

Syllabus
For the trade of
DAIRYING

Under CTS

2002

Designed by

Government of India
Ministry of Labour (D.G.E.&T.)
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN – Block, Sector – V, Salt Lake,
Kolkata-700091.

**List of the Trade Committee Members approved the syllabus for the trade of
“Dairying” under CTS**

1.	Shri H.Somasundram, Director	CSTARI, Kolkata	Chairman
2.	Shri Asitava Sur, Manager (QA)	Metro Dairy Ltd.	Member
3.	Shri P.K.De, Dy. Director	Ministry of food processing	Member
4.	Shri S.C.Ghosh, Manager (QC)	Mother Dairy	Member
5.	Shri K.S.Khulia, J.T.O.	Ministry of food processing Ltd., Govt. of India	Member
6.	Shri Sanjay Kant, DDT.	CSTARI., Kolkata	Member
7.	Shri P.K.Roy, ADT.	CSTARI., Kolkata	Member
8.	Shri M.S.Ekambaram, ADT	CSTARI, Kolkata	Member
9.	Shri P.K. Kolay, T.O.	CSTARI, Kolkata	Member
10.	Shri R.N.Manna	CSTARI., Kolkata	Member

GENERAL INFORMATION

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|-----------------------------------|---|--|
| 1. Name of the Trade | : | DAIRYING |
| 2. N.C.O. Code | : | |
| 3. Duration of Craftsmen Training | : | One Year |
| 4. Entry Qualification | : | Passed 10 th class under 10 + 2 system of education or its equivalent |
| 5. Unit Size | : | 25 Trainees |
| 6. Space requirement | : | 5 Sq.m/trainee |

Objectives of the course :

1. To Train manpower for Dairy development activities in Rural and Urban sectors.
2. To impart knowledge for production of clean milk and manufacture of Dairy products.
3. To prepare Young Entrepreneur for self employment through dairying.
4. To develop facilities for production and sale of milk and milk products.

Syllabus for the trade of “Dairying” under C.T.S

Week No.	Trade Practical	Trade Theory
Animal Husbandry:		
1	Visit to a Dairy Farm	Present status and future prospects of Dairy Industry. Role of Dairy animals in Indian Farming.
2	Recognition of different breeds of cows and buffaloes. External anatomy of cow and buffalo.	Important Indian and Exotic Dairy Breeds of cattle and Buffaloes, their origin, distribution and characteristics.
3	Care of new born calf/handling of new Born calf, its sanitation, cutting and sealing of naval cord.	Economic characters of dairy animals. Control of Dairy Animals. Dairy Animal improvement through breeding.
4	Drawing of sketch of floor plan for Different animal houses.	Principles and design of animal housing. Location and Layouts of animal sheds. Sanitation in dairy farm.
5	Grooming & Washing of animals. Cleaning & sanitation of sheds.	Animal response to environment changes, Protection against heat & cold. Farm washes, availability, collection and utilization. Disposal of dead animals.
6	Observing signs of health in dairy animals. Observing and identifying symptoms of certain specific diseases in animals. Pressing of wounds.	First Aid for common animals. Knowledge of common contagious and infectious diseases, Preventive Measures.
7	Identification of various feeds, fodders, feed supplements and additives in different seasons.	Importance of feeding of dairy animal. Classification of feeds: a) Roughages- leguminous and - Non-leguminous - Succulent and dry b) Concentrates- energy and protein Feeds c) Feed supplements- minerals and Vitamins
8	Identification of animal feed adulterants by physical methods. Grinding and mixing of feed ingredients	Classification of nutrients and their role in animal body, water, carbohydrates, proteins, lipids, minerals and vitamins.
9	Calculation of feed and fodder requirements for various categories of dairy animals viz.	Feeding of various categories of dairy animals, pregnant and newly calved cows, new born calf, growing calves,

	Growing, heifers, bull calves, bulls, pregnant cows, lactating cows etc.	heifers bull-calves, lactating cows, dry cows and bulls.
10	Visits to feed laboratory and cattle Feed manufacturing units. Feeding and watering of calves, heifers, pregnant & lactating cows and bulls.	Methods of purchasing, procurement of feed ingredients and their physical evaluation. Compounding of feeds- objectives, advantages, methods and machinery for compounding.
11	Visit to markets for assessing availability and knowing prices of feed ingredients.	Major nutritional disorders and their preventive-milk fever, grass tetany , rickets, bloat etc.
12	Cleaning and fumigation of feed stores. Storing of prepared feed.	Packaging and forwarding of feeds-materials for packaging methods of packaging and transportation.
13	Mixing of feed ingredients. Packaging of mineral and concentrate mixture storing of prepared feed.	Storage of concentrates-storage types, space requirement, cleaning and fumigation of stores, precautions in use of pesticides.
14	Mechanical maintenance: Cutting of mild steel flat, marking of job. Practice on chipping, surface & sides. Use of different files. Exercise on drilling, tapping etc. Grinding of drill bits. Measurement with precision measuring instrument e.g. Vernier caliper, micrometer, bevel protractor, dial test indicator etc.	General tools used in the workshop. Types and classification of chisels and files. Types of filing, types of working tools and their uses. Drills, taps and dies – use and classification. Calculation of tap drill size. Construction, care and maintenance of precision measuring instruments.
15	Threading on pipes. Simple joints by using T-bends, elbow, coupler, reduction of pipe, bending of pipe, copper tube fitting practice, use of bending and seating tools. Pneumatic construction. Simple job on soldering and brazing.	Pipe grade and material, use of T-bend, elbow, coupler, reducer, ripple, different types of valves, leakage of pipe fitting. Different sealing materials. Working of pressure test instruments bending procedure, use of PVC tube and fittings. Use of pipe cutter and tube cutter. Soldering iron, types of solders and their compositions, flux.
16 to 18	Different types of Valves:- Fitting and assembling of different gear boxes. Assembly and maintenance of different types of pumps and compressors. Checking and correcting the	Construction and use of different types of valves. Types of gears, their uses. Types of pumps and compressor and their construction and uses. Causes of misalignment, different

	alignment of shaft and couplings of motors. Fitting of bearings and oil seals. Use of packing, gaskets and locking devices.	methods of checking alignment, effects of misalignment of shaft and couplings. Types of bearing, construction and uses.
19	Electrical maintenance: Use of electrician hand tools. Safety precaution and first aid.	Fundamentals of electricity, electron theory, free electrons, fundamental terms, definitions, units and effects of electric current. Conductors and insulators. Electrical work, power, energy, their calculation in simple electrical circuit, types and construction of common electrical measuring instruments calculation.
20	Formation of simple electrical circuit, series circuit and parallel circuit. Fixing and connecting electrical switches, holders, fuses, plug sockets on T.W. board and testing.	Simple electrical circuit, essential requirement of electrical circuit, series and parallel circuit.
21	Care, maintenance and running of AC single and poly phase motor, starters and transformers.	AC motor, starters and transformers, their working principles, specification and use. Care and safety.
22	Boiler: Boiler safety precautions. Operation of boiler feed water pumps, fans etc. Operation of fuel feeding mechanism.	Steam – its heating and power properties. Principles of steam and application in boilers. Steam generation, steam distribution, condensate handling etc.
23	Reading and control of steam pressure temperature and stem flow. Working in steam boiler and economizer.	Boiler mounting and fittings. Description and use of safety valves and other types of valves. Types of boilers, their brief study.
24	Refrigeration and air conditioning :- Identification of refrigeration system. Stripping components, care and safety. Use of refrigeration service tools – care and safety.	Principle system and application of refrigeration. Refrigeration components – type specification and use.
25	Dismantling of different types of compressors. Checking and servicing of components. Assembly and testing.	Refrigeration compressor. Its function, mode of drive, types of compressors – classification and application. Construction and function. Advantages

		and disadvantages of different types.
26	<p>Servicing air cooled condenser. Checking leak repair and testing.</p> <p>Servicing evaporator, removal of oil, checking, leak repair and testing.</p>	<p>Condenser – its function, type, classification, construction and application.</p> <p>Evaporator – its function, type, classification, construction and application.</p>
27	<p>Checking automatic and thermostatic expansion switches, valves and capillary tube. Servicing and testing.</p>	Refrigeration control – function and type. Automatic, thermostatic and capillary control, construction, operation and application.
28	<p>Oil charging to compressor, installing compressor, electric wiring of refrigeration system. Testing leak in the refrigeration system. Effect of over charge and under charge.</p>	<p>Oil used in refrigeration system, their desirable properties. Leak detectors – their type, specification, use and care.</p> <p>Refrigerants – their properties and use.</p>
29	<p>Operation and servicing cold store cooling system. Control and instrument. Repair and maintenance of refrigerator and deep freezer. Bottle coolers and water coolers.</p>	<p>Food preservation spoilage agents control of spoilage agents. Cold storage plant operation refrigerator, deep freezer, bottle cooler and water cooler, its common trouble and remedies.</p>
30 & 31	<p>Instrumentation:</p> <p>Calibration of pressure gauge on dead weight tester and by standard calibration.</p> <p>Study construction and operation of pressure regulating valve and filter.</p>	<p>Different types of pressure gauges and their application.</p> <p>Types of manometer and their use.</p> <p>Construction and operation of differential pressure transmitter.</p>
32 & 33	<p>Calibration of different types of pressure recorder.</p> <p>Maintenance and reconditioning of different types of thermometers and thermocouples.</p>	<p>Pressure recorder – its type and construction.</p> <p>Construction of different types of thermometer and thermocouple.</p>
Processing of Milk:		
34	<p>Chemical quality of milk. Reception, weighment and sampling of milk.</p>	<p>Pricing of milk, composition of milk, factors affecting composition of milk; nutritive value of milk.</p>
35	<p>Platform tests for milk. Sampling of milk and milk products for microbiological and chemical analysis.</p>	<p>Sensory and physio -Chemical properties of milk. Types of micro-organisms present in milk and their relation with public health.</p>
36	<p>Preservation of milk samples for Chemical analysis, Sensory evaluation of milk.</p>	<p>Grading and testing of milk for quality.</p>

37 & 38	Study of an immersion cooler, plate chiller, surface cooler and farm milk cooler .Study of Filters & clarifiers of milk and various parts of separator.	Functioning of chilling centers: milk reception, different methods of chilling and storage, handling of milk at chilling center, modes of transportation of chilled milk. Straining, filtration and clarification of milk. Principle of cream separation.
39	Different SNF test for milk. Determination of specific gravity of milk by lactometer. Determination of titratable acidity of milk	Sampling procedures and testing the quality of milk at reception dock, chilling center; maintenance of milk receipt register.
40 & 41	Identification and counting of different types of micro organism. Presumptive test.	Milk borne disease. Pathozenes and causative organism. Water bold disease, air bold disease, zoonotic diseases.
42	Sediment test, Clot-on-boiling test. (COB) Methyl blue reduction (MBR) test.	Principle of homogenization of milk, packaging of milk storage of processed milk. Importance of pasteurization, methods of pasteurization (LTLT, HTST).
43	Separation, Standardization and Homogenization of milk. Pasteurization of milk by HTST and LTLT methods.	Dispensing of milk through bulk vending machines, cans, cartons, sachets and bottles. Handling losses and factors affecting milk solids losses.
44 to 47	Packaging of milk in bottles, cans and sachets. Preparation of Toned and Double Toned milk. Preparation of flavoured milk and chocolate milk. Preparation of sterilized milk by batch methods. Preparation of butter.	Method of preparation of flavored, chocolate and sterilized milk, ghee, butter etc. and various milk products. Problems of storage, transportation and marketing of Dairy products.
48 & 49	Handling of Audio-Visual Aids. Case study of a milk Co-operative Society and Dairy entrepreneur.	Dairy Economics in large and small size dairy farm. Accounts keeping, Maintenance of Registers & Records, preparation of Balance Sheets etc. Marketing of milk and milk products.
50	Visit to a Dairy Farm, Co-operative Society & live stock markets	
51 & 52	Revision and Test	

Note:- Trainees should be taken to a Cattle Farm at least two days in a week to cover all the practical aspects contained from week no. 1 to 13.

LIST OF TOOLS AND EQUIPMENT FOR THE TRADE OF “DAIRYING”
UNDER CTS

<u>Sl. No.</u>	<u>Item</u>	<u>Number/Quantity</u> (for a batch of twenty five student)
1.	Stiff Brushes	5
2.	Floor Brushes	6
3.	Ear tags	100
4.	Bull nose ring	2
5.	Bull rope	10 ft.
6.	Milk strainer	1
7.	Drenching bamboo	1
8.	Enamel tray	2
10.	Tongs	2
11.	Mouth gag	1
12.	Cattle Travis (wooden)	1
13.	Sanitary Milking pails	2
14.	Buckets	3
15.	Milk feeding pail with nipple	1
16.	Strip cup	1
17.	Chains for cows	5
18.	Chains for calves	5
19.	Chaff cutter hand operated	1
20.	Wheel harrows	1
21.	Grinder (Elec. Operated)	1
22.	Centrifuge	1
23.	Refrigerator	1
24.	Water distillation apparatus	1
25.	Spirit Lamp	10
26.	Hot air oven	1
27.	pH meter	1
28.	Student’s microscope	2
29.	Water bath	1
30.	Gerber centrifuge	1
31.	Lactometer with jars	15
32.	Milk plunger	1
33.	Sediment testing equipment	1
34.	Klett Colorimeter	1
35.	Cream separator	
	a) Hand operated	1
	b) Electricity operated	1

36.	Butter churn	1
37.	Butter worker	2
38.	Butter paper	1(Ream)
39.	Sampler	1
40.	Butter scoop	1
41.	Weighing balance Double pan	1
42.	Ice cream freezer (Hand operated)	1
43.	Ice cream cutter	2
44.	Frying pan 2 litres	2
45.	Steel Bhagona 5 litres	1
46.	Bottle capper	1
47.	Milk measures – 250 ml	1
	-do- - 500 ml	1
48.	Sterilizer	1
49.	Stacking Trolley	1
50.	Homogenizer	1
51.	Trolley lift	1
52.	Butter moisture balance	1
53.	Measuring tape	2
54.	Khurpi	3
55.	Knife	3
56.	Iron pans	5
57.	Crowbar	1
58.	Muffle furnace	1

LIST OF GLASSWARE

1.	Clinical thermometer	5
2.	Thermometer	10
3.	Automatic tilt measure for sulphuric acid	5
4.	Automatic tilt measure for amyl alcohol	5
5.	Pipette for milk 11.05 ml	10
6.	Lactometer	5
7.	Dairy Thermometer	5
8.	Lactometer jars (aluminium)	5
9.	Burettes (0.01 sub-division)	10
10.	Pipette 10 ml	10
11.	Porcelain dish 10 ml cap.	5
12.	Beakers 100 ml	10
	250 ml	10
	500 ml	10
	1000 ml	10
13.	Test tubes cap. 15 ml	50

14.	Milk bottles 250 ml	100
15.	Kjeldhal flask 500 ml cap.	10
16.	Round bottom Flask 1000 ml	10
17.	Conical Flask 1000 ml	10
18.	Funnels 10 cm dia	10
19.	Measuring Cylinders 100 ml	2
	500 ml	2
	1000 ml	2
20.	Volumetric flask 100 ml	2
21.	Reagent bottles 250 ml	10
	500 ml	10
22.	Soxhlet apparatus	6 set
23.	Wash bottles cap. 500 ml	10
24.	Glass rods	1 kg.
25.	Indicator bottles	10
26.	Sample bottles	50
27.	Pipette, graduated 10ml 0.1 ml div.	5
28.	Pipette, graduated 10 ml 1 ml division	5
29.	Jar with over lapping lid 10 dia 12" high	5
30.	Spirit lamp	10
31.	Syringe 5 ml	2
32.	Rubber bulbs for suction	10
33.	Physical Balance	1
34.	Test tube stand 6 TT	15
35.	Test tube holder	10
36.	Alkali detergents	1 kg.
37.	Gerber centrifuge	1
38.	Filter paper (11 cm dia)	2 boxes
39.	Brushes to clean glassware	6
40.	Plastic aprons	6
41.	Microscope	6
42.	Cotton apron	10
43.	Gloves with sleeves	10
44.	Plastic tubing	10
45.	Sediment tester	2

LIST OF CHEMICALS, DETERGENTS AND PESTICIDES ETC.

<u>Sl. No.</u>	<u>Item</u>	<u>Number/Quantity</u> (for a batch of twenty five student)
1.	Sulphuric Acid (C. grade)	5 lit.
2.	Sulphuric Acid (A.R)	500 ml
3.	Sodium Hydroxide	5 kg.
4.	Litmus paper	Red/Blue
5.	Filter paper (Whatman no. 1 and 40)	
6.	Petroleum ether (40° - 60° C)	500 ml
7.	Copper Sulphate	500 gm
8.	Sodium Sulphate	500 gm
9.	Potassium Dichromate	500 gm
10.	Sodium Bicarbonate	500 gm
11.	Petroleum jelly/liquid paraffin	50 gm
12.	Spirit	5 lit
13.	Glucose	250 gm
14.	Salt	250 gm
15.	Urea	500 gm
16.	Petroleum ether	500 gm
17.	Mustard oil	1 lit
18.	Zinc Oxide	500 gm
19.	Caustic potash	5 kg
20.	Phenol	500 gm
21.	Alcohol	450 ml