COURSE CODE: **VCM 102**

COURSE TITLE: **INTRODUCTION TO VETERINARY MEDICINE**

NUMBER OF UNITS:

COURSE DURATION:

COURSE DETAILS:

COURSE DETAILS:

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COURSE CONTENT:

Meaning of Veterinary Medicine, Origin of Veterinary Medicine, Veterinary Medicine in ancient civilization, Formal Veterinary education, and establishments of veterinary schools in Europe, North America and Africa. Veterinary medicine curriculum: undergraduate and postgraduate, including academic and professional specialties, accreditation of veterinary schools: roles of National Universities Commission (NUC), Veterinary Council of Nigeria (VCN), and Nigerian Veterinary Medical Association (NVMA). Veterinary ethics and Veterinary oaths, Regulation of Veterinary Practices, Organization of Veterinary practice and opportunities in Veterinary Medicine

COURSE REQUIREMENTS:

READING LIST:

E

LECTURE NOTES

**OBJECTIVES OF VETERINARY TRAINING**

The objective of veterinary training is to produce Veterinarian that will engage confidently in economic livestock production and animal health protection. To achieve this goal, the College of Veterinary Medicine, University of Agriculture Abeokuta divided her curriculum into three major areas:

**Pre-clinical phase**

**Para-clinical phase**

**Clinical Phase**

**Pre-clinical phase:** this deal mainly with healthy animals and it involves studies on the structure and functions of normal healthy animal body.

**Para-clinical phase:** this deal mainly with infectious diseases affecting animal body ( Veterinary Microbiology/ Veterinary Parasitology), transformation from healthy body to disease state (Pathogenesis/ pathophysiology), gross and microscopic appearance of disease organ and tissues (Pathology) and the drugs used for prevention and treatment of disease (Pharmacology)

**Clinical phase:** this deals with prevention and cure (Veterinary Medicine / Surgery and Public Health), breeding of animals and management of reproductive diseases (Reproduction / theriogenology)

**PRE CLINICAL SUBJECTS**

1. **Veterinary Anatomy:**

a) Embryology: b) Surface or Topographic anatomy: c) Gross or macroscopic anatomy d) Histology or Microanatomy e) Applied or clinical anatomy:

2. **Veterinary Biochemistry** (chemistry of living matter/ physiological chemistry).

3. **Veterinary Physiology**.

4. **Animal Management**.

Animal management practices including feeding housing as it influences productivity and health of livestock. It very essential for veterinarian to have good knowledge in the principles of animal management and these include:

**PARA CLINICAL SUBJECTS**

1. **Veterinary Microbiology**: Deals mainly with life cycles, growth, isolation of microbes from animals or contaminated objects (feed, water and environment).

**2. Veterinary Parasitology:** Study of pathogenic parasites including helminthes their morphology, appearances, life cycles, pathogenicity, control and economic importance.

**Protozology**: Protozoa in the blood, Gastro intestinal tract and reproductive tract.

**Entomology**: Arthropods insects of veterinary importance where we have the winged and wingless

**3. Veterinary Pathology or Morbid Anatomy:** This study the appearance of body during disease process or after death, in an attempt to determine the cause or nature of disease or death.

**Branches of Veterinary Pathology**

* **Gross Pathology**
* **Histopathology**
* **Clinical Pathology:** (applicable to living animals).
* **Haematology:** Study of blood
* **Clinical enzymology:** AST, ALT indicate tissue damage

**4. Pharmacology:** This is the study of the principles of drug action, drug and their use in veterinary practice.

**CLINICAL PHASE**

**Veterinary Medicine:** This involves study of disease condition through healing

Clinical diagnosis which includes:

 History taking, examination of environ (poison, Starvation, overfeeding).

 Examination of subject (clinical examination of animal)

**Branches of Veterinary Medicine include**:

 Food Animal Medicine (cattle, sheep, goats and pigs).

 Poultry Medicine.

 Companion Animal Medicine (dogs, cats, horses).

 Wildlife and Fisheries Medicine

 Laboratory Animal Medicine (Rabbits, Rat, Mice, guinea pig)

**2. Veterinary Surgery:** This involves treatment of disease involving use of hands or instruments.

 Preparation for surgery (Asepsis and Anaesthesia)

 Operative techniques

 Postoperative care

**Veterinary Surgery** is usually divided into 2

Soft tissue surgery and Orthopaedics Surgery

In the Veterinary curriculum also under surgery is Diagnostic imaging

**3. Veterinary Public Health** involves:

 Studies on disease transmitted between animals and man (Zoonosis)

 Ante-mortem and post mortem inspections of food animals, contamination of meat, milk, fish with microorganism and chemical residues (Antibiotics/ pesticides)

 Organization and regulation of Veterinary practice

**4. Theriogenology (Reproduction**) this deals mainly with the following:

 Examination of animals for breeding soundness

 Disease of the reproductive tract

 Causes of infertility in animals

 Artificial insemination (collection, preservation and insemination).

 In-vitro fertilization, oestrus synchronization.

Other areas in the Veterinary curriculum

**Field Study:** After every session students are go for a mandatory 6 weeks industrial training either in farm/diagnostic laboratory/ Veterinary clinic

***Project***: Carried out in 600 level where experiments or survey is carried out by student under the supervision of Lecturer in area of animal diseases viz a viz factors that may influence intensity of disease process.

**POSTGRADUATE VETERINARY TRAINING**

The undergraduate veterinary curriculum is aimed at providing instruction in the basic principles of art and science of veterinary practice. It has however been observed that such training does not empower a young veterinary graduate to provide high quality service which are often desirable especially where knowledge of particular health problems are required. This situation has led to the need for specialization or “restricted effort” within the broad area of veterinary science, since it is not possible to produce someone who is “all things to all animals” in other words “a complete veterinarian”

There are 2 types of veterinary specialist

**TYPES OF VETERINARY SPECIALIST**

There are 2 types of veterinary specialist

 Academic specialist

 Professional specialist

**Academic specialist**

A doctor of veterinary medicine graduate may obtain a higher academic qualification such as post graduate diploma, masters degree or doctorate degree in any of the branches of veterinary sciences such as Pathology, Surgery and Public health. Such postgraduate qualifications are awarded by university and are usually utilized for teaching and research.

**Professional specialist**

Unlike the academic postgraduate degree, professional PG diploma, membership and fellowships are awarded by boards set up by the professional association /bodies. The fellowship are granted to members who have attained certain degree of skill or proficiency in a branch of veterinary medicine practice which are directly involve in clinical or diagnostic functions e.g Pathology, Microbiology, Surgery and Public health. Professional specialists are primarily trained for thorough diagnosis, prevention or treatment of diseases. The qualification obtained include

**ACCREDITATION OF VETERINARY SCHOOLS**

There are 2 bodies responsible for the accreditation of veterinary programmes in Nigeria; these are the:

1) National Universities Commission (NUC), and

2) Veterinary Council of Nigeria (VCN).

**Accreditation by NUC**

1) To ensure that no university fall below acceptable standards, and

2) that the degree offered by the universities have international currency .

**ACCREDITATION BY VCN**

The Veterinary Surgeon decree no 37 of 1969 established the VCN and charged it, among other function, with the responsibility of determining what standard of knowledge and skill are to be attained by person seeking to be registered as Veterinay Surgeon in Nigeria. This responsibility is executed through:

Granting approval to courses, qualification and institution, Monitoring of teaching and examination in approved veterinary schools, and Withdrawal of approval previously given where necessary.

**HISTORICAL BACKGROUND OF VETERINARY MEDICINE**

1. **Meaning of Veterinary Medicine**

Veterinary Medicine can simply be defined as the study of the art and science of prevention and treatment of animal diseases. Veterinary Medicine is medicine related to animals. In other words, Veterinary Medicine is the study of the diseases of animals including their diagnosis, prevention and treatment.

A Veterinarian or Veterinary Surgeon is a person trained and authorized to practice Veterinary Medicine and Surgery, that is, a doctor of Veterinary Medicine.

**2.0 Origin of Veterinary Medicine/Ancient Civilization**

Before the development of agriculture, man traveled about the earth in roving bands, usually to areas that promised abundant food of some kind. After man became bound to the earth through agriculture, communities developed, culture became more diversified, possessions were accumulated and traded, towns and cities were formed, records were kept and orderly governments established.

Highly developed composite civilizations existed about 7000 years ago in the Nile valley and in the Babylonian land of the Two Rivers. The students of Babylon developed the natural sciences of mathematics, geometry and astronomy. One of the Babylonian Kings, Hammurabi, who reigned about 2000 B.C., was particularly famous for his love for law and order. Under his reign, a set of laws known as the **“code of Hammurabi”** was developed. A fixed monetary unit was established, interest on loans and on other transactions was controlled, crafts and trades, and including the practice of human and Veterinary Medicine were regulated. The fact that animal doctors were specifically referred to in the “code of Hammurabi” is but one of many examples down through the ages that Veterinary Medicine is inseparable from a higher civilization.

Archaeological evidences such as from paintings on tombs and popular ancient Papyrus of Kahun written around 1800 B.C. (the oldest veterinary record in existence) showed that veterinary practice existed around 2000 B.C. in ancient Egypt and Asia.

The Greeks made splendid use of their Babylonian heritage, for it was through the minds of the immortal philosophers of ancient Greece that astronomy, mathematics, medicine and others of the natural sciences were developed to new heights. Even today, the code of ethics written by the Greek physician and philosopher, Hippocrates (460 – 377 B.C.), is the creed of every physician of human medicine. Hippocrates and his followers were searching continually for natural causes for disease; they kept careful records of their observations and the results of their treatments. Hippocrates is considered to be the father of Medicine.

Another famous Greek Philosopher, Aristotle (384 – 322 B.C.), applied the scientific method of empirical observation and inductive reasoning to the study of plants and animals. He recorded his observations based upon discovered facts and classified animals according to their similarities of structure. He dissected more than 50 different animals and recorded the likenesses and differences in their structure. His work marks him as the Father of Biology.

A Veterinarian, Apsyrtus of Constantinople, who lived around 350 A.D. described with some accuracy, many of the infectious and contagious diseases of the horse. As an army officer, he taught Veterinary Medicine of Calvary men. Because Apsyrytus was one of the most famous of animal doctors up to that time, some historians consider him the Father of Veterinary Medicine. Other historians however consider Vegetius Renatus (450 A.D. - 500 A.D), the Father of Veterinary Medicine, as Hippocrates did. He ignored superstition in his search for natural causes of disease, and expounded sound medical doctrines.

Progress made by the Romans in the Medical and Veterinary Sciences on the European continent was short-lived. Disuse of human and Veterinary Medical Sciences during the Middle Ages brought obvious results. Human and animal plagues swept through all parts of Europe, taking a tremendous animal toll of life. Carts were piled high with human victims of small pox and so-called plague, then wheeled to the edge of the city so the bodies could be burned. Fields and farmlands frequently were littered with dead and dying domesticated animals. Superstition prevailed over reason, and everything that happened was supposed to be the result of divine will. The quest of natural causes by Hippocrates and Vegetius was forgotten. Treatments for disease were usually absurd and often injurious rather than helpful.

Beginning around 600 A.D, the Mohammedans swept through Arabia, Syria and Persia and across all of North Africa. By 715 A.D., their empire extended from Spain to the Indus River in India. After establishing their empire, the Mohammedans eagerly pursued all phases of learning. The works of the great philosophers, scientists and physicians, dormant for centuries were revived by Arabian scholars and translated into Arabic. The legacy of ancient Greece was restored. Books dealing with the natural sciences were enriched by the observations of Arab scientists. Saracen or Arabian physicians added their own findings to the works of Hippocrates. The Veterinary art, especially as it applied to the horse, was highly developed by Arab horsemen. Learning in agriculture and Veterinary Medicine grew, improved, and was disseminated in Arabic.

The development of the sciences by the Mohammedan Empire influenced the people of Europe through Spain, Silicy, and Asia Minor. During the twelfth century, Arabic translations from the Greek were translated into Latin. Latin scholars learned more of Aristotle by translating Arabic manuscripts based on Greek thought.

The veterinary sciences began to evolve with the rebirth of the natural sciences during the sixteenth and seventeenth centuries. The veterinary sciences of our own age came into existence through the European veterinary schools and later, through the veterinary schools of the American continent. The veterinary sciences include all the numerous subdivisions of biology as they apply to Veterinary Medicine, including: Physiology, Histology, Pharmacology, Pathology, Bacteriology, Helminthology, Protozoology and Parasitology

One of the most important contributions in the sixteenth century was the development of the experimental method and scientists invented tools with which to carry on their work. Instruments like the telescope, the microscope, the thermometer, and the barometer were produced. The tools invented in some instances, brought remarkable development of many phases of the natural sciences. The microscope alone, for example, provided the means for developing all of the many biological sciences that have to do with a world of life and materials too small to be visible of the naked eye.

The tasks of the early scientists were not easily performed. The shackles of ancient authority and popular superstition made it necessary for them to work in the face of opposition and sometimes under the threat of imprisonment and death. When Copernicus and Galileo found that the sun was the centre of the universe for example, the Holy Bible and the greatness of God’s earth seemed contradicted. The wrath of some of the clergy therefore was frequently directed at the scientist and his work.

The Christian church most of the time did not help to inspire interest in medicine including Veterinary Medicine since diseases of man and animals was considered as God’s punishment or Divine wrath and prayers by stock owners was often the antidote recommenced. However, when the cattle plague reached Rome in 1713 A.D., Pope Clemens XI directed his physician, Giovanni Lancisi to investigate the cause of the cattle plague. Giovanni gave a detailed description including post mortem lesions of a disease called Rinderpest. In addition, he recommended measures for controlling the outbreak of the disease including slaughter of affected animals and burial of their carcasses in quick lime. He further recommended measures for preventing subsequent outbreaks. Unfortunately, Giovanni died 7 years later (1720) and his work was forgotten for many years afterwards.

Cattle plague reached England from Holland in 1714 and King George I also assigned his surgeon, Thomas Bates to investigate. Like Giovanni, Thomas Bates described the disease (Rinderpest) accurately and recommended slaughter of suspected herd, as well as quarantine and the isolation of grazing fields for at least 2 months and prohibition of contact between different groups of animals. The Government also introduced compensation for slaughtered cattle. These procedures are still employed until today worldwide for the control of major animal diseases.

Apart form Rinderpest, other diseases were described in the 18th century. In Spain, Fleming in 1761 reported a dangerous viral disease especially of exotic young dogs called Canine Distemper.

About the same time, Albrecht Von Haller described another disease of cattle called contagious Bovine Pleuro Pneumonia (CBPP) and this is still one of the most problematic diseases of cattle in Nigeria.

Between 1711 and 1769, millions of cattle died in Western Europe due to cattle plagues, mostly Rinderpest and to a lesser extent, CBPP. To cope with this disease problem in Europe, the need for the establishment of a Veterinary school became very obvious.

Veterinary Medicine has contributed its quota to uplift the human race. A veterinarian of note is Dr. J.B. Dunlop (1840-1921), whose observations from the hoof of the horse led to the development of pneumatic or inflatable tyre in 1888 and commercial production began in Belfast in 1890. Dunlop’s image appears today on the £10 note in circulation in Northern Ireland.

**3.0 Formal Veterinary Education**

The first Veterinary school was founded at Lyons, France in 1761 by Claude Bourgelat. Bourgelat was one of the upper class, educated in law, and was an internationally –famous horseman. In 1764, Bourgelat was called to Paris by the French government to found the National Veterinary School at Alfort, where special attention was paid to cattle and sheep.

Following these two (2) Veterinary Schools in France are the following:

**Country Location Year Established**

Italy Turin 1769

Sweden Copenhagen 1773

Austria Vienna 1777

Germany Giessen 1777

Hungary Budapest 1787

England London 1791

Scotland Edinburgh 1823

In North America, the first Veterinary School is the Ontario Veterinary College, Guelph in Canada which was established in 1862. This was followed by the Veterinary School in Lowa, USA in 1879 and another in Pennsylvania in 1884.

**4.0 Veterinary Establishment and Education in Africa**

Rinderpest was introduced into Africa in 1889 through the North-Eastern end around Ethiopia and Somalia and by 1896, the disease has spread into South Africa killing not lonely cattle but also many wild antelopes. By this time, other important disease especially Trypanosomosis (Nagana) have also been described in Africa.

The need to control these diseases was the force that encouraged the process of the establishment of Veterinary laboratories and research institutes in Africa. The strategy employed by the colonial masters was to train sufficient number of some professional staff to assist the very few available qualified Veterinarians. Training schools were thus established for various categories of auxiliary health staff all over Africa.

In Nigeria, the first Veterinary Department was established in VOM, near Jos, Plateau State in 1923. The Department is now called National Veterinary Research Institute (NVRI). The Institute has a school for training Veterinary support staff including inoculators, veterinary assistants (OND/ND) and Veterinary Superintendents (HND). In 1947, the VOM Veterinary School turned out the first batch of 3 veterinary graduates with VOM license to practice Veterinary Medicine in Nigeria. The scheme is similar to that provided by their medical colleague at Yaba College in Lagos.

In 1954, there were only 39 Veterinary Doctors on the register of Veterinary Council of Nigeria (VCN) and these were mostly expatriates. It was not until 1967 that the next batch of Veterinary graduates emerged from the joint effort of Ahmadu Bello University and University of Ibadan which were the first schools for full Veterinary Medicine in Nigeria. There are now over 5,000 Veterinarians on the VCN register.

**Chronology of Veterinary Education in Africa**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **UNIVERSITY** | **YEAR** | **1st enrolment** |
| 1 | Cairo University, Gaza, Egypt | 1901 |  |
| 2 | University of Pretoria, Onderstepoort, South Africa | 1920 |  |
| 3 | University of Khartoum, Sudan | 1938 |  |
| 4 | University of Cairo, Egypt | 1946 |  |
| 5 | University of Nairobi, Kabete , Kenya | 1949 |  |
| 6 | Assiat University, Egypt | 1962 |  |
| 7 | University of Ibadan, Ibadan, Nigeria | 1963 | 9 |
| 8 | Facultade de Ciencias, Lisbon, Angola | 1963 |  |
| 9 | Universite de Mozambique, Mozambique | 1963 |  |
| 10 | Ahmadu Bello University, Zaria, Nigeria | 1964 | 1 |
| 11 | Universite de Lubambashi, Congo (former Zaire) | 1965 |  |
| 12 | Universite de Dakar, Senegal | 1968 |  |
| 13 | University of Nigeria, Nsukka, Nigeria | 1970 | 20 |
| 14 | Institute Rabat, Morocco | 1970 |  |
| 15 | Makerere University, Uganda | 1971 |  |
| 16 | Alexandria University, Egypt | 1974 |  |
| 17 | University of Al Fateh, Libya | 1975 |  |
| 18 | Sekoine University of Agriculture, Tanzania | 1976 |  |
| 19 | Addis Ababa University, Debre Zeit, Ethiopia | 1979/80 |  |
| 20 | University of Maiduguri, Nigeria | 1980 |  |
| 21 | University of Zambia | 1983 | 14 |
| 22 | Usman Dan Fodio University, Sokoto, Nigeria | 1984 |  |
| 23 | Monsoura University, Egypt | 1994 |  |
| 24 | Menofia University, Sadat City, Egypt | 1997 |  |
| 25 | Bamenda University of Science & Technology, Cameroon | 1998 |  |
| 26 | University of Agriculture, Markurdi, Nigeria | 2001 | 12 |
| 27 | University of Agriculture, Abeokuta, Nigeria | 2002 | 30 |
| 28 | University of Agriculture, Umudike, Nigeria | 2004 | 12 |
| 29 | University of Abuja, Nigeria | 2005 |  |
| 30 | Nkrumah University of Science & Technology, Kumasi, Ghana | 2010 |  |
| 31 | University of Ghana, Legon, Ghana | 2010 |  |
| 32 | University of Ilorin, Ilorin, Nigeria | 2010 |  |

1. **Objectives and Philosophy of Veterinary Education in Nigeria**

The present day objectives of training in Veterinary Medicine are as follows:

1. Production of Veterinarians that will engage conveniently in economic livestock production and animal health protection.
2. Provision of courses of instruction for qualified personnel necessary for teaching, research and public health functions.

To achieve these objectives, the D.V.M Curriculum has 12 subjects’ areas which are grouped for effective training into 3 broad areas: preclinical, paraclinical and clinical. The 12 subject areas are Anatomy, Physiology, Biochemistry, Animal Management, Microbiology, Parasitology, Pathology, Pharmacology, Medicine, Surgery, Public Health and Theriogenology.

Anatomy is the scientific study of the structure of the body. Areas in Anatomy include:

1. Embryology which is the study of the development of the embryo from the zygote to the basic body plan.
2. Surface or topographic anatomy, which is the identification of the surface landmarks of the body.
3. Gross or macroscopic anatomy, which is the study of the appearance or normal organs of the body to the normal eye.
4. Histology or microscopic anatomy, which is the study of the microscopic appearance of normal tissues and cells.
5. Applied or clinical anatomy, which is a review of topographic and gross anatomy in relation to clinical, surgical or reproductive procedures and meat inspection.

Physiology is the science which deals with the functions of

the living organism and its parts, as well as the physical and chemical factors and processes involved. It deals with the functions and functioning of all body systems including respiratory, digestive, renal, cardiovascular, reproductive, nervous, musculoskeletal and endocrine systems.

Biochemistry involves the study of degradation and digestion of food nutrients including carbohydrates, fats, proteins, minerals and vitamins, as well as the storage of nutrients in the body (as glycogen and fat), biosynthesis of proteins and the biochemical basis of disease and ageing.

As animal management practices including feeding and housing influence the health and productivity of livestock, it is essential that a Veterinarian be very knowledgeable in the principles and practice of animal management. These principles include:

1. Systems of animal management. That is, intensive, semi-intensive, extensive and subsistent systems.
2. Management procedures and routines which include mating of animals, maintenance of pregnancy, parturition process and care of the new born, growing and adult animals.
3. Feeds for various types of animals including herbivores, carnivores and omnivores as well as feedstuffs for the composition of animal feed such as maize, wheat, groundnut, soyabeans and industrial by products especially maize bran, wheat bran, groundnut cake, soyabean meal, palm kernel cake and rice bran. Also, the uses of cassava tuber, leaves and peels as well, and yam and banana peels.
4. The nutritive composition of various feedstuffs in terms of crude protein, metabolizable energy, crude fibre, ether extracts and trace minerals.
5. Principles of ration formulation in addition to genetics and immunology.

Microbiology is the study of disease causing (pathogenic) microorganisms which include bacteria, viruses and fungi. This include the life cycle, growth and isolation of the microbes from animals or from contaminated objects especially food and water. The microbes are characterized and identified using criteria such as the shape, staining ability, growth requirements and biochemical characteristics.

Parasitology is the study of pathogenic parasites helminthes, protozoa and arthropods. The study includes morphology, lifecycle, economic importance and pathogenicity of the parasites as well as the measures of controlling the parasites.

Pathology or morbid anatomy is the study of the appearance of the body during disease process or after death in an attempt to determine the cause or nature of disease or death. Branches of pathology include:

1. Gross Pathologoy (Necropsy or PostMortem examination) which deals with the appearance of organs in diseased state or after death.
2. Histopathology deals with the appearance of diseased tissues or cells under the microscope.
3. Clinical pathology involves the examination of body fluids most especially blood as a pointer to or an index of the diseased process or diseased state. Clinical pathology involves living animals and not the dead and branches include
   1. Haematology, which is the study of blood. For example, red blood cell values are studied to determine whether the animal is anemic or not, whereas, white blood cell values are assessed for evidence of infection and at times, the type of infection.
   2. Clinical chemistry, which is the study of electrolyte ions, (that is, Na+, K+, HCO3-,Cl-, H+, Ca2+ and Mg2+), enzymes, sugar and protein.
   3. Immunology

Pharmacology is the science that deals with the origin, nature, chemistry, effects and uses of drugs. It includes pharmacognosy (dealing with natural drugs and their constituents), pharmacokinetics (movement of drugs in the body including absorption, distribution, localization in tissues, biotransformation and excretion), pharmacodynamics (mechanisms of action of drugs), pharmacotherapeutics (treatment of disease with medicines) and toxicology (study of poisons).

Medicine is the science and art of treatment of diseases by use of drugs or medicaments. Medicine involves the study of disease condition through clinical diagnosis which includes history taking, examination of the environment and the subject which may involve the use of diagnostic tools and methods especially clinical thermometer and stethoscope. In addition to collection of sample needed for laboratory diagnosis and finally treatment that is, reversal of disease process to health. Branches of Medicine include food animal Medicine, companion animal medicine, avian medicine, wildlife and fisheries medicine and laboratory animal medicine.

Surgery is that branch of Veterinary Science which treats diseases, injuries and deformities by manual or operative methods. Study areas include principles of wound healing, preparation for surgery, asepsis (how to carry out operation with animal contamination), anesthesia (for muscle relaxation and less pain during operation), operative techniques, post-operative care and nursing. Branches of surgery include soft tissue surgery, orthopedic surgery, anesthesia and diagnostic imaging. There are 3 areas of diagnostic imaging:

* 1. Radiology, which is the branch of science dealing with the use of x-rays, radio active substances and other forms of radiant energy in diagnosis and treatment of disease.
  2. Ultrasonography, which is an imaging technique in which deep structures of the body are visualized by recording the reflections (echoes) of ultrasonic waves directed into the tissues. Ultrasound is mechanical radiant energy of a frequency greater thant 20,000 cycles per second.
  3. Computed tomography is a radiological imaging technique that produces images of “slices” through a patient’s body.

Public health includes studies on diseases transmitted from animals to man and vice versa, otherwise referred to as Zoonosis. Study areas of public health include preventive medicine, ante-mortem and post-mortem inspection of food animals, food safety (monitoring of the degree of contamination of milk, meat and fish with microorganisms or chemical residues such as antibiotics and pesticides), and organization and regulation of Veterinary practice.

Theriogenology or reproduction is that branch of Veterinary Science which comprises the study of the normal physiology, anatomy, pathology and diseases of the male and female reproductive tracts of animals. It includes the subjects of obstetrics (dealing with pregnancy, labour and the puerperium), gynecology (study and treatment of the diseases and disorders of women, especially those affecting the reproductive system), andrology, reproduction on a herd and flock basis, artificial insemination and embryo transfer.

\*\*The Holy Bible in the Book of Numbers 21: 4-9, gives an account of how God told the Jewish Leader, Moses to make a snake and put it on a pole so that anyone bitten by a snake that looks up to the bronze snake on the pole will live and not die. This is dated back to 1300BC. This healing through looking at the snake on the pole is also believed to be the same source of symbol of the medical profession.