Jobs in Today's Tech - Driven Dairy Industry

Jyoti Tiwari

Dairy is a significant agri-business in India, with a large portion of the sector (around 35%) being organised. India's dairy industry has been fairly successful in delivering multiple development goals crucial for the economy, such as improving farmers' livelihoods, creating jobs, supporting agricultural industrialisation and commercialisation, and enhancing nutrition for the masses. India's dairy ecosystem includes a variety of players such as small and large-scale farmers, co-operatives, private dairies, aggregators, milk processing companies, distributors and retailers. The government plays a significant role in the sector through policies and programs aimed at supporting farmers and promoting the growth of the industry.

From Farm to Fridge

The dairy supply chain is a complex process that begins on the farm and ends in the fridge. From milking the cows to supplying end products, dairy businesses must adhere to strict processing and handling requirements to ensure the quality and safety of the milk and milk products.

To operate a successful dairy business, it is essential to have a strong team in place. This team is responsible meticulously executing an array of responsibilities ranging from maintaining milch herd health, ensuring the quality of milk used for direct retail or processing, using innovation and technology for producing and selling value added products, ensuring safe preservation and timely delivery to the consumers. The team includes individuals with expertise in areas such as farm management, veterinary care and nutrition, food processing, food technology, quality control experts, packaging experts, supply chain management, marketing and sales, and engineers and technicians for operation and maintenance of heavy machineries.

The following is a list of key roles in the dairy business set-up and their responsibilities:

- **Product Developer:** New products, flavors and formats keep dairy processors growing. Hence, medium and large scale dairy businesses spend on research and development to innovate new and upgraded products to strike a chord with consumers in the ever growing

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competitive market. Professionals who can develop products with added functionality and health benefits are in great demand in the dairy industry.

- **Dairy Technologist** is responsible for developing and implementing new technologies and processes to improve the efficiency and quality of dairy production.
- **Dairy Engineer** is responsible for designing, installing, and maintaining equipment and machinery used in dairy production. Trends suggest that the dairy industry is undergoing large-scale automation and is becoming more and more tech-driven. Hence, the demand for engineers is on the rise.
- **Dairy Quality Control Officer** oversees the monitoring and testing the quality of milk and dairy products to ensure they meet industry standards.
- **Dairy Manager** oversees the day-to-day operations of a dairy farm or facility, including production, financial management, and staff management.
- **Dairy Laboratory Technician** is responsible for conducting tests and analysing samples of milk and dairy products to ensure their quality and safety.
- **Dairy Sales and Marketing Executive** fulfills the role of promoting and selling dairy products to customers and distributors.
- **Milk Procurement Officer** looks after collecting and purchasing milk from dairy farmers and ensuring its quality and quantity.
- **Dairy Plant Operator** operates the various equipment and machinery used in dairy production processes including pasteurisation and packaging.
- **Dairy Nutritionist** develops and implements nutrition plans for dairy animals to optimise their health and milk production.
- **Dairy Veterinarian** provides medical care and treatment for dairy animals to ensure their health and well-being.
- **Dairy Farm Mechanic** takes care of the maintenance and repairing equipment and machinery used in dairy production.
- **Dairy Accountant** manages the financial aspects of a dairy farm or facility, including budgeting, accounting, and record-keeping.
- **Dairy Extension Officer** provides education and technical assistance to dairy farmers on best practices for animal care and production.
- **Dairy Herdsman** manages a herd of dairy animals on a daily basis, including feeding and milking.

To best prepare for top jobs in the dairy sector, one should pursue an academic course that not only educates the candidate on the different aspects of dairy production, processing and supply chain but also makes him/her industry-ready. The most apt academic courses for pursuing a career in the dairy industry are Dairy Science and/or Food Technology.

Dairy Science: Courses and Colleges

Dairy Science is the study of the biology, chemistry, physics, and engineering of milk and milk-derived food products. It encompasses the study of the various aspects of milk production, processing, and management, as well as the development of new and improved dairy products.

The field of dairy science includes a wide range of topics, such as:

- Milk production and management, including genetics, breeding, nutrition, and health of dairy animals
- Milk processing and preservation, including pasteurisation, homogenisation, and fermentation
- Dairy chemistry and microbiology, including the study of the composition and properties of milk and the microorganisms found in it
- Dairy engineering and technology, including the design and operation of equipment and facilities used in the dairy industry
- Dairy product development and evaluation, including the formulation, production, and evaluation of different types of dairy products

Dairy scientists often work in the dairy industry, government agencies, or research institutions, where they may be involved in research, product development, quality control, or management. Graduates in dairy science also have career opportunities in food processing and manufacturing, consulting, and education.

Top Indian Colleges Teaching Dairy Science

- National Dairy Research Institute (NDRI), Karnal, Haryana
- Indian Veterinary Research Institute (IVRI), Uttar Pradesh
- College of Dairy Science and Technology, Anand Agricultural University, Gujarat
- Madras Veterinary College, Chennai
- Dairy Science College, University of Agricultural Sciences, Bangalore.
- Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana
- Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab
- College of Dairy Science and Food Technology, Orissa University of Agriculture and Technology, Odisha
- College of Dairy Science and Technology, Mahatma Phule Krishi Vidyapeeth, Maharashtra
- College of Dairy Science, Veterinary College and Research Institute, Tamil Nadu
- College of Dairy Science and Technology, University of Agricultural Sciences, Dharwad, Karnataka
- College of Dairy Science, MPKV, Rahuri, Maharashtra
- College of Dairy Science and Technology, Rajasthan University of Veterinary and Animal Sciences, Bikaner, Rajasthan
- Department of Dairy Science, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh
- Dairy Science College, Gujarat Agricultural University, Gujarat
- Department of Dairy Science, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu
- Department of Dairy Science, Chaudhary Charan Singh Haryana Agricultural University, Haryana
- Department of Dairy Science, University of Agricultural Sciences, Raichur, Karnataka
- Department of Dairy Science, Assam Agricultural University, Assam
- Department of Dairy Science, Sardar Patel University, Gujarat.

Please note that this is not an exhaustive list and there are other colleges offering similar programs. It is always recommended to check the official website of the college or university to get more information on the admission process, eligibility criteria, course structure and fees.

Course Highlights: Dairy Science

Common Nomenclature: B.Tech (Dairy Technology)/ B. Tech (Dairy Science)/ B. Tech (Dairy Science and Technology)/Diploma in Dairy Technology or Dairy Engineering

Eligibility and Entrance

B. Tech Dairy Technology/Dairy Engineering/Dairy Science is a 4 year undergraduate engineering degree course. Students who have passed Class 12 in Science stream from a recognised board are eligible to apply for admission to the B.Tech Dairy Technology course. Almost all the top engineering institutes in the country admit students on the basis of entrance examinations like JEE Main and JEE Advanced. There is also a round of counseling held after qualifying the entrance examinations.

Syllabus

The subjects taught for the B. Tech Dairy Technology/ B.Tech Dairy Science program are almost similar in most of the engineering colleges. The semesters are roughly divided in the following manner:

Semester I

- Physical Chemistry of Milk
- Milk Production Management & Dairy Development
- Fluid Mechanics
- Basic Microbiology
- Thermodynamics
- Mathematics

Semester II

- Dairy Microbiology
- Heat and Mass Transfer
- Chemistry of Milk
- Traditional Dairy Products.
- Biochemistry and Human Nutrition
- Industrial Statistics

Semester III

- Computer Programming
- Condensed & Dried Milks
- Fat Rich Dairy Products
- Refrigeration and Air Conditioning
- Dairy Engineering
- Economic Analysis
- Dairy Extension Education

Semester IV

- Cheese Technology
- Ice Cream & Frozen Desserts
- Judging of Dairy Products
- Starter Culture and Fermented Milk Products
- Dairy Process Engineering
- Marketing Management & International Trade
- Dairy Plant Management & Pollution Control
- Dairy Biotechnology

Semester V

- Information Technology in Dairy Industry
- Quality and Safety Monitoring in Dairy Industry
- By Products Technology
- Financial Management & Cost Accounting
- Dairy Plant Design and Layout
- Chemical Quality Assurance
- Principles of Dairy Machine Design
- Environmental Sciences-I

Semester VI

- Food Engineering
- Food Chemistry
- Food and Industrial Microbiology
- Packaging of Dairy Products
- Food Technology
- Entrepreneurship Development and Industrial Consultancy
- Operation Research
- Environmental Sciences-II

Semester VII

- Hands on Training and Experiential Learning

Semester VIII

- In-Plant Training

Higher Studies

The Dairy Technology graduates can prefer to join the dairy industry on various capacities and job roles on or can go for higher studies.

- **Post Graduation in Dairy Science:** If one wishes to continue in the same field of education, the first program of choice is a M.Tech or M.Sc in Dairy Technology. It is a two-year course and the eligibility criteria include having a B.Sc/ B.Tech in Dairy Technology. This is one of the most popular masters engineering programs and admissions are highly competitive.
- **MBA:** A large number of engineering graduates choose to go for the management route by choosing to pursue a PGDM (Post Graduate Diploma in Management) or MBA (Master of Business Administration) course. Admissions are offered through a national level entrance test. Having a B. Tech Dairy Technology degree together with an MBA as a specialisation of choice is highly advantageous and many organisations actively search for such candidates.

Course Highlights: Food Technology

Obtaining a degree in Food Technology/Food Processing/Food Engineering can also be a good alternative to entering the diary industry. Learning food technology can help in dairy industry jobs by providing a strong foundation in the scientific principles and techniques used in the production, preservation, and packaging of dairy products. This knowledge can be applied in roles such as product development, quality control, and food safety management. Understanding food technology can also help to improve production efficiency, increase product yield, and ensure compliance with industry regulations.

Common Nomenclature: B.Sc (Food Technology), B.Tech (Food Technology), B.E. (Food Technology), B.E. (Food Engineering), B.Tech (Food Processing), B.Sc (Food Safety and Technology) etc.

Top Indian Colleges Teaching Food Technology

- Indian Institutes of Technology (IITs)
- National Institute of Food Technology Entrepreneurship and Management (NIFTEM), Delhi
- MIT Art, Design and Technology University, Maharashtra
- Harcourt Butler Technical University, Kanpur
- Indian Institute of Food Science and Technology
- National Institute of Food Technology
- Laxminarayan Institute of Technology, Nagpur
- Jamia Hamdard University, Delhi
- Gautam Buddha University, Delhi
- Galgotias University, Noida
- Lovely Professional University, Chandigarh

Syllabus

The following table elucidates the varied range of subjects you can expect to study in a degree or a diploma in Food Technology:

- Food Microbiology
- Enzyme Technology
- Food Hygiene and Sanitation
- Nutrition and Health
- Food Processing
- Food Plant Layout & Design
- Laws and Quality Assurance
- Unit Operations in Food Processing
- Food and Vegetable Processing
- Plant Engineering
- Seafood and Dairy Technology
- Applied Food Biotechnology
- Crop Processing Technology
- Meat and Poultry Processing Technology
- Food Additives
- Confectionary Technology
- Fermented Milk Products
- Food Analysis
- Packaging Technology
- Product Design & Development

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- Food Technology Courses: Popular Electives

Higher Studies in Food Technology

At the master's level, you will study not only the core subjects in Food Technology courses but will also have to choose an elective or concentration in order to specialise in one domain. Listed below are some of the popular electives:

- Nutraceuticals
- Packaging and Related Technology
- Food Sensory Science
- Food Technology and Safety
- Chemistry of Food Proteins
- Quality Management
- Biochemical Engineering
- Dairy Products and Technology
- Fabricated and Textured Foods
- Health Data Analysis
- Agribusiness Management
- Flavour Technology

Doctoral Level Courses

- Ph.D in Food Technology
- Ph.D in Food Engineering and Technology
- Ph.D in Food Science and Technology
- Ph.D in Food and Dairy Technology
- Ph. D in Food Biotechnology
- Ph.D in Agriculture and Food Security

List of Major Indian Dairy Companies

- Amul
- Mother Dairy
- The Kerala Cooperative Milk Marketing Federation Ltd (MILMA)
- Parag Milk Foods Ltd.
- Schreiber Dynamix Dairies Ltd.
- Mehsana District Co-operative Milk Producers Union Ltd. (Dudhsagar Dairy)
- Karnataka Co-operative Milk Producers Federation Ltd. (Nandini)
- Tamilnadu Co-operative Milk Producers Federation Ltd.
- Creamline Dairy Products Ltd. (Jersey Dairy)
- Andhra Pradesh Dairy Development Cooperative Federation Ltd.

Trends Indicating Spike in Employment Opportunities in Dairy Sector

New-age technologies such as the Internet of Things (IoT), advanced analytics, and Artificial Intelligence (AI) has helped to digitise the operations of dairy businesses, reduce milk wastage, improve the production of milk, develop last-mile logistics infrastructure, monitor the health of livestock, find anomalies in milk production and predict weather conditions. The role of technology in the dairy industry has grown from the village level of testing the composition of milk or automated milk collection to air-lifting of milk, mechanical dairy plant operations, and assessing total milk quality parameters. Further-more, technology adoption has witnessed innovative solutions like sensors to detect whether the cow is ready for milking or not, robotic milking machines, blockchain for product trace-ability, cattle monitoring, and drones.

Moreover, following the COVID-19 pandemic, health and wellness have become the primary focus for consumers. Nowadays, consumers are increasingly concerned about the hygiene, quality, safety, of food products, especially dairy products. As a result, demand for products that have nutritionally high values like probiotics is expected to grow. Additionally, eco-friendly and convenient packaging has also become an essential criterion for the dairy industry. Moreover, e-commerce has also created opportunities for the dairy industry to connect with consumers directly. Realising its humungous potential, the government, academia, industry and private organisations are joining hands to foster a positive environment for the dairy industry to flourish and promote it as a successful career prospect.

(The author is a Delhi-based web content writer. She can be contacted at jyotitiwarijune5@gmail.com)

Views expressed are personal.