

|  |
| --- |
| **Lasbela University of Agriculture, Water and Marine Sciences** |
|  |

**LUAWMS -Center of Excellence   
6 MONTHS**

**Diploma Courses**

1. Faculty of Agriculture  
2. Faculty of veterinary and Animal Sciences  
3. Faculty of Marine Science

Contents

[1. Faculty of Agriculture 3](#_Toc188346407)

[1.1 Commercial Hybrid Seed Production Duration: 6 months 3](#_Toc188346408)

[1.2 DIPLOMA IN TUNNEL AND GREENHOUSE FARMING Duration: 6 months 6](#_Toc188346409)

[1.3 MUSHROOM CULTIVATION Duration: 3 Months 8](#_Toc188346410)

[2. Faculty of veterinary and Animal Sciences 11](#_Toc188346411)

[2.1 Diploma in Dairy Technology Duration: 3 months 11](#_Toc188346412)

[2.2 Diploma in Milk Quality and safety Duration: 3 months 13](#_Toc188346413)

[2.3 15](#_Toc188346414)

[Duration: 3 months 15](#_Toc188346415)

[2.4 Semen Production Unit (SPU) & Artificial Insemination: Enhancing Animal Productivity & Workforce Competency at Lasbela, Balochistan 19](#_Toc188346416)

[2.5 Diploma in Community Livestock Assistant (CLA) Duration: 3 months 30](#_Toc188346417)

[2.6 Training Module for Broiler Farming Duration: 3 months 51](#_Toc188346418)

[2.7 Camel Farming and Products Development Duration: 6 months 58](#_Toc188346419)

[2.8 Manufacturing Livestock Feeds Duration: 06 months 62](#_Toc188346420)

[3. Faculty of Marine Science 65](#_Toc188346421)

[Fisheries and Aquaculture 65](#_Toc188346422)

[3.1 .Bio floc Technology in Aquaculture Duration: 01 Year 65](#_Toc188346423)

[3.2 Shellfish Aquaculture (Shrimp, Crab, and lobster) Duration: 01 Year 67](#_Toc188346424)

[3.3 Aquarium Design and Management Duration: 3-6 months 69](#_Toc188346425)

[3.4 Pond Management for Aquaculture Duration: 3-6 months 71](#_Toc188346426)

[3.5 Hatchery Management for fish seed production Duration: 3-6 months 72](#_Toc188346427)

[3.6 Fish feed formulation Duration: 3-6 months 74](#_Toc188346428)

[FISHERIES AND AQUACULTURE 75](#_Toc188346429)

[Equipment/Chemicals Requirement 76](#_Toc188346430)

1. Faculty of Agriculture

1.1 Commercial Hybrid Seed Production Duration: 6 months

**Objectives:**

1. To understand the principles of commercial hybrid seed production.
2. To enhance understanding of plant breeding, genetics, and seed technology.
3. To acquire hands-on experience in seed production, harvesting, and processing.
4. To understand the importance of quality control and assurance in seed production.
5. To develop skills in seed analysis, including physical, chemical, and biological testing.
6. To develop practical skills in commercial hybrid seed production.
7. To understand the regulatory requirements for seed production and marketing.
8. To develop entrepreneurship and business management skills for seed production.

**Course Curriculum:**

**Module 1 - Introduction to Commercial Hybrid Seed Production (Weeks 1-2)**

1. History and principles of commercial hybrid seed production
2. Benefits and limitations of hybrid seed production
3. Overview of seed production process

**Module 2 - Plant Breeding and Genetics (Weeks 3-4)**

1. Plant breeding techniques
2. Genetic principles
3. Hybridization methods
4. Introduction to seed science and technology

**Module 3 - Seed Science and Technology (Weeks 5-6)**

1. Seed development and maturation
2. Seed quality evaluation
3. Seed processing and storage
4. Seed testing methods

**Module 4 - Seed Production and Harvesting (Weeks 7-10)**

1. Field preparation and sowing
2. Seed Nursery sowing & management
3. Crop management and pollination
4. Seed harvesting and drying
5. Practical exercises in seed production and harvestin**g**

**Module 5 - Seed Processing and Storage (Weeks 11-14)**

1. Seed cleaning and grading
2. Seed packaging and labeling
3. Storage and maintenance
4. Practical exercises in seed processing and storage

**Module 6 - Hybrid Seed Production for Specific Crops (Weeks 15-18)**

1. Maize, rice, wheat, and vegetable seed production
2. Crop-specific hybridization techniques
3. Seed production challenges and solutions
4. Practical exercises in hybrid seed production

**Module 7 - Advanced Seed Production and Processing (Weeks 19-22)**

1. Advanced seed production techniques
2. Seed processing and quality control
3. Business planning and marketing strategies
4. Visit of seed companies
5. Practical exercises in advanced seed production and processing

**Module 8 - Project Work and Viva (Weeks 23-25)**

1. Project work on commercial hybrid seed production
2. Viva voce examination
3. Final project presentation

**Career Opportunities:**

1. Seed Analyst
2. Seed Production Technician
3. Seed Inspector
4. Seed Quality Assurance Manager
5. Seed Quality Control Assistant
6. Research Assistant

**Laboratory Equipment & Tools**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S#** | **Item name** | **Qty** | **Cost/ Unit** | **Amount** | **Remarks** |
| 1 | Analytical balance | 01 | 150000 | 150000 |  |
| 2 | Portable seed moisture meter | 01 | 150000 | 150000 | For measuring seed moisture |
| 3 | Probes and triers for seed | 05 | 26000 | 130000 | For drawing samples from bags |
| 4 | Seed Counter | 01 | 300000 | 300000 | For counting seeds to conduct germination tests |
| 5 | Sampling kit (Magnifying Lens, forceps, stainless cups) | 01 | 180000 | 180000 | For physical purity of seeds |
| 6 | Ergonomic Inspection Station | 01 | 1300000 | 1300000 | For purity analysis |
| 7 | Commercial Sieves | 01 | 300000 | 300000 | For samples collection |
| 8 | Top loading balance (1g - 30 kg) | 01 | 120000 | 120000 | For weighing of seeds and  chemicals |
| 09 | Seed incubator (with lights and temperature range of 10-30 C) | 01 | 1400000 | 1400000 | For seed germination |
| 10 | Size Seed Starter Kit with Grow Light, Heat Mat & seedling trays | 10 | 30000 | 300000 | For growing seeds |
| 11 | Seedling trays | 500 | 150 | 75000 | For growing seeds |
| 12 | Pre-basic seed of Vegetable & Crops | - | - | 500000 |  |
| 13 | Knapsack sprayer | 5 | 15000 | 75000 |  |
| 14 | Flexible arm illuminated seed magnifier | 05 | 25000 | 125000 | To magnify and visualized the damaged & undamaged  grains |
| 15 | Aluminum Sampling Trier Probe | 10 | 25000 | 250000 | For the collection of different grains samples form bulk storage |
| 16 | South Dakota Seed Blower | 01 | 1000000 | 1000000 | For purity analysis of cereals |
| 17 | Terracotta germinator/ Sprouter Starter Kit | 10 | 8000 | 80000 | For seeds germination test |
| 18 | Seed planters | 02 | 40000 | 80000 | For planting seeds |
| 19 | Seed storage containers | 10 | 4000 | 40000 | For storing different seeds of vegetables & crops |
| 20 | Bulb planter (steel) | 5 | 5000 | 25000 | For bulbs and seedlings |
| 21 | Plant Labels 10 Pc set (Metal) | 5 | 5000 | 25000 | For labelling plants/fields of seeds |
| 22 | Pollination bags | 100 | 300 | 30000 | For breeding |
| 23 | Plant breeding kit | 10 | 2000 | 20000 |  |
| 24 | Gloves gardening | 50 | 500 | 25000 |  |
| 25 | Safety glasses | 20 | 1000 | 20000 |  |
| 26 | Lab coats | 30 | 1500 | 45000 |  |
| 27 | Miscellaneous |  |  | 500000 |  |
|  | Grand Total |  |  | 7245000 | 7.245 Million |

1.2 DIPLOMA IN TUNNEL AND GREENHOUSE FARMING Duration: 6 months

**Course Introduction:**

This course on Tunnel Farming aims to equip participants with the essential knowledge and practical skills needed to successfully implement and manage tunnel farming systems. Tunnel farming is a modern agricultural technique that allows for year-round cultivation of crops by creating a controlled environment, significantly improving crop yield and quality.

**Objectives:**

1. Equip with the latest off-season vegetable production techniques
2. Foster entrepreneurship and business management skills related to tunnel farming.
3. Improve crop production through the best management skills
4. Develop practical skills in tunnel farming setup and management.

**Course Curriculum:**

**Module 1: Introduction to tunnel farming (Week 1-2)**

1. History and principles
2. Benefits and limitations
3. Overview of tunnel farming system

**Module 2: Site selection (Week 3-4)**

1. Area and site selection
2. Land leveling for tunnel
3. Visit to markets

**Module 3: tunnel and green house preparation (Week 5-6)**

1. Installation of tunnel structure
2. Material and equipment used
3. Visit to tunnel farms

**Module 4: Soil analysis (Week 7-8)**

1. Soil structure and importance
2. Soil sampling and testing
3. Preparation of soil for nursery

**Module 5: Selection of quality seeds of vegetables (Week 9-10)**

1. Definition and importance of seed
2. Identification of quality seed
3. Hybrid seed and importance

**Module 6: Nursery development (Week 11-12)**

1. Material required for nursery preparation
2. Purchasing of nursery material
3. Nursery preparation of different vegetables

**Module 7: Transplantation and irrigation system (Week 13-14)**

1. Preparation of Irrigation system
2. Preparation of beds/ridges
3. Transplantation of Nurseries

**Module 8: Management practices (Week 15-18)**

1. Importance and types of cultural practices
2. Fertilization, importance and application
3. Weeding importance and different weedicide.

**Module 9: Pest and diseases (Week 18-20)**

1. Identification of pest and diseases
2. Biological and synthetic mean of control
3. Impotence and application of pesticides and fungicides

**Module 10: Harvesting, packing and marketing (Week 20-22)**

1. Proper stage and time of harvesting
2. Available packing materials
3. Importance of marketing
4. Visit of markets for sale of vegetables

|  |  |  |
| --- | --- | --- |
| **S. NO** | **Equipment** | **Proposed cost** |
| 1 | Fiat Tractor NH 480 Power Plus | 2800000 |
| 2 | Front blade | 300000 |
| 3 | Back blade | 300000 |
| 4 | Plough 5 Tines | 250000 |
| 5 | 36 Blades Rotavator | 400000 |
| 6 | Cement pillars | 150000 |
| 7 | Bamboo sticks | 100000 |
| 8 | Green net | 200000 |
| 9 | Plastic sheet Plastic Cost Kg/ Acre) | 100000 |
| 10 | Spray machines | 30000 |
| 11 | Wire and rope | 50000 |
| 12 | seeds | 100000 |
| 13 | Peat moss | 200000 |
| 14 | Seedling trays | 150000 |
| 13 | Labor cost | 100000 |
| 14 | Irrigation pipes | 50000 |
| 15 | Water tank | 30000 |
| 16 | Pesticides and fungicides | 100000 |
| 17 | Weighing balance | 50000 |
| 18 | Miscellaneous | 200000 |
| 19 | Laptop | 300000 |
| 20 | Printer | 100000 |
| 21 | Air conditioner | 300000 |
| 22 | Dispenser | 30000 |
| 23 | Office stationary & others | 200000 |
|  | **Total** | **65,90,000** |

1.3 MUSHROOM CULTIVATION Duration: 3 Months

**COURSE INTRODUCTION**

Mushroom cultivation, locally known as "Khumbi," is an emerging agricultural business in Pakistan. With a high demand in the local market, mushroom farming has tremendous potential for growth. The demand for both fresh and canned mushrooms has increased significantly in recent years, driven by a shift towards vegetable proteins and a growing interest in global cuisine.

Despite its potential, mushroom cultivation in Pakistan is still in its infancy, hindered by inadequate support from both the private and public sectors. The high infrastructure requirements for mushroom cultivation have slowed its development. Statistics reveal that Pakistan's annual mushroom imports valued $1.54 million in 2022, with no exports recorded that year. In contrast, total imports in 2021 stood at $1.38 million.

The mushroom market in Pakistan is largely dependent on imports, with a significant hike in sales of 11.5% from 2003 to 2021. Currently, a small portion of the total market demand is met through local production of fresh mushrooms, while the majority is fulfilled by importing canned mushrooms from China, which accounts for 99% of the market share.

A major challenge facing the mushroom industry in Pakistan is the lack of awareness among conventional farmers and young entrepreneurs about mushroom cultivation. Many believe that mushrooms are cultivated in land like other crops. To tap into the growing demand for mushrooms, hands-on training is necessary to equip farmers and entrepreneurs with the skills required for mushroom cultivation.

**Objectives:**

1. To equip trainees with the knowledge and skills required for mushroom cultivation.

2. To categorize different varieties of fungi which are commonly eaten

3. To provide hands-on training in mushroom cultivation, processing,

4. To enable trainees to start their own mushroom cultivation business.

5. To Explain marketing strategies for mushrooms

**COURSE CURRICULUM:**

**Module 1: Introduction to Mushroom Cultivation (Weeks 1-2)**

1. Introduction of mushroom cultivation
2. Types/species of mushrooms (Milky, Button & Oyster)
3. Life history of mushroom
4. Products from mushroom
5. Mushroom cultivation techniques

**Module 2: Mushroom Spawn Production (Weeks 3-4)**

1. Options for obtaining spawn Mushroom
2. Identification of edible mushroom
3. Spawn production techniques
4. Steps in growing edible mushroom species
5. Spawn production equipment and materials
6. Growing of media
7. Quality control measures for spawn production

**Module 3: Mushroom Cultivation Techniques (Weeks 5-6)**

1. Understanding soil and compost, components and characteristics
2. Making compost for mushroom, Different composition of compost, Moisture level in compost
3. Mushroom bed preparation
4. components and characteristics
5. Spawn inoculation and incubation
6. Storage of spawn
7. Problems with spawn handling, Biotic and abiotic conditions for spawn production
8. Fruiting body formation and harvesting, fruiting patterns of mushrooms
9. Environment control, equipment to measure and control the environment

**Module 4: Mushroom Processing and Preservation (Weeks 7-8)**

1. Growing methods (caves, bags, houses, outdoor, troughs etc.)
2. Casing ; biological process , characteristics of biological process, procedure
3. Techniques; spawning case , ruffling, scratching
4. Mushroom cleaning and grading
5. Fungi nutrition
6. Casing to harvest, growing indoors, growing outdoor
7. Harvesting buttons, cups and flats on button mushroom
8. Mushroom drying and packaging (Drying mushrooms, Freezing mushrooms, Cold storage of mushrooms)
9. Mushroom preservation techniques, Canning mushrooms
10. Controlled atmosphere storage.

**Module 5: Mushroom Marketing and Business Management (Weeks 9-10)**

1. Mushroom market trends and demand
2. Marketing strategies for mushroom products
3. Business planning and management for mushroom cultivation

**Module 6: Practical Training and Project Work (Weeks 11-13)**

1. Hands-on training in mushroom cultivation and processing
2. Project work on mushroom cultivation and marketing
3. Final project presentation and evaluation

**Laboratory Equipment & Tools**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S#** | **Item name** | **Qty** | **Cost/ Unit** | **Amount** |
| 1 | Growing bags | 200 | 50 | 10000 |
| 2 | Shelves and racks | 01 | 150000 | 150000 |
| 3 | Probes and triers for seed | 05 | 26000 | 130000 |
| 4 | Substrate (0.5-1 ton) | 01 | 500000 | 500000 |
| 5 | Mycelium (1 kg) | 01 kg | 10000 | 10000 |
| 6 | Inoculation tools (needles, syringes, etc.) | 01 | 10000 | 10000 |
| 7 | Watering system (sprayers, misters, etc.) | 01 | 20000 | 20000 |
| 8 | Heating and cooling system (small)/Air conditioner | 01 | 250000 | 250000 |
| 09 | Humidifier | 01 | 35000 | 35000 |
| 10 | Air exchange system | 01 | 50000 | 50000 |
| 11 | Lighting (LED grow lights) | 10 | 5000 | 50000 |
| 12 | Thermometer & hygrometer | 01 | 5000 | 5000 |
| 13 | Autoclave (small) | 01 | 500000 | 500000 |
| 14 | Gloves and protective clothing | 01 | 10000 | 10000 |
| 15 | Face masks and respirators | 10 | 500 | 5000 |
| 16 | Cleaning solutions and disinfectants | 01 | 10000 | 10000 |
| 17 | CO2 meter | 01 | 50000 | 50000 |
| 18 | Inoculation loop | 100 | 50 | 5000 |
| 19 | Air quality monitor | 01 | 100000 | 100000 |
| 20 | Glass jars | 10 | 500 | 50000 |
| 21 | Glass containers | 10 | 200 | 20000 |
| 22 | Petri dishes | 50 | 200 | 10000 |
| 23 | Test tubes | 50 | 200 | 10000 |
| 24 | Gloves gardening | 50 | 500 | 25000 |
| 25 | Safety glasses | 20 | 1000 | 20000 |
| 26 | Lab coats | 30 | 1500 | 45000 |
| 27 | Scalpel | 50 | 150 | 7500 |
| 28 | Forceps | 50 | 150 | 7500 |
| 29 | Mushroom picking tool | 10 | 8000 | 80000 |
| 30 | Miscellaneous | 01 | 500000 | 500000 |
| Grand Total | |  |  | **2675000** |

2. Faculty of veterinary and Animal Sciences

2.1 Diploma in Dairy Technology Duration: 3 months

**Objectives:**

1. To understand the principles of milk production, processing, and safety.

2. To learn about the different types of milk and milk products, including cheese, yogurt, butter, and ice cream.

3. To acquire hands-on experience in milk processing, including pasteurization, homogenization, and packaging.

4. To understand the principles of ice cream manufacturing, including mixing, aging, freezing, and packaging.

5. To learn about the importance of quality control and assurance in the dairy industry.

6. To develop skills in milk and ice cream analysis, including physical, chemical, and microbiological testing.

7. To understand the regulatory requirements for milk and milk products, including labeling and packaging regulations.

**Course Curriculum:**

**Module 1: Introduction to Milk and Milk Products (Week 1-2)**

1. Overview of the dairy industry

2. Types of milk and milk products

3. Importance of milk quality and safety

**Module 2: Milk Production and Handling (Week 3-4)**

1. Dairy cattle management

2. Milk production and harvesting

3. Milk handling and storage

**Module 3: Milk Processing and Analysis (Week 5-6)**

1. Milk processing techniques (pasteurization, homogenization, etc.)

2. Milk analysis methods (physical, chemical, and microbiological)

3. Milk quality control and assurance

**Module 4: Milk Products Manufacturing (Week 7-8)**

1. Cheese manufacturing

2. Yogurt and fermented milk products

3. Butter and ghee manufacturing

**Module 5: Ice Cream Manufacturing (Week 9-10)**

1. Ice cream ingredients and formulation

2. Ice cream manufacturing processes (mixing, aging, freezing, etc.)

3. Ice cream quality control and safety

**Module 6: Packaging and Marketing of Milk, Milk Products, and Ice Cream (Week 11-12)**

1. Packaging materials and techniques

2. Labeling and branding

3. Marketing strategies for milk, milk products, and ice cream

**Module 7: Project Work and Viva (Week 13-14)**

1. Project work on milk, milk products

2. Viva voce examination

**Career Opportunities:**

1. Dairy Plant Manager

2. Milk Quality Control Specialist

3. Ice Cream Manufacturer

4. Food Safety Inspector

5. Quality Assurance Manager

|  |  |  |
| --- | --- | --- |
| **S. NO** | **Equipment** | **Proposed cost** |
| 1 | Pasteurizer | 2500000 |
| 2 | Homogenizer | 1200000 |
| 3 | Cheese making machine | 2200000 |
| 4 | Ice Cream Machine | 1800000 |
| 5 | Yogurt Marker | 800000 |
| 6 | Rennet enzyme | 120000 |
| 7 | Emulsifier | 12000 |
| 8 | Stabilizer | 13000 |
| 9 | Utensils | 3000000 |
| 10 | Chiller 500Lit | 300000 |
| 11 | Packaging machine | 400000 |
| 12 | Butter making machine | 300000 |
| 13 | Clean in place (CIP) system | 1300000 |
| 14 | Milk samples | 300000 |
| 15 | Flavors (mango, pistachio, vanilla, strawberry and etc.) | 200000 |
| 16 | Miscellaneous | 900000 |
| 17 | Glassware | 1000000 |
| 18 | Chemicals | 450000 |
| 19 | Cream separator automatic | 600000 |
| 20 | Laptop (Apple) | 300000 |
| 21 | Printer | 100000 |
| 22 | Air conditioner | 300000 |
| 23 | Dispenser | 60000 |
| 24 | Office maintains | 200000 |
| 25 | Labeling and branding | 1000000 |
| 26 | Refrigerator | 250000 |
| 27 | Weighing balance | 500000 |
|  | **Total** | **20105000** |

2.2 Diploma in Milk Quality and safety Duration: 3 months

**Project Objective**

To assess the quality of milk consumed in the community, identify potential contaminants, and educate the community on safe milk handling and consumption practices. The Diploma in Milk Quality and Safety is a specialized program designed to equip community with the knowledge and skills required to ensure the quality and safety of milk and dairy products.

**Course Objectives**

1. Understand the principles of milk quality testing

2. Learn about the different types of milk quality tests

3. Acquire hands-on experience in conducting milk quality tests

4. Understand the importance of quality control in the dairy industry

**Course Curriculum**

**Module 1: Introduction to Milk Quality Testing (Week 1-2)**

1. Overview of milk quality testing

2. Importance of quality control in the dairy industry

3. Types of milk quality tests

**Module 2: Physical and Chemical Tests (Week 3-4)**

1. Temperature testing

2. pH testing

3. Specific gravity testing

4. Viscosity testing

5. Fat content testing

6. Protein content testing

7. Lactose content testing

**Module 3: Microbiological Tests (Week 5-6)**

1. Total bacterial count

2. Coliform bacteria testing

3. E. coli testing

4. Salmonella testing

**Module 4: Adulteration of milk (Week 7-8)**

Adulteration Tests

1. Water Addition Test: Detects the presence of added water in milk.

2. Formaldehyde Test: Detects the presence of formaldehyde in milk.

3. Hydrogen Peroxide Test: Detects the presence of hydrogen peroxide in milk.

4. Urea Test: Detects the presence of urea in milk.

5. Detection of detergent in milk

**Module 5: Quality Control and Assurance (Week 9-10)**

1. Quality control in the dairy industry

2. Quality assurance in the dairy industry

3. HACCP (Hazard Analysis and Critical Control Points)

4. GMP (Good Manufacturing Practice)

**Module 6: Project and Viva (Week 11-12)**

1. Project work on milk quality testing

2. Viva voce examination

|  |  |
| --- | --- |
| **Course Assessment** | **Career Opportunities** |
| 1. Theory exams (40%)  2. Practical exams (30%)  3. Viva voce examination (30%) | 1. Milk Quality Control Specialist  2. Dairy Plant Manager  3. Food Safety Inspector  4. Dairy Microbiologist  5. Quality Assurance Manager |

**Equipment and glassware needed**

|  |  |  |
| --- | --- | --- |
| **S. No** | **Equipment** | **Estimated Cost** |
| 1 | Milk Testing Kit: (includes pH meter, lactometer, and bacterial testing equipment) | 1000000 |
| 2 | Refrigerator: (for storing milk samples) | 200000 |
| 3 | Incubator: (for bacterial culturing) | 500000 |
| 4 | Microscope: (for bacterial identification) | 250000 |
| 5 | petri dishes | 10000 |
| 6 | Laminar flow | 1000000 |
| 7 | Viscometer | 120000 |
| 8 | Lactoscan | 800000 |
| 9 | Media | 500000 |
| 10 | pH meter | 30000 |
| 11 | Butyrometer 10%, 40%, 60% to 80% | 80000 |
| 12 | Garber centrifuge machine | 400000 |
| 13 | Amyl Alcohol | 25000 |
| 14 | Sulphuric acid | 15000 |
| 15 | Pipette 10.94 ml | 15000 |
| 16 | Pipettes 1, 5, 10 15 ML | 30000 |
| 17 | Test tube | 25000 |
| 18 | Test tube holder | 1500 |
| 19 | CMT kit | 30000 |
| 20 | Urease | 50000 |
| 21 | Bromothymol blue | 15000 |
| 22 | Sodium suphate | 8000 |
| 23 | Kjeldhal unit with accessories | 1500000 |
| 24 | Copper sulphate | 9000 |
| 25 | Sodium chloride | 6000 |
| 26 | Phenolphthalein | 15000 |
| 27 | Sodium hydroxide | 6000 |
| 28 | Chemicals required | 800000 |
| 29 | Glassware (beakers, conical flask etc ) | 700000 |
|  | **Total** | **8140500** |

**2.3** **LUAWMS Wool production and Processing Unit, CoE LUAWMS**

Duration: 3 months

Balochistan being largest province of Pakistan contributing ~45% of the total sheep population (12-15 million) of the country. In Pakistan ~50,000 metric tons of wool are produced with the highest share from Balochistan with the major sheep population. Wool produced in Balochistan is categorized as coarse to medium (fine) in fiber quality depending upon type of breeds, environmental conditions and management. Wool produced in Balochistan is used to produce various traditional as well as industrial products such as threads, carpets, rugs, shawls, blankets etc. Due to lack of wool processing units/infrastructure, limited or in access to market, lack of training, in access to resources and many other factors have created challenges to wool industry in the region causing a reasonable economic loss to the farmers and country’s GDP in general.

Productive trait specific breeding strategies, enhanced animal living conditions, training of farmers and their families involved in producing traditional wool products, entrepreneurs and establishing wool processing units could improve wool and wool by products in Balochistan with better market value both nationally and globally.

To establish wool processing units various hands-on training, certification programs will be launched to cover the entire wool production cycle from shearing to final finished products, quality enhancement of wool production through application of the modern technologies used in wool sector through research and innovation will be the key considerations of the wool production unit at LUAWMS.

**Objectives of the Unit:**

The prime objective of the unit will be to market the wool which is almost being wasted or used with very little market value. The objectives of the unit will be as under:

1. Skill development
2. Quality enhancement and value addition
3. Sustainability
4. Economic Growth
5. Market expansion
6. Traditional products (Culture) conservation
7. Technology adoption
8. Traceability and quality assurance
9. Research and innovation
10. Collaboration and marketing

**Training and Certification Modules:**

1. **Sheep handling and shearing techniques (3 weeks hands-on training)**

**Module topics:**

* + 1. Basics of sheep shearing
    2. Animal welfare and handling techniques
    3. Maintenance and operation of shearing tools
    4. Health and safety protocols in shearing

1. **Wool sorting and Grading (3 weeks hands-on training)**

**Module topics:**

* + 1. Wool types and characteristics (micron count, crimp, staple length)
    2. Grading and classifying wool for various products
    3. Sorting techniques for improving wool quality
    4. Economic aspects of wool grading

1. **Wool Scouring and Cleaning (2 weeks hands-on training)**

**Module topics:**

* + 1. Principles of wool scouring and degreasing (removal of lanolin)
    2. Use of detergents and scouring agents
    3. Wool drying techniques
    4. Wastewater management in wool scouring

1. **Carding, Combing, and Wool Preparation (2 weeks hands-on training)**

**Module topics:**

* + 1. Introduction to wool carding and combing processes
    2. Manual carding vs. machine carding techniques
    3. Preparing wool for spinning (fiber alignment and blending)
    4. Quality control measures for carded wool

1. **Spinning and Yarn Production ( 5 weeks hands-on training)**

**Module topics:**

* + 1. Traditional and modern spinning techniques (drop spindle, spinning wheel)
    2. Introduction to wool yarn properties and uses
    3. Single and multiple-ply yarn production
    4. Quality assurance and troubleshooting in spinning

1. **Dyeing and Color Management (2 weeks hands-on training)**

**Modul topics:**

* + 1. Introduction to natural and synthetic dyes
    2. Wool dyeing techniques and colorfastness
    3. Use of mordants and other dyeing reagents
    4. Environmental considerations in wool dyeing

1. **Weaving and Fabric/Carpet Production ( 3 Months)**

**Module topics:**

* + 1. Basics of weaving techniques (handloom and mechanical loom)
    2. Warping, threading, and preparing the loom
    3. Carpet weaving and other textile products
    4. Quality assurance in woven wool products

1. **Finishing Techniques for Wool Products (3 weeks training)**

**Modul topics:**

* + 1. Finishing methods for woolen fabrics and carpets
    2. Wool pressing, felting, and shrinking processes
    3. Carpet trimming and binding
    4. Maintenance and care of woolen products

1. **Business and Marketing for Wool Products ( 2 weeks)**

**Module topics:**

* + 1. Marketing wool products to niche and mass markets
    2. Pricing, branding, and packaging strategies
    3. Global trends in wool textiles and carpets

**Note:** A candidate can enroll for 1 to all above mentioned modules whereas candidates apply for associated degree program (2 years duration) require doing all the above modules along with online proposed training program and 4 months internship program from a relevant textile industry/institute.

LUAWMS wool production unit will also support research and innovation in the field of wool research through MS and Ph.D. degree programs. The research area will include Phenotypic Research Areas (Physical Traits)

**Phenotypic research** focuses on observable traits in sheep that influence wool characteristics, such as:

Fleece Weight, Fiber diameter, Fiber length and strength, Crimp, Color, Staple Structure, Environmental and Nutritional Effects

**Genetic research** focuses on understanding and manipulating the genetic basis of wool traits, often with the goal of selective breeding to improve desirable characteristics.

Genomic Selection for Wool Traits, Heritability of Wool Traits, Market-Assisted Selection, Quantitative Trait Loci Mapping, Breed-Specific Genetic Research, Genetic resistance to Diseases, Transgenic approaches, Epigenetic Studies

**Combined Genetic and Phenotypic Approaches:**

Many researchers are now combining genomic tools with phenotypic data to create comprehensive breeding programs that can improve wool characteristics efficiently. This often involves:

Genetic-Phenotypic Correlation Studies, Selection Indexes, Emerging Research Trends (Precision breeding and Climate Change Impact)

Equipments’ required and their specifications

|  |  |  |
| --- | --- | --- |
| S.No. | Equipments’ and their specifications | Estimated Price |
| 1 | 1. Sharing clippers for wool harvesting (electric) (5 no.   Specifications:  item Type: Electric Sheep Clipper  Material: Plastic + Aluminum  Blade Material: Stainless Steel  Color: Red  Power: 690W  Voltage / Plug: 110V-240V  No Load: 2400r/min  Blade Width: Approx. 76mm / 3.0in  Teeth: Upper Teeth Number: 4 Teeth, Lower Teeth Number: 13 Teeth  Noise: 78DB  Product Size: Approx. 36.5 x 8 cm / 14.4 x 3.2 in   1. Mannual sheep shears/ wool cutters/clippers   Stainless steel with long blades (10 no.) | Rs. 40,000/unit price  **(Rs. 200,000)**  Rs. 4000/unit price  **(Rs. 40,000)** |
| 2 | Wool Sorting Table (1 no.)  Table size: 2400L x 1200W x 800H  Table legs: 90x90mm  Recessed 8mm table top - to comfortably take 6-8mm toughened glass with polished edges | Rs. 100,000/ |
| 3 | Wool scouring tubs/vats (2.no. each) | Rs. 50,000/ |
| 4 | Washing machine (1 no.)  Capacity : 8 kg  Color : Silver  Motor Type : Induction  Drum Pattern : Diamond  Lid Color & Material : Transparent glass | Rs. 100,000/ |
| 5 | Wool dryer machine (1 no.) | Rs. 100,000/ |
| 6 | OFDA 2000 | Rs.15,000,000/ |
| 7 | Electric Wool Spinning wheel (3 no.) | Rs. 375000/ |
| 8 | Indigenous manual wool spinning machine (10 no.) | Rs. 100,000/ |
| 9 | Textile bobbins (larger size) (100 no.) | Rs. 100,000/ |
| 10 | Niddy noddy (10 no.) | Rs. 100,000/ |
| 11 | Lazy Kate (5 no.) | Rs. 100,000/ |
| 12 | Yarn Swift (2 no.) | Rs. 150,000/ |
| 13 | Dyeing pots (4 no.) | Rs. 100,000/ |
| 14 | Stirring rods and strainers (8 no.) | Rs. 80,000/ |
| 15 | Dyes and Mordants (Consumables) | Rs. 500,000/ |
| 16 | Wrapping board (2 no.) | Rs. 100,000/ |
| 17 | Weaving Shuttles (10 no.) | Rs. 150,000/ |
| 18 | Hand loom (Wooden frame) (5 no.) | Rs. 300,000/ |
| 19 | Mechanical loom (1 no.) | Rs. 5,000,000/ |
| 20 | Weaving comb/beater (10 no.) | Rs. 50,000/ |
| 21 | Weaving Reed (5 no.) | Rs. 100,000/ |
|  | **Total** | **Rs. 22,895,000/** |

2.4 Semen Production Unit (SPU) & Artificial Insemination: duration: 3 months

**(13 Weeks) Class hours: 4 hours per day**

**Enhancing Animal Productivity & Workforce Competency at Lasbela, Balochistan**

**Executive Summary**

Lasbela, a region in Balochistan, is heavily reliant on livestock for its economy, with cattle, sheep, goats, and camels being vital to local livelihoods. Moreover, the source of income among population is livestock, fishing practices and agriculture. In addition, the livestock is a major subsector of agriculture. It contributes about 56% in Agriculture and 11% to the gross domestic product (GDP). Furthermore, district Lasbela can play a major role in the livestock productivity. Moreover, the Lasbela possesses about 70% poor households and 24.5% are very poor households. Correspondingly, the per capita monthly income is about 1475/ Pakistani Rupees. Moreover, multidimensional poverty exists in district Lasbela.

However, livestock productivity remains low due to traditional breeding practices, limited access to advanced technologies, and poor genetic selection. These challenges hinder the growth of the sector, affecting milk, meat, and leather production. The introduction of Semen Production Units (SPUs) and Artificial Insemination (AI) can address these issues by improving the genetic quality of livestock, enhancing disease resistance, and increasing productivity. AI can rapidly introduce superior genetics into local herds, boosting productivity and disease resistance. Additionally, the project aims to build local workforce competency through training in AI techniques and semen preservation. With a significant portion of the population dependent on livestock for their livelihoods, enhancing breeding practices will increase income, improve food security, and support sustainable agricultural practices in the region. Establishing local infrastructure will reduce dependency on external suppliers, lower costs, and make advanced breeding technologies more accessible to farmers. In Pakistan, livestock is developing and achieved many milestones in milk and meat processing unit.

Currently, the region lacks proper infrastructure for SPU and AI services, resulting in reliance on external sources, which is costly and inefficient. This proposal aims to establishment the semen production unit (SPU) at LUAWMS will focus on high quality semen production, cryopreservation, and AI services, alongside training the local unemployed youth, veterinarians, farm workers, and technicians in AI techniques. The goal is to enhance the genetic improvement, reproductive efficiency, and economic sustainability of livestock farming in Lasbela.

**Background and Rationale**

Reproductive performance is low and a major problem of cow among the cattle population in district lasbela, Balochistan. Heat detection on time and lacking facilities of artificial insemination are major responsible factors decreases the overall female reproductive performance which increases the poverty and economic losses. However, these losses could be minimizing through development of quality cryopreservation of semen, providing the artificial insemination technique. Unfortunately, the artificial insemination is not practicing regularly in district Lasbela. The rationale for establishing the **semen production unit (SPU)** and implementing **artificial insemination (AI)** in Lasbela is rooted in the need to overcome the existing challenges and capitalize on the potential for agricultural growth in the region.

**Objectives & expectations**

**Objectives of Semen Production Unit (SPU)**

* Improvement of livestock genetics
* Supporting artificial insemination (AI) Programs
* Enhancing livestock productivity
* Reproductive disease control
* Sustainability and cost efficiency
* Promotion of scientific farming

**Objectives of the certificates & diploma courses in artificial insemination**

* Employable skills and hands-on practice for artificial insemination techniques effectively, and ensuring the reproductive management with high success rates in breeding programs.
* Hand-on practice in the methods of semen collection, evaluation, and processing.
* To gain expertise in the application of reproductive management techniques and estrus synchronization methods in order to improve livestock productivity.
* Provide the potential and true frozen semen for local breeders.
* A good and cheap A.I doses for the beef production throughout Lasbela District to increase the productivity and may help in decrease poverty of the local population.
* Support for Farmers in Adoption of Modern Techniques
* Promoting Animal Welfare
* Empowering Youth in Agriculture

**Note:** **Semen production unit will also support the research and innovation in the field of semen cryopreservation and techniques related to reproductive biotechnologies through MS and Ph.D. degree programs.**

**Certification & diploma in artificial insemination**

**Learning Outcomes**

After successful completion of this course. The trainee will be able to

* Explain the bovine male and female reproductive system
* Describe the bovine reproductive cycle
* Heat detection techniques
* Semen collection and evaluation
* Semen processing and handling
* Artificial insemination techniques
* Pregnancy diagnosis through rectal palpation
* Pregnancy diagnosis through ultrasonography
* Manage the reproductive problem during pregnancy
* Ability to solve problems using a variety of techniques and methods.

**Entry-level of trainees** Metric (Science) **Diploma titles & course execution plan**

**Certificate in artificial insemination**

The total duration of the course: 3 months (13 Weeks)

Class hours: 4 hours per day

Theory: 30%

Practical: 70%

Weekly hours: 20 hours per week

**Certificate in artificial insemination & reproductive techniques**

The total duration of the course: 6 months (26 Weeks)

Class hours: 4 hours per day

Theory: 30%

Practical: 70%

Weekly hours: 20 hours per week

**Diploma in cattle reproduction & artificial insemination technician**

The total semesters: 4 (2 years)

Class hours: 4 hours per day

Theory: 30%

Practical: 70%

Weekly hours: 20 hours per week

**Department & Institution**

Department of Animal Reproduction, Veterinary and Animal Sciences (FVAS), Lasbela University of Agriculture, Water and Marine Sciences (LUAWMS), Balochistan Pakistan

|  |  |
| --- | --- |
| **Companies offering jobs in the respective trade** | **Job Opportunities** |
| * Livestock & Dairy Development Department, Quetta Balochistan * Tyson Foods, Inc. * ICI Pakistan Private Ltd * Maxim Agri * Nestlé Pakistan | * Dairy Production Supervisor * Assistant Dairy Farm Manager * Cattle Attendant * Artificial Insemination Technician * Breed Improvement Technician * Veterinary Assistant * Assistant Farm Manager |

**No. of Students** 40 in each

**Learning Place** Lab/Classroom/Veterinary and Dairy Farm

|  |  |
| --- | --- |
| **Target audience** | **Delivery mode** |
| * Veterinary technicians * Livestock farmers * Agriculture extension workers * Unemployed youth | * Classroom-based Learning: Conventional in-person lectures combined with interactive workshops held in farms or labs. * Online learning refers to the delivery of courses via online resources, such as interactive modules, recorded lectures, and virtual laboratories. * Field Training: Acquiring hands-on experience in relevant AI and semen handling through internships or placements. * Workshops and seminars: Brief classes concentrating on particular abilities or subject areas linked to semen handling and artificial insemination. |

**Learning units of certificate courses with weekly schedule**

* + 1. **Certificate in Artificial insemination (3 months)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Couse title (modules)** | **Scheduled weeks** | **Learning units** | **Remarks** |
| **Introduction to Theriogenology** | Week 1-2 | Course Introduction  Job market  Institute/work ethics  Course Applications  National breeds of cattle  Local Breeds of cattle | Assignment |
| Week 3 | Anatomy of female reproductive organs of cattle  Endocrinology of reproduction  Age of puberty  Breeding seasons  Oestrus and Methods of oestrus detection | Assignment |
| Week 4 | Anatomy of male reproductive organs of cattle  Age of puberty Selection of Sires for breeding semen collection  Brief introduction to semen evaluation and processing | Monthly examination |
| Week 5 | Introduction to liquid and frozen semen  Cryogenic storage  Transportation  Semen Handling | Assignment |
| **Techniques of Artificial Insemination** | Week 6 | Introduction to Artificial Insemination  Historic Backgrounds of Artificial insemination  Natural Service vs Artificial Insemination  Different techniques of AI  Advantages  Disadvantages  Time of insemination after onset of  oestrous  Hands-on training in artificial insemination | Assignment |
| Week 9-11 | Hands-on training in artificial insemination | Monthly examination |
| Week 12 | Hands-on training in artificial insemination |  |
| Week 13 | Final evaluation | |

* + 1. **Certificate in Artificial insemination & Reproductive Techniques (6 months)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Couse title (modules)** | **Scheduled weeks** | **Learning units** | **Remarks** |
| **Introduction to Theriogenology** | Week 1-2 | Course Introduction  Job market  Institute/work ethics  Course Applications  National breeds of cattle  Local Breeds of cattle | Assignment |
| Week 2-4 | Anatomy of female reproductive organs of cattle  Endocrinology of reproduction  Age of puberty  Breeding seasons  Oestrus cycle  Methods of oestrus detection  Different aids of Oestrus detection | Assignment |
| Week 4-6 | Anatomy of male reproductive organs of cattle  Age of puberty Selection of Sires for breeding  Brief introduction to semen evaluation and processing | Assignment, Monthly examination |
| **Semen Collection and Quality** | Week 7-9 | Composition of semen  Attributes of semen  Method of Semen collection  Method of semen collection through artificial vagina (AV) | Assignment, Monthly examination |
| Week 10 | Hands-on training on semen collection through AV |  |
| Week 10-11 | Macroscopic evaluation of semen  Volume  Colour  Taste  pH | Assignment |
| Week 12 | Hand of training on macroscopic evaluation of semen | Monthly examination |
| Week 13-14 | Microscopic evaluation  Includes  of semen includes:  Sperm concentration  Sperm motility  Sperm morphology |  |
| Week 15 | Hand on training on macroscopic evaluation of semen | Assignment |
| Week 16 | Semen processing and packing | Monthly examination |
| Week 17 | Hand on training on macroscopic evaluation of semen |  |
| **Assessment Techniques of Artificial Insemination** | Week 18 | Introduction to Artificial Insemination  Historic Backgrounds of Artificial insemination  Natural Service vs Artificial Insemination  Different techniques of AI  Advantages  Disadvantages  Time of insemination after onset of  Oestrous | Assignment |
| Week 19-21 | Hands-on training in artificial insemination | Monthly examination |
| Week 22 | Fertilization and implantation in cattle  Placentation in cattle  Rectal palpation and its signs  Pregnancy diagnosis through rectal palpation |  |
| Week 23-24 | Hands-on training in pregnancy diagnosis through rectal palpation | Assignment |
| Week 25 | Hands-on training in Artificial insemination Hands-on training in pregnancy diagnosis through rectal palpation |  |
| Week 26 | Final evaluation (examination) |  |

* + 1. **Diploma in Cattle Reproduction and Artificial insemination technician**

|  |  |
| --- | --- |
| **Semester** | **Courses and contents** |
| **1st (16-18 weeks**) | **Basic Bovine Reproductive Anatomy DCRA ANAT 3(1-2)**  **Theory:** Introduction to anatomy, body points; general body points of bovine, anatomical terminology; directional terms, planes, bone surface modifications, structure of bone, classes of bones, basic myology; muscles and structures associated to bovine reproduction, structural and functional classification of joints related to reproduction, arteries, ligaments and nerves associated with male and female reproduction.  **Practical:** Introduction to anatomy, branches of anatomy, terminology, anatomical planes and directional terms, anatomy arthrology of forelimb and hindlimb region, udder and anatomy of reproductive organs includes ligaments associated with male and female reproductive organs of bovine. |
| **Basic Reproductive Physiology DCRA THER 4(2-2)**  **Theory:** Anatomy and physiology of male and female reproductive system,  Classification of reproductive hormones, Roles of reproductive hormones, Factors affecting the onset of puberty, Factors influencing reproductive cyclicity, Physiology of estrous cycle: Follicular Phase and luteal phase, male and female reproductive behaviour, oogenesis and spermatogenesis copulation and ejaculation behaviour, Sperm transport and fertilization, Implantation and placentation, gestation, parturition.  **Practical:**  Table palpation and biometry of male and female reproductive organs, Demonstration of normal semen attributes including colour, volume, pH, mass activity, sperm concentration, sperm morphology, dosage, semen extender, processing and packing. |
| **Basic Veterinary Pharmacology DCRA PHAR 2(2-0)**  **Theory:** General Pharmacology: Introduction to Pharmacology, historical perspectives and definitions, drug sources , classification of drugs, nomenclature of drugs and drugs information sources, distribution of drugs, metabolism of drugs, elimination of drugs, pharmacodynamic concepts of drugs, adverse drug reactions and drug resistance/tolerance, factors modifying the drug effects and drug interactions. |
| **Theriogenology clinic-I DCRA THER 3(0-3)**  **Clinic:** Steps to identify a clinical case of reproduction, Approach to clinical case and pre-requisites for handling, Palpation & identification of female reproductive system on table, Technique of rectal palpation in domestic animals, Identification of parts of reproductive tract in live animals, Identification of ovarian structures in live animals, Determination of stage of estrus cycle in live animals, Development of models for estrus detection |
| **2nd (16-18 weeks)** | **Basic Veterinary Obstetrics and genital diseases DCRA THER 3(1-2)**  **Theory:** Introduction of obstetrics, causes of abortion, Uterine torsion, Genital prolapse, Causes and types of dystocia, Retention of fetal membranes, Repeat Breeding and Anestrus.  Practical:  **Practical:** Basins of obstetrical anatomy, Normal/abnormal presentation, position and posture, Identification and usage of obstetrical instruments, Fetal and maternal dystocia: causes and treatment, Performance of mutation and forced extraction, Handling of prolapse and torsion. |
| **Semen Collection, evaluation and processing DCRA THER 3(1-2)**  **Theory:** Basics of cooling and freezing of semen, basics of extenders, buffers and cryo-protectants for frozen semen, processing; extension; equilibration; deep freezing methods, storage and thawing of deep frozen semen  **Practical:** Semen collection, evaluation, basics of semen processing. Preparation of different types of extenders for liquid and frozen semen, basics of quality assessment through computer assisted semen analysis semen production unit (SPU) |
| **Artificial Insemination DCRA THER 3(1-2)**  **Theory:** History, scope and development of artificial insemination; basics of evaluation of reproductive health status of female; insemination techniques; Factors affecting conception rate in artificial insemination; record keeping.  Practical: Washing and sterilization of equipment; Demonstration of artificial insemination instruments, rectal palpation, estrus detection and timing of insemination Practice of passing AI rod, case recording for AI. |
| **Theriogenology clinic-II DCRA THER 3(0-3)**  **Practical:** Method and importance of history questions in case handling, Breeding program in a herd, How to diagnose pregnancy in domestic animals. |
| **3rd (16-18 weeks)** | **Basics of Veterinary Ultrasonography DCRA THER 3(0-3)**  **Practical:** Principles of Diagnostic Ultrasound including indications and techniques; Ultrasound Artifacts; Sonography of the General Abdomen: reproductive organs during pregnancy and without pregnancy in bovine. Sonographic features of Urinary Tract & Reproductive Tract. |
| **General Reproductive Management DCRA THER 3(1-2)**  **Theory:** Overview on bovine reproduction, Reproductive efficiency, Factors affecting reproductive efficiency (nutrition, environment, genetics), Record keeping and data management for reproductive monitoring.  **Practical:** Culling decisions based on reproductive performance Management practices to improve conception rates and reduce calving intervals, Common reproductive disorders in cattle (e.g., metritis, endometritis, cystic ovaries), Prevention and management of reproductive diseases, Vaccination protocols and biosecurity measures regarding bovine reproduction, Health management for pregnant cows and post-partum cows. |
| **Theriogenology clinic-III DCRA THER 3(1-2)**  **Practical:** Approaches to diagnose and record reproductive disorders in clinical cases, Different methods of artificial insemination (AI) in domestic animals, Semen handling and structure of liquid nitrogen container, Thawing of frozen semen, Preparation of AI gun, Pre-requisites for AI procedure, Determination of time of insemination, Method of AI rod & AI gun passing in the female reproductive tract on table and in live animals |
| **Theriogenology clinic-IV DCRA THER-IV 3(1-2)**  **Practical:** AI/ breeding plans in multilevel dairy enterprises, how to effectively communicate with animal owner/ clients, AI procedures, pregnancy diagnosis practices etc. to increase pregnancy rate through AI in dairy herds, Synchronization programs in dairy herds, Diagnosis and treatment of uterine infections, Prevention and management of vaginal & uterine prolapse, Causes, prevention and management of retained placenta, Use of ultrasonography in reproductive management. |
| **4th (16-18 weeks)** | **Theriogenology clinic-IV DCRA THER-VI 2(0-2)** Hands-On training activities in AI, pregnancy diagnosis, dystocia management, semen processing and handling, reproductive health monitoring and intervention |
| **Internship DCRA-INTSH 10(0-10)**  In this internship, trainee will focus on focused on the trainings related to **artificial insemination (AI), pregnancy diagnosis, handling of dystocia, semen processing and packing, and related reproductive health practices.** Mostly, visits will be conducted to specific farms that allow for practical, hands-on exposure. |
| **Marks distribution/weightage of examination** | The number and nature of tests and assignments depend on the nature of course. However, in each course, there shall be at least two tests, mid-term and final examination. However, the proportionate worth shall be as under:  **Theory:**  1st Quiz =05%  Mid Term Test =30%  2nd Quiz =05%  Teacher’s Discretion /Assignments =10%  Final Examination =50%  **Total =100%**  **Practical:**  For practical examination (if applicable) 100% worth of credit hour (s) will be towards final examination with the following distribution:  Practical Performance =50%  Quiz =10%  Viva Voce =40%  **Total =100%**  In view of the worth for various examinations. The duration for various tests/examinations shall be as follows:  Midterm Test =One to Two Hours  Final Examination =Two to Three Hours  **Note:** Internship will be evaluated and marked on basis of performance by the concerned head of department. Certificate based trainings will be evaluation on the basis of performance, assigned tasks and weekly or monthly examinations. |
|  |

**Requirements of Glassware, Chemicals & Equipment**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. #.** | **A. Glassware** | | **Quantity** | | **Total Estimated Cost (PKRS)** | | **Remarks** |
| 1 | Reagent glass bottle with screw cap (200, 500 & 1000mL) | | 10 each | | | 50000 | Used in semen collection, evaluation, processing and cryopreservation |
| 2 | Graduated test tubes (10 mL and 20 mL) | | 40 each | | | 100000 |
| 3 | Volumetric pipet (20mL) | | 20 | | | 100000 |
| 4 | Graduated cylinder (200 and 500 mL) | | 10 each | | | 20000 |
| 5 | Glass slide | | 30 packets | | | 25000 |
| 6 | Glass rod for stirring | | 10 | | | 10000 |
| 7 | Cover slips | | 20 packets | | | 5000 |
| 8 | Glass vials | | 30 | | | 20000 |
| 9 | Test Tubes (3, 5 and 10 mL) | | 100 each | | | 10000 |
| 10 | Test tubes holders (Metal or Steel made) | | 5 | | | 5000 |
| 11 | Test tubes racks (Steel made) | | 20 | | | 15000 |
| 12 | Funnels | | 20 | | | 20000 |
| 13 | Dropping bottles (plastic made, 500 mL) | | 10 | | | 20000 |
| 14 | Beakers (200, 500 & 1000 mL) | | 30 each | | | 10000 |
| 15 | Petri dishes (glass made) | | 200 | | | 150000 |
| 16 | Stirring rod | | 10 | | | 2000 |
| 17 | Bunsen burner | | 5 | | | 5000 |
| 18 | Beaker tongs | | 5 | | | 5000 |
| 19 | Erlenmeyer flask (Conical flask, 500mL) | | 10 | | | 20000 |
| 20 | Ring stand | | 10 | | | 15000 |
| 21 | Micropipette Dispenser (single channels, 10, 20, 200 and 1000 µL with stands) | | 4sets | | | 200000 |
| 22 | Micro pipette tips (10, 200 and 1000 µL) | | 1000 each | | | 30000 |
| 23 | Opaque glass bottles with taper cork stopper (500 & 1000mL) | | 20 each | | | 10000 |
| 24 | Diluent apparatus | | 3 | | | 3000 |
| 25 | Box Cooler (Portable cold and warm, 5Liter capacity) | | 10 | | | 3000 |
| 26 | Insemination catheters | | 100 | | | 3000 |
| 27 | Insulating bags | | 5 packets | | | 5000 |
| 28 | Straws (0.5ml) | | 01 packet | | | 1000 |
| 29 | Artificial insemination rods | | 20 | | | 200000 |
| 30 | A.I gun sheet | | 10 packets | | | 1000 |
| 31 | Plastic bath with a capacity of 750 ml | | 10 | | | 10000 |
| 32 | Straw forceps (long) | | 20 | | | 5000 |
| 33 | Straw cutting scissors | | 10 | | | 3000 |
| 34 | Tissue paper for lab use | | 20 packets | | | 2000 |
| 35 | Electric kettle (stainless steel, 2 Liters capacity) | | 2 | | | 5000 |
| 36 | Laboratory Thermometer | | 20 | | | 5000 |
| 37 | Surgical gloves (small, medium & large size) | | 10 each | | | 5000 |
| 38 | Sleeves | | 20 packets | | | 5000 |
| 39 | Filter papers | | 10 packets | | | 5000 |
| 40 | Face Mask | | 24 dozens | | | 5000 |
| 41 | Cotton for clinic used | | 8 Roles | | | 5000 |
| 42 | Needles (16 and 18 gauge) | | 150 | | | 5000 |
| 43 | Syringes (10ml) | | 300 | | | 5000 |
| 44 | Thermometer for clinic use | | 2 dozen | | | 5000 |
| **Total** | | | | | | **1133000/=** | |
| **B. Chemicals** | | | | | | | |
| 45 | Sodium Chloride (Nacl) | | 01 Kg | | | 20000 | Used in semen collection, evaluation, processing and cryopreservation |
| 46 | Methylene blue solution | | 01 Liter | | | 50000 |
| 47 | Eosin | | 1.5 Kg | | | 100000 |
| 48 | Nigrosin | | 1.5 Kg | | | 100000 |
| 49 | Sodium citrate | | 500g | | | 5000 |
| 50 | K-y jelly | | 05 Liters | | | 5000 |
| 51 | Mineral oil (500mL) | | 02 bottles | | | 5000 |
| 52 | Liquid paraffin | | 10 Liters | | | 5000 |
| 53 | Glucose | | 1000g | | | 5000 |
| 54 | Fructose | | 1000g | | | 5000 |
| 55 | Formaldehyde (37%, one liter in packing) | | 10 bottles | | | 30000 |
| 56 | Ethanol (one liter in packing) | | 10 bottles | | | 30000 |
| 57 | Dettol (Chloroxynol, one liter in packing) | | 05 bottles | | | 5000 |
| 58 | Potassium permanganate (KMNO4, 1Kg in packing) | | 02 packets | | | 5000 |
| 59 | Tincture Iodine (one liter) | | 10 bottles | | | 5000 |
| 60 | Lactose | | 1000g | | | 5000 |
| 61 | Glycerol (500 mL) | | 04 bottles | | | 5000 |
| 62 | Dimethyl sulfoxide (DMSO) | | 500g | | | 10000 |
| 63 | Ethylene di amine tetra acetic acid ( EDTA) | | 500g | | | 10000 |
| 64 | Penicillin (40 Lac IU/vial) | | 50 vials | | | 10000 |
| 65 | Streptomycin (50g) | | 01 bottle | | | 10000 |
| 66 | Sodium citrate dehydrate (500g) | | 02 bottles | | | 10000 |
| 67 | PVC straw sealing powder (White) | | 500g | | | 10000 |
| **Total** | | | | | | **445000/=** | |
| **C. Equipment** | | | | | | | |
| 1 | Automatic Casa Semen Analysis (CASA) | 1 | | 1500000 | Semen evaluation | | |
| 2 | Electro-Ejaculator With all accessories including bull and buck electro-ejaculator probes (France) | 1 | | 1200000 | Semen collection | | |
| 3 | Artificial Vagina with accessories | 10 | | 500000 | Semen collection | | |
| 4 | Haemo-cytometer (Germany) | 10 | | 100000 | Sperm counting | | |
| 5 | Biological Freezer | 1 | | 300000 | Used for procedure of semen cryopreservation | | |
| 6 | Semen straw microjet ink printer | 1 | | 150000 | Used for printing of bull pedigree on straws | | |
| 7 | Automatic Staw Filling, Sealing Machine and accessories | 1 | | 2000000 | Used for semen processing | | |
| 8 | Triple distillation unit | 2 | | 200000 | Used in making semen extenders | | |
| 9 | Liquid Nitrogen Containers (21 L) | 6 | | 900000 | Semen cryopreservation | | |
| 10 | Liquid Nitrogen Generator  Capacity: more than 500 Liters/day | 1 | | 6000000 | Used for producing liquid nitrogen for semen cryopreservation | | |
| **Total** | | | | **12850000/=** | | | |
| **Grand Total (A+B+C)** | | | | **14428000/= (14.428 Million)** | | | |

2.5 Diploma in Community Livestock Assistant (CLA) Duration: 3 months

**Introduction**

This curriculum for community livestock assistants is designed to produce lower-level technical workforce equipped with knowledge and skills related to livestock production and management occupation. It makes the trainees able to get opportunities for wage and self- employment in the related occupational field.

**Aim**

To produce lower-level livestock workers (community livestock assistants) able to provide livestock services in the community being an entrepreneur/employee/self-employed.

**Objectives**

After the completion of the training program, the trainees will be able:

* To be familiar with livestock production/management
* To be familiar with social mobilization
* To manage livestock (herd/flock)
* Assisting in breeding management
* Managing nutrition
* To Keep Goat/sheep
* To provide/facilitate preventive services
* Providing first aid services to the animals
* To be familiar with zoonotic diseases
* To assist to manage drugs
* To manage dairy products
* To manage wool/hide
* To market livestock products
* To communicate with others and
* To be familiar with entrepreneur development

**Course Description**

This curriculum provides skills & knowledge necessary for community livestock assistant. There will be both demonstrations by instructors/trainers and opportunity by trainees to perform skills/tasks specified in this curriculum. Trainees will practice & learn skills using typical tools, materials, equipment & machines necessary for the program.

After successful completion of this program the trainees will be equipped with the knowledge and skills related to social mobilization, livestock management, livestock health services, livestock products management, livestock marketing, communication and entrepreneur development

**Course structure**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Community Livestock Assistant (CLA)** | | | | | | | | |
| **Modules/Sub modules** | | **Nature** | Total hours | | | Full marks | | |
| **Th** | **Pr** | **Tot** | **Th** | **Pr** | **Tot** |
| **1. Introductory agriculture & social Mobilization** | | **T/P** | **13** | **31** | **44** | **5** | **20** | **25** |
|  | 1. Introduction to livestock |  | 3 | 3 | 6 |  |  |  |
|  | 2. Social mobilization |  | 10 | 28 | 38 |
| **2. Livestock management** | | **T/P** | **22** | **66** | **88** | **20** | **80** | **100** |
|  | 1. Herd/flock management |  | 6 | 18 | 24 |  |  |  |
|  | 2. Breeding management |  | 5 | 15 | 20 |
|  | 3. Nutrition management |  | 6 | 18 | 24 |
|  | 4. Goat / sheep keeping |  | 5 | 15 | 20 |  |  |  |
| **3. Livestock health services** | | **T/P** | **25** | **59** | **84** | **20** | **80** | **100** |
|  | 1. Preventive services |  | 8 | 8 | 16 |  |  |  |
|  | 2. First aid treatment |  | 7 | 21 | 28 |
|  | 3. Zoonotic diseases |  | 5 | 15 | 20 |
|  | 4. Drugs management |  | 5 | 15 | 20 |
| **4. Livestock products management** | | **T/P** | **18** | **54** | **72** | **10** | **40** | **50** |
|  | 1. Dairy products management |  | 11 | 33 | 44 |  |  |  |
|  | 3. Wool / hide management |  | 7 | 21 | 28 |
| **5. Marketing, communication and entrepreneur development** | | **T/P** | **21** | **33** | **54** | **5** | **20** | **25** |
|  | 1. Livestock product marketing |  | 6 | 6 | 12 |  |  |  |
|  | 2. Communication |  | 8 | 8 | 16 |
|  | 3. Entrepreneur development |  | 7 | 19 | 26 |
|  | **Total:** |  | **99** | **243** | **342** | **60** | **240** | **300** |

**Duration**

The total duration of the course will be of 342 credit hours (6 months).

**Target group**

All interested individuals in the field of livestock with educational prerequisite of class eight pass.

**Group size**

Maximum of thirty **Medium of instruction** Urdu, English or both

**Pattern of attendance**

* + Attendance Mandatory

**Focus of curriculum**

This curriculum emphasizes on competency /performance. 80% time is allocated for performance and only 20% for related technical knowledge. So the focus will be on performance of the specified competencies in the curriculum

**Entry criteria**

* + Minimum of eight class pass or equivalent
  + Minimum of 14 years of age
  + Should pass entrance examination

**Certificate**

The related training institute will provide the certificate of "Community Livestock Assistant". Again, individuals who complete module (s) of the curriculum will receive a

**Theory:**

1st Quiz =05%

Mid Term Test =30%

2nd Quiz =05%

Teacher’s Discretion /Assignments =10%

Final Examination =50%

**Total =100%**

**Practical:**

For practical examination (if applicable) 100% worth of credit hour (s) will be towards final examination with the following distribution:

Practical Performance =50%

Quiz =10%

Viva Voce =40%

**Total =100%**

**Students evaluation**

* + Continuous evaluation of the trainees' performance is to be done by the related instructor/ trainer to ensure the proficiency over each competency under each of the sub-module.
  + Related technical knowledge learnt by trainees will be evaluated through written or oral tests.
  + Trainees must secure minimum marks of 60% in an average of both theory and practical evaluations.
  + There will be three internal evaluations and one final evaluation in each module.
  + The entrance test will be conducted by the concerned training institute

**Trainers qualification**

* + Doctor of Veterinary Medicine. (DVM)
  + Good communicative and instructional skills
  + Experience in related field

**Trainer-trainees ratio**

* + 1:15 for practical classes
  + For theory, as per the class room situation

**Suggestions for instructor Suggestions for instruction**

1. Select objectives
   * Write objectives of cognitive domain
   * Write objectives of psychomotor domain
   * Write objectives of affective domain
2. Select subject matter
   * Study subject matter in detail
   * Select content related to cognitive domain
   * Select content related to psychomotor domain
   * Select content related to affective domain
3. Select instructional methods
   * Teacher centered methods: like lecture, demonstration, questions answer inquiry, induction and deduction methods.
   * Student initiated methods like experimental, field trip/excursion, discovery, exploration, problem solving, and survey methods.
   * Interaction methods like discussion, group/team teaching, microteaching and exhibition.
   * Dramatic methods like role play and dramatization
4. Select Instructional method (s) on the basis of objectives of lesson plans.
5. Select appropriate educational materials and apply at right Time and place.
6. Evaluate the trainees applying various tools .
7. Make plans for classroom / field work / workshop organization and management.
8. Coordinate among objectives, subject matter and instructional methods.
9. Prepare lesson plan for Theory and Practical classes.
10. Deliver /conduct instruction / program
11. Evaluate instruction/ program

**Suggestion for the performance evaluation of the trainees**

1. Perform task analysis
2. Develop a detail task performance checklist
3. Perform continuous evaluation of the trainees by applying the performance checklist.

**Suggestion for skill training**

Demonstrate performance

* 1. Demonstrate task performance in normal speed
  2. Demonstrate slowly with verbal description of each and every step in the sequence of activity of the task performance using question and answer techniques.
  3. Repeat 2 for the clarification on trainees demand if necessary
  4. Perform fast demonstration of the task.

Provide trainees the opportunities to practice the task performance demonstration

1. Provide trainees to have guided practice
2. Create environment for practicing the demonstrated task performance
3. Guide the trainees in each and every step of task performance
4. Provide trainees to repeat and repeat as per the need to be proficient on the given task performance
5. Switch to another task demonstration if and only trainees developed proficiency in the task performance.

**Other suggestions**

1. Apply principles of skill training
2. Allocate 20% Time for Theory classes and 80% Time for task performance while delivering instructions
3. Apply principles of adult learning
4. Apply principles of intrinsic motivation
5. Facilitate maximum trainees involvement in learning and task performance activities

**Modules and sub modules**

**Module: 1: Introductory livestock & social mobilization**

**Description**: It deals with the knowledge and skills related to Introductory livestock & social mobilization.

**Objectives**: After its completion the trainees will be able:

1. To introduce livestock occupation
2. To be familiar with the concept of social mobilization

**Sub-modules:**

1. Introduction to livestock
2. Social mobilization

**Sub module: 1: Introduction to livestock**

**Description**: It deals with the knowledge and skills/tasks related to introductory livestock. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able to introduce livestock occupation

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Th.(3 credit hrs) + Pr.(3 credit hrs) = Tot. 6 credit hrs** | | | | | |
| SN | Tasks/skills/competencies | Pr  (credit hrs) | Related technical knowledge | Th (cr hrs) | Total  (cr hrs) |
| 1 | Develop concept of animal husbandry | 1 | * The importance and scope of livestock production to the farming system in Pakistan. * Importance of livestock productivity as source of income and major capital investment of most village farmers | 1 | 2 |
| 2 | Develop concept of livestock management | 1 | * General requirements for livestock farming e.g. housing feed, water, health care etc | 1 | 2 |
| 3 | Perform First Aid in animals | 1 | * Bleeding control, wound dressing, dehydration control, fever control, treatment for poisoning, burns and scalds | 1 | 2 |
| **Total:** | | **3** |  | **3** | **06** |

**Sub module: 2: Social mobilization**

**Description**: It deals with the knowledge and skills/tasks related to social mobilization. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able:

* To be familiar with the concept of social mobilization

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Th.( 10 cr: hrs) + Pr.( 28 c r : hrs) = Tot.( 38 c r : hrs) | | | | | |
| SN | Tasks/skills/competencies | Pr  (cr: hrs) | Related technical knowledge | Th  (cr: hrs) | Tot  (cr: hrs) |
| 1 | Observe the Sites | 3 | * Background information (Location, General Socio economic condition) | 1 | 4 |
| 2 | Select Community Sites | 3 | * Number of communities, target objectives | 1 | 4 |
| 3 | Build Rapport | 3 | * Techniques , social environment | 1 | 4 |
| 4 | Prepare Village Profile | 3 | * Tools, keeping records | 1 | 4 |
| 5 | Collect Information from  Other Organizations about Their Activities | 3 | * Targeted details about the organizations, keeping Records | 1 | 4 |
| 6 | Enlist Current Status of Target Group | 3 | * Target group identification, tools and methods, report writing | 1 | 4 |
| 7 | Collect Historical Cases | 3 | * Tools and methods, report writing | 1 | 4 |
| 8 | Conduct Household Survey | 3 | * Data collection, checklist/questionnaires   preparation, sampling methods, keeping records | 1 | 4 |
| 9 | Conduct Individual Interview | 1 | * Key informants, checklist/questionnaires   preparation, sampling methods, keeping records | 1 | 2 |
| 10 | Conduct Group Interview | 3 | * Checklist/questionnaires preparation, time management, keeping Records | 1 | 4 |
|  | **Total:** | **28** |  | **10** | **38** |

**Module: 2: Livestock management**

**Description**: It deals with the knowledge and skills related to herd/flock management, breeding management, nutrition management and goat / sheep keeping.

**Objectives**: After its completion the trainees will be able:

* To assist for herd/flock management
* To assist for breeding management
* To manage nutrition
* To keep goat / sheep

**Sub-modules:**

1. Herd/flock management
2. Breeding management
3. Nutrition management

Goat / sheep keeping

**Sub-module:1: Herd/flock management**

**Description**: It deals with the knowledge and skills/tasks related to herd/flock management. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able to assist for herd/flock management

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the

following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Th.( 6 crt: hrs) + Pr.( 18 crt: hrs) = Tot.( 24 credits hrs)** | | | | | |
| SN | Tasks/skills/competencies | Pr  (cr: hrs) | Related technical knowledge | Th  (cr:hrs) | Total  (cr: hrs) |
| 1 | Manage housing | 3 | * Criteria of site selection * Construction of animal shed * Construction of individual pen * Use of locally available materials for the Construction | 1 | 4 |
| 2 | Care/Manage pregnant/ milch animal | 3 | * Special requirements for pregnant female animals (feed, water, housing) * Precautions to be taken during parturition, handling of dystocia * Caring of mothers after parturition * Care for udder to prevent mastitis | 1 | 4 |
| 3 | Keep record of production / animal health | 3 | * Importance of record keeping for management decisions (breeding records, production and weight gain records, feeding records, financial   records and health Records | 1 | 4 |
| 4 | Care/Manage of newly born calves | 3 | * Care of the new born (warm, dry, ensure that it is feeding, colostrums and its importance, dipping of navel to prevent infections) | 1 | 4 |
| 5 | Identify animal Animals | 3 | * Importance and various methods of identification * Different types of tags available and | 1 | 4 |
| 6 | Shear wools | 3 | * Introduction to wool fiber proper * Different shearing techniques | 1 | 4 |
|  | Total: | 18 |  | 6 | 24 |

**Sub-module:2: Breeding management**

**Description**: It deals with the knowledge and skills/tasks related to breeding management. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able to assist for breeding management

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Th.( 5 cr: hrs) + Pr.( 15 cr: hrs) = Tot.( cr: 20 hrs) | | | | | |
| SN | Tasks/skills/competencies | Pr  ( cr: hrs) | Related technical knowledge | Th  (cr: hrs) | Tot  (cr: hrs) |
| 1 | Manage improve breeding sire | 3 | * Breed wise selection criteria * Feed, water, space requirement * Regular health checkup care for external and internal parasite * Maintenance of service | 1 | 4 |
| 2 | Manage improve breeding female/dam | 3 | * Breed wise selection criteria * Feed, water, space requirement * Regular health checkup care for external and internal parasite * Plan for breeding | 1 | 4 |
| 3 | Assist to provide AI | 3 | * Introduction to AI merits and demerits * AI methodology | 1 | 4 |
| 4 | Provide advice about | 3 | * Causes of infertility | 1 | 4 |
|  | Infertility |  | * Possible correction measures |  |  |
| 5 | Keep breeding record | 3 | * Contents and preparation breeding record | 1 | 4 |
|  | **Total:** | **15** |  | **5** | **20** |

**Sub-module:3: Nutrition management**

**Description**: It deals with the knowledge and skills/tasks related to nutrition management. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent / professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able to manage nutrition

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Th.( 6 cr: hrs) + Pr.( 18 cr: hrs) = Tot.( 24 cr: hrs) | | | | | |
| SN | Tasks/skills/competencies | Pr  ( cr: hrs) | Related technical knowledge | Th  (cr:hr) | Total  (cr:hr) |
| 1 | Identify local grasses | 2 | * Introduction to different local grasses found in lasbela Balochistan Pakistan | 0.5 | 2.5 |
| 2 | Grow improved grasses | 3 | * Requirements for growing of Napier, Setaria, Rye, Berseem, Oat | 1.0 | 4.0 |
| 3 | Prepare silage/ hay | 2 | * Crops suitable for hay/silage making according to season * Process of hay and silage making, characteristics of good hay and silage * Storage of hay, straw stalks and silage and their Utilization | 0.5 | 2.5 |
| 4 | Improve nutritive value of dry roughage | 1 | * Roughage treatment - by physical and chemical means * Urea treatment | 0.5 | 1.5 |
| 5 | Calculate dry matter requirement | 1 | * Definition of dry matter (DM) and its components, role and   requirement of dry matter in animal nutrition   * Total amount of feed consumption by an animal in dry matter and fresh matter basis in roughages and concentrates in daily, weekly and monthly basis | 0.5 | 1.5 |
| 6 | Grow fodder tree | 2 | * Locally available multipurpose fodder trees and their importance * Procedure of growing | 1.0 | 3.0 |
| 7 | Manage fodder nursery | 3 | * Care and management of fodder nursery | 1.0 | 4.0 |
| 8 | Orient feeding practice | 2 | * Day to day feeding of animals with different types of feed | 0.5 | 2.5 |
| 9 | Formulate locally available concentrate ration | 2 | * Simple concept of ration formulation: protein requirement, energy requirement, DM requirement, minerals and vitamins and their sources | 0.5 | 2.5 |
|  | Total: | 18 |  | 6 | 24 |

**Sub-module:4: Goat / sheep keeping**

Description: It deals with knowledge and skills/tasks related to goat and sheep keeping. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

Objective:

* After its completion the trainees will be able:
* To Keep goat / sheep
* Tasks: To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Th.( 5 cr: hrs) + Pr.( 15 cr: hrs) = Tot.( 20 cr: hrs) | | | | | |
| SN | Tasks/skills/competencies | Pr  ( cr: hrs) | Related technical knowledge | Th  (c:hrs) | Tot  (cr:hrs) |
| 1 | Plan for Goat / Sheep keeping | 3 | * Importance of sheep and goat production in different parts of Lasbela Balochistan Pakistan (geographical, economical, socio- cultural) | 1 | 4 |
| 2 | Manage housing | 3 | * Types of housing and equipment facilities provided for different types of animals according to number, size, sexes and management level: lamb/kids, lactating and   dry, breeding male and pregnant, sick, etc. | 1 | 4 |
| 3 | Identify breeds | 3 | * Different types of breeds Exotic and Indigenous and their characteristics | 1 | 4 |
| 4 | Protect Goat / Sheep | 3 | * Vaccination and deforming in sheep and Goat | 1 | 4 |
| 5 | Feed Goat / Sheep | 3 | * Day to day feeding of concentrate and green and dry fodder feeding practices * Stall feeding and pasture feeding | 1 | 4 |
|  | Total: | 15 |  | 5 | 20 |

**Module: 3: Livestock health services**

**Description**: It deals with the knowledge and skills related to preventive services, first aid treatment, zoonotic diseases, and drugs management.

**Objectives**: After its completion the trainees will be able:

* To provide / facilitate preventive services
* To provide first aid treatment
* To be familiar with zoonotic diseases
* To assist to manage drugs

**Sub-modules:**

1. Preventive services
2. First aid treatment
3. Zoonotic diseases
4. Drugs management

**Sub module: 1: Preventive services**

**Description**: It deals with the knowledge and skills/tasks related to preventive livestock health services. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able:

* To provide / facilitate preventive livestock health services

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Th.( 8 cr: hrs) + Pr.( 8 cr: hrs) = Tot.( 16 cr: hrs) | | | | | |
| SN | Tasks/skills/competencies | Pr  (cr: hrs) | Related technical knowledge | Th  (cr: hrs) | Tot  (cr:hrs) |
| 1 | Organize awareness program for farmers | 1 | * Set up farmers group * Focus on de-worming vaccination and general care and management of livestock for preventive Measures | 1 | 2 |
| 2 | Facilitate for animal health campaign | 1 | * Dissemination of message * Coordination among the stakeholders * Preparation for the camp, drugs, vaccines, surgical instruments etc. | 1 | 2 |
| 3 | Quarantine animals | 1 | * Definition of quarantine * Quarantine procedure | 1 | 2 |
| 4 | Isolate sick animal | 1 | * Justification of isolation * Isolation procedure | 1 | 2 |
| 5 | Vaccinate animals | 1 | * Introduction to vaccine * Common vaccines and their inoculation procedure in animals | 1 | 2 |
| 6 | Disinfect shed | 1 | * Definition of disinfection * Different types of disinfectants used in livestock * Actual process of cleaning and disinfection | 1 | 2 |
| 7 | Carry out routine drenching | 1 | * Procedure of drenching * Common drenching done at livestock farm | 1 | 2 |
| 8 | Dispose carcass | 1 | * Different methods of carcass disposal | 1 | 2 |
|  | Total: | 8 |  | 8 | 16 |

**Sub module: 2: First aid treatment**

**Description**: It deals with the knowledge and skills/tasks related to first aid treatment in livestock/animals. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able to provide first aid treatment

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Th.( 7 cr: hrs) + Pr.( 21 cr: hrs) = Tot.( 28 c r : hrs) | | | | | |
| SN | Tasks/skills/competencies | Pr  (cr: hrs) | Related technical knowledge | Th (cr:hrs) | Tot (cr:hrs) |
| 1 | Control bleeding | 3 | * Different methods of controlling bleeding * Ligation, use of haemostat | 1 | 4 |
| 2 | Dress wound | 3 | * Procedure of wound dressing aseptically * Common anticeptics and ointments used in   wound dressing | 1 | 4 |
| 3 | Perform local splinting in fracture | 3 | * Indication of splinting * Local splints and their application procedure | 1 | 4 |
| 4 | Provide oral rehydration | 3 | * Assessment of dehydration * Preparation of rehydration solutions and their uses | 1 | 4 |
| 5 | Treat for burning / scald | 3 | * Management and treatment of burns and scalds cases    | 1 | 4 |
| 6 | Treat for poisoning | 3 | * Use of emetics * Use of purgatives and chelating agents * General symptomatic treatment | 1 | 4 |
| 7 | Control high fever | 3 | * Management of fever cases use of ice pack * Common antipyretic drugs | 1 | 4 |
|  | Total: | 21 |  | 7 | 28 |

**Sub module: 3: Zoonotic diseases**

**Description**:

It deals with the knowledge and skills/tasks related to zoonotic diseases. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:**

* After its completion the trainees will be able:
* To be familiar with zoonotic diseases

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Th.( 5 cr: hrs) + Pr.( 15 cr: hrs) = Tot.( 20 cr: hrs) | | | | | |
| SN | Tasks/skills/competencies | Pr(cr:hr) | Related technical knowledge | Th  (cr: hrs) | Tot  (cr: hrs) |
| 1 | Familiarize with Meat borne diseases | 3 | * Enlist meat borne diseases and their adverse effects in humans | 1 | 4 |
| 2 | Familiarize with Milk Born diseases | 3 | * Enlist milk borne diseases and their adverse effects in humans | 1 | 4 |
| 3 | Familiarize with Common Bacterial zoonoses | 3 | * Enlist bacterial zoonotic   diseases and their adverse effects in humans | 1 | 4 |
| 4 | Familiarize with Common Viral zoonoses | 3 | * Enlist viral zoonotic diseases and their adverse   effects in humans | 1 | 4 |
| 5 | Familiarize with Common Parasitic zoonoses | 3 | * Enlist common parasitic zoonotic diseases and their adverse effects in Humans | 1 | 4 |
|  | Total: | 15 |  | 5 | 20 |

**Sub module: 4: Drugs management**

**Description**: It deals with the knowledge and skills/tasks related to drugs management. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:**

* After its completion the trainees will be able to assist to manage drugs

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Th.( 5 cr: hrs) + Pr.( 15 cr: hrs) = Tot.( 20 cr: hrs) | | | | | |
| SN | Tasks/skills/competencies | Pr  ( cr: hrs) | Related technical knowledge | Th  (cr: hrs) | Tot  (cr: hrs) |
| 1 | Clean shops | 3 | * Removal of unwanted materials/ substances and their management * Disinfection | 1 | 4 |
| 2 | Store Medicine | 3 | * Storing in the refrigerator * Storing and labeling at medicine rack | 1 | 4 |
| 3 | Prepare Bill | 3 | * Format of a bill * Filling up of the bill after drug sale | 1 | 4 |
| 4 | Maintain Inventory | 3 | * Preparing a day book * Preparing a cash register * Maintaining a ledger | 1 | 4 |
|  | Total: | 15 |  | 5 | 20 |

**Module: 4: Livestock Products management**

**Description**: It deals with the knowledge and skills related to manage dairy and poultry products, and wool and hide.

**Objectives**: After its completion the trainees will be able:

* To manage dairy products
* To manage poultry products
* To manage wool and hide

**Sub-modules:**

1. Dairy products management
2. Poultry products management
3. Wool/hide management

**Sub module: 1: Dairy products management**

**Description**: It deals with the knowledge and skills/tasks related to dairy products management. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able to manage dairy products

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Th.( 11 cr: hrs) + Pr.( 33 cr: hrs) = Tot.( 44 c r : hrs) | | | | | |
| SN | Tasks/skills/competencies | Pr  (cr: hrs) | Related technical knowledge | Th  (cr: hrs) | Tot  (cr: hrs) |
| 1 | Produce clean milk | 3 | * Points to be considered in clean milk production | 1 | 4 |
| 2 | Perform plate form test | 3 | * Different organoleptic test * Clot on boiling * Alcohol test | 1 | 4 |
| 3 | Pasteurize milk | 3 | * Principles involved in pasteurization, * Methods of pasteurization: local and using special equipment | 1 | 4 |
| 4 | Make dahi/ yoghurt | 3 | * Use of different starter | 1 | 4 |
|  |  |  | culture   * Preparation principles and storage of dahi/ Yoghurt |  |  |
| 5 | Make sweets | 3 | * Procedure and principle   of making Raswari, Lalmohan | 1 | 4 |
| 6 | Make paneer | 3 | * Procedure and principle of making Paneer | 1 | 4 |
| 7 | Make khuwa | 3 | * Procedure and principle of making Khuwa | 1 | 4 |
| 8 | Make chenna | 3 | * Procedure and principle of making Chenna | 1 | 4 |
| 9 | Make butter / ghee | 3 | * Procedure and principle of making butter/ghee | 1 | 4 |
| 10 | Make churpi | 3 | * Procedure and principle of making churpi | 1 | 4 |
| 11 | Make ice-cream | 3 | * Procedure and principle of making ice-cream | 1 | 4 |
| Total | | 33 |  | 11 | 44 |

**Sub module: 3: Wool / hide management**

**Description**: It deals with the knowledge and skills/tasks related to wool and hide management. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able:

* To manage wool and hide

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the

following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Th.( 7 cr: hrs) + Pr.( 21 c r : hrs) = Tot.( 28 c r : hrs) | | |  |
| SN | Tasks/skills/competencies | Pr (cr:hrs) | Related technical knowledge | Th (cr:hrs) | Total  (cr: hrs) |
| 1 | Collect Wool | 3 | * Shearing of wool from live animal and its Collection | 1 | 4 |
| 2 | Grade Wool | 3 | * Criteria of wool grading (fleece length, fleece colour, diameter etc) | 1 | 4 |
| 3 | Store Wool | 3 | * Procedure and precaution of wool storage (temperature humidity, storing place etc ) | 1 | 4 |
| 4 | Market wool | 3 | * Survey of wool supply (demand and supply) | 1 | 4 |
| 5 | Collect hide | 3 | * Procedure of hide collection | 1 | 4 |
| 6 | Perform initial processing of hide | 3 | * Steps of hide processing | 1 | 4 |
| 7 | Market hide | 3 | * Survey of hide supply * (demand and supply) | 1 | 4 |
| Total | | 21 |  | 7 | 28 |

**Module: 5: Marketing, communication and entrepreneur**

**Description**: It deals with the knowledge and skills related to market livestock products, communicate with others, and develop entrepreneurship skills.

**Objectives**: After its completion the trainees will be able:

* To market livestock products
* To communicate with others
* To develop entrepreneurship skills

**Sub-modules:**

1. Livestock product marketing
2. Communication
3. Entrepreneur development

**Sub module: 1: Livestock product marketing**

**Description**: It deals with the knowledge and skills/tasks related to livestock product marketing. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able:

* To market livestock products

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Th.( 6 cr: hrs) + Pr.( 6 cr: hrs) = Tot.( 12 cr: hrs)** | | | | | |
| SN | Tasks/skills/competencies | Pr (cr: hrs) | Related technical knowledge | Th  (cr: hrs) | Total  (cr: hrs) |
| 1 | Store livestock products | 1 | * Introduction to different storing techniques (Thermal storage, curing, canning etc) | 1 | 2 |
| 2 | Season livestock products | 1 | * Curing * Freezing * Smoking * Drying etc | 1 | 2 |
| 3 | Identify market | 1 | * Survey of livestock products’ market | 1 | 2 |
| 4 | Manage transportation | 1 | * Different types of transportation system used for livestock Products | 1 | 2 |
| 5 | Promote sales | 1 | * Advertisement * Emphasis of the scientific | 1 | 2 |
|  |  |  | Technique |  |  |
| 6 | Prepare packages | 1 | * Principles of packaging * Different packaging techniques for different livestock products | 1 | 2 |
|  | Total: | 6 |  | 6 | 12 |

**Sub module: 2: Communication**

**Description**: It deals with the knowledge and skills/tasks related to communication. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able:

* To communicate with others

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Th.( 8 cr: hrs) + Pr.( 8 c r : hrs) = Tot.( 16c r : hrs)** | | | | | |
| SN | Tasks/skills/competencies | Pr  (cr: hrs) | Related technical knowledge | Th  (cr: hrs) | Total  (cr: hrs) |
| 1 | Write Job Application | 1 | * Contents and format of application | 1 | 2 |
| 2 | Prepare Resume | 1 | * Contents and format of resume | 1 | 2 |
| 3 | Communicate with senior | 1 | * Disciplinary approach * Develop skills to communicate with senior | 1 | 2 |
| 4 | Communicate with junior | 1 | * Disciplinary approach * Skills to communicate with junior | 1 | 2 |
| 5 | Deal with Customers | 1 | * Important points taken into consideration while dealing with customers | 1 | 2 |
| 6 | Communicate with Other Farm owners | 1 | * Important points taken   into consideration while dealing with farmers | 1 | 2 |
| 7 | Request / Purchase Tool, Supplies, Materials and Equipment | 1 | * Enlisting the materials of purchase * Making inquiry with the concerning agent | 1 | 2 |
| 8 | Fill up Leave Requisition  Form | 1 | * Format and content of leave requisition form | 1 | 2 |
|  | Total: | 8 |  | 8 | 16 |

**Sub module: 3: Entrepreneur development**

**Description**: It deals with the knowledge and skills/tasks related to entrepreneurship skills development. Each task consists of terminal performance objective, minimum related technical knowledge necessary to carry out that very task in a competent/ professional manner, and time allocation for the task and its related knowledge.

**Objective:** After its completion the trainees will be able:

* To develop entrepreneurship skills

**Tasks:** To fulfill the objective the trainees are expected to get proficiency on the following tasks together with their related technical knowledge:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Th.( 7 cr: hrs) + Pr.( 19 c r ; hrs) = Tot.( 26  cr: hrs) | | |  |
| SN | Tasks/skills/competencies | Pr  (cr: hrs) | Related technical knowledge | Th  (cr: hrs) | Tot  (cr: hrs) |
| 1 | Develop Entrepreneurial Competencies | 3 | * Market information, govt. policies, market channel | 1 | 4 |
| 2 | Select / Identify a Project | 3 | * Scope, market demand, project formulation,   project feasibility | 1 | 4 |
| 3 | Manage an Enterprise | 3 | * Office establishment, staff selection, human resource management, market channel | 1 | 4 |
| 4 | Develop Marketing Skill. | 3 | * Market strategies, market information, company policies, market channel | 1 | 4 |
| 5 | Conduct Promotional Activities | 3 | * Types (training, advertisement, fair) | 1 | 4 |
| 6 | Prepare a Business Plan /  Scheme | 3 | * Inventory, budget allocation | 1 | 4 |
| 7 | Develop communication Skills | 1 | * Type of communication : mass, individual, group and media | 1 | 2 |
|  | Total: | 19 |  | 7 | 26 |

|  |  |  |
| --- | --- | --- |
| **List of tools, materials and equipment** | | |
| * Different vaccines for bovines- Cattle, Buffalo ( HS, FMD, IBD, PPR) * Casting rope, * Trevis * Drenching bottle * Balling gun * AI gun | | For animal health camp:  Anthelmintics, Vaccines, Ice box, Ice packs, Antifungal oientments, Syringes- 3ml, 5ml, 10ml, 20ml, Surgical instrument set, Burdizzo’s castrator- large, medium. |
| * Trocar and canula * AI sheath * AI catheter. * Different types of fodders and their seeds (Napier, Berseem, Stylo, Vetch, Amriso, Paspalam, Taki, etc). * Chopping machine. * Urea, equipments for preparation of mineral blocks. * Molasses, feed(concentrate and roughages) * Oven/ dessicstor. * Weighing machine * Anthelmintics (Albendazole, Febendazole (Panacur ), Levamisole, Ivermectin, etc).   For dairy:   * Yoghurt Culture * Pots of various sizes, Milk, Sugar, Flavours, Emulsifiers, Stabilizers. | | For First Aid treatment:   * Catgut, Suturing needles, KMnO4, Vitamin K injection, Betadine, Cotton swabs. * Hydrogen peroxide, Cotton rolls, Dettol, Savlon, Sulphur Oientment, fly repellent oientments, IV set, canula * Splints, Local/ genera; anaesthetic agents, Cotton swabs, Analgesics, Antibiotics. Normal Saline Solution, Dextrose solution, RL solution, Hemacoel. |
| **Reading materials** | | |
| * Text book of animal husbandry By: G. C. Banerjee * Dairy technology By: Sukumar Dey * Kukhura Palan Gyan   By: Dr. Bansi sharma /Dinesh Parajuli   * Sheep and Goat production By: Dr. B. R. Joshi * Gaai Palan   By: Dr. Bhuwaneshwar sharma | | * Krishi Prachar   By: Department of livestock Services   * Techniques in veterinary surgery By: Anresh Kumar * Dogs   By: Amalendu Chakrawarti   * Ethnic Veterinary Practices in South Asian Countries. (Heifer publications)   CTEVT publications |
|  | **Facilities** | |
|  | * Well equipped enough class/ office rooms * Demonstration farms for various livestock species * Transportation facilities * Laboratory / library * OHP/computers/ Pictures | * Multimedia presentation set * Various animal feeds and fodders   Source of concentrate feeds(feed mill) |

2.6 Training Module for Broiler Farming Duration: 3 months

**Objective:**

To train individuals on modern and sustainable broiler farming practices to enhance profitability and productivity.

To train the local community to initiate their own business on a small scale

**Module Content:**

**1. Introduction to Broiler Farming**

* Overview of the poultry industry in Pakistan.
* Importance of broiler farming for the economy.
* Current challenges and opportunities.

**2. Planning for Broiler Farming**

* **Site Selection:** Location, water availability, ventilation, and biosecurity.
* **Farm Setup:** Housing systems (open vs. controlled environment).
* **Licensing and Regulations:** Compliance with local laws.

**3. Broiler Management**

* **Breed Selection:** Market demand and adaptability.
* **Chick Placement:** Ideal conditions for chick arrival, temperature, and brooding.
* **Feed Management:** Nutritional requirements at different growth stages.
* **Water Management:** Clean and sufficient water supply.

**4. Health Management**

* Common diseases in broilers (ND, IB, IBD, etc.).
* Vaccination schedule and protocols.
* Preventive measures (biosecurity, hygiene).
* Treatment plans for common illnesses.

**5. Environmental Management**

* Proper ventilation and temperature control.
* Litter management to prevent ammonia buildup.
* Waste disposal practices.

**6. Marketing and Sales**

* Market research and demand forecasting.
* Pricing strategies.
* Building connections with buyers (wholesalers, retailers, and consumers).

**7. Financial Management**

* Budget preparation and cost analysis.
* Record keeping (feed, medicine, labor).
* Risk management strategies.

**8. Hands-on Training**

* Farm visits for practical exposure.
* Demonstration of brooding, feeding, and disease management.
* Monitoring and record-keeping exercises.

**9. Advanced Techniques and Sustainability**

* Use of technology in broiler farming.
* Organic and antibiotic-free broiler farming.
* Environmental sustainability practices.
* Handling and care of day-old chicks.

1. **Training Module for Incubation to Hatching of the Australorp Layer Eggs**

**Objectives**

* Identify the key requirements for successful incubation.
* Set up and operate an incubator correctly.
* Monitor and maintain optimal conditions during incubation.
* Handle and care for eggs and chicks safely.

**Pre-Incubation Preparation**

**Selecting Fertile Eggs**

**Setting Up the Incubator**

* Place the incubator in a well-ventilated, temperature-controlled room.
* Disinfect the incubator thoroughly before use.
* Test-run the incubator for 24 hours to ensure proper functioning.
* Calibrate the thermometer and hygrometer.

**Incubation Process**

**Temperature and Humidity Requirements**

**Turning the Eggs**

* Turn eggs at least 3-5 times daily to prevent the embryo from sticking to the shell.
* Stop turning eggs after day 18 (lockdown phase).

**Ventilation**

* Ensure proper air circulation inside the incubator.
* Do not block ventilation holes.

**Monitoring**

* Use a candler to check egg fertility and development
* Remove infertile or dead eggs to avoid contamination.

**Hatching Process**

**Lockdown Phase (Day 19-21)**

* Do not open the incubator during this period unless necessary.
* Increase humidity to prevent chicks from sticking to the shell.

**Hatching**

* Chicks usually begin to pip (break the shell) on day 20 and hatch fully by day 21.
* Allow chicks to dry inside the incubator before transferring them to a brooder.

**Common Issues**

* **Chicks fail to hatch**: Check temperature and humidity records.
* **Malformed chicks**: Could indicate nutritional deficiencies in the breeder diet.

1. **Training Module for Australorp Layers**

**Objective:**

To provide a comprehensive guide on raising and managing Australorp layers for egg production,

**Module Content**

**1. Introduction to Australorp Layers**

* Overview of Australorp breed characteristics (hardiness, egg production, and adaptability).
* Benefits of raising Australorps for small-scale egg farming in Pakistan.

**2. Planning for 300-Bird Setup**

* **Housing Requirements:** Space (1.5-2 sq. ft per bird), proper ventilation, and nesting boxes.
* **Feed and Watering Systems:** Automatic feeders and drinkers to minimize waste.
* **Equipment Needed:** Perches, feeders, drinkers, and lighting.

**3. Nutrition and Feeding Management**

* Grower feed for 7-18 weeks (balanced protein and calcium).
* Layer feed from 19 weeks onward (high calcium for eggshell quality).
* Providing clean and fresh water at all times.

**4. Vaccination Schedule:**

Standard Vaccine Schedule Practice

**5. Egg Production Management**

* Initiating light stimulation after 18 weeks (14-16 hours daily).
* Nest box management (cleaning, bedding material).
* Collecting eggs twice daily to maintain hygiene.

**6. Health and Biosecurity**

* Identifying and managing common diseases (Coccidiosis, respiratory infections).
* Proper waste disposal and cleanliness.
* Quarantine and biosecurity protocols for new birds.

**7. Marketing and Sales**

* Understanding market trends for eggs.
* Packaging and branding for higher value.
* Building customer relationships (local markets, households, bakeries).
* Training Schedule and Budgeting

**Work Schedule**

|  |  |  |  |
| --- | --- | --- | --- |
| **Module** | **Week** | **Activity** | **Details** |
|  |  |  |  |
| Introduction to Broiler Farming | **Week 1** | Conduct introductory session on broiler farming. | Overview of poultry industry, importance, challenges, and opportunities. |
|  | **Week 2** | Site visits to existing broiler farms. | Practical exposure to current broiler farming practices. |
| Planning for Broiler Farming | **Week 3** | Training on site selection, housing setup, and licensing. | Classroom and practical sessions on location planning and biosecurity. |
| Broiler Management | **Week 4** | Training on breed selection, feed, and water management. | Practical demonstrations of feeding schedules and water systems. |
| Health and Environmental Management | **Week 5** | Disease prevention and ventilation training. | Emphasis on vaccination and waste disposal. |
| Marketing, Sales, and Finance | **Week 6** | Workshops on market research, pricing strategies, and record-keeping. | Practical budgeting and building buyer relationships. |
| Hands-on Training | **Week 7** | Farm visits for practical broiler management. | Chick placement, feeding, and health monitoring exercises. |
| **Incubation to Hatching** | **Week 1** | Introduction to incubation and egg preparation. | Overview of methods, storage techniques, and egg cleaning. |
|  | **Week 2** | Training on incubator setup and monitoring. | Temperature, humidity control, and egg turning. |
|  | **Week 3** | Candling eggs and troubleshooting incubation issues. | Identification of viable eggs and managing power outages. |
|  | **Week 4** | Practical hatching process training. | Monitoring internal and external pipping and managing hatchlings. |
| **Australorp Layers Management** | **Week 1** | Introduction to Australorp layers and housing setup. | Breed benefits, space requirements, and housing demonstrations. |
|  | **Week 2** | Training on feeding and vaccination schedules. | Detailed diet plans and vaccination protocols. |
|  | **Week 3** | Training on egg production management and marketing. | Nest box management, egg collection, and customer relationship building. |
|  | **Week 4** | Practical farm visit for monitoring and health management. | Disease prevention, waste management, and hygiene practices. |

**Combined Budget Table**

|  |  |  |
| --- | --- | --- |
| **Item** | **Cost (PKR)** | **Remarks** |
| **Broiler Farming Training Module (8 weeks)** | | |
| Equipment (feeders, drinkers, etc.) | 150000 | Initial investment (Once) |
| Day-old Chicks (5,00) | 75000 | @ 150 PKR per chick |
| Feed (3 kg/bird) | 300000 | @ 200 PKR/kg |
| Vaccination & Medicines | 20000 | Approximate estimate |
| Labor (2 workers) | 54000 | @ 18,000/month per worker |
| Utilities (electricity, water) | 10000 | Monthly average |
| Miscellaneous | 5000 | Unexpected expenses |
| Bouchers and stationary | 10000 | Per training |
| Trainer rumination | 50000 | Completion of Training |
| **Total** | **539000.00** | **Complete Broiler Farming Training Module** |
| **Incubation to Hatching Module of Astrolop Eggs (21days)** | | |
| Fertile Eggs (200 eggs) | 4,0000 | @ 200 PKR per egg |
| Thermometer & Hygrometer | 2,000 | For monitoring temperature and humidity |
| Backup Power Supply | 300000 | Power batteries/UPS/Fitting (Once) |
| Electricity (21 days) | 5,000 | Approximate usage |
| Cleaning chemicals Supplies | 5000 | For sanitization of equipment |
| Small Incubator for Field Demonstration | 20000 | Incubation training outreach at Village |
| Bouchers and stationary | 10000 | Per training |
| Trainer rumination | 25000 | At Completion of training |
| Miscellaneous | 10,000 | Unexpected expenses |
| **Total** | **470000** | **Incubation and Hatching Training Module** |

|  |  |  |
| --- | --- | --- |
| **Australorp Layers farming Module (6months)** | | |
| Feeders and Drinkers | 20,000 | Automatic systems for 200 birds |
| Nesting Boxes (20 boxes) | 20,000 | 1 box per 5 birds |
| Lighting System | 10,000 | For egg production stimulation |
| 5-6 months old Australorp birds | 600,000 | @ 3000 PKR per bird |
| Feed for 6 months | 320,000 | grower, and layer feed |
| Vaccines (as per schedule) | 20,000 | Estimated |
| Medicines and Supplements | 30,000 | Vitamins, dewormers, etc. |
| Labor (1 caretaker) | 72,000 | @ 12,000/month for 6 months |
| Electricity | 10,000 | Average usage |
| Egg Tray and Boxes | 20000 | To carry and preserve the eggs |
| Bouchers and stationary | 10000 | Per training |
| Trainer rumination | 50000 | Completion of Training |
| Miscellaneous | 15,000 | Unexpected expenses |
| **Total** | **1090,000** | **(Australorp Layers Training Module)** |
| Laptop and Printer | 300000 | To main all trainings and financial records and printings |
| **Grand Total for All Training Modules** | **2399000** | For the All-Training Courses and Practical and Applications in the community |

2.7 Camel Farming and Products Development Duration: 6 months

**Training/Course:**

Balochistan is bestowed with rich wealth of camels. The total population in this province is 0.41 m which is 41% of the total camel heads of Pakistan. Of the twenty camel breeds documented at national level, seven breeds (Kharani, Kacchi, Lassi, Makrani, Brahvi, Pishin, Rodbari) are native to Balochistan. It is interesting to note that this animal species is found in all ecological zones of Balochistan (from zero sea level to higher altitudes) and hence has huge potential to perform well in climate change dynamics. However, there are ten regions which have more than ten thousand camel population. Based on available data, it is found that 0.32 million camel population is found in these top ten major regions i.e., Kharan, Kholu, Dera Bugti, Bolan, Lasbela, Khuzdar, Killa Saifullah, Musa Khail, Chaghi and Kalat. Other regions have less than ten thousand camel population. However, this unique animal species that served humanity as “Ship of Desert” has the potential to serve as source of “Food Security” and animal of “Climate Change”. Nevertheless, camel despite of healthy total strength and naturally gifted milk and meat potentials remained neglected by policy makers both at provincial and national levels.

Camel milk in Balochistan is an unearthed “White Gold”. It is estimated that an average 1,65,860 L/d (approx.166 tons) camel milk is being produced in only major top ten regions of Balochistan. While estimating monetary worth at nominal cost i.e., Rs.200/L camel milk, it is found that 32 million rupees is being wasted per day in these regions. Of this value, if half of camel milk is fed to calf or used for home consumption, still 16 million per day, 480 million/month and 5760 million/ annum can be generated. Further, there is huge demand of camel milk powder in China and robust marketing opportunities of camel milk value added products at national level. The employment opportunities for skilled youth in camel farming and its products are high in UAE and other Middle East countries. Hence, there is dire need to improve skills in commercial camel dairy farming and development of camel milk products for entrepreneurship and earning robust and sustainable profits in this novel and virgin field of Pakistan.

**Training/Course Objectives**

To understand pre-requisites for establishing small level commercial camel dairy farms.

To provide practical, hands-on training in development and management of small commercial camel dairy farm and development of unique camel milk dairy products.

To empower youth, farmers, women and entrepreneurs by equipping them with technical skills to create and excel in camel farming, products development and avail marketing opportunities for sustainability and profitability.

To develop a workforce ready for employment in various segments of the camel and camel products value chain for national and Middle East countries.

To contribute to the region’s socio-economic development and poverty alleviation through optimum utilization of camels, camel milk resource, direct and indirect job creation, and enhanced food security.

**Target Audience**

**Unemployed youth:** Those looking to enter workforce of skilled labor.

**Local Farmers and entrepreneurs**: Individuals seeking to learn / improve their camels’ production and dairy products development techniques and their marketing.

**Rural Youth and Women**: A special focus on empowering women and rural youth by providing them with access to skills and knowledge that enhance their employability and entrepreneurial potential.

**Curriculum Outline**

|  |  |  |
| --- | --- | --- |
| **Sr. #** | **Module** | **Duration** |
| 1 | **Camels and Their Significance**   * Camels in world map * Climate change and consequent significance of camels husbandry * Camels mapping of Pakistan * Camels mapping of Balochistan * Characteristics of milk and meat camels * Camel behavior and its unique characteristics of milk and meat | Week-1 |
| 2 | **Pastoral Camel Husbandry**   * Calf rearing practices * Young-stock rearing practices * Breeding practices * Feeding practices * Housing practices * Conventional treatment practices * Milk and milking practices * Marketing practices of camels and camel products * Products development practices * Advantages and disadvantages of pastoral camel husbandry * Camping/internship in pastoral camel farming habitat and community engagement ( Two week Practical) | Week 2-4  Week 5-6 |
| 3 | **Commercial Camel Dairy Farming**   * Pre-requisites for establishing commercial camel dairy farm * Advantages and disadvantages * Establishing least cast small camel dairy farm * Housing Management at commercial camel dairy farms * Breeding Management at commercial camel dairy farms * Feeds and feeding at commercial camel dairy farms * Calf-rearing at commercial camel dairy farms * Young-stock Management at commercial camel dairy farms * Milk and milking management at commercial camel dairy farms * Marketing of camel milk * Record keeping at commercial camel dairy farms * Managerial services at small commercial camel dairy farm (Two week Practical) | Week 7-9  Week 10-11 |
| 4 | **Commercial Camel feed formulation**   * Understanding nutrient requirements of camels at different physiological stages * Understanding different energy sources * Understanding different protein sources * Understanding fat sources * Understanding mineral sources * Understanding vitamin sources * Feed formulation and development of feed products   (Two Week Practical) | Week 12-14  Week 15-16 |
| 5 | **Camel Milk Products Development and Marketing**   * Understanding unique physiological characteristics of camel milk * Medical worth of camel milk * Constraints in developing products from camel milk * Visit to QASWA Hut * Development of camel milk ice cream; camel milk yoghurt; camel milk chocolate; and camel milk cheese (Four week Practical) | Week 17  Week18-21 |
| 6 | **Establishment of Social Enterprise**   * Visit to QASWA Hut * Registration process with SECP and FBR * Constraints in marketing of camel milk and its value added products * HR and other management * Development of marketing linkages * Marketing of brand products   (One week practical) | Week 22  Week 23 |
| 7 | Examinations and Certificate awarding | Week 24 |

**Delivery Mode:**

Classroom-based learning, laboratory work, practical weeks and field visits

1. **Estimated Support Budget**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr.**  **#** | **Description** | **Quantity** | **Unit price**  **(PKR)** | **Estimated total amount**  **(million)** | **Remarks** |
| 1. | Establishment of small level commercial Camel dairy farm | 01 | | | Least cast,Overall Open farm with watering, feeding under covered area |
| Land | 01 acre | - | - | University support/Available |
| Lactating  she-camels | 10 | @600000/camel | 6.0 |  |
| Construction of Pillars and simple shaded area/readymade roofs |  |  | 1.0 |  |
| Construction of watering and feeding mangers |  |  | 0.6 |  |
| Fencing of area | 1 acre |  | 0.5 |  |
| Labour (HR) | 06 | @40000/m | 2.88 | Salary for first 12 months |
| 2 | Establishment of feed manufacturing unit | 01 | | | For preparing least cast, commercial camel feeds |
|  | Feed grinder | 01 |  |  | University support/Available |
|  | Feed mixer | 01 |  |  | University Support/Available |
|  | Feed pellet machine | 01 |  | 1.0 |  |
|  | Feed ingredients | All ingredient |  | 0.5 |  |
|  | Labour (HR) | 03 |  |  | University Support/Available |
| 3 | Camel Products Development |  | | |  |
|  | Ice cream machine |  |  |  | University Support/Available |
|  | Portable milk Scan |  |  |  | University Support/Available |
|  | Yoghurt maker |  |  |  | University Support/Available |
|  | Deep freezer | 01 |  | 0.4 |  |
|  | Chemicals/Ingredients | All… |  | 0.1 |  |
|  | Miscellaneous |  | | 0.5 |  |
|  | **Total** |  | | **13.48** |  |

2.8 Manufacturing Livestock Feeds Duration: 06 months

**Training/Course:**

Livestock is the major contributor in GDP of Balochistan and serves as an important source of

livelihood. The productivity of livestock depends on quality of feeds. Approximately 70%

expenses incurred on commercial livestock farming relates to feeds. Hence balancing rations on

least cost available sources can make a big difference on profitability of the commercial

farms. Farmers, youth and entrepreneurs can learn feed formulation techniques to earn

employment on farms at national or international levels or they can initiate their own business set

up. Hence, this training course is designed for learning practical skills for profitability,

employment and initiating startup/business ideas.

Course Objectives

To provide a basic understanding and concepts of livestock feed resources

Practical, hands-on training in the development of various livestock feeds for different stages

Empower youth, farmers, women and entrepreneurs by equipping them with technical skills to develop cost-effective livestock feeds.

Developing marketing linkages for different feeds, their sustainability in market and profitability.

Develop a workforce ready for employment in the dairy and meat sectors.

Contribute to the region’s socio-economic development, direct and indirect job creation, and enhanced food security.

Target Audience

Unemployed youth

Entrepreneurs

Women

Dairy business sector

Meat businessmen sector

Curriculum Outline

|  |  |  |
| --- | --- | --- |
| **Sr. #** | **Module** | **Duration** |
| 1 | **Feeds and Feeding**  Livestock and its importance  Livestock in Balochistan  Factors affecting livestock productivity  Basics concepts of livestock feed resources  Feed Nutrients  Feed classes  Livestock nutritional requirements at different physiological stages for different livestock species  Grazing and Pasture Management  Feeding practices  Identification of feeds and industrial feed by-products (One Week Practicals/visits/fields) | Week 1-4  Week 5-6 |
| 2 | **Fodders**  Understanding Summer and winter fodders  Understanding fodder preservation techniques  Learning Silage and Hay as fodder preservation techniques (Two Week) | Week 7-8  Week 9-10 |
| 3 | **Feed Formulation**  Understanding feed formulation procedures  Understanding nutrient requirements of livestock at different physiological stages  Understanding different energy sources  Understanding different protein sources  Understanding fat sources  Understanding mineral sources  Understanding vitamin sources  Understanding concepts of climate smart feed  Feed formulation through Person square method;  Feed formulation through use of Xcel sheets; and  Feed formulation through use of feed soft wares  (Four Week Hand on Practice) | Week 11-14  Week 15-18 |
| 4 | **Entrepreneurship Development**  Development of business ideas and incubation in BICs  Preparation of Climate smart livestock feed  (Startup idea)  Registration with SECP and FBR  Markets and development of marketing linkages  Fund raising  Marketing of MVP (Two weeks) | 19-20  Week 21-23 |
| 5 | Examinations and Certificate awarding | Week 24 |

Delivery Mode:

Classroom-based learning, laboratory work, practical field and visits to cooperatives.

**Estimated Support Budget**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. #** | **Description** | **Quantity** | **Unit price**  **(PKR)** | **Estimated total amount**  **(million)** | **Remarks** |
| 1 | Feed grinder  (100 kg) | 01 |  | | University support/Available |
| 2 | Feed Mixer  (100 Kg) | 01 |  | | University support/Available |
| 3 | Feed weighing balance | 01 | 150000 | 0.15 |  |
| 4 | Feed Pelleting machine  (50 kg) | 01 | 1200000 | 1.2 |  |
| 5 | Packaging machine | 01 | 400000 | 0.4 |  |
| 6 | Printing materials | All type... | 500000 | 0.5 |  |
| 7 | Feed ingredients | All type--- | - | 0.5 |  |
| 8 | Labor | 03 | - | - | University support/Available |
| 9 | Miscellaneous |  |  | 0.2 |  |
| 10 | **Total** |  | | **2.95 PKR** |  |

3. Faculty of Marine Science

Fisheries and Aquaculture

All Courses Equipment/Budget list is provided separately

3.1 .Bio floc Technology in Aquaculture Duration: 01 Year

(12 months) (2 Semester)

**Course Objectives**

1. Provide practical, hands-on training in the development of Biofloc technology for aquaculture.
2. Empower youth, fish farmers, women and entrepreneurs by equipping them with technical skills to create and improve aquaculture opportunity, sustainability, and profitability.
3. Develop a workforce ready for employment in various segments of the aquaculture and aquaculture products value chain, including processing and marketing.
4. Contribute to the region’s socio-economic development and poverty alleviation through optimum utilization of aquatic resources, direct and indirect job creation, and enhanced food security.

**Target Audience**

* **Unemployed youth:** Those looking to enter a workforce of skilled labor.
* **Local Fish Farmers and entrepreneurs**: Individuals seeking to learn / improve their aquaculture techniques production and fishery products development techniques and their marketing.
* **Rural Youth and Women**: A special focus on empowering women and rural youth by providing them with access to skills and knowledge that enhance their employability and entrepreneurial potential.

**Curriculum Outline:**

**Semester 1**

**1. Module I: Basics of Aquaculture**

1. Definition and Scope
2. Importance of Aquaculture
3. History and Evolution of Aquaculture
4. Differences Between Aquaculture and Capture Fisheries
5. **Module II: Types of Aquacultures**
6. Based on Environment
   * Freshwater Aquaculture
   * Brackish Water Aquaculture
   * Marine Aquaculture
7. Based on Culture System
   * Extensive Aquaculture
   * Semi-intensive Aquaculture
   * Intensive Aquaculture
8. Integrated Systems
   * Rice-Fish Farming
   * Integrated Multi-Trophic Aquaculture (IMTA)

**3. Module III: Introduction to different fish farming system**

* + 1. Open Systems
* Ponds
* Cages
* Pens
  + 1. Closed Systems
* Recirculating Aquaculture Systems (RAS)
* Bio floc Systems
* Aquaponics

**4. Module IV: Introduction of bio floc technology**

I. Definition of Bio floc Technology

II. Historical Background and Evolution of BFT

III. Importance of BFT in Modern Aquaculture

1. **Module V: Principles of Bio floc technology**

I. Concept of Bio floc Formation

II. Role of Carbon-to-Nitrogen (C:N) Ratio

III. Microbial Communities in Bio floc

IV. Nutrient Cycling and Waste Management

**Semester 2**

1. **Module VI: Bio floc system design and setup**

I.Site Selection and Setup

II. Management of Water Quality Parameters

III. Stocking and Feeding Strategies

IV. Harvesting and Maintenance

1. **Module VII: Water quality management in biofloc**
   * 1. Importance of Water Quality in Biofloc Technology
     2. Relationship Between Water Quality and Biofloc Efficiency
     3. Monitoring and Measurement Techniques
     4. Tools and Technologies for Water Quality Management
2. **Module VIII: Species selection for biofloc systems**
   * 1. Importance of Species Selection in Biofloc Technology
     2. Factors Influencing the Suitability of Species for Biofloc Systems
     3. Objectives of Species Selection
     4. Key Criteria for Species Selection
     5. Commonly Cultured Species in Biofloc Systems
3. **Module IX: Monitoring and maintaining biofloc health**
   * 1. Importance of Biofloc Health in Aquaculture Systems
     2. Key Objectives of Monitoring Biofloc Health
     3. Overview of Factors Influencing Biofloc Dynamics
     4. Parameters for Monitoring Biofloc Health
     5. Tools and Techniques for Monitoring Biofloc Health
4. **Module X: Economic benefits and environmental impact of biofloc systems**
   * 1. Purpose of Assessing Economic Benefits and Environmental Impact
     2. Role of Biofloc in Sustainable Aquaculture
     3. Case Studies on Economic and Environmental Outcomes
     4. Economic and Environmental Trade-Offs
     5. Future Directions for Economic and Environmental Optimization

**Training Mode:**

* Classroom instruction
* Hands-on training
* Online learning platforms
* Field visits and guest lectures

**Training Materials:**

* Presentation slides
* Handouts and worksheets
* Online resources

3.2 Shellfish Aquaculture (Shrimp, Crab, and lobster) Duration: 01 Year

**(12 months) (2 Semester)**

**Course Objectives**

* Provide practical, hands-on training in site selection and preparation.
* Empower youth, farmers, women and entrepreneurs by equipping them with technical skills to shellfish breeding and nursery techniques; disease prevention and management; harvesting and post harvesting; marketing and export opportunity; sustainability in seafood business, and profitability from coastal ecosystem.
* Develop a workforce ready for employment in seafood value chain.
* Optimum utilization of coastal community and unemployed youth.

**Target Audience**

* **Unemployed youth:** Those looking to enter workforce of skilled labor.
* **Entrepreneurs**: Individuals seeking to learn / improve seafood products development techniques and their marketing.
* **Rural Youth and Women**: A special focus on empowering women and rural youth by providing them with access to skills and knowledge that enhance their employability and entrepreneurial potential through different recipes of seafood.

**Curriculum Outline:**

**Semester 1**

**1. Module I: Basics of Aquaculture**

1. Definition and Scope
2. Importance of Aquaculture
3. History and Evolution of Aquaculture
4. Differences Between Aquaculture and Capture Fisheries
5. **Module II: Types of Aquacultures**
6. Based on Environment
   * Freshwater Aquaculture
   * Brackish Water Aquaculture
   * Marine Aquaculture
7. Based on Culture System
   * Extensive Aquaculture
   * Semi-intensive Aquaculture
   * Intensive Aquaculture
8. Integrated Systems
   * Rice-Fish Farming
   * Integrated Multi-Trophic Aquaculture (IMTA)
9. Open Systems

* Ponds
* Cages
* Pens

1. Closed Systems

* Recirculating Aquaculture Systems (RAS)
* Bio floc Systems
* Aquaponics

**3. Module III: Introduction to Shellfish Aquaculture**

1. Definition and Significance
2. Importance of Aquaculture
3. History and Evolution of Aquaculture
4. Economic and nutritional importance

**4.Module IV: Overview of Commonly Cultivated Shellfish**

1. Shrimps, Crabs and Lobster
2. Habitat preferences (Salinity, temperature and substrate)
3. Growth and reproductive cycles
4. Feeding habits and diet
5. **Module V: Site Selection and preparation**
6. Water quality parameters (pH, salinity, dissolved oxygen)
7. Sediment type and suitability
8. Assessment of environmental impact
9. Permitting and regulations

**Semester 2**

1. **Module VI: Water quality management**
2. Introduction to Water Quality in Shellfish Farming
3. Key Water Quality Parameters
4. Water Source and Supply Management
5. Monitoring and Testing Water Quality
6. Nutrient and Waste Management
7. **Module VII: Shellfish breeding and nursery techniques**
8. Broodstock selection and management
9. Spawning techniques
10. Larval rearing methods
11. Nursery practices
12. Grow-out Systems in Shellfish Farming
13. **Module VIII: Disease prevention and management**
14. Common diseases and parasites
15. Biosecurity measures
16. Use of probiotics and immunostimulants
17. **Module IX: Harvesting and post-harvest care**
18. Methods of harvesting
19. Grading and sorting
20. Storage and transport practices
21. Ensuring product safety and traceability
22. **Module X: Marketing and export opportunities**
23. International standards and certifications
24. Legal frameworks and compliance
25. Market trends and global demand

**Training Mode:**

* Classroom instruction
* Hands-on training
* Online learning platforms
* Field visits and guest lectures

**Training Materials:**

* Presentation slides
* Handouts and worksheets
* Online resources

3.3 Aquarium Design and Management Duration: 3-6 months

**(13 weeks to 26 weeks) (2 Semester)**

**Course Objectives**

* To provide basic understanding and concepts of aquarium.
* Understanding the importance of ornamental fish
* Learning techniques for maintaining ornamental fish in at home or office for aesthetic purposes
* Practical, hands-on training in setting up aquariums
* Empower youth, women and entrepreneurs by equipping them with technical skills to develop cost effective aquariums for different species and at different stages.
* Developing marketing linkages for selling aquariums, their sustainability in the market and profitability.
* Develop a workforce ready for employment in aesthetic value of office, home, parks and zoo sectors.

**Target Audience**

* Unemployed youth
* Entrepreneurs
* Women

**Curriculum Outline:**

**Semester 1**

* + - 1. **Module I: Aquarium construction and filtration systems**
  1. Introduction to Aquarium Design
  2. Aquarium Construction
  3. Filtration Systems in Aquariums
  4. Water Circulation and Aeration
     + 1. **Module II: Water quality management**

1. Introduction to Water Quality in Aquariums
2. Key Water Quality Parameters
3. Water Quality Monitoring Tools and Equipment
4. Regular Water Changes and Maintenance
5. Managing Specific Water Quality Issues
   * + 1. **Module III: Species selection and compatibility**
6. Introduction to Species Selection in Aquariums
7. Types of Aquariums and Their Suitable Species
8. Factors to Consider in Species Selection
9. Stocking Density and Bio load Management

**Semester 2**

* + - 1. **Module IV: Maintenance routines (feeding, cleaning)**

1. Introduction to Maintenance Routines
2. Feeding Practices in Aquariums
3. Cleaning and Tank Maintenance
4. Waste Management in Aquariums
   * + 1. **Module V: Development of business ideas and incubation in BICs**
5. Introduction to Business Ideas and Incubators (BICs)
6. Identifying Business Opportunities in Aquarium Design and Management
7. Ideation Process
8. Developing a Business Plan
9. **Support Services Offered by BICs**
   * + 1. **Module VI: Managing ornamental fish health**
10. Introduction to Ornamental Fish Health Management
11. Understanding the Basics of Fish Health
12. Common Diseases in Ornamental Fish
13. Factors Influencing Fish Health
14. Preventive Measures for Fish Health Management
    * + 1. **Module VII:** **Aquarium aesthetics and aqua scaping**
15. Introduction to Aquarium Aesthetics and Aqua scaping
16. Principles of Aquarium Aesthetics
17. Components of Aqua scaping
18. Tools and Equipment for Aqua scaping
19. Steps in Creating an Aquascape

**Training Mode:**

* Classroom instruction
* Hands-on training
* Online learning platforms
* Field visits and guest lectures

**Training Materials:**

* Presentation slides
* Handouts and worksheets
* Online resources

3.4 Pond Management for Aquaculture Duration: 3-6 months

**(13 weeks to 26 weeks) (2 Semester)**

**Course Objectives**

* To provide basic understanding and concepts of aquatic animals and plants resources
* Practical, hands-on training in development of techniques and construction of ponds
* Empower youth, fish farmers, women and entrepreneurs by equipping them with technical skills to develop aquaculture business.
* Developing marketing linkages for different fish, their sustainability in the market and profitability.
* Develop a workforce ready for employment in aquaculture and meat sectors.
* Contribute to the region’s socio-economic development, direct and indirect job creation, and enhanced food security.

**Target Audience**

* Unemployed youth
* Entrepreneurs
* Women

**Curriculum Outline:**

**Semester 1**

* + - 1. **Module I:** **Pond design and construction**
  1. Introduction to Pond Management in Aquaculture
  2. Site Selection for Pond Construction
  3. Pond Types in Aquaculture
  4. Design components and Construction Process of Aquaculture Ponds
     + 1. **Module II:** **Water quality management**

1. Introduction to Water Quality in Ponds
2. Key Water Quality Parameters
3. Water Quality Monitoring Tools and Equipment
4. Regular Water Changes and Maintenance
5. Managing Specific Water Quality Issues
   * + 1. **Module III:** **Stocking density and species selection**
6. Introduction to Stocking Density and Species Selection
7. Factors Influencing Stocking Density
8. Importance of Species Selection
9. Criteria for Species Selection

**Semester 2**

* + - 1. **Module IV:** **Pond fertilization and feeding schedules**

1. Introduction to Pond Fertilization and Feeding
2. Objectives of Pond Fertilization
3. **Types of Fertilizers Used in Aquaculture**
4. Methods of Pond Fertilization
5. Feeding Schedules and Strategies
6. Best Practices for Fertilization and Feeding
7. **Module V: Disease management and monitoring**
   1. Introduction to Disease Management and Monitoring
   2. Common Aquaculture Diseases
   3. **Disease Monitoring Systems**
   4. Treatment and Control of Diseases
8. **Module VI: Harvesting methods and marketing**
   1. Harvesting Methods in Aquaculture
   2. Post-Harvest Handling
   3. Marketing of Aquaculture Products
   4. Sustainability and Certification in Marketing

**Training Mode:**

* Classroom instruction
* Hands-on training
* Online learning platforms
* Field visits and guest lectures

**Training Materials:**

* Presentation slides
* Handouts and worksheets
* Online resources

3.5 Hatchery Management for fish seed production Duration: 3-6 months

**(13 weeks to 26 weeks) (2 Semester)**

**Curse Objectives**

* To provide basic understanding and concepts of commercial fish species
* Practical, hands-on training in development of techniques and skills to manage fish hatcheries
* Empower youth, fish farmers, women and entrepreneurs by equipping them with technical skills to develop aquaculture business typically in seed production.
* Developing marketing linkages for different fish seeds, their sustainability in the market and profitability.
* Develop a workforce ready for employment in the aquaculture sector.
* Contribute to the region’s socio-economic development, direct and indirect job creation, and enhanced food security.

**Target Audience**

* Unemployed youth
* Entrepreneurs
* Women

**Curriculum Outline:**

**Semester 1**

* + - 1. **Module I: Broodstock selection and breeding**
  1. Introduction to Broodstock Selection and Breeding
  2. Criteria for Selecting Broodstock
  3. Broodstock Management Practices
  4. Breeding Techniques
     + 1. **Module II: Water management systems**

1. Introduction to Water Quality in Hatchery system
2. Key Water Quality Parameters
3. Water Quality Monitoring Tools and Equipment
4. Regular Water Changes and Maintenance
5. Managing Specific Water Quality Issues
   * + 1. **Module III: Egg incubation techniques**
   1. Introduction to Egg Incubation
   2. Key Factors Influencing Egg Incubation
   3. Incubation Techniques
   4. **Handling and Monitoring During Incubation**

**Semester 2**

* + - 1. **Module IV: Larval rearing and feed management**

1. Introduction to Larval Rearing and Feed Management
2. Stages of Larval Development
3. Key Factors Affecting Larval Rearing
4. Feed Management for Larvae
5. Monitoring Larval Growth and Development
6. **Common Challenges in Larval Rearing**
   * + 1. **Module V: Managing live feed (zooplankton, phytoplankton)**
7. Introduction to Live Feed Management
8. Types of Live Feed
9. Culturing Phytoplankton and Zooplankton
10. **Enrichment of Live Feed**
11. **Module VI: Quality control of fish seed**
12. Preventing contamination and maintaining hygiene in live feed cultures
13. Monitoring and Assessment Techniques
14. Preventing and treating diseases in live feed cultures
15. Biosecurity protocols to prevent pathogen introduction
16. Challenges in Maintaining Fish Seed Quality

**Training Mode:**

* Classroom instruction
* Hands-on training
* Online learning platforms
* Field visits and guest lectures

**Training Materials:**

* Presentation slides
* Handouts and worksheets
* Online resources

3.6 Fish feed formulation Duration: 3-6 months

**(13 weeks to 26 weeks) (2 Semesters)**

**Course Objectives**

* To provide basic understanding and concepts of aquatic feed used in aquatic feed.
* Practical, hands-on training in development of techniques to formulate cost-effective nutrient-rich feed for various fish species.
* Empower youth, fish farmers, women and entrepreneurs by equipping them with technical skills to develop aquaculture business.
* Developing marketing linkages for fish feed, their sustainability in the market and profitability.
* Develop a workforce ready for employment in aquaculture and feed sectors.
* Contribute to the region’s socio-economic development, direct and indirect job creation, and enhanced food security.

**Target Audience**

* Unemployed youth
* Entrepreneurs
* Women
* Feed business sector
* Aquaculture businessmen sector

**Curriculum Outline:**

**Semester 1**

1. **Module I: Introduction to Fish Feed Formulation**
   * 1. Importance of balanced fish feed for aquaculture success
     2. Overview of the role of nutrition in fish growth, health, and reproduction
     3. Objectives of formulating high-quality fish feed
     4. Types of feed formulations (e.g., commercial, on-farm, specialized)
2. **Module II: Nutritional needs of fish species**
   * 1. General Nutritional Requirements for Fish
     2. Species-Specific Nutritional Needs
     3. Nutritional Needs Based on Life Stages
     4. **Key Nutrients and Their Roles in Fish Nutrition**
3. **Module III: Feed ingredient sourcing**
   * 1. Types of Feed Ingredients
     2. Criteria for Selecting Feed Ingredients
     3. Sourcing Practices for Animal-Based and Plant-Based Ingredients
     4. Alternative and Emerging Feed Ingredients

**Semester 2**

1. **Module IV: Manual and mechanical feed preparation**
   * 1. Distinction between manual and mechanical feed preparation methods
     2. Basic Process of Manual Feed Preparation
     3. Tools and Equipment for Manual Feed Preparation
     4. Overview of Mechanical Feed Preparation
2. **Module V: Cost-effective formulations using local resources**
   * 1. Importance of cost efficiency in aquaculture feed production
     2. Role of local resources in reducing feed production costs
     3. Balancing economic viability with nutritional adequacy
     4. Sourcing Local Ingredients for Feed Formulation
3. **Module VI:** **Quality control and storage practices**
   * 1. Importance of Feed Quality Control
     2. Methods of Quality Control
     3. Monitoring and Adjustments
     4. Importance of Proper Feed Storage
     5. Storage Conditions

**Training Mode:**

* Classroom instruction
* Hands-on training
* Online learning platforms
* Field visits and guest lectures

**Training Materials:**

* Presentation slides
* Handouts and worksheets
* Online resources

FISHERIES AND AQUACULTURE

**COURSES**

1. **Bio Floc Technology in aquaculture**
2. **Shellfish framing (Shrimp, Crab, and lobster)**
3. **Pond Management for Aquaculture**
4. **Hatchery Management for fish seed production**
5. **Seaweed farming in Mariculture**
6. **Aquarium Design and Management**
7. **Probiotic for Fish Farming**
8. **Fish feed formulation**
9. **Algae Culture**
10. **Brine shrimp (Artemia) Farming**
11. **Integrated Aquaculture System**

Equipment/Chemicals Requirement

1. **General Equipment**

|  |  |  |  |
| --- | --- | --- | --- |
| **Requirements** | **Quantity** | **Justification** | **Total Cost (Rs.)** |
| **General Equipment** | | | |
| Tanks (spawning, incubation, larval rearing, Brood stock) | 15 (Diff. sizes) | Fish/Shrimps culture | 10,00000 |
| Circular Tank Size 2x1.5 M  (capacity 47000 liters) | 08 | For Biofloc culture | 8,00000 |
| Circular Tank Size 3x1.5 M  (capacity 10600 liters) | 3 | For Biofloc culture | 3,00000 |
| Grow out Ponds (0.5-1 hectare) | 04 | For Fish/Shrimps/Crabs culture | 15,20000 |
| Feed Dispenser/trays (Anco) | 20 | For feed distribution | 1,40000 |
| Drums/Cans (40 & 120 liters) | 10 | Water storage | 1,50,000 |
| Water Pumps | 03 | Water circulation and replacement | 2,90,000 |
| Lights | 05 | Overhead lights for monitoring and nighttime observation | 2,30,000 |
| Drainage Tools | 05 | For removing solid waste | 10,000 |
| Weighing Scales | 02 | To measure feed and biomass | 25,000 |
| Gloves, Mask, and water-resistant clothing |  | Protective Gears | 105,000 |
| First Aid Kit | 01 | For safety during operations | 10,000 |
| Water sampling bottles | 5 dozen | for analyzing probiotic/ nutrients effectiveness | 10,000 |
| Refrigerator | 01 | For storing live probiotics/ feed | 1,00000 |
| Generator | 02 | For pumps and aeration backup | 150000 |
| Nets, scoops, or traps | 25 pieces | For Harvesting (Fish, crabs, lobsters) | 10,000 |
| **Storage Bins and Containers** | 5 dozen | Airtight containers for storing ingredients to prevent contamination | 8,0000 |
| Grinders and Pulverizer | 01 | For grinding feed raw materials into fine powder | 40,000 |
| Sieves | 05 | To remove impurities and ensure uniform particle size | 10,000 |
| Light Microscopes | 02 | For observing larval development and health | 4,00000 |
| Heaters | 05 | To Maintain water temperature | 15,000 |
| Secchi disk | 01 | For water transparency checking | 30,000 |
| Solar panel system (10 KW package) and complete Installation | 01 | For Electricity | 4,000,000 |
| **TOTAL** |  |  | **9,425,000** |

**2. Pond/Tank Aeration and Filtration Equipment**

|  |  |  |  |
| --- | --- | --- | --- |
| **Requirements** | **Quantity** | **Justification** | **Total Cost (Rs.)** |
| **Aeration System Equipment** | | | |
| Air blowers | 10 | For Oxygen supply | 9,50,000 |
| Air stones/diffusers | As required | ″ ″ ″ ″ | 3,50,000 |
| PVC pipes and connectors for air distribution | As required | ″ ″ ″ ″ | 3,00000 |
| **Filtration Equipment** | | | |
| Mechanical filters | 10 | For Filtration | 5,95,000 |
| Screens/ Siphons | 10 | To prevent debris accumulation | 1,30,000 |
| **TOTAL** |  |  | **2,325,000** |

**3. Water quality Monitoring Equipment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirements** | **Quantity** | **Justification** | | **Total Cost (Rs.)** |
| **Water Quality Monitoring Equipment** | | | | |
| pH meter | 01 | For pH measurement | 2,25,000 | |
| Dissolved Oxygen meter | 01 | For DO measurement | 5,25,000 | |
| Refractometer | 01 | For salinity measurement | 2,00000 | |
| Digital Thermometers | 02 | For temperature measurement | 50,000 | |
| Ammonia Test Kit | 01 | For Ammonia measurement | 3,25,000 | |
| Nitrate Test Kit | 01 | For Nitrate/Nitrite measurement | 2,30,000 | |
| Nitrite Test Kit | 01 | For Nitrite measurement | 2,20,000 | |
| Phosphate Kit | 01 | For Phosphate measurement | 2,30,000 | |
| TOTAL |  |  | **2,005,000** | |

**4.** **Chemicals**

|  |  |  |  |
| --- | --- | --- | --- |
| **Requirements** | **Quantity** | **Justification** | **Total Cost (Rs.)** |
| **Chemicals** | | | |
| Ethanol | 20 bottles  (2.5 liter) | Samples preservation & tools disinfection | 8,00000 |
| Formaldehyde solution (about 37%) | 10 bottles  (2.5 liter) | To treat Ectoparasites & Fungal infections | 10,00000 |
| Chlorine | 80 liters | Disinfectants | 5,00000 |
| Potassium permanganate (KMnO₄) | 2 bottles (1 kg) | Disinfectants | 1,00000 |
| Sodium thiosulfate | 2 bottles (1 kg) | Dechlorinating Agents | 1,00000 |
| Lime (Calcium carbonate or calcium hydroxide) | 10 kg | pH control | 2,00000 |
| Sodium bicarbonate (NaHCO₃) | 5 kg | PH control | 2,50,000 |
| **Mineral/Vitamins Supplements** | | | |
| Magnesium sulfate (MgSO₄) | 20 bottles (227 g) | Feed supplements | 5,50,000 |
| Potassium chloride (KCl) | 10 bottles (227 g) | ″ ″ ″ ″ | 4,50,000 |
| Trace minerals (Zn, Fe, Mg) | 10 bottles each | ″ ″ ″ ″ | 20,00000 |
| Ascorbic acid (Vitamin C) | 10 bottles (1kg) | ″ ″ ″ ″ | 10,00000 |
| Fish Oil | 10 bottles (1000ml) | For feed (lipid source) | 5,00000 |
| **TOTAL** |  |  | **6,200,000** |
| **GRAND TOTAL (**Inclusive of Taxes) | | | **19,955,000/Rs.** |