastructure / Faculty Strength

The Dairy Technology Division has been engaged in research and teaching activities in the area of milk processing. Various cells, viz. Traditional Dairy Products, Cheese and Fermented Milk Products, Concentrated, Dried and Frozen Dairy Products, Dairy Analogues and Rheology Infant Food Cells and Food Technology Laboratory exist in the division for carrying out area specific research. A 10,000 lpd dairy is attached to the Division. This Experimental Dairy serves as a central facility for the research and teaching activities of the Institute. A 60,000 lpd state-of-the-art computer controlled dairy plant has been established at NDRI for giving hands on training to B.Tech. (DT) students. The plant has equipment to process milk and convert it into various products such as butter, ghee, cheese, paneer ice-cream, powder and traditional sweets. The faculty of the division consists of 12 scientists.

Brief Outline of the course

The course on “Technology of milk and milk products” has been designed to familiarise the candidates with the basic aspects of milk processing and the technology of various dairy products being manufactured in India and abroad.

Market milk industry; clean milk production; collection and transportation of milk; physico-chemical properties of milk, Processing of milk - Reception, Chilling, Clarification, Bactofugation, Separation and Homogenisation; Thermal processing Pasteurization & UHT processing; Processing of cream; Technology of butter, cheese, fermented milk products, ice-cream and frozen desserts, condensed milk and dried milks; Technology of Indian dairy products, viz. ghee, khoa, chhana, paneer, chakka, srikhand and milk sweets / confections; Formulated dried products - Infant foods, and malted milk foods. Technology of by-products - casein, caseinates. Whey processing and its utilization; Sensory evaluation of dairy products; Packaging of dairy products, Cleaning and sanitization of dairy equipment.

Course Coordinator	: Dr R R B Singh Senior Scientist, Associate Professor
Duration	: 2 weeks (June/December)
Course fee	: US \$ 2,500 per trainee
No. of trainees per course	: 10
Accommodation	: Will be provided at reasonable cost in the Hostel of the Institute
Eligibility	: Dairy / Food Technology graduates, R & D personnel & Dairy / Food entrepreneurs with knowledge of written and spoken English.



8. Technology of Cheese & Fermented Milk Products

The course on “Technology of Cheese Making” has been designed to familiarize the participants with the basic aspects of cheese making and the technology of common varieties of cheese various fermented milks being manufactured in India and abroad.

Brief Outline of the Course

Principles and basic requirements of cheese making; raw materials for cheese; starter cultures; rennet; pre-treatments of milk, methods of manufacture of different varieties of cheese; ripening changes; accelerated ripening, defects and remedies; recent advances, Fresh varieties of cheese including paneer.

Processed cheese and cheese spread

Processed-cheese products; standards; selection of raw materials; role of different ingredients; methods of manufacture; packaging defects and shelf life.

Fermented milk products

Principles and basic requirements of manufacturing fermented milk products, pretreatments of milk, starter cultures, method of manufacture of different fermented milk products such as dahi, fruit dahi, Misti dahi, Lassi, etc. Analysis and sensory evaluation of cheese and fermented milks.

Course	: Dr S K Kanawjia
Coordinator	Principal Scientist/Professor
Duration	: 1 week (July/January)
Course fee	: US \$ 1,500 per trainee
No. of trainees per course	: 10
Accommodation	: Will be provided at reasonable cost in the Hostel of the Institute
Eligibility	: Dairy / Food Technology graduates, R & D personnel & Dairy / Food entrepreneurs with knowledge of written and spoken English.

9. Technology of Traditional Indian Dairy Products

The objective of this course is to familiarize participants with the different types of Indian dairy products and principles of their manufacture.

Brief Outline of the Course

Status and classification of traditional dairy products, significance of these products and principles involved in their manufacture. Methods of manufacture, compositions, uses and shelf life of ghee, khoa, chhana, paneer, shrikhand, rabri, kulfi and milk sweets such as burfi, peda, rasogolla, milk cake etc. Mechanized / large scale / commercial methods of manufacturing and packaging traditional dairy products and packaging.

Course	: Dr Dharam Pal
Coordinator	Principal Scientist/Professor
Duration	: 1 week (July/January)
Course fee	: US \$ 1,500 per trainee
No. of trainees per course	: 10
Accommodation	: Will be provided at reasonable cost in the Hostel of the Institute
Eligibility	: Dairy / Food Technology graduates, R & D personnel & Dairy / Food entrepreneurs with knowledge of written and spoken English

10. Technology of Dairy By-Products including Membrane Technology

The course is designed to impart training in dairy by-products covering latest methodologies and status and uses of dairy by-products etc. Basic principles of membrane processing and the uses of various membrane processes in the manufacture of dairy and food products.

Brief Outline of the Course

Manufacturing processes, physico-chemical and functional properties and uses of casein, caseinates, whey concentrate and dried whey, whey protein concentrates, lactose and buttermilk. Principles of membrane processing, hardware of membrane units, processing of whey and milk using microfiltration, ultrafiltration, nanofiltration, reverse osmosis, cleaning of membranes, manufacture of cheese, paneer, chakka, milk protein concentrate using membrane technology.

Course Coordinator	: Dr Vijay Kumar Gupta Principal Scientist/Professor
Duration	: 1 week (July/January)
Course fee	: US \$ 1,500 per trainee
No. of trainees per course	: 10
Accommodation	: Will be provided at reasonable cost in the Hostle of the Institute
Eligibility	: Dairy / Food Technology graduates, R & D personnel & Dairy / Food entrepreneurs with knowledge of written and spoken English.

11. Technology of Value added and Functional Dairy Foods

This course has been designed to introduce the student to add value to milk and milk products in order to harness the market potential, to cater to health and nutritional demands and to provide variety and choice in food.

Brief Outline of the Course

Role of food in nutrition and health – an introduction; technology of low lactose products; low fat dairy products; probiotic dairy foods, sports beverages, infant foods, ice cream, high fibre foods, high energy foods, foods for the elderly, low sugar and sugar based dairy foods.

Course Coordinator	: Dr (Ms) Latha Sabikhi Sr. Scientist / Associate Professor
Duration	: 1 week (July/December)
Course fee	: US \$ 1,500 per trainee
No. of trainees per course	: 10
Accommodation	: Will be provided at reasonable cost in the Hostle of the Institute
Eligibility	: Dairy / Food Technology graduates, R & D personnel & Dairy / Food entrepreneurs with knowledge of written and spoken English.

12. Sensory Evaluation of Milk and Milk Products

The Course on “Sensory Evaluation of Milk and Milk Products” has been designed to acquaint and train the participants in sensory evaluation techniques of raw materials and final processed foods.

Brief Outline of the Course

Applications of sensory evaluation, brief physiology of sensory receptors, selection and training of test panel, various sensory tests, setting up of sensory laboratory, statistical analysis of sensory data, sensory evaluation of milk and milk products, instrumental analysis of texture.

Course	: Dr Dharam Pal
Coordinator	Principal Scientist/Professor
Duration	: 1 week (June/July/December)
Course fee	: US \$ 1,500 per trainee
No. of trainees per course	: 10
Accommodation	: Will be provided at reasonable cost in the Hostel of the Institute
Eligibility	: Dairy / Food Technology graduates, R & D personnel & Dairy / Food entrepreneurs with knowledge of written and spoken English

13. Whey Utilization

The course on “Whey Utilization” has been designed to familiarise the students with the whey processing operations involved in the manufacture of various products from whey.

Brief Outline of the Course

Sources, type and composition of whey, Basic unit operations in processing of whey, technology of whey powder, lactose and whey protein concentrates (WPC) including membrane processing, whey constituents and their application in processed foods, technology of whey cheeses and beverages including fruit based, fermented beverages, sports beverages.

Course	: Dr A K Singh
Coordinator	Sr Scientist/Associate Professor
Duration	: 1 week (July/December/January)
Course fee	: US \$ 1,500 per trainee
No. of trainees per course	: 10
Accommodation	: Will be provided at reasonable cost in the Hostel of the Institute
Eligibility	: Dairy / Food Technology graduates, R & D personnel & Dairy / Food entrepreneurs with knowledge of written and spoken English

14. Manufacture of Ice cream & Frozen Desserts

The course on Ice cream and frozen desserts has been designed to familiarize the participants with the principles and methods of manufacture of various frozen dairy products.

Brief Outline of the Course

Status of ice cream industry in India & abroad, classification of frozen desserts, selection of different ingredients used for the manufacture of ice cream; calculating the proportion of each ingredient to meet the compositional requirements in the final product, manufacture of ice cream mix and its processing. Ice cream making equipment, preparation of fruit / chocolate / plain / soft serve ice cream; manufacture of kulfi etc.

Course	: Dr F C Garg
Coordinator	Sr Scientist/Associate Professor
Duration	: 1 week (July/December/January)
Course fee	: US \$ 1,500 per trainee
No. of trainees per course	: 10
Accommodation	: Will be provided at reasonable cost in the Hostel of the Institute
Eligibility	: Dairy / Food Technology graduates, R & D personnel & Dairy / Food entrepreneurs with knowledge of written and spoken English

15. Dairy Food Plant Design & Layout

This course is design to develop competence for development of milk processing plant of different sizes and products under different climatic conditions.

Faculty

Well qualified & trained Engineers & technologist of the division and invited speakers from ICAR, SAU and industries will constitute the faculty.

Course Contents

- Dairy and food industry scenario.
- Various type of milk/food plants.
- Steps to start the plant design and layout.
- Deciding the process flow schedule.
- Finalizing equipment required for processing.
- Estimation of service/utility required for the plant.
- Development of layout plan.
- Development of master- plan.
- Break even and cost analysis of the project.

Course Director	: Head, DE
Duration	: 2 weeks (December, 2008/ February, 2009)
Course fee/trainee	: US \$ 1000 per trainee
No. of trainee	: 10
Accommodation per course	: To be arranged at guest house/scientist (twin sharing basis) transport will be provided from guest house to division & back
Eligibility	: Milk processor working in the manufacturing of milk & milk products with engineering competence