NATIONAL BOARD FOR TECHNICAL EDUCATION

PLOT B BIDA ROAD, P.M.B. 2239, KADUNA, NIGERIA

NATIONAL DIPLOMA
IN

ANIMAL HEALTH AND PRODUCTION TECHNOLOGY

CURRICULUM AND COURSE SPECIFICATIONS

JUNE, 2026

PREFACE

The transformation of Nigeria's agricultural sector remains central to the nation's aspirations for sustainable economic growth, food security, job creation, industrial development, and poverty reduction. As agriculture continues to evolve in response to technological advancements, climate change, emerging global market demands, and the need for increased productivity across agricultural value chains, it has become imperative to ensure that curricula in Nigerian tertiary institutions remain relevant, responsive, and aligned with contemporary industry requirements. It is against this backdrop that we embarked on the comprehensive review and modernization of Agricultural curricula for Nigerian tertiary institutions. The review process was designed to address identified skills gaps, integrate emerging technologies and innovations, strengthen entrepreneurship and employability competencies, promote climate-smart agriculture, and align training programmes with the industry expectations and global best practices. The successful execution of this important project was made possible through the invaluable support and commitment of key stakeholders. I wish to express profound appreciation to the Honourable Minister of Education for providing the policy direction and leadership that facilitated this initiative. I also extend sincere gratitude to the Honourable Minister of Agriculture and Food Security and the Honourable Minister of Livestock Development for their unwavering support, technical contributions, and commitment to strengthening agricultural education and workforce development in Nigeria. Special appreciation goes to the Tertiary Education Trust Fund (TETFund) for providing the special intervention grant that enabled the conduct of nationwide skills gap analyses and supported the series of national curriculum review and development workshops. The findings from the skills gap studies provided critical evidence and industry insights that guided the review process and ensured that the curricula reflect current and future workforce requirements within the agricultural sector.

I also acknowledge with gratitude the immense contributions of the Sector Skills Council for Agriculture, whose expertise and industry perspectives greatly enriched the curriculum development process. Equally commendable are the efforts of members of the Implementation Committee, resource persons, industry experts, professional bodies, French Embassy in Nigeria, regulatory agencies, academic institutions, employers, development partners, and other stakeholders who devoted their time, knowledge, and experience to the various workshops and technical sessions. The revised curricula represent a collective national effort to produce graduates equipped with relevant knowledge, practical skills, digital competencies, entrepreneurial capabilities, and professional attitudes required to drive innovation and productivity across Nigeria's agronomy, forestry, fisheries and livestock sectors. It is my expectation that Institutions offering these programmes will faithfully implement the curricula and continue to collaborate with industry to ensure sustained relevance and quality. I commend all stakeholders for their dedication and contributions to this landmark achievement and look forward to the successful implementation of these curricula for the benefit of our dear nation.

Professor Idris M. Bugaje, FNSE
Chairman, Implementation Committee
EXECUTIVE SECRETARY
National Board for Technical Education (NBTE), Kaduna

ACKNOWLEDGEMENT

The National Board for Technical Education (NBTE) expresses its profound appreciation to all individuals and organizations whose invaluable support, expertise, and commitment made the successful review and modernization of the Agricultural Education curricula for Nigerian tertiary institutions possible. Our sincere gratitude goes to the Honourable Minister of Education for providing the policy direction and leadership that made this national initiative possible. We also appreciate the Honourable Minister of Agriculture and Food Security and the Honourable Minister of Livestock Development for their technical guidance, collaboration, and unwavering commitment to strengthening agricultural education and workforce development in Nigeria. The Board is particularly grateful to the Tertiary Education Trust Fund (TETFund) for providing the special intervention grant that funded the nationwide skills gap analyses, stakeholder engagements, curriculum review exercises, validation meetings, and development workshops. The evidence generated through these studies provided a solid foundation for developing curricula that are relevant, industry-driven, and responsive to national and global agricultural priorities.

Special appreciation is extended to the curriculum specialists, resource persons, academic experts, professional bodies, regulatory agencies, employers, industry practitioners, development partners, and representatives of public and private sector organizations who participated actively in the skills gap studies, technical sessions, validation exercises, and curriculum development workshops. Their diverse expertise and practical insights greatly enriched the quality and relevance of the curricula. We further appreciate the support of the French Embassy in Nigeria and other development partners for their collaboration in promoting excellence and innovation in technical and vocational education within the agricultural sector.Finally, NBTE expresses its gratitude to all tertiary institutions, researchers, facilitators, rapporteurs, technical staff, and administrative personnel whose commitment and hard work contributed to the successful completion of this important national assignment. The Board acknowledges that this achievement is the result of a collective effort and remains confident that the effective implementation of these curricula will contribute significantly to producing competent, innovative, and entrepreneurial graduates capable of advancing sustainable agricultural development, food security, and economic prosperity in Nigeria.

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GENERAL INFORMATION

1.0 PROGRAMME NOMENCLATURE

National Diploma (ND) in Animal Health and Production Technology

2.0 PROGRAMME GOAL

The National Diploma in Animal Health and Production Technology is designed to produce middle level manpower to improve animal health, livestock production, food security and promote sustainable practices through effective and efficient management of livestock.

3.0 OBJECTIVES OF THE PROGRAMME

At the end of the programme, the diplomates should be able to:

i. Manage farm operations and agricultural production in line with modern standards.
ii. Maintain accurate farm records and agricultural data.
iii. Supervise agricultural production projects.
iv. Carry out animal production and management practices.
v. Implement pest and disease control using safe and appropriate methods.
vi. Use digital tools and technologies in agricultural management.
vii. Apply Good Agricultural Practices (GAP) and food safety standards.
viii. Provide agricultural extension and advisory services.
ix. Demonstrate entrepreneurial skills for self-employment in the agricultural sector.

4.0 ENTRY REQUIREMENTS

The minimum entry requirements into the ND Animal Health and Production Technology programme are:

i. Five (5) O'Level credits in relevant subjects including English Language, Mathematics, Agricultural Science or Biology, Chemistry and one other relevant subject;
ii. Evidence of registration with JAMB.

5.0 STRUCTURE/DURATION OF THE PROGRAMME

The National Diploma in Animal Health and Production Technology programme is structured to last for two (2) years (four semesters) of classroom work, laboratory, field practicals and workshop practices.
Each semester shall be for 17 weeks, made up as follows:

i. 15 contact weeks of teaching (i.e. lectures and practical sessions etc.) and
ii. 2 weeks for registration and examinations.

6.0 CURRICULUM

The ND Animal Health and Production Technology programme consists of four (4) main components. These are:
i) General studies/General education courses;
ii) Foundation courses
iii) Professional courses;
iv) Supervised Industrial Work Experience Scheme (SIWES).

7.0 STAFFING REQUIREMENTS

7.1 Core Teaching Staff

A minimum of four (4) core teaching staff who should possess at least HND or B.Sc. in Animal Production, Animal Science and Veterinary Medicine and related discipline

7.2 Technical Staff

i. **Technologist**

Technologist is a senior technical staff responsible for supervising practical and laboratory activities in the department. The technologist operates, manages, and maintains laboratory and field equipment, assists lecturers during practical sessions, and supports research and field studies in animal health. There has to be a relevant Technologist attached to each training facility.

ii. **Technician**

Technician assists in carrying out technical and practical operations within the department. The technician helps in preparing equipment and materials for practical classes, maintaining tools and facilities, and supporting students and lecturers during laboratory and field activities. There has to be a relevant Technician attached to each training facility.

iii. **Field Assistant**

Field Assistant supports outdoor and field operations such as conservation activities, habitat monitoring, camping exercises, and data collection. The field assistant also helps in handling field equipment and ensuring smooth coordination of field trips and excursions.

7.3 Headship of the Department (HOD)

The Head of Department shall possess at least a First Degree and Master's Degree in Animal production, Animal Science/Production and Veterinary Medicine or related discipline and should not be below the rank of Senior Lecturer and must be registered with the relevant professional body and must have a minimum of (12 years) experience in both academic and industry.

8.0 CERTIFICATION

A diplomate of this programme shall be awarded National Diploma (ND) in Animal Health and Production Technology

9.0 CONDITIONS FOR THE AWARD OF ND

Institutions offering accredited programmes will award the National Diploma to candidates who successfully completed the programme after passing prescribed coursework, examinations, diploma project and the Students Industrial Work Experience Scheme (SIWES). Such candidates should have completed a minimum of between 72 and 80 semester credit units depending on the programme.

9.1 Grading of Courses: Courses shall be graded as follows:

MARK RANGE	LETTER GRADE	WEIGHTING
75% and above	A	4.00
70% – 74%	AB	3.50
65% – 69%	B	3.25
60% – 64%	BC	3.00
55% – 59%	C	2.75
50% – 54%	CD	2.50
45% – 49%	D	2.25
40% – 44%	E	2.00
Below 40%	F	0.0

9.2 Classification of Diplomas:

Diploma Certificates shall be awarded based on the following classifications:

CGPA	CLASS OF DIPLOMA
CGPA 3.50 and above	Distinction
CGPA 3.00-3.49	Upper Credit
CGPA 2.50-2.99	Lower Credit
CGPA 2.00-2.49	Pass

10.0 ACCREDITATION

The National Diploma (ND) in Animal Health and Production Technology programme shall be accredited by NBTE before the diplomates can be awarded the diploma certificate. Details about the process of accrediting a programme for the award of the ND are available from the Executive Secretary, National Board for Technical Education (NBTE), Plot 'B', Bida Road, P.M.B. 2239, Kaduna, Nigeria.

11.0 LOGBOOK

A personal logbook for each course is to be kept by the students. It shall contain all the recordings of the day-to-day, weekly and semester practical works/activities from day one to the end of the programme. This is to be checked, marked appropriately and endorsed by all lecturers concerned at the end of every week.

12.0 FINAL YEAR PROJECTS

Final year students are expected to carry out project work, either on individual or group basis (not more than 2 per group). The project topics should as much as possible be related to the programme and serve as useful tools for further Research and /or Development. Projects should be properly supervised, and their reports well presented. The Institution should develop formats for presenting and grading projects. The formats should be adopted as applied to each stakeholder.

13.0 Guidance Notes for Teachers of the Programme:

13.1 The new curriculum is drawn in unit courses. This is in keeping with the provisions of the National Policy on Education which stress the need to introduce the semester credit units which will enable a student, who so wishes, to transfer the units already completed in an institution of similar standard from which he/she is transferring.

13.2 In designing the units, the principle of the modular system by product has been adopted, thus making each of the professional modules, when completed provides the student with technician operative skills, which can be used for employment purposes.

13.3 As the success of the credit unit system depends on the articulation of programmes between the institution and industry, the Curriculum content has been written in behavioral objectives, so that the expected performance of the student is clear to all students who successfully completed some of the courses or the diplomates of the programme. There is a slight departure in the presentation of the performance-based curriculum which requires the conditions under which the performance is expected to be carried out and the criteria for the acceptable levels of performance. It is a deliberate attempt to further involve the staff of the department teaching the programme to write their own curriculum stating the conditions existing in their institution under which the performance can take place and follow that with the criteria for determining an acceptable level of performance. Departmental submission on the final curriculum may be vetted by the Academic Board of the institution. Our aim is to continue to see to it that a solid internal Evaluation system exists in each institution for ensuring minimum standard and quality of education in the programmes offered throughout the polytechnic system.

13.4 The teaching of theory and practical work should, as much as possible, be integrated. Practical exercises, especially those in professional courses and laboratory work should not be taught in isolation from the theory. For each course, there should be a balance of theory to practice in the ratio of 50:50 or 60:40 or the reverse.

14.0 GUIDELINES ON SIWES PROGRAMME

For the smooth operation of the SIWES, the following guidelines shall apply:

14.1 Responsibility for placement of Students.

a. Institution offering the ND programme shall arrange to place the students in relevant industries. By the end of second semester of the first academic session, six copies of the master list showing where each student has been placed shall be submitted to the Executive Secretary, NBTE, who shall, in turn authenticate the list and forward it to the Industrial Training Fund, Jos.
b. The Placement Officer should discuss and agree with the various industries on the following:
    i. A task inventory of what the student is expected to experience during the period of attachment. It may be wise to adopt the one already approved for each field by the industry-based supervisor.
    ii. The evaluation of the student by the industry-based supervisor and the institution-based supervisor.
    iii. The final grading of the student during the period of attachment should be weighted more on the evaluation by industry-based supervisor.

14.2 Evaluation of Student during the SIWES

In the evaluation of the student, cognisance should be taken of the following items:

i. Punctuality
ii. Attendance
iii. General attitude to work
iv. Routine report of weekly activities in the logbook
v. Respect for authority
vi. Interest in the field/technical area
vii. Technical competence as a potential technician in his field.

14.3 Grading of SIWES

To ensure uniformity of grading scales, the institution should ensure that the uniform grading of students work agreed to by all TVET Institutions is adopted.

14.4 The Institution based Supervisor

The institution-based supervisor should initial the log book during each visit. This will enable him to check and determine to what extent the objectives of the scheme are being met and to assist students having any problems regarding the specific tasks given to them by their industry-based supervisor.

14.5 Frequency of visit

Institutions should ensure that students placed on the attachment are visited within one month of their placement. Other visits shall be arranged so that:

i. There is another visit six weeks after the first visit; and
ii. A final visit in the last month of the attachment.

14.6 Stipend for Students in SIWES

The rate of stipend payable shall be determined from time to time by the Federal Government after due consultation with the Federal Ministry of Education, the Industrial Training fund and the NBTE.

14.7 SIWES as a component of the Curriculum

The completion of SIWES is important in the final determination of whether the student is successful in the programme or not. Failure in the SIWES is an indication that the student has not shown sufficient interest in the field or has no potential to become a skilled technician in his field. The SIWES should be graded on a ***fail*** or ***pass*** basis. Where a student has satisfied all other requirements but failed SIWES, she/he may only be allowed to repeat another four months SIWES at his own expense.

15.0 GUIDELINES ON MANDATORY SKILLS QUALIFICATIONS (MSQ)

Please, see the Guidelines for the Implementation of MSQ in Polytechnics in Nigeria, available on NBTE website (web.nbte.gov.ng/downloads).



CURRICULUM TABLE

YEAR I SEMESTER I

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 101	Use of English I	2	0	0	2	2
2.	GNS 111	Citizenship Education I	2	0	0	2	2
3.	MSQ 111	Mandatory Skills Qualification	1	0	1	2	2
4.	COM 111	Introduction to Computing	2	0	2	4	4
5.	AGR 101	Introduction to Agriculture	1	0	2	3	3
6.	FIT 114	Introduction to Fisheries Technology	1	0	3	4	4
7.	STC 111	General Principles of Chemistry	2	0	0	2	2
8.	AHP 111	Cell Biology	1	0	2	3	3
9.	AHP 112	Livestock Production Mathematics	1	0	1	2	2
10.	AHP 113	Anatomy and Physiology I	1	0	2	3	3
11.	AHP 114	Principles of Pasture and Range Management I	1	0	1	2	2
12.	AHP 115	Livestock Equipment Maintenance	1	0	2	3	3
13.	AHP 116	Introduction to Animal Husbandry	1	0	2	3	3
TOTAL			**17**	**0**	**18**	**35**	**35**

YEAR I SEMESTER II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 121	Citizenship Education II	2	0	0	2	2
2.	GNS 102	Communication in English I	2	0	0	2	2
3.	ENT 126	Introduction to Entrepreneurship I	2	0	1	3	3
4.	STC 121	Organic Chemistry I	2	0	0	2	2
5.	AGT 125	Agro-Climatology	1	0	2	3	3
6.	AHP 121	Animal Parasitology	1	0	2	3	3
7.	AHP 122	Anatomy and Physiology II	1	0	3	4	4
8.	AHP 123	Introductory Veterinary Microbiology	1	0	2	3	3
9.	AHP 124	Pharmacology and Therapeutics	1	0	2	3	3
10.	AHP 125	Introduction to Animal Nutrition	1	0	2	3	3
11.	AHP 126	Introduction to Genetics and Animal Breeding	1	0	2	3	3
12.	AHP 127	Elements of livestock Economics	2	0	0	2	2
13.	AHP 128	Pathology	1	0	3	4	4
TOTAL			**18**	**0**	**19**	**37**	**37**

YEAR II SEMESTER I

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 201	Use of English II	2	0	0	2	2
2.	ENT 216	Introduction to Entrepreneurship I	2	0	1	3	3
3.	AGR 201	Research Methods and Experimental Design	1	0	1	2	2
4.	AHP 211	Sheep and Goat Production	1	0	2	3	3
5.	AHP 212	Swine Production	1	0	2	3	3
6.	AHP 213	Animal Diseases I	1	0	2	3	3
7.	AHP 214	Clinical Techniques I	1	0	2	3	3
8.	AHP 215	Principles of Pasture and Range Management II	1	0	1	2	2
9.	AHP 216	Rabbit Production	1	0	2	3	3
10.	AHP 217	Computer Application in Animal Health and Production	1	0	1	2	2
11.	AHP 218	SIWES	0	0	4	4	4
TOTAL			12	0	18	**30**	**30**

YEAR II SEMESTER II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 202	Communication In English II	2	0	0	2	2
2.	AGT 226	Agricultural Extension, Digital Advisory System & Rural Development	1	0	1	2	2
3.	AHP 221	Principles of Mini Livestock Production	1	0	1	2	2
4.	AHP 222	Animal Products Hygiene and Inspection	1	0	2	3	3
5.	AHP 223	Animal Diseases II	1	0	2	3	3
6.	AHP 224	Clinical Techniques II	1	0	3	4	4
7.	AHP 225	Poultry Production	1	0	3	4	4
8.	AHP 226	Beef and Dairy Production	1	0	3	4	4
9.	AHP 227	Livestock Farm Management	1	0	1	2	2
10.	AHP 228	Project	0	0	4	4	4
TOTAL			**10**	**0**	**20**	**30**	**30**

Keys: L – Lectures (Hours/week) T – Tutorial (Hours/week) P – Practical (Hours/week) CU – Credit Unit CH – Contact Hours

YEAR I- SEMESTER I

CELL BIOLOGY

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: CELL BIOLOGY	**COURSE CODE: AHP 111**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to provide students with knowledge and skills of cell structure and their functions.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know cell as the basic unit of life; 2.0 Know the composition of the nucleus and cytoplasm of the cell; 3.0 Know the different types of cell division and their significance; 4.0 Understand Chemical reactions in a cell; 5.0 Know the different types of specialized cells and their functions; 6.0 Understand the process of photosynthesis; 7.0 Understand the process of transpiration; 8.0 Understand the process of respiration; 9.0 Understand the process of translocation in plant.		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: CELL BIOLOGY	COURSE CODE: AHP 111	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to provide students with knowledge and skills of cell structure and their functions.		
GENERAL OBJECTIVE 1.0: Know cell as the basic unit of life		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define the cell as a unit of Life. 1.2 Explain cell theory. 1.3. Explain cell organelles. 1.4 List the functions of cell organelles. 1.5 Explain prokaryotic and eukaryotic cells. 1.6 Explain the difference between animal and plant cells.	• Explain the cell as a unit of Life. • Explain cell theory • Discuss cell organelles. • Explain the functions of cell organelles. • Differentiate prokaryotic and eukaryotic cells. • Differentiate between animal and plant cells.	White board and marker, Video films, monographs Microscope, charts etc.	• Draw single celled animal and plants under the microscope; Amoeba, paramecium, plasmodium, chlamydomonas, chlorella, and Spirogyra. • Draw samples of plant and animal cells from appropriate sources, under the microscope viz, cheek cells, blood cells, epidermis of *Allium cepa*, • Draw the plant and animal cells as seen under the electron microscope.	Guide students to; • Use the microscope and magnifying glass. • Identify the different types of cell.	Microscope, Petri dish, beaker, magnifying glasses.
General Objective 2.0: Know the composition of the nucleus and cytoplasm of the cell						
	2.1. Describe the structure and	• Discuss the structure and functions of the	White board and marker,	• Draw the cytoplasm and its components as	Guide students to; • Draw the cytoplasm	Microscope, Petri dish,

2-3	functions of the components of cell nucleus. 2.2 Describe the structure and functions of DNA and RNA 2.3 Explain the differences and significance of DNA and RNA in protein synthesis 2.4 Explain the building blocks of nucleic acid (nucleotides), sugar and phosphoric acid. 2.5 List the biochemical components of the cytoplasm and the nucleus. 2.6 Explain the replication of the DNA molecules and its significance. 2.7 Explain the role of the RNA in protein synthesis.	components of cell nucleus. • Describe the structure and functions of DNA and RNA. • Discuss the differences and significance of DNA and RNA in protein synthesis • Discuss the building blocks of nucleic acid (nucleotides), sugar and phosphoric acid. • Enumerate the biochemical components of the cytoplasm and the nucleus. • Explain the replication of the DNA molecules and its significance. • Discuss the role of the RNA in protein synthesis.	Video films, monographs Microscope, charts etc.	revealed by an electron micrograph.	and organelles as seen on the micrograph. • Draw the components of the cytoplasm.	beaker, magnifying glasses.
General Objective 3.0: Know the different types of cell division and their significance						
	3.1.Define cell division 3.2.List the various types of cell division 3.3.Define mitosis and	• Explain cell division • Explain the various types of cell division • Explain mitosis and meiosis	White board and marker, Video films, monographs Microscope,			

4	meiosis 3.4. Explain the difference between mitotic and meiotic cell divisions 3.5. Explain the significance of mitotic and meiotic cell divisions in plant and animals	• Differentiate mitotic and meiotic cell divisions. • Elaborate the significance of mitotic and meiotic cell divisions in plant and animals.	charts, Internet files etc.			
General Objective 4.0: Understand Chemical reactions in a cell						
5	4.1. Highlight some chemical Reactions in the cell 4.2. Explain the importance of hydrogen ions concentration (pH) in cell. 4.3. Enumerate the importance of water to life. 4.4. List enzymes of biological importance. 4.5. State the role of the following components in the cell: (a) carbohydrates (b) lipids (c)Proteins (d) Ribonucleic acid.	• Enumerate some chemical Reactions in the cell • Discuss the importance of hydrogen ions concentration (pH) in cell. • Enumerate the importance of water to life • Enumerate enzymes of biological importance. • Explain the role of the following components in the cell: (a) carbohydrates (b) lipids (c)Proteins (d) Ribonucleic acid.	White board and marker, Video films, monographs Microscope, charts, Internet files etc.	• Determine effects of different pH values on solubility of proteins • Prepare simple buffer • Draw the structure of any named simple sugar, amino and fatty acids	Guide students to: • Carry out simple Laboratory experiment on different pH values on solubility of proteins. • Draw the structure of any named simple sugar, amino and fatty acids	pH meter, reagents, beakers.

	4.6. List the basic component of carbohydrates (Simple Sugar), protein (Amino Acid) and fat (fatty Acid).	• Explain the basic component of carbohydrates, protein and fat.				
General Objective 5.0: Know the different types of specialized cells and their functions						
6-7	5.1. List various types of cells e.g. plant (meristematic cells, parenchyma, sclerenchyma, collenchyma), Somatic (bone marrows, blood and bone cells), etc. 5.2. Define tissue. 5.3. Describe the structure and composition of the following: brain, bone, blood, etc. and vascular bundles in plants. 5.4. List the functions of the various tissues described above.	• Discuss the various types of cells e.g. plant (meristematic cells, parenchyma, sclerenchyma, collenchyma), Somatic (bone marrows, blood and bone cells), etc. • Explain tissue. • Describe the structure and composition of the following: brain, bone, blood, etc. and vascular bundles in plants. • Explain the functions of the various tissues described above.	White board and marker, Video films, monographs, charts, Internet files etc.	• Examine slides of plants and animals tissue under the microscope • Identify different types of tissues	Guide students to; • Examine slides of plants and animals tissue under the microscope • Identify different types of tissues	Charts containing different type of tissues, visual aids, Microscopes,
General Objective 6.0: Understand the process of photosynthesis						
8	6.1 Define photosynthesis 6.2. List the factors affecting photosynthesis	• Explain photosynthesis • Highlight the factors affecting photosynthesis	White board and marker, Charts, Internet files etc.	• Carry out the experiments on photosynthesis. • Determine the presence of starch in leaf	Guide students to • Carry out the experiments on photosynthesis. • Determine the	Carbon paper, sunlight, jar, Sun screen box,

	6.3 State the importance of photosynthesis	• Enumerate the importance of photosynthesis			presence of starch in leaf	
General Objective 7.0: Understand the process of Transpiration						
9-10	7.1. Define transpiration in plants. 7.2. List types of transpiration in plants. 7.3. Explain the difference between transpiration and guttation 7.4. Outline the importance of transpiration to plants. 7.5. List the factors affecting transpiration	• Explain transpiration in plants. • Highlight types of transpiration in plants. • Differentiate between transpiration and guttation • Discuss the importance of transpiration to plants. • Highlight the factors affecting transpiration	White board and marker, Video films, monographs, charts, Internet files etc.	• Measure the rate of transpiration in plants by using a photometer	Guide the student to; • Measure the rate of transpiration in plants	Potometer
General Objective 8.0 Understand the process of Respiration						
11-12	8.1. Explain the process of respiration 8.2. List the differences between aerobic and anaerobic respiration. 8.3. Describe the role of the mitochondria in respiration. 8.4. Explain tissue respiration with fermentation. 8.5. List the factors affecting respiration	• Explain the process of respiration • Discuss the differences between aerobic and anaerobic respiration. • Describe the role of the mitochondria in respiration. • Discuss tissue respiration with fermentation • Explain the factors affecting respiration	White board and marker, Video films, monographs, charts, Internet files etc.			

General Objective 9.0 Understand the process of translocation in plant						
13-15	9.1 Explain translocation 9.2 Explain the process of translocation in plants. 9.3 Describe the mechanism of translocation in plants. 9.4 State the factors affecting translocation.	• Explain translocation and the process of translocation in plants. • Describe the mechanism of translocation in plants. • Explain the factors affecting translocation.	• White board and marker, Video films, monographs, charts, Internet files etc.	• Demonstrate translocation by using dyes, • Carry out experiments to show that translocation takes place through the phloem • Draw the structure of the phloem in relation to translocation	Guide the students to • Carry out experiment on translocation in plants • Carry out experiments to show that translocation takes place through the phloem • Draw the structure of the phloem in relation	Dyes,
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% **Total: 100%**						

LIVESTOCK PRODUCTION MATHEMATICS

PROGRAMME: NATIONAL DIPLOMA ANIMAL AND PRODUCTION TECHNOLOGY		
COURSE TITLE: LIVESTOCK PRODUCTION MATHEMATICS	**COURSE CODE: AHP 112**	**CONTACT HOURS: 2 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL: 1 HOUR/WEEK**
YEAR: 1 SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 1 HOUR/WEEK**
GOAL: The course is designed to equip students with basic mathematical knowledge and skills applicable to calculating livestock production indices.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand livestock production mathematics and its application to livestock production; 2.0 Know live weight calculation formulas and how to calculate life weight of different livestock species; 3.0 Know dressing percentages for different species of livestock and how to calculate dressed weight and carcass weight; 4.0 Know how to calculate concentration of basic drugs and chemicals used in livestock production;		

PROGRAMME: NATIONAL DIPLOMA ANIMAL AND PRODUCTION TECHNOLOGY		
COURSE TITLE: LIVESTOCK PRODUCTION MATHEMATICS	**COURSE CODE: AHP 112**	**CONTACT HOURS: 2 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 1 HOUR/WEEK**
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: The course is designed to equip students with basic mathematical knowledge and skills applicable to calculating livestock production indices.		
GENERAL OBJECTIVE: 1.0 Understand livestock production mathematics and its application to livestock production.		

THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
	1.1 Define livestock production mathematics 1.2 Explain how to calculate Mean weight Average weight 1.3 Explain how to convert: Grams to milligrams Kilograms to grams Liters to milliliters etc.	• Explain use of mathematics in livestock production. • Discuss how to calculate mean weight of a group of animals. • Explain conversion of different unit of metric system to common units	Computer Measuring tape Text books Projector Markers Calculators Weighing scale	• Demonstrate how to calculate mean weight • Identify percentage of production e.g. egg, milk etc. • Demonstrate how to calculate drug volumes for treatment • Demonstrate how to calculate drug concentrations for doses • Demonstrate how to calculate volumes of diluents for vaccine reconstitution and administration.	Guide students to: • Take measurements on life animals. • Generate the data and do the calculations • Calculate concentration and dosages / volumes to be administered	On farm animals (cattle, sheep, chicken) etc Calculator Syringes Diluents
General Objective 2.0: Know live weight calculation formulas and how to calculate life weight of different livestock species						

	2.1 Explain how to summarize data using graphs, charts etc., 2.2 Explain the application the formulas for calculating: i. Cattle live weight ii. Sheep and goats live weight iii. Pig live weight iv. Horses live weight 2.3 Explain the generation of data for the use of the formulas for the calculations of live weight.	• Discuss how to summarize data using graphs, charts etc., • Describe how to apply the formulas for calculating: i. Cattle live weight ii. Sheep and goats live weight iii. Pig live weight iv. Horses life weight • Describe the generation of data for the use of the formulas for the calculations of live weight. i. Girth length ii. body length of animals both in inc/cm	Measuring tape Calculator Markers Flipcharts	• Calculate live weight for different livestock species.	Guide students to: • Calculate live weight for different livestock species.	Live animals on farm Measuring tape Markers Flipcharts
General Objective 3.0: Know dressing percentages for different species of livestock and how to calculate dressed weight and carcass weight.						

	3.1 Explain how to apply dressing percentages formulas for different livestock species 3.2 Explain how to calculate dressing percentage of different live weight 3.3 Explain how to calculate dressed weight of different livestock species.	• Explain how to calculate dressing percentage of different live weight. • Explain how to calculate dressed weight of different livestock species.	Measuring tape Calculators Markers Flipcharts Weighing scale	• Calculate dressing percentages for different livestock species • Calculate dressed weight of different livestock species ✓ Cattle ✓ Sheep and goats ✓ Pigs etc	Guide students to: • Calculate dressing percentages for different livestock species. • Calculate dressed weight of different livestock.	Animals Measuring tape Calculators Markers Flipcharts
General Objective 4.0: Know how to calculate concentration of basic chemicals used in livestock production.						
	4.1 Explain basic chemicals used in livestock production 4.2 Outline the basic chemical used in livestock production 4.3 Explain how to calculate concentration of chemicals used in livestock production	• Discuss basic chemicals used in livestock production • Explain how to calculate concentration of chemicals used in livestock production.	Chemicals Diluents Measuring cylinders syringes	• Reconstitute chemicals for: i. Spraying of livestock ii. Dipping of livestock iii. Disinfections iv. Fumigations v. Foot dips	Guide the student to • Calculate concentration of chemicals used in livestock production on farm for i. Spraying of livestock ii. Dipping of livestock iii. Disinfections iv. Fumigations v. Foot dips	Chemicals Measuring cylinders Syringes Diluents

COURSE ASSESSMENT:

Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%
Total: 100%

ANATOMY AND PHYSIOLOGY I

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANATOMY AND PHYSIOLOGY I	**COURSE CODE: AHP 113**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: 1 SEMESTER: 1	**PRE-REQUISITE:**	**PRACTICAL: 2HOURS/WEEK**
GOAL: This course is designed to equip students with the basic knowledge and skills of the structure and functions of the different parts of the body of animals.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know the animal body parts; 2.0 Know normal parts from abnormal parts; 3.0 Know the structure and functions of various types of tissues; 4.0 Know the importance of hemopoiesis and blood clotting; 5.0 Know the major muscles and bones that aid locomotion and give shape to the body; 6.0 Know Monogastric and Ruminants.		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANATOMY AND PHYSIOLOGY I	**COURSE CODE: AHP 113**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the basic knowledge and skills of the structure and functions of the different parts of the body of animals.		
GENERAL OBJECTIVE 1.0: Know the animal body parts		

THEORETICAL CONTENT			**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
	1.1 Explain Anatomy and Physiology 1.2 Describe the following in animals: i. Caudal ii. Median iii. Sagittal iv. Transverse v. Frontal vi. Lateral vii. Dorsal viii. Ventral ix. Deep x. Superficial xi. Proximal xii. Distal xiii. Volar xiv. Planter xv. Prone xvi. Supine xvii. Regions of the Body	• Discuss Anatomy and Physiology • Explain the following in animals: - Caudal - Median - Sagittal - Transverse - Frontal - Lateral - Dorsal - Ventral - Deep - Superficial - Proximal - Distal - Volar - Planter - Prone - Supine - Regions of the	Models of animals. Videos Textbooks, Pictorials, Projector Markers, White board Etc.	• Identify the following in animals: i. Caudal ii. Median iii. Sagittal iv. Transverse v. Frontal vi. Lateral vii. Dorsal viii. Ventral ix. Deep x. Superficial xi. Proximal xii. Distal xiii. Volar xiv. Planter xv. Prone xvi. Supine xvii. Regions of the Body • Demonstrate a model of a given	Guide students to: • Identify the following in animals: - Caudal - Median - Sagittal - Transverse - Frontal - Lateral - Dorsal - Ventral - Deep - Superficial - Proximal - Distal - Volar - Planter - Prone - Supine - Regions of the Body • Demonstrate a	Models of different animals. Videos Live Animals

	1.4 Explain the regions of the body and reference points such as the head, poll, wither etc. 1.5 Explain the regions of the fore limb e.g. shoulder, arm, forearm and manus. 1.6 Explain the regions of the hind limb e.g. hip, thigh, leg and pes.	Body • Describe the regions of the body and reference points such as the head, poll, wither etc. • Describe the regions of the fore limb e.g. shoulder, arm, forearm and manus. • Describe the regions of the hind limb e.g. hip, thigh, leg and pes.		animal showing the various parts listed	model of a given animal showing the various parts listed	
General Objective 2.0: Know normal parts from abnormal parts						
	2.1 Explain normal part 2.2 Explain Abnormal part 2.3 Explain the species and age to differentiate normal parts from abnormal parts	• Describe standard features such as colour, size, shape, texture posture and movement. • Describe the species and age to differentiate normal parts from abnormal parts.	Models of animals. Videos Textbooks, Pictorials, Projector Markers, White board Etc.	• Identify normal size, texture, shape and color of major external organs from the head to the tail. • Carry out the identification of normal eyes, moist nose, smooth coat, even gait and alert behavior. • Demonstrate with a normal animal and an abnormal animal using different species.	• Guide students to: Identify normal size, texture, shape and color of major external organs from the head to the tail. • Identify normal eyes, moist nose, smooth coat, even gait and alert behavior. • Demonstrate with a normal animal and an abnormal animal using different species.	Models of different animals. Videos Live Animals Preserved specimen or live animals
General Objective 3.0: Know the structure and functions of various types of tissues						

	3.1 Explain the structure and function of Tissues 3.2 List the various types of tissues. 3.3 Describe the parts of the body where each type can be found 3.4 Describe the functions of each of the following classes of tissues i. Epithelial tissue ii. Squamous iii. Cuboidal iv. Columnar v. Transitional vi. Connective tissue vii. Areolar viii. Fibrous ix. Elastic x. Adipose xi. Hyaline cartilage xii. Fibro cartilage xiii. Elastic cartilage xiv. Bone xv. Haemopoietic tissue xvi. Muscular tissue xvii. Smooth xviii. Skeletal xix. Cardiac xx. Nervous tissue.	• Describe the structure and function of Tissues • Explain the various types of tissues. • Explain the parts of the body where each type can be found • Discuss the functions of each of the following classes of tissues in 3.4. • Discuss the above tissues under the microscope and make representative diagrams	Lecture notes Pictures Videos	• Conduct both gross and microscopic activities to describe parts of the tissues and their functions • Carry out drawing and labelling of various types of tissues	Guide students to: • Conduct both gross and microscopic activities to describe parts of the tissues and their functions • Carry out drawing and labelling various types of tissues	Prepared histology slides showing different types of tissues e.g. Muscular, nervous, connective etc.
General Objective 4.0: Know the importance of hemopoiesis and blood clotting						

	4.1 Define haemopoiesis 4.2 List the components of blood e.g., water, cells, minerals etc. 4.3 List the phases involved in: - i. Yolk sac phase ii. Hepatic phase iii. Bone marrow phase 4.4 Describe the processes of red blood cell formation and white blood cell formation 4.5 Explain the factors governing the processes in 4.4 above. 4.6 Explain the role of certain body organs in the processes in 4.4 above. 4.7 Explain the importance of blood clotting as a means of controlling haemorrhage.	• Explain haemopoies • Outline the components of blood e.g., water, cells, minerals etc. • State the phases involved in: - - Yolk sac phase - Hepatic phase - Bone marrow phase • Describe the processes of red blood cell formation and white blood cell formation • Discuss the factors governing the processes in 4.4 above. • Discuss the role of certain body organs in the processes in 4.4 above. • Discuss the importance of blood live as a means of controlling haemorrhage.	Lecture notes Pictures Videos	• Make thin blood smear or use prepared slides. • Use microscope to identify red cells and platelets. • Demonstrate components of blood and clotting time	Guide students to: • Make thin blood smear or use prepared slides. • Use microscope to identify red cells and platelets. • Demonstrate clotting time	Blood Microscope Wrights and Leishman stains
General Objective 5.0: Know the major muscles and bones that aid locomotion and give shape to the body						

	5.1 Explain bones according to their gross appearance. 5.2 Explain the axial skeleton of cattle and compare with those of other animals and the chicken. 5.3 Describe the appendicular skeleton, of cattle and compare with those of other domestic animals and chicken	• Describe bones according to their gross appearance. • Describe the axial skeleton of cattle and compare with those of other animals and the chicken. • Describe the appendicular skeleton, of cattle and compare with those of other domestic animals and chicken	Lecture notes, Projectors, Pictures White board, Marker Etc.	• Identify bone as mentioned in 5.1, 5.2 and 5.3 • Draw the axial skeleton of cattle and compare with those of other animals and the chicken: - i. Vertebrae Cervical ii. Thoracic iii. Lumbar iv. Sacral v. Coccygeal vi. Ribs vii. Sternum	• Explain and show students the different types of bone and why they are so called • Draw the axial skeleton of cattle and compare with those of other animals and the chicken: - - Vertebrae Cervical - Thoracic - Lumbar - Sacral - Coccygeal - Ribs - Sternum	Mounted skeletons and bones of different animals
General Objective 6.0: Know Monogastric and Ruminants						
	4.1 Define Monogastric animal. 4.2 Explain Ruminants animal. 4.3 Explain the characteristics of monogastric and ruminants animals 4.4 Explain the importance of proper nutrition in livestock production.	• Explain Monogastric animal • Explain Ruminants animal. • Explain the characteristics of monogastric and ruminants animals • Discuss the importance of proper nutrition livestock production.	Lecture notes, Projectors, Pictures White board, Marker Etc.	• Identify common monogastric and ruminant animals. • Identify monogastric digestive system parts. • Identify ruminant digestive system parts • Observe feeding habits of monogastric and ruminant animals. • Demonstrate rumination process in ruminant animals	Guide students to; • Identify common monogastric and ruminant animals. • Identify monogastric digestive system parts. • Identify ruminant digestive system parts • Observe feeding habits of monogastric and ruminant animals.	Live/Cadava Animals, Stomach models of Ruminants and Monogastric digestive tracts, feed ingredients

				using live animals or video clips. • Prepare simple feed rations for monogastric animals. • Prepare simple feed rations for ruminant animals.	• Demonstrate rumination process in ruminant animals using live animals or video clips. • Prepare simple feed rations for monogastric animals. • Prepare simple feed rations for ruminant animals.	

COURSE ASSESSMENT:
Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%
Total: 100%

PRINCIPLES OF PASTURE AND RANGE MANAGEMENT I

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF PASTURE AND RANGE MANAGEMENT I	**COURSE CODE: AHP 114**	**CONTACT HOURS:2 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL:1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: 0**	**PRACTICAL: 1 HOUR/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in Pasture Production		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know the terms used in pasture and range management; 2.0 Know the ecological zones of Nigeria; 3.0 Know the botany and role of pasture plants; 4.0 Know the establishment of pasture, range and grazing reserve; 5.0 know the production of pasture seeds; 6.0 know how to produce pasture through Hydroponics.		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF PASTURE AND RANGE MANAGEMENT I	COURSE CODE: AHP 114	CONTACT HOURS:2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL:1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: 0	PRACTICAL: 1 HOUR/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with Knowledge and skills in Pasture Production		
GENERAL OBJECTIVE 1.0: Know the terms used in pasture and range management		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning**	**Teacher's Activities**	**Resources**
	1.1 Define pasture and range management. 1.2 Define grazing reserve, 1.3 Explain the importance of Grazing reserves. 1.4 Explain improved Pasture (Hay, silage) topography, fertility, fodder bank, stocking density, grazing rotation, zero grazing, overgrazing, under grazing, deferred grazing etc.	• Discuss pasture and range management. • Discuss grazing reserve, • Discuss the importance of Grazing reserves. • Discuss improved Pasture (Hay, silage) topography, fertility, fodder bank, stocking density, grazing rotation, zero grazing, overgrazing, under grazing, deferred grazing etc.	Diagrams, Marker Boards, pictures, textbooks etc.	• Identify common pasture grasses and legumes. • Classify forage crops and fodder materials. • Estimate stocking rate and carrying capacity using sample data. • Visit a ranch or grazing field to observe range management practices. • Conduct hay and silage preparation techniques. • Identify signs of overgrazing and range deterioration in the field.	• Identify common pasture grasses and legumes. • Classify forage crops and fodder materials. • Estimate stocking rate and carrying capacity using sample data. • Visit a ranch or grazing field to observe range management practices. • Conduct hay and silage preparation techniques. • Identify signs of overgrazing and range deterioration	Tractor, Sickle, crusher, tapes, hay bailers, Silage pits etc.

					in the field.	
General Objective 2.0: Know the ecological zones of Nigeria						
	2.1 Outline agro-ecological zones in Nigeria 2.2 Describe the Pasture crops distribution of the various agro-ecological zones. 2.3 Describe the relationship between ecological zones and livestock distribution in Nigeria.	• Outline agro-ecological zones in Nigeria • Describe the Pasture crops distribution of the various agro-ecological zones. • Describe the relationship between ecological zones and livestock distribution in Nigeria.	Maps, Diagrams, Marker Boards, pictures, textbooks etc.	• Identify the ecological zones of Nigeria and their locations. • Compare rainfall, vegetation and temperature patterns across ecological zones using charts and tables. • Collect samples or pictures of plants associated with different ecological zones. • Carry out a simple field observation of local vegetation and classify the area into an ecological zone. • Develop posters showing conservation measures for protecting ecological zones. • Compile a practical report on findings from map work, field observation or group activities.	Guide students to: • Identify the ecological zones of Nigeria and their locations. • Compare rainfall, vegetation and temperature patterns across ecological zones using charts and tables. • Collect samples or pictures of plants associated with different ecological zones. • Carry out a simple field observation of local vegetation and classify the area into an ecological zone. • Develop posters showing conservation measures for protecting ecological zones. • Compile a practical report on findings from map work, field observation or group activities.	Vehicle, aids, Drawing Materials, Maps, Pictures Etc.

General Objective 3.0: Know the botany and role of pasture plants.						
	3.1 Explain pasture plants by botanical names 3.2 Explain the role of pasture, range and forage crops in livestock production e.g. nutrition, bedding etc. 3.3 Explain the differences between pasture, range and forage crops 3.4 Explain the importance of legumes to animals, pasture and soils. 3.5 Classify pasture/forage crops according to: i. Longevity (Annual/Biennial/ Perenial) ii. Nutrient composition	• Explain pasture plants by botanical names • Discuss the role of pasture, range and forage crops in livestock production e.g. nutrition, bedding etc. • Explain the differences between pasture, range and forage crops • Explain the importance of legumes to animals, pasture and soils. • Explain the Classification of pasture/forage crops according to: i. Botanical characteristics ii. Longevity ii. Nutrient composition	Textbooks, Encyclopedia, E-books, Journals, Magazines, Charts, Marker, Multimedia Projector.	• Identify pasture grasses and legumes using live or preserved specimens. • Carry out Observation and description of the botanical features of pasture plants such as roots, stems, leaves, flowers, and seeds. • Collect pasture plant samples for herbarium purposes. • Visit a pasture farms, grazing fields, or rangelands for identification of pasture species. • Assess soil conditions suitable for pasture establishment.	• Guide students to: Identify pasture grasses and legumes using live or preserved specimens. • Carry out Observation and description of the botanical features of pasture plants such as roots, stems, leaves, flowers, and seeds. • Collect pasture plant samples for herbarium purposes. • Visit a pasture farms, grazing fields, or rangelands for identification of pasture species. • Assess soil conditions suitable for pasture establishment.	Use of charts, projector
General Objective: 4.0 Know the establishment of pasture, range and grazing reserve.						
	4.1 Describe suitable land for Pasture establishment 4.2 Explain the species for planting 4.3 Explain how seeds	• Explain suitable land for Pasture establishment • Discuss the species for planting • Discuss how seeds are	Textbooks, Encyclopedia, E-books, Journals, Magazines,	• Select land for pasture establishment. • Prepare land for the establishment of pasture.	Guide students to: • Select land for pasture establishment. • Prepare land for the	Hoes, diggers, ropes, wood cuttings etc. Fertilizers/Manure, containers etc.

	are planted and the cultural practices involved 4.4 Explain how pasture is harvested using appropriate implements 4.5 Describe basic infrastructures in grazing reserves (Watering Facilities, Pastoralist settlements, pasture plots, holding yards, human and animal Health Centre etc.)	planted and the cultural practices involved • Discuss how pasture is harvested using appropriate implements • Describe basic infrastructures in grazing reserves (Watering Facilities, Pastoralist settlements, pasture plots, holding yards, human and animal Health Centre etc.)	Video clips, Charts, Marker, Multimedia Projector.	• Carry out sow/plant seeds/cuttings by drilling, or broadcasting • Apply Fertilizer/manure to the sown pasture. • Carry out other necessary cultural practices on pasture plot, e.g. weeding and slashing. Harvest pasture using correct equipment.	establishment of pasture. • Carry out sow/plant seeds/cuttings by drilling, or broadcasting • Apply Fertilizer/manure to the sown pasture. • Carry out other necessary cultural practices on pasture plot, e.g. weeding and slashing. • Harvest pasture using correct equipment.	cutlass, sickle, forage harvester.
General Objective 5.0: know the production of pasture seeds						
	5.1 Define Pasture seed 5.2 Explain grass and legumes seeds 5.3 Highlight the processes involved of pasture seed production	• Explain Pasture seed • Discuss grass and legumes seeds • Explain the processes involved of pasture seed production	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector. Visual Aids et.	• Identify different pasture grass and legume seeds. • Carry out land clearing and seed bed preparation techniques. • Sow pasture seeds using appropriate spacing. • Apply organic and inorganic fertilizers on pasture plots. • Irrigate and maintain pasture seed crops. • Identify common pests	Guide students to: • Identify different pasture grass and legume seeds. • Carry out land clearing and seed bed preparation techniques. • Sow pasture seeds using appropriate spacing. • Apply organic and inorganic fertilizers on pasture plots. • Irrigate and maintain	Seeds, seed trays, planting implements

				and diseases affecting pasture crops. • Carry out pest and disease control measures. • Harvest mature pasture seeds. • Record pasture seed production activities and estimate yield.	pasture seed crops. • Identify common pests and diseases affecting pasture crops. • Carry out pest and disease control measures. • Harvest mature pasture seeds. • Record pasture seed production activities and estimate yield.	
General Objective 6.0: know how to establish Hydroponics						
	6.1 Explain the concept and principles of hydroponics. 6.2 Explain the different types of hydroponic systems used in pasture production. 6.3 Describe the materials required for establishing a hydroponic unit. 6.4 Explain the procedures for preparing nutrient solutions for hydroponic farming. 6.5 Explain the steps involved in setting up a simple hydroponic system.	• Discuss the concept and principles of hydroponics. • Discuss the different types of hydroponic systems used in crop production. • Describe the materials required for establishing a hydroponic unit. • Describe the procedures for preparing nutrient solutions for hydroponic farming. • Describe the steps involved in setting up a simple hydroponic system. • Discuss the	Textbooks, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector.Visual Aids etc.	• Identify hydroponic equipment and materials. • Construct a simple hydroponic system using locally available materials. • Prepare and mix hydroponic nutrient solutions. • Measure pH and nutrient concentration in water. • Monitor water circulation and aeration in the system. • Record plant growth performance in hydroponic systems.	• Guide students to: • Identify hydroponic equipment and materials. • Construct a simple hydroponic system using locally available materials. • Prepare and mix hydroponic nutrient solutions. • Measure pH and nutrient concentration in water. • Monitor water circulation and aeration in the system.	

	6.6 Explain the environmental conditions necessary for successful hydroponic production. 6.7 Explain routine maintenance practices in hydroponic systems.	environmental conditions necessary for successful hydroponic production. • Explain routine maintenance practices in hydroponic systems.		• Carry out maintenance and cleaning of hydroponic facilities and equipment.	• Record plant growth performance in hydroponic systems. • Carry out maintenance and cleaning of hydroponic facilities and equipment.	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% **Total: 100%**						

LIVESTOCK EQUIPMENT MAINTENANCE

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: LIVESTOCK EQUIPMENT MAINTENANCE	**COURSE CODE: AHP 115**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: NONE**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills for the safe operation, routine servicing and preventive maintenance of livestock equipment		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand workshop safety and the use of hand and power tools in livestock-equipment maintenance. 2.0 Know the principles of measurement, marking-out, materials and fasteners used in livestock-equipment fabrication and repair. 3.0 Know basic metalwork, woodwork and welding for the fabrication and repair of livestock equipment. 4.0 Comprehend feeding and watering equipment used in livestock and poultry production. 5.0 Appreciate animal handling and identification equipment under low-stress. 6.0 Know housing and environmental-control equipment. 7.0 Understand milking equipment and basic dairy-plant equipment, with biosecure cleaning. 8.0 Know hatchery, veterinary and reproductive equipment, with cold-chain integrity and biosecurity zoning. 9.0 Plan preventive maintenance, cost repairs, in a livestock-equipment maintenance enterprise.		

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: LIVESTOCK EQUIPMENT MAINTENANCE	**COURSE CODE: AHP 115**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: NONE**	**PRACTICAL: 2 HOURS/WEEK**
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills for the safe operation, routine servicing and preventive maintenance of livestock equipment		
GENERAL OBJECTIVE 1.0: Understand workshop safety and the use of hand and power tools in livestock-equipment maintenance.		

THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define workshop, workshop practice, livestock equipment, maintenance and repair. 1.2 Outline workshop safety rules and the use of personal protective equipment (PPE) overalls, safety boots, goggles, gloves, ear-defenders, dust masks. 1.3 Describe common hand tools.	• Explain workshop, workshop practice, livestock equipment, maintenance and repair. • State workshop safety rules and the use of personal protective equipment (PPE) overalls, safety boots, goggles, gloves, ear-defenders, dust masks. • Explain common hand tools — hammers (claw, ball-pein), spanners (open-ended, ring, socket), screwdrivers (flat, Phillips), pliers,	Whiteboard, markers, projector, charts. Lecture notes, Reference textbooks, internet.	• Demonstrate proper donning and doffing of PPE. • Demonstrate the safe use of common hand tools (hammers, spanners, screwdrivers, pliers, hacksaw, files). • Demonstrate the safe operation of an electric drill and a bench grinder. • Practice the workshop fire drill • Demonstrate the use of a fire extinguisher.	Guide students to: • Demonstrate proper PPE handling. • Use common hand tools safely. • Operate electric drill and bench grinder safely.	Workshop fitted with hand and power tools. PPE (overalls, boots, goggles, gloves, ear-defenders, dust masks). Electric drill, bench grinder. Fire extinguisher, fire-drill alarm, first-aid kit.

	1.4 Explain common power. 1.5 Describe workshop layout, ventilation, lighting, fire prevention and waste management. 1.6 Explain first aid in the workshop and emergency response.	files, hacksaw, chisels, punches. • Explain common power tools — electric drill, angle grinder, bench grinder, electric arc-welding machine, jigsaw. • Discuss workshop layout, ventilation, lighting, fire prevention and waste management. • Explain first aid in the workshop and emergency response (fire, electric shock, cuts).				
GENERAL OBJECTIVE 2.0: Know the principles of measurement, marking-out, materials and fasteners used in livestock-equipment fabrication and repair.						
2	2.1 Explain measuring and marking-out tools. 2.2 Explain measurements in metric and imperial units. 2.3 Describe materials used in livestock-equipment fabrication.	• Explain measuring and marking-out tools • Explain measurements in metric and imperial units. • Discuss materials used in livestock-equipment • Explain fasteners and their uses — nails, wood screws, machine screws, bolts and nuts, washers, rivets, hinges, latches, clamps.	Charts, projector, whiteboard, markers, Lecture notes, reference textbooks, internet.	• Measure a given object using a steel rule, measuring tape, vernier calliper and micrometer. • Mark out a piece of mild-steel plate to specified dimensions for cutting. • Identify samples of materials and	Guide students to; • Measure a given object using a steel rule, measuring tape, vernier calliper and micrometer. • Mark out a piece of mild-steel plate to specified dimensions for cutting. • Identify samples of materials and fasteners. • Convert measurements	Steel rule, measuring tape, vernier calliper, micrometer. Scriber, try-square, divider, spirit level. Sample materials (mild steel, GI pipe, PVC, plywood, mesh wire). Sample fasteners

	2.4 Explain fasteners and their uses. 2.5 Outline the properties of each material relevant to livestock-equipment use 2.6 Outline the principles of selecting materials for poultry, ruminant and dairy applications.	• Outline the properties of each material relevant to livestock-equipment use (corrosion resistance, hygiene, cost, durability). • State the principles of selecting materials for poultry, ruminant and dairy applications.		fasteners. • Convert measurements between metric and imperial units.	between metric and imperial units.	(nails, screws, bolts, rivets). Calculator, recording sheets, PPE.
GENERAL OBJECTIVE 3.0: Know basic metalwork, woodwork and welding for the fabrication and repair of livestock equipment.						
3-4	3.1 Describe metalwork operations 3.2 Describe woodwork operations 3.3 Explain welding 3.4 Describe the principles of arc welding and gas welding. 3.4 List welding equipment. 3.5 Describe types of welded joints.	• Explain metalwork operations — marking, cutting (hacksaw, snips), filing, drilling, bending, threading. • Explain woodwork operations — marking, cutting (saw), planing, sanding, joining (nails, screws, glue). • Explain welding and describe the principles of arc welding and gas welding. • Enumerate welding equipment — electrodes, electrode	Charts of welding equipment and joint types, Projector, whiteboard, samples of welded joints, Reference textbooks, internet.	• Carry out Cut, file, drill and bend a piece of mild-steel rod or plate to a given specification. • Carry out cut and join of wooden boards to make a simple feeder/drinker frame. • Set up an electric arc-welding machine; produce a butt joint and a fillet joint. • Demonstrate	Guide students to: • Carry out Cut, file, drill and bend mild steel. • Demonstrate cut and join of wooden boards. • Set up an arc-welding machine. • Demonstrate soldering and riveting. • Fabricate a simple piece of livestock equipment.	Mild-steel rod/plate, hacksaw, files, electric drill, bending jig. Wooden boards, hand saw, plane, sandpaper. Arc-welding machine, electrodes, welding shield, leather apron and gloves. Soldering iron, solder, flux, pop-rivet gun and

	3.6 Outline soldering, brazing and riveting as alternatives to welding. 3.7 Outline welding safety and common welding defects (porosity, undercutting, cracks).	holder, earth clamp, welding shield, welding cables, welding machine. • Describe types of welded joints — butt, lap, fillet, T-joint. • Outline soldering, brazing and riveting as alternatives to welding. • Discuss welding safety and common welding defects (porosity, undercutting, cracks).		soldering of electrical wires and connections. • Demonstrate riveting using a pop-rivet gun. • Fabricate a simple piece of livestock equipment under supervision (e.g., a poultry feeder, a calf creep-feeder gate or a small feed trough).		rivets. Materials for fabrication project, PPE.
GENERAL OBJECTIVE 4.0: Comprehend feeding and watering equipment used in livestock and poultry production.						
5-6	4.1 Describe feeding equipment for poultry. 4.2 Describe feeding equipment for ruminants and pigs 4.3 Explain watering equipment 4.4 Describe feed-processing equipment 4.5 Outline operating principles, common faults and routine	• Explain feeding equipment for poultry — tube feeders, pan feeders, chain feeders, tray feeders, automatic feeders. • Discuss feeding equipment for ruminants and pigs — feed troughs, hay racks, calf feeders, sow feeders, automatic feeders. • Explain watering equipment — bell drinkers, nipple	Charts, Projector, whiteboard, equipment samples, Reference textbooks, internet.	• Dismantle feeders and drinkers. • Clean feeders and drinkers. • Reassemble feeders and drinkers. • Service a hammer mill; replace worn hammers and screen. • Service feed mixer (lubrication, belt tension, blade inspection). • Calibrate a weighing scale	Guide student to; • Dismantle feeders and drinkers. • Clean feeders and drinkers. • Reassemble feeders and drinkers. • Service a hammer mill; replace worn hammers and screen. • Service feed mixer (lubrication, belt tension, blade inspection). • Calibrate a weighing scale	Tube feeders, bell drinkers, nipple drinkers. Hammer mill, feed mixer, weighing scale. Tools (spanners, screwdrivers, hammers, pliers). Replacement parts (hammers, screens, belts, nipples, washers). PPE.

	maintenance for the above. 4.6 Describe smart feeding and watering systems.	drinkers, cup drinkers, automatic float waterers, water tanks. • Discuss feed-processing equipment — hammer mill, pelletiser, feed mixer, weighing scale. • Outline operating principles, common faults and routine maintenance for the above. • Discuss smart feeding and watering systems (automatic feeders, sensors, IoT-based water-flow monitoring).		• Verify its accuracy with known masses. • Repair common faults in nipple drinkers (leaking, blocked).	• Verify its accuracy with known masses. • Repair common faults in nipple drinkers (leaking, blocked).	
GENERAL OBJECTIVE 5.0: Appreciate animal handling and identification equipment under low-stress						
7-8	5.1 Explain animal handling equipment. 5.2 Discuss animal identification equipment 5.3 Explain hoof-care and dehorning equipment. 5.4 Outline operation, common faults and maintenance of the above	• Explain animal handling equipment. • Discuss animal identification equipment. • Explain hoof-care and dehorning equipment. • Outline operation and maintenance. • Discuss low-stress, welfare-friendly handling principles.	Charts, Projector, whiteboard, equipment samples, Reference textbooks, WOAH/Grand in handling guides, internet.	• Inspect and lubricate the moving parts of a cattle crush and head-gate. • Sharpen and repair hoof knives and shears. • Demonstrate the correct use of an ear-tag applicator and a tattoo set; • Tag/tattoo a goat or calf.	Guide students to; • Inspect and lubricate the moving parts of a cattle crush and head-gate. • Sharpen and repair hoof knives and shears. • Demonstrate the correct use of an ear-tag applicator and a tattoo set; • Tag/tattoo a goat or calf.	Cattle crush, head-gate, halters, ropes, prods. Ear-tag applicator with tags, tattoo set, RFID tags. Hoof knives, shears, trimmers, dehorners, disbudding iron. Sharpening stone, lubricating oil, disinfectant. Live animals

	equipment. 5.5 Explain low-stress animal-handling principles) and welfare-friendly equipment design.			• Disinfect a disbudding iron and dehorner; • Carryout disbudding on a calf model or live calf (where ethics permits). • Inspect ropes, halters and prods; replace worn parts.	• Disinfect a disbudding iron and dehorner; • Carryout disbudding on a calf model or live calf (where ethics permits). • Inspect ropes, halters and prods; replace worn parts.	(goat/calf) or models, PPE.
GENERAL OBJECTIVE 6.0: Know housing and environmental-control equipment.						
9-10	6.1 Explain ventilation equipment. 6.2 Describe temperature-control equipment. 6.3 Explain lighting equipment for poultry. 6.4 Explain water supply and pumping equipment. 6.5 Explain electrical equipment. 6.6 Outline the operation, common faults and maintenance	• Explain ventilation equipment. • Discuss temperature-control equipment. • Identify lighting equipment. • Explain water supply and pumping equipment. • Discuss electrical equipment. • Outline operation, faults and maintenance. • Discuss energy-efficient/climate-smart options.	Charts of equipment, projector, whiteboard. Equipment samples, manufacturers ' manuals, reference textbooks, internet.	• Service a tunnel/exhaust fan • Replace a faulty brooder lamp, • Install thermostat. • Replace incandescent bulbs with LED equivalents and install a timer. • Service a surface or submersible pump. • Service a small petrol/diesel generator. • Inspect a solar panel, inverter and battery. • Use a multimeter to test continuity,	Guide students to: • Service a fan and replace bearings/belt. • Replace brooder lamp • Install thermostat. • Replace bulbs with LEDs and install timer. • Service a water pump. • Service a generator. • Inspect a solar panel, inverter and battery. • Use a multimeter to test a circuit.	Fans, brooder lamps, thermostats, light bulbs, timers. Surface and submersible pumps, plumbing fittings. Petrol/diesel generator, oil, air filter, spark plug. Solar panel, inverter, battery, multimeter. Tools (spanners, screwdrivers, pliers, electrical tape). PPE.

	of all the above. 6.7 Describe energy-efficient and climate-smart housing equipment			voltage and current in a simple lighting circuit.		
GENERAL OBJECTIVE 7.0: Understand milking equipment and basic dairy-plant equipment, with biosecurity cleaning.						
11-12	7.1 Explain components of a milking machine. 7.2 Describe the operating principle of a milking machine. 7.3 Describe other dairy equipment. 7.4 Outline cleaning and sanitation procedures. 7.5 Enumerate common faults and their effect on milk quality and udder health. 7.6 Outline routine maintenance schedules.	• Explain milking-machine components. • Describe the operating principle. • Discuss other dairy equipment. • Outline cleaning and sanitation procedures. • Discuss common faults and their effects on milk quality and udder health. • Outline routine maintenance schedules.	Charts of milking machine, projector, whiteboard, manufacturers' manuals, Reference textbooks, internet.	• Dismantle/reassemble a teat-cup cluster; replace worn liners. • Test and adjust the vacuum level using a vacuum gauge. • Clean /sanitise a milking machine using a CIP cycle. • Service a milk cooler/bulk tank. • Inspect a cream separator. • Identify a faulty pulsator • Replace a faulty pulsator .	• Guide students to: • Dismantle/reassemble cluster and replace liners. • Test vacuum level. • Run a CIP cleaning cycle. • Service a milk cooler and check thermostat. • Inspect a cream separator. • Identify a faulty pulsator • Replace a faulty pulsator.	Milking-machine cluster, vacuum gauge, replacement liners. Milk cooler/bulk tank, milk cans, strainers. Cream separator, CIP detergents (alkali, acid), sanitiser, brushes. PPE, food-grade gloves.
GENERAL OBJECTIVE 8.0: Know hatchery, veterinary and reproductive equipment, with cold-chain integrity and biosecurity zoning.						
13	8.1 Explain hatchery equipment 8.2 Outline hatchery	• Discuss hatchery equipment. • Discuss hatchery	Charts and photographs of equipment,	• Service an incubator/hatcher • Calibrate	Guide students to; • Service an incubator/hatcher	Setter/hatcher incubator, candler, eggs.

	biosecurity zones 8.4 Explain reproductive equipment 8.5 Explain hygiene and disinfection equipment. 8.6 Outline operation, common faults and maintenance schedules for the above, with emphasis on cold-chain integrity for vaccine fridge and semen flask.	biosecurity zoning. • Explain reproductive equipment. • Explain hygiene and disinfection equipment. • Outline operation and maintenance with cold-chain emphasis.	Projector, whiteboard, equipment samples, Manufacturers' manuals, reference textbooks, internet.	temperature and humidity; • Clean and lubricate egg-turner; check motor and fan. • Operate a candler to inspect fertile and infertile eggs at days 7, 14 and 18. • Set up a hatchery footbath and disinfection fogger. • Service a vaccine fridge. • Service a knapsack sprayer. • Service an autoclave and hot-air oven. • Refill a liquid-N_2 dewar under supervision. • Service a microscope (clean lenses, align, store).	• Calibrate temperature and humidity; • Clean and lubricate egg-turner; check motor and fan. • Operate a candler to inspect fertile and infertile eggs at days 7, 14 and 18. • Set up a hatchery footbath and disinfection fogger. • Service a vaccine fridge. • Service a knapsack sprayer. • Service an autoclave and hot-air oven. • Refill a liquid-N_2 dewar under supervision. • Service a microscope (clean lenses, align, store).	Vaccine fridge, thermometer log sheets, Knapsack sprayer, replacement seals/nozzles. Autoclave, hot-air oven, replacement gaskets. Liquid-N_2 dewar, semen straws (dummy or real). Microscope, lens-cleaning solution. Disinfectants, footbath, fogger. PPE, cryogenic gloves.
GENERAL OBJECTIVE 9.0 Plan preventive maintenance, cost repairs, in a livestock-equipment maintenance enterprise.						
14-15	9.1 Define preventive, corrective and breakdown maintenance. 9.2 Outline a	• Explain types of maintenance (preventive, corrective and breakdown maintenance). • Outline a preventive-	Charts, projector, whiteboard, Sample maintenance schedules and	• Develop a preventive-maintenance schedule for the institutional poultry house, dairy unit	• Guide students to: • Develop a preventive-maintenance schedule. • Maintain equipment registers and service logs.	Maintenance schedule and form templates. Excel/CMMS app on mobile devices/laptops.

	preventive-maintenance for a livestock farm. 9.3 Describe maintenance records. 9.4 Outline costing and budgeting for equipment maintenance. 9.5 Describe digital tools for maintenance and management. 9.6 Describe entrepreneurship in livestock-equipment 9.7 Outline the safe disposal of obsolete equipment, used motor oil, dead batteries and electronic waste.	maintenance schedule for a livestock farm. • Explain maintenance records. • Outline costing and budgeting for equipment maintenance. • Discuss digital tools maintenance and Management. • Discuss entrepreneurship in livestock-equipment maintenance. • Outline safe disposal of waste.	forms,Reference textbooks, internet.	and feed mill. • Maintain an equipment register, service log and fault report (paper or Excel template). • Cost the routine maintenance of three pieces of equipment. • Use a mobile maintenance app (or Google Sheets) to log a real or simulated breakdown and its repair. • Develop a one-page business plan for a livestock-equipment maintenance and fabrication enterprise. • Demonstrate safe disposal of used motor oil, dead batteries and worn-out electrical components.	• Cost routine maintenance for selected equipment. • Use a mobile maintenance app or spreadsheet. • Develop a one-page business plan. • Demonstrate safe waste disposal.	Calculators, computer, projector. Used-oil collection bin, battery-disposal box, e-waste bin. PPE.

COURSE ASSESSMENT:
Course work: 10%
Test/Assignments: 10%

Practical:	40%
Examination:	40%
Total:	**100%**

INTRODUCTION TO ANIMAL HUSBANDRY

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO ANIMAL HUSBANDRY	**COURSE CODE: AHP 116**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to enable students acquire the basic knowledge and skills of animal husbandry practices in the farm		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the concept of Animal Husbandry 2.0 Know the different species of animals 3.0 Know routine management operations on the farm 4.0 Know how to handle and restrain animals 5.0 Know how to care and manage sick animals 6.0 Understand basic health management of animals 7.0 Understand the various methods of drug administration 8.0 Know basic veterinary/ surgical procedures 9.0 Know how to brood and rear chicks 10.0 Understand farm management systems and how to keep farm records.		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO ANIMAL HUSBANDRY	COURSE CODE: AHP 116	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: 1 SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to enable students acquire the basic knowledge and skills of animal husbandry practices in the farm		
GENERAL OBJECTIVE 1.0: Understand the concept of Animal Husbandry		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define Animal Husbandry 1.2 List the types of Animal Husbandry 1.3 Describe a Dairy Farm 1.4 Describe a Poultry Farm 1.5 Explain Bee Keeping 1.6 Describe a Fish Farm	• Explain Animal Husbandry • Describe the types of Animal Husbandry • Describe a Dairy Farm • Describe a Poultry Farm • Explain Bee Keeping • Explain a Fish Farm	White Board, Lecture Notes, Marker, Charts	• Identify the different types of Animal Husbandry - Dairy farm, poultry farm - Honey bee colonies - Aquaculture farm	Guide students to; • Identify the different types of Animal Husbandry - Dairy farm, poultry farm - Honey bee colonies - Aquaculture farm	Dairy Animals Chickens Fish ponds Honey bee colonies
General Objective 2.0: Know the different species of Animals.						
2	2.1 Explain various livestock species 2.2 Outline the importance of various animal species 2.3 Explain the terms	• Explain various livestock species • Discuss the importance of various animal species • Explain the terms used to describe different animals • Expatiate the common	White Board, Lecture Notes, Marker, Charts, Maps	• Identify different species of animals • Draw common breeds of livestock	• Guide students to; Identifying species of Livestock • Draw common breeds of livestock	Ruminants and non-ruminants

	used to describe different animals 2.4 Describe the common breeds of livestock and their distribution in Nigeria	breeds of livestock and their distribution in Nigeria				
General Objective 3.0: Know the routine management operations on the farm						
3	3.1 Define routine farm operations 3.2 Describe daily routine farm operations on a i. Poultry farm ii. Rabbitry iii. Cattle farm iv. Piggery 3.3 Describe periodic routine management operations such as identification of farm animals, despurring, mixing, weighing of farm animals, debeaking, castration, dehorning etc. 3.4 Describe equipment used in livestock feeding and watering	• Explain routine farm operations • Explain daily routine farm operations on a - Poultry farm - Rabbitry - Cattle farm - Piggery • Explain periodic routine management operations such as identification of farm animals, despurring, mixing, weighing of farm animals, debeaking, castration, dehorning etc. • Discuss equipment used in livestock feeding and watering • Discuss milking process • Outline the signs of heat in various class of livestock. • Explain estrus, oestrus cycle, pregnancy, Gestation period, parturition for different species animals	White Board, Lecture Notes, Marker, Charts, Maps	• Carry out routine farm operations • Process feed • Determine the age of farm animals • Identify equipment used in livestock feeding and watering • Conduct Hand and machine milking • Determine pregnancy in Farm Animals	Guide the students to; • Carry out routine farm operations • Process feed • Determine the age of farm animals • Identify equipment used in livestock feeding and watering • Conduct Hand and machine milking • Determine pregnancy in Farm Animals	Livestock farm, Feedmill, Feeding trough, watering Trough Weighing Scales, Birds, Rabbit, Goat/Pig, Cattle/Horses, Strip cup, Bucket, Towels, Milking machine, Oestrus cycle chart

	3.5 Describe milking process 3.6 List the signs of heat in various class of livestock. 3.7 Define estrus, oestrus cycle, pregnancy, Gestation period, parturition for different species animals					
General Objective 4.0: Know how to handle and restrain farm animals						
4-5	4.1 Outline the general precautions in approaching and holding animals 4.2 Describe how cattle, sheep, goats and pigs can be handled for examination 4.3 Describe the use of common appliances in controlling animals, such as Anti-kicker, Bull nose rings, mouth gag, Halters,	• Explain the general precautions in approaching and holding animals • Discuss how cattle, sheep, goats and pigs can be handled for examination • Discuss the use of common appliances in controlling animals, such as Anti-kicker, Bull nose rings, mouth gag, Halters, Muzzlers, Pig catcher, Pig holder etc. • Discuss the use of the appliances in 4.3 above • Discuss the use of other equipment and structures in restraint of animals, • Explain the restraint of cattle head by various methods • Explain leg restraint in cattle	White Board, Lecture Notes, Marker, Charts, Maps	• identify general precautions in restraint animals • Carryout the handling of animals for examination • Apply common appliances in controlling animals • Apply the use of other equipment and structures in restraint of animals • Carry out various restraining methods of cattle • Carry out restraining of leg and head in cattle and horse • Carry out casting of	Guide students to; • Identify general precautions in restraint animals • Carryout the handling of animals for examination • Apply common appliances in controlling animals • Apply the use of other equipment and structures in restraint of animals • Carry out various restraining methods of cattle	Ropes Bull nose ring Mouth gag, Muzzlers, Pig catcher, Pig holder, Halters, Crush Crates, Ropes, Bull, nose ring, Mouth gag, Pig catcher, Pig holder, Halters, Animals, Dog catcher, Speculum

	Muzzlers, Pig catcher, Pig holder etc. 4.4 Describe the use of the appliances in 4.3 above 4.5 List the use of other equipment and structures in restraint of animals, 4.6 Describe the restraint of cattle head by various methods 4.7 Describe leg restraint in cattle 4.8 Describe head restraint in the horse 4.9 Describe leg restraint in the horse 4.10 Explain the preparations necessary for casting of cattle and horses 4.11 Describe casting of cattle	• Discuss head restraint in the horse • Discuss leg restraint in the horse • Explain the preparations necessary for casting of cattle and horses • Explain casting of cattle by various methods • Explain casting of the horse • Explain turning up sheep/goats • Explain casting of pigs		cattle, pigs and horse • Carry out turning up of sheep/goats • Carry out restraint of dogs • Carry out chemical restraint in animals	• Carry out restraining of leg and head in cattle and horse • Carry out casting of cattle, pigs and horse • Carry out turning up of sheep/goats • Carry out restraint of dogs • Carry out chemical restraint in animals	Table Narcotic, drugs, Anesthetic chemicals.

	by various methods e.g. Reuff's and alternative methods 4.12 Describe casting of the horse 4.13 Describe turning up sheep/goats 4.14 Describe casting of pigs					
General Objective 5.0: Know how to care and manage sick animal						
6-7	5.1 Explain the importance of close observation and early detection of ill health in animals 5.2 Explain the measures to be adopted in cases of disease outbreak in a flock/herd 5.3 Describe how to handle and care for sick animals 5.4 Describe the handling of dead animals	• Discuss the importance of close observation and early detection of ill health in animals • Discuss the measures to be adopted in cases of disease outbreak in a flock/herd • Explain how to handle and care for sick animals • Explain the handling of dead animals	White Board, Lecture Notes, Marker, Charts, Maps	• Identify sick animals • Handle sick animals	Guide students to ; • Diagnose sick animals • Identify sick animals • Handle sick animals	Farm Animals
General Objective 6.0: Understand basic health management of animals						

8-9	6.1 Describe disease control measures on the farm such as sanitation and hygiene, disinfection and vaccination 6.2 Define vaccines 6.3 List vaccine regime in some species; poultry 6.4 List the vaccines produced by NVRI Vom for the control of animal diseases in Nigeria	• Discuss disease control measures on the farm such as sanitation and hygiene, disinfection and vaccination • Explain vaccines • Enumerate vaccine regime in some species; poultry • Enumerate the vaccines produced by NVRI Vom for the control of animal diseases in Nigeria	White Board, Lecture Notes, Marker, Charts, Maps	• Design a vaccination programme for poultry • Demonstrate the use of the common vaccines such as Newcatle disease vaccine, Gumboro, Fowlpox • Design a typical vaccination programme for a poultry flock	• Guide students to ; • Design a vaccine schedule for poultry • Demonstrate the use of the common vaccines such as Newcatle disease vaccine, Gumboro, Fowlpox • Design a typical vaccination programme for a poultry flock	Different types of vaccines, needles syringes, cold chain facilities
General Objective 7.0: Understand the various methods of drug administration						
10-11	7.1 Explain IV, IM, sub cut, intraperitoneal drug administration 7.2 Explain the use of equipment such as Balling gun, Drenching gun, Stomach tube, Forceps for oral administration of drugs. 7.3 List the advantages and disadvantages of	• Discuss IV, IM, sub cut, intraperitoneal drug administration • Discuss the use of equipment such as Balling gun, Drenching gun, Stomach tube, Forceps for oral administration of drugs. • Explain the advantages and disadvantages of both the oral and parenteral routes of drug administration • Explain the term demorming in Animal Husbandry practices	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector.	• Carry out deworming in farm animals • Identify the different sizes of needles and their usage • Administer drugs to farm animals	• Guide students to: • Carry out deworming in farm animals • Identify the different sizes of needles and their usage • Administer drugs to farm animals	Drenching gun Balling gun Needles (various sizes) Dehorning cable

	both the oral and parenteral routes of drug administration 7.4 Explain the term demorming in Animal Husbandry practices					
General Objective 8.0: Know how to brood and rear chicks						
12-13	8.1 Outline the preparations to receive day old chicks 8.2 Define brooding 8.3 List the equipment used in brooding 8.4 Explain the factors affecting brooding and rearing of chicks	• Explain the preparations to receive day old chicks • Explain brooding • Explain the equipments used in brooding • Discuss the factors affecting brooding and rearing of chicks	Textbooks, Encyclopedia, E-books, Journals, Magazines, Charts, Marker, Multimedia Projector.	• Set up of a brooder house • Carry out brooding	Guide students to: • Set up of a brooder house • Carry out brooding	Hover, Thermometer, Brooder Guard, Candler, Heat source
General Objective 9.0: Understand farm management systems and how to keep farm records						
14-15	9.1 Explain the systems of animal management. 9.2 Explain the management system of ruminant and non-ruminant animal. 9.3 Define farm	• Explain the systems of animal management. • Explain the application of management system to ruminant and non-ruminant animal • Explain farm records • Enumerate types of farm records	Textbooks, E-books, Journals, Magazines, Charts, Marker, Multimedia Projector, Farm records			

	records 9.4 List types of farm records					

COURSE ASSESSMENT:
Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%
Total: 100%

YEAR I SEMESTER II

ANIMAL PARASITOLOGY

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL PARASITOLOGY	**COURSE CODE: AHP 121**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NONE**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with the knowledge and skills to identify, diagnose, prevent and control parasitic infections of livestock and poultry.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the basic concepts and principles of animal parasitology. 2.0 Know the morphology, life cycle, pathology and control of trematodes (flukes) 3.0 Know the morphology, life cycle, pathology and control of cestodes (tapeworms) 4.0 Know the morphology, life cycle, pathology and control of nematodes (roundworms) 5.0 Understand the classification, life cycle, pathology and control of protozoan parasites of farm animals. 6.0 Know the economic importance and control of insect parasites (lice, fleas, flies) of livestock and poultry. 7.0 Know the economic importance and control of ticks and mites of livestock and poultry. 8.0 Know diagnostic techniques for parasitic infections. 9.0 Understand integrated parasite management, anthelmintic resistance, climate-smart parasite control and zoonotic parasites.		

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL PARASITOLOGY	COURSE CODE: AHP 121	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE: NONE	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the knowledge and skills to identify, diagnose, prevent and control parasitic infections of livestock and poultry.		
GENERAL OBJECTIVE 1.0: Understand the basic concepts and principles of animal parasitology.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define parasitology and related terms (parasite, host, parasitism, vector, pathogen). 1.2 Explain the Classification of parasites into ectoparasites, endoparasites, obligate, facultative, periodic and permanent parasites. 1.3 Explain the major groups of parasites of veterinary importance	• Explain parasitology and related terms (parasite, host, parasitism, vector, pathogen). • Describe the Classification of parasites into ectoparasites, endoparasites, obligate, facultative, periodic and permanent parasites. • Discuss the major groups of parasites of veterinary importance (helminths, protozoa,	Charts. Projector, whiteboard, markers. textbooks, internet etc.	• Identify compound microscope, McMaster slide, sieves, centrifuge, refractometer. • Examine preserved specimens of major parasite groups (flukes, tapeworms, roundworms, ticks). • Operate a compound light microscope • Demonstrate Köhler illumination.	Guide students to: • Identify equipment. • Examine preserved specimens of major parasite groups. • Operate a compound light microscope.	Compound microscopes, slides, McMaster slides. Preserved parasite specimens (museum jars). PPE Sieves, centrifuge, refractometer.

	(helminths, protozoa, arthropods). 1.4 Explain the types of hosts and their roles in parasite life cycles. 1.5 Outline the economic and public-health importance of parasitic diseases of livestock and poultry in Nigeria.	arthropods). • Describe the types of hosts and their roles in parasite life cycles. • Discuss the economic and public-health importance of parasitic diseases of livestock and poultry in Nigeria.				
GENERAL OBJECTIVE 2.0: Know the morphology, life cycle, pathology and control of trematodes (flukes)						
2-3	2.1 Explain the general morphology of trematodes. 2.2 Describe the life cycle of Fasciola gigantica and F. hepatica, highlighting the role of the snail {Lymnaea spp.] as an intermediate host. 2.3 Describe other trematodes of veterinary importance (Paramphistomum, Schistosoma, Dicrocoelium,	• Discuss the morphology of trematodes. • Explain the life cycle of Fasciola spp. with the role of snails. • Describe other trematodes of veterinary importance. • Explain pathology and clinical signs of trematode infections. • Discuss prevention and control of trematode infections.	Charts. Projector, whiteboard, markers. textbooks, internet.	• Examine preserved adult flukes (Fasciola, Paramphistomum, Schistosoma). • Identify diagnostic features. • Identify trematode eggs in faecal samples using sedimentation technique. • Inspect of fluke-affected livers. • Identify livers condemned due to fluke infestation. • Collect snail (Lymnaea, Bulinus) as an intermediate host from local water bodies.	Guide students to: • Examine preserved adult flukes and identify features. • Perform sedimentation on faecal samples and identify trematode eggs. • Carry out inspection on fluke-infected livers. • Visit abattoir to identify condemned livers. • Collect and identify snail	Preserved flukes, microscopes, slides. Faecal samples, beakers, sieves, formalin. Dissecting kits, Hand lens, infected livers (from abattoir). Snail collection nets, sample bottles.

	Fascioloides). 2.4 Explain the pathology, clinical signs and post-mortem lesions of fasciolosis and other trematode infections. 2.5 Describe the principles of prevention and control (snail control, strategic anthelmintic dosing, drainage and pasture management).				intermediate hosts.	PPE.
GENERAL OBJECTIVE 3.0: Know the morphology, life cycle, pathology and control of cestodes (tapeworms)						
4-5	3.1 Explain the general morphology of cestodes (scolex, neck, immature/mature/gravid proglottids, strobila). 3.2 Explain the life cycle and pathology of Moniezia expansa in ruminants. 3.3 Explain Taenia spp. (T. saginata, T. solium, T. ovis, T. hydatigena) and their cysticerci in farm	• Discuss the general morphology of cestodes (scolex, neck, immature/mature/gravid proglottids, strobila). • Describe the life cycle and pathology of Moniezia expansa in ruminants. • Describe Taenia spp. (T. saginata, T. solium, T. ovis, T. hydatigena) and their cysticerci in farm animals. • Describe Echinococcus granulosus and the	Charts. Projector, whiteboard, markers, textbooks, internet Etc.	• Examine adult tapeworms; identify the scolex, neck and proglottids under microscope. • Differentiate gravid from immature proglottids by uterine branching. • Identify cestode eggs in faecal samples. • Inspect carcasses at the abattoir for cysticerci (measly meat) and hydatid cysts. • Conduct post-mortem of	Guide students to: • Examine adult tapeworms and identify their parts. • Differentiate proglottids by uterine branching. • Identify cestode eggs in faecal samples. • Inspect meat for cysticerci and hydatid cysts at the abattoir. • Conduct post-mortem on poultry	Preserved cestodes, microscopes, slides. Faecal samples, sieves, formalin, India ink. Carcasses (abattoir), inspection knives, gloves. Post-mortem kits, fresh

	animals. 3.4 Describe Echinococcus granulosus and the epidemiology of hydatidosis. 3.5 Describe Dipylidium caninum, Raillietina spp. (poultry) and Anoplocephala perfoliata (equine). 3.6 Discuss public-health implications of zoonotic cestodes and outline One-Health control measures.	epidemiology of hydatidosis. • Describe Dipylidium caninum, Raillietina spp. (poultry) and Anoplocephala perfoliata (equine). • Discuss public-health implications of zoonotic cestodes and outline One-Health control measures.		poultry intestines to identify Raillietina spp.	to identify Raillietina.	poultry intestines. Transport for abattoir visit, PPE.
GENERAL OBJECTIVE 4.0: Know the morphology, life cycle, pathology and control of nematodes (roundworms)						
6-7	4.1 Describe the general morphology of nematodes (cuticle, alimentary canal, reproductive organs, sexual dimorphism). 4.2 Describe the life cycle and pathology of major gastro-intestinal nematodes of ruminants (Haemonchus contortus, Trichostrongylus,	• Discuss the morphology of nematodes. • Explain the life cycle of major GIT nematodes. • Describe nematodes of pigs and poultry. • Discuss lungworms. • Discuss tissue and skin nematodes. • Explain pathology and clinical signs. • Discuss strategic	Charts. Projector, whiteboard, markers. textbooks, internet.	• Examine preserved adult nematodes (Haemonchus, Ascaris, Dictyocaulus) and identify diagnostic features. • Perform faecal flotation and identify nematode eggs. • Conduct McMaster faecal egg counts (FEC). • Set up coproculture and identify L3 larvae	Guide students to: • Examine preserved nematodes and identify them. • Perform faecal flotation and identify eggs. • Conduct McMaster faecal egg count. • Set up larval cultures and identify L3	Preserved nematodes, microscopes, Hand lens,slides. Faecal samples, McMaster slides, saturated NaCl flotation solution. Petri dishes,

	Ostertagia, Cooperia, Oesophagostomum, Bunostomum). 4.3 Describe Ascaris suum (pig), Ascaridia galli and Heterakis gallinarum (poultry), Toxocara, Strongyloides and Trichuris. 4.4 Describe lungworms (Dictyocaulus filaria, D. viviparus, Metastrongylus apri). 4.5 Describe tissue and skin nematodes (Onchocerca, Stephanofilaria, Setaria, Habronema). 4.6 Explain the pathology and clinical signs of major nematode infections, including parasitic gastro-enteritis (PGE) and haemonchosis. 4.7 Outline strategic control of nematodes (anthelmintics, pasture management, targeted-selective treatment).	control of nematode infections.		of trichostrongyles. • Conduct post-mortem of GIT to recover • Identify nematodes. • Identify lungworms by trans-tracheal wash or post-mortem of trachea/lungs.	larvae. • Carry out GIT post-mortem and recover nematodes. • Identify lungworms in tracheal/lung samples.	distilled water (for larval cultures). Post-mortem kits, ruminant GIT samples, from abbatoir Trachea/lung samples, PPE, gloves, lab coats.

GENERAL OBJECTIVE 5.0: Understand the classification, life cycle, pathology and control of protozoan parasites of farm animals.						
8	5.1 Explain the general features of protozoa and their classification (Mastigophora, Sarcodina, Apicomplexa, Ciliophora). 5.2 Explain blood and tissue protozoa: Trypanosoma (T. vivax, T. congolense, T. brucei), Babesia and Theileria, including Anaplasma (rickettsia, treated with blood parasites). 5.3 Explain enteric protozoa: Eimeria spp. (coccidiosis), Cryptosporidium parvum, Giardia, Histomonas meleagridis (blackhead in turkeys), Balantidium. 5.4 Describe Toxoplasma gondii and its life cycle in	• Discuss general features of protozoa and classification. • Explain blood and tissue protozoa. • Discuss enteric protozoa. • Explain Toxoplasma gondii and its hosts. • Discuss pathology and control of protozoan diseases.	Charts. Projector, whiteboard, markers. textbooks, internet.	• Prepare blood smears • Examine blood smears. • Stain blood smears with Giemsa stain • Identify Trypanosoma, Babesia and Theileria under the microscope. • Perform faecal flotation for coccidial oocysts and modified Ziehl–Neelsen staining for Cryptosporidium. • Identify species by morphology Sporulate Eimeria oocysts in 2.5% potassium dichromate.	Guide students to: • Prepare blood smears (thin and thick). • Stain blood smears with Giemsa. • Identify blood protozoa under the microscope. • Perform flotation for coccidial oocysts and identify them. • Sporulate oocysts and identify Eimeria species.	Microscopes, slides, cover-slips, immersion oil. Giemsa stain, methanol, phosphate buffer. Modified Ziehl–Neelsen reagents. Faecal samples, flotation solution. 2.5% potassium dichromate, Petri dishes, PPE.

	cats, livestock and humans. 5.5 Explain the pathology, clinical signs and prevention/control of major protozoan diseases (trypanosomosis, babesiosis, coccidiosis, toxoplasmosis).					
GENERAL OBJECTIVE 6.0: Know the biology, economic importance and control of insect parasites (lice, fleas, flies) of livestock and poultry.						
9	6.1 Explain the general morphology and biology of insects of veterinary importance. 6.2 Explain lice — chewing (Mallophaga) and sucking (Anoplura) — of livestock and poultry. 6.3 Explain fleas (Ctenocephalides, Echidnophaga, Pulex) and their roles as vectors. 6.4 Explain biting flies: tsetse (Glossina),	• Discuss morphology and biology of insect parasites. • Explain lice of livestock and poultry. • Discuss fleas and their roles as vectors. • Discuss biting flies. • Explain non-biting flies and myiasis. • Discuss economic importance and control of insect parasites.	Charts. Projector, whiteboard, markers. textbooks, internet etc.	• Identify common insect parasites of livestock under hand-lens and microscope. • Carry out collection, mounting and preserving insect specimens. • Examine live animals at the institutional farm to identify lice, flies and myiasis lesions. • Spray insecticide animals.	• Guide students to: • Identify common insect parasites. • Carry out collection, mounting and preserving insect specimens. • Inspect live animals for ectoparasites. • Demonstrate insecticide application and trap deployment.	Hand lenses, stereo microscopes, mounting needles. Insect collection kits (forceps, vials, ethanol). Live animals (cattle, sheep, dogs, poultry). Insecticides, pour-on applicators. NZI /

	stable fly (Stomoxys), horse-fly (Tabanus), Hippobosca, Simulium and Culicoides. 6.5 Explain non-biting flies and myiasis-causing flies (Cordylobia, Hypoderma, Oestrus, Cochliomyia, Lucilia). 6.6 Explain the economic importance of insect parasites and outline integrated control measures.					biconical tsetse trap, PPE.
GENERAL OBJECTIVE 7.0: Know the biology, economic importance and control of ticks and mites of livestock and poultry.						
10	7.1 Explain the general morphology of ticks (Ixodidae — hard ticks; Argasidae — soft ticks) and their one-, two- and three-host life cycles. 7.2 Explain the major tick species in Nigeria and West Africa (Amblyomma variegatum,	• Describe the morphology of ticks. • Discuss tick species and life cycles. • Describe major tick-borne diseases. • Describe mites and mange of livestock and poultry. • Discuss integrated control of ticks and mites.	Charts. Projector, whiteboard, markers. textbooks, internet.	• Collect ticks from animals and preserve them in 70% ethanol. • Identify ticks to genus and species using a stereo microscope and identification keys. • Perform skin scrapings and prepare slides to identify mange mites (Sarcoptes, Demodex, Psoroptes).	Guide students to: • Collect and preserve ticks from animals. • Identify ticks using keys and stereo microscope. • Perform skin scrapings and identify mange mites. • Demonstrate	Forceps, sample bottles, 70% ethanol. Stereo microscopes, tick identification keys. Scalpel blades, mineral oil,

	Rhipicephalus (Boophilus) decoloratus, Hyalomma spp, Rhipicephalus sanguineus). 7.3 Explain major tick-borne diseases (East Coast Fever, anaplasmosis, babesiosis, heartwater). 7.4 Explain mites and mange of livestock (Sarcoptes, Psoroptes, Chorioptes, Demodex, Notoedres) and the red mite of poultry (Dermanyssus gallinae) and Knemidocoptes. 7.5 Outline integrated management of ticks and mites (acaricides, dipping, hand-dressing, tick-resistant breeds, anti-tick vaccines).			• Demonstrate dipping, spraying and pour-on application of acaricides. • Inspect a poultry house for red mite (Dermanyssus gallinae).	acaricide application. • Inspect poultry houses for red mites.	slides, cover-slips, 10% KOH. Acaricides, dipping vat or knapsack sprayer, PPE. Poultry housing, torch.
GENERAL OBJECTIVE 8.0: Know diagnostic techniques for parasitic infections, including modern and digital tools.						
11	8.1 Explain the	• Explain sample	Charts.	• Collect, label and	• Guide students to:	Sample

	procedures for collection, labelling, packaging and transport of parasitological samples (faeces, blood, skin scrapings, ectoparasites, tissues). 8.2 Explain direct smear, sedimentation, simple flotation and centrifugal flotation techniques. 8.3 Explain the McMaster and modified McMaster techniques for faecal egg count (FEC) and the Faecal Egg Count Reduction Test (FECRT). 8.4 Explain the Baermann technique for larvae and faecal cultures (coproculture). 8.5 Explain staining methods (Giemsa for blood parasites; modified Ziehl–Neelsen for Cryptosporidium).	collection and packaging. • Describe direct smear, sedimentation and flotation techniques. • Describe McMaster, modified McMaster and FECRT. • Explain the Baermann technique and faecal cultures. • Describe staining methods. • Discuss modern molecular and digital diagnostics.	Projector, whiteboard, markers. textbooks, internet.	package parasitological samples (faeces, blood, skin scrapings). • Perform direct smear, sedimentation and flotation techniques on faecal samples. • Carry out McMaster and modified McMaster faecal egg counts. • Set up Baermann apparatus for larval recovery. • Prepare and stain blood smears with Giemsa, and faecal smears with modified Ziehl–Neelsen. • Use a smartphone-based faecal egg-count application (e.g., FECPAK G2, Telenostic, Parasight) where available.	• Collect, label and package samples correctly. • Perform direct smear, sedimentation and flotation. • Carry out McMaster FEC and modified McMaster. • Operate Baermann apparatus. • Stain blood smears with Giemsa and faecal smears with Ziehl–Neelsen. • Use a smartphone-based egg-count app .	bottles, slides, cover-slips, microscopes. McMaster slides, flotation/sedimentation reagents. Baermann apparatus, beakers, funnels, sieves. Giemsa and Ziehl–Neelsen stains, methanol. Smartphone, FECPAK / equivalent app and lens attachment. PPE.

	8.6 Outline the principles of modern molecular and immunological diagnostics (PCR, ELISA, copro-antigen tests) and digital tools (smartphone-based egg-count apps such as FECPAK G2 and Telenostic).					
GENERAL OBJECTIVE 9.0: Understand integrated parasite management, anthelmintic resistance, climate-smart parasite control and zoonotic parasites						
12-15	9.1 Define Integrated Parasite Management (IPM) 9.2 Outline IPM principles. 9.3 Explain major classes of anthelmintics (benzimidazoles, imidazothiazoles/levamisole, macrocyclic lactones / ivermectin, salicylanilides, isoquinolones / praziquantel). 9.4 Explain anthelmintic resistance:	• Explain IPM • Explain the principles of IPM. • Describe major anthelmintic classes. • Discuss anthelmintic resistance and its management. • Describe FAMACHA© scoring. • Describe non-chemotherapeutic controls. • Discuss climate-smart parasite control. • Discuss zoonotic parasites and One-Health.	• Charts, FAMACHA © card. • Projector, whiteboard, markers. • Reference textbooks, journal articles. • Internet, mobile devices.	• Conduct FAMACHA© scoring on goats/sheep at the institutional farm and record results. • Calculate Faecal Egg Count Reduction (FECRT) from given pre- and post-treatment data. • Demonstrate correct dosing of anthelmintics (oral drench, injectable, pour-on) using a calibrated drench gun. • Develop a year-round parasite control plan for a smallholder mixed-livestock farm.	Guide students to: • Conduct FAMACHA© scoring and record outcomes. • Calculate FECRT from given data. • Demonstrate correct anthelmintic dosing. • Develop a year-round parasite control plan. • Use a digital herd-health record-keeping app or spreadsheet.	FAMACHA © cards. Drench guns, anthelmintic samples, weighing scale. Goats / sheep, recording sheets.Computer / tablet, herd-health app or Excel template. Calculator, projector, PPE.

	mechanisms, detection (FECRT, larval development assay) and management (refugia-based dosing, targeted-selective treatment). 9.5 Explain FAMACHA© scoring as a tool for selective treatment of haemonchosis in small ruminants. 9.6 Describe non-chemotherapeutic control: pasture rotation, biological control (Duddingtonia flagrans), tannin-rich forages (sericea lespedeza), breed selection. 9.7 Explain the impact of climate variability on parasite epidemiology and the principles of climate-smart parasite control. 9.8 Discuss zoonotic parasites (Toxoplasma,	• Discuss digital tools for parasite monitoring.		• Use a digital herd-health record-keeping app (or Excel template) to log parasite challenge and treatment outcomes.		

	Echinococcus, Taenia solium, Cryptosporidium, Trypanosoma brucei rhodesiense, Toxocara, Fasciola) under the One-Health framework. 9.9 Describe digital tools for parasite monitoring and herd-health record-keeping (mobile apps, herd-health dashboards, SMS-based extension).					

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

ANATOMY AND PHYSIOLOGY II

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANATOMY AND PHYSIOLOGY II	**COURSE CODE: AHP 122**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR:1 SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills of the structure and functions of the different parts of the animal body		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand metabolism and heat regulation; 2.0 Know the structure and functions of mammary gland; 3.0 Know the anatomy of the hoof and foot; 4.0 Know the accessory digestive organs and their functions; 5.0 Know the spleen, liver and their functions; 6.0 Know the different parts and functions of the digestive system; 7.0 Know the components of the lymphatic system of mammals and avians; 8.0 Know the components and functions of the circulatory system of mammals and avians.		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANATOMY AND PHYSIOLOGY II	COURSE CODE: AHP 122	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills of the structure and functions of the different parts of the animal body		
GENERAL OBJECTIVE 1.0 Understand Metabolism and Heat Regulation		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Explain Metabolism and Heat Regulation. 1.2 Explain the different metabolic processes in the animal body. i. Carbohydrate metabolism (b) Protein metabolism ii. Mineral metabolism iii. Lipid metabolism 1.3 List the factors that control metabolism.	• Discuss Metabolism and Heat Regulation. • Discuss the differences between carbohydrate, protein, mineral and Lipid metabolism • Discuss the factors that control metabolism.	Notes Videos White board marker.	• Identify body organs involved in metabolism and heat regulation using charts or models. • Carry out measurement and recording of body temperature using clinical thermometers. • Observe pulse rate and respiratory rate before and after physical activity. • Identify heat loss mechanisms such as sweating, radiation, conduction, and convection. • Calculate Body Mass Index (BMI) and discussion of its	Guide students to: • Identify body organs involved in metabolism and heat regulation using charts or models. • Carry out measurement and recording of body temperature using clinical thermometers. • Observe pulse rate and respiratory rate before and after physical activity. • Identify heat loss mechanisms such as sweating, radiation, conduction, and	Chats Cardboard

				relationship with metabolism. • Record temperature variations under different environmental conditions. • Demonstrate first aid measures for heat exhaustion, heat stroke, and hypothermia. • Interpret of temperature charts and metabolic activity records.	convection. • Calculate Body Mass Index (BMI) and discussion of its relationship with metabolism. • Record temperature variations under different environmental conditions. • Carry out first aid measures for heat exhaustion, heat stroke, and hypothermia. • Interpret of temperature charts and metabolic activity records.	
General Objective 2.0: Know the structure and functions of mammary gland						
2-3	2.1 Explain the anatomy of the mammary gland of the cow (udder). i. Growth and development ii. Suspensory apparatus iii. Udder Substance iv. Blood supply of the udder v. Various drainage of the udder vi. Lymphatics of the	• Explain the anatomy of the mammary gland of the cow (udder). - Growth and development - Suspensory apparatus - Udder Substance - Blood supply of the udder - Various	Notes Videos White board marker	• Identify the external and internal structures of the mammary gland using charts, models, or specimens. • Observe the histological slides of mammary gland tissues. • Identify the stages of mammary gland development. • Identify the process of	Guide students to: • Identify the external and internal structures of the mammary gland using charts, models, or specimens. • Observe the histological slides of mammary gland tissues. • Identify the stages of mammary gland	Charts and model of mammary glands of different animals.

	udder vii. Mammary glands of other domestic animals. 2.2 List the functions of the mammary gland. 2.3 Describe the factors affecting quality and quantity of milk yield	drainage of the udder - Lymphatics of the udder - Mammary glands of other domestic animals. • List the functions of the mammary gland. • Describe the factors affecting quality and quantity of milk yield		milk secretion and ejection using diagrams or multimedia resources. Identify hormones involved in mammary gland function and lactation. • Practice of breast self-examination (BSE) techniques using models or simulations. • Observe common mammary gland disorders such as mastitis and breast cancer.	development. • Identify the process of milk secretion and ejection using diagrams or multimedia resources. • Identify hormones involved in mammary gland function and lactation. • Practice of breast self-examination (BSE) techniques using models or simulations. • Observe common mammary gland disorders such as mastitis and breast cancer.	
General Objective 3.0: Know the anatomy of the hoof and foot						
4-5	3.1 Explain the parts of the hoof and foot e.g. Sole, frog etc. 3.2 Explain the structure of the hoof 3.3 Explain the structure of the foot 3.4 Describe the dew claw chestnut and ergots in the animals where present.	Describe the parts of the hoof and foot e.g. Sole, frog etc. Describe the structure of the hoof Describe the structure of the foot Describe the dew claw chestnut and ergots in the animals where present.	Notes Videos White board marker Etc.	• Identify the external and internal parts of the hoof and foot using charts, models, or specimens. • Examine hoof structure in cattle, sheep, goats, or horses. • Perform proper animal restraint for hoof inspection.	Guide students to: • Identify the external and internal parts of the hoof and foot using charts, models, or specimens. • Examine hoof structure in cattle, sheep, goats, or horses. • Perform proper	Full mounted skeleton. Mounted and preserved specimen of the hoof and foot of different animals.

				• Carry out cleaning and washing of hooves and feet. • Perform hoof trimming techniques. • Carry out hoof care tools and equipment maintenance.	animal restraint for hoof inspection. • Carry out cleaning and washing of hooves and feet. • Perform hoof trimming techniques. • Carry out hoof care tools and equipment maintenance.	Physiological wall charts and drawing of the various types of the digestive systems in different animals.
General Objective 4.0: Know the accessory digestive organs and their functions						
5-6	4.1 Explain the location of the various types of teeth, tongue, salivary glands in animals. 4.2 Explain the shape of the above-named organs in various animals including the chicken. 4.3 Describe the functions of the organs in 4.1 above.	• Describe the location of the various types of teeth, tongue, salivary glands in animals. • Describe the shape of the above-named organs in various animals including the chicken. • Describe the functions of the organs in 4.1 above.	White board, Marker, Lecture notes	• Identify accessory digestive organs using anatomical charts/models. • Label the liver, pancreas, salivary glands, and gallbladder. • Observe of salivary secretion and its effect on starch digestion. • Demonstrate enzyme action from pancreatic extracts (amylase/protease activity).	Guide students to: • Identify accessory digestive organs using anatomical charts/models. • Label the liver, pancreas, salivary glands, and gallbladder. • Observe of salivary secretion and its effect on starch digestion. • Demonstrate enzyme action from pancreatic extracts (amylase/protease activity).	Model charts
General Objective 5.0: Know the spleen, liver and their functions.						
7-8	5.1 Explain the location of the liver and spleen 5.2 Describe the shape of the avian spleen and	• Explain the location of the liver and spleen. • Describe the shape	Notes White board marker, Anatomical	• Identify the spleen and liver on cadava animal, anatomical charts and 3D models.	Guide students to: • Identify the spleen and liver on cadava animal, anatomical	Slaughtered animals Preserved samples

	liver with those of other animals. 5.3 Explain the functions of the liver including the production of bile. 5.4 Describe the functions of the spleen in relation to antibody production.	of the avian spleen and liver with those of other animals • Discuss the functions of the liver including the production of bile. • Describe the functions of the spleen in relation to antibody production.	charts Etc.	• Locate spleen and liver using torso models or human diagrams. • Cary out drawing and labeling of the spleen and liver. • Observe preserved specimens or virtual anatomy simulations. • Carry out blood filtration and storage functions using models/animations.	charts and 3D models. • Locate spleen and liver using torso models or human diagrams. • Cary out drawing and labeling of the spleen and liver. • Observe preserved specimens or virtual anatomy simulations. Carry out blood filtration and storage functions using models/animations.	
General Objective 6.0: Know the different parts and functions of the digestive system						
9-10	6.1 Explain digestive system based on types and functions. 6.2 Describe from given specimen the different parts of the digestive system of cow, horse, pig and bird 6.3 Explain the functions of the various parts identified in 6.2 above. 6.4 Explain digestion in ruminants and monogastric animals	• Explain the components of the digestive system in ruminants and monogastric • Discuss the functions of the various parts identified in 6.2 above. • Discuss digestion in ruminants and monogastric animals	Notes Videos White board marker	• Carry out the identification and labeling of models or charts of the human digestive system. • Trace the pathway of food using diagrams, slaughtered animals or models. • Observe prepared slides or images of digestive organs (where available). • Demonstrate mechanical digestion (e.g., chewing bread or biscuits to show breakdown).	Guide student to: • Carry out the identification and labeling of models or charts of the human digestive system. • Draw the digestive system diagram. • Trace the pathway of food using diagrams or models. • Observe prepared slides or images of digestive organs (where available). • Demonstrate mechanical digestion	Slaughtered animals or preserved samples pictures

					(e.g., chewing bread or biscuits to show breakdown).	
General Objective 7.0: Know the components of the lymphatic system of mammals and avians						
11-12	7.1 Define the lymphatic system. 7.2 Explain its general functions in mammals and avians. 7.3 Explain the major components of the lymphatic system in mammals and birds (avians). 7.4 Describe the structure and functions of lymph nodes, lymph vessels, and lymph. 7.5 Explain the role of lymphatic organs such as the spleen and thymus in mammals. 7.6 Describe the role of avian lymphoid tissues such as the spleen and cloacal bursa. 7.7 Explain how lymph is formed and transported in both mammals and birds.	• Explain the lymphatic system. • Discuss its general functions in mammals and avians. • Discuss the major components of the lymphatic system in mammals and birds (avians). • Describe the structure and functions of lymph nodes, lymph vessels, and lymph. • Discuss the role of lymphatic organs such as the spleen and thymus in mammals. • Discuss the role of avian lymphoid tissues such as the spleen and cloacal bursa. • Explain how lymph is formed and transported in both mammals and birds.	Notes White board marker Etc.	• Identify lymphatic organs in preserved mammalian specimens or charts (e.g., spleen, thymus, lymph nodes). • Identify lymphatic structures in avian specimens or diagrams (e.g., spleen, bursa of Fabricius, lymphatic tissue). • Carry out observation and labeling of lymphatic system diagrams in mammals and birds. • Trace the pathway of lymph flow using models or charts. • Demonstrate immune-related lymphatic organs and their positions in the body. • Construct a labeled model of mammalian and avian lymphatic systems.	Guide students to: • Identify lymphatic organs in preserved mammalian specimens or charts (e.g., spleen, thymus, lymph nodes). • Identify lymphatic structures in avian specimens or diagrams (e.g., spleen, bursa of Fabricius, lymphatic tissue). • Carry out observation and labeling of lymphatic system diagrams in mammals and birds. • Trace the pathway of lymph flow using models or charts. • Demonstrate immune-related lymphatic organs and their positions in the body. • Construct a labeled model of mammalian and avian lymphatic	Slaughtered animals or preserved samples pictures

					systems.	
General Objectives 8.0: Know the components and functions of the circulatory system of mammals and avians.						
13-15	8.1 Explain the concept and functions of the circulatory system in mammals and avians. 8.2 Explain the major components of the mammalian circulatory system. 8.3 Describe the structure and functions of the avian circulatory system. 8.4 Differentiate between single and double circulation in avians and mammals. 8.5 Explain the structure and function of the heart in mammals and birds. 8.6 Explain the functions of blood vessels (arteries, veins, and capillaries). 8.7 Explain the composition and functions of blood in vertebrates.	• Dicuss the concept and functions of the circulatory system in mammals and avians. • Discuss the major components of the mammalian circulatory system. • Describe the structure and functions of the avian circulatory system. • Discuss the difference between single and double circulation in avians and mammals. • Describe the structure and function of the heart in mammals and birds. • Describe the functions of blood vessels (arteries, veins, and capillaries). • Describe the	Lecture notes, White board marker, Phsiological charts	• Identify mammalian heart (e.g., goat or sheep heart). • Observe the external and internal parts of the mammalian heart. • Identify major blood vessels (aorta, vena cava, pulmonary artery, pulmonary vein). • Trace the flow of blood through the mammalian circulatory system using diagrams/models. • Observe and identify avian heart features (e.g., chicken heart etc.). • Prepare a labeled diagram of circulatory systems. • Measure pulse rate and its relation to heart activity under different conditions.	Guide students to: • Identify mammalian heart (e.g., goat or sheep heart). • Observe the external and internal parts of the mammalian heart. • Identify major blood vessels (aorta, vena cava, pulmonary artery, pulmonary vein). • Trace the flow of blood through the mammalian circulatory system using diagrams/models. • Observe and identify avian heart features (e.g., chicken heart etc.). • Prepare a labeled diagram of circulatory systems. • Measure pulse rate and its relation to heart activity under different conditions.	Slaughtered animals or preserved samples pictures Trace the pathway of blood circulation in mammals and avians.

		composition and functions of blood in vertebrates.				

COURSE ASSESSMENT:

Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%
Total: 100%

INTRODUCTION TO VETERINARY MICROBIOLOGY

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO VETERINARY MICROBIOLOGY	**COURSE CODE: AHP 123**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NONE**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with the knowledge and skills of disease investigation, prevention and control in livestock		

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

1.0 Understand microorganisms in veterinary microbiology;
2.0 Know the morphology, structure and classification of bacteria;
3.0 Know the major pathogenic bacteria;
4.0 Understand fungi;
5.0 Understand the structure, classification and replication of viruses of livestock and poultry;
6.0 Know immunology relevant to disease, vaccination and herd-health management;
7.0 Understand sterilization, disinfection, biosecurity and laboratory biosafety;
8.0 Know antimicrobial agents and antimicrobial resistance (AMR);
9.0 Know basic microbiological diagnostic techniques.

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO VETERINARY MICROBIOLOGY	COURSE CODE: AHP 123	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE: NONE	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the knowledge and skills of disease investigation, prevention and control in livestock		
GENERAL OBJECTIVE 1.0: Understand microorganisms in veterinary microbiology.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define microbiology, 1.2 Explain veterinary microbiology and related terms (microbe, pathogen, virulence, infection, contamination, commensal) 1.3 Outline the history and milestones of microbiology (Leeuwenhoek, Pasteur, Koch, Lister, Fleming). 1.4 Explain Koch's postulates and their modern relevance.	• Explain microbiology and related terms. • Discuss the history and milestones of microbiology. • Discuss Koch's postulates. • Discuss classification of microorganisms and outline their features. • Discuss the scope and importance of veterinary	Whiteboard, markers, projector, charts. reference textbooks (Quinn, Hirsh, Carter). Internet, video clips.	• Identify compound and stereo microscopes, autoclave, hot-air oven, incubator, biosafety cabinet, anaerobic jar, refrigerator, centrifuge. • Operate a compound light microscope and	Guide students to: • Identify (compound and stereo microscopes, autoclave, hot-air oven, incubator, biosafety cabinet, anaerobic jar, refrigerator, centrifuge) • Operate a compound	Compound and stereo microscopes. Autoclave, hot-air oven, incubator, biosafety cabinet. Bunsen burners, inoculating loops. PPE

	1.5 Explain the Classification of microorganisms (bacteria, fungi, viruses, protozoa, prions) 1.6 Outline their distinguishing features. 1.7 Outline the scope and importance of veterinary microbiology in animal health and production	microbiology in animal health and production		demonstrate Köhler illumination. • Carry out aseptic technique (flame-sterilizing loops, working near a Bunsen burner).	microscope. • Carry out aseptic technique (flame-sterilizing loops, working near a Bunsen burner).	
GENERAL OBJECTIVE 2.0: Know the morphology, structure and classification of bacteria.						
2-3	2.1 Describe the morphology and arrangement of bacteria (cocci, bacilli, spirilla, vibrios; pairs, chains, clusters, palisades). 2.2 Describe the structure of a bacterial cell (cell wall, capsule, flagella, fimbriae, endospores, plasmids). 2.3 Explain the differences between Gram-positive from Gram-negative bacteria on the basis of cell-wall structure. 2.4 Describe bacterial nutrition, growth requirements (oxygen, temperature, pH, moisture) and the bacterial growth curve.	• Discuss bacterial morphology and arrangement. • Describe the bacterial cell structure. • Distinguish Gram-positive from Gram-negative bacteria. • Discuss bacterial nutrition and growth. • Outline classification of bacteria of veterinary importance. • Describe reproduction and genetic transfer.	• Charts. • Projector, whiteboard, markers. • Reference textbooks, lecture notes, internet.	• Prepare basic culture media (Nutrient Agar, MacConkey, Blood Agar). • Sterilize basic culture media (Nutrient Agar, MacConkey, Blood Agar). • Perform streak-plate, pour-plate and spread-plate inoculation techniques. • Carry out Gram staining of provided cultures and identify Gram-positive and Gram-	• Guide students to: • Prepare and sterilize culture media. • Perform streak, pour and spread-plate inoculations. • Conduct Gram staining and observe under microscope. • Perform simple staining. • Subculture aseptically.	PPE Culture media (NA, MacConkey, Blood Agar), Petri dishes. Autoclave, inoculating loops, Bunsen burners. Glass slides, Gram-stain reagents (crystal violet, iodine, decolouriser, safranin). Methylene blue, microscopes, immersion oil. .

	2.5 Outline the classification of bacteria of veterinary importance. 2.6 Describe bacterial reproduction (binary fission) and genetic transfer (conjugation, transformation, transduction).			negative bacteria under oil immersion. • Perform simple staining (methylene blue) and observe bacterial morphology.		
GENERAL OBJECTIVE 3.0: Know the major pathogenic bacteria.						
4-5	3.1 Explain Gram-positive cocci of veterinary importance (Staphylococcus, Streptococcus) and the diseases they cause. 3.2 Explain Gram-positive rods (Bacillus anthracis, Clostridium spp., Corynebacterium, Listeria, Erysipelothrix). 3.3 Explain Gram-negative bacteria (Escherichia coli, Salmonella, Pasteurella, Mannheimia, Brucella, Haemophilus). 3.4 Describe acid-fast bacteria (Mycobacterium bovis, M. tuberculosis, M.	• Discuss Gram-positive cocci of veterinary importance (Staphylococcus, Streptococcus) and the diseases they cause. • Describe Gram-positive rods (Bacillus anthracis, Clostridium spp., Corynebacterium, Listeria, Erysipelothrix). • Describe Gram-negative bacteria (Escherichia coli, Salmonella, Pasteurella, Mannheimia, Brucella,	Charts. Projector, whiteboard, markers. Reference textbooks, lecture notes, internet.	• Identify Staphylococcus, Streptococcus, E. coli and Salmonella from prepared/known cultures. • Carry out catalase and coagulase tests on Gram-positive cocci. • Carry out IMViC tests (indole, methyl red, Voges-Proskauer, citrate) on Gram-negative rods. • Perform Ziehl–Neelsen acid-fast	• Guide students to: • Identify common bacterial pathogens from cultures. • Perform catalase and coagulase tests. • Perform IMViC tests. • Perform Ziehl–Neelsen staining. • Demonstrate use of selective and differential media.	Bacterial cultures (Staph, Strep, E. coli, Salmonella). Hydrogen peroxide, plasma (rabbit), oxidase reagent. Indole, methyl red, VP and citrate media. Ziehl–Neelsen reagents, selective/differential media. Microscopes, immersion oil, slides.

	avium subsp. paratuberculosis) and their zoonotic significance. 3.5 Describe spirochaetes (Leptospira, Borrelia) and Mycoplasmas (M. mycoides — CBPP, M. gallisepticum). 3.6 Describe Rickettsia, Chlamydia and Anaplasma as obligate intracellular bacteria.	Haemophilus). • Describe acid-fast bacteria (Mycobacterium bovis, M. tuberculosis, M. avium subsp. paratuberculosis) and their zoonotic significance. • Describe spirochaetes (Leptospira, Borrelia) and Mycoplasmas (M. mycoides — CBPP, M. gallisepticum). • Describe Rickettsia, Chlamydia and Anaplasma as obligate intracellular bacteria.		staining and identify Mycobacterium under oil immersion. • Demonstrate the use of selective and differential media (MacConkey, EMB, Blood Agar, MSA).		
GENERAL OBJECTIVE 4.0: Understand fungi.						
6	4.1 Define mycology 4.2 Outline the general features of fungi. 4.3 Describe dermatophytes (Microsporum, Trichophyton) — ringworm of livestock, pets and humans. 4.4 Describe yeast infections.	• Explain mycology • Outline the general features of fungi. • Describe dermatophytes (Microsporum, Trichophyton) — ringworm of livestock, pets and humans.	Charts. Projector, whiteboard, markers. Reference textbooks, lecture notes, internet.	•Inoculate Sabouraud Dextrose Agar (SDA) with skin scrapings/hair from suspected ringworm cases. •Examine slides of dermatophytes using lactophenol	Guide students to: • Inoculate SDA with skin/hair samples. • Examine dermatophyte slides under microscope. • Perform Wood's lamp	SDA media, skin-scraping kits, scalpel blades. Lactophenol cotton blue, microscopes, slides, coverslips. Wood's lamp, UV lamp. Feed samples

	4.5 Describe systemic and dimorphic fungi (Aspergillus, Histoplasma). 4.6 Describe mycotoxins (aflatoxins, ochratoxins, zearalenone, fumonisins) and their effects on livestock and poultry production.	• Describe yeast infections (Candida, Cryptococcus, Malassezia). • Describe systemic and dimorphic fungi (Aspergillus, Histoplasma). • Describe mycotoxins (aflatoxins, ochratoxins, zearalenone, fumonisins) and their effects on livestock and poultry production.		cotton blue mount. •Perform Wood's lamp examination on skin/hair samples to detect Microsporum fluorescence. •Conduct a qualitative test for aflatoxin contamination in feed	examination. • Conduct aflatoxin UV screening on feed (UV bright-greenish-yellow fluorescence test).	(maize, groundnut cake).
GENERAL OBJECTIVE 5.0: Understand the structure, classification and replication of viruses of livestock and poultry.						
7-8	5.1 Describe the general structure and properties of viruses 5.2 Describe the classification viruses (DNA vs RNA, enveloped vs non-enveloped, families) using examples of veterinary importance. 5.3 Describe the viral replication cycle 5.4 Describe major viral diseases of livestock:. 5.5 Describe major viral	• Explain the structure of viruses (nucleic acid, capsid, envelope). • Explain the classification of viruses • Discuss the viral replication cycle. • Discuss major livestock viral diseases. • Discuss major poultry viral diseases. • Discuss rabies and pig	Charts, Projector, whiteboard, markers,Reference textbooks, lecture notes, internet.	• Inoculate embryonated chicken eggs via the allantoic and chorioallantoic-membrane routes. • Perform haemagglutination (HA) and haemagglutination-inhibition (HI) tests on Newcastle Disease/Avian	Guide students to; • Inoculate embryonated chicken eggs via the allantoic and chorioallantoic-membrane routes. • Perform haemagglutination (HA) and haemagglutination-inhibition (HI) tests on Newcastle	Embryonated chicken eggs, candling box. Syringes, needles, microtitre plates, sera. NDV/AIV antigens, RBC suspension. Rapid test kits

	diseases of poultry:. 5.6 Describe rabies, African Swine Fever (ASF), Classical Swine Fever and PRRS. 5.7 Outline principles of viral diagnosis	viral diseases. • Outline principles of viral diagnosis.		Influenza samples. • Use of rapid antigen test kits (e.g., for ND/AI). • Visit a veterinary diagnostic laboratory (NVRI, state vet lab) to observe ELISA and PCR setup.	Disease/Avian Influenza samples. • Use of rapid antigen test kits (e.g., for ND/AI). • Visit a veterinary diagnostic laboratory (NVRI, state vet lab) to observe ELISA and PCR setup.	
GENERAL OBJECTIVE 6.0: Know immunology relevant to disease, vaccination and herd-health management.						
9	6.1 Define immunity and types 6.2 Describe components of the immune system 6.3 Explain antigens and antibodies. 6.4 Explain vaccines types, routes of administration, and standard vaccination schedules in livestock and poultry. 6.5 Describe vaccine cold-chain management and the consequences of cold-chain breaks. 6.6 Outline serological	• Explain immunity and types (innate vs adaptive; humoral vs cell-mediated). • Describe immune-system components . • Describe antigens and antibodies. • Describe vaccines and schedules. • Discuss vaccine cold-chain management. • Outline serological diagnostic tests.	• Charts. • Projector, whiteboard, markers. • Reference textbooks, lecture notes, internet.	• Demonstrate vaccination by various routes (subcutaneous, intramuscular, intranasal, eye-drop, drinking-water and wing-web) in poultry and small ruminants. • Demonstrate cold-chain handling — packing a cool box with ice	• Guide students to: • Demonstrate vaccination by various routes. • Demonstrate cold-chain handling and logging. • Perform agglutination tests. • Demonstrate ELISA plate reading.	Vaccines (live and inactivated), syringes and needles. Cool box, ice packs, vaccine fridge, thermometers, log sheets. Agglutination antigens, plates, ELISA kit, plate reader. Live poultry/small ruminants

	diagnostic tests (ELISA, agglutination, complement fixation, immunofluorescence).			packs, reading vaccine-fridge thermometers and completing a temperature log. • Perform a basic agglutination test • Demonstrate ELISA plate reading using a prepared kit.		
GENERAL OBJECTIVE 7.0: Understand sterilization, disinfection, biosecurity and laboratory biosafety.						
10-11	7.1 Define sterilization, disinfection, antisepsis and sanitization. 7.2 Explain the physical methods of sterilization. 7.3 Describe chemical disinfectants and their modes of action and uses. 7.4 Outline biosecurity principles for livestock and poultry farms 7.5 Describe laboratory biosafety levels and good laboratory practice. 7.6 Describe disposal of infectious and sharps waste	• Explain sterilization-related terms. • Discuss physical methods of sterilization. • Discuss chemical disinfectants and their modes of action and uses. • Explain farm biosecurity principles for livestock and poultry. • Discuss Laboratory biosafety levels (BSL-1 to BSL-4) and good laboratory practice. • Explain disposal of	Charts. Projector, whiteboard, markers. Reference textbooks, lecture notes, internet.	• Operate the autoclave and verify sterilization with autoclave tape and biological indicators. • Operate the hot-air oven for glassware sterilization. • Prepare working dilutions of common disinfectants (Virkon-S, formalin, sodium hypochlorite)	Guide students to: • Operate autoclave with sterilization indicators. • Operate the hot-air oven. • Prepare disinfectant working dilutions. • Set up footbaths and biosecurity zoning. • Demonstrate safe waste disposal.	Autoclave, hot-air oven, autoclave tape, biological indicators. Disinfectants (Virkon-S, formalin, hypochlorite). Measuring cylinders, footbath trays. Sharps containers, biohazard bags.

		infectious and sharps waste (autoclaving, incineration, sharps containers)..		using calculation. • Set up footbaths and demonstrate biosecurity zoning at the institutional poultry/livestock unit. • Demonstrate safe handling and disposal of infectious and sharps waste.		
GENERAL OBJECTIVE 8.0: Know antimicrobial agents and antimicrobial resistance (AMR).						
12-13	8.1 Define antimicrobial, antibiotic, antiseptic, broad- and narrow-spectrum agents. 8.2 Describe antimicrobials classification by target and major class 8.3 Describe antifungals and antivirals briefly. 8.4 Describe antimicrobial resistance (AMR) and its mechanisms. 8.5 Explain drivers of AMR in livestock 8.6 Outline antimicrobial stewardship and One-Health. 8.7 Describe principles of	• Discuss antimicrobials and related terms. • Discussantimicrobials classification by target and major class • Describe antifungals and antivirals. • Discuss AMR and its mechanisms. • Discuss drivers of AMR in livestock. • Outline antimicrobial stewardship and One-Health. • Discuss principles of antimicrobial sensitivity-testing.	Charts of antibiotic classes and AMR mechanisms, Projector, whiteboard, markers. CLSI/EUCAST guidelines. Reference textbooks, internet, Nigeria NAP-AMR document.	• Perform antimicrobial sensitivity testing (Kirby-Bauer disc diffusion) using known cultures and a panel of antibiotic discs; • Measure zone of inhibition and interpret using CLSI charts. • Calculate dose and dilution for antibiotic administration in poultry drinking water.	Guide students to; • Perform antimicrobial sensitivity testing (Kirby-Bauer disc diffusion) using known cultures and a panel of antibiotic discs; • Measure zone of inhibition and interpret using CLSI charts. • Calculate dose and dilution for antibiotic administration in poultry drinking	Mueller-Hinton agar, bacterial cultures, antibiotic discs. Sterile swabs, ruler / Vernier callipers, CLSI interpretive chart. Antibiotic samples, drug-label specimens. Calculators, computer, projector, PPE.

	antimicrobial-sensitivity testing.			• Read and interpret antibiotic drug labels (active ingredient, dose, withdrawal period). • Develop a sample antimicrobial stewardship policy for the institutional farm.	water. • Read and interpret antibiotic drug labels (active ingredient, dose, withdrawal period). • Develop a sample antimicrobial stewardship policy for the institutional farm.	
GENERAL OBJECTIVE 9.0: Know basic microbiological diagnostic techniques.						
14-15	9.1 Describe specimen collection, labelling and transport 9.2 Describe direct microscopy 9.3 Describe culture and identification using selective/differential media and biochemical tests. 9.4 Describe rapid diagnostic kits 9.5 Outline molecular diagnostics and serological diagnostics (ELISA). 9.6 Describe digital	• Explain specimen collection, labelling and transport for microbiology (blood, swab, milk, faeces, tissue, organ, post-mortem samples).. • Explain direct microscopy techniques. • Discuss culture and identification methods. • Describe rapid diagnostic kits (lateral-flow tests for ND, AI, brucellosis). • Outline molecular and serological diagnostics	Charts of diagnostic workflows,Projector, whiteboard, markers, Reference textbooks, internet, smartphones.	• Collect, label and package microbiology specimens • Perform the California Mastitis Test (CMT) on milk samples and identify mastitis cases. • Carry out a complete bacterial isolation: inoculation → incubation →	Guide students to: • Collect, label and package microbiology specimens (swab, milk for mastitis, organ post-mortem sample).. • Perform the California Mastitis Test. • Perform a full bacterial-isolation workflow. • Demonstrate a rapid lateral-flow	Sample bottles, swabs, milk samples, CMT paddle and reagent. Culture media, biochemical media. Rapid lateral-flow kits, smartphones, microscope adaptor. Notifiable-disease form templates, computer/printer.

	diagnostic tools. 9.7 Outline reporting of notifiable diseases to veterinary authorities	(ELISA). • Discuss digital diagnostic tools (smartphone-microscopy adaptors, AI-based image analysis, cloud-based laboratory data portals). • Discuss disease reporting and surveillance.		observation → biochemical tests → reporting. • Demonstrate the use of a rapid lateral-flow test. • Use a smartphone-based microscope adaptor or digital app to image and share micrographs. • Complete a notifiable-disease report form for a simulated outbreak.	test. • Use a smartphone microscope adaptor digital app to image and share micrographs. • Complete a notifiable-disease report.	

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

PHARMACOLOGY AND THERAPEUTICS

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PHARMACOLOGY AND THERAPEUTICS	**COURSE CODE: AHP 124**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 2 HOUR/WEEK**
GOAL: This course is design to equip student with the knowledge of drugs for efficient production		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know some terms used in pharmacology, common sources and classification of drugs; 2.0 Know the different dosage forms and their routes of administration; 3.0 Understand absorption, distribution, metabolism and elimination in drugs; 4.0 Understand some peculiarities of drug action and interaction; 5.0 Know chemotherapeutic drugs and their uses; 6.0 Understand the use of Anti Helminthic; 7.0 Understand the role of fluid therapy in veterinary practice; 8.0 Know some Anti protozoan drugs.		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PHARMACOLOGY AND THERAPEUTICS	**COURSE CODE: AHP 124**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
Year: I Semester: II	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the knowledge drugs used in farm animals for efficient production		
GENERAL OBJECTIVE 1.0: Know some terms used in pharmacology and common sources and classification of drugs		

THEORETICAL CONTENT			**PRACTICAL CONTENT**			
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define the following:- • Pharmacology • Pharmacy • Parmacognosy • Therapy • Chemotherapy etc. 1.2 List with examples the common sources from which drugs are manufactured 1.3 Explain the various systems of classification of of drug based on origin, uses, side of action etc.	• Explain the following terms; Pharmacology Pharmacy Pharmacognosy Chemotherapy, etc. • Discuss the common sources from which drugs are manufactured • Discuss the sources of drugs and the associated terms • Disuss the various system of classification of drug based on origin, uses, side of action etc.	White board, markers lecture notes, internet.	• Identify the plant from which drugs are manufactured • Identify the animal and by product from which some drugs are manufactured. • Identify tools use in plant extraction.	Guide students to; • Identify the plant from which drugs are manufactured • Identify the animal and by product from which some drugs are manufactured. • Identify tools use in plant extraction.	Animal, plant extract, PPE
General Objective 2.0: Know the different dosage forms and their routes of administration						

2-3	2.1 Describe the forms in which drugs are presented 2.2 List the common routes and examples of drug Administration. 2.3 Explain why different routes are chosen for particular drugs.	• Explain the forms in which drugs arepresented e.g. Tablets, capsules, powders, ointments, aerosols,suppository, pastes etc. • Enumerate the common routes and examples of drug Administration - oral, nasal, rectal, cutaneous, parenteral e.g. intramuscular, sub-cutaneous; intradermal, intrathecal, intraperitoneal etc. • Explain why different routes are chosen for particular drugs.	Chart, Marker, white board, videos ,internet	• Identify the forms in which drugs are presented • Identify the common route of drug administration e.g oral, nasal, rectal, cutaneous, parenteral • Identify the best route based on the form of drug.	Guide students to; • Identify the forms in which drugs are presented • Identify the common route of drug administration e.g oral, nasal, rectal, cutaneous, parenteral • Identify the best route based on the form of drug.	Drug, PPE, animal
General Objective 3.0: Understand absorption, distribution, metabolism and elimination in drugs.						
4-5	3.1 Describe drug metabolism 3.2 Describe drug absorption into the animal body in relation to the routes	• Explain drug metabolism • Explain drug absorption in relation to route of administration	Projector, pictures, white board,	• Identify the effect of drug absorption in the body of farm animals • Identify factors affecting drug	Guide students to; • Identify the effect of drug absorption in the body of farm animals • Identify factors	Animal, PPE

	of administration 3.3 Describe the various factors affecting drug metabolism 3.4 Describe ways by which drugs are excreted from the body..	• Discuss the various factors affecting drug metabolism • Discuss the ways by which drugs are excreted from the body		metabolism • Identify the ways by which drugs are excreted by the body	affecting drug metabolism Identify the ways by which drugs are excreted by the body	
General Objective 4.0: Understand some peculiarities of drug action and interaction.						
6-7	4.1 Explain the concept of drug action and drug interaction. 4.2 Explain factors influencing drug action in the human body. 4.3 Describe the effects of age, sex, body weight, and disease conditions on drug response. 4.4 Describe the influence of food, alcohol, and lifestyle on drug action. 4.5 Differentiate between synergistic, antagonistic, and additive drug interactions. 4.6 Describe the effects of drug–drug, drug–food, and drug–disease interactions. 4.7 Explain adverse drug	• Discuss the concept of drug action and drug interaction. • Explain factors influencing drug action in the human body. • Discuss the effects of age, sex, body weight, and disease conditions on drug response. • Explain the influence of food, alcohol, and lifestyle on drug action. • Differentiate between synergistic, antagonistic, and additive drug interactions. • Discuss the effects	Projector, Sketches. Markers, white board, internet.	• Identify common drugs and their therapeutic uses. • Document drug labels, contraindications, and precautions. • Demonstrate common drug interaction scenarios using case studies. • Practice exercises on interpreting drug prescription sheets. • Classify drugs based on their actions and interactions. • Demonstrate the effects of food and alcohol on selected drugs using charts/models. • Record adverse drug reactions in simulated clinical	• Guide student to: • Identify common drugs and their therapeutic uses. • Document drug labels, contraindications, and precautions. • Demonstrate common drug interaction scenarios using case studies. • Practice exercises on interpreting drug prescription sheets. • Classify drugs based on their actions and interactions. • Demonstrate the effects of food and alcohol on selected drugs using charts/models. • Record adverse drug reactions in	Drugs, animals, thermometer.

	reactions and side effects associated with drug interactions. 4.8 Identify common drugs that may produce harmful interactions.	of drug–drug, drug–food, and drug–disease interactions. • Explain adverse drug reactions and side effects associated with drug interactions. • Identify common drugs that may produce harmful interactions.		situations. • Group discussion and presentation on harmful drug combinations. • Practice on drug administration safety procedures and precautions.	simulated clinical situations. • Group discussion and presentation on harmful drug combinations. • Practice on drug administration safety procedures and precautions.	
General Objective 5.0: Know chemotherapeutic drugs and their uses.						
8-9	5.1 Define chemotherapy 5.2 Explain the following categories of drugs and their uses 5.3 Describe some adverse effect of drugs due over dosing or under dosing	• Discuss chemotherapy • Discuss the different categories of drugs and their uses • Explain some adverse effect of drugs due over dosing or under dosing	Projector, lecture notes, white board, markers,			
General Objective 6.0: Understand the use of Anthelmintics						
10-11	6.1 Define antihelmintics 6.2 Explain the broad classification of antihelmintics 6.3 List the antihelmintics used in fam animals. 6.4 Explain how	• Explain antihelmintics • Explain the broad classification of antihelmintics • Enumerate the	Projector, white board, markers, computer, internet	• Identify anthelmintic drugs • Identify the effect mishandling or wrong administration of anthelmintics	Guide students to; • Identify anthelmintic drugs • Identify the effect mishandling or wrong administration of	Animal, drug, PPE

	antihelmintics can best be used 6.5 List possible dangers that accompany mishandling and wrong dosage of anti helminthics.	antihelmintics used in fam animals. • Explain how antihelmintics can best be used • Outline possible dangers that accompany mishandling and wrong dosage of anti helminthics.			anthelmintic	
General Objective 7.0: Understand the role of fluid therapy in veterinary practice						
12-13	7.1 Define fluid therapy 7.2 Explain dehydration and list the causes 7.3 List the various routes of applying fluid to dehydrated animals 7.4 Explain the precautions and the need for proper attention 7.5 List common preparation used in fluid therapy.	• Explain the concept of fluid therapy • Discuss dehydration and list the causes • Discuss the various route administering fluid therapy • Explain the precautionary measures during fluid therapy • Explain the common preparation in fluid therapy	Projector, whiteboard, markers, internet, videos	• Identify the level of dehydration in farm animals • Identify fluids and route of administration	Guide students to; • Identify the level of dehydration in farm animals • Identify fluids and route of administration	Animal, given sets, PPE, drip stand.
General Objectives:8:0: Know some Antiprotozoan drugs						
14-15	8.1 List the drugs classified as antiprotozoan	• Explain the drugs classified as anti-protozoan	Markers, white board, videos,	• Identify the anti-protozoan drugs.	Guide students to; • Identify the anti-protozoan drugs.	Drug , animal, PPE,

	8.2 List common antiprotozoal drugs 8.3 Describe the dangers in misuse or under dosage of antiprotozoans.	• Explain the common anti protozoan drugs • Explain the dangers of overdosing or underdosing	internet	• Identify the effect of overdosing or under dosing of antiprotozoan drugs	• Identify the effect of overdosing or under dosing of antiprotozoan drugs	

COURSE ASSESSMENT:

Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%
Total: 100%

INTRODUCTION TO ANIMAL NUTRITION

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO ANIMAL NUTRITION	**COURSE CODE: AHP 125**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL:2 HOURS/WEEK**
GOAL: This course is designed to equip students with the practical knowledge and skills of animal nutrition, feed evaluation and feed formulation.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand nutrients and their physiological roles in farm animals; 2.0 Know classification, evaluation and value addition of feed resources; 3.0 Understand Ingestion, digestion, absorption and metabolism in monogastric and ruminant animals; 4.0 Know the nutrient requirements and feeding standards for major livestock species; 5.0 Know the application of feed formulation: 6.0 Understand modern feed mill operation and feed quality control; 7.0 Apply mycotoxin management and feed-safety practices.		

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO ANIMAL NUTRITION	**COURSE CODE: AHP 125**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOURS/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: BASIC BIOLOGY AND CHEMISTRY**	**PRACTICAL: 2 HOURS/WEEK**
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the practical knowledge and skills of animal nutrition, feed evaluation and feed formulation.		
GENERAL OBJECTIVE 1.0: Understand nutrients and their physiological roles in farm animals		

THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Define nutrition, nutrient, ration, balanced ration and feed. 1.2 Explain the classification of nutrients with examples. 1.3 List the physiological functions of each nutrient class. 1.4 List Nutrient deficiency and	• Discuss nutrition, nutrient, ration, balanced ration and feed. • Explain the classification of nutrients with examples. • State the physiological functions of each nutrient class. • Discuss Nutrient deficiency and signs in farm	Animal nutrition textbooks, nutrient charts; NRC and NIAS feeding standards; deficiency-symptom photographs; energy partitioning diagrams; projector.	• Perform proximate analysis on a feed sample (maize or soyabean meal) — moisture, crude protein, crude fibre, ether extract, ash; calculate nitrogen-free extract. • Identify 5 nutrient deficiency signs in farm animals.	Guide students to: • Perform proximate analysis on a feed sample; • Identify 5 nutrient deficiency signs in farm animals.	Feed samples, analytical balance, drying oven, muffle furnace, Kjeldahl distillation unit, Soxhlet extractor; crude fibre digestion unit; deficiency photographs; calculator; NRC /NIASformulae handout.

	signs of major nutrients in poultry, ruminants and swine.	animals.				
GENERAL OBJECTIVE 2.0: Know classification, evaluation and value addition of feed resources.						
3-4	2.1 Outline feed classification with samples and inclusion rates. 2.2 Describe major Nigerian feed resources. 2.3 Describe urea-treatment of straws. 2.4 Explain molasses-urea block production and silage making. 2.5 Explain modern feed evaluation methods.	• Discuss feed classification with samples and inclusion rates. • Explain major Nigerian feed resources with reference to NVRI, NAPRI, NIAS, SON and NAFDAC feed composition tables. • Explain urea-treatment of straws (4% urea, 60% moisture, 21 days, anaerobic). • Explain molasses-urea block production and silage making. • Discuss modern feed evaluation methods.	Feed classification chartsNVRI, NAPRI, NIAS, SON and NAFDAC feed composition tables; urea-treatment reference; molasses; NIRS demonstration, projector, whiteboard.	• Identify 15 commonly used feed ingredients in Nigeria using physical samples. • Tabulate dry matter, CP, ME, Ca, P content from NAPRI and NIAS feed-composition tables. • Perform urea-treatment of rice straw (4% urea, 60% moisture, 21-day anaerobic incubation); test pre- and post-treatment CP. • Produce 10 molasses-urea blocks using local recipe; record cost and yield. • Test 3 maize samples for aflatoxin using a lateral-flow strip kit.	Guide students to: • Identify and describe 15 commonly used feed ingredients in Nigeria. • Tabulate nutrient composition from NAPRI feed-composition tables. • Perform urea-treatment of rice straw; calculate CP improvement. • Produce 10 molasses-urea blocks using local recipe. • Test 3 maize samples for aflatoxin using a lateral-flow strip kit.	Feed-ingredient samples, NAPRI/NIAS feed-composition tables, urea, plastic drums for ensiling, rice straw, Kjeldahl unit; molasses, salt; lime, MUB moulds; aflatoxin lateral-flow kits. weighing scale.
GENERAL OBJECTIVE 3.0: Understand Ingestion, digestion, absorption and metabolism in monogastric and ruminant animals						

5-6	3.1 Explain the anatomy of monogastric and ruminant digestive systems. 3.2 Describe digestion in monogastrics: enzymatic breakdown in stomach and small intestine; cecum role in rabbit (cecotrophy). 3.3 Describe ruminant digestion: rumen microbial fermentation. 3.4 Outline absorption and metabolism of Glucose, Fat, protein etc	• Discuss the anatomy of monogastric and ruminant digestive systems with charts. • Explain monogastric digestion: enzymes in stomach and small intestine; rabbit cecotrophy. • Describe ruminant digestion • Explain absorption and key metabolic pathways of nutrients ; Glucose, Fat, protein etc.	Digestive anatomy charts, lecture notes, whiteboard projector.	• Dissect a recently slaughtered chicken and goat (or use preserved specimens). • Identify and label all parts of the digestive tract. • Observe a rumen-fluid microbial sample under microscope.	Guide students to: • Dissect a chicken and goat digestive tract. • Identify and label all parts. • Observe a rumen-fluid microbial sample under microscope.	Recently slaughtered chicken and goat / preserved tracts; dissection kit; gloves; rumen fluid; microscopes; slides; methyl green stain;
GENERAL OBJECTIVE 4.0: Know the nutrient requirements and feeding standards for major livestock species						
7-8	4.1 Explain poultry feeding requirements. 4.2 Explain ruminant feeding:	• Discuss poultry feeding CP 18–23%, ME 2,800–3,100 kcal/kg, Ca 4% for layers).	Poultry/swine/cattle feeding-standard tables;	• Tabulate daily nutrient requirements for 5 livestock classes using tables.	• Guide students to: • Tabulate daily nutrient requirements for 5 livestock classes using tables.	tables; calculator; commercial farm access; smartphones; commercial feed

	maintenance, growth, lactation, gestation; roughage :concentrate ratio. 4.3 State swine feeding requirements. 4.4 Outline rabbit feeding.	• Discuss ruminant feeding requirements; maintenance, growth, lactation, gestation; roughage : concentrate ratio. • Discuss swine feeding requirements. (phase-feeding) • Explain rabbit feeding requirements.	feeding bulletins, Hatchery Manuals, projector, White board, lecture note.	• Visit a commercial poultry/swine/dairy farm; • Document the feeding programme;	• Visit a commercial poultry/swine/dairy farm. • Document the feeding programme;	labels
GENERAL OBJECTIVE 5.0: Know the application of feed formulation						
9-11	5.1 Define ration formulation; 5.2 State the concept of least-cost formulation. 5.3 Describe the use of Pearson square for feed formulation 5.4 Explain computer feed-formulation software. 5.5 Explain Excel Solver to least-cost feed formulation. 5.6 Explain AFOS or Allix	• Discuss ration formulation and the concept of least-cost. • Explain the Pearson square using maize and SBM example. • Explain feed-formulation software packages: Allix, AFOS, Best Mix, Microsoft Excel. • Discuss Excel Solver: objective, constraints, inclusion limits.	Feed formulation textbooks; Pearson square worksheets, calculator, whiteboard projector.	• Formulate a 60 kg broiler-starter ration (23% CP, 3,000 kcal ME) using Pearson square (maize + SBM only). • Use Excel Solver to formulate a least-cost broiler-finisher ration (20% CP, 3,100 kcal ME) using 6 ingredients, • Compare cost with the manual formulation. • Use AFOS/Allix to repeat the broiler-finisher formulation, • Compare cost, time taken and ease of use vs Excel Solver.	• Guide students to: • Formulate a broiler-starter ration using Pearson square. • Use Excel Solver to formulate a least-cost broiler-finisher ration; compare with manual method. • Use AFOS/Allix to repeat the formulation; compare cost, time and ease of use vs Excel Solver.	Pearson square worksheet; calculator; computer lab with Excel + Solver; AFOS/Allix software access (or open-source LP); tables; current Nigerian feed-ingredient prices.

	introductory feed-formulation software.					
GENERAL OBJECTIVE 6.0: Understand standard feed mill operation and feed quality control.						
12-13	6.1 Describe standard feed mill layout. 6.2 Outline feedmill quality control measures. 6.3 State feedmill safety: dust explosion control, lockout-tagout 6.5 List Nigerian feed-safety regulators.	• Discuss standard feed mill layout. • Explain feedmill quality control • Discuss feedmill safety: dust-explosion control, lockout-tagout etc. • Explain Nigerian feed-safety regulations (NIAS, NVRI, NAFDAC and SON).	Feedmill flow diagrams; photographs of commercial Nigerian feedmill projector., white Board, Marker	• Visit a commercial feedmill; document the production flow from raw material to bagged feed. • Perform a mixing-uniformity test on a school feed mixer using salt as tracer; • Sketch a Standard feedmill layout	Guide students to: • Visit a commercial feedmill; document the production flow from raw material to bagged feed. • Perform a mixing-uniformity test on a school feed mixer; calculate CV% and recommend optimal mixing time. • Design a Standard for using AutoCAD or hand drawing.	Commercial feedmill access, smartphones, school feed mixer, salt (NaCl), NaCl test kit, aflatoxin ELISA strip kits; maize/groundnut samples, AutoCAD/Sketch Up/drawing materials; NIAS, NVRI references.
GENERAL OBJECTIVE 7.0: Understand mycotoxins management and feed-safety practices						
13-15	7.1 Define mycotoxins 7.2 Describe major mycotoxins of Nigerian feeds. 7.3 Outline mycotoxin sources. 7.4 Explain clinical effects on livestock	• Explain mycotoxins with fungal sources. • Describe major mycotoxins of Nigerian feeds. • Outline contamination sources. • Explain clinical effects: hepatotoxicity,	Mycotoxin classification charts, GMP guidelines, Lecture notes, reference textbooks, white board, projector	• Identify mycotoxin-contaminated grain samples by visual inspection (mould, discolouration). • Demonstrate Good Storage Practices: silo cleaning, moisture metres, temperature monitoring. • Conduct a feed-storage	• Guide students to; Identify mycotoxin-contaminated grain samples by visual inspection (mould, discolouration. • Demonstrate Good Storage Practices. • carry out feed-storage audit. • Carry out LFA strip-	Mycotoxin-contaminated and clean grain samples, Moisture meter, thermometer, Storage-audit checklist, LFA aflatoxin test kits, Feed samples,

	7.5 Discuss NAFDAC and SON aflatoxin limits. 7.6 Describe mycotoxin screening. 7.7 Outline rapid LFA strip-test interpretation 7.8 Describe mycotoxin binders. 7.9 Explain Good Manufacturing Practices (GMP) at the feed-mill level for mycotoxin control.	immunosuppression, reproductive failure, reduced feed intake. • Discuss NAFDAC/SON limits in Nigerian feeds and feed ingredients. • Explain mycotoxin screening methods: Lateral Flow Assay (LFA), ELISA, Thin Layer Chromatography (TLC), HPLC. • Outline LFA interpretation. • Describe mycotoxin binders bentonite, activated charcoal, yeast cell-wall (mannan-oligosaccharides), zeolite. • Explain Good Manufacturing Practices (GMP) at feed-mill level.		audit on the institutional feed store. • Perform an LFA strip test for aflatoxin on a feed sample and interpret the result. • Identify mycotoxin binder products and their inclusion rates. • Compose a feed-mill mycotoxin-control SOP.	test procedure and interpretation. • Identify mycotoxin binder products and their inclusion rates. • Compose a feed-mill mycotoxin-control SOP.	Mycotoxin binder samples (bentonite, MOS), SOP templates.

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

INTRODUCTION TO GENETICS AND ANIMAL BREEDING

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO GENETICS AND ANIMAL BREEDING	**COURSE CODE: AHP 126**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NONE**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with foundational knowledge and practical skills in genetics and animal breeding		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the basic concepts of genetics and their application to animal breeding. 2.0 Know the cellular basis of inheritance. 3.0 Know Mendelian genetics to inheritance in farm animals. 4.0 Understand quantitative and population genetics. 5.0 Know the systems of breeding and their use in livestock improvement. 6.0 Know the application of selection methods to climate-smart livestock improvement. 7.0 Understand modern genomic and reproductive breeding technologies.		

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO GENETICS AND ANIMAL BREEDING	COURSE CODE: AHP 127	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with foundational knowledge and practical skills in genetics and animal breeding		
GENERAL OBJECTIVE 1.0: Understand the basic concepts of genetics and their application to animal breeding.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define genetics and related terms 1.2 State the importance of genetics and animal breeding in livestock improvement and food security. 1.3 Differentiate between qualitative and quantitative traits traits in	•Explain genetics and related terms (animal breeding, heredity, variation, gene, allele, genotype and phenotype). •Explain the importance of genetics to livestock improvement and food security •Differentiate qualitative from quantitative traits.	Whiteboard, Markers, projector, charts, Lecture notes, reference, textbooks Internet,	•Identify the breeds of cattle, sheep, goat, pig and poultry kept on the farm. •Record qualitative traits (coat colour, horn presence, comb type) and quantitative traits (body weight, height at withers). •Construct a simple three-generation pedigree of an animal from farm records.	Guide students to; •Identify the breeds of cattle, sheep, goat, pig and poultry kept on the farm. •Record qualitative traits (coat colour, horn presence, comb type) and quantitative traits (body weight, height at withers). •Construct a simple three-generation	Live animals (cattle, sheep, goat, pig, poultry), Measuring tape, weighing scale. Recording sheets, farm record books. Breed identification charts

	farm animals.				pedigree of an animal from farm records.	
GENERAL OBJECTIVE 2.0: Know the cellular basis of inheritance						
2	2.1 Describe the structure of a typical animal cell. 2.2 Describe the structure of chromosomes and DNA. 2.3 List the chromosome numbers of major farm animals 2.4 Differentiate between mitosis and meiosis. 2.5 Outline the genetic significance of mitosis and meiosis	• Explain the structure of an animal cell. • Explain chromosome and DNA structure. • Enumerate chromosome numbers of farm animals. • Differentiate mitosis and meiosis. • State the genetic significance of mitosis and meiosis	Whiteboard, markers, projector, charts. Lecture notes, reference textbooks, Internet, etc.	• Examine prepared slides of cells in mitosis and meiosis under microscope • Identify the stages. • Build a model of the DNA double helix using locally available materials (beads, wire, foam). • Examine karyotype charts of farm animals and identify autosomes and sex chromosomes.	Guide students to; • Examine prepared slides of cells in mitosis and meiosis under microscope • Identify the stages. • Build a model of the DNA double helix using locally available materials (beads, wire, and foam). • Examine karyotype charts of farm animals and identify autosomes and sex chromosomes.	Microscopes, prepared slides of mitosis/meiosis, DNA model materials (beads, wire, foam), Karyotype charts of farm animals, Salt, detergent, ethanol, chicken liver/blood, Beakers, filter paper.
GENERAL OBJECTIVE 3.0: Know Mendelian genetics to inheritance in farm animals.						
3-4	3.1 State Mendel's First Law (Law of Segregation) and Second Law (Law of Independent	• State Mendel's laws of inheritance. • Discuss the application of Mendelian principles	Whiteboard , markers, projector, charts. Lecture	• Conduct a chi-square test on observed segregation data and interpret the result.	Guide students to: • Conduct chi-square tests on data.	Calculators, chi-square distribution tables. Recording sheets, pen, pencil.

	Assortment). 3.2 Explain the application of Mendelian principles of inheritance in farm animals. 3.3 Explain probability and the chi-square (χ^2) test in genetics.	of inheritance in farm animals. • Explain probability and chi-square test in genetics.	notes, reference textbooks Internet,			Live animals (cattle/goats)
GENERAL OBJECTIVE 4.0: Understand quantitative and population genetics.						
6-7	4.1 Differentiate qualitative from quantitative traits with examples in farm animals. 4.2 Explain heritability (h^2) and its importance 4.3 List heritability estimates of importance to production traits. 4.4 Define population, gene and genotype frequencies.	• Distinguish qualitative from quantitative traits. • Discuss heritability and its importance. • Enumerate heritability estimates of major traits. • Discuss population, gene and genotype frequencies.	Whiteboard, markers, projector, charts. Lecture notes, reference textbooks Internet,			
GENERAL OBJECTIVE 5.0: Know the systems of breeding.						
8-9	5.1 Define mating system breeding system. 5.2 Define inbreeding	• Explain mating and breeding systems. • Explain inbreeding and calculate F.	Whiteboard, markers, projector, charts.			

	(full-sib, half-sib, parent-offspring). 5.3 Explain inbreeding depression and its consequences. 5.4 Define line-breeding and its applications. 5.5 Define outbreeding 5.6 Discuss heterosis and its exploitation in commercial livestock. 5.7 Describe specific crossbreeding systems used in poultry, swine and cattle. 5.8 Outline breed-improvement programmes in Nigeria.	• Discuss inbreeding depression and its consequencies. • Discuss line-breeding. • Explain outbreeding systems. • Discuss heterosis and its exploitation in commercial. • Describe crossbreeding systems. • Outline Nigerian breed-improvement programmes.	Lecture notes, reference textbooks Internet,			
GENERAL OBJECTIVE 6.0: Know the application selection methods to climate-smart livestock improvement.						
10-11	6.1 Define selection and its purpose in animal breeding. 6.2 Describe types of selection. 6.3 Explain methods of artificial selection 6.4 Define selection differential (S), selection intensity (i),	• Explain selection and its purpose in animal breeding. • Describe types of selection. • Explain methods of artificial selection. • Discuss selection parameters. • Discuss single- and	Whiteboard, markers, projector, charts. Lecture notes, reference textbooks Internet,	• Compute selection differential, selection intensity and expected response from given data. • Compute a selection index for two or more traits using assigned economic weights. • Carry out body-	Guide students to; • Compute selection differential, selection intensity and expected response from given data. • Compute a selection index for two or more traits	Calculators, recording sheets, weighing scale. BCS charts, measuring tape, Live animals (cattle, sheep, goat, poultry). Computer with Excel, projector

	generation interval (L) and response to selection ($R = h^2 \times S$). 6.5 Explain selection for a single trait vs multiple traits. 6.7 Explain climate-smart breeding goals.	multi-trait selection. • Describe EBV. • Discuss climate-smart breeding goals.		condition scoring (BCS) • Weigh animals as the basis for selection. • Develop a one-page performance-recording sheet (or Excel template) for a smallholder farm. • Score live animals for breeding soundness (conformation, frame, udder, testicles).	using assigned economic weights. • Carry out body-condition scoring (BCS) • Weigh animals as the basis for selection. • Develop a one-page performance-recording sheet (or Excel template) for a smallholder farm. • Score live animals for breeding soundness (conformation, frame, udder, testicles).	
GENERAL OBJECTIVE 7.0: Understand modern genomic and reproductive breeding technologies.						
	7.1 Define genomic selection 7.2 outline the difference between conventional EBV and Genomic Breeding Values (GEBV). 7.3 Explain (SNPs) and SNP. 7.4 Describe MAS and	• Explain genomic selection . Explain Genomic Breeding Values (GEBV). • Explain Single Nucleotide Polymorphisms -chip genotyping SNPs and SNP-chips.	Genomic selection diagrams, SNP-chip informatio n sheets NACGRAB /NIAS publications ,	• Identify genomic-selection products and SNP-chip information sheets. • Interpret a sample GEBV report. • Compare conventional vs. genomic selection in spreadsheet exercise.	Guide students to; • Identify genomic-selection products and SNP-chip information sheets. • Interpret a sample GEBV report. • Compare conventional vs. genomic selection	SNP-chip information sheets, Sample GEBV reports, Computer with Excel, Sexed-semen sample straws, ET/IVF videos.

12-15	its livestock applications. 7.5 Outline the role of reference populations and prediction equations. 7.6 Describe Nigerian conservation genomics 7.7 Describe sexed semen and flow cytometry. 7.8 Outline ET and IVF procedures 7.9 Explain ethical/regulatory aspects	• Describe Marker-Assisted Selection (MAS) and its livestock applications. • Outline the role of reference populations and prediction equations. • Discuss Nigerian context: White Fulani conservation under NACGRAB / ARCN genomic studies. • Describe sexed-semen technology (X-Y semen sorting by flow cytometry • Outline embryo transfer (ET) and in vitro fertilisation (IVF) in cattle. • Discuss ethical and regulatory considerations of gene editing in livestock.	ET/IVF procedure, CRISPR case-study materials, Ethical framework documents.	• Identify sexed-semen straws (information). • Identify ET and IVF procedure videos and complete a comprehension exercise.	in spreadsheet exercise. • Identify sexed-semen straws (information). • View ET and IVF procedure videos and complete a comprehension exercise. .	

Course Assessment:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

ELEMENTS OF LIVESTOCK ECONOMICS

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ELEMENTS OF LIVESTOCK ECONOMICS	**COURSE CODE: AHP 127**	**CONTACT HOURS: 2 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL: 2 HOURS/WEEK**
YEAR: 1 SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 0**
GOAL: This course is designed to equip students with knowledge and skills in basic Economic principles as applicable to livestock production		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know the concept of economics as applied to Livestock. 2.0 Understand demand and supply in Livestock economics. 3.0 Know the determination of market price. 4.0 Know the principles and application of elasticities. 5.0 Know the theory and application of the concept of production function. 6.0 Know the various types of costs and revenue.		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ELEMENTTS OF LIVESTOCK ECONOMICS	COURSE CODE: AHP 127	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 2 HOURS/WEEK
Year: I Semester: II	PRE-REQUISITE:	PRACTICAL:
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in basic Economic principles as applicable to livestock production		
GENERAL OBJECTIVE 1.0: Know the concept of economics as applied to livestock.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Define the concepts of Economics 1.2 State the application of Economics to livestock 1.3 Describe the relationship between social sciences and Economics. 1.4 Describe Livestock Economic problems. 1.5 Describe concepts of scarcity and choice 1.6 Describe the relationships between the concepts of scarcity, choice, opportunity cost etc.	• Explain the concepts of general Economics • Explain the application of economics to livestock • Explain the relationship between economics and other social sciences. • Explain Livestock Economic problems. • Discuss the concepts of scarcity and choice. • Explain the relationships between such concepts as scarcity, choice, opportunity	LCD projector, Slide projector, White board, Markers, Computers.			

		cost etc.				
General Objective 2.0: Understand demand and supply in economics						
3-4	2.1 Define demand 2.2 State the law of demand. 2.3 Describe the mathematical and diagrammatic representation of demand. 2.4 State the factors affecting the demand for a commodity. 2.5 Describe the relationship between change in the level of demand and movement along the demand curve. 2.5 List the different types of demand. 2.6 Define supply 2.7 State the law of supply. 2.8 Describe the mathematical and diagrammatic representation of supply. 2.9 Explain the factors affecting the supply of a commodity. 2.10 Describe the relationship between change in the level of supply and movement along the supply curve.	• Explain demand • State the law of demand. • Explain demand with diagrams and equations. • Explain the factors affecting the demand for a commodity. • Explain the relationship between change in the level of demand and movement along the demand curve. • Explain the different types of demand. • Explain supply • State the law of supply. • Explain supply with diagrams and equations. • Explain the factors affecting the supply of a commodity. • Explain the relationship between change in the level	LCD projector, Slide projector, White board, Markers, Computers.			

	2.11 Describe the different types of supply.	of supply and movement along the supply curve. • Explain the different types of supply.				
General Objective 3.0: Know the determination of market price.						
5-6	3.1 Describe the relationship between the demand and supply in a free market economy. 3.2 Highlight the effect of demand being greater, smaller or equal to supply. 3.3 State the principle of price control.	• Explain the relationship between the demand and supply in a free market economy. • Explain the effect of demand being greater, smaller or equal to supply. • Explain the principle of price control.	LCD projector, Slide projector, White board, Markers, Computers.			
General Objective 4.0: Know the principles and application of elasticities.						
7-9	4.1 Describe price elasticities of demand and supply. 4.2 Explain various values of elasticities from simple tables and information. 4.3 Describe the various coefficients with appropriate diagrams. 4.4 List various values of elasticities of price, income and cross elasticities of demand. 4.5 List the importance of	• Explain price elasticities of demand and supply. • Explain the various values of elasticities from simple tables and information. • Explain how to draw the various coefficients with appropriate diagrams. • Explain various values of elasticities of price income and				

	both elasticities of demand and supply as related to livestock.	cross elasticities of demand. • Explain the importance of both elasticities of demand and supply as related to livestock.				
General Objective 5.0: Know the theory and application of the concept of production function.						
10-12	5.1 Explain the concept of "factors of production". 5.2 Define production function. 5.3 Distinguish between the curves of the production function. 5.4 Highlight the different stages of production. 5.5 List the principles and application of the law of diminishing returns.	• Discuss the concept of "factors of production". • Explain production function. • Explain the difference between the curves of the production function. • Discuss the different stages of production. • Explain the principles and application of the law of diminishing returns.	LCD projector, Slide projector, White board, Markers, Computers.			
General Objective 6.0: Know the various types of costs and revenue.						
13-15	6.1 Define costs and revenue. 6.2 Explain the different category of cost. e.g. fixed, average, variable etc. 6.3 Describe the different category of revenue e.g. total, average and marginal etc.	• Explain costs and revenue. • Explain how to categorize cost into fixed, average variable etc. • Explain how to categorize revenue into total, average and				

		marginal etc.				

Course Assessment:
Course work: 20%
Test/Assignments: 20%
Examination: 60%
Total: 100%

PATHOLOGY

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PATHOLOGY	**COURSE CODE: AHP 128**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in veterinary pathology		

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

1.0 Understand the scope of veterinary pathology;
2.0 Understand cell injury, cellular adaptation, cell death and post-mortem change;
3.0 Understand inflammation, mediators and outcomes;
4.0 Understand circulatory disturbances;
5.0 Understand neoplasia;
6.0 Understand disorders of metabolism, pigmentation, calcification and developmental defects of farm animals;
7.0 Know systematic necropsy (post-mortem) examination of poultry, ruminants, pigs and small mammals;
8.0 Know histopathology and clinical pathology;
9.0 Know gross and microscopic lesions of common diseases of the major body systems.

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PATHOLOGY	COURSE CODE: AHP 128	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in veterinary pathology		
GENERAL OBJECTIVE 1.0: Understand the scope of veterinary pathology.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define pathology, veterinary pathology and related terms (disease, lesion, etiology, pathogenesis, morphology, prognosis, sequelae). 1.2 Outline the branches of pathology 1.3 Describe the etiologies of disease 1.4 Explain pathogenesis as the sequence of events from cause to lesion.	• Explain pathology, veterinary pathology and related terms (disease, lesion, etiology, pathogenesis, morphology, prognosis, sequelae). • Outline the branches of pathology • Discuss the etiologies of disease • Discuss pathogenesis as the sequence of events	Whiteboard, markers, projector, charts. Lecture notes, reference textbooks Internet	• Identify equipment (post-mortem table, knives, hooks, scales, formalin, microscope, freezer). • Demonstrate proper PPE for post-mortem work (overalls, apron, double gloves, mask, goggles, boots). • Examine preserved specimens of common gross	Guide students to; • Identify equipment (post-mortem table, knives, hooks, scales, formalin, microscope, freezer). • Demonstrate proper PPE for post-mortem work (overalls, apron, double gloves, mask, goggles, boots). • Examine preserved specimens of common gross	Post-mortem instruments, formalin, sample bottles. Preserved specimens (formalin jars). PPE Biohazard bags, sharps containers, microscope.

	1.5 List the importance of pathology in animal-disease diagnosis, food safety and One-Health surveillance.	from cause to lesion. • Enumerate the importance of pathology in animal-disease diagnosis, food safety and One-Health surveillance.		lesions (consolidated lung, fatty liver, congested spleen) in formalin jars. • Demonstrate biosafety/biohazard handling of post-mortem material and waste disposal.	lesions (consolidated lung, fatty liver, congested spleen) in formalin jars. • Demonstrate biosafety/biohazard handling of post-mortem material and waste disposal.	
GENERAL OBJECTIVE 2.0: Understand cell injury, cellular adaptation, cell death and post-mortem change.						
2	2.1 Describe the normal cell and homeostasis. 2.2 Define cell injury (reversible and irreversible) and its common causes 2.3 Describe cellular adaptations. 2.4 Describe necrosis and apoptosis. 2.5 Describe post-mortem changes	• Explain the normal cell and homeostasis. • Explain cell injury and list its causes. • Explain cellular adaptations. • Discuss necrosis and apoptosis. • Explain post-mortem changes.	Whiteboard, markers, projector, charts. Lecture notes, reference textbooks Internet	• Examine histology slides showing cellular adaptations. • Examine slides illustrating different types of necrosis and apoptosis. • Examine fresh and progressively decomposed tissue samples to identify post-mortem changes. • Document gross and microscopic findings using descriptive pathology	Guide students to; • Examine histology slides showing cellular adaptations. • Examine slides illustrating different types of necrosis and apoptosis. • Examine fresh and progressively decomposed tissue samples to identify post-mortem changes. • Document gross and microscopic findings using descriptive pathology terminology	Microscopes, prepared histology slides, Fresh and decomposed tissue samples, Pathology report sheets, immersion oil, PPE.

				terminology on a report sheet.	on a report sheet.	
GENERAL OBJECTIVE 3.0: Understand inflammation, mediators and outcomes.						
3	3.1 Define inflammation 3.2 Describe the cardinal signs of inflammation. 3.3 Describe the vascular and cellular events of acute inflammation 3.4 Describe types of acute inflammation. 3.5 Describe chronic inflammation, the cells involved and granulomatous inflammation. 3.6 Describe the outcomes of inflammation	• Explain inflammation and its purpose. • Explain the cardinal signs. • Explain vascular and cellular events. • Discuss types of acute inflammation. • Explain chronic and granulomatous inflammation. • Discuss outcomes of inflammation.	Whiteboard, markers, projector, charts, Lecture notes, reference textbooks, Internet	• Examine histology slides showing acute inflammation (suppurative pneumonia, fibrinous pericarditis, serous oedema). • Examine slides of chronic inflammation and granulomas (TB lung, Johne's intestine). • Conduct a gross examination of an inflamed organ at post-mortem (e.g., pneumonic lung, mastitic udder) and record findings. • Identify abscesses and their contents and surrounding capsule.	Guide students to; • Examine histology slides showing acute inflammation (suppurative pneumonia, fibrinous pericarditis, serous oedema). • Examine slides of chronic inflammation and granulomas (TB lung, Johne's intestine). • Conduct a gross examination of an inflamed organ at post-mortem (e.g., pneumonic lung, mastitic udder) and record findings. • Identify abscesses and their contents and surrounding capsule.	Microscopes, prepared inflammation slides, Post-mortem material (lungs, udders, abscesses) from abattoir. Pathology report sheets, knives, gloves. PPE.

GENERAL OBJECTIVE 4.0: Understand circulatory disturbances						
4	4.1 Describe oedema and its causes 4.2 Describe hyperaemia and congestion 4.3 Describe haemorrhage and its causes. 4.4 Describe thrombosis and Virchow's triad,. 4.5 Describe embolism 4.6 Describe infarction causes and morphology in different organs. 4.7 Describe shock (hypovolaemic, cardiogenic, septic, anaphylactic) and its lesions, including disseminated intravascular coagulation (DIC).	• Discuss oedema and its causes • Discuss hyperaemia and congestion • Explain haemorrhage and its causes. • Explain thrombosis and Virchow's triad. • Explain embolism • Explain infarction causes and morphology in different organs. • Explain shock (hypovolaemic, cardiogenic, septic, anaphylactic) and its lesions, including disseminated intravascular coagulation (DIC).	Whiteboard, markers, projector, charts. Lecture notes, reference textbooks Internet	• Examine post-mortem material with oedema (subcutaneous, pulmonary, ascites), congestion and haemorrhage. • Examine histology slides showing thrombosis, embolism and infarction. • Identify infarcted organs (kidney, spleen, heart) at necropsy where available. • Identify lesions consistent with shock and DIC (microthrombi, multifocal haemorrhage).	Guide students to; • Examine post-mortem material with oedema (subcutaneous, pulmonary, ascites), congestion and haemorrhage. • Examine histology slides showing thrombosis, embolism and infarction. • Identify infarcted organs (kidney, spleen, heart) at necropsy where available. • Identify lesions consistent with shock and DIC (microthrombi, multifocal haemorrhage).	Microscopes, prepared slides. Post-mortem material with circulatory lesions. Pathology report sheets, knives, gloves. PPE.
GENERAL OBJECTIVE 5.0: Understand neoplasia						

5-6	5.1 Define neoplasia, neoplasm, tumour and cancer. 5.2 Differentiate benign from malignant tumours 5.3 Describe the nomenclature of tumours by tissue of origin 5.4 List common tumours of farm animals and pets. 5.5 Describe the etiologies of cancer. 5.6 Describe routes of metastasis. 5.7 Outline principles of cancer diagnosis.	• Explain neoplasia, neoplasm, tumour and cancer. • Differentiate benign from malignant tumours. • Explain the nomenclature of tumours by tissue of origin. • Enumerate common tumours of farm animals and pets. • Explain the etiologies of cancer. • Explain routes of metastasis. • Discuss principles of cancer diagnosis.	Charts and photographs of tumours, Projector, whiteboard, slides, Reference textbooks, internet.	•Examine gross specimens of common tumours specimen •Examine histology slides of benign and malignant tumours; • Identify mitotic figures and invasion. •Demonstrate fine-needle aspiration (FNA) and impression smears from a tumour or model. •Stain smears with Giemsa or Diff-Quik and examine under microscope. • Identify suspect tumour lesions during carcass inspection.	Guide students to; •Examine gross specimens of common tumours specimen •Examine histology slides of benign and malignant tumours; • Identify mitotic figures and invasion. •Demonstrate fine-needle aspiration (FNA) and impression smears from a tumour or model. •Stain smears with Giemsa or Diff-Quik and examine under microscope. • Identify suspect tumour lesions during carcass inspection.	Microscopes, gross tumour specimens, histology slides, FNA needles, syringes, glass slides, Giemsa or Diff-Quik stain, immersion oil, PPE.
GENERAL OBJECTIVE 6.0: Understand disorders of metabolism, pigmentation, calcification and developmental defects of farm animals.						
7-8	6.1 Describe disorders of carbohydrate metabolism.	• Explain disorders of carbohydrate metabolism.	Charts and photographs of metabolic	• Examine post-mortem material showing fatty liver,	Guide students to; • Examine post-mortem material showing fatty	Microscopes, prepared slides, Post-mortem

	6.2 Describe disorders of protein metabolism. 6.3 Describe disorders of lipid metabolism. 6.4 Describe disorders of pigmentation. 6.5 Describe pathologic calcification and lithiasis. 6.6 Describe nutritional pathologies. 6.7 Describe genetic and developmental disorders.	• Explain disorders of protein metabolism. • Explain disorders of lipid metabolism. • Explain disorders of pigmentation. • Explain pathologic calcification and lithiasis. • Explain nutritional pathologies. • Explain genetic and developmental disorders.	and developmental lesions, Projector, whiteboard, slides, Reference textbooks, internet.	jaundice, urolithiasis and white-muscle disease. • Examine histology slides of amyloidosis, fatty change and dystrophic calcification. • Identify pigmentation changes in carcasses at the institution farm or abattoir. • Examine specimens of developmental defects where available. • Carry out simple urinalysis (dip-stick) to detect ketones. • Identify uroliths under hand lens/microscope.	liver, jaundice, urolithiasis and white-muscle disease. • Examine histology slides of amyloidosis, fatty change and dystrophic calcification. • Identify pigmentation changes in carcasses at the institution farm or abattoir. • Examine specimens of developmental defects where available. • Carry out simple urinalysis (dip-stick) to detect ketones. • Identify uroliths under hand lens/microscope.	material, urolith samples, Urine dip-sticks, urine samples, Pathology report sheets, knives, gloves. PPE.
GENERAL OBJECTIVE 7.0: Know systematic necropsy (post-mortem) examination of poultry, ruminants, pigs and small mammal						

9-10	7.1 Define necropsy/post-mortem and its purposes. 7.2 List the equipment, PPE and biosafety requirements for necropsy. 7.3 Outline the systematic approach to necropsy. 7.4 Describe necropsy techniques in ruminants, pigs, poultry, rabbits and dogs. 7.5 Describe specimen collection for laboratory diagnosis. 7.6 Describe sample shipping and chain-of-custody procedures. 7.7 Describe digital necropsy documentation.	• Explain necropsy/post-mortem and its purposes. •Enumerate the equipment, PPE and biosafety requirements for necropsy. •Outline the systematic approach to necropsy. • Discuss necropsy techniques in ruminants, pigs, poultry, rabbits and dogs. • Discuss specimen collection for laboratory diagnosis. •Explain sample shipping and chain-of-custody procedures. •Explain digital necropsy documentation.	Whiteboard, markers, projector, charts, Lecture notes, reference textbooks Internet	•Conduct a complete necropsy on a poultry carcass •Conduct a necropsy on a sheep/goat carcass. •Conduct a necropsy on a piglet/calf carcass where available. •Conduct a necropsy on a rabbit/dog where available. •Label tissue samples for histopathology (10% formalin), bacteriology (sterile) and parasitology (70% ethanol). •Photograph gross lesions with a smartphone and prepare a digital necropsy report.	•Conduct a complete necropsy on a poultry carcass •Conduct a necropsy on a sheep/goat carcass. •Conduct a necropsy on a piglet/calf carcass where available. • • Guide students to; •Conduct a necropsy on a rabbit/dog where available. •Label tissue samples for histopathology (10% formalin), bacteriology (sterile) and parasitology (70% ethanol). •Photograph gross lesions with a smartphone and prepare a digital necropsy report.	Cadavers (poultry, sheep/goat, piglet, rabbit) — from died-on-arrival or research-ethics-approved cases. Necropsy instruments (knives, scissors, hooks, bone saw, scalpels, forceps). Post-mortem table, 10% buffered formalin, sample bottles. Sterile containers, transport media, ice packs. Smartphone, necropsy-report templates, computer/printer. PPE.

GENERAL OBJECTIVE 8.0: Know histopathology and clinical pathology						
11-12	8.1 Describe tissue processing for histopathology. 8.2 List special stains. 8.3 Outline the basic interpretation of an H&E slide. 8.4 Define clinical pathology and outline its components. 8.5 Describe routine haematology and reference ranges in farm animals. 8.6 Describe basic blood chemistry and their interpretation. 8.7 Describe urinalysis. 8.8 Describe cytology and basic interpretation.	• Discuss tissue processing for histopathology. • Enumerate special stains. • Explain the basic interpretation of an H&E slide. • Explain clinical pathology and outline its components. • Discuss routine haematology and reference ranges in farm animals. • Explain basic blood chemistry and their interpretation. • Explain urinalysis. • Explain cytology and basic interpretation.	Charts of tissue processing, Projector, whiteboard, Reference textbooks, internet.	• Carryout tissue trimming for histopathology and proper fixation in 10% buffered formalin. • Process a tissue section using H&E (where possible) or • Examine H&E slides. • Perform PCV by micro haematocrit. • Perform total WBC count using haemocytometer • Use a portable spectrophotometer or chemistry analyser to estimate blood urea, glucose and total protein. • Perform urinalysis using dip-sticks • Examine sediment under microscope. • Examine FNA cytology smears	Guide students to; • Carryout tissue trimming for histopathology and proper fixation in 10% buffered formalin. • Process a tissue section using H&E (where possible) or • Examine H&E slides. • Perform PCV by micro haematocrit. • Perform total WBC count using haemocytometer • Use a portable spectrophotometer or chemistry analyser to estimate blood urea, glucose and total protein. • Perform urinalysis using dip-sticks • Examine sediment under microscope. • Examine FNA cytology smears (Diff-	Tissues (liver, kidney, spleen, lung), formalin, trimming knife. Tissue processor, paraffin embedding station, microtome (where available) — or ready H&E slides. Microhaematocrit centrifuge, capillary tubes, sealant, PCV reader. Haemocytometer, WBC diluting fluid, microscope. Giemsa stain, Diff-Quik stain, immersion oil. Portable chemistry analyser or spectrophotometer, reagent strips. Urine dip-sticks, centrifuge, urine samples, slides.

				(Diff-Quik staining).	Quik staining).	PPE.
GENERAL OBJECTIVE 9.0: Know gross and microscopic lesions of common diseases of the major body systems						
13-15	9.1 Outline the gross and microscopic lesions of common gastrointestinal diseases. 9.2 Outline lesions of common respiratory diseases. 9.3 Outline lesions of common urinary and reproductive diseases. 9.4 Outline lesions of common cardiovascular diseases. 9.5 Outline lesions of common nervous-system and musculoskeletal. 9.6 Outline lesions of common skin and integumentary diseases. 9.7 Outline forensic and	• Explain the gross and microscopic lesions of common gastrointestinal diseases. • Explain lesions of common respiratory diseases. • Explain lesions of common urinary and reproductive diseases. • Explain lesions of common cardiovascular diseases. • Explain lesions of common nervous-system and musculoskeletal. • Explain lesions of	Charts and photographs of system lesions, Projector, whiteboard, atlases of veterinary pathology, Reference textbooks, internet.	•Conduct a system-by-system review of post-mortem cases, identifying gross and microscopic lesions of GIT, respiratory, urinary/reproductive, cardiovascular, nervous, integumentary diseases. • Carryout routine meat inspection •Identify lesions and condemned organs. •Investigate a simulated case of mass mortality (suspected poisoning). •Complete a notifiable-disease report form. •Use a digital app/photo log to	Guide students to; •Conduct a system-by-system review of post-mortem cases, identifying gross and microscopic lesions of GIT, respiratory, urinary/reproductive, cardiovascular, nervous, integumentary diseases. • Carryout routine meat inspection •Identify lesions and condemned organs. •Investigate a simulated case of mass mortality (suspected poisoning). •Complete a notifiable-disease report form. •Use a digital app/photo log to document lesions during necropsy and submit to a class shared dashboard.	Pathology specimens (gross and slides), Notifiable-disease report templates, simulated case materials, computer, PPE.

	toxicological pathology. 9.8 Outline the role of the pathologist in One-Health surveillance, zoonotic disease detection and reporting to veterinary authorities.	common skin and integumentary diseases. • Explain forensic and toxicological pathology. • Discuss the role of the pathologist in One-Health surveillance, zoonotic disease detection and reporting to veterinary authorities.		document lesions during necropsy and submit to a class shared dashboard.		

Course Assessment:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

YEAR TWO SEMESTER ONE

SHEEP AND GOAT PRODUCTION

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: SHEEP AND GOAT PRODUCTION	**COURSE CODE: AHP 211**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip the student with knowledge and skills in the production and management of sheep and goats.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Understand the economic, social and ecological importance of sheep and goats in Nigeria. 2.0 Understand the identification of Nigerian indigenous sheep and goat breeds. 3.0 Know reproductive management and breeding programmes for small ruminants. 4.0 Know how to formulate diets and apply feeding management for sheep and goats. 5.0 Understand housing and routine husbandry systems for small ruminants. 6.0 Understand young, growing, breeding and culled stock from kid/lamb to market. 7.0 Know preventive health and disease management to small-ruminant flocks. 8.0 Know process, store and market small-ruminant products in Nigerian markets. 9.0 Understand records management, economics and integrated small-ruminant systems.		

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: SHEEP AND GOAT PRODUCTION	COURSE CODE: AHP 211	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip the student with knowledge and skills in the production and management of sheep and goats.		
GENERAL OBJECTIVE 1.0: Comprehend the economic, social and ecological importance of sheep and goats in Nigeria.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define small ruminants. 1.2 Distinguish sheep (Ovis aries) from goats (Capra hircus). 1.2 Outline anatomical and behavioural differences in sheep and goat 1.3 Outline Nigerian sheep and goat populations. 1.4 Describe Nigeria as the largest small-ruminant producer in West Africa. 1.5 Describe the	• Explain small ruminants. • Distinguish sheep (Ovis aries) from goats (Capra hircus). • Discuss anatomical and behavioural differences in sheep and goat. • Discuss Nigerian sheep and goat populations. • Describe Nigeria as the largest small-ruminant producer in West Africa. • Discuss the	Whiteboard, projector. Reference textbooks. FAOSTAT and NBS data, Sheep and goat photos.	• Identify sheep and goats based on physical and behavioural features on live animals. • Visit a local sheep/goat market; document trade volumes and species. • Map Nigerian small-ruminant population across the 6 geopolitical zones. • Profile ram	Guide students to; • Identify sheep and goats based on physical and behavioural features on live animals. • Visit a local sheep/goat market; document trade volumes and species. • Map Nigerian small-ruminant population across the 6 geopolitical zones. • Profile ram market in Nigeria.	Live animals, Market access, Country map, Market data.

	economic products of sheep and goat. 1.6 Describe the social and religious importance of sheep and goat. 1.7 Describe the ecological role of sheep and goat. 1.8 Explain the small-ruminant value chain. 1.9 Explain the AfCFTA and Middle-East export opportunity.	economic products of sheep and goat: meat (mutton, chevon), milk, skin (Sokoto Red premium leather), manure, wool/hair, breeding stock. • Discuss the social and religious importance of sheep and goat • Outline the ecological role of sheep and goat: browsing weed control, manure for cropping and integration with crops. • Discuss the small-ruminant value chain: producer → trader → butcher/processor → consumer/exporter. • Discuss the AfCFTA and Middle-East export opportunity.		market in Nigeria.		
GENERAL OBJECTIVE 2.0: Understand the identification of Nigerian indigenous sheep and goat breeds.						

2-3	2.1 Explain Nigerian sheep breeds and their distribution: 2.2 Describe Yankasa Breed. 2.3 Explain Uda breed: 2.4 Explain Balami breed. 2.5 Describe West African Dwarf (WAD) sheep: 2.6 Explain Nigerian goat breeds 2.7 Describe Sokoto Red Breed: 2.8 Describe Sahel goat breed. 2.9 Describe WAD goat. 2.10 Describe Kano Brown breed. 2.11 Describe exotic breeds used for crossing 2.12 Describe NAPRI, NACGRAB conservation work on indigenous breeds.	• Explain Nigerian sheep breeds and their distribution: Yankasa (Middle Belt/North), Uda (North), Balami (North-East), West African Dwarf (South). • Discuss Yankasa breed. • Discuss Uda Breed. • Explain Balami Breed. • Discuss West African Dwarf (WAD) breed. • Discuss Nigerian goat breeds • Discuss Sokoto Red breed. • Discuss Sahel goat breed. • Discuss Kano Brown breed. • Discuss exotic breeds used for crossing: Boer (meat), Saanen (dairy), Anglo-Nubian, Red Sokoto × Saanen. • Discuss NAPRI,	Breed photos, Reference textbooks (Adu and Ngere). NAPRI/NIAS materials, Live animals. Projector.	• Identify 8 Nigerian sheep and goat breeds from photos and live specimens. • Measure body weight, body length, height at withers on 5 animals. • Score body condition (BCS 1–5) on 10 small ruminants. • Profile NAPRI breed-conservation activities. • Compose a breed-selection guide for a chosen Nigerian zone.	Guide students to: • Identify 8 Nigerian sheep and goat breeds from photos and live specimens. • Measure body weight, body length, height at withers on 5 animals. • Score body condition (BCS 1–5) on 10 small ruminants. • Profile NAPRI breed-conservation activities. • Compose a breed-selection guide for a chosen Nigerian zone.	Photos, animals. Scale, tape. BCS chart. NAPRI data. Guide template.

		NACGRAB conservation work on indigenous breeds.				
GENERAL OBJECTIVE 3.0: Know reproductive management and breeding programmes for small ruminants.						
4-5	3.1 Outline reproductive parameters. 3.2 Describe signs of oestrus. 3.3 Describe breeding seasonality. 3.4 Differntiate natural service from artificial insemination (AI). 3.5 Describe oestrous synchronization. 3.6 Explain AI. 3.7 Outline breeding programmes.	• Discuss reproductive parameters: puberty 6–12 month; oestrous cycle 17–21 d; oestrus 24–48 h (sheep), 12–36 h (goats); gestation 145–155 d (sheep), 148–155 d (goats). • Explain signs of oestrus: restlessness, mounting, vulvar swelling, mucus, bleating, tail wagging. • Explain breeding seasonality: WAD largely aseasonal; Sahel breeds shorter day-length influence. • Distinguish natural service from artificial insemination (AI). • Discuss oestrous synchronisation: $PGF_2\alpha$, CIDR,	Reproduction references, whiteboard, Reference textbooks, Projector.	• Detect oestrus on a flock or simulated case. • Apply CIDR or progestagen sponge insertion (simulation or with supervision). • Conduct pregnancy diagnosis by abdominal ballottement. • Assist a normal lambing or kidding (or observe). • Calculate prolificacy and lambing rate from sample flock data. • Calculate reproductive efficiency: lambing/kidding	Guide students to: • Detect oestrus on a flock or simulated case. • Apply CIDR or progestagen sponge insertion (simulation or with supervision). • Conduct pregnancy diagnosis by abdominal ballottement. • Assist a normal lambing or kidding (or observe). • Calculate prolificacy and lambing rate from sample flock data. • Calculate reproductive efficiency: lambing/kidding rate, prolificacy, mortality. • Maintain breeding records: ear tag,	Live flock. CIDR/sponges. Pregnant ewes/does. Lambing/kidding facility. Calculator. Record book.

		progestagen sponges, ram/buck effect. • Explain AI: oestrus detection, semen handling, intra-cervical or laparoscopic intra-uterine insemination. • Discuss breeding programmes: pure-breeding (conserve breeds), cross-breeding (improvement — Boer × WAD, Sokoto Red × Saanen), selection (BLUP).		rate, prolificacy, mortality. • Maintain breeding records: ear tag, mating date, parturition date, litter size.	mating date, parturition date, litter size.	
GENERAL OBJECTIVE 4.0: Know how to formulate diets and apply feeding management for sheep and goats.						
6-7	4.1 Describe small-ruminant digestive anatomy. 4.2 Differentiate sheep (grazers) from goats (browsers) and management implications. 4.3 Describe nutritional requirements for animals. 4.4 Describe water	• Discuss small-ruminant digestive anatomy: rumen, reticulum, omasum, abomasum. • Distinguish sheep (grazers) from goats (browsers) and management implications. • Explain nutritional requirements: maintenance,	Forage samples, NRC tables, Reference textbooks, Projector.	• Identify 10 Nigerian forages and concentrates. • Formulate maintenance, gestation and lactation diets by Pearson square. • Apply urea treatment to a crop residue sample. • Calculate dry	Guide students to • Identify 10 Nigerian forages and concentrates. • Formulate maintenance, gestation and lactation diets by Pearson square. • Apply urea treatment to a crop residue sample. • Calculate dry matter	Feed samples. Calculator. Urea, residues. NRC tables. Materials. Farm access.

	requirements for animals. 4.5 Explain Nigerian forages. 4.6 Explain Nigerian concentrates. 4.7 Describe crop residues. 4.8 Describe urea treatment of crop residues to improve digestibility. 4.9 Explain maintenance formulation, growing, gestation and lactation diets by Pearson square. 4.10 Describe feeding systems. 4.11 Explain the application minerals and vitamins and deficient areas.	growth, gestation, lactation per NRC. • Discuss water requirements: 3–6 L/d adult. • Explain Nigerian forages: Andropogon, Pennisetum, Panicum, Brachiaria, Stylosanthes, Centrosema, Calopogonium, cassava leaves, Leucaena, Gliricidia, Moringa. • Explain Nigerian concentrates: maize, sorghum, millet, rice bran, wheat offal, palm-kernel cake, groundnut cake, soybean meal. • Discuss crop residues: maize stover, sorghum stover, rice straw, groundnut haulms, cowpea haulms. • Discuss urea treatment of crop residues to improve digestibility (with		matter intake (DMI) for a 35 kg ewe at gestation. • Construct a feeding trough for cut-and-carry. • Visit a Nigerian small-ruminant feeding operation.	intake (DMI) for a 35 kg ewe at gestation. • Construct a feeding trough for cut-and-carry. • Visit a Nigerian small-ruminant feeding operation.	

		caution). • Explain maintenance formulation, growing, gestation and lactation diets by Pearson square. • Discuss feeding systems: intensive (cut-and-carry, concentrate), semi-intensive (grazing + concentrate), extensive (pasture/range). • Explain the application minerals and vitamins: salt licks, mineral blocks; Cu, Zn, Se, vitamin E in deficient areas.				
GENERAL OBJECTIVE 5.0: Understand housing and routine husbandry systems for small ruminants.						
8	5.1 Outline housing systems: tethering, free-range scavenging, paddocking, semi-intensive. 5.2 Outline housing requirements. 5.3 Outline routine husbandry practices.	• Explain housing systems: tethering, free-range scavenging, paddocking, semi-intensive (yard + grazing), intensive (zero-grazing). • Explain housing requirements: shelter from rain/sun/cold;	Whiteboard, marker, Reference textbooks. Projector.	• Construct a low-cost shelter using local materials (wood, palm thatch, mud bricks). • Apply slatted floor (raised) to reduce parasite-load. • Provide feed	Guide studentrs to: • Construct a low-cost shelter using local materials (wood, palm thatch, mud bricks). • Apply slatted floor (raised) to reduce parasite-load. • Provide feed trough, water trough, mineral	Housing access. Materials. Ear tags. Hoof tools. Banding kit. Plan template, Burdizzo.

	5.4 Describe Nigerian climate-adaptation features (link to climate-smart livestock).	ventilation; dry, slatted or earthen floor; predator-proof. • Explain routine husbandry practices: identification (ear tag, tattoo, brand), hoof trimming, dehorning (where required), castration (banding, surgical, Burdizzo), shearing (in wool breeds), tail docking (in long-tailed breeds where required for hygiene). • Discuss Nigerian climate-adaptation features (link to climate-smart livestock).		trough, water trough, mineral lick station. • Inspect the institutional sheep/goat house; identify deviations. • Construct a small slatted-floor pen (or model). • Apply ear-tag identification on 10 animals. • Demonstrate hoof trimming on a sheep or goat. • Demonstrate banding castration on a kid/lamb (or model). • Compose a housing plan for a 50-doe enterprise.	lick station. • Inspect the institutional sheep/goat house; identify deviations. • Construct a small slatted-floor pen (or model). • Apply ear-tag identification on 10 animals. • Demonstrate hoof trimming on a sheep or goat. • Demonstrate banding castration on a kid/lamb (or model). • Compose a housing plan for a 50-doe enterprise.	
GENERAL OBJECTIVE 6.0: Understand young, growing, breeding and culled stock from kid/lamb to market.						
9-10	6.1 Explain the meaning of young, growing, breeding, and culled stock in livestock	• Explain the meaning of young, growing, breeding, and culled stock in livestock production.	Whiteboard. BCS chart. Reference textbooks. Projector.	• Care for a newborn lamb/kid (or simulation). • Apply creep	Guide students to: • Care for a newborn lamb/kid (or simulation). • Apply creep feeding	Newborn animals. Creep feed. Scale, BCS chart. Selection criteria. Handling facility.

	production. 6.2 Outline the stages of growth of kids/lambs from birth to market age. 6.3 Differentiate between breeding stock and culled stock in sheep and goat production. 6.4 Describe the characteristics of healthy kids/lambs at different growth stages. 6.5 Explain feeding requirements for young and growing stock. 6.6 Describe management practices for breeding stock. 6.7 Explain factors used in selecting animals for breeding purposes. 6.8 Explain reasons for culling animals in livestock production. 6.9 Describe marketing procedures for mature goats and	• Discuss the stages of growth of kids/lambs from birth to market age. • Distinguish between breeding stock and culled stock in sheep and goat production. • Explain the characteristics of healthy kids/lambs at different growth stages. • Explain feeding requirements for young and growing stock. • Discuss management practices for breeding stock. • Explain factors used in selecting animals for breeding purposes. • Explain reasons for culling animals in livestock production. • Discuss marketing procedures for mature goats and sheep.		feeding to a group of kids. • Weigh and BCS-score 10 animals; calculate ADG. • Select 5 animals for culling based on criteria. • Apply pre-slaughter handling on a small group. • Calculate dressing percentage from sample data.	to a group of kids. • Weigh and BCS-score 10 animals; calculate ADG. • Select 5 animals for culling based on criteria. • Apply pre-slaughter handling on a small group. Calculate dressing percentage from sample data.	Calculator.

	sheep.					
GENERAL OBJECTIVE 7.0: Know preventive health and disease management to small-ruminant flocks.						
11-12	7.1 Explain the concept of preventive health management in small-ruminant production. 7.2 List common diseases affecting sheep and goats. 7.3 Describe the causes, symptoms, and modes of transmission of small-ruminant diseases. 7.4 Explain vaccination schedules and deworming programmes for small ruminants. 7.5 Describe biosecurity measures used in preventing disease outbreaks in flocks. 7.6 Explain the importance of sanitation and proper housing in disease prevention. 7.7 List common	• Explain the concept of preventive health management in small-ruminant production. • Explain common diseases affecting sheep and goats. • Discuss the causes, symptoms, and modes of transmission of small-ruminant diseases. • Explain vaccination schedules and deworming programmes for small ruminants. • Discuss biosecurity measures used in preventing disease outbreaks in flocks. • Explain the importance of sanitation and proper housing in disease prevention. • Enumerate common parasites affecting small ruminants and their control measures. • Explain appropriate	Whiteboard, Marker Reference textbooks. Projector.	• Identify common diseases and parasites affecting sheep and goats. • Demonstrate vaccination and deworming techniques in small ruminants. • Prepare an administration of basic medications under supervision. • Carry out cleaning and disinfection of pens, feeders, and watering equipment. • Demonstrate quarantine and isolation procedures for sick animals. • Identify signs of ill health in sheep and goats. • Routine inspection of flock health status and body condition scoring.	Guide students to: • Identify common diseases and parasites affecting sheep and goats. • Demonstrate vaccination and deworming techniques in small ruminants. • Prepare an administration of basic medications under supervision. • Carry out cleaning and disinfection of pens, feeders, and watering equipment. • Demonstrate quarantine and isolation procedures for sick animals. • Identify signs of ill health in sheep and goats. • Routine inspection of flock health status and body condition scoring.	PPR vaccine. FAMACHA cards. McMaster slides. Hoof tools. CMT kit. Plan template.

	parasites affecting small ruminants and their control measures. 7.8 Describe appropriate feeding and nutritional practices that promote animal health. 7.9 Explain the procedures for isolation and treatment of sick animals.	feeding and nutritional practices that promote animal health. • Explain the procedures for isolation and treatment of sick animals.		• Prepare simple health management schedules for small-ruminant flocks. • Carryout proper feeding and watering practices for disease prevention	• Prepare simple health management schedules for small-ruminant flocks. • Conduct proper feeding and watering practices for disease prevention	
\]GENERAL OBJECTIVE 8.0: Know process, store and market small-ruminant products in Nigerian markets.						
13	8.1 Outline the importance of small-ruminant products in the Nigerian economy. 8.2 Explain various products obtained from small ruminants such as meat, milk, skin, wool, and manure. 8.3 Describe the processes involved in slaughtering and dressing small ruminants.	• Explain the importance of small-ruminant products in the Nigerian economy. • Discuss various products obtained from small ruminants such as meat, milk, skin, wool, and manure. • Discuss the processes involved in slaughtering and dressing small ruminants. • Explain hygienic methods of processing	Whiteboard, Marker Reference textbooks. Projector.	•Plan organised slaughter at a registered abattoir. •Apply humane slaughter: stunning where permitted; halal slaughter per Sharia. •Carryout slaughter, skinning, evisceration, dressing, chilling. •Maintain cold chain: chill to 4 °C within 24 h. •Identify primal	Guide students to; •Plan organised slaughter at a registered abattoir. •Apply humane slaughter: stunning where permitted; halal slaughter per Sharia. •Carryout slaughter, skinning, evisceration, dressing, chilling. •Maintain cold chain: chill to 4 °C within 24 h.	Abattoir access. Carcass, knives. Suya ingredients. Salt, skin. Market access. Plan template.

	8.4 Explain hygienic methods of processing small-ruminant products. 8.5 Describe the equipment and materials used in processing and storage of small-ruminant products. 8.6 Describe appropriate methods of preserving and storing meat, milk, and skin products. 8.7 Explain packaging and transportation procedures for small-ruminant products. 8.8 Outline marketing channels for small-ruminant products in Nigerian markets. 8.9 Explain factors affecting pricing and demand of small-ruminant products.	small-ruminant products. • Discuss the equipment and materials used in processing and storage of small-ruminant products. • Describe appropriate methods of preserving and storing meat, milk, and skin products. • Explain packaging and transportation procedures for small-ruminant products. • Discuss marketing channels for small-ruminant products in Nigerian markets. • Explain factors affecting pricing and demand of small-ruminant products.		cuts: shoulder, rack, loin, leg. •Apply ageing for tenderness (2–7 d at 1–4 °C). •Perform value-addition: kilishi (dried meat), suya, balangu, smoked meat, sausages. •Process skin: salting/drying for leather industry (link to Sokoto Red → "Moroccan" leather). •Process milk (in dairy goats): pasteurisation, cheese, yoghurt. •Identify Nigerian markets: live-animal markets (Sallah peak), butcher, supermarket, online. •Calculate pricing and profit per animal. •Identify AfCFTA and livestock export	•Identify primal cuts: shoulder, rack, loin, leg. •Apply ageing for tenderness (2–7 d at 1–4 °C). •Perform value-addition: kilishi (dried meat), suya, balangu, smoked meat, sausages. •Process skin: salting/drying for leather industry (link to Sokoto Red → "Moroccan" leather). •Process milk (in dairy goats): pasteurisation, cheese, yoghurt. •Identify Nigerian markets: live-animal markets (Sallah peak), butcher, supermarket, online. •Calculate pricing and profit per animal. Identify AfCFTA and livestock export opportunities.	

				opportunities.		
GENERAL OBJECTIVE 9.0: Understand records management, economics and integrated small-ruminant systems						
14-15	9.1 Explain the concept and importance of records management in small-ruminant production. 9.2 Explain the different types of farm records used in integrated small-ruminant systems. 9.3 Outline procedures for keeping accurate production, health, breeding, and financial records. 9.4 Explain the principles of farm economics in small-ruminant production. 9.5 Explain factors affecting the profitability of integrated small-ruminant systems. 9.6 Explain the concept and components of integrated small-	• Explain the concept and importance of records management in small-ruminant production. • Discuss the different types of farm records used in integrated small-ruminant systems. • Explain procedures for keeping accurate production, health, breeding, and financial records. • Explain the principles of farm economics in small-ruminant production. • Discuss factors affecting the profitability of integrated small-ruminant systems. • Explain the concept and components of integrated small-ruminant farming systems. • Discuss suitable	Record templates. Lecture notes, whiteboard . Reference textbooks. Projector.	• Identify essential records: breeding, parturition, growth, health, feed, sales. • Apply paper and digital record-keeping (Excel, dedicated farm software). • Calculate KPIs: lambing/kidding %, prolificacy, mortality, growth, FCR. • Compose a 1-year budget for a 50-doe enterprise: startup costs, operating costs, revenue. • Compute break-even, ROI and payback period. • Examine integrated small-ruminant systems: with crops (manure for crop, residues for animal); with	Guide students to: • Identify essential records: breeding, parturition, growth, health, feed, sales. • Apply paper and digital record-keeping (Excel, dedicated farm software). • Calculate KPIs: lambing/kidding %, prolificacy, mortality, growth, FCR. • Compose a 1-year budget for a 50-doe enterprise: startup costs, operating costs, revenue. • Compute break-even, ROI and payback period. • Examine integrated small-ruminant systems: with crops (manure for crop, residues for animal); with fish/poultry (integrated farming); with agroforestry	Plan rubric. Sample data. Submission portal. Assessment, NLTP Document,

	ruminant farming systems. 9.7 Describe suitable crops, livestock, and by-products used in integrated farming systems. 9.8 Describe the advantages of integrating small-ruminant production with crop farming.	crops, livestock, and by-products used in integrated farming systems. • Elucidate the advantages of integrating small-ruminant production with crop farming.		fish/poultry (integrated farming); with agroforestry (silvopasture; link to climate-smart). • Identify Nigerian National Livestock Transformation Plan (NLTP). • Identify funding sources: • Recognise SGA Items: 1/3 (reproduction), 8 (climate-smart), 15 (entrepreneurship), 24 (biosecurity). • Apply integrated knowledge to a capstone small-ruminant enterprise plan.	(silvopasture; link to climate-smart). • Identify Nigerian National Livestock Transformation Plan (NLTP). • Identify funding sources: BOA, CBN Anchor Borrowers, AGSMEIS, NIRSAL. • Recognise SGA Items: 1/3 (reproduction), 8 (climate-smart), 15 (entrepreneurship), 24 (biosecurity). • Apply integrated knowledge to a capstone small-ruminant enterprise plan.	

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

SWINE PRODUCTION

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: SWINE PRODUCTION	**COURSE CODE: AHP 212**	**CONTACT HOURS:3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with basic knowledge and skills in swine production.		

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

1.0 Know the breeds of pig their characteristics and economic importance.
2.0 Know the types of housing and equipment required for pig rearing.
3.0 Understand the management of adult pig.
4.0 Know the care and management of females during gestation, parturition and of the young.
5.0 Understand nutrition of pig.
6.0 Understand the importance of improvement of pig through selection and breeding.
7.0 Understand health and disease problems of pig.
8.0 Understand swine finishing, marketing and digital-commerce skills

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY						
COURSE TITLE: SWINE PRODUCTION		**COURSE CODE: AHP 212**		**CONTACT HOURS:3 HOURS/WEEK**		
		CREDIT UNIT: 3		**THEORETICAL: 1 HOUR/WEEK**		
YEAR: II SEMESTER: I		**PRE-REQUISITE:**		**PRACTICAL: 2 HOURS/WEEK**		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: The course is designed to equip students with basic knowledge and skills in swine production.						
GENERAL OBJECTIVE 2.0: Know the breeds of pig and their characteristics						
THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Explain the external features of a typical pig. 1.2 Describe the various breeds of pig in Nigeria and their characteristics. 1.3 Describe the distribution and adaptation of pigs in Nigeria. 1.4 Explain the classification pigs into end-use categories. 1.5 Outline the economic importance of pigs in Nigeria.	• Explain the external features of a typical pig. • Discuss the various breeds of pig in Nigeria and their characteristics. • Discuss the distribution and adaptation of pigs in Nigeria. • Explain the Classification of pigs into end- use categories. • Explain the economic importance of pigs in Nigeria (meat, manure and biogas)	Lecture notes. Multi-media Projection, Associated Teaching aids, Whiteboard, Charts. Posters, Maps.	• Identify the breeds of pig and their external characteristics.	Guide the students • Identify the breeds of pig and their external characteristics.	Pig farms, Different Breeds.
General Objective 2.0: Know the types of housing and equipment required for pig rearing						
2-3	2.1 List the factors influencing the	• Enumerate the factors influencing	Lecture notes. Multi-media	• Design pig housing on paper following	Guide the students to;	Photographs

	location of pig house. 2.2 Describe the design of a pig house in relation to climatic conditions. 2.3 List the equipment needed for rearing of pig	the location of pig house. • Explain the design of a pig house in relation to climatic conditions. • Discuss the equipment needed for rearing of pig	Projection, Associated Teaching aids, Whiteboard. Charts. Posters. .	instructions. • Present for exercise grading and assessment. • Carry out construction project to design. • Demonstrate feeding, water troughs and other environmental physical needs of the animals. • Observe farm example • Write a technical report on a visit to farms.	• Design pig housing on paper following instructions. • Present for exercise grading and assessment. • Carry out construction project to design. • Demonstrate feeding, water troughs and other environmental physical needs of the animals. • Organise farm visit.	Posters Plans Design examples. Pig, Equipment tore.
General Objective 3.0: Understand the management of pig.						
4-5	3.1 Explain the importance of procurement of stock from reliable sources 3.2 Explain the concept of Quarantine in pig production. 3.3 Describe the major systems of pig management. 3.4 List the importance of good sanitation, ventilation and exercise in the management of pig.	• Discuss the importance of procurement of stock from reliable sources • Explain the concept of Quarantine in pig production. • Explain the major systems of pig management. • Enumerate the importance of good sanitation, ventilation and exercise in the	Lecture notes. Multi-media Projection, Associated Teaching aids, Whiteboard. Charts.	• Carryout routine Management practices: - cleaning - feeding - Watering.	Guide studentsto; • Carryout routine Management practices: - cleaning - feeding - Watering.	Disinfectants. Farm premises. Feeder, waterer. Identification Equipment/Tools.

	3.4 Describe the various methods of identification 3.5 Describe parasites control in pigs. 3.6 Explain the principles of farm record keeping.	management of pig. • Explain the various methods of identification • Explain parasites control in pigs. • Explain the principles of farm record keeping.				
General Objective 4.0: Know the care and management of females during gestation, parturition and the young.						
6-7	4.1 Define gestation period. 4.2 Explain steaming up and farrowing 4.3 Explain farrowing. 4.4 Describe the signs of onset of parturition and the common problems encountered during parturition. 4.5 List the importance of post- parturition management like: i. Treatment of Navel with iodine ii. Feeding colostrum iii. Fostering iv. Creep feeding 4.6 Describe the care for the young with the Dams before weaning. 4.7 Describe the process of weaning piglets. 4.8 List the reasons and	• Discuss gestation period. • Explain steaming up and farrowing • Discuss farrowing. • Explain the signs of onset of parturition and the common problems encountered during parturition • Enumeratethe importance of post-parturition management like: i. Treatment of Navel with iodine ii. Feeding colostrum iii. Fostering iv. Creep feeding • Explain the care for the young with the Dams before weaning. • Explain the process of	Lecture notes. Multi-media Projection, Associated Teaching aids, Whiteboard. Charts. Posters.	• Identify the key management activities for pregnant Sow. . • Identify the signs of impending parturition. • Perform effective management care of the young. • Carryout castration procedure under close supervision.	Guide students to; • Identify the key management activities for pregnant Sow. • Identify the signs of impending parturition. • Perform effective management care of the young. • Carryout castration procedure under close supervision.	Pregnant Sow, Iodine Tincture, Piglets, Creep feeds, Castration kits, iodine Tincture, -disinfectant\ - Gloves Anesthesia

	methods of castration in piglets.	weaning of piglets. • Enumerate the reasons and methods of castration in piglets.				
General Objective 5.0: Understand nutrition of pig						
8-9	5.1 Describe the digestive system of pig. 5.2 Describe the various dry and wet feedstuffs for feeding pigs. 5.3 Outline the nutrient requirements of pigs and their daily feed and water allowance. 5.4 Describe the symptoms of some nutritional diseases of Pigs	• Discuss the digestive system of pig. • Explain the various dry and wet feedstuffs for feeding pigs. • Explain the nutrient requirements of pigs and their daily feed and water allowance • Discuss the symptoms of some nutritional diseases of Pigs	Lecture notes. Multi-media Projector, Associated Teaching aids, Whiteboard. Charts.	• Carry out limited dissection of digestive systems. • Identify the components of the gastro intestinal tract. • Identify a number of different feedstuffs for pigs • Observe the management of pig feeding systems.	Guide students to; • Carry out limited dissection of digestive systems. • Identify the components of the gastro intestinal tract. • Identify a number of different feedstuffs for pigs • Observe the management of pig feeding systems.	Live/cadaver animal, Digestive System model, Dissecting kits, Grazing land, Feedstuffs.
General Objective 6.0: Understand the importance of improvement of pig through selection and breeding						
10-11	6.1 Define Selection and Breeding 6.2 list the factors considered in selection and breeding of animals. 6.3 Describe the desirable characteristics or conformation of male and female pigs for breeding.	• Explain Selection and Breeding • Discuss the factors considered in selection and breeding of animals. • Explain the desirable characteristics or conformation of male and female pigs for breeding.	Lecture notes Whiteboard Charts and Photographs Projector. Internet.	• Create an appropriate selection and breeding programme for pigs. • Identify the features of good conformation in breeding pigs. • Identify signs of oestrus in pigs. • Demonstrate the practical implications	Guide students to; • Create an appropriate selection and breeding programme for pigs. • Identify the features of good conformation in breeding pigs.	Breeding animals. Breeding records. Pigs showing oestrus signs and breeding activity.

	6.4 List the effects of pre-breeding, in-breeding and cross breeding on performance of pigs. 6.5 Describe the following: i. Age at puberty ii. Oestrus cycle and signs of heat iii. Photoperiodity in breeding iv. Age at first service v. Mating methods vi. Mating ratios 6.6 Highlight the importance of flushing in pigs. 6.7 Explain piglet percentage and pseudopregnancy in pigs	• Expatiate the effects of pre- breeding, in-breeding and cross breeding on performance of pigs. • Discuss the following: i. Age at puberty ii. Oestrus cycle and signs of heat iii. Photoperiodity in ii. breeding i. Age at first service ii. Mating methods iii. Mating ratios •Enumerate the importance of flushing in pigs. •Explain piglet percentage and pseudopregnancy in pigs		of the breeding cycle of pig • Design nutrition strategy for 'flushing' in pigs. .	• Identify signs of oestrus in pigs. • Demonstrate the practical implications of the breeding cycle of pig • Design nutrition strategy for 'flushing' in pigs. .	
General Objective 7.0: Understand health and disease problems of pig.						
12-13	7.1 Describe the signs of ill health in pigs. 7.2 List the common diseases of pigs. 7.3 Describe the symptoms and control of swine diseases.	• Explain the signs of ill health in pigs. • Enumerate the common diseases of pigs. • Discuss the symptoms and control of swine diseases.	Lecture notes -Slides -Photographs -White Board -Marker -Charts	•Identify signs of all health and compromised welfare of pigs. •Identify common diseases symptoms. Suggest various control measures.	Guide students to: •Identify signs of all health and compromised welfare of pigs. •Identify common diseases symptoms. Suggest various control measures.	Sick animals. Healthy, Animals. Treatment Materials.
General Objective 8.0; Apply swine finishing, marketing and digital-commerce skills						
14-15	8.1 Explain BCS using	•. Explain Body	BCS chart	• Conduct BCS scoring	Guide students to;	Live finishing

	photographs and live pigs 8.2 Outline pricing models with worked examples 8.3 Explain break-even calculation on worksheets 8.4 Describe Nigerian pork-market dynamics 8.5 Describe halal-alternative niche-market awareness (non-halal certification routes for pork). 8.6 Describe digital marketing channels for swine products. 8.7 Explain Nigerian e-commerce platforms for processed pork products. 8.8 Outline social-media content strategy. 8.9 Describe B2B (restaurants, hotels) and B2C (retail) channels for processed pork (sausage, bacon, ham). 8.10 Describe food-safety	Condition Scoring (BCS) for finishing pigs on the 1–5 scale • Outline live-weight, dressed-weight and carcass-weight pricing models. • Describe finishing-period feed budgets (90 kg live-weight target at 5.5–6 months) and break-even calculation. • Discuss Nigerian pork-market characteristics: church-feast spikes, religious-festival peaks, urban niche markets • Discuss digital marketing channels with screenshots. • Explain Nigerian e-commerce platforms. • Outline social-media content strategy. • Explain marketing channels for processed pork (sausage, bacon, ham) • Discuss NAFDAC/SON compliance.	for swine, Worked example sheets, Nigerian pork-market data.	on a cohort of finishing pigs. • Take live-weight measurements with weighing scale. • Calculate dressing percentage from sample data. • Compute a feed budget and break-even price. • Set up a WhatsApp Business catalogue for swine products. • Create product photographs and short marketing videos using a smartphone. • Compose a 7-day social-media content calendar. • Draft a B2B pitch deck for a restaurant client.	• Conduct BCS scoring on a cohort of finishing pigs. • Take live-weight measurements with weighing scale. • Calculate dressing percentage from sample data. • Compute a feed budget and break-even price. • Set up a WhatsApp Business catalogue for swine products. • Create product photographs and short marketing videos using a smartphone. • Compose a 7-day social-media content calendar. • Draft a B2B pitch deck for a restaurant client.	pigs, Weighing scale, BCS chart, Calculators, worksheets, Product samples for photography, Computer with PowerPoint for pitch-deck.

	and product-labelling compliance (NAFDAC, SON) for processed pork sold online.					

COURSE ASSESSMENT:

Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%
Total: 100%

ANIMAL DISEASES I

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL DISEASES I	**COURSE CODE: AHP 213**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is design to equip student with the knowledge of drugs for efficient production		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know animal diseases and their economic effect in livestock industry 2.0 Know the characteristic features of sick animals 3.0 Know the systemic examination of animals for sickness 4.0 Know common poison conditions and injuries in livestock 5.0 Know the major groups of nutrients and the metabolic deficiencies in livestock 6.0 Know important ailments peculiar to the young in animals.		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL DISEASES I	COURSE CODE: AHP 213	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the knowledge of basic diseases of livestock and their economic importance		
GENERAL OBJECTIVE 1.0: Know animal diseases and their economic effect in livestock industry		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Define the following terms i. Diseases, Diagnosis, Pandemic ii. Infection, Endemic, Contagious iii. Sporadic, Pathogenesis 1.2 Explain the direct and indirect effects of animal ill health on the economy of farmer and the nation 1.3 Explain geographical basis of livestock diseases spread in Nigeria 1.4 List national programmes that have been mounted against certain prevalent animal diseases in Nigeria 1.5 list certain factors that	• Explain the following terms; diseases,diagnosis,pandemic, infection, endemic, contagious, sporadic and pathogenesis • Discuss the effect of direct and indirect effect of animal ill health the economy of farmer and the nation • Explain geographical basis of livestock disease spread in Nigeria • Explain factors that may predispose animal to diseases. • Discuss national programmes that have been mounted against certain prevalent animal diseases in Nigeria	White board, markers, lecture notes, internet.	• Identify sick animals • Identify effect of diseases in farm animals • Identify the effect of disease outbreak in livestock	Guide students to; • Identify sick animals • Identify effect of diseases in farm animals Identify the effect of disease outbreak in livestock	Animal, PPE

	may predispose animals to diseases					
General Objective .2.0 Know the characteristic features of sick animals						
3-4	2 .1 List features of sick animals 2.2 Explain the importance of closely observing animals regularly for early defection of ill health 2.2 List early signs of ill health in livestock and poultry. 2.3 Explain parameters that can indicate ill health in livestock. 2.4 Explain immediate measures on detecting signs of ill health	• Enumerate features of sick animals • Explain the importance of closely observing animals regularly for early defection of ill health • Explain early signs of ill health in livestock and poultry e.g. lagging behind while grazing appearance of coat, feathers, texture of feaces and urine, droopiness dullness of eyes, gait etc. • Explain parameters that can indicate ill health in livestock e.g. pulse, heart beat, respiratory and rumeral rate, temperature etc • Explain immediate measures on detecting signs of ill health e.g. isolation of sick stock.	White board, markers, charts, lecture notes, internet.	• Identify all the early signs of ill health in livestock and poultry e.g. lagging behind while grazing, appearance of coat, feathers, texture and colour of faeces and urine etc • Identify and measure parameters that can indicate ill health in livestock e.g. pulse, heartbeat, respiratory and rumeral rate, temperature both with and without thermometer etc	Guide students to; • Identify all the early signs of ill health in livestock and poultry e.g. lagging behind while grazing, appearance of coat, feathers, texture and colour of faeces and urine etc Identify and measure parameters that can indicate ill health in livestock e.g. pulse, heartbeat, respiratory and numeral rate, temperature both with and without thermometer etc	Thermometer, stethoscope, vaginal speculum, examination table, PPE
General Objective 3.0: Know the systemic examination of animals for sickness						
5-7	3.1 Describethe step by step systemic examination of sick animals	• Discuss the step by step systemic examination of sick animals	Markers, lecture notes,	• Carryout preliminary	Guide students to: • Carryout	Thermometer, Stethoscope, Percussion,

	3.2 Explain close examination and distance observation of farm animals 3.3 Describe the effect of delayed medication in farm animals	• Discuss close examination and distance observation in farm animals • Explain the effect of delayed medication after clinical signs	charts, internet.	examination of animals	preliminary examination of animals	instrument, Diagnostic kit, examination, table microscope, test-tubes, examination lamp.
General Objective 4.0: Know common poison conditions and injuries in livestock						
8-10	4.1 Describe livestock poisons, their sources, clinical signs and their palliative, handling. 4.1 Describe the early signs of ill health in livestock and poultry 4.3 Describe proper handling and care of surface and internal injuries encountered in the farm eg burns cuts, and other mechanical wounds,intestinal injuries	• Explain livestock poisons, their sources, clinical signs and their palliative, handling. • Explain the early signs of ill health in livestock and poultry • Explani proper handling and care of surface and internal injuries encountered in the farm eg burns cuts, and other mechanical wounds,intestinal injuries	Markers, lecture notes, charts, internet.	• Identify all the early signs of ill health in livestock and poultry e.g. lagging behind while grazing, appearance of coat, feathers, texture of feaces and urine, droopiness dullness of eyes, gait etc. • Apply proper handling, care of surface and internal injury encaunteredin the farm	Guide students to; • Identify all the early signs of ill health in livestock and poultry e.g. lagging behind while grazing, appearance of coat, feathers, texture of feaces and urine, droopiness dullness of eyes, gait etc. • Apply proper handling, care of surface and internal	Dressing materials, analgsesic, antibiotics, animal

					injury encaunter edin the farm	
General Objective 5.0 Know the major groups of nutrients and the metabolic deficiencies in livestock						
11-12	5.1 List the major groups of nutrients for farm animals. 5.2 List deficiency syndromes of the nutrients in farm animals 5.3 Explain sources and functions of proteins, fats, and carbohydrates in animal feeds. 5.4 List the common nutrients diseases 5.5 Explain the deficiency syndromes ofvitamins A D K B complex C 5.6 Explain the causes, clinical signs and ap control measures of some metabolic conditions in animals,. 5.7 Explain the causes, prevention and handling of the following deficiency conditions in animals. (i)Mineral defienciency (ii)Avitaminosis	•Discuss the major groups of nutrients for farm animals. •Discuss the deficiency syndromes of the nutrients in farm animals •Discuss sources and functions of proteins, fats, and carbohydrates in animal feeds. •Explain the common nutrients diseases •Discuss the deficiency syndromes ofvitamins A D K B complex C •Explain the causes, clinical signs and apply control measures of some metabolic conditions in animals •Discuss the causes, prevention and handling of the following deficiency conditions in animals. Mineral deficiency Avitaminosis	Projector Maker, white board, lecture notes, internet Marker, white board, lecture notes, videos internet	• Identify the causes, clinical signs and apply control measures of some metabolic conditions in animals, ketosis, pregnancy toxaemia parturient paresis, grass tetany etc. • Identify the deficiency syndromes ofvitamins A D K B complex C	Guide students to; • Identify the causes, clinical signs and apply control measures of some metabolic conditions in animals, ketosis, pregnancy toxaemia parturient paresis, grass tetany etc. • Identify the deficiency syndromes ofvitamins A D K B complex C	Animal

General Objective 6.0: Know important ailments peculiar to the young in animals						
13-15	6.1 Describe the care of the pregnant and young animals to reduce incidence of diseases among the young. 6.2 Describe the therapys caring of young and pregnant animals to reduce the incidence of 6.3 diseases 6.4 Describe the processes, clinical signs and control of some important diseases of neonantes	• Discuss the care of the pregnant and young animals to reduce incidence of diseases among the young. • Discuss the therapys caring of young and pregnant animals to reduce the incidence of diseases • Discuss the process and clinical signs of navel ill.	Markers, white board, lecture note, internets	• Identify all the early signs of ill health in livestock and poultry e.g. lagging behind whilegrazing, appearance of coat, feathers, texture of feaces and urine, droopiness dullness of eyes, etc.	Guide students to: • Identify all the early signs of ill health in livestock and poultry e.g. lagging behind while grazing, appearance of coat, feathers, texture of feaces and urine, droopiness etc.	Thermometer, animal, PPE.

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

CLINICAL TECHNIQUES I

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: CLINICAL TECHNIQUES I	**COURSE CODE: AHP 214**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in clinical-technique required of an animal-health technologist		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the scope of clinical techniques, the layout of a veterinary clinic, biosafety, PPE and clinical record-keeping; 2.0 Know safe and humane restraint of cattle, sheep/goat, pig, poultry, dog/cat and horse for clinical procedures; 3.0 Understand systematic clinical history-taking, physical examination and vital-signs assessment, and document findings in SOAP format; 4.0 Know drugs administer by appropriate routes (oral, parenteral, topical) and calculate doses correctly; 5.0 Know venipuncture and blood collection in farm animals, dogs and poultry for diagnostic purposes; 6.0 Know ship urine, faecal, milk, swab, skin-scraping, biopsy and semen samples for laboratory analysis; 7.0 Understand aseptic technique, manage wounds, place basic suture patterns and apply common bandages; 8.0 Comprehend basic reproductive examination; 9.0 Know vaccines administer by appropriate routes and develop a herd-health calendar. 10.0 Apply species-specific artificial insemination, oestrus synchronization and pregnancy diagnosis techniques		

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: CLINICAL TECHNIQUES I	COURSE CODE: AHP 214	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in clinical-technique required of an animal-health technologist		
GENERAL OBJECTIVE 1.0: Understand the scope of clinical techniques, the layout of a veterinary clinic, biosafety, PPE and clinical record-keeping.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define clinical technique, clinical examination, clinical case and related terms. 1.2 Outline the scope of clinical techniques. 1.3 Describe the layout of a basic veterinary clinic. 1.4 Describe biosafety and biosecurity in clinical practice 1.5 Describe PPE for different clinical procedures	• Explain clinical-technique terms. • Explain the scope of clinical techniques. • Explain veterinary clinic layout. • Discuss biosafety and biosecurity in clinical practice • Explain PPE selection. • Explain clinical record-keeping. • Discuss professional ethics and communication.	Whiteboard, markers, projector, charts. Lecture notes, reference textbooks Internet,.	• Tour the institutional veterinary clinic; • Identify zones and equipment. • Demonstrate hand-washing technique (WHO 6 steps), gowning, gloving (sterile and non-sterile). • Demonstrate safe handling and disposal of sharps and biohazard waste. • Examine sample clinical record forms	Guide students to; • Tour the institutional veterinary clinic; • Identify zones and equipment. • Demonstrate hand-washing technique (WHO 6 steps), gowning, gloving (sterile and non-sterile). • Demonstrate safe handling and disposal of sharps and biohazard	Veterinary clinic, hand-washing station, antiseptic soap. Surgical gowns, gloves, masks, face shield, aprons. Sharps container, biohazard bags. Sample record forms, PPE.

	1.6 Describe clinical record-keeping 1.7 Outline professional ethics and communication skills with clients.			(patient register, case file, prescription). • Conduct a role-play of client communication (intake, history-taking).	waste. • Examine sample clinical record forms (patient register, case file, prescription). • Conduct a role-play of client communication (intake, history-taking).	
GENERAL OBJECTIVE 2.0: Know safe and humane restraint of cattle, sheep/goat, pig, poultry, dog/cat and horse for clinical procedures.						
2	2.1 Describe principles of safe and humane restraint and welfare considerations. 2.2 Describe restraint of cattle. 2.3 Describe restraint of sheep and goat. 2.4 Describe restraint of pig. 2.5 Describe restraint of poultry. 2.6 Describe restraint of dog and cat. 2.7 Describe restraint of horse. 2.8 Describe principles of low-stress handling. 2.9 Describe handler	• Discuss principles of safe and humane restraint and welfare considerations restraint. • Discuss restraint of cattle. • Discuss restraint of sheep and goat. • Discuss restraint of pig. • Discuss restraint of poultry. • Discuss restraint of dog and cat. • Discuss restraint of horse. • Discuss low-stress handling. • Discuss handler safety.	Charts of restraint techniques, Projector, whiteboard, Reference textbooks, internet.	• Demonstrate halter application, head-gate restraint and tail jack on cattle. • Demonstrate lap restraint and casting on sheep/goat. • Demonstrate snare restraint on pig. • Demonstrate single-hand and two-hand poultry restraint. • Demonstrate muzzle, towel restraint and scruff on dog and cat. • Demonstrate halter,	Guide students to: • Demonstrate restraint of cattle. • Demonstrate restraint of sheep/goat. • Demonstrate restraint of pig. • Demonstrate restraint of poultry. • Demonstrate restraint of dog and cat. • Demonstrate restraint of horse. • Demonstrate low-stress group handling.	Live animals (cattle, sheep, goat, pig, poultry, dog, cat, horse). Halters, head-gate, casting ropes, tail strap, twitch. Pig snare, hurdle, cat carrier, towel, muzzle. Curved race, sorting gate, PPE.

	safety.			twitch and stock restraint on horse (where available). • Demonstrate low-stress group handling using a curved race.		
GENERAL OBJECTIVE 3.0: Understand systematic clinical history-taking, physical examination and vital-signs assessment, and document findings in SOAP format.						
3	3.1 Describe clinical history-taking 3.2 Describe general appearance assessment. 3.3 Describe vital signs 3.4 Describe physical-examination techniques 3.6 Describe systematic examination of body systems 3.7 Describe common clinical signs and their differential interpretation. 3.8 Describe documentation in SOAP format	•Discuss the clinical history-taking. •Discuss general appearance assessment. •Discuss vital signs and reference ranges. •Discuss physical examination techniques. •Discuss systematic body-system examination. •Discuss common clinical signs. •Discuss SOAP-format documentation.	Charts of vital-signs ranges. Projector, whiteboard, sample exam forms. Reference textbooks, internet.	•Take a complete history from a simulated client (role-play). •Take rectal temperature, heart rate and respiratory rate on cattle, sheep/goat, pig, poultry and dog. •Conduct a full systematic physical examination on a healthy animal and on a clinical case. •Score body condition (BCS) on cattle, goat and dog. •Auscultate lungs, heart and rumen with a stethoscope. •Document a case in	Guide students to: •Take a complete history. •Take vital signs. •Conduct systematic physical examination. •Score body condition. •Auscultate body systems. •Document a case in SOAP format.	Live animals. Clinical/digital thermometer, stethoscope, watch. BCS chart, SOAP-format examination forms. PPE.

				SOAP format.		
GENERAL OBJECTIVE 4.0: Know drugs Administer by appropriate routes (oral, parenteral, topical) and calculate doses correctly.						
4	4.1 Describe routes of drug administration 4.2 Describe selection of route. 4.3 Describe injection techniques 4.4 Describe injection sites by species 4.5 Describe drug calculation 4.6 Describe water-medication calculation for poultry. 4.7 Describe controlled-drug handling. 4.8 Describe withdrawal periods for meat, milk and eggs.	• Discuss routes of drug administration. • Discuss route selection. • Discuss injection technique. • Discuss injection sites by species. • Discuss drug calculation. • Discuss water-medication calculation. • Discuss controlled-drug handling. • Discuss withdrawal periods for meat, milk and eggs..	Charts of injection sites,. Projector, whiteboard. Reference textbooks (BNF for Animals; Plumb's Veterinary Drug Handbook). Internet.	• Demonstrate drawing up of drug from a vial; expel air. • Demonstrate IM, SC, IV (jugular) and intramammary injection on cattle/goat (or model). • Demonstrate oral drenching of sheep/goat using a drenching gun. • Demonstrate eye-drop and water-medication for poultry. • Calculate doses for given clinical scenarios (e.g., oxytetracycline 10 mg/kg for a 250-kg cow at 200 mg/ml). • Calculate dilution for in-water medication of 1,000 broilers.	• Guide students to: • Draw up drug from a vial. • Demonstrate injection routes. • Demonstrate oral drenching. • Demonstrate eye-drop and water medication. • Calculate doses. • Read drug labels.	Syringes (1–20 ml), needles (18–25 G). Sample drugs (saline, antibiotic vials). Drenching gun, eye droppers. Calculator, drug labels, chart of injection sites. Live animals/models, PPE.

				• Read drug labels and identify withdrawal periods.		
GENERAL OBJECTIVE 5.0: Know venipuncture and blood collection in farm animals, dogs and poultry for diagnostic purposes.						
5-6	5.1 Describe purposes of blood collection 5.2 Describe venipuncture sites by species 5.3 Describe equipment for venipuncture 5.4 Describe pre-collection preparation 5.5 Describe venipuncture technique. 5.6 Describe post-collection 5.7 Describe troubleshooting 5.8 Describe biosafety and sharps handling during venipuncture.	•Discuss purposes of blood collection. •Discuss venipuncture sites by species. •Discuss equipment for venipuncture. •Discuss pre-collection preparation. •Discuss venipuncture technique. •Discuss post-collection care. •Discuss troubleshooting. •Discuss biosafety and sharps handling during venifpuncture.	•Charts of venipuncture sites, sample tubes. •Projector, whiteboard. •Reference textbooks, internet, videos.	•Demonstrate jugular venipuncture in cattle/sheep/goat. •Demonstrate coccygeal venipuncture in cattle. •Demonstrate ear-vein blood collection in pig (where available). •Demonstrate cephalic and jugular venipuncture in dog. •Demonstrate brachial-vein collection in poultry. •Label tubes and pack samples for transport to laboratory. •Practise vein localisation on a	Guide students to: •Demonstrate jugular venipuncture. •Demonstrate coccygeal venipuncture. •Demonstrate ear-vein collection in pig. •Demonstrate cephalic and jugular in dog. •Demonstrate brachial collection in poultry. •Label tubes and pack samples. •Practise on a vein-pad model.	Live animals, restraint equipment. Vacutainer system, blood-collection tubes (EDTA, plain, heparin, fluoride). Syringes, needles, butterfly needles. Alcohol swabs, cotton wool, plaster, tourniquet. Sharps container, sample-transport box, vein-pad model, PPE.

				vein-pad model first.		
GENERAL OBJECTIVE 6.0: Know ship urine, faecal, milk, swab, skin-scraping, biopsy and semen samples for laboratory analysis.						
7	6.1 Describe urine sampling 6.2 Describe faecal sampling 6.3 Describe milk sampling for mastitis. 6.4 Describe 6.5 Describe skin scraping for ectoparasites. 6.6 Describe biopsy techniques 6.7 Describe semen collection 6.8 Describe sample labelling, packaging and shipping	• Explain urine sampling. • Explain faecal sampling. • Explain milk sampling. • Explain swab collection. • Explain skin scraping. • Explain biopsy techniques. • Explain semen collection. • Explain sample labelling and shipping.	Charts, projector, whiteboard, Sample collection materials, Reference textbooks, internet.	• Collect a urine sample from a dog (free-catch, manual expression). • Collect a rectal-grab faecal sample from cattle. • Collect a milk sample using a strip cup; perform CMT. • Collect nasal, ocular and vaginal swabs from a goat or dog. • Perform deep skin scraping on a mange-affected animal; prepare a slide. • Perform fine-needle aspiration on a tumour or abscess (model). • Demonstrate semen collection from a cock by abdominal massage; observe under microscope.	Guide students to: • Collect urine, faeces, milk. • Collect swabs. • Perform skin scraping. • Perform FNA. • Demonstrate semen collection. • Label, package and ship samples.	Sample bottles, urine cups, faecal containers. CMT paddle, reagent, milk samples. Swabs (rayon-tipped), Amies/Cary-Blair transport medium. Scalpel blades, mineral oil, slides, cover-slips. FNA needles, syringes. Cock, restraint chute, microscope. Cold-chain shipping box, ice packs. Chain-of-custody forms, PPE.

				• Label, package and complete a chain-of-custody form for samples.		
GENERAL OBJECTIVE 7.0: Understand aseptic technique, manage wounds, place basic suture patterns and apply common bandages.						
8-9	7.1 Describe principles of asepsis. 7.2 Describe surgical-site preparation draping. 7.3 Describe operator preparation 7.4 Describe surgical instrument identification 7.5 Describe wound classification 7.6 Describe wound management 7.7 Describe suture materials 7.8 Describe basic suture patterns 7.9 Describe bandaging techniques. 7.10 Describe post-operative care.	•Explain principles of asepsis. •Explain surgical-site preparation. •Explain operator preparation. •Explain surgical instruments. •Explain wound classification. •Explain wound management. •Explain suture materials and needles. •Explain basic suture patterns. •Explain bandaging techniques. •Explain post-operative care.	Charts,. Projector, whiteboard. Reference textbooks, internet.	•Demonstrate surgical hand-scrub and gowning/gloving (closed technique). •Demonstrate clipping, scrubbing and draping of a surgical site. •Identify and assemble a basic surgery pack. •Demonstrate wound cleaning, debridement and irrigation on a model. •Demonstrate simple interrupted, continuous, horizontal mattress and cruciate sutures on synthetic skin or pig-skin. •Demonstrate the instrument tie. •Apply figure-of-	Guide students to: •Perform surgical scrub and gowning. •Prepare a surgical site. •Assemble a surgery pack. •Demonstrate wound cleaning and debridement. •Practice suture patterns on a model. •Apply bandages. •Manage a clinical wound case.	Surgical scrub solution, brush, hand towels. Sterile gowns, gloves, drapes. Clippers, scissors, scalpels, forceps. Synthetic skin / pig skin / sponge. Suture materials (absorbable, non-absorbable; various sizes). Needle holders, suture scissors. Bandaging materials (gauze, cotton, crepe, adhesive tape), PPE.

				eight, spica and Robert-Jones bandages. •Manage a clinical wound case from cleaning to bandaging.		
GENERAL OBJECTIVE 8.0: Comprehend basic reproductive examination						
10-11	8.1 Describe sexual anatomy of farm animals (male and female reproductive tracts) 8.2 Describe sexing 8.3 Describe oestrus signs 8.4 Describe oestrus in farm animals. 8.5 Describe basic rectal palpation in cattle 8.6 Describe vaginal examination 8.7 Describe basic semen evaluation,. 8.8 Describe pregnancy detection methods, 8.9 Describe parturition	• Explain sexual anatomy of farm animals (male and female reproductive tracts). • Explain sexing. • Explain oestrus signs. • Explain oestrus cycles. • Explain basic rectal palpation. • Explain vaginal examination. • Explain basic semen evaluation. • Explain pregnancy detection. • Explain parturition.	Charts of reproductive anatomy and oestrus signs, Projector, whiteboard, Reference textbooks, internet.	• Sex day-old chicks by vent sexing (with experienced demonstrator). • Sex adult chickens, ducks and turkeys by sexual dimorphism. • Inspect cows for oestrus signs at the institutional farm. • Practise rectal palpation on a cow rectal-palpation simulator (or under direct supervision on a farm cow). • Use a vaginal speculum on a	Guide students to: • Sex day-old chicks and adult birds. • Inspect cows for oestrus signs. • Practise rectal palpation. • Use a vaginal speculum. • Collect and evaluate semen. • Examine semen under microscope. • Observe parturition.	Day-old chicks, adult birds. Live cows, vaginal speculum. Rectal-palpation simulator (where available). Cock, restraint chute. Microscope, haemocytometer, slides. Heat-detection patches, AI calendar charts. Reproductive-tract specimens. PPE (long-arm gloves for rectal palpation).

				cow/goat (post-mortem tract or live). • Collect semen from a cock by abdominal massage; evaluate macroscopically. • Examine fresh semen under microscope; estimate motility and morphology. • Observe parturition (live or video).		
GENERAL OBJECTIVE 9.0: Know vaccines administer by appropriate routes and develop a herd-health calendar.						
12-13	9.1 Describe types of vaccines. 9.2 Describe routes of vaccination 9.3 Describe vaccination schedules. 9.4 Describe cold-chain handling of vaccines. 9.5 Describe adverse reactions and their management. 9.6 Describe a herd-health calendar and programme	•Explain types of vaccines. •Explain routes of vaccination. •Explain vaccination schedules. •Explain cold-chain handling. •Explain adverse reactions. •Explain herd-health programme. •Explain documentation and reporting.	Charts of vaccination schedules, projector, whiteboard, vacination cards. Reference textbooks, internet.	•Pack a vaccine cool-box for a field vaccination day; verify temperature with a thermometer. •Reconstitute a freeze-dried vaccine (e.g. Newcastle disease). •Administer vaccine to poultry by drinking-	Guide students to; •Pack a vaccine cool-box for a field vaccination day; verify temperature with a thermometer. •Reconstitute a freeze-dried vaccine (e.g. Newcastle disease). •Administer vaccine to poultry by drinking-water, eye-drop, intramuscular	Vaccines (live and inactivated). Cool box, ice packs, thermometer. Syringes, needles, eye droppers, wing-web pricker. Live animals (poultry, goats). Vaccination-card and herd-health-record templates. Adverse-reaction

	9.7 Describe documentation and reporting 9.8 Outline the technologist's role in mass-vaccination campaigns and One-Health surveillance.	•Discuss the role in mass-vaccination and One-Health surveillance.		water, eye-drop, intramuscular and wing-web routes. •Administer SC and IM vaccine to a goat/sheep. •Develop a 12-month vaccination/deworming/biosecurity calendar for a 50-doe goat herd or a 1,000-bird layer flock. •Complete a vaccination card and herd-health record. •Investigate and report a simulated adverse vaccine reaction.	and wing-web routes. •Administer SC and IM vaccine to a goat/sheep. •Develop a 12-month vaccination/deworming/biosecurity calendar for a 50-doe goat herd or a 1,000-bird layer flock. •Complete a vaccination card and herd-health record. •Investigate and report a simulated adverse vaccine reaction.	report forms, PPE.
GENERAL OBJECTIVE 10.0: Apply species-specific artificial insemination, oestrus synchronization and pregnancy diagnosis techniques						
14-15	10.1 Define Oetrus 10.2 Describe species-specific AI techniques 10.3 Describe semen collection methods by species. 10.4 Explain semen evaluation parameters.	• Explain Oetrus • Discuss species-specific AI techniques • Explainsemen collection methods by species • Explain semen evaluation parameters.	Whiteboard, lecture notes, projector	• Identify CIDR devices, $PGF_2\alpha$ and GnRH injection samples and label storage requirements. • Construct an Ov-Synch protocol calendar for a	Guide students to; • Identify CIDR devices, $PGF_2\alpha$ and GnRH injection samples and label storage requirements. • Construct an Ov-Synch protocol calendar for a cattle	CIDR, $PGF_2\alpha$, GnRH samples, Refrigerator/cooler for hormone storage, Cattle herd (institutional farm), Heat-detection record sheets, Pregnant and non-

	10.5 Describe liquid-nitrogen handling and straw thawing. 10.6 Describe Nigerian AI infrastructure. 10.7 Describe synchronisation protocols using flowcharts. 10.8 Explain activity-monitor heat detection. 10.9 Describe mount-detection aids. 10.10 Describe pregnancy-diagnosis techniques with images and ultrasound clips. 10.11 Outline sexed-semen and embryo-transfer technologies. 10.12Discuss awareness of IVF and CRISPR.	• Discuss liquid-nitrogen handling and straw thawing. • Discuss Nigerian AI infrastructure. • Describe synchronisation protocols using flowcharts. • Explain activity-monitor heat detection. • Describe mount-detection aids. • Describe pregnancy-diagnosis techniques with images and ultrasound clips. • Outline sexed-semen and embryo-transfer technologies. • Discuss awareness of IVF and CRISPR.		cattle herd. • Identify heat signs in cows by direct observation and recording. • Demonstrate rectal palpation on a non-pregnant and a pregnant cow. • Operate trans-rectal ultrasound (where institutional resources permit). • Interpret a milk-progesterone or PAG ELISA result sheet. • Identify CIDR devices, $PGF_2\alpha$ and GnRH injection samples and label storage requirements. • Construct an Ov-Synch protocol calendar for a cattle herd. •• Identify heat signs in cows by direct observation and recording.	herd. • Identify heat signs in cows by direct observation and recording. • Demonstrate rectal palpation on a non-pregnant and a pregnant cow. • Operate trans-rectal ultrasound (where institutional resources permit). • Interpret a milk-progesterone or PAG ELISA result sheet. • Identify CIDR devices, $PGF_2\alpha$ and GnRH injection samples and label storage requirements. • Construct an Ov-Synch protocol calendar for a cattle herd. • Identify heat signs in cows by direct observation and recording.	pregnant cows, Ultrasound machine, Sample ELISA result sheets, PPE, recording forms, CIDR, $PGF_2\alpha$, GnRH samples, Refrigerator/cooler for hormone storage, Cattle herd (institutional farm), Heat-detection record sheets.

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

PRINCIPLES OF PASTURE AND RANGE MANAGEMENT II

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF PASTURE AND RANGE MANAGEMENT II	**COURSE CODE: AHP 215**	**CONTACT HOURS: 2 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 1 HOUR/WEEK**
GOAL: This course is designed to equip students with the Knowledge and skills in Pasture and Range Management		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know systems of grazing; 2.0 Know the management of pasture, range and grazing reserves; 3.0 Know the improvement of pasture, range and grazing reserve; 4.0 Know pasture conservation and storage; 5.0 Understand fodder bank. 6.0 Understand climate-smart methane-mitigation and carbon-accounting practices in livestock production		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF PASTURE AND RANGE MANAGEMENT II	**COURSE CODE: AHP 215**	**CONTACT HOURS: 2 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL: 1 HOUR/WEEK**
Year: II Semester: I	**PRE-REQUISITE:**	**PRACTICAL: 1 HOUR/WEEK**
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the Knowledge and skills in Pasture and Range Management		
GENERAL OBJECTIVE 1.0: Know systems of grazing		

THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Explain the concept and importance of grazing systems in animal production. 1.2 Explain the different types of grazing systems used in livestock management. 1.3 Explain the advantages and disadvantages of continuous grazing systems. 1.4 Explain the principles and management practices of rotational grazing. 1.5 Differentiate between paddock grazing, strip grazing, zero grazing, and ranching systems. 1.6 Describe the environmental and economic effects of improper grazing practices.	• Explain the concept and importance of grazing systems in animal production. • Discuss the different types of grazing systems used in livestock management. • Discuss the advantages and disadvantages of continuous grazing systems. • Explain the principles and management practices of rotational grazing. • Differentiate between paddock grazing, strip grazing, zero grazing, and ranching systems. • Discuss the environmental and	Whiteboard, marker, Lecture notes, projector, charts	• Demonstrate of paddock layout and rotational grazing methods. • Field observation of grazing patterns of cattle, sheep, or goats. • Carry out measurements and demarcation of grazing land using simple farm tools. • Prepare a simple grazing timetable or rotational grazing plan. • Compare overgrazed and properly managed pasture areas. • Demonstrate forage availability assessment in grazing fields.	Guide Students to • Demonstrate of paddock layout and rotational grazing methods. • Field observation of grazing patterns of cattle, sheep, or goats. • Carry out measurements and demarcation of grazing land using simple farm tools. • Prepare a simple grazing timetable or rotational grazing plan. • Compare overgrazed and properly managed	PPE, Pasture, Grazing reserve. Animal

		economic effects of improper grazing practices.		• Visit to a livestock farm or ranch to observe grazing management practices.	pasture areas. • Demonstrate forage availability assessment in grazing fields. • Visit to a livestock farm or ranch to observe grazing management practices.	
General Objective 2.0: Know the management of pasture, range and grazing reserves						
3-4	2.1 Explain the objectives and principles of Pasture, range and grazing reserve management. 2.2 List different regulations controlling grazing reserves. 2.3 State reasons for the regulations listed in 2.2 above 2.4 List the factors that affect the condition of pasture, range and grazing reserves e.g. stocking density, management, fire, moisture, plant species, etc. 2.5 Describe the effects of the factors listed in 2.5 above on pasture and range	• Explain the objectives and principles of Pasture, range and grazing reserve management. • Outline different regulations controlling grazing reserves. • State reasons for the regulations listed above • Enumerate the factors that affect the condition of pasture, range and grazing reserves e.g. stocking density, management, fire, moisture, plant species, etc. • Discuss the effects of the factors listed above on pasture and range	Album of preferred pasture/range species, Lecture notes, projector textbooks,	• Identify pasture, range and grazing reserve • Identify common Pasture/range species. • Identify soil types. • Compare the effect of factors by practical plots demonstrations	Guide students to; • Identify pasture, range and grazing reserve • Identify common Pasture/range species. • Identify soil types. • Compare the effect of factors by practical plots demonstrations	Pasture, Range, Multi media, pictures, Textbooks
General Objective 3.0: Know the improvement of pasture, range and grazing reserve						

5-7	3.1 Explain the concept of pasture, range, and grazing reserve improvement. 3.2 Explain the methods used in improving natural and artificial pastures. 3.3 Outline the importance of controlled grazing in range management. 3.4 Explain the role of irrigation, fertilization, and reseeding in pasture improvement. 3.5 Describe common pasture weeds and pests and their control measures. 3.6 List the importance of grazing reserves in livestock production. 3.7 Explain methods of preventing overgrazing and land degradation.	• Explain the concept of pasture, range, and grazing reserve improvement. • Discuss the methods used in improving natural and artificial pastures. • Discuss the importance of controlled grazing in range management. • Explain the role of irrigation, fertilization, and reseeding in pasture improvement. • Explain common pasture weeds and pests and e their control measures. • Discuss the importance of grazing reserves in livestock production. • Discuss methods of preventing overgrazing and land degradation.	Lecture notes, projector, whiteboard, marker textbooks,	• Identify common pasture grasses and legumes. • Carryout land preparation techniques for pasture establishment. • Carryout pasture reseeding and planting methods. • Carryout fertilizer application on pastureland. • Identify and control of pasture weeds and pests. • Field demonstration of rotational and controlled grazing systems. • Assess grazing land condition and forage availability.	Guide students to; • Identify common pasture grasses and legumes. • Carryout land preparation techniques for pasture establishment. • Carryout pasture reseeding and planting methods. • Carryout fertilizer application on pastureland. • Identify and control of pasture weeds and pests. • Field demonstration of rotational and controlled grazing systems. • Assess grazing land condition and forage availability.	Pasture plants, range, grazing reserves, Fertilizers, manures.
General Objective: 4.0 Know pasture conservation and storage						
8-10	4.1 Define forage conservation. 4.2 Explain the importance of pasture conservation and storage. 4.3 Explain the different	• Explain forage conservation. • Explain the importance of pasture conservation and storage. • Explain the different	Lecture notes, projector, whiteboard, marker textbooks,	• Identify pasture conservation materials and equipment. • Demonstrate pasture harvesting techniques. • Carry out hay making,	Guide students to; • Identify pasture conservation materials and equipment. • Demonstrate	Grasses, legumes. Silage bags, urea, Molasses.

	methods of pasture conservation used in livestock production. 4.4 Describe the principles and procedures involved in hay making. 4.5 Explain the process of silage production and storage. 4.6 Explain materials, equipment, and structures used in pasture conservation. 4.7 Explain factors affecting the quality of conserved pasture.	methods of pasture conservation used in livestock production. • Discuss the principles and procedures involved in hay making. • Explain the process of silage production and storage. • Explain materials, equipment, and structures used in pasture conservation. • Discuss factors affecting the quality of conserved pasture.		drying, and baling. • Make silage using grasses or legumes. • Use simple silage pits or storage structures. • Determinate moisture content of forage before storage. • Identify good and poor-quality hay and silage samples. • Carryout proper stacking and storage of hay bales. • Observe and record spoilage factors in stored pasture. • Carry out maintenance and safety practices in pasture conservation and storage facilities.	pasture harvesting techniques. • Carry out hay making, drying, and baling. • Make silage using grasses or legumes. • Use simple silage pits or storage structures. • Determinate moisture content of forage before storage. • Identify good and poor-quality hay and silage samples. • Carryout proper stacking and storage of hay bales. • Observe and record spoilage factors in stored pasture. • Carry out maintenance and safety practices in pasture conservation and storage facilities.	
General Objective 5.0 Understand fodder bank						

11-13	5.1 Explain the meaning and importance of fodder bank. 5.2 List different types of fodder crops used in fodder banks. 5.3 Describe the methods of establishing and managing fodder banks. 5.4 Explain the benefits of fodder banks in livestock production. 5.5 List tools, materials, and inputs required for fodder bank establishment. 5.6 Describe harvesting, storage, and utilization methods of fodder crops. 5.7 Explain challenges associated with fodder bank management and their solutions.	• Explain the meaning and importance of fodder bank. • List different types of fodder crops used in fodder banks. • Discuss the methods of establishing and managing fodder banks. • Explain the benefits of fodder banks in livestock production. • List tools, materials, and inputs required for fodder bank establishment. • Describe harvesting, storage, and utilization methods of fodder crops. • Explain challenges associated with fodder bank management and their solutions.	Lecture notes, projector, whiteboard, marker textbooks.	• Identify common fodder crops used in fodder banks. • Carryout land preparation techniques for fodder bank establishment. • Carryout planting of fodder grasses and legumes. • Conduct watering, and fertilizer application in fodder production. • Identify tools and equipment for fodder bank management. • Practical maintenance activities such as weeding and pest control. • Carryout harvesting and preservation methods of fodder crops. • Prepare and store hay and silage from fodder materials. • Field visit to a livestock farm with an established fodder bank.	Guide students to; • Identify common fodder crops used in fodder banks. • Carryout land preparation techniques for fodder bank establishment. • Carryout planting of fodder grasses and legumes. • Conduct watering, and fertilizer application in fodder production. • Identify tools and equipment for fodder bank management. • Practical maintenance activities such as weeding and pest control. • Carryout harvesting and preservation methods of fodder crops. • Prepare and store hay and silage from fodder materials.	Cutlass, rake, spade, sprayer, sprinkler, brush cutter, chopper, wheelbarrow, cart

					• Field visit to a livestock farm with an established fodder bank.	
General Objective 6.0: Understand climate-smart methane-mitigation and carbon-accounting practices in livestock production						
14-15	6.1 Define enteric methane with mechanism explanation. 6.2Describe methane-mitigation additives. 6.3 Explain low-emission diet formulation. 6.4 Describe the Nigerian NDC commitments. 6.5Outline carbon-sequestration practices. 6.6 Describe heat-stress mitigation strategies. 6.7 Outline water-use efficiency practices. 6.8 Describe climate-resilient Nigerian breeds. 5.8 6.9 Outline carbon-credit financing.	• Explain enteric methane with mechanism explanation. • Discuss methane-mitigation additives. • Explain low-emission diet formulation. • Discuss Nigerian NDC commitments. • Elaborate carbon-sequestration practices. • Explain heat-stress mitigation strategies. • Explain water-use efficiency practices. • Discuss climate-resilient Nigerian breeds. • • Ennumerate carbon-credit financing.	Whiteboard, lecture notes, reference materials, projector, AfDB/GCF financing guides.	• Identify methane-mitigation feed additives and tannin-rich Nigerian forages (Acacia, Calliandra). • Calculate enteric methane emissions from a herd using IPCC Tier-1 formulas. • Establish a small silvopasture demonstration plot with Acacia or Leucaena. • Design a shade-and-cooling layout for a 100-head feedlot. • Establish a drought-tolerant pasture plot. • Compose a climate-smart livestock plan for a smallholder mixed farm.	• Guide identification of mitigation additives. • Guide IPCC Tier-1 calculation. • Guide silvopasture plot establishment. • Guide shade-cooling design exercise. • Guide drought-tolerant pasture establishment. • Guide climate-smart plan composition.	Acacia, Calliandra, Leucaena seed/cuttings, IPCC Tier-1 calculation worksheet,Calculator, garden tools, Drawing materials, Andropogon, Cenchrus seeds. Planning templates.

COURSE ASSESSMENT:	
Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

RABBIT PRODUCTION

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: RABBIT PRODUCTION	**COURSE CODE: AHP 216**	**CONTACT HOURS: 3 HOUSR/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in rabbit production		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know the development of rabbit industry in Nigeria; 2.0 Know the breeds of rabbit in Nigeria; 3.0 Know the system of breeding rabbits; 4.0 Know rabbit housing and equipment; 5.0 Understand rabbit management and nutrition; 6.0 Know common diseases of rabbits, their control and Treatment.		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY						
COURSE TITLE: RABBIT PRODUCTION		**COURSE CODE: AHP 216**		**CONTACT HOURS: 3 HOUSR/WEEK**		
		CREDIT UNIT: 3		**THEORETICAL: 1 HOUR/WEEK**		
YEAR: II SEMESTER: I		**PRE-REQUISITE:**		**PRACTICAL: 2 HOURS/WEEK**		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in rabbit production						
GENERAL OBJECTIVE 1.0: Know the development of rabbit industry in Nigeria						
THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-3	1.1 Explain the importance of rabbit industry in Nigeria 1.2 List the factors favorable and unfavorable to rabbit production in Nigeria 1.3 Explain the distribution and adaptation of rabbit breeds to Nigeria climates	• Discuss the importance of rabbit industry in Nigeria • Outline the factors favorable and unfavorable to rabbit production in Nigeria • Discuss the distribution and adaptation of rabbit breeds to Nigeria climates	Lecture Notes, white board, marker,			
General Objective 2.0: Know the Rabbit breeds in Nigeria						
4-6	2.1 Define terms used in rabbit production e.g. Buck, doe, kindling, caprophagel etc. 2.2 Explain rabbits classification based on:- i. Meat and fur ii. Fancy breeds	• Explain terms used in rabbit production e.g. Buck, doe, kindling, caprophagel etc. • Explain the Categorization of rabbits based on:- - Meat and fur	Lecture Notes, white board, marker,	• Identify the breeds of Rabbits	Guide students to; • Identify the breeds of Rabbits	- Live Rabbits - Different breeds of rabbit

	iii. Sizes 2.3 List the different breeds of rabbit available in Nigeria 2.4 Describe the characteristic features of different breeds of rabbits in 2.3 above	- Fancy breeds - Sizes • Enumerate the different breeds of rabbit available in Nigeria • Discuss the characteristic features of different breeds of rabbits above				
General Objective 3.0: Know the system of breeding rabbits						
7-9	3.1 List factors considered in selecting breeding stock 3.2 Explain the following in relation to rabbits:- i. Pure breeding ii. In-breeding iii. Cross- breeding 3.4 Explain the following; i. mating behavior in rabbits ii. mating methods in rabbits iii. signs of pregnancy in does iv. gestation period in rabbits v. sex determination ii. vi) age at first mating	• Explain factors considered in selecting breeding stock • Discuss the following in relation to rabbits:- - Pure breeding - In-breeding - Cross- breeding Discuss the following; - Mating behavior in rabbits - Mating methods in rabbits - Signs of pregnancy in does - Gestation period in rabbits - Sex determination - Vi) age at first mating	Lecture Notes, white board, marker,	• Select breeding stock • Carryout sexing of rabbits	Guide the students to; • Select breeding stock • Carryout sexing of rabbits	Breeding stock Rabbits
General Objective 4.0: Know rabbit housing and equipment						

10-11	4.1 Describe the types of housing suitable for rabbit 4.2 Explain the uses of the following equipment in rabbitry:- (i) Crocks and cans (ii) Feed troughs and guards (iii) Hoppers (iv) Hay mangers 4.3 Describe the maintenance of Rabbit House and equipment	• Explain the types of housing suitable for rabbit • Discuss the uses of the following equipment in rabbitry:- (i) Crocks and cans (ii) Feed troughs and guards (iii)Hoppers (iv)Hay mangers • Describe the maintenance of Rabbit House and equipment	Lecture Notes, white board, marker,	• Design a rabbit house • Construct hutches rabbits • Construct feed trough and hoppers for rabbits • Carry out routine maintenance of rabbit housing	Guide students to; • Design a rabbit house • Construct hutches rabbits • Construct feed trough and hoppers for rabbits • Carry out routine maintenance of rabbit housing	Rabbit accommodation, Hutches, Rabbit drinkers and feed troughs, Hoppers
General Objective 5.0: Understand rabbit management and nutrition						
12-13	5.1 Describe the management of Rabbit 5.2 Explain pre and post kindling care of does' 5.3 Outline the reasons and methods of identification used in rabbit management 5.4 Describe the forms of feeds used in feeding rabbits	•Discuss the management of Rabbit •Explain pre and post kindling care of does' •State reasons and methods of identification used in rabbit management •Discuss local feedstuff used for feeding rabbits e.g. legumes, grasses etc.	Lecture Notes, white board, marker,	• Locate local feeds for rabbits • Identify the raw materials in formulating rabbit feed • Formulate basic rabbit feed • Carry out the cleaning of rabbit house	Guide students to; •Locate local feeds for rabbits •Identify the raw materials in formulating rabbit feed •Formulate basic rabbit feed •Carry out the cleaning of rabbit house	Feed ingredients, shovel, milling machine, weighing scales
General Objective 6.0: Know common diseases of rabbits and the control measure						
14-15	6.1 Describe signs of ill health in rabbits e.g. sneezing, diarrhea, loss of appetite, restlessness etc 6.2 List common diseases of	• Explain the signs of ill health in rabbits e.g. sneezing, diarrhea, loss of appetite, restlessness	Lecture Notes, white board, marker,	• Identify sick and healthy rabbits • Carry out basic treatment of sick rabbits	Guide students to; • Identify sick and healthy rabbits • Carry out basic treatment of sick	Thermometer Rabbit Magnifying glass Veterinary clinic and Personnel

	rabbits: Mange , Coccidiosis 6.3 Describe some preventive measures against rabbit diseases	etc • Enumerate common diseases of rabbits: Mange , Coccidiosis • Discuss some preventive measures against rabbit diseases		• Carryout preventive measures against rabbit diseases • Visit a rabbit farm for disease observation and reportage	rabbits • Carryout preventive measures against rabbit diseases • Visit a rabbit farm for disease observation and reportage	Disinfectants Vaccines Vetmedical kit box.

COURSE ASSESSMENT:

Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%
Total: 100%

COMPUTER APPLICATION IN ANIMAL HEALTH AND PRODUCTION TECHNOLOGY

<table>
<tr><td colspan="3">PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY</td></tr>
<tr><td rowspan="2">COURSE TITLE: COMPUTER APPLICATION IN ANIMAL HEALTH AND PRODUCTION TECHNOLOGY</td><td>COURSE CODE: AHP 217</td><td>CONTACT HOURS: 2 HOURS/WEEK</td></tr>
<tr><td>CREDIT UNIT: 2</td><td>THEORETICAL: 1 HOUR/WEEK</td></tr>
<tr><td>YEAR: II SEMESTER: I</td><td>PRE-REQUISITE:</td><td>PRACTICAL: 1 HOUR/WEEK</td></tr>
<tr><td colspan="3">GOAL: This course is designed to equip students with the knowledge and skills of computer applications and digital tools for efficient management in animal health and production systems.</td></tr>
<tr><td colspan="3">GENERAL OBJECTIVES: On completion of this course, the students should be able to:

1.0 Understand basic computer concepts and applications in Livestock Production
2.0 Know how to use word processing, spreadsheets, and presentation software
3.0 Know how to apply spreadsheets in livestock data management and analysis
4.0 Understand how to use computers for record keeping in animal production systems
5.0 Know how to apply software tools for basic statistical analysis
6.0 Understand the use of ICT in animal health management
7.0 Know digital tools for farm planning, reporting, and communication
8.0 Understand basic data entry, storage, and retrieval skills
9.0 Understand Precision Livestock Farming (PLF) technologies and digital tools</td></tr>
</table>

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: COMPUTER APPLICATION IN ANIMAL HEALTH AND PRODUCTION TECHNOLOGY	COURSE CODE: AHP 217	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: 1	PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the knowledge and skills of computer applications and digital tools for efficient management in animal health and production systems.		
GENERAL OBJECTIVE 1.0: Understand basic computer concepts and applications in Livestock Production		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Define basic computer concepts (hardware, software, data, information) 1.2 Explain the role of computers in Livestock production 1.3 List common computer applications used in livestock Production 1.4 Describe the importance of ICT in modern Livestock Production	• Explain basic computer concepts (hardware, software, data, information) • Explain the role of computers in Livestock production • Enumerate common computer applications used in livestock Production • Describe the importance of ICT in modern Livestock Production	Whiteboard, markers, Lecture notes Posters showing, ICT in agriculture Textbooks	• identify actual computer system components (CPU, monitor, keyboard, mouse) • Demonstrate switching on/off and basic system navigation • Identify input and output devices • Observe and interact with a computer system • Demonstrate simple farm-related computer applications (e.g., data entry sample) • Participate in basic exercises in the	Guide students to: • identify actual computer system components (CPU, monitor, keyboard, mouse) • Demonstrate switching on/off and basic system navigation • Identify input and output devices • Observe and interact with a computer system • Demonstrate simple farm-related computer applications (e.g.,	Desktop or laptop computers Keyboard, mouse, monitor, CPU (real system units) Projector (for demonstration) Sample livestock data sheets Computer lab access Power supply/backup (generator

				computer lab	data entry sample) • Participate in basic exercises in the computer lab	or inverter where necessary)
General Objective 2.0: Know how to use word processing, spreadsheets, and presentation software						
3	2.1 Define word processing, spreadsheets, application software 2.2 List the basic features of word processing software 2.3 Explain the structure of a document 2.4 List the types of application software 2.5 List the role of computers in modern animal production.	• Explain word processing, spreadsheets, application software • Discuss the basic features of word processing software • Explain the structure of a document • Enumerate the types of application software • Enumerate the role of computers in modern animal production.	Whiteboard, markers Lecture notes Printed screenshots of software interfaces, Sample farm reports, charts ICT textbooks	• Identify common word processing, spreadsheet, and presentation software • Use word processing software to create and format documents • Use spreadsheet software to enter, organize, and calculate data • Create simple tables, charts, and graphs using spreadsheets • Develop basic presentations using presentation software • Save, retrieve, and print documents from different applications	Guide students to; • Identify common word processing, spreadsheet, and presentation software • Use word processing software to create and format documents • Use spreadsheet software to enter, organize, and calculate data • Create simple tables, charts, and graphs using spreadsheets • Develop basic presentations using presentation software • Save, retrieve, and print documents from different applications	Desktop or laptop computers Microsoft Office suite or equivalent (Word, Excel, PowerPoint) Projector and screen Sample animal production datasets Flash drives for file storage Printer Stable electricity supply or backup power

General Objective 3.0: Know how to apply spreadsheets in livestock data management and analysis						
4-5	3.1 Explain the use of spreadsheets in livestock data management 3.2 Explain the structure of a spreadsheet 3.3 Explain the functions of a spreadsheet	• Describe the use of spreadsheets in livestock data management • Describe basic spreadsheet structure (rows, columns, cells, worksheets) • Discuss common functions of a spreadsheet used in livestock data analysis • Demonstrate how spreadsheets support farm decision-making	Whiteboard and markers Lecture notes Sample livestock data sheets Printed spreadsheet examples ICT textbooks	• Organize livestock data in spreadsheet software (e.g., Excel) • Create simple tables for livestock records (feed, weight, egg production, etc.) • Use basic spreadsheet functions for calculations (sum, average, percentage) • Generate charts and graphs from livestock data	Guide students to; • Organize livestock data in spreadsheet software (e.g., Excel) • Create simple tables for livestock records (feed, weight, egg production, etc.) • Use basic spreadsheet functions for calculations (sum, average, percentage) • Generate charts and graphs from livestock data	Desktop or laptop computers Microsoft Excel or equivalent software (Google Sheets, etc.) Projector for demonstrations Sample livestock datasets (feed intake, growth records, egg production) Flash drives for saving files Printer Stable electricity supply or backup power
General Objective 4.0: Understand how to use computers for record keeping in animal production systems						
6	4.1 Define computer-based record keeping in animal production 4.2 Explain the importance of digital records in livestock	• Explain computer-based record keeping in animal production • Discuss the importance of digital records in	Whiteboard and markers Lecture notes Sample farm record	• Identify types of farm records (health, feed, production, financial) • Set up simple digital record templates using	Guide students to; • Identify types of farm records (health, feed, production,	Desktop or laptop computers Word processing

	management 4.3 Describe basic file management (create, save, retrieve, back up)	livestock management • Explain basic file management (create, save, retrieve, back up)	Charts on file organization and data flow ICT textbooks	a computer • Update livestock records accurately	financial) • Set up simple digital record templates using a computer • Update livestock records accurately	and spreadsheet software Sample livestock datasets (feed, health, production logs) Flash drives or cloud storage for backup Projector for demonstrations Reliable power supply/backup
General Objective 5.0: Know how to apply software tools for basic statistical analysis						
7-8	5.1 Define basic statistical analysis in animal production 5.2 Explain the purpose of basic statistical functions (sum, mean, percentage) 5.3 Explain basic functions to compute simple statistics	• Explain the concept of statistical analysis in animal production • Discuss basic statistical functions and their uses • Explain basic functions to compute simple statistics	Whiteboard, markers Lecture notes, ICT/statistics textbooks, Charts showing basic statistical functions	• Identify common software tools used for analysis (e.g., spreadsheets) • Enter livestock data into analysis software • Generate summary outputs (tables, simple charts)	Guide students to; • Identify common software tools used for analysis (e.g., spreadsheets) • Enter livestock data into analysis software • Generate summary outputs (tables, simple charts)	Desktop or laptop computers Spreadsheet software, Google Sheets) Sample livestock datasets (feed intake, weight gain, production

						records) Projector for demonstrations
General Objective 6.0: Understand the use of ICT in animal health management						
9	6.1 Define ICT and its role in animal health management 6.2 Explain how ICT tools support disease monitoring and reporting 6.3 Describe digital methods for recording and tracking animal health data 6.4 Outline basic procedures for reporting disease outbreaks using ICT platforms	• Explain the concept of ICT in animal health management • Discuss the importance of digital tools in disease control and monitoring • Discuss examples of ICT applications (health records, surveillance systems)	Whiteboard, markers Lecture notes, Charts or diagrams of disease reporting systems ICT and animal health manuals	• Identify common ICT tools used in animal health (databases, mobile apps, reporting systems) • Demonstrate simple use of ICT tools for recording and retrieving health data	Guide students to; • Identify common ICT tools used in animal health (databases, mobile apps, reporting systems) • Demonstrate simple use of ICT tools for recording and retrieving health data	Desktop or laptop computers Spreadsheet software or simple database tools Sample animal health datasets (vaccination, disease records) Mobile devices (optional for demonstration) Projector for demonstrations Internet access Reliable power supply/backup
General Objective 7.0: Know digital tools for farm planning, reporting, and communication						

10-11	7.1 Define digital tools used in farm planning, reporting, and communication 7.2 Explain the uses of these tools in animal production systems 7.3 Describe basic procedures for planning, reporting, and communication using digital tools	• Explain the concept and importance of digital tools in farm management • Discuss different tools used for planning, reporting, and communication	Whiteboard and markers Lecture notes Sample farm plans and reports Charts showing digital tools and their uses ICT textbooks	• Identify common tools (spreadsheets, word processors, presentation software, mobile apps, email) • Use selected digital tools to prepare simple farm plans and reports • Communicate farm information using digital platforms (e.g., email, messaging tools)	Guide students to; • Identify common tools (spreadsheets, word processors, presentation software, mobile apps, email) • Use selected digital tools to prepare simple farm plans and reports • Communicate farm information using digital platforms (e.g., email, messaging tools)	Desktop or laptop computers Software: MS Word, Excel, PowerPoint or equivalents Internet access Sample livestock datasets and farm scenarios Projector for demonstrations Flash drives or cloud storage Reliable power supply/backup
General Objective 8.0: Understand basic data entry, storage, and retrieval skills						
12-13	8.1 Explain the concepts of data entry, storage, and retrieval 8.2 Describe importance of accurate data management in animal production 8.3 Explain file organization systems (folders, directories, naming	• Explain the concepts of data entry, storage, and retrieval • Discuss importance of accurate data management in animal production • Discuss file organization systems	Whiteboard, markers Lecture notes Diagrams of file systems and storage structures ICT textbooks/ma	• Identify basic methods of entering data into computer systems • Conduct proper procedures for saving and naming files • Enter simple animal production data accurately into digital	Guide students to; • Identify basic methods of entering data into computer systems • Conduct proper procedures for	Desktop or laptop computers Spreadsheet software (e.g., MS Excel, SPSS, Google Sheets etc.,) Word

	conventions) 8.4 Describe common errors in data entry and how to avoid them	(folders, directories, naming conventions) • Discuss common errors in data entry and how to avoid them	nuals	systems • Store and retrieve files using folders and directories • Apply basic file management practices for farm records	saving and naming files • Enter simple animal production data accurately into digital systems • Store and retrieve files using folders and directories • Apply basic file management practices for farm records	processing software (for simple data entry) Flash drives or external storage devices Sample livestock datasets Projector for demonstrations Stable power supply/backup
General Objective 9.0: Understand Precision Livestock Farming (PLF) technologies and digital tools						
14-15	9.1 Define Precision Livestock Farming (PLF) 9.2 outline its principles. 9.3 Describe IoT sensors for livestock. 9.4 Explain accelerometer-based oestrus and sickness detection. 9.5 Describe drone applications in pasture monitoring, herd counting, geo-fencing. 9.6 Outline farm-management software. 9.7 Describe smartphone-	• Explain Precision Livestock Farming (PLF) • Enumerate the PLF principles. • Explain IoT sensors for livestock: RFID ear-tags, GPS collars, accelerometers, rumen boluses. • Explain accelerometer-based oestrus and sickness detection.	Lecture Notes, Textbooks, white Board, LCD projectors	• Identify RFID ear-tags, GPS collars and rumen bolus samples. • Demonstrate RFID-tag reader operation on tagged animals. • Identify drone components and demonstrate take-off/landing. • Install and operate at least two smartphone livestock-management apps. • Use of FAMACHA-	Guide students to; • Identify RFID ear-tags, GPS collars and rumen bolus samples. • Demonstrate RFID-tag reader operation on tagged animals. • Identify drone components and demonstrate	RFID ear-tags, RFID reader, GPS collar samples, Drone (small commercial unit), Tagged demonstration animals, Smartphones, internet, Smartphone apps (FECPAK G2 demo, FAMACHA-mobile,

	based applications for livestock: 9.8 Explain blockchain traceability in livestock supply chains 9.9 Describe digital herd-health dashboards and SMS-based extension delivery. 9.10 Outline computer-vision applications: body-condition scoring, lameness detection.	• Explain drone applications: pasture monitoring, herd counting, geo-fencing. • Outline farm-management software. • Explain smartphone-based applications for livestock: FECPAK G2, Telenostic, Parasight; FAMACHA-mobile (small ruminants); Cattletoday (record-keeping). • Explain blockchain traceability in livestock supply chains: from farm to fork. • Explain digital herd-health dashboards and SMS-based extension delivery. • Outline computer-vision applications: body-condition scoring, lameness detection.		mobile or equivalent for small-ruminant parasite control. • Set up a basic blockchain traceability entry (demo platform). • Compose a digital herd-health record using Excel or a free farm-management app.	take-off/landing. • Install and operate at least two smartphone livestock-management apps. • Use of FAMACHA-mobile or equivalent for small-ruminant parasite control. • Set up a basic blockchain traceability entry (demo platform). • Compose a digital herd-health record using Excel or a free farm-management app.	Cattletoday), Blockchain demo platform access, Excel templates, herd-health app trial accounts.

COURSE ASSESSMENT:	
Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

YEAR II SEMESTER II

INTRODUCTION TO MICRO-LIVESTOCK PRODUCTION

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF MICRO-LIVESTOCK PRODUCTION	**COURSE CODE: AHP 221**	**CONTACT HOURS: 2 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 1 HOUR/WEEK**
GOAL: This course is designed to equip students with the knowledge and skills to establish, manage and market climate-smart mini-livestock enterprises		

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

1.0 Understand the climate-smart attributes of micro-livestock production.
2.0 Know snail farming (heliciculture).
3.0 Know grasscutter (cane rat) farming.
4.0 Know quail production.
5.0 Know guinea fowl production.
6.0 Know pigeon and turkey production.
7.0 Know beekeeping (apiculture) and honey production.
8.0 Know edible-insect production for food and feed.
9.0 Apply marketing, processing, value-addition and entrepreneurship principles to mini-livestock enterprises.
10.0 Apply Black Soldier Fly larvae and alternative-protein production practices

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF MICRO-LIVESTOCK PRODUCTION	**COURSE CODE: AHP 221**	**CONTACT HOURS: 2 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 1 HOUR/WEEK**
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the knowledge and skills to establish, manage and market climate-smart mini-livestock enterprises		
GENERAL OBJECTIVE 1.0: Understand the climate-smart attributes of micro-livestock production.		

THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define micro-livestock and unconventional/micro-livestock 1.2 Distinguish them from conventional livestock and unconventional/micro-livestock 1.3 List common micro-livestock species in Nigeria and West Africa (snails, grasscutters, quail, guinea fowl, pigeons, turkeys, bees, edible insects etc.)	• Explain micro-livestock and unconventional/micro-livestock • Differentiate them from conventional livestock and unconventional/micro-livestock • Enumerate common micro-livestock species in Nigeria and West Africa (snails, grasscutters, quail, guinea fowl, pigeons, turkeys,	Whiteboard, markers, projector Charts Lecture notes FAO micro-livestock manuals textbooks internet.	• Identify the species of (snail pen, grasscutter colony, quail cages, guinea fowl pen, pigeon loft, beehive, insect farm). • Conduct a survey of mini-livestock farms in the local community; • Document species, scale and marketing channels. • Prepare a comparative chart on housing, feed and	Guide students to; • Identify the species of (snail pen, grass cutter colony, quail cages, guinea fowl pen, pigeon loft, beehive, insect farm). • Conduct a survey of mini-livestock farms in the local community; • Document species, scale and marketing channels. • Prepare a comparative chart on housing, feed and labour requirements for at least three mini-	Micro-livestock unit grasscutter house quail cages beehive Recording sheets, Cameras Computer systems Projector PPE etc.

	1.4 List the importance of micro-livestock to food security, animal-protein supply, women/youth empowerment, employment and rural development. 1.5 Explain climate-smart attributes of micro-livestock (low water demand, low feed intake, small space, low GHG emissions, and climate resilience). 1.6 Outline major constraints to micro-livestock production in Nigeria (poor breeding stock, predators, marketing, feed, regulation, cultural taboos). 1.7 Describe the role of micro-livestock under a One-Health framework (zoonotic risks, food safety, integrated farming).	bees, edible insects etc.) • State the importance of micro-livestock to food security, animal-protein supply, women/youth empowerment, employment and rural development. • Explain climate-smart attributes of micro-livestock (low water demand, low feed intake, small space, low GHG emissions, and climate resilience). • Outline major constraints to micro-livestock production in Nigeria (poor breeding stock, predators, marketing, feed, regulation, cultural taboos). • Discuss the role of micro-livestock		labour requirements for at least three mini-livestock species.	livestock species.	

		under a One-Health framework (zoonotic risks, food safety, integrated farming).				
GENERAL OBJECTIVE 2.0: Know snail farming (heliciculture).						
2-3	2.1 Explain common snail species kept in Nigeria 2.2 List the external and internal anatomy of the snail. 2.3 Outline the life cycle of the snail, hermaphroditism and reciprocal mating. 2.4 Describe snail housing systems such as paddock, hutch box, trench pen, plastic baskets, free-range with construction details. 2.5 List the feeding habits of snails, including preferred forages, fruits (paw-paw, banana, water melon, pineapple), concentrate, and calcium supplementation (egg shell, lime, ground	• Explain common snail species kept in Nigeria • Discuss the external and internal anatomy of the snail. • Outline the life cycle of the snail, hermaphroditism and reciprocal mating. • Discuss snail housing systems such as paddock, hutch box, trench pen, plastic baskets, free-range with construction details. • Outline the feeding habits of snails, including preferred forages (paw-paw, okra, cocoyam and banana leaves, lettuce), fruits (paw-	Charts Projector, whiteboard, textbooks Internet,	• Identify *Archachatina marginata, Achatina achatina* and *Achatina fulica* by shell features. • Construct a simple hutch-box and a trench pen for snail farming. • Stock snails at the recommended density (10–20 per m^2); record initial weights. • Feed snails with fresh leaves, fruits and a calcium supplement; mist and maintain humidity. • Collect and incubate snail eggs; record hatchability.	Guide students to; • Identify *Archachatina marginata, Achatina achatina* and *Achatina fulica* by shell features. • Construct a simple hutch-box and a trench pen for snail farming. • Stock snails at the recommended density (10–20 per m^2); record initial weights. • Feed snails with fresh leaves, fruits and a calcium supplement; mist and maintain humidity. • Collect and incubate snail eggs; record hatchability. • Treat a fungus-affected snail (clean	Live snails (*Archachatina, Achatina*), measuring tape, weighing scale. Construction materials (wood, mesh wire, sand, top soil, cocoyam leaves). Snail feed (paw-paw, lettuce, cocoyam leaf), egg shells, water mister. Hatching containers, sand, recording sheets. Harvesting basket, parboiling pots, salt,

	bone). 2.6 Describe management of snails, temperature, humidity (60–80%), shade, predator and pest control (ants, rodents, lizards). 2.7 Identify common diseases (fungal infections, bacterial foot rot) and pests affecting snails. 2.8 List the processes involved in harvesting, processing, and marketing snails	paw, banana, water melon, pineapple), concentrate, and calcium supplementation (egg shell, lime, ground bone). • Discuss management of snails, temperature, humidity (60–80%), shade, predator and pest control (ants, rodents, lizards). • Discuss common diseases (fungal infections, bacterial foot rot) and pests affecting snails. • Explain the processes involved in harvesting, processing, and marketing snails		• Treat a fungus-affected snail (clean shell, apply ash). • Harvest snails; parboil, de-shell and prepare for market.	shell, apply ash). • Harvest snails; parboil, de-shell and prepare for market.	water, knives, PPE.
GENERAL OBJECTIVE 3.0: Know grasscutter (cane rat) farming						
4-5	3.1 Describe grasscutter (*Thryonomys swinderianus*) its taxonomy and characteristics. 3.2 Describe the anatomy and	• Discuss grasscutter (*Thryonomys swinderianus*) its taxonomy and characteristics. • Discuss the anatomy and physiology relevant to	Charts Projector, whiteboard, textbooks Internet,	• Identify male and female grasscutters by external genitalia. • Inspect different grasscutter housing systems at the	• Identify male and female grasscutters by external genitalia. • Inspect different grasscutter housing systems at the institutional farm.	Live grasscutters (bucks and does), housing units. Forage (elephant

	physiology relevant to grasscutter production (incisors, gut, reproduction). 3.3 Describe breeding biology 3.4 Explain housing systems such as colony pen, individual cage, breeding unit, growers' unit, ventilation, lighting and security. 3.5 Describe feeding forages (elephant grass, guinea grass, sugarcane, maize stover, cassava peel), concentrate, salt-lick, water. 3.6 List diseases (pneumonia, coccidiosis, mange, salmonellosis), parasites (lice, mites) and predators. 3.7 Outline harvesting, humane slaughter, dressing percentage (60%) and marketing.	grasscutter production (incisors, gut, reproduction). • Discuss breeding biology • Explain housing systems such as colony pen, individual cage, breeding unit, growers' unit, ventilation, lighting and security. • Explain feeding forages (elephant grass, guinea grass, sugarcane, maize stover, cassava peel), concentrate, salt-lick, water. • List common diseases (pneumonia, coccidiosis, mange, salmonellosis), parasites (lice, mites) and predators. • Discuss harvesting, humane slaughter, dressing percentage (60%) and marketing.		institutional farm. • Set up a colony pen with one buck and 4–6 does. • Feed grasscutters with forage and concentrate; monitor intake. • Conduct a routine health check and weighing; • Record growth performance. • Carryout humane slaughter, dressing and carcass evaluation.	• Set up a colony pen with one buck and 4–6 does. • Feed grasscutters with forage and concentrate; monitor intake. • Conduct a routine health check and weighing; • Record growth performance. • Carryout humane slaughter, dressing and carcass evaluation.	grass, sugarcane), concentrate, water, salt lick. Weighing scale, recording sheets, cleaning tools. Slaughter knife, dehairing equipment, dressing tools. PPE.
GENERAL OBJECTIVE 4.0: Know quail production.						

6	4.1 Describe the Japanese quail (Coturnix coturnix japonica) and its characteristics. 4.2 List quail breeds (Bobwhite, Pharaoh, Tuxedo, English White) and the differences between meat-type and egg-type strains. 4.3 Describe housing battery cages, deep-litter, floor space (~150 cm²/bird), feeders, drinkers. 4.4 Describe brooding (35–37°C in week 1, decreasing 2–3°C per week), feeding (starter, grower, and layer rations) and watering. 4.5 Describe reproduction: sexual maturity (5–6 weeks), egg production (~250–300 eggs/year), hatchability (17 days incubation). 4.6 Explain diseases (Newcastle disease, salmonellosis, coccidiosis, ulcerative	• Discuss the Japanese quail (Coturnix coturnix japonica) and its characteristics. • Enumerate quail breeds (Bobwhite, Pharaoh, Tuxedo, English White) and the differences between meat-type and egg-type strains. • Discuss housing battery cages, deep-litter, floor space • Discuss brooding (35–37°C in week 1, decreasing 2–3°C per week), feeding (starter, grower, and layer rations) and watering. • Explain reproduction: sexual maturity (5–6 weeks), egg production (~250–300 eggs/year), hatchability (17 days incubation). • Discuss diseases (Newcastle disease, salmonellosis, coccidiosis, ulcerative enteritis) and	Charts of quail anatomy and housing. Projector, whiteboard, Reference textbooks, internet.	• Identify male and female quail by plumage colour and the cloacal-foam test (males). • Set up quail battery cages and brooder; calibrate the temperature. • Feed and water quail; record feed intake and growth. • Collect, candle and incubate quail eggs. • Process quail (slaughter, dressing, packaging) for market.	•Identify male and female quail by plumage colour and the cloacal-foam test (males). •Set up quail battery cages and brooder; calibrate the temperature. •Feed and water quail; record feed intake and growth. •Collect, candle and incubate quail eggs. •Process quail (slaughter, dressing, packaging) for market.	Live quail, battery cages, brooder and brooder lamps. Feed (starter, grower, layer), water, drinkers. Incubator, candler, weighing scale. Slaughter table, scalding and defeathering tools. Recording sheets, PPE.

	enteritis) and prevention. 4.7 Describe processing of quail meat and eggs — pickling, packaging, and marketing. 4.8 Explain therapeutic and nutraceutical claims of quail eggs with critical evaluation of the evidence.	prevention. • Explain the processing of quail meat and eggs — pickling, packaging, and marketing. • Discuss therapeutic and nutraceutical claims of quail eggs with critical evaluation of the evidence.				
GENERAL OBJECTIVE 5.0: Know guinea fowl production.						
7	5.1 Describe the helmeted guinea fowl (Numida meleagris) and its varieties (pearl, lavender, white). 5.2 Describe the natural distribution and adaptive features of guinea fowl in West Africa. 5.3 Describe housing systems — semi-intensive deep-litter, free-range and fold systems. 5.4 Describe feeding from chick mash to grower mash, with ranging on	• Discuss the helmeted guinea fowl (Numida meleagris) and its varieties (pearl, lavender, white). • Explain the natural distribution and adaptive features of guinea fowl in West Africa. • Discuss housing systems — semi-intensive deep-litter, free-range and fold systems. • Explain feeding from chick mash to grower mash, with ranging	Charts of guinea-fowl anatomy. Projector, whiteboard, photographs. Reference textbooks, internet.	• Identify the three varieties of guinea fowl (pearl, lavender, white) by plumage. • Sex adult guinea fowl by call (one-syllable for cocks, two-syllable for hens). • Inspect housing and management practices at the institutional farm. • Set up a brooder and rear keets through the first four weeks; record	Guide students to; • Identify the three varieties of guinea fowl (pearl, lavender, white) by plumage. • Sex adult guinea fowl by call (one-syllable for cocks, two-syllable for hens). • Inspect housing and management practices at the institutional farm. • Set up a brooder and rear keets through the first four weeks; record mortality. • Collect guinea-fowl	Live guinea fowl (varieties), housing, brooder and lamps. Chick and grower mash, water. Incubator, broody chicken hen, eggs. ND and fowl-pox vaccines, syringes. Recording sheets, PPE.

	natural insects. 5.5 Describe reproduction — seasonal layers hidden-nest laying habits, incubation, and the use of broody chicken hens to incubate eggs. 5.6 Describe rearing of keets and management of high mortality in the first four weeks. 5.7 Describe diseases (Newcastle disease, fowl cholera, coccidiosis) and parasite control. 5.8 Outline marketing of guinea-fowl meat and eggs.	on natural insects. • Describe reproduction — seasonal layers, hidden-nest laying habits, incubation and the use of broody chicken hens to incubate eggs. • Discuss rearing of keets and management of high mortality in the first four weeks. • Discuss diseases (Newcastle disease, fowl cholera, coccidiosis) and parasite control. • Outline marketing of guinea-fowl meat and eggs.		mortality. • Collect guinea-fowl eggs and incubate them (or use a broody chicken hen). • Conduct routine vaccination (Newcastle disease, fowl pox).	eggs and incubate them (or use a broody chicken hen). • Conduct routine vaccination (Newcastle disease, fowl pox).	
GENERAL OBJECTIVE 6.0: Know pigeon and turkey production.						
8	6.1 Describe common pigeon breeds for meat and racing 6.2 Describe pigeon housing (loft) (free-flight loft, cage system, nesting boxes, perches and feeding troughs.)	• Discuss common pigeon breeds for meat and racing • Discuss pigeon housing (loft) (free-flight loft, cage system, nesting boxes, perches and feeding troughs.)	Charts and photographs of pigeons and turkeys. Projector, whiteboard, Reference textbooks, internet.	• Construct a simple pigeon loft with nesting boxes. • Identify pigeon breeds and stages (squab, juvenile, adult). • Feed pigeons with grain mix and grit.	Guide students to; •Construct a simple pigeon oft with nesting boxes. •Identify pigeon breeds nd stages (squab, juvenile, dult). •Feed pigeons with grain ix and grit. •Identify turkey breeds at	Pigeon-loft construction materials, nesting boxes. Live pigeons, pigeon feed, grit, water. Live turkeys

	6.3 Describe pigeon feeding; grains, pigeon mix, grit (for digestion), fresh water. 6.4 Describe pigeon breeding monogamous pairing 6.5 List common turkey breeds and their characteristics. 6.6 Describe turkey housing and feeding 6.7 Describe turkey reproduction 6.8 Describe diseases of pigeon and turkey	• Discuss pigeon feeding; grains, pigeon mix, grit (for digestion), fresh water. • Discuss pigeon breeding monogamous pairing • State common turkey breeds and their characteristics. • Discuss turkey housing and feeding • Discuss turkey reproduction • Discuss diseases of pigeon and turkey		• Identify turkey breeds at the institutional farm. • Sex turkeys (snood, beard, plumage and conformation). • Vaccinate turkeys against ND and fowl pox; treat for blackhead with metronidazole if applicable.	he institutional farm. •Sex turkeys (snood, eard, plumage and onformation). •Vaccinate turkeys against ND and fowl pox; treat for lackhead with etronidazole if applicable.	(different breeds). ND and fowl-pox vaccines, syringes. Recording sheets, PPE.
GENERAL OBJECTIVE 7.0: Know beekeeping (apiculture) and honey production.						
9-10	7.1 Describe the species and races of honey bees in Nigeria 7.2 Describe colony structure and their roles and biology. 7.3 Describe types of beehives 7.4 Describe siting of an apiary 7.5 Describe basic beekeeping operations such as colony	• Discuss the species and races of honey bees in Nigeria • Explain colony structure and their roles and biology. • Discuss types of beehives • Explain siting of an apiary • Discuss basic beekeeping operations such as colony establishment,	Charts of bee anatomy and hive types. Projector, whiteboard , reference textbooks, internet.	• Identify the queen, worker and drone bees from a sample colony. • Construct or assemble a Kenya top-bar hive. • Bait and site a hive at the apiary. • Don a beekeeping suit; light a smoker; conduct a colony inspection. • Harvest combs from	Guide students to; • Identify the queen, worker and drone bees from a sample colony. • Construct or assemble a Kenya top-bar hive. • Bait and site a hive at the apiary. • Don a beekeeping suit; light a smoker; conduct a colony inspection. • Harvest combs from a colony at honey flow; extract honey using a	Bee suits, gloves, veil, boots, smoker. Top-bar hive components, frames, comb foundation. Hive tool, queen excluder, bee brush. Live colony

	establishment, inspection, splitting and requeening. 7.6 Describe bee forage and the seasonal calendar 7.7 Describe diseases, pests and absconding. 7.8 Describe harvesting, extraction and processing of honey, beeswax, propolis and royal jelly. 7.9 Explain bee safety and the pollination services bees provide to crops.	inspection, splitting and requeening. • Explain bee forage and the seasonal calendar • Discuss diseases, pests and absconding. • Explain harvesting, extraction and processing of honey, beeswax, propolis and royal jelly. • Discuss bee safety and the pollination services bees provide to crops.		a colony at honey flow; extract honey using a strainer or extractor. • Process and bottle honey for market; render beeswax. • Manage a sting incident with basic first aid.	strainer or extractor. • Process and bottle honey for market; render beeswax. • Manage a sting incident with basic first aid.	at the apiary. Honey extractor or strainer, settling tank, bottles, labels. Beeswax-rendering equipment. First-aid kit (antihistamines, EpiPen if available), PPE.
GENERAL OBJECTIVE 8.0: Know edible-insect production for food and feed.						
11	8.1 Define entomophagy and outline the rationale for edible insects as food and feed. 8.2 Describe African palm-weevil larvae prodcution 8.3 Describe house-cricket production. 8.4 Describe yellow mealworm (Tenebrio molitor) and black-	• Explainentomophagy and outline the rationale for edible insects as food and feed. • Explain African palm-weevil larvae production • Explain house-cricket production. • Explain yellow mealworm and black-soldier-fly larvae	Charts of insect life cycles. Projector, whiteboard, "Edible Insects" report. Reference textbooks, internet.	• Set up a palm-weevil larvae cultivation tub using palm-trunk pulp seeded with sugar/yeast. • Set up a small cricket-rearing crate (egg cartons, feed, water gel). • Set up a black-soldier-fly larvae bin using kitchen	Guide students to; • Set up a palm-weevil larvae cultivation tub using palm-trunk pulp seeded with sugar/yeast. • Set up a small cricket-rearing crate (egg cartons, feed, water gel). • Set up a black-soldier-fly larvae bin using kitchen waste.	Palm-trunk pulp, plastic tubs, sugar, yeast, palm-weevil starter. Cricket crate, egg cartons, cricket feed, water gel. BSFL bin, kitchen waste, BSFL starter.

	soldier-fly (Hermetia illucens) larvae production for animal feed. 8.5 Describe locust/grasshopper and termite collection in Nigeria. 8.6 Outline processing of edible insects 8.7 Explain food safety, allergen and regulatory aspects of edible insects. 8.8 Explain the use of insect protein meal as a substitute for fish meal/soybean meal in livestock feeds.	production for animal feed. • Explain locust/grasshopper and termite collection in Nigeria. • Discuss processing of edible insects • Explain food safety, allergen and regulatory aspects of edible insects. • Explain the use of insect protein meal as a substitute for fish meal/soybean meal in livestock feeds.		waste. • Harvest, blanch and dry sample insects. • Mill dried insects into flour and analyse simple proximate composition (in-house or send-out). • Demonstrate the inclusion of BSFL meal in a poultry/fish ration formulation.	• Harvest, blanch and dry sample insects. • Mill dried insects into flour and analyse simple proximate composition (in-house or send-out). • Demonstrate the inclusion of BSFL meal in a poultry/fish ration formulation.	Blanching pots, drying trays, mill, sieves. Feed-formulation worksheets, calculators, PPE.
GENERAL OBJECTIVE 9.0: Apply marketing, processing, value-addition and entrepreneurship principles to mini-livestock enterprises.						
12-13	9.1 Describe value chains for mini-livestock. 9.2 Describe marketing channels. 9.3 Describe value-addition products. 9.4 Explain simple cost–benefit analysis (CBA), break-even point, cash flow and profitability for a mini-livestock	• Describe value chains for mini-livestock. • Describe marketing channels. • Explain value-addition to products. • Explain simple cost–benefit analysis (CBA), break-even point, cash flow and profitability for a mini-livestock	Charts of value chains. Projector, whiteboard, Reference textbooks, internet, mobile devices.	• Develop a one-page business plan for a chosen mini-livestock enterprise. • Prepare a sample cost–benefit analysis spreadsheet. • Develop a sample brand and label for a mini-livestock product. • Use a digital record-	• Guide students to: • Develop a one-page business plan. • Prepare a CBA spreadsheet. • Design a brand and product label. • Use a digital record-keeping app. • Conduct a mock market visit..	Business-plan templates, CBA worksheets, calculators. Computers/tablets with Excel and design app (e.g. Canva). Sample products,

	enterprise. 9.5 Describe record-keeping 9.6 Outline access to finance, business registration, regulation, branding and packaging. 9.7 State the climate-smart and food-security advantages of mini-livestock and how to communicate them to consumers. 9.8 Describe entrepreneurship pathways — youth/women SME models, cooperatives, contract aggregator schemes, agro-tourism around mini-livestock.	enterprise. • Explain record-keeping • Discuss access to finance, business registration, regulation, branding and packaging. • State the climate-smart and food-security advantages of mini-livestock and how to communicate them to consumers. • Explain entrepreneurship pathways — youth/women SME models, cooperatives, contract aggregator schemes, agro-tourism around mini-livestock.		keeping app or Excel template to log production and sales. • Conduct a mock market visit and interact with vendors of mini-livestock products.		packaging materials, labels. Smokers, jars, bottles, drying trays. Transport for market visit, PPE.
GENERAL OBJECTIVE 10.0: Apply Black Soldier Fly larvae and alternative-protein production practices						
14-15	10.1 Describe the Black Soldier Fly (Hermetia illucens) life cycle. 10.2 Outline the rationale for BSF as alternative livestock 10.3 Describe organic waste streams	• Explain the Black Soldier Fly (Hermetia illucens) life cycle. • Explain the rationale for BSF as alternative livestock • Discuss organic waste streams suitable for BSF: brewery spent	BSF life-cycle chart. BSF feeding-trial data. BSF facility photographs .FAO Insects	• Establish a small BSF demonstration unit on the institutional farm. • Set up love-cage for adult flies and oviposition trap. • Manage a grow-out bin from neonate	Guide students • Establish a small BSF demonstration unit on the institutional farm. • Set up love-cage for adult flies and oviposition trap. • Manage a grow-out bin from neonate larvae to	BSF starter colony (sourced from research institution) Love-cage materials, oviposition pads,

	suitable for BSF: brewery spent grain, poultry manure, fruit waste, abattoir waste. 10.4 Describe BSF rearing facilities. 10.5 Explain Nigerian regulatory context: NAFDAC, NIAS, FAO Insects for Food and Feed (2021).	grain, poultry manure, fruit waste, abattoir waste. • Explain BSF rearing facilities. • Discuss Nigerian regulatory context: NAFDAC, NIASFAO Insects for Food and Feed (2021).	Edible/Feed publication., whiteboard, lecture notes	larvae to harvest (12–14 days).	harvest (12–14 days).	Grow-out bins, organic waste substrates, Harvest sieves.

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

ANIMAL PRODUCTS HYGIENE AND INSPECTION

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL PRODUCTS HYGIENE AND INSPECTION	**COURSE CODE: AHP 222**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with the knowledge and skills for the hygienic production, inspection, modern butchery, cold-chain handling, processing and value-addition of animal products and by-products		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the scope, hazards and One-Health framework of animal-products hygiene and food safety. 2.0 Know ante-mortem inspection and apply humane and halal slaughter procedures. 3.0 Know systematic post-mortem (carcass) inspection of cattle, sheep/goat, pig and poultry. 4.0 Comprehend common diseases and conditions at meat inspection and apply appropriate judgements. 5.0 Know modern butchery. 6.0 Manage the cold chain of animal products and vaccines under a HACCP framework, including data-logging and climate-smart cold-chain options. 7.0 Understand hygienic processing and preservation of meat. 8.0 Comprehend hygienic handling and processing of milk, eggs, honey, fish, hides/skins and rendered by-products). 9.0 Know food-safety management systems (HACCP, GMP, ISO 22000). 10.0 Understand livestock logistics and cold-chain transport competencies		

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL PRODUCTS HYGIENE AND INSPECTION	COURSE CODE: AHP 222	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the knowledge and skills for the hygienic production, inspection, modern butchery, cold-chain handling, processing and value-addition of animal products and by-products		
GENERAL OBJECTIVE 1.0: Understand the scope, hazards and One-Health framework of animal-products hygiene and food safety.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define animal-products hygiene, meat inspection, food safety, food-borne illness and zoonosis. 1.2 List the major animal products and by-products 1.3 State the importance of animal-products hygiene to public health, food security, trade and animal welfare. 1.4 State the One-Health framework as it applies to the human–animal–	• Explain animal-products hygiene and related terms. • List animal products and by-products. State the importance of hygiene to public health, food security, trade and animal welfare. • Outline the One-Health framework as it applies to the human–animal–environment interface in food systems. • List the major hazards	Whiteboard, markers, projector, charts. Lecture notes, textbooks, FAO/WOAH guidelines, Codex Alimentarius. Internet.	• Tour the institutional or local abattoir; • Identify the layout (lairage, stunning bay, slaughter line, evisceration, washing, chilling, by-products section). • Carryout proper hygiene and PPE for abattoir/processing work. • Survey local meat markets and identify hygiene strengths	Guide students to: • Tour the abattoir • Demonstrate proper hygiene and PPE • Survey local meat markets • Document findings in a hygiene audit	Local/institutional abattoir/ slaughter slab, transport. PPE (white coats, head caps, hair nets, gloves, boots, masks). Hygiene-audit checklist forms, cameras. Computers/pr

	environment interface in food systems. 1.5 List the major hazards in animal products such as biological, chemical and physical. 1.6 Outline regulatory bodies in Nigeria (Federal Ministry of Livestock, NAFDAC, SON, NCDC, VCN, NIAS and internationally (FAO, WHO, Codex Alimentarius).	such as biological, chemical and physical. • Outline regulatory bodies in Nigeria (Federal Ministry of Livestock, NAFDAC, SON, NCDC, VCN, NIAS and internationally (FAO, WHO, Codex Alimentarius).		and gaps. • Document findings in a hygiene-audit report on a standard checklist.		ojectors, recording sheets.
GENERAL OBJECTIVE 2.0: Know ante-mortem inspection and apply humane and halal slaughter procedures.						
2	2.1 Define ante-mortem inspection 2.2 State the purposes of ante-mortem. 2.3 Describe the procedure for ante-mortem inspection. 2.4 State conditions warranting condemnation, conditional approval or further laboratory testing. 2.4 List lairage requirements 2.5 Describe stunning	• Explain ante-mortem inspection. • Explain the inspection procedure. • Explain conditions warranting action. • Explain lairage requirements. • Explain stunning methods. • Explain slaughter types and procedures. • Outline the slaughter line.	Charts of stunning methods, halal procedure and slaughter-line layout. Projector, whiteboard, Reference textbooks,	• Conduct ante-mortem inspection on a batch of slaughter animals at the abattoir. • Carryout humane low-stress handling (curved race, no electric prods, calm tone). • Carryout or assist (under supervision and where ethics permits) different stunning methods on cattle, sheep/goat	• Guide students to: • Conduct ante-mortem inspection. • Demonstrate low-stress handling. • Observe stunning methods. • Observe halal slaughter and check compliance. • Identify	Abattoir, slaughter-line equipment, stunning equipment. Halal-compliant slaughterer / abattoir partnership. Ante-mortem inspection forms, audit checklists. Sharp knif.

	methods 2.6 Describe slaughter types and procedures. 2.7 Outline the slaughter line.			and pig. • Carryout or assist halal slaughter. • Identify welfare lapses and recommend corrections.	welfare lapses and recommend corrections.	
GENERAL OBJECTIVE 3.0: Know systematic post-mortem (carcass) inspection of cattle, sheep/goat, pig and poultry.						
3-4	3.1 Define post-mortem (carcass) inspection and state its purposes. 3.2 Describe the systematic procedure for post-mortem inspection (head → viscera → carcass). 3.3 Explain inspection of the head and associated lymph nodes. 3.4 Describe inspection of the pluck 3.5 Describe inspection of the viscera. 3.6 Describe inspection of urogenital organs. 3.7 Describe carcass inspection 3.8 Describe species-specific differences .	• Define post-mortem inspection. • Explain the systematic procedure. • Explain head inspection. • Explain pluck inspection. • Explain visceral inspection. • Explain urogenital inspection. • Explain carcass inspection. • Explain species-specific differences.	Charts of inspection points and lymph-node maps. Projector, whiteboard, Reference textbooks, internet.	• Conduct supervised post-mortem inspection on a freshly slaughtered cattle carcass: head, viscera and carcass. • Conduct post-mortem inspection on sheep/goat carcasses. • Conduct post-mortem inspection on a pig carcass with special attention to the submaxillary LN and the intestines. • Conduct post-mortem inspection on poultry carcasses with emphasis on liver, heart, intestines	Guide students to; • Conduct supervised post-mortem inspection on a freshly slaughtered cattle carcass: head, viscera and carcass. • Conduct post-mortem inspection on sheep/goat carcasses. • Conduct post-mortem inspection on a pig carcass with special attention to the submaxillary LN and the intestines.	Abattoir, freshly slaughtered carcasses (cattle, sheep, goat, pig, poultry). Inspection knives, hooks, sharpening steel. Recording sheets, judgement stamp/seal. PPE.

				and joints. • Record findings on a standard form and apply the appropriate judgement category.	• Conduct post-mortem inspection on poultry carcasses with emphasis on liver, heart, intestines and joints. • Record findings on a standard form and apply the appropriate judgement category.	
GENERAL OBJECTIVE 4.0: Comprehend common diseases and conditions at meat inspection and apply appropriate judgements.						
5	4.1 Describe lesions and judgements for tuberculosis. 4.2 Describe lesions and judgements for cysticercosis and remediation by freezing/cooking. 4.3 Describe lesions and judgements for hydatidosis. 4.4 Describe lesions and judgements for fascioliasis infestation. 4.5 Describe lesions and	• Explain lesions and judgements for tuberculosis. • Explain lesions and judgements for cysticercosis and remediation by freezing/cooking. • Explain lesions and judgements for hydatidosis. • Explain lesions and judgements for fascioliasis infestation. • Explain lesions and	Charts and photographs of lesions, atlas of meat inspection. Projector, whiteboard, sample notifiable-disease forms. Reference textbooks, internet.	• Identify at least three diseased livers (fluke), TB-suspect lymph nodes, cysticerci in beef and condemned organs. • Apply judgement (passed, total condemnation, partial condemnation, conditional approval) to specific cases.	• Identify at least three diseased livers (fluke), TB-suspect lymph nodes, cysticerci in beef and condemned organs. • Apply judgement (passed, total condemnation, partial condemnation, conditional approval) to	Abattoir, condemned organ specimens, formalin samples. Notifiable-disease report templates. Smartphones, digital photo apps, recording sheets. PPE.

	judgements for actinomycosis/actinobacillosis 4.6 Describe lesions and judgements for CBPP, FMD and PPR. 4.7 Describe lesions and judgements for anthrax, brucellosis and salmonellosis 4.8 Describe lesions and judgements for poultry diseases (Marek's disease, leucosis, ND, AI, fowl cholera, Salmonella). 4.9 Describe other disqualifying conditions (abscesses, bruising, jaundice, fevered carcass, sexual odour (boar taint), uraemia, emaciation) 4.10 Outline the role of meat inspection in zoonotic-disease detection and notifiable-disease reporting under One Health.	judgements for actinomycosis/actinobacillosis • Explain lesions and judgements for CBPP, FMD and PPR. • Explain lesions and judgements for anthrax, brucellosis and salmonellosis • Explain lesions and judgements for poultry diseases. • Explain other disqualifying conditions (abscesses, bruising, jaundice, fevered carcass, sexual odour , uraemia, • Outline the role of meat inspection in zoonotic-disease detection and notifiable-disease reporting under One Health.		• Complete a notifiable-disease report form for an anthrax-suspect case (simulated). • Photograph lesions with a smartphone and submit to a class shared dashboard for peer review.	specific cases. • Complete a notifiable-disease report form for an anthrax-suspect case (simulated). • Photograph lesions with a smartphone and submit to a class shared dashboard for peer review.	
GENERAL OBJECTIVE 5.0: Know modern butchery						
6-7	5.1 Describe carcass dressing and chilling	• Discuss carcass dressing and chilling	Charts of primal cuts,	• Carry out structured beef-	Guide students to; • Carry out	Carcasses (beef,

	5.2 List primal cuts of beef 5.3 Describe primal cuts of mutton/lamb 5.4 List primal cuts of pork 5.5 Describe poultry cuts and portions 5.6 Describe meat-grading systems 5.7 Describe retail-cut merchandising: 5.8 Describe social-media and e-commerce marketing of retail meat cuts.	• Enumerate primal cuts of beef • Discuss primal cuts of mutton/lamb • Enumerate primal cuts of pork • Discuss poultry cuts and portions • Discuss meat-grading systems • Discuss retail-cut merchandising: • Discuss social-media and e-commerce marketing of retail meat cuts.	meat-grading photos. Projector, whiteboard,. Reference textbooks Internet.	carcass cutting in an institutional or partner butchery; • Identify primal cuts. • Carry out structured mutton, pork and poultry cutting. • Grade carcasses for sex, age, conformation, fat cover and marbling; • Assign EUROP or local grade. • Vacuum-pack a sample retail cut • Design a sell-ready label (cut name, weight, sell-by date, batch ID, halal logo). • Develop a social-media post advertising a retail-cut promotion (Instagram, Facebook, WhatsApp Business). • Maintain a	structured beef-carcass cutting in an institutional or partner butchery; • Identify primal cuts. • Carry out structured mutton, pork and poultry cutting. • Grade carcasses for sex, age, conformation, fat cover and marbling; • Assign EUROP or local grade. • Vacuum-pack a sample retail cut • Design a sell-ready label (cut name, weight, sell-by date, batch ID, halal logo). • Develop a social-media post advertising a retail-cut promotion	mutton/goat, pork, poultry). Butchery knives (boning, breaking, cleaver), bandsaw or handsaw, sharpening steel. Cutting boards, scales, vacuum-packing machine, vacuum bags. Cling-film overwrap, MAP equipment (where available). Label templates, printer, social-media account. Yield-recording sheets, calculator, PPE (white coat, hair net,

				butchery yield record (carcass weight → primal weight → retail weight; calculate yield %).	(Instagram, Facebook, WhatsApp Business). • Maintain a butchery yield record (carcass weight → primal weight → retail weight; calculate yield %).	gloves, boots, mesh gloves).
GENERAL OBJECTIVE 6.0: Know the cold chain of animal products and vaccines under a HACCP framework.						
8-9	6.1 Define cold chain and its importance for milk, meat, eggs and vaccines. 6.2 Explain the principles of refrigeration. 6.3 Describe cold-chain stages of chilling at source → cold storage → transport refrigeration → wholesale → retail → consumer. 6.4 State critical temperature limits of different items such as fresh meat, raw milk, frozen meat; vaccines, semen / liquid N_2. 6.5 Describe temperature	• Explain cold chain and its importance for milk, meat, eggs and vaccines. • Explain the principles of refrigeration • .Discuss cold-chain stages of chilling at source → cold storage → transport refrigeration → wholesale → retail → consumer. • Explain critical temperature limits of different items such as fresh meat, raw milk, frozen meat; vaccines,	Charts of the cold chain and refrigeration cycle, Projector, whiteboard, sample data-loggers, lecture notes. Reference textbooks, FAO/WHO cold-chain manuals, internet.	• Calibrate a temperature data-logger and place it in a chiller/freezer; download readings after 24 h; • Plot the temperature curve. • Pack a vaccine cool-box for field use with conditioned ice packs and maintain a temperature log. • Service and clean a chiller and freezer; check thermostat and condenser coils.	Guide students to; • Calibrate a temperature data-logger and place it in a chiller/freezer; download readings after 24 h; • Plot the temperature curve. • Pack a vaccine cool-box for field use with conditioned ice packs and maintain a temperature log. • Service and	Chiller, freezer, vaccine fridge, vaccine carrier, ice packs. Temperature data-loggers, calibration thermometers. Computer/laptop for data download. HACCP-plan templates, audit checklists. Solar vaccine fridge,

	data-loggers, calibration, alarm systems and continuous monitoring. 6.6 Describe transport refrigeration and last-mile cold chain. 6.7 Describe the vaccine cold chain 6.8 Describe HACCP: the seven principles (hazard analysis, CCPs, critical limits, monitoring, corrective actions, verification, documentation). 6.9 Describe a cold-chain HACCP plan for an abattoir or dairy plant. 6.10 Explain climate-smart cold chain such as solar refrigeration, energy-efficient compressors, off-grid storage.	semen • Explain temperature data-loggers, calibration, alarm systems and continuous monitoring. • Discuss transport refrigeration and last-mile cold chain. • Explain the vaccine cold chain • Discuss HACCP: the seven principles (hazard analysis, CCPs, critical limits, monitoring, corrective actions, verification, documentation). • Explain a cold-chain HACCP plan for an abattoir or dairy plant. • Discuss climate-smart cold chain such as solar refrigeration, energy-efficient compressors, off-grid storage.		• Carry out a cold-chain audit at the institutional or local dairy unit and abattoir; identify breaks. • Develop a cold-chain HACCP plan for (a) a milk-collection centre, (b) a poultry slaughter line and (c) a vaccine cold-store. • Demonstrate use of a solar vaccine refrigerator.	clean a chiller and freezer; check thermostat and condenser coils. • Carry out a cold-chain audit at the institutional or local dairy unit and abattoir; identify breaks. • Develop a cold-chain HACCP plan for (a) a milk-collection centre, (b) a poultry slaughter line and (c) a vaccine cold-store. • Demonstrate use of a solar vaccine refrigerator.	multimeter. PPE.
GENERAL OBJECTIVE 7.0: Understand hygienic processing and preservation of meat.						

10	7.1 Describe physical preservation methods 7.2 Explain the chemical preservation methods such as salting, curing, smoking 7.3 Describe heat preservation (pasteurisation, sterilisation and canning). 7.4 Describe modern packaging:. 7.5 Describe meat-processing products:. 7.6 Describe traceability — slaughter-batch ID, supply-chain barcoding, blockchain pilots in food. 7.7 Outline microbiological standards for meat products 7.8 Describe climate-smart processing.	• Explain physical preservation methods • Explain the chemical preservation methods such as salting, curing, smoking • Explain heat preservation (pasteurisation, sterilisation and canning). • Discuss modern packaging:. • Explain meat-processing products • Discuss traceability — slaughter-batch ID, supply-chain barcoding, blockchain pilots in food. • Explain microbiological standards for meat products • Discuss climate-smart processing.	Charts, Projector, whiteboard, Reference textbooks. Internet, video clips.	• Prepare smoked beef/fish (kilishi, suya, smoked fish) using a charcoal or solar-electric smoker. • Prepare cured/salted meat (basic bacon or biltong) and document the curing schedule. • Prepare a basic fresh sausage (mince, season, stuff casing). • Vacuum-pack and label cured meat samples. • Conduct simple microbiological screening (TVC on plate-count agar..	• Guide students to: • Prepare smoked meat/fish. • Prepare cured/salted meat. • Prepare fresh sausage. • Vacuum-pack and label. • Conduct microbiological screening.	Meat and fish samples. Smoker (charcoal/electric/solar), drying racks. Curing salts (NaCl, nitrite/nitrate where allowed), spices, sugar. Mince machine, sausage stuffer, casings. Vacuum-packing machine, bags, labels. Plate-count agar, MacConkey agar, swabs, incubator. PPE.
General Objective 8.0: Comprehend hygienic handling and processing of milk, eggs, honey, fish, hides/skins and rendered by-products.						
11	8.1 Describe milk composition and the principles of clean milk production.	• Discuss milk composition and the principles of clean milk production.	Charts, Projector, whiteboard. Reference	• Conduct CMT and SCC on a milk sample; • Conduct alcohol	Guide students to; • Conduct CMT and SCC on a milk sample;	Raw milk samples, CMT paddles and reagent, SCC

	8.2 Highlight the quality tests for raw milk 8.3 Describe pasteurisation, homogenisation and the processing of yoghurt, cheese, butter, ghee and condensed/powdered milk. 8.4 Describe egg quality such as candling, Haugh unit, yolk colour and egg processing. 8.5 Describe honey quality such as moisture (<20%), HMF, diastase activity and adulteration tests; bottling and labelling. 8.6 Describe fish hygiene such as gutting, scaling, chilling on ice, smoking; histamine and ciguatoxin concerns. 8.7 Describe hides and skins such as flaying, fleshing, salting/curing, grading; basic leather processing 8.8 Describe rendered by-products: bone meal, tallow rendering (wet/dry), blood meal, meat-and-bone meal and	• Outline the quality tests for raw milk • Explain pasteurisation, homogenisation and the processing of yoghurt, cheese, butter, ghee and condensed/powdered milk. • Explain egg quality such as candling, Haugh unit, yolk colour and egg processing. • Discuss honey quality such as moisture (<20%), HMF, diastase activity and adulteration tests; bottling and labelling. • Discuss fish hygiene such as gutting, scaling, chilling on ice, smoking; histamine and ciguatoxin concerns. • Discuss hides and skins such as flaying, fleshing, salting/curing, grading; basic leather processing • Explain rendered by-	textbooks, FAO leather and rendering manuals. Internet.	and clot-on-boiling tests. • Perform LTLT pasteurisation of raw milk; bottle and label. • Make a simple yoghurt or wara (West-African soft cheese) from pasteurised milk. • Conduct egg candling and Haugh-unit measurement on table eggs. • Conduct a simple honey-quality test (moisture by refractometer; visual adulteration). • Carryout flaying and salting of a small-animal hide; • Classify hides as 1st, 2nd or 3rd grade. • Demonstrate small-scale tallow rendering and bone-meal preparation from	• Conduct alcohol and clot-on-boiling tests. • Perform LTLT pasteurisation of raw milk; bottle and label. • Make a simple yoghurt or wara (West-African soft cheese) from pasteurised milk. • Conduct egg candling and Haugh-unit measurement on table eggs. • Conduct a simple honey-quality test (moisture by refractometer; visual adulteration). • Carryout flaying and salting of a small-animal hide; • Classify hides	kit (DeLaval/lab). Pasteurisation pot/pasteuriser, thermometer, bottles. Yoghurt starter culture, wara coagulant (Calotropis or vinegar). Eggs, candler, Haugh meter, refractometer. Honey samples. Hides from abattoir, flaying knife, salt, drying racks. Tallow rendering pot, bone-meal cooker, mill. PPE.

	their uses	products: bone meal, tallow rendering (wet/dry), blood meal, meat-and-bone meal and their uses		abattoir residues.	as 1st, 2nd or 3rd grade. • Demonstrate small-scale tallow rendering and bone-meal preparation from abattoir residues.	
GENERAL OBJECTIVE 9.0: Know food-safety management systems (HACCP, GMP, ISO 22000)						
12-13	9.1 Describe food-safety management systems — Good Hygiene Practice (GHP), Good Manufacturing Practice (GMP), HACCP and ISO 22000. 9.2 Describe the seven HACCP principles in detail with a worked example for a meat plant. 9.3 Describe sanitation — Cleaning In Place (CIP), Cleaning Out of Place (COP) and sanitation standard operating procedures (SSOPs). 9.4 Describe Nigerian regulation: NAFDAC (registration, labelling,	• Explain food-safety management systems — Good Hygiene Practice (GHP), Good Manufacturing Practice (GMP), HACCP and ISO 22000. • Explain the seven HACCP principles in detail with a worked example for a meat plant. • Explain sanitation — Cleaning In Place (CIP), Cleaning Out of Place (COP) and sanitation standard operating procedures (SSOPs). • Explain Nigerian regulation: NAFDAC (registration, labelling, inspection), SON	Charts, projector, whiteboard. Sample HACCP plans, NAFDAC/SON guidelines. Reference textbooks, internet,	• Develop a one-page HACCP plan for a chosen product (smoked fish, suya, pasteurised milk, vacuum-packed beef). • Develop a sanitation SOP for a slaughter line and a milking parlour. • Carry out a preventive-maintenance check on a chiller, vacuum-packing machine and mincer/grinder; log findings on a maintenance log-	Guide students to; • Develop a one-page HACCP plan for a chosen product (smoked fish, suya, pasteurised milk, vacuum-packed beef). • Develop a sanitation SOP for a slaughter line and a milking parlour. • Carry out a preventive-maintenance check on a chiller, vacuum-	HACCP-plan and SOP templates. Maintenance log-sheets, spare-parts inventory templates. Sample NAFDAC/SON forms, Codex documents. Computers/tablets, projector. Recording sheets, PPE.

	inspection), SON (standards), NIAS (veterinary public health), VCN. 9.5 Describe Codex Alimentarius and the WOAH Terrestrial Code in international trade. 9.6 Describe preventive maintenance of processing equipment 9.7 Describe entrepreneurship in animal-products hygiene. 9.8 Describe careers — meat inspector, dairy QA officer, food-safety consultant, abattoir manager, halal auditor.	(standards), NIAS (veterinary public health), VCN. • Explain Codex Alimentarius and the WOAH Terrestrial Code in international trade. • Explain preventive maintenance of processing equipment • Explain entrepreneurship in animal-products hygiene. • Explain careers — meat inspector, dairy QA officer, food-safety consultant, abattoir manager, halal auditor.		sheet. • Prepare a sample NAFDAC/SON registration dossier for a hypothetical meat product. • Develop a one-page business plan for a chosen animal-products enterprise (cold-chain logistics, halal abattoir, suya SME, leather SME). • Conduct a class debate on HACCP-based vs traditional inspection.	packing machine and mincer/grinder; log findings on a maintenance log-sheet. • Prepare a sample NAFDAC/SON registration dossier for a hypothetical meat product. • Develop a one-page business plan for a chosen animal-products enterprise (cold-chain logistics, halal abattoir, suya SME, leather SME). • Conduct a class debate on HACCP-based vs traditional inspection.	
GENERAL OBJECTIVE 10: Understand livestock logistics and cold-chain transport competencies						
14-15	10.1 Define livestock logistics as a sub-value	• Explain Livestock logistics as a sub-value	Vehicle-type photographs,	• Inspect a livestock	Guide students to; • Inspect a	livestock transport

	chain distinct from production and processing. 10.2 Describe live-animal transport welfare standards: 10.3 Outline transport-vehicle types. 10.4 Explain transport-stocking density, journey-time limits, water and feed requirements, rest stops. 10.5 Outline Nigerian livestock-logistics corridors 10.6 Describe cold-chain transport for milk, meat, eggs and vaccines. 10.7 Explain refrigerated truck classes and temperature ranges. 10.8 Outline temperature data-logging with electronic data-loggers (TempTale, LogTag). 10.9 Describe last-mile cold-chain. 10.10 Describe digital freight-tracking using GPS and IoT platforms	chain distinct from production and processing. • Explain live-animal transport welfare standards: • Explain transport-vehicle types: open trucks, ventilated trucks, climate-controlled trailers, livestock haulers. • Explain transport-stocking density, journey-time limits, water and feed requirements, rest stops. • Discuss Nigerian livestock-logistics corridors • Explain cold-chain transport for milk, meat, eggs and vaccines. • Explain refrigerated truck classes and temperature ranges. • Explain temperature data-logging with electronic data-loggers. • Discuss last-mile cold-chain (insulated boxes with ice-packs, cold-bag delivery). • Discuss digital freight-	Stocking-density calculation tables, Map of Nigerian livestock corridors. Projector, Lecture Notes, Relevant Textbooks, whiteboard	transport vehicle for compliance with welfare standards. • Calculate appropriate stocking density for cattle, sheep and pig transport. • Develop a journey plan including rest-stops and water. • Operate a temperature data-logger and download readings. • Pack a last-mile cold-bag with ice-packs and verify temperature-hold for 4 hours. • Demonstrate basic GPS freight-tracking on a smartphone platform.	livestock transport vehicle for compliance with welfare standards. • Calculate appropriate stocking density for cattle, sheep and pig transport. • Develop a journey plan including rest-stops and water. • Operate a temperature data-logger and download readings. • Pack a last-mile cold-bag with ice-packs and verify temperature-hold for 4 hours. • Demonstrate basic GPS freight-tracking on a smartphone platform.	vehicle ‘Inspection checklist. Calculators, planning worksheets, Maps Temperature data-logger, Insulated cold-bags, ice-packs, thermometer, Smartphone with Kobo360/Trella app.

	(Kobo360, Trella). 10.11 Outline HACCP application to cold-chain logistics.	tracking using GPS and IoT platforms (Kobo360, Trella). Explain HACCP application to cold-chain logistics.				

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

ANIMAL DISEASES II

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL DISEASES II	**COURSE CODE: AHP 223**	**CONTACT HOURS: 3 HOUR/WEEK**
	CREDIT UNIT: 3	**THEORETICAL:1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is design to equip student with knowledge and skills in farm animal diseases adversely affecting production		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know major viral diseases of domestic animals 2.0 Know the major bacteria diseases of domestic animals 3.0 Know animal Diseases due to mycoplasma infections 4.0 Know the major fungal diseases of animals 5.0. Know major diseases of Poultry 6.0 Know animal Protozoan and Diseases of economic importance in Nigeria. 7.0 Know animal helminth diseases of economic importance 8.0 Know the major reproductive problems of animals 9.0 Understand the occurrence of shock in domestic animals.		

PROGRAMME: NATIONAL DIPLOMA IN ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL DISEASES II	COURSE CODE: AHP 223	CONTACT HOURS: 3 HOUR/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is design to equip student with knowledge and skills in farm animal diseases adversely affecting production		
GENERAL OBJECTIVE 1.0: Know major viral diseases of domestic animals		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 List major viral diseases of domestic animals 1.2 Explain the methods of Clinical transmission signs, diagnosis, treatment and control of the viral infection 1.3 List viral diseases characterized by skin lesions 1.4 Highlight specific viral diseases of cattle. 1.5 List some specific viral diseases of sheep and goats 1.6 List some specific viral diseases of swine 1.7 List some viral diseases with nervous involvement	Discuss the general effect of of viral diseases in animals Discuss mode oftransmission, diagnosis,clinical signs, treatment and control. Outline specific viraldiseases e.g. PPR, foot and mouth diseases etc. Explain some viral disease with nervous involvement e.g. rabies and canine distemper.	White board, markers, chats, lecture notes, internet, videos	• Identify clinical signs of viral infection • Identify effect of clinical signs of viral infection on production • Identify some pathognomonic lesions of viral infection	Guide students to; • Identify clinical signs of viral infection • Identify effect of clinical signs of viral infection on production • Identify some pathognomonic lesions of viral infection	Animal Diagnostic kits; Microscope Syringes drench dissecting tools

General Objective .2.0 Know the major bacteria diseases of domestic animals						
2-3	2.1 Explain the meaning and characteristics of bacterial diseases in domestic animals. 2.2 Describe common bacterial diseases affecting domestic animals. 2.3 Explain the causes and modes of transmission of bacterial diseases in animals. 2.4 Describe the signs and symptoms of major bacterial diseases in livestock and pets. 2.5 Explain preventive and control measures for bacterial diseases in domestic animals	Explain the meaning and characteristics of bacterial diseases in domestic animals. Discuss common bacterial diseases affecting domestic animals. Discuss the causes and modes of transmission of bacterial diseases in animals. Discuss the signs and symptoms of major bacterial diseases in livestock and pets. Explain preventive and control measures for bacterial diseases in domestic animals	White board, Markers, chats, internet, videos ,lecture notes	• Identify the clinical signs of some major bacterial infection in domestic animals • Identify the effect of some major bacterial infection on animal production	Identify the clinical signs of some major bacterial infection in domestic animals Identify the effect of some major bacterial infection on animal production	Animal Syringes Drenches Diagnostic kits, milk cup test tube, lactometer
General objective 3.0: know animal diseases due to mycoplasma infections						
4-5	3.1 Define mycoplasma infections 3.2 Explain the aetiology, occurrence, clinical signs, diagnosis treatment and control of: i. Contagious	• Discuss mycoplaster infection in farm animals • Describe the clinical signs, mode of transmission,treate	White board , markers, videos, lecture notes and internet	• Identify the clinical signs of mycoplasma infection in farm animals • Identify some tools used in diagnosis of	Guide students to; Identify the clinical signs of mycoplasma infection in farm animals Identify some tools used in	Animals Syringes, sample bottles microscope, test tube nasal swabs, diagnostic

	bovine pleura pneumonia CBPP ii. Contagious caprine pleura pneumonia CCPP 3.3 List the symptoms of CBPP and CCPP in farm animals.	ment,prevention and control of mycolpasma infection in farm animals e.g CBPP,CCPP etc • Discuss the effect of mycoplasma infe		mycoplasma infection • Identify the effect of mycoplasma infection on farm animals	diagnosis of mycoplasma infection Identify the effect of mycoplasma infection on farm animals	kits, drugs PPE
General Objective 4.0: Know the major fungal diseases of animals						
6-7	4.1 List some of the common fungal diseases of domestic animals 4.2 List the symptoms of fungal infection on animals 4.3 Explain mode of transmission, treatment, prevention and control of some common fungal infections	Discuss the common fungal diseases in farm animal Explain the clinical signs of fungal infection Discuss the mode of transmission, treatment, prevention and control.	White board, marker, lecture notes, chats, internet, videos	• Identify the clinical signs of fungal infections • Identify sample collection tools for fungal infection • Identify the effect of fungal infection on farm animals	Guide the student to: • Observe some clinical signs of fungal infection • Participate in sample collection for fungal infection. • Understand the effect of fungal infection in farm animals	Blade, sample bottle ,cotton wool,test tube, animal PPE
General Objective 5.0: Know major diseases of Poultry						
8-9	5.1 List the most common poultry diseases 5.2 Explain the aetiology, occurrence, clinical signs, diagnosis,	Discuss the most common poultry diseases Explain the aetiology, occurrence, clinical	White board, marker, chats, internet. Lecture notes, computer.	Identify clinical signs of some basic poultry diseases Identify tools use in postmortem	Guide students to; Identify clinical signs of some basic poultry diseases	Chicken, knife, blade PPE, water

	treatment and control of some common poultry diseases 5.3 List the categories of disease-causing organism in poultry e.g viral, bacterial, protozoan, fungal etc. 5.4 Explain the aetiology occurrence, clinical signs, post mortem lesions, diagnosis and treatment of: Chronic respiratory disease CRD and other common poultry disease . 5.5 List poultry diseases caused by virus i Explain the aetiology, occurrence, clinical signs post mortem lesions, diagnosis, treatment and control of: ii Leukosis complex iii Avian encephalomyelitis iv Fowl pox	signs, diagnosis, treatment and control of some common poultry diseases Enumerate the categories of disease-causing organism in poultry e.g viral, bacterial, protozoan, fungal etc. Explain the aetiology occurrence, clinical signs, post mortem lesions, diagnosis and treatment of: Chronic respiratory disease CRD and other common poultry disease. Enumerate poultry diseases caused by virus. Explain the aetiology, occurrence, clinical signs post mortem lesions, diagnosis, treatment and control of: (i) Leukosis complex (ii) Avian encephalomyelitis (iii) Fowl pox (iv) Newcastle disease (v) Infections		examination Identify pathognomonic lesions specific for basic poultry diseases	Identify tools use in postmortem examination Identify pathognomonic lesions specific for basic poultry diseases	

	v Newcastle disease vi Infections laryngotrachitis 5.6 List the disease of poultry due to bacterial infection. i. Describe the aetiology, occurrence, clinical signs, ii. Fowl typhoid iii. Salmonellosis – Pullorum iv. Avian salmonellosis v. Fowl cholera Pasteurellosis vi. List nutritional deficiencies in poultry vii. List the causes, occurrence, clinical signs, treatment and control of: viii. Avian avitaminosis - Rickets curled, toe paralysis ix. Mineral deficiencies-Perosis 5.7 List diseases of poultry	laryngotrachitis Enumerate the disease of poultry due to bacterial infection. Discuss the aetiology, occurrence, clinical signs, (i) Fowl typhoid (ii) Salmonellosis – Pullorum (iii) Avian salmonellosis (iv) Fowl cholera Pasteurellosis Enumerate nutritional deficiencies in poultry List the causes, occurrence, clinical signs, treatment and control of: (i) Avian avitaminosis - Rickets curled, toe paralysis (ii) Mineral deficiencies-Perosis Enumerate diseases of poultry due to environmental influence e.g. heat stress.				

	due to environmental influence e.g. heat stress.					
General Objective 6.0: Know animal Protozoan Diseases of economic importance in Nigeria						
10-11	6.1 List the protozoan diseases of farm animals 6.2 State the economic importance of protozoan diseases of farm animals in Nigeria. 6.3 Explain the mode of transmission, clinical signs, treatment, prevention and control of protozoan diseases e.g. Trypanosomiasis, babesiasis, heartwater, coccidiosis etc.	• Discuss the protozoan diseases of farm animals and their economic importance in nigeria • Discuss the mode of transmission, clinical signs, treatment, prevention and control of protozoan diseases in nigeria	Textbooks, lecture note, markers, videos, internet, Pictures -	• Identify the clinical signs of protozoan infection • Identify the tools use for postmortem examination • Identify the difference of lesion compare to other infection	Guide students to; • Identify the clinical signs of protozoan infection • Identify the tools use for post-mortem examination • Identify the difference of lesion compare to other infection	Diagnostic kit, bird, PPE, Farm, microscope, slides, blood samples
General Objective 7.0: Know animal Helminth diseases of economic importance						
12	7.1 List animal helmimth diseases of economic importance in Nigeria 7.2 7Explain the life cycle, mode of transmission, clinical signs, treatment, prevention and control, e.g cestodes, nematodes and trematodes e.t.c. 7.3 Enumurate the economic importance of helminths in farm animals	• Discuss helminth disease of economic importance in Nigeria • Discuss the life cycle, mode of transmission, clinical signs, treatment, prevention and control of helminths affecting farm animals • Explain the	Markers, charts, lecture notes,videos, internet	• Identify the clinical signs of helminth • Identify the tools use in the diagnosis of helminth in farm animals • Identify the eggs or adult helminth • Identify some basic anthelminthic drugs use in farm	Guide students to; • Identify the clinical signs of helminth • Identify the tools use in the diagnosis of helminth in farm animals • Identify the eggs or adult helminth • Identify	Test tube, microscope, slides, samples, cotton wool, alcohol, PPE, animal,

	7.4 List some basic antihelminthic drugs used in farm animal and their specification of usage including precausions	economic importance of helminths in farm animals • Explain some basic anthelminthic drugs use in farm animals		animals	some basic anthelminthic drugs use in farm animals	
General Objectives 8.0: Know the major reproductive problems of animals						
13	8.1 Define infertility 8.2 Explain infertlity and their causes 8.3 List the types of infertilty and their causes e.g anestrus e.t.c. 8.4 List reproductive diseases of animals in terms of causes and clinical signs e.g False pregnancy pseudopregnancy, Phymosis and paraphymosis e.t.c. 8.5 Define abortion 8.6 List the causes of abortions and their economic importance in farm animals in farm animals	• Discuss infertility and its economic importance in farm animals • Explain the causes of infertility • Explain the type of infertility in farm animals • Describe some reproductive diseases in terms of their causes prevention and control • Describe causes of abortion, clinical signs,prevention and control • Describe the economic importance of	White board, markers, lecture notes, internet, videos, Vaginal speculum, Diagnostic kit, Microscope, Test tube	• Identify clinical signs of reproductive problems • Identify the tools use in the diagnosis of reproductive problems • Identify an aborted foetus in the clinic or on the farm	Guide student to: Observe the clinical signs of reproductive problems in farm animals Participate in sample collection for the diagnosis of reproductive problems Handle the tools use in diagnosis of reproductive problems	Animal, swab stick, test tube, vaginal speculum, Diagnostic kits, microscope

		abortion in farm animal • Discuss enzootic abortion in farm animals and its economic importance				
General Objectives 9.0: Understand the occurrence of shock in domestic animals.						
14-15	9.1 Define shock 9.2 List the types of shock in farm animal 9.3 State the causes of shock in farm animals 9.4 Outline the effect of shock in animal production.	• Explain shock • Discuss the type and the cause of shock in farm animals • Discuss its a etiology clinical signs and treatment	Marker, white board, lecture notes, internet	• Identify signs of shock in farm animals • Identify variables indicating shock in farm animals	Guide students to; • Identify signs of shock in farm animals • Identify variables indicating shock in farm animals	Diagnostic kits, thermometer, stethoscopes, PPE
Course Assessment: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

CLINICAL TECHNIQUES II

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: CLINICAL TECHNIQUES II	**COURSE CODE: AHP 224**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in clinical-technique covering chemical immobilisation, full reproductive technology and pregnancy diagnosis in cattle, sheep/goat, swine and poultry.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: **1.0** Know restraint, sedation, tranquillisation and chemical immobilisation in farm and companion animals. 2.0 Know artificial insemination (AI) procedures in cattle, sheep/goat, swine and poultry breeder hens. 3.0 Understand diagnose pregnancy by rectal palpation and ultrasonography in cattle and small ruminants. 4.0 Comprehend routine field-surgical procedures 5.0 Know lameness, perform routine hoof trimming, manage common foot diseases and operate footbaths. 6.0 Know basic anaesthesia and pain management 7.0 Appreciate the principles of diagnostic imaging radiography, ultrasonography and basic endoscopy. 8.0 Know how to manage emergencies 9.0 Understand mobile veterinary clinic, telemedicine tools and clinical-service entrepreneurship plan. 10.0 Apply contemporary animal welfare frameworks and low-stress handling.		

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: CLINICAL TECHNIQUES II	COURSE CODE: AHP 224	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in clinical-technique covering chemical immobilisation, full reproductive technology and pregnancy diagnosis in cattle, sheep/goat, swine and poultry.		
GENERAL OBJECTIVE 1.0: Know restraint, sedation, tranquillization and chemical immobilization in farm and companion animals.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Explain safe restraint principles and welfare considerations. 1.2 Describe casting of cattle and lateral recumbency in small ruminants. 1.3 Describe sedation, tranquillization and chemical	• Discuss safe restraint principles welfare considerations. • Discuss casting of cattle and lateral recumbency in small ruminants. • Explain sedation and tranquillization and chemical immobilization with species-specific doses. • Discuss	Charts of casting and immobilisation. Projector, whiteboard, Reference textbooks, internet.	• Demonstrate Reuff's and Burley's casting on cattle (live or model). • Calculate and demonstrate IM xylazine sedation on a goat or dog. • Demonstrate xylazine–ketamine combination on a dog (under supervision). • Monitor a sedated animal — record HR, RR, jaw tone every 5	• Guide students to: • Demonstrate cattle casting. • Calculate and administer xylazine. • Demonstrate xylazine–ketamine combination. • Monitor sedated animal. • Reverse sedation with antagonist.	Live animals, casting ropes. Xylazine, ketamine, atipamezole. Syringes, needles, calculator. Stethoscope, watch, monitoring sheets. PPE.

	immobilization with species-specific doses. 1.4 Describe combination protocols and reversal agents 1.5 Describe pre-anaesthetic assessment and ASA classification. 1.6 Describe wildlife immobilisation principles.	combination protocols and reversals agents. • Explain pre-anaesthetic assessment and ASA classification. • Discuss wildlife immobilisation principles. .		minutes. • Demonstrate reversal with atipamezole/yohimbine.		
GENERAL OBJECTIVE 2.0: Know artificial insemination (AI) procedures in cattle, sheep/goat, swine and poultry breeder hens.						
2-3	2.1 Define artificial insemination **(**AI) 2.2 Outline artificial insemination advantages over natural service. 2.3 Describe semen collection with biosecurity protocols. 2.4 Describe semen evaluation. 2.5 Describe semen	• Explain artificial insemination **(**AI) • Elaborate artificial insemination advantages over natural service. • Discuss semen collection with biosecurity protocols. • Discuss semen evaluation. • Discuss semen extension and	Charts of AI procedures, Projector, whiteboard Reference textbooks, internet.	•Collect semen from a bull using an artificial vagina (or watch a video and demo on a model bull). •Collect semen from a cock by abdominal massage. •Evaluate semen — gross, microscopic motility, concentration, and morphology with eosin–nigrosin stain.	Guide students to; •Collect semen from a bull using an artificial vagina (or watch a video and demo on a model bull). •Collect semen from a cock by abdominal massage. •Evaluate semen — gross, microscopic motility, concentration, and	Bull, cock, artificial vagina, electro ejaculator. Microscope, slides, haeocytometer, eosin–nigrosin. Semen extenders, straws, semen flask, liquid N_2. AI gun, sheaths, vaginal speculum.

	extension and preservation 2.6 Describe oestrus detection 2.7 Describe AI procedure in cattle 2.8 Describe AI procedure in sheep/goat 2.9 Describe AI procedure in pig 2.10 Describe AI in poultry	preservation • Discuss oestrus detection • Discuss AI procedure in cattle • Discuss AI procedure in sheep/goat • Discuss AI procedure in pig • Discuss AI in poultry		• Dilute semen with extender and package in straws. • Perform AI on a cow using the recto-vaginal technique (or model). • Perform AI on a doe using a vaginal speculum (or model). • Perform AI on a breeder hen by intra-vaginal injection. • Perform AI on a sow (where available).	morphology with eosin–nigrosin stain. • Dilute semen with extender and package in straws. • Perform AI on a cow using the recto-vaginal technique (or model). • Perform AI on a doe using a vaginal speculum (or model). • Perform AI on a breeder hen by intra-vaginal injection. • Perform AI on a sow (where available).	Live cow/doe/hen/sow (or models), PPE.
GENERAL OBJECTIVE 3.0: Comprehend routine field-surgical procedures						
4	3.1 Describe pregnancy-diagnosis methods 3.2 Describe rectal-palpation pregnancy signs in cattle 3.3 Describe ultrasonography.	• Discuss pregnancy-diagnosis methods. • Discuss rectal-palpation findings by gestational month. • Discuss ultrasonography. • Discuss pregnancy diagnosis in pig and	Charts of pregnancy stages. Projector, whiteboard, Reference textbooks, internet.	• Perform rectal palpation on a known-pregnant cow under supervision; • Estimate gestational age. • Use a portable ultrasound on a cow/doe to confirm pregnancy. • Use ultrasound to	Guide students to; • Perform rectal palpation on a known-pregnant cow under supervision; • Estimate gestational age. • Use a portable ultrasound on a cow/doe to confirm	Live animals (pregnant and non-pregnant). Portable ultrasound, gel. Long-arm gloves, lubricant. GnRH, $PGF_2\alpha$, CIDR. Dystocia

	3.4 Describe pregnancy diagnosis in pig 3.5 Describe oestrus-synchronisation 3.6 Describe Fixed-Time AI (FTAI) protocols. 3.7 Describe management of dystocia. 3.8 Describe induction of parturition 3.9 Describe post-partum management.	small ruminants. • Review oestrus-synchronisation protocols. • Discuss Fixed-Time AI protocols. • Discuss dystocia management. • Discuss induction of parturition. • Discuss post-partum management.		detect pregnancy in a sow (transabdominal). • Demonstrate the Ovsynch protocol on a group of cows • Demonstrate insertion and removal of a CIDR in a doe. • Manage a simulated dystocia case • Conduct a post-partum check on a recently calved cow.	pregnancy. • Use ultrasound to detect pregnancy in a sow (transabdominal). • Demonstrate the Ovsynch protocol on a group of cows • Demonstrate insertion and removal of a CIDR in a doe. • Manage a simulated dystocia case • Conduct a post-partum check on a recently calved cow.	simulator (mock cow/doe). Calving ropes, calf jack, hand sanitiser, PPE.
GENERAL OBJECTIVE 4.0: Know lameness, perform routine hoof trimming, manage common foot diseases and operate footbaths						
5-6	4.1 Describe pre-surgical preparation. 4.2 Describe castration of bull calves. 4.3 Describe castration of ram/billy — surgical,	• Discuss pre-surgical preparation. • Discuss castration of bull calves. • Discuss castration of ram/billy. • Discuss castration of piglets. • Discuss castration of dog.	Charts, projector, whiteboard, Reference textbooks, internet.	• Carryout elastrator castration of a kid/lamb. • Carryout Burdizzo castration of a young bull. • Carryout surgical castration of a piglet (under supervision and ethics). • Carryout disbudding	Guide students to; • Carryout elastrator castration of a kid/lamb. • Carryout Burdizzo castration of a young bull. • Carryout surgical castration of a piglet (under supervision	Surgical instruments, scalpels, suture materials. Elastrator and rings, Burdizzo. Disbudding iron, gas burner. Calving ropes, calf jack,

	Burdizzo, elastrator. 4.4 Describe castration of piglets 4.5 Describe castration of dog. 4.6 Describe dehorning/disbudding of calf 4.7 Describe dehorning of goat kid. 4.8 Describe dystocia management 4.9 Describe hernia repair. 4.10 Describe abscess and lump management 4.11 Describe post-operative care	• Discuss dehorning/disbudding of calf. • Discuss dehorning of goat kid. • Discuss dystocia management. • Discuss hernia repair. • Discuss abscess management. • Discuss post-operative care.		of a 1-week-old calf using a disbudding iron. • Carryout disbudding of a goat kid. • Manage a simulated dystocia — manual mutation and application of calving aids. • Demonstrate manual reduction and umbilical-hernia repair on a piglet (or model). • Demonstrate incision and drainage of an abscess.	and ethics). • Carryout disbudding of a 1-week-old calf using a disbudding iron. • Carryout disbudding of a goat kid. • Manage a simulated dystocia — manual mutation and application of calving aids. • Demonstrate manual reduction and umbilical-hernia repair on a piglet (or model). • Demonstrate incision and drainage of an abscess.	foetotome. Dystocia simulator. Live animals (where ethics permits) or models. Antibiotics, analgesics, tetanus toxoid, PPE.
GENERAL OBJECTIVE 5.0: Know lameness, perform routine hoof trimming, manage common foot diseases and operate footbaths.						
7	5.1 Describe normal hoof anatomy and physiology in cattle and small ruminants.	• Discuss hoof anatomy. • Discuss lameness scoring. • Discuss common	Charts of hoof anatomy. Projector, whiteboard,. Reference	• Score lameness on a group of cows using the Sprecher 1–5 scale. • Examine hooves of cattle and goats;	Guide students to; • Score lameness on a group of cows using the Sprecher 1–5 scale.	Live cattle and goats. Hoof knife, hoof shears, hoof grinder.

	5.2 Describe lameness scoring. 5.3 Describe common hoof conditions. 5.4 Describe routine hoof trimming equipment. 5.5 Describe foot-bath protocols 5.6 Describe principles of shoeing in horses. 5.7 Describe lameness in horses 5.8 Describe poultry lameness	hoof conditions. • Discuss routine hoof trimming. • Discuss foot-bath protocols. • Discuss shoeing principles in horses. • Discuss lameness in horses. • Discuss poultry lameness.	textbooks, internet, videos.	• Identify overgrowth and lesions. • Perform routine hoof trimming on a goat using the Dutch method. • Treat a foot-rot case — paring, application of topical antibiotic, bandaging. • Set up a footbath with copper sulphate at the institutional farm. • Examine poultry for leg deformities; assess gait score.	• Examine hooves of cattle and goats; • Identify overgrowth and lesions. • Perform routine hoof trimming on a goat using the Dutch method. • Treat a foot-rot case — paring, application of topical antibiotic, bandaging. • Set up a footbath with copper sulphate at the institutional farm. • Examine poultry for leg deformities; assess gait score.	Lameness-scoring sheets. Topical antibiotics, bandages. Footbath, copper sulphate, zinc sulphate. Poultry, gait-scoring sheets, PPE.
GENERAL OBJECTIVE 6.0: Know basic anaesthesia and pain management						
8	6.1 Define anaesthesia and types. 6.2 Explain pre-anaesthetic assessment. 6.3 Explain local anaesthetics. 6.4 Explain regional blocks.	• Discuss anaesthesia and types. • Discuss pre-anaesthetic assessment. • Discuss local anaesthetics. • Discuss regional blocks.	Charts, projector, whiteboard, Reference textbooks, internet,.	• Calculate the dose of and demonstrate a lidocaine ring block on a calf's tail (for tail docking). • Demonstrate a cornual nerve block on a calf for disbudding. • Demonstrate a	Guide students to: • Calculate and demonstrate lidocaine ring block. • Demonstrate cornual block. • Demonstrate paravertebral block. • Calculate and	Lidocaine, bupivacaine, xylazine, ketamine. Syringes, needles, calculator. Live calf, cow, goat, dog.

	6.5 Explain epidural anaesthesia. 6.6 Explain injectable anaesthetics. 6.7 Explain inhalation anaesthesia. 6.8 Explain analgesics. 6.9 Explain pain assessment.	• Discuss epidural anaesthesia. • Discuss injectable anaesthetics. • Discuss inhalation anaesthesia. • Discuss analgesics. • Discuss pain assessment.		paravertebral block on a cow for laparotomy (under supervision). • Calculate and demonstrate xylazine–ketamine general anaesthesia in a dog. • Demonstrate intratesticular block in a calf for castration. • Demonstrate epidural injection in a cow/goat. • Use a pain-assessment scale on a sheep/goat. • Monitor an anaesthetised animal (HR, RR, jaw tone, palpebral reflex).	demonstrate xylazine–ketamine. • Demonstrate intratesticular block. • Demonstrate epidural. • Use a pain-score scale. • Monitor anaesthesia.	Pain-score scales. Stethoscope, watch, monitoring sheets, PPE.
GENERAL OBJECTIVE 7.0: Appreciate the principles of diagnostic imaging radiography, ultrasonography and basic endoscopy						
9	7.1 Describe principles of radiography 7.2 Describe radiation safety 7.3 Describe positioning and views 7.4 Describe contrast	• Discuss principles of radiography. • Discuss radiation safety. • Discuss positioning and views. • Discuss contrast studies. • Discuss principles	Charts, projector, whiteboard, sample radiographs. Reference textbooks, internet.	• Demonstrate radiation-safety protocols at the X-ray machine. • Position a dog for lateral and DV chest radiograph (model or live with appropriate PPE). • Take and interpret radiographs of a	• Guide students to: • Apply radiation-safety protocols. • Position animals for radiography. • Take and interpret radiographs. • Operate a portable ultrasound.	X-ray machine, lead aprons, thyroid shields, dosimeter (where available). Sample radiographs (digital or film). Portable ultrasound

	studies 7.5 Describe principles of ultrasonography 7.6 Describe ultrasound applications in farm-animal practice 7.7 Describe endoscopy 7.8 Describe basic image interpretation	of ultrasonography. • Discuss ultrasound applications. • Discuss endoscopy. • Discuss basic image interpretation.		fractured limb (sample images). • Set up and operate a portable ultrasound machine on a cow/dog. • Perform transabdominal ultrasound to identify uterus, ovary, kidney and urinary bladder. • Observe an endoscopy demonstration (where equipment is available; otherwise video).	• Perform transabdominal ultrasound. • Observe endoscopy.	machine, gel, transducer covers. Live animals (cow, dog). Endoscope (where available) or demo video, PPE.
GENERAL OBJECTIVE 8.0: Know how to manage emergencies						
10	8.1 Define emergency and shock; 8.2 Describe types of shock. 8.3 Describe initial assessment 8.4 Describe CPR 8.5 Describe Intra Veins fluid therapy. 8.6 Describe IV catheter	• Explain emergency and shock. • Discuss initial assessment. • Discuss CPR. • Discuss IV fluid therapy. • Discuss IV catheter placement. • Discuss shock management. • Discuss common emergencies.	Charts, projector, whiteboard, Reference textbooks, internet.	• Demonstrate ABC assessment on a model. • Practise chest compressions and ventilation on a CPR mannequin. • Demonstrate IV catheter placement in cephalic vein of a dog (or model). • Set up an IV-fluid drip and calculate flow rate (drops/min).	Guide students to; • Demonstrate ABC assessment on a model. • Practise chest compressions and ventilation on a CPR mannequin. • Demonstrate IV catheter placement in cephalic vein of a dog (or model). • Set up an IV-fluid drip and calculate	CPR mannequin (or substitute). IV catheters (18–22 G), IV sets, fluid bags (NS, LRS). Drip stand, calculator. Trocar and cannula, sterile saline. Stomach tube (cattle and small-

	placement maintenance. 8.7 Describe shock management 8.8 Describe management of common emergencies 8.9 Describe trocarisation for bloat in cattle/sheep. 8.10 Describe stomach tubing for choke and indigestion.	• Discuss trocarisation for bloat in cattle/sheep. • Discuss stomach tubing.		• Calculate fluid requirement for a 30-kg dog with 8% dehydration. • Demonstrate trocarisation for bloat on a cow (or post-mortem specimen). • Demonstrate stomach tubing for indigestion in a cow/goat. • Demonstrate IV calcium administration for milk fever.	flow rate (drops/min). • Calculate fluid requirement for a 30-kg dog with 8% dehydration. • Demonstrate trocarisation for bloat on a cow (or post-mortem specimen). • Demonstrate stomach tubing for indigestion in a cow/goat. • Demonstrate IV calcium administration for milk fever.	ruminant sizes). IV calcium borogluconate. Live animals or models, PPE.
GENERAL OBJECTIVE 9.0: Understand mobile veterinary clinic, telemedicine tools and clinical-service entrepreneurship plan						
11-12	9.1 Describe a mobile veterinary clinic 9.2 Describe field-trip operations 9.3 Describe telemedicine in animal health 9.4 Describe digital tools	• Discuss a mobile veterinary clinic. • Discuss field-trip operations. • Discuss telemedicine. • Discuss digital tools. • Discuss pharmacy management. • Discuss billing and	Charts, projector, whiteboard, VCN guidelines, Reference textbooks, internet,.	• Pack a mobile-clinic kit • Take inventory. • Plan a field trip • Use a telemedicine app to conduct a mock remote consultation. • Set up an Excel-based inventory and expiry-tracking system for a	Guide students to; • Pack a mobile-clinic kit • Take inventory. • Plan a field trip • Use a telemedicine app to conduct a mock remote consultation. • Set up an Excel-	Mobile-clinic kit ,Smartphone with telemedicine app. Computer/tablet with Excel. Business-plan templates, VCN guidelines. Prescription pads, live animals at

	9.5 Describe pharmacy management 9.6 Describe billing, pricing of services and clinic financial management. 9.7 Describe entrepreneurship in veterinary 9.8 Describe legal and regulatory requirements 9.9 Describe One-Health services. .	financial management. • Discuss entrepreneurship pathways. • Discuss legal and regulatory requirements. • Discuss One-Health services. .		clinic pharmacy. • Develop a one-page business plan for a mobile veterinary clinic or telemedicine service. • Write a sample prescription compliant with VCN rules. • Conduct a mock vaccination/extension day at the institutional farm.	based inventory and expiry-tracking system for a clinic pharmacy. • Develop a one-page business plan for a mobile veterinary clinic or telemedicine service. • Write a sample prescription compliant with VCN rules. • Conduct a mock vaccination/extension day at the institutional farm.	institutional farm, PPE.
GENERAL OBJECTIVE 10.0: Apply contemporary animal welfare frameworks and low-stress handling.						
13-15	10.1 Explain the evolution from the FAWC Five Freedoms (1979) to the Mellor 5 Domains Welfare Model (2017/2020). 10.2 Describe the 5 Domains: (1) Nutrition, (2) Physical	• Explain the evolution from the FAWC Five Freedoms (1979) to the Mellor 5 Domains Welfare Model (2017/2020). • •Explain the 5 Domains: (1) Nutrition, (2)	Charts, projector, whiteboard, VCN guidelines, Reference textbooks, internet,.	• Conduct a welfare audit on the institutional livestock unit using the 5 Domains framework. • Complete a Welfare Quality® scoring sheet for a small group of cattle or sheep. • Compose a welfare-improvement plan from audit findings.	Guide students to; • Conduct a welfare audit on the institutional livestock unit using the 5 Domains framework. • Complete a Welfare Quality® scoring sheet for a small group of cattle or sheep.	• Institutional livestock unit. • 5 Domains audit template. • Welfare Quality® scoring sheets. • Recording forms. • Cattle/sheep at

	Environment, (3) Health, (4) Behavioural Interactions, (5) Mental State. 10.3 Outline the WOAH (formerly OIE) Terrestrial Animal Health Code Section 7 10.4 Describe the Welfare Quality® protocols (12 welfare criteria across 4 principles). 10.5 Describe Nigerian regulatory context: Animal Welfare laws, VCN Code of Veterinary Ethics, halal slaughter requirements. 10.6 Describe low-stress livestock handling principles 10.7 Outline Temple Grandin curved-corral designs, single-file races,	Physical Environment, (3) Health, (4) Behavioural Interactions, (5) Mental State. • Outline the WOAH (formerly OIE) Terrestrial Animal Health Code Section 7: animal welfare standards for transport, slaughter, beef, dairy, broiler and laying-hen production. • Describe the Welfare Quality® protocols (12 welfare criteria across 4 principles). • Discuss Nigerian regulatory context: Animal Welfare laws, VCN Code of Veterinary Ethics, halal		• Identify flight zone and point of balance on cattle/sheep using safe distance. • Visit a commercial abattoir and assess slaughter-line welfare (where accessible). • Practise calm-handling techniques on small-ruminant flock.	• Compose a welfare-improvement plan from audit findings. • Identify flight zone and point of balance on cattle/sheep using safe distance. • Visit a commercial abattoir and assess slaughter-line welfare (where accessible). • Practise calm-handling techniques on small-ruminant flock.	institutional farm. • Abattoir/Slaughter Slab. • PPE for abattoir visit.

	double-V chutes for cattle handling. 10.8 Describe stunning methods for humane slaughter. 10.9 Describe halal slaughter procedures. 10.10 Outline welfare auditing in commercial abattoirs and on-farm.	slaughter requirements. • Describe low-stress livestock handling principles • Outline Temple Grandin curved-corral designs, single-file races, double-V chutes for cattle handling. • Describe stunning methods for humane slaughter. • Discuss halal slaughter procedures: reversible stunning options, sharp-blade single-cut, drainage of blood. • • Outline welfare auditing in commercial abattoirs and on-farm.				
COURSE ASSESSMENT:						

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

POULTRY PRODUCTION

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: POULTRY PRODUCTION	**COURSE CODE: AHP 225**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to enable students acquire basic knowledge and skills in Poultry Production		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the role of poultry industry in the economy; 2.0 Know the different breeds of poultry in Nigeria; 3.0 Understand the principles of commercial poultry production; 4.0 Understand poultry housing and construction; 5.0 Understand basic management practices in a poultry enterprise; 6.0 Understand basic health management practices in a poultry enterprise; 7.0 Understand production technologies of poultry produce; 8.0 Understand the need for record keeping in the poultry farm. 9.0: Understand artificial insemination (AI) in poultry breeder birds		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY						
COURSE TITLE: POULTRY PRODUCTION		**COURSE CODE: AHP 225**		**CONTACT HOURS: 4 HOURS/WEEK**		
		CREDIT UNIT: 4		**THEORETICAL: 1 HOUR/WEEK**		
YEAR: II SEMESTER: II		**PRE-REQUISITE:**		**PRACTICAL: 3 HOURS/WEEK**		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to enable students acquire a basic knowledge of poultry production						
GENERAL OBJECTIVE 1.0: Understand the role of poultry industry in the economy						
THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Explain the importance of poultry and its products in the Nigerian economy 1.2 Explain the reasons for poultry keeping 1.3 Outline the factors militating against poultry production in Nigeria 1.4 List the various types of poultry enterprise in Nigeria	• Discuss the importance of poultry and its products in the Nigerian economy • Discuss the reasons for poultry keeping • Highlight the factors militating against poultry production in Nigeria • Enumerate the various types of poultry enterprise in Nigeria	- Board - Maker - Slide - LCD - Projectors		-	-
General Objective 2.0: Know the different breeds of poultry in Nigeria						
2	2.1 List the different breeds of poultry in Nigeria 2.2 Classify the different breeds of poultry into meat and egg type in Nigeria. 2.3 Describe each breed of poultry in 2.2 above	•Explain the different breeds of poultry in Nigeria •Categorize the different breeds of poultry into meat and egg type in Nigeria. •Explain each breed of	White Board, Maker, Slide and LCD Projectors	•Identify common poultry breeds using live birds, charts, or pictures. •Observe physical features of different poultry breeds.	Guide students to; •Identify common poultry breeds using live birds, charts, or pictures. •Observe physical features of different poultry	Different breeds of poultry

		poultry in 2.2 above		•Classify poultry breeds into layers, broilers, cockerels, and dual-purpose breeds. •Compare local and exotic poultry breeds based on body size, feather colour, growth rate, and egg production. •Visit to a poultry farm to observe different poultry breeds and management practices. Prepare record sheet showing the characteristics and uses of various poultry breeds.	breeds. •Classify poultry breeds into layers, broilers, cockerels, and dual-purpose breeds. •Compare local and exotic poultry breeds based on body size, feather colour, growth rate, and egg production. •Visit to a poultry farm to observe different poultry breeds and management practices. •Prepare record sheet showing the characteristics and uses of various poultry breeds.	
General Objective 3.0: Understand the principles of commercial poultry production						
3	3.1 Describe the size of the commercial poultry farm. 3.2Explain the purpose of production (Meat or Egg) 3.2 Describe the systems of commercial egg and meat production 3.3 Explain the criteria for choosing any particular	• Explain the size of the commercial poultry farm • Explain the purpose of poultry production (Meat or Egg) • Discuss the systems of commercial egg and meat production	White Board, Maker, Slide and LCD Projectors	•Identify common commercial poultry breeds. •Demonstrate poultry housing designs and pen preparation. •Carry out formulation and weighing of poultry feeds.	Guide student to: •Identify common commercial poultry breeds. •Demonstrate poultry housing designs and pen preparation. •Carry out	Poultry farm Eggs Battery cages Chickens Battery cages Deep litter

	system of poultry production 3.4 List the advantages and disadvantages of each system in 3.2 above	• Discuss the criteria for choosing any particular system of poultry production • State the advantages and disadvantages of each system		•Practice feeding and watering poultry birds. •Carry out vaccination and medication procedures in poultry production. •Demonstrate brooding techniques for day-old chicks. •Use poultry equipment such as feeders, drinkers, brooders, and egg trays. •Farm sanitation and disinfection practices. •Record keeping on feed intake, mortality, vaccination, and egg production.	formulation and weighing of poultry feeds. •Practice feeding and watering poultry birds. •Carry out vaccination and medication procedures in poultry production. •Demonstrate brooding techniques for day-old chicks. •Use poultry equipment such as feeders, drinkers, brooders, and egg trays. •Farm sanitation and disinfection practices. •Record keeping on feed intake, mortality, vaccination, and egg production.	
General Objective 4.0: Understand poultry housing and construction						
4	4.1 Describe the environmental factors to be considered in building a poultry house. 4.2 List some important	• Explain the environmental factors to be considered in building a poultry house e.g. Climate,	White Board, Maker, Lecture notes LCD Projectors	• Identify good site for the construction of a poultry house • Produce model of a poultry house	Guide students to; • Identify good site for the construction of a poultry house	Model chicken house, Charts ,

	considerations in poultry house construction. 4.3 Describe the structure and space for a known number of birds	Topography, Securities. • Highlight some important considerations in poultry house construction e.g. foundations, floors, walls, roofs, etc • Explain the structure and space for a known number of birds		• Select the type of accommodation for birds	• Produce model of a poultry house • Select the type of accommodation for birds	
General Objective 5.0: Understand the basic terminologies in poultry production and management						
5-6	5.1 Define the following terms; (i) brooding (ii) de-beaking (iii) deworming (iv) culling (v) delousing (vi) vaccination (vii) Dip bath (viii) Caponization in poultry management 5.2 Explain common feed and nutrition terminologies in poultry production 5.3 Identify terms related to poultry reproduction and Hatchery Management.	• Explain the following terms; (i) brooding (ii) de-beaking (iii) deworming (iv) culling (v) delousing (vi) vaccination (vii) Dip bath (viii) Caponization in poultry management •Discuss common feed and nutrition terminologies in poultry production •Discuss terms related to poultry reproduction and Hatchery Management	White Board, Maker, Lecture notes LCD Projectors	• Visit a poultry unit or poultry house • Use Poultry Equipment i. Feeders ii. Drinkers iii. Brooders iv. Egg trays v. Incubators vi. Cages vii. Litter materials • Carryout Basic Poultry Management Practices	Guide students to; • Visit a poultry unit or poultry house • Use Poultry Equipment viii. Feeders ix. Drinkers x. Brooders xi. Egg trays xii. Incubators xiii. Cages xiv. Litter materials • Carryout Basic Poultry Management Practices	Poultry birds, debeaker, disinfectants, budizzor,
General Objective 6.0: Understand basic health management practices in a poultry enterprise						
7-8	6.1 List common diseases in poultry (nutritional and parasitic)	•Discuss common diseases in poultry (nutritional and	Lecture note Textbooks White Board	• Carryout poultry house cleaning and disinfection	Guide students to; • Carryout poultry house cleaning	Poultry farm, Vaccines,

	6.2 Explain nutritional and pathogenic diseases in birds 6.3 Explain the different types of vaccines in poultry production	parasitic) •Discuss nutritional and pathogenic diseases in birds •Explain the different types of vaccines in poultry production	Journals Projector Marker	procedures. • Identify common symptoms of sick birds using charts or live observations. • Carryout vaccination techniques such as eye drop, drinking water and injection methods. • Identify external and internal parasites in poultry birds. • Perform proper waste disposal and litter management practices. • Carry out routine inspection of poultry birds for signs of diseases and stress. • Prepare simple poultry health and medication records. • Demonstration of biosecurity practices such as footbath use, isolation and restricted movement.	and disinfection procedures. • Identify common symptoms of sick birds using charts or live observations. • Carryout vaccination techniques such as eye drop, drinking water and injection methods. • Identify external and internal parasites in poultry birds. • Perform proper waste disposal and litter management practices. • Carry out routine inspection of poultry birds for signs of diseases and stress. • Prepare simple poultry health and medication records. • Demonstration of biosecurity	disinfectants, birds

					practices such as footbath use, isolation and restricted movement.	
General Objective 7.0: Understand production technologies of poultry products						
9-10	7.1 Explain Egg collection process 7.2 Define Egg grading 7.3 List types of egg grades 7.4 Describe Egg Hygiene	• Discuss Egg collection process • Discuss egg grading and types of egg grades • Explain Egg Hygiene	Lecture note Textbooks White Board Journals Projector Marker	•Carry out egg collection • Carry out egg grading	Guide students to; •Carry out egg collection • Carry out egg grading	Egg grader Eggs crates
General Objective 8.0: Understand the need for record keeping in the poultry industry						
11-12	8.1 Define Record Keeping 8.2 Highlight the importance of record keeping in poultry industry 8.3 List the types of records to be kept in poultry business	•Explain Record Keeping •Outline the importance of record keeping in poultry industry •Enumerate the types of records to be kept in poultry business	Lecture note Textbooks White Board Journals Projector Marker	•Design a good record book and enter records	•Guide students to design a good record book and enter records	Logbooks Pencil/pen Rulers Computer
General Objective9.0: Understand artificial insemination (AI) in poultry breeder birds						

13-15	9.1 Define poultry artificial insemination 9.2 Outline its advantages over natural mating in breeder flocks. 9.3 Describe the reproductive anatomy of male and female chickens, turkeys and ducks relevant to AI. 9.4 Identify the equipment required for poultry AI 9.5 Describe the abdominal-massage technique for semen collection in cockerels and toms. 9.6 Outline semen evaluation: volume, motility, concentration and morphology. 9.7 Describe semen dilution, storage and shelf-life. 9.8 Explain insemination timing, site of deposition and frequency. 9.9 Outline biosecurity protocols for poultry AI including hand hygiene, equipment sterilization and disease screening.	• Explain poultry artificial insemination • Enumerate its advantages over natural mating in breeder flocks. • Explain the reproductive anatomy of male and female chickens, turkeys and ducks relevant to AI. • Explain the equipment required for poultry AI: semen collection vials, diluents insemination tubes/syringes • .Elucidate the abdominal-massage technique for semen collection in cockerels and toms. • Explain semen evaluation: volume, motility, concentration and morphology. • Explain semen dilution, storage (room temperature,	Lecture note Textbooks White Board Journals Projector Marker	• Identify male and female reproductive organs in slaughtered cockerel and hen. • Carryout handling and restraint of cockerels and hens for AI. • Identify the equipment and diluents in a standard poultry AI kit. • Collect semen from a cockerel by abdominal-massage technique. • Evaluate fresh semen for volume, colour, motility and concentration under a microscope. • Dilute semen with appropriate extender at 1:1 to 1:4 ratio. • Perform AI by intra-vaginal deposition in restrained hens at the correct oviducal timing. • Record AI activities in farm log with batch traceability.	Guide students to; • Identify male and female reproductive organs in slaughtered cockerel and hen. • Carryout handling and restraint of cockerels and hens for AI. • Identify the equipment and diluents in a standard poultry AI kit. • Collect semen from a cockerel by abdominal-massage technique. • Evaluate fresh semen for volume, colour, motility and concentration under a microscope. • Dilute semen with appropriate extender at 1:1 to 1:4 ratio. • Perform AI by intra-vaginal deposition in	Slaughtered cockerels and hens, Dissecting kits, hand-lens, PPE, Poultry AI kit, Live cockerels, Live hens, AI kit, Microscopes, slides, cover-slips, AI logbook templates, PPE.

		refrigerated 4 °C, frozen) and shelf-life. • Explain insemination timing (oviducal cycle), site of deposition (vagina/intra-uterine) and frequency (twice weekly). • Discuss biosecurity protocols for poultry AI including hand hygiene, equipment sterilization and disease screening.			restrained hens at the correct oviducal timing. • Record AI activities in farm log with batch traceability.	

COURSE ASSESSMENT:

Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%
Total: 100%

BEEF AND DAIRY PRODUCTION

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: BEEF AND DAIRY PRODUCTION	**COURSE CODE: AHP 226**	**CONTACT HOURS: 4 HOUR/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 3 HOUR/WEEK**
GOAL: This course is designed to equip students with the knowledge and skills in beef and dairy cattle production.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand beef and dairy livestock breeds and production systems; 2.0 Know livestock housing in feedlot and dairy management production; 3.0 Understand feeding and climate-smart beef and dairy management in livestock production; 4.0 Know breeding, heat detection and artificial insemination basics for beef and dairy livestock production; 5.0 Understand milking procedures and milk hygiene practices in dairy livestock production; 6.0 Know common diseases, biosecurity and animal welfare practices in beef and dairy livestock production; 7.0 Understand record keeping, marketing and cold-chain handling in beef and dairy livestock production. 8.0 Know modern dairy husbandry and milking technology		

PROGRAMME: NATIONAL DIPLOMA ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: BEEF AND DAIRY PRODUCTION	**COURSE CODE: AHP 226**	**CONTACT HOURS: 4 HOUR/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 3 HOUR/WEEK**
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the knowledge and skills in beef and dairy cattle production.		
GENERAL OBJECTIVE 1.0: Understand beef and dairy livestock breeds and production systems.		

THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Objectives**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Explain Beef and Dairy cattle breeds in Nigeria 1.2 Explain systems of beef and dairy production 1.3 Describe Beef production 1.4 Describe dairyproduction.	• Discuss Beef and Dairy cattle breeds in Nigeria • Discuss systems of beef and dairy production. • Explain beef production. • Discuss dairy production .	Lecture note Textbooks White Board Journals Projector Marker	• Identify common beef breeds and dairy breeds using charts, pictures, or live animals. • Demonstrate livestock body conformation and breed characteristics. • Observe beef and dairy production systems. • Demonstrate of feeding and watering practices for livestock. • Identify feed ingredients and ration formulation. • Demonstrate milking procedures and milk hygiene practices.	• Identify common beef breeds and dairy breeds using charts, pictures, or live animals. • Demonstrate livestock body conformation and breed characteristics. • Observe beef and dairy production systems. • Demonstrate of feeding and watering practices for livestock. • Identify feed ingredients and ration formulation. • Demonstrate milking procedures and milk hygiene	Farm animals (cattle) Cattle farm

				• Practice handling and restraining techniques for cattle. • Identify common livestock diseases and preventive measures. • Demonstrate cleaning and sanitation of animal housing units. • Farm visit to a beef or dairy production facility. • Practice record keeping for feed intake, milk yield, and animal health.	practices. • Practice handling and restraining techniques for cattle. • Identify common livestock diseases and preventive measures. • Demonstrate cleaning and sanitation of animal housing units. • Farm visit to a beef or dairy production facility. • Practice record keeping for feed intake, milk yield, and animal health.	
General Objective 2.0: Know livestock housing in feedlot and dairy management production.						
2-3	2.1 Explain the importance of livestock housing systems for beef and dairy productions. 2.2 List different housing systems for beef and dairy livestock production. 2.3 Describe feedlot housing systems with its advantages and disadvantages.	• Discuss the importance of livestock housing systems for beef and dairy productions. • Explain different housing systems for beef and dairy livestock production. • Discuss feedlot housing systems	Whiteboard and marker Internet Lecture notes Textbooks Chart of housing systems	• Carryout cleaning and sanitation procedures in animal housing units. • Identify feeding, watering, and ventilation systems in livestock houses. • Carryout waste disposal and manure management practices in feedlot and dairy housing.	Guide students too: • Demonstrate cleaning and sanitation procedures in animal housing units. • Identify feeding, watering, and ventilation systems in livestock houses. • Carryout waste	Animal house/pen, feedlot, feeders, drinkers, milking machine, milking parlour

	2.4 Explain Dairy housing systems with its advantages and disadvantages. 2.5 Describe beef and dairy housing management in livestock production.	with its advantages and disadvantages. • Discuss Dairy housing systems with its advantages and disadvantages. • Explain beef and dairy housing management in livestock production.		• Construct simple livestock housing layouts and floor plans. • Identify the use of housing equipment such as feeders, drinkers, milking stands, and bedding materials. • Carryout routine maintenance practices in feedlot and dairy housing systems. .	disposal and manure management practices in feedlot and dairy housing. • Construct simple livestock housing layouts and floor plans. • Identify the use of housing equipment such as feeders, drinkers, milking stands, and bedding materials. • Carryout routine maintenance practices in feedlot and dairy housing systems.	
General Objective 3.0: Understand feeding and climate-smart beef and dairy management in livestock production.						
4-5	3.1 Explain ration formulation and Beef animal feeding in livestock production. 3.2 Explain ration formulation and Dairy animal feeding in livestock production. 3.3 Explain the different considerations in	• Discuss ration formulation and Beef animal feeding in livestock production. • Discuss ration formulation and dairy animal feeding in livestock production.	Whiteboard and marker Internet Lecture notes Textbooks Chart of housing systems	• Formulate ration Beef animal feeding in livestock production. • Formulate ration and dairy animal feeding in livestock production. • Identify the different considerations in formulating rations	Guide student to: • Formulate ration Beef animal feeding in livestock production. • Formulate ration and dairy animal feeding in livestock production. • Identify the	Feed materials Farm facilities

	formulating rations for beef and dairy animals in terms of nutrient requirements, withdrawal periods etc. 3.4 Define climate-smart livestock production in relation to beef and dairy production. 3.5: Describe body condition scoring as a factor of animal nutrition in livestock production.	• Explain the different considerations in formulating rations for beef and dairy animals in terms of nutrient requirements, withdrawal periods etc. • Discuss climate-smart livestock production in relation to beef and dairy production. • Explain body condition scoring as a factor of animal nutrition in livestock production.		for beef and dairy animals in terms of nutrient requirements, withdrawal periods etc. • Carry out climate-smart livestock production in relation to beef and dairy production.	different considerations in formulating rations for beef and dairy animals in terms of nutrient requirements, withdrawal periods etc. • Carry out climate-smart livestock production in relation to beef and dairy production.	
General Objective 4.0: Know breeding, heat detection and artificial insemination basics for beef and dairy livestock production.						
6-7	4.1 Explain reproductive systems of male and female farm animals. 4.2 List the reproductive hormones of male and female farm animals 4.3 List the four factors that determine the percentage success rate of an artificial	• Discuss the reproductive systems of male and female farm animals. • Discuss the reproductive hormones of male and female farm animals. • Explain the four	Whiteboard and marker Internet Lecture notes Textbooks Chart of housing systems	• Identify common beef and dairy cattle breeds. • Carry out observation and identification of heat signs in cattle. • Demonstrate estrus cycle charting and heat recording. • Demonstrate breeding	Guide students to: • Identify common beef and dairy cattle breeds. • Carry out observation and identification of heat signs in cattle. • Demonstrate estrus cycle charting and	Farm animals AI equipment Computer Internet White board marker

	insemination in farm animal breeding (AI). 4.4 Discuss the equation of artificial insemination and the implications of each factor of the equation. 4.5 Explain basics principles of artificial insemination	factors that determine the percentage success rate of an artificial insemination in farm animal breeding (AI). • Explain the equation of artificial insemination and the implications of each factor of the equation. • Discuss the basics principles of artificial insemination		management practices in cattle production. • Handle artificial insemination equipment. • Demonstrate semen storage and handling procedures. • Record keeping for breeding and insemination activities. • Field visit to a cattle farm or artificial insemination center for practical exposure	heat recording. • Demonstrate breeding management practices in cattle production. • Handle artificial insemination equipment. • Demonstrate semen storage and handling procedures. • Record keeping for breeding and insemination activities. • Field visit to a cattle farm or artificial insemination center for practical exposure	
General Objective 5.0: Understand milking procedures and milk hygiene practices in dairy livestock production.						
8-9	5.1 Define milk and its composition. 5.2: Describe milking methods, scales of production utensils, machines and equipment used. 5.3: Explain the basic principles of milk	• Discuss milk and its composition. • Explain milking methods, scales of production utensils, machines and equipment used. • Discuss the basic principles of milk	Whiteboard and marker Internet Lecture notes Textbooks Chart of housing systems	• Identify milk and its composition. • Identify milking methods, scales of production utensils, machines and equipment used. • Identify basic principles of milk	Guide students to: • Identify milk and its composition. • Identify milking methods, scales of production utensils, machines and equipment used. • Identify basic	Milking parlour Cooling equipment, utensils

	hygiene, handling and preservation. 5.4: List basic milk test for quality control. 5.5: Describe mastitis in dairy livestock production its prevention, control and management.	hygiene, handling and preservation. • Explain basic milk test for quality control. • Discuss mastitis in dairy livestock production its prevention, control and management.		hygiene, handling and preservation. • Carry out basic milk test for quality control.	principles of milk hygiene, handling and preservation. • Carry out basic milk test for quality control.	
General Objective 6.0: Know common diseases, biosecurity and animal welfare practices in beef and dairy livestock production.						
10-11	6.1 Describe common livestock diseases and parasites that affect beef and dairy livestock production. 6.2 Describe zoonosis of importance in beef and dairy livestock production. 6.3 Explain animal welfare and biosecurity measures in beef and dairy livestock production.	• Explain common livestock diseases and parasites that affect beef and dairy livestock production. • Discuss zoonosis of importance in beef and dairy livestock production. • Explain animal welfare and biosecurity measures in beef and dairy livestock production.	Whiteboard and marker Internet Lecture notes Textbooks Chart of housing systems	• Identify common livestock diseases and parasites that affect beef and dairy livestock production. • Identify zoonosis of importance in beef and dairy livestock production. • Check animal welfare and biosecurity measures in beef and dairy livestock production.	Guide students to • Identify common livestock diseases and parasites that affect beef and dairy livestock production. • Identify zoonosis of importance in beef and dairy livestock production. • Check animal welfare and biosecurity measures in beef and dairy livestock production.	Farm animals Disinfectants Computer Internet White board marker Chemicals
General Objective 7.0: Understand record keeping, marketing and cold-chain handling in beef and dairy livestock production.						
12-13	7.1 List records of importance for beef and dairy livestock	• Discuss records of importance for beef and dairy livestock	Whiteboard and marker Internet	• Identify records of importance for beef and dairy livestock	Guide students to: • Identify records of importance for	Record books Milk cans Farm facilities

	production. 7.2 Explain characteristics of good record keeping and how to analyse the records for profitable beef and dairy livestock production. 7.3 Explain beef and milk marketing strategies in relation to quality and market demand.	production. • Explain characteristics of good record keeping and how to analyse the records for profitable beef and dairy livestock production. • Discuss beef and milk marketing strategies in relation to quality and market demand.	Lecture notes Textbooks Chart of housing systems	production. • Identify good record keeping and how to analyse the records for profitable beef and dairy livestock production. • Carry out beef and milk marketing strategies in relation to quality and market demand.	beef and dairy livestock production. • Identify good record keeping and how to analyse the records for profitable beef and dairy livestock production. • Carry out beef and milk marketing strategies in relation to quality and market demand.	Freezers Fridge
General Objective 8.0: **Know modern dairy husbandry and milking technology**						
14-15	8.1 Describe machine-milking systems: 8.2 Explain parlour-hygiene protocols. 8.3 Describe automated calf feeders and automated milk-replacer mixers. 8.4 Describe milk cooling 8.5 Outline somatic-cell-count (SCC) monitoring. 8.6 Describe robotic	• Explain machine-milking systems using diagrams and videos. • Explain parlour-hygiene protocols: pre-milking teat dip, fore-stripping, drying, post-milking teat dip • . Discuss automated calf-feeding systems. • Discuss milk-cooling requirements: in-tank bulk cooling at	Whiteboard and marker Internet Lecture notes Textbooks Chart of housing systems	• Identify components of a machine-milking unit . • Demonstrate pre-milking teat preparation and post-milking teat dip. • Perform Mastitis Test (CMT) on milk samples. • Operate a portable somatic-cell counter (where available). • Visit a commercial dairy farm with modern parlour or robotic milking). • Demonstrate herd-management software using a free demo or screen-share session.	• Guide students to; identify milking-machine components. • carry out pre/post-milking teat protocols. • Perform Mastitis TestT procedure. • Carry out portable SCC counter operation. • visit a dairy-farm . • Demonstrate herd-management software.	Machine-milking unit, Teat dip, paper towels, gloves, ,Portable SCC counter (DeLaval or equivalent) Commercial dairy farm (visit) or virtual-tour video. Computer, internet, herd-management software demo. Activity-monitor collar samples (loaned).

	milking systems 8.7 Explain herd-management software (DelPro, T4C) for performance recording. 8.8 Describe the economic case for robotic milking in commercial Nigerian dairy operations). 8.9 Outline activity-monitor heat-detection with robotic systems	4 °C, time-to-temperature requirements. • Outline SCC monitoring techniques. • Discuss robotic milking using videos and case studies. • Explain herd-management software. • Discuss economic case for robotic milking. • Outline activity-monitor heat detection collars (CowManager, SCR) integrated with robotic systems.		• • Identify activity-monitor collars and explain their data outputs.	• identify activity-monitor of collars.	

COURSE ASSESSMENT:

Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%
Total: 100%

LIVESTOCK FARM MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: LIVESTOCK FARM MANAGEMENT	**COURSE CODE: AHP 227**	**CONTACT HOURS: 2 HOURS/WEEK**
YEAR: II SEMESTER: II	**CREDIT UNIT: 2**	**THEORETICAL: 1 HOUR/WEEK**
	PRE-REQUISITE:	**PRACTICAL: 1 HOUR/WEEK**
GOAL: This course is designed to equip students with the knowledge and skills management of livestock-farm enterprise.		

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

1.0 Understand the concepts, principles, functions and qualities of livestock farm management;
2.0 Know the procedures to Classify, plan, design and establish a livestock farm against minimum practical-infrastructure standards;
3.0 Understand the methods of maintaining and using farm records on paper and in digital systems with traceability;
4.0 Comprehend the principles of farm financial management;
5.0 Understand the principles of production planning and resource allocation for feed, breeding, labour, water, equipment and pasture;
6.0 Appreciate farm risks, including biosecurity, disease outbreak, climate, market and financial risks;
7.0 Understand the principles of marketing, supply-chain management, value addition and digital marketing to a livestock enterprise;
8.0 Know the principles of human-resource management, occupational health and safety, and labour-welfare on a livestock farm;
9.0 Comprehend the application of digital and precision livestock farming tools.

PROGRAMME: NATIONAL DIPLOMA (ND) ANIMAL HEALTH AND PRODUCTION TECHNOLOGY		
COURSE TITLE: LIVESTOCK FARM MANAGEMENT	COURSE CODE: AHP 227	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with the knowledge and skills management of livestock-farm enterprise.		
GENERAL OBJECTIVE 1.0: Understand the concepts, principles, functions and qualities of livestock farm management.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define farm management, livestock farm management, the farm manager and related terms. 1.2 State the objectives of farm management. 1.3 Outline the functions of a farm manager. 1.4 Explain the principles of farm management	• Explain farm-management terms. • State the objectives of farm management. • Outline the functions of a farm manager. • Discuss the principles of farm management. • Outline manager qualities and skills. • Discuss relationships with other animal sciences.	Whiteboard, markers, projector, charts. Lecture notes, reference textbooks, Internet	• Identify the management functions on display (planning, organising, controlling). • Identify the structure of the management team and their roles (farm manager, supervisor, herdsman, record-keeper, accountant etc.). • Write a one-page profile of the farm.	Guide students to; • Identify the management functions on display (planning, organising, controlling). • Identify the structure of the management team and their roles (farm manager, supervisor, herdsman, record-keeper, accountant etc.). • write a one-page profile of the farm.	Institutional teaching farm. Interview templates, recording sheets. Computer, projector.

	1.5 Outline the qualities and skills of a successful livestock farm manager 1.6 Describe the relationship between farm management and other animal sciences.					
GENERAL OBJECTIVE 2.0: Know the procedures to classify, plan, design and establish a livestock farm against minimum practical-infrastructure standards.						
2	2.1 Explain the classification of livestock farms by purpose 2.2 Explain livestock management systems 2.3 Explain the classification ownership (sole proprietor, partnership, cooperative, company,	• Explain the classification of livestock farms by purpose. • Explain livestock management system. • Explain the classification ownership. • Discuss farm-planning steps. • Discuss farm layout and design. • Outline biosecurity zoning in farm layout • Discuss the documentation	Charts of farm layouts. Projector, whiteboard, markers, Reference textbooks, internet.	• Visit a commercial farm in the locality and document its type, layout, scale and ownership. • Sketch the layout of the institutional farm to scale, indicating biosecurity zones (red/amber/green). • Audit the institutional farm against the minimum practical-infrastructure list	Guide students to: • Visit a commercial farm and document. • Sketch farm layout to scale. • Audit minimum infrastructure. • Develop a farm-establishment checklist.	Local commercial farm, transport. Drawing paper, scales, pencils, rulers. Audit checklist (minimum infrastructure). Computer, projector, PPE.

	government). 2.4 Outline the steps in farm planning 2.5 Describe the design and layout of a livestock farm. 2.6 Outline biosecurity zoning principles in farm layout. 2.7 Describe the documentation required to establish a farm in Nigeria. 2.8 Describe the minimum practical-infrastructure standard for an accredited training/commercial farm	required to establish a farm in Nigeria. • Discuss minimum practical-infrastructure standards for an accredited training/commercial farm.		(milking parlour, layer pen, feedlot, piggery, apiary, forage field). • Develop a one-page farm-establishment checklist for a smallholder.		
GENERAL OBJECTIVE 3.0: Understand the methods of maintaining and using farm records on paper and in digital systems with traceability.						
3-4	3.1 Define a farm record 3. 2 Outline the	• Explain farm record Outline the importance of	Sample paper-based	• Examine the sample paper-based record forms used at the	• Guide students to: • Examine paper record forms.	Sample record forms, paper logbooks. Computers/laptops

	importance of record-keeping. 3.3 Describe types of farm records. 3.4 Describe poultry-specific records. 3.5 Describe dairy-specific records 3.6 Describe small-ruminant and pig records. 3.7 Outline the qualities of good records. 3.8 Outline digital record-keeping options. 3.9 Outline traceability. 3.10 Outline data privacy and ethics in farm-record systems.	record-keeping. • Discuss types of farm records. • Discuss poultry-specific records. • Discuss dairy-specific records. • Discuss small-ruminant and pig records. • Enumerate qualities of good records. • Enumerate digital record-keeping. • Enumerate traceability. • Enumerate data privacy and ethics.	record forms. Projector, whiteboard, Tablets/laptops, reference textbooks. Internet.	institutional farm. • Set up a poultry, dairy or pig record book using paper and an Excel template. • Capture one week's production, feed and health data on the institutional farm. • Set up a digital herd record on a mobile app (or Google Sheets) with at least 10 animals; enter weight, breed, parity and health events. • Apply RFID/ear tags on a sample group and link them to the record system. • Generate a simple weekly performance report from the records (egg production, growth rate, feed conversion).	• Set up record books on paper and Excel. • Capture production, feed and health data. • Use a mobile app for herd records. • Apply RFID/ear tags and link to records. • Generate a weekly performance report.	with Excel/Google Sheets. Tablets/smartphones with herd-management app. RFID tags and reader, ear tags and applicator. Live animals, recording sheets, PPE.
GENERAL OBJECTIVE 4.0: Comprehend the principles of farm financial management**.**						

5-6	4.1 Define farm finance, capital, revenue, cost, profit and loss. 4.2 Differentiate fixed cost from variable cost; total cost from average cost; opportunity cost. 4.3 Describe cost components in livestock farming 4.4 Describe sources of capital. 4.5 Describe gross margin and how to calculate it for poultry, dairy, pig and sheep enterprises. 4.6 Describe the partial budget for evaluating a single management change. 4.7 Describe the enterprise budget 4.8 Explain the cash-flow statement and its importance.	• Explain farm finance, capital, revenue, cost, profit and loss. • Distinguish fixed cost from variable cost; total cost from average cost; opportunity cost. • Discuss cost components in livestock farming • Explain the sources of capital. • Discuss gross margin and how to calculate it for poultry, dairy, pig and sheep enterprises. • Discuss the partial budget for evaluating a single management change. • Discuss the enterprise budget • Explain the cash-flow statement and its importance. • Discuss the profit-and-loss (income)	Charts and sample financial statements. Projector, whiteboard, calculators. Reference textbooks, internet. Computers with Excel.	• Set up an Excel template for a poultry/dairy/pig enterprise budget. • Compute the gross margin for a 1,000-bird broiler batch from given data. • Construct a 12-month cash-flow projection for a small-scale layer enterprise. • Construct a simple profit-and-loss statement for the institutional poultry unit using last quarter's data. • Compute the break-even point (in birds and in price/kg) for a broiler enterprise. • Apply a partial budget to evaluate a switch from maize-based to cassava-based feed (using given data). • Develop a one-page loan-application brief for a livestock SME using the	Guide students to; • Set up an Excel template for a poultry/dairy/pig enterprise budget. • Compute the gross margin for a 1,000-bird broiler batch from given data. • Construct a 12-month cash-flow projection for a small-scale layer enterprise. • Construct a simple profit-and-loss statement for the institutional poultry unit using last quarter's data. • Compute the break-even point (in birds and in price/kg) for a broiler enterprise. • Apply a partial budget to evaluate a switch from maize-based to cassava-based feed (using given data). • Develop a one-page loan-application brief for a livestock SME using the NIRSAL/AGSMEIS	Computers/laptops with Excel. Calculators, projector. Sample farm data, NIRSAL/AGSMEIS forms. Recording sheets, printer.

	4.9 Describe the profit-and-loss (income) statement and the balance sheet. 4.10 Describe break-even analysis 4.11 Describe simple investment appraisal 4.12 Describe tax obligations of a livestock farm in Nigeria.	statement and the balance sheet. • Discuss break-even analysis • Explain simple investment appraisal • Discuss tax obligations of a livestock farm in Nigeria.		NIRSAL/AGSMEIS template.	template.	
GENERAL OBJECTIVE 5.0: Understand the principles of production planning and resource allocation for feed, breeding, labour, water, equipment and pasture.						
7	5.1 Describe production planning. 5.2 Describe feed planning procurement and storage. 5.3 Describe breeding planning 5.4 Describe labour planning 5.5 Describe capital and equipment planning	• Discuss production planning. • Discuss feed planning procurement and storage. • Discuss breeding planning • Discuss labour planning • Discuss capital and equipment planning • Discuss stocking	Charts, KPI tables, projector, whiteboard, Calculators, reference textbooks, internet.	• Develop a 12-month production calendar for the institutional poultry/dairy unit. • Forecast feed requirements for a 500-layer flock for 12 months and develop a procurement schedule. • Develop a breeding/calving schedule for a 30-doe goat herd over	• Guide students to: • Develop a production calendar. • Forecast feed requirements. • Develop a breeding schedule. • Develop a labour roster. • Compute carrying capacity. • Compute water demand.	Calculators, computers/Excel. KPI tables, sample data. Projector, recording sheets.

	5.6 Describe stocking density and carrying capacity 5.7 Describe water-supply planning per-animal demand, dry-season storage, reservoir. 5.8 Outline benchmarking comparing farm KPIs against industry standards.	density and carrying capacity • Discuss water-supply planning per-animal demand, dry-season storage, reservoir. • Explain benchmarking comparing farm KPIs against industry standards.		12 months. • Develop a labour roster for the institutional farm. • Compute the carrying capacity of a 5-ha pasture for sheep/goat using the AU/ha approach. • Compute the monthly water demand for a 1,000-broiler batch.		
GENERAL OBJECTIVE 6.0: Appreciate farm risks, including biosecurity, disease outbreak, climate, market and financial risks						
8	6.1 Define risk and uncertainty in livestock farming. 6.2 Describe categories of risk 6.3 Describe biosecurity as the first line of defence 6.4 Describe disease-outbreak preparedness and response	• Explain risk and uncertainty in livestock farming. • Discuss categories of risk • Discuss biosecurity as the first line of defence • Discuss disease-outbreak preparedness and response • Discuss livestock insurance	Charts of risk types. Projector, whiteboard, brochures. Reference textbooks, internet.	• Conduct a risk-assessment exercise on the institutional farm using a risk matrix (likelihood × impact). • Develop a biosecurity plan for the poultry unit (perimeter, footbath, visitor log, quarantine, all-in/all-out schedule). • Prepare a disease-outbreak	Guide students to; • Conduct a risk-assessment exercise on the institutional farm using a risk matrix (likelihood × impact). • Develop a biosecurity plan for the poultry unit (perimeter, footbath, visitor log, quarantine, all-in/all-out schedule). • Prepare a disease-outbreak preparedness checklist.	Risk-matrix templates. Biosecurity-plan templates. NAIC/NIRSAL brochures and sample forms. Calculators, computers, projector. Recording sheets, PPE.

	6.5 Describe livestock insurance 6.6 Describe market-risk management 6.7 Describe climate-risk management 6.8 Describe contingency planning	• Discuss market-risk management • Discuss climate-risk management • Discuss contingency planning		preparedness checklist. • Review a livestock-insurance brochure and complete a sample application. • Develop a climate-smart contingency plan for dry-season feed and water.	• Review a livestock-insurance brochure and complete a sample application. • Develop a climate-smart contingency plan for dry-season feed and water.	
GENERAL OBJECTIVE 7.0: Understand the principles of marketing, supply-chain management, value addition and digital marketing to a livestock enterprise.						
9-10	7.1 Define marketing and the marketing mix. 7.2 Describe livestock marketing channels 7.3 Describe market intelligence 7.4 Describe pricing strategies 7.5 Describe value-addition opportunities 7.6 Describe supply-chain management. 7.7 Describe digital	• Explain marketing and the marketing mix. • Explain livestock marketing channels. • Discuss market intelligence. • Discuss pricing strategies. • Explain value-addition. • Discuss supply-chain management. • Explain digital marketing. • Discuss cooperatives and collective marketing.	Charts, projector, whiteboard. Sample marketing materials, Reference textbooks, internet.	• Conduct a market survey of livestock products in the local market and document prices and seasonality. • Develop a marketing plan for a chosen enterprise (e.g. 500-layer farm) covering the four Ps. • Develop a social-media post and a WhatsApp Business catalog entry for a farm product. • Compute a simple cost-plus and a	Guide students to; • Conduct a market survey of livestock products in the local market and document prices and seasonality. • Develop a marketing plan for a chosen enterprise (e.g. 500-layer farm) covering the four Ps. • Develop a social-media post and a WhatsApp Business catalog entry for a farm product. • Compute a simple cost-plus and a value-based price for a poultry	Social-media accounts. Recording sheets, calculators. Computers, projector, transport. PPE.

	marketing 7.8 Discuss farmer cooperatives and collective marketing.			value-based price for a poultry product.	product.	
GENERAL OBJECTIVE 8.0: Know the principles of human-resource management, occupational health and safety and labour-welfare on a livestock farm.						
11-12	8.1 Describe roles on a livestock farm 8.2 Describe recruitment, selection and onboarding processes. 8.3 Describe training and capacity building. 8.4 Describe motivation, performance appraisal, incentives and discipline. 8.5 Describe occupational health and safety (OHS) on the livestock farm 8.6 Describe labour laws relevant to farming in Nigeria	• Discuss roles on a livestock farm. • Discuss recruitment and onboarding. • Discuss training and capacity building. • Discuss motivation, appraisal and discipline. • Discuss occupational health and safety. • Discuss labour laws. • Discuss worker welfare. • Discuss communication and conflict resolution.	Charts, sample job descriptions, OHS posters. Projector, whiteboard, . Reference textbooks, internet.	• Develop a job description for a herdsman at the institutional farm. • Develop a sample induction package for a new farm worker. • Conduct an OHS audit of the institutional farm and recommend corrections. • Develop a daily work-schedule for a shift of five farm hands. • Conduct a role-play of a recruitment interview and a disciplinary meeting.	Guide students to; • Develop a job description for a herdsman at the institutional farm. • Develop a sample induction package for a new farm worker. • Conduct an OHS audit of the institutional farm and recommend corrections. • Develop a daily work-schedule for a shift of five farm hands. • Conduct a role-play of a recruitment interview and a disciplinary meeting.	Job-description templates, induction materials. OHS-audit checklists. Work-schedule templates. Recording sheets, projector, PPE.

	8.7 Describe farm-worker welfare. 8.8 Describe communication and conflict resolution on the farm.					
GENERAL OBJECTIVE 9.0: Comprehend the application of digital and precision livestock farming tools						
13-15	9.1 Define precision livestock farming (PLF). 9.2 Describe IoT sensors used in livestock farming 9.3 Describe GPS, geo-fencing and tracking for grazing livestock; drone pasture monitoring. 9.4 Describe automated equipment. 9.5 Describe farm-management software (FMS) and selection criteria. 9.6 Describe digital extension services. 9.7 Describe data-	• Explain precision livestock farming. • Discuss IoT sensors. • Discuss GPS and drone use. • Discuss automated equipment. • Discuss FMS software and selection criteria. • Discuss digital extension services. • Discuss data-driven decision-making. • Discuss entrepreneurship pathways. • Discuss SIWES and lifelong learning.	Charts of PLF systems. Projector, whiteboard, Reference textbooks, internet	• Demonstrate the use of an IoT sensor or RFID ear-tag system at the institutional farm; download and interpret data. • Set up a free-tier farm-management app (e.g. Farmonaut, Google Sheets dashboard) and capture one week of data. • View or operate a drone (or watch a demo video) and discuss applications in pasture monitoring. • Develop a one-page business plan for a livestock-related agritech start-up or	Guide students to; • Demonstrate the use of an IoT sensor or RFID ear-tag system at the institutional farm; download and interpret data. • Set up a free-tier farm-management app (e.g. Farmonaut, Google Sheets dashboard) and capture one week of data. • View or operate a drone (or watch a demo video) and discuss applications in pasture monitoring. • Develop a one-page business plan for a livestock-related agritech start-up or value-addition SME. • Develop a digital	RFID/IoT sensors, smartphones/tablets. Farm-management apps (Farmonaut, Google Sheets). Drone (where available) or demo video. Business-plan templates. Computers, projector, recording sheets, PPE.

	driven decision-making and farm dashboards 9.8 Explain entrepreneurship pathways in livestock 9.9 Explain SIWES, internships and lifelong learning in farm management.			value-addition SME. • Develop a digital extension content piece (WhatsApp advisory message, short video). • Conduct a farm-dashboard exercise: define five KPIs, alert thresholds and a corrective-action plan. • Conduct a class debate on the benefits and risks of precision livestock farming for smallholders in Nigeria.	extension content piece (WhatsApp advisory message, short video). • Conduct a farm-dashboard exercise: define five KPIs, alert thresholds and a corrective-action plan. • Conduct a class debate on the benefits and risks of precision livestock farming for smallholders in Nigeria.	

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

LIST OF MINIMUM RESOUCES/PHYSICAL FACILITTIES

1. Animal Parasitology Laboratory

S/N	Item	Quantity
1	Autoclave	2
2	Refrigerator	1
3	Platinum with loops	30
4	Incubator	1
5	Anaerobic jar	2
6	Lovibond colour comparators	2
7	Milk sampling outfit	1
8	Colony counter	1
9	Centrifuge	1
10	Water bath	2
11	Shaker for bottle	2
12	Microscope – Simple	10
13	Microscope – Compound	10
14	Staining trough	15
15	Magnifying glasses	15
16	pH Meter	2
17	Hot air oven	1
18	Triple beam balance	2

S/N	Item	Quantity
19	Top loading balance	2
20	Electronic analytical balance	2
21	Evaporating dish	15
22	Vacuum pump	1
23	CO_2 gas cylinder with gas	1
24	Gas particle anaerobic jar	4
25	Inoculating loop holder	50
26	Ultraviolet light	1
27	Microtome and knives	1
28	Microhaematocrit centrifuge	1
29	Wax embedding oven	2
30	Floating bath	1
31	Hot plate	1
32	Embedding tray	1
33	Tissue processing bottle	10
34	Tally counter	20
35	Water still	30
36	Forceps	40
37	Aspirator jar	2
38	Insect cages and cabinets	5 each

S/N	Item	Quantity
39	Insect nets	30
40	Lamps	10
41	Mist nets	10

2. **Anatomy and Physiology Laboratory**

S/N	Item / Description	Quantity
1	Model of the cow (approx. ⅓ natural size) with detachable entrails: ½ lung, heart, intestines, ruminant stomach	1
2	Model of cow (approx. ½ natural size) showing muscles with detachable entrails	1
3	Model of domestic fowl (natural size) showing internal detachable organs	1
4	Model illustrating development of animals (e.g. cell division)	1
5	Models of the heart of vertebrates individually mounted on stands with base	1 set
6	Mounted skeletons: (a) Bovine (b) Equine (c) Canine (d) Caprine (e) Avian (f) Lapine (g) Ovine	1 each
7	Collection of bones of mammals and avian: Bony pelvis, Ossa coxarum, Os coxae, Femur, Tibia & Fibula, Tarsals, Metatarsals, Phalanges, Scapula, Humerus, Radius & Ulna, Carpals, Skull, Atlas, Axis, Cervical/Thoracic/Lumbar/Sacral/Coccygeal vertebrae, Ribs, Sternum	1 set
8	Microscopes	5
9	Prepared histology slides: Cell division, Germ layers, Epithelial/Connective/Muscular/Nervous tissues, Small & Large intestine, Liver, Spleen, Pancreas, Lymph nodes, Salivary glands, Arteries, Veins, Kidney, Ovary, Lung, Trachea, Skin	1 set

S/N	Item / Description	Quantity
10	Digestive system of monogastric animal	1
11	Respiratory organ of cow/horse	1
12	Male and female reproductive organs of different species of animals	1 set
13	Liver, spleen and kidneys	1 set
14	Relevant physiological wall charts of various systems	1 set

3. Microbiology Laboratory

S/N	Item	Quantity
1	Autoclave	2
2	Refrigerator	1
3	Platinum wire loops	30
4	Incubator	1
5	Anaerobic jar	2
6	Milk sampling outfit	2
7	Colony counter	1
8	Centrifuge	1

S/N	Item	Quantity
9	Water bath	1
10	Electronic balance	2
11	Microscopes – Simple	10
12	Microscopes – Compound	10
13	Staining troughs	15
14	Cool boxes	10
15	Specimen bottles	20
16	Lovibond colour comparators	2
17	Hot air oven	1
18	Inoculating loop holder	40
19	Forceps	—

4. Animal Husbandry

S/N	Item	Quantity
1	Ropes	10
2	Bull nose ring	4
3	Mouth gag	4

S/N	Item	Quantity
4	Muzzler	4
5	Pig catcher	4
6	Pig holder	2
7	Halters	4
8	Refrigerator	1
9	Deep freezer	1
10	Drenching gun	1
11	Balling gun	1
12	Hypodermic syringe	10
13	Needles (various sizes)	20
14	Thermometer	10
15	Surgical blade	5
16	Suture material	1
17	Burdizzo	1
18	Hoof trimmer	1
19	Dehorning saw	1
20	Dehorning cable	2
21	Weigh band	4
22	Elastrator	4
23	Weighing scale	2
24	Strip cup	6
25	Bucket	6
26	Towels	1

S/N	Item	Quantity
27	Milking machine	4
28	Brooder	4
29	Hover	10
30	Thermometer (brooder)	4
31	Guard	4
32	Candler	5

5. **Sheep and Goat Production**

S/N	Item / Equipment	Quantity
1	Shearing equipment	20
2	Drenching guns	20
3	Hoof trimming kits	5
4	Sheep handling crates	10
5	Goat milking equipment	5
6	Portable fencing systems	10
7	Grazing management tools	10
8	Mineral lick dispensers	10

6**. Swine Production**

S/N	Item / Equipment	Quantity
1	Farrowing crates	20

S/N	Item / Equipment	Quantity
2	Piglet creep feeders	20
3	Automatic pig feeders	10
4	Nipple drinkers	10
5	Swine weighing scales	10
6	Pig handling boards	10
7	Pig restraining equipment	10
8	Pig waste management systems	10
9	Swine housing ventilation systems	10
10	Swine heating systems	10
11	Artificial insemination kits for pigs	10

7. **Poultry Production**

S/N	Item / Equipment	Quantity
1	Egg incubators	5
2	Hatchery units	1
3	Automatic hatching machine	1
4	Candling machines	5
5	Egg trays	40
6	Egg graders	10
7	Egg washing machines	10
8	Egg storage refrigerators	2

S/N	Item / Equipment	Quantity
9	Chick boxes	5
10	Poultry feeders	100
11	Brooder unit	1
12	Poultry drinkers	100
13	Battery cages	5
14	Poultry weighing scales	5
15	Ventilation fans	50
16	Poultry vaccination equipment	10
17	Poultry debeakers	4
18	Feed and water troughs	100 each
19	Litter management equipment	—
20	Broiler and Layer birds	1,000 each

8. Pathology Laboratory

S/N	Item	Quantity
1	Microscopes	5
2	Microscope slides	assorted
3	Slide projector	2
4	Charts	assorted
5	Pictures	assorted
6	Specimens	assorted
7	Centrifuge	2

S/N	Item	Quantity
8	Refrigerator	2
9	Incubator	2
10	Microtome and knives	assorted
11	Wax embedding oven	1
12	Embedding tray	2
13	Tissue processing bottle	assorted
14	Forceps	assorted

9. Animal Diseases

S/N	Item	Quantity
1	Thermometer	5
2	Stethoscope	5
3	Vaginal speculum	3
4	Examination table	2
5	Sick bay	1
6	Isolation block	2
7	Diagnostic kit	1
8	Microscope	5
9	Test-tubes	assorted
10	Surgical examination lamp	2
11	Restraining ropes	assorted
12	Halters	assorted

S/N	Item	Quantity
13	Trocar and canula	assorted
14	Steel cabinet for drugs	1
15	Stomach tube	1
16	Antidotes	assorted

10. Clinical Techniques I

S/N	Item	Quantity
1	Washing and cleaning equipment	1
2	Steam sterilizer	1
3	Autoclave	1
4	Instrument rack / cabinet	1
5	Register	1
6	Demonstration animals	1
7	Examination table	1
8	Small and large animal clinic	1
9	Post-mortem kit	1
10	Diagnostic set	5
11	Disinfectant	-
12	Leather muzzles	-
13	Nose ring	5
14	Ropes	-
15	Mouth gag for dogs	5

S/N	Item	Quantity
16	Anesthetic agent	—
17	Weighing scale	3
18	Refrigerator	2
19	Halter	—
20	Hand gloves	assorted
21	Test tubes	assorted
22	Forceps	assorted
23	Sample bottles	assorted
24	Cotton wool	—
25	Multidose syringes	assorted
26	Scalpel blade	assorted
27	Glass slides	assorted
28	Centrifuge	3
29	Bijou bottle	3

11. Principles of Pasture and Range Management II

S/N	**Item / Equipment**	**Quantity**
1	Forage harvesters	5
2	Disc mowers	5
3	Balers	5

S/N	Item / Equipment	Quantity
4	Irrigation systems	5
5	Grass cutters	5
6	Soil testing kits	5
7	Pasture seeders	5
8	Fodder conservation equipment	5
9	Silage bags and silos	10
10	Hay storage facilities	5
11	Pasture moisture meters	5
12	Drone mapping systems	5
13	Quadrat	20
14	Tractor and implements	2
15	Water reticulation equipment	Assorted
16	Planters	10

12. Rabbit Production

S/N	Item	Quantity
1	Nigerian Map Rabbit model	2
2	Model of horse	2
3	Hutches	4
4	Feed trough – Wood	4
5	Feed trough – Metal	4
6	Feed trough – Plastic	4
7	Hoppers	4
8	Nest boxes	4
9	Branding iron	2
10	Tags	6
11	Rabbitry (capacity)	30

13. Mini-Livestock Production

S/N	**Item / Equipment**	**Quantity**
1	Beehives	5
2	Honey extractors	5
3	Bee suits and gloves	10
4	Smokers	10
5	Hive tools	10
6	Honey storage containers	12
7	Snailery pens	10

S/N	Item / Equipment	Quantity
8	Grasscutter cages	10
9	Rabbit hutches	10
10	Mini-livestock feeders and drinkers	10

14. Animal Products Hygiene and Inspection

S/N	Item	Quantity
1	Overall (Robe)	5
2	Rain coat	5
3	Glove	5
4	Goggles	5
5	Stethoscope	2
6	Thermometer	10
7	Ropes	—
8	Halters	—
9	Nose rings	2
10	Stunning gun	2
11	Assorted knives	1

S/N	Item	Quantity
12	Slaughter slab	1
13	Hooks	2
14	Axe/Saw	1
15	Surgical pack	1
16	Refrigerator	1
17	Examination table	1
18	Post-mortem kit	—
19	Light duty cautery	1

15. Animal Disease II

S/N	Item	Quantity
1	Diagnostic kit	1
2	Syringes (Assorted)	10
3	Drencher	1
4	Slides	10
5	Microscope – Simple	1
6	Microscope – Compound	10
7	Sample bottles	10
8	Test-tube	20
9	Milk cup	10
10	Teat dip	5
11	Vaginal speculum	4
12	Automatic syringe	5
13	Refrigerator	4
14	Freezer	1

S/N	Item	Quantity
15	Curved forceps	1
16	Diagnostic set	3
17	Surgical tray with lid	2
18	Enumeration lamp	2
19	Trocar and canula	1
20	Steam sterilizer	2

16. Audio Visual Room / Facilities

S/N	Item	Quantity	Remark
1	Video recorder	2	—
2	Slide projector	2	—
3	Overhead projector	2	—
4	Film projector	2	—
5	Magnetic board	2	—
6	Public address system	1	—

S/N	Item	Quantity	Remark
7	Television set	2	—
8	Cameras	5	—
9	Enlarger	1	Dark room
10	Photo dryer	1	—
11	Photo cutter	1	—
12	Tables for drawing	5	To sit 6 each
13	Water colours	—	—
14	Drawing pencils	—	—
15	Drawing pens	—	—
16	Display cabinets and boards	—	—

17. Veterinary Clinic

S/N	Item	Quantity
1	Artery forceps	10
2	Tissue forceps	10
3	Thumb forceps	10
4	Uterine holding forceps	5
5	Alligator forceps	5
6	Dissecting forceps	10
7	Peritoneum forceps	5
8	Intestinal forceps	5
9	Rat-Toothed mosquito forceps	3
10	Mosquito straight forceps	3
11	Umbical O forceps	3
12	Curved forceps	3
13	Allis forceps	5
14	Sterilizer forceps	5

S/N	Item	Quantity
15	Towel clips	5
16	Obstetrical hooks	5

18. General Equipment

S/N	Item	Quantity
1	Surgery table	1
2	Examination lamps	2
3	Emasculator	2
4	Examination table	1
5	Pig catcher	1
6	Probang	1
7	Diagnostic set	2
8	Post mortem kit	2
9	Light duty cautery	2
10	Uterine catheter	3
11	Aural speculum	2
12	Vaginal speculum	2
13	Trocar and canula	2
14	Bloodless castrator	2
15	Automatic vaccinator	3
16	Ligature scissors	3

S/N	Item	Quantity
17	Multidose syringes	5
18	Grooved director	5
19	Clinical knife	2
20	Surgical needles	Assorted
21	Surgical saw	2
22	Surgical trays with lid (M, L)	2
23	Obstetrical instruments	Assorted
24	Debeaker	2
25	Drencher – Sheep / Cattle	2 each
26	Oxygen cylinders	2
27	Otoscope	1
28	Stethoscope	2
29	Thermometers	10
30	Autoclave	1
31	Steam sterilizer	1
32	Weighing scale	2
33	Refrigerator	1
34	Microscope	2
35	Ambulatory box	1
36	Portable pump sprayers	3
37	Mouth gag for dogs	2
38	Haemostat (5" and 8")	3 each
39	Retractors	3

S/N	Item	Quantity
40	Cat guts	3
41	Kidney dish	5

19. Clinical Techniques II

S/N	Item	Quantity
1	Calibrator beaker	4
2	Test tubes	20
3	Weighing balance	2
4	N.G.T. Tubes	3
5	Surgical pack	1
6	Artery forceps	10
7	Surgical scissors	10
8	Tissue forceps	10
9	Surgical needle	10
10	Surgical tray	5

S/N	Item	Quantity
11	Obstetrical instruments	Assorted
12	Suture material	10
13	Needles	10
14	Syringe	10
15	Dissecting forceps	10
16	Fluid giving set	1
17	X-ray films	6
18	Orthopedic surgical pack	2
19	Emasculator	2
20	Burdizzo	1
21	Hoof trimmer	1
22	O.B. Wire	4

20. Animal Farm Mechanization Equipment Laboratory

S/N	Item / Equipment	Quantity
1	Multi-purpose tractors	6
2	Tractor implements	6
3	Disc ploughs	6
4	Harrows	6
5	Ridgers	6
6	Seed drills	6
7	Trailers	6
8	Front-end loaders	6
9	Forage harvesters	4
10	Hammer mills	1
11	Feed grinders	5
12	Feed mixers	5
13	Disc mowers	5
14	Balers	5
15	Chaff cutters	5

S/N	Item / Equipment	Quantity
16	Silage making machines	5
17	Hay balers	4
18	Hay rakes	5
19	Fodder choppers	5
20	Manure spreaders	5
21	Water bowsers	5
22	Power tillers	5
23	Generator-powered sprayers	3
24	GPS-guided machinery	4
25	Farm drones for monitoring	5

21. Workshop — Wood Work Section

S/N	Item	Quantity
1	Working benches with vice	10
2	Band saw	2

S/N	Item	Quantity
3	Surface planer	2
4	Thickness planer	2
5	Drilling machine	1
6	Hand tools (saws, chisels, try square, gauges, rulers, screwdrivers, drill bits, hammers, pincers, oil stones, planners, etc.)	15 sets

22. Workshop — Metal Work Section

S/N	Item	Quantity
1	Lathe machine	4
2	Pipe benders	3
3	Anvils	3
4	Micrometers (inside, outside)	1
5	Stock and dice set	5
6	Drill sets	5
7	Electrical hand drills	2

S/N	Item	Quantity
8	Hydraulic jack (12 and 15 tons)	1
9	Tool boxes	5
10	Box of drill	4
11	Battery charger	1
12	Grease gun	2
13	Pipe cutters	1
14	Scribers	1
15	Steel ruler	5
16	Mallet sets	2
17	Pipe screwing / threading	2
18	Arc welding equipment with working benches	8
19	Arc welder	42
20	Electric grinder	2
21	Welding gloves	15
22	Welding helmet	15

S/N	Item	Quantity
23	Wire brush	5
24	Welding boots and screen	15
25	Soldering equipment	4
26	Blow torch	4
27	Tin snips	4
28	Soldering flux	4
29	Sheet metal sheer	4
30	Mallet hammer	4
31	Hack saw	2
32	Oxygen and acetylene bottles	2
33	Oxygen and acetylene regulator	3
34	Cylinder wrenches	5
35	Spark lighter	—

23. Workshop — Maintenance Section

S/N	Item	Quantity
1	Tool boxes	5
2	Hydraulic jack	2
3	Service pit	1
4	Tool boxes (maintenance)	5
5	Teaching models / scraps: Tractor engines, Trailers, Ploughs, Other farm implements	1 set each

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