

# **A NEED TO REVIEW AND IMPROVE CURRICULA FOR VETERINARY LABORATORY TECHNOLOGY PROGRAMMES**

## **Introduction**

Livestock Training Agency (LITA) was established in 2011, in accordance with the Executive Agency Act No. 30 (Cap. 245) of 1997 and its subsequent amendments. The core functions of LITA include: delivery of quality trainings on Animal Health and Production, Veterinary Laboratory Technology, Rangeland Management and Tsetse Fly control. The Agency is also mandated to conduct applied research and consultancy/advisory services to different clients along the livestock sector.

Currently, the agency offers three courses or training programmes at certificate and diploma levels, including: Animal Health and Production, Veterinary Laboratory Technologies and Rangeland and Tsetse fly control. Graduates from these programmes are collectively designated as veterinary paraprofessionals or livestock field officers and serve as livestock extension officers in the public and private sectors. Recently, the agency has revitalised three more special curricula in order to address the shortage of livestock products technologists in the country. Implementation of the three tailor-made courses aims to abreast the existing technical professionals with strategic competencies on processing technologies, on dairy, meat, hides and skins. Coverage of these short courses takes three months.

## **Rationale for a need to review Veterinary Laboratory Technology Curricula**

Review and improvement of any training curricula is a continuous process and is usually attributed with different factors, such as on-going socio-economic changes, change of government policy, clients' demands, changes of science and technology, market forces, etc. In the last five years, LITA has been receiving increased criticisms from livestock keepers, investors, employers and other stakeholders along the livestock sector on the relevancy, usefulness and applicability of the Vet Laboratory Technology graduates in relation to the existing veterinary services delivery system in the country.

The existing vet lab training programme is claimed to be inadequate in provision of graduates with enough field exposure and direct on-farm practical competencies and attachment. According to the stakeholders' claims and observations, there is no direct contact and interactions of the respective graduates with the livestock keeping community and other clients in the sector. Graduates from this programme are claimed to lack key professional components on their competences to interact with the livestock farming communities, largely on animal health and relevant production aspects, including entrepreneurial skills contrary to their clients' expectations. Lack of competences on animal health and production aspects is also claimed to be a hindrance to self-employment of this group of graduates in the sector.

The agency has also noted a significant drop of new applicants and ongoing students on this programme in the last three consecutive years. These observations are further associated with the observed gaps on the existing curricula. For instance, during the academic year 2020/2021, the agency planned to enrol 300 students on Vet Lab Technologies. However, only 180 of them applied for this course. During the same year, more than 50 continuing students absconded their studies based on the same claims. These observations were therefore among the factors that necessitated the agency to review the respective curricula.

According to the results from the stakeholders' situational analysis survey on the relevancy in the community and the need for review of this course, the majority (89.6%) of respondents suggested to review the curricula and make them comprehensive and integrative in provision of quality veterinary extension services through quality services on Animal Health and Veterinary Laboratory Technologies (Situational Analysis Report, 2021). The respondents suggested also the name of the reviewed programme to be Animal Health and Veterinary Laboratory Technology that would cater for all relevant aspects of health and lab technologies. Fortunately, LITA Temeke and Tengeru campuses have sufficient infrastructures, equipment and human resource to run and accommodate the proposed programmes. Improvement of the existing curricula is expected to equip graduates with sufficient and up-to-date competences to address emerging clients' requirements, private sector and national priorities. The scope and flexibility of graduates to serve the livestock keeping community efficiently are also expected to increase. The graduates of the proposed programme are also expected to become successful investors in the livestock sector. This strategy is in line with the country's emphasis on engagement of the private sector in provision of extension services and self-employment of graduates in agricultural sectors.

The proposed curricula have been structured to leverage and address the needs of clients on animal health services and veterinary laboratory technologies in the public and private sectors. Relevant animal health skills have been integrated and incorporated with those of Veterinary Laboratory Technology curricula to equip trainees with adequate competences that will help them provide quality extension services on animal health and laboratory technologies. During incorporation of the reviewed modules, frontline practical applicability on day-to-day practices of the Veterinary Paraprofessionals was considered. Some modules have been combined and others restructured, modified or adopted from the existing curricula of animal health and production and credit hours adjusted accordingly, as indicated in the comparison and elaboration table below:

<b>NTA LEVEL 4</b>				
<b>Curriculum</b>	<b>ANIMAL HEALTH &amp; VET. LAB. TECHNOLOGY - Proposed</b>	<b>ANIMAL HEALTH AND PRODUCTION - Existing</b>	<b>VETERINARY LABORATORY TECHNOLOGY - Existing</b>	<b>Remarks on adjustment of Credit Hours</b>
<b>Module</b>	<b>Anatomy and Physiology of Domestic Animals</b>	<b>Anatomy and Physiology of Domestic Animals</b>	<b>Veterinary Anatomy &amp; Physiology</b>	
<b>Credit Hours</b>	<b>14</b>	<b>11</b>	<b>12</b>	
<b>Sub-enabling outcomes</b>	3.1.6 Describe veterinary anatomical nomenclature in relation to body structure 3.1.7 Describe topographic anatomy of different species of domestic animals. 3.1.8 Describe different body systems of domestic animals. 3.1.9 Describe organs of different domestic animal species. <b>3.1.10 Use anatomical features to determine organs of different domestic animal species.</b> 3.2.5 Explain functions of different body systems. <b>3.2.6 Describe coordination of various body systems</b> 3.2.7 Explain regulation of the functions of various body tissues/systems 3.2.8 Describe the physiological mechanisms of different body systems (same thing)	1.1.1 Describe veterinary anatomical nomenclature 1.1.2 Describe topographic anatomy of different species of domestic animals 1.1.3 Describe structures of different body systems of domestic animals. 1.1.4 Differentiate organs/systems of domestic animals. 1.2.1 Explain functions of different body systems. 1.2.3 Explain regulation of the function of various body tissues/systems 1.2.4 Describe the mechanisms of different body systems	6.1.1 Describe topographic anatomy of different domestic animals 6.1.2 Describe body cells and tissues of domestic animals 6.1.3 Describe and compare micro and macroscopic appearance of body organs and systems of domestic animals 6.1.4 Describe functions of body systems of different domestic animals	Two more Module Contents or Sub-enabling Outcomes (SEO) have been added to this Module in the proposed curricula with more detailed contents in all SEO, to cellular level  This improvement has led to an increase of two more CHs from 12 to 14
<b>Module</b>	<b>Basic Microbiology</b>	<b>Basic Microbiology</b>		
<b>Credit Hours</b>	<b>10</b>	<b>08</b>		
<b>Sub-enabling outcomes</b>	2.1.1 Describe common types of micro-organisms of veterinary importance 2.1.2 Describe morphological features of common microorganisms	2.1.1 Classify common types of different micro-organisms. 2.1.2 Describe morphological features of common micro-organisms 2.1.3 Describe staining characteristics of		Three more detailed SEO have been added to this Module in the proposed curricula.

	<p>of veterinary importance</p> <p>2.1.3 Describe staining characteristics of common micro-organisms of vet. importance</p> <p>2.1.4 Apply staining technique to identify different common micro-organisms of veterinary importance</p> <p>2.1.5 Utilize microscope to identify common micro-organisms.</p> <p>2.2.1 Describe common culture media used in laboratory for growth of microorganisms of vet. importance</p> <p>2.2.2 Describe methods for preparation of different types of culture media</p> <p>2.2.3 Demonstrate preparation of common culture media used in the laboratory</p>	<p>common micro-organisms.</p> <p>2.1.4 Outline common types of media used in bacteriology</p> <p>2.1.5 Apply stains to identify different common micro-organisms.</p> <p>2.1.6 Use microscope to identify common micro-organisms.</p>		<p>This improvement has led to an increase of two more CHs from 08 to 10.</p>
<b>Module</b>	<b>Basic Parasitology</b>	<b>Basic Parasitology</b>		
<b>Credit Hours</b>	<b>10</b>	<b>10</b>		
<b>Sub-enabling outcomes</b>	<p>2.2.1 Describe common parasites of veterinary importance</p> <p>2.2.2 Use classification methods to categorize common parasites of vet importance</p> <p>2.2.3 Explain the importance of common parasites of veterinary importance</p> <p>2.2.4 Use parasitological techniques to detect parasites of veterinary importance</p>	<p>2.2.1 Explain the importance of common endoparasites and ectoparasites parasites in domestic animals</p> <p>2.2.2 Classify common parasites in domestic animals.</p> <p>2.2.3 Identify common parasites in domestic animals.</p> <p>2.3.1 Explain the importance of common haemoparasites in domestic animals</p> <p>2.3.2 Classify common haemoparasites in domestic animals.</p> <p>2.3.3 Outline the common haemoparasites in domestic animals</p>		<p>Similar module contents and Credit hours between the two curricula</p>
<b>Module</b>	<b>Basic Computer Application</b>	<b>Introduction to Computer</b>	<b>Laboratory information tech.</b>	
<b>Credit Hours</b>	<b>08</b>	<b>06</b>	<b>13</b>	

<b>Sub-enabling outcomes</b>	<p>1.2.1 Apply knowledge of a computer system to describe computer components and operating system software</p> <p>1.2.2 Employ standard procedures in assembling computer system components.</p> <p>1.2.3 Employ standard procedures in performing boot up and shut down operations.</p> <p>1.3.1 Use word processing package to prepare documents</p> <p>1.3.2 Employ spreadsheet package to facilitate production of documents</p> <p>1.3.3 Use PowerPoint presentation package to create slides for presentation</p> <p>1.3.4 Use internet to perform mailing, browsing and search of information</p>	<p>6.1.1 Explain basic concepts of computer</p> <p>6.1.2 Differentiate between computer hardware and software</p> <p>6.1.3 Operate computer</p> <p>6.1.4 Apply word processing programme to communicate</p> <p>6.1.5 Apply MS excel to keep records</p> <p>6.1.6 Use Internet facility to communicate</p>	<p>1.1.1 Demonstrate individual methods for communication of laboratory information</p> <p>1.1.2 Describe group methods for communication of laboratory information</p> <p>1.1.3 Explain mass methods for communication of laboratory information</p> <p>1.1.4 Apply communication skills to disseminate laboratory technology</p> <p>1.2.1 Differentiate between computer hard ware and soft ware</p> <p>1.2.2 Operate computer</p> <p>1.2.3 Apply word processing programmes to communicate</p> <p>1.3.1 Document daily laboratory activities</p> <p>1.3.2 Compile weekly, monthly and annual laboratory activities</p> <p>1.3.3 Report laboratory results to supervisors</p> <p>1.3.4 Report Expired chemicals and reagents to supervisors</p> <p>3.1.5 Report the broken equipment in the laboratory</p> <p>6.2.4 Keep records of laboratory animal units.</p>	<p>Nine SEO of this Module highlighted in green colour under the VLT curricula have been moved to the Livestock Extension Methods and Techniques Module under NTA Levels 5 &amp; 6 in the proposed curricula.</p> <p>This rearrangement of SEO has led to a decrease of CHs from 13 to 8.</p>
			<p><b>Veterinary Laboratory Information &amp; Communication Technology (6 CRH)</b></p> <p>2.1.1 Apply listening skills in attending clients</p> <p>2.1.2 Identify client problems</p> <p>2.1.3 Respond to clients' problems/complaints concerning laboratory results</p> <p>2.2.2 Write report using established procedures and format</p> <p>2.2.3 Submit report to supervisor</p>	

			2.3.1 Enter data into computer for analysis 2.3.2 Analyse data using data processing software 2.3.3 Use internet to communicate	
<b>Module</b>	<b>General Pathology</b>	<b>General Pathology</b>	<b>General Veterinary Pathology</b>	
<b>Credit Hours</b>	<b>09</b>	<b>07</b>	<b>09</b>	
Sub-enabling outcomes	<p>3.3.1 Explain branches of pathology in relation to disease conditions.</p> <p>3.3.2 Explain predisposing and disease-causing factors in domestic animal species.</p> <p>3.3.3 Describe disturbances of cell metabolism occurring in the animal body.</p> <p>3.3.4 Describe inflammation to determine pathological changes that occurs in the animal body.</p> <p>3.3.5 Describe circulatory disturbances to determine pathological changes that occurs in animal body.</p> <p>3.3.6 Describe growth disturbances to determine pathological changes that occurs in animal body.</p> <p>3.3.7 Describe pathological changes to determine pigmentation that occurring in different organs in the animal body</p> <p>3.3.8 Use pathological changes to determine concretions and neoplasm in different organs of the animal body.</p> <p>3.3.9 Describe death and post-mortem examination to determine pathological changes in animal body</p>	<p>1.3.1 Outline branches of pathology.</p> <p>1.3.2 Outline predisposing and disease-causing factors.</p> <p>1.3.3 Describe different general pathological changes occurring in the domestic animal body.</p>	<p>6.2.1 Outline branches of pathology</p> <p>6.2.2 Explain disease causing factors</p> <p>6.2.3 Describe different general pathological changes occurring in the animal body</p> <p>6.3.3 Describe basic laboratory tests for histopathology</p>	<p>SEO 6.2.3 in the VLT curriculum has resulted into six SEO (from 3.3.4 to 3.3.9) in the proposed curricula.</p> <p>One SEO of this Module highlighted in green colour in the VLT curricula has been moved to the Module of Histopathology under NTA Level 6 in the proposed curricula.</p> <p>Despite this improvement and rearrangement, there is no change in CHs since module contents are almost similar</p>
<b>Module</b>	<b>Basic Livestock Extension</b>	<b>Introduction to Livestock Extension</b>		

<b>Credit Hours</b>	<b>08</b>	<b>08</b>		
<b>Sub-enabling outcomes</b>	<p>1.1.1 Explain basic concepts of extension in relation to animal health and laboratory services.</p> <p>1.1.2 Describe concepts of communication in relation to animal health and laboratory services.</p> <p>1.1.3 Describe extension methods for dissemination of livestock and laboratory technologies.</p> <p>1.1.4 Describe Adoption and diffusion of technological transfer in the community</p> <p>1.1.5 Explain the role of communities in technology transfer.</p> <p>1.1.6 Describe group dynamics in relation to farmer mobilization.</p> <p>1.1.7 Explain gender relations in production and extension services.</p>	<p>6.2.1 Explain basic concepts of livestock extension</p> <p>6.2.2 Explain group dynamics in relation to farmer mobilization</p> <p>6.2.3 Explain the role of communities in technology transfer</p> <p>6.2.4 Describe social systems/structure in adoption of technology</p> <p>6.2.5 Explain gender relations in production and extension services</p> <p>6.3.1 Describe method for dissemination of livestock technologies</p> <p>6.3.2 Describe adoption and diffusion processes of innovation</p> <p>6.3.3 Apply communication skills in different context</p>		Similar Module contents and Credit hours between the two curricula
<b>Module</b>	<b>Entrepreneurship</b>	<b>Entrepreneurship</b>		
<b>Credit Hours</b>	<b>07</b>	<b>08</b>		
<b>Sub-enabling outcomes</b>	<p>6.4.1. Explain economic principles</p> <p>6.4.2 Identify business opportunities</p> <p>6.4.3 Generate business ideas</p> <p>6.4.4 Validate business ideas</p> <p>6.4.5. Prepare and implement business plans</p>	<p>1.4.1 Describe concept of economics to determine livestock enterprise.</p> <p>1.4.2 Use economic principles to determine business opportunities in livestock enterprise</p> <p>1.4.3 Apply entrepreneurial technique to generate business ideas for livestock enterprise</p> <p>1.4.4 Use economic principle to validate business ideas for livestock enterprise.</p> <p>1.4.5 Use economic principle to prepare and implement business plan for livestock enterprise.</p>		Two SEO (1.4.2 and 1.4.3) are inseparable and have therefore been used to reallocate CHs from 08 to 07.
<b>Module</b>	<b>General Management of farm and Laboratory animals</b>	<b>General Livestock Husbandry</b>	<b>Management of Laboratory and experimental animals</b>	
<b>Credit</b>	<b>15</b>	<b>10</b>	<b>15</b>	

Hours				
<b>Sub-enabling outcomes</b>	<p>4.1.1 Identify animals (livestock and laboratory animals) for different purposes</p> <p>4.1.2 Restrain animals for different operations</p> <p>4.1.3 Carry out harvesting of livestock products</p> <p>4.1.4 Maintain hygiene in production units</p> <p>4.1.5 Determine reproductive changes in farm animals</p> <p>4.1.6 Carry out managerial operations in animal units</p> <p>4.1.7 Manage different classes of animals</p> <p>3.1.2 Identify common grasses, legumes and fodder trees</p> <p>3.2.1 Control weeds on pastures/fodders</p> <p>3.2.3 Control poisoning from pasture and fodder crops</p> <p>6.1.2 Explain different types of feed stuff for different categories of animals</p> <p>6.1.3 Demonstrate preparations of ration for different classes of animals.</p> <p>6.1.4 Demonstrate feeding for different classes of animals</p>	<p>4.1.1 Identify animals for different purposes</p> <p>4.1.2 Restrain animals for different operations</p> <p>4.1.3 Carry out harvesting of livestock products</p> <p>4.1.4 Maintain hygiene in production units</p> <p>4.1.5 Determine reproductive changes in farm animals</p> <p>4.1.6 Maintain farm records</p> <p><b>Management of grazing land and Pasture Production (15 CRH)</b></p> <p>3.1.1 Identify suitable areas for establishing pastures and fodder crops</p> <p>3.1.2 Identify common grasses, legumes and fodder trees</p> <p>3.1.3 Prepare seedbeds for pasture establishment</p> <p>3.1.4 Prepare seeds/vegetative planting materials</p> <p>3.1.5 Plant/sow seeds according to specifications</p> <p>3.2.1 Control weeds on pastures/fodders</p> <p>3.2.2 Apply fertilizers in pastures/fodders</p> <p>3.2.3 Control poisoning from pasture and fodder crops</p> <p>3.2.4 Carry out harvesting of pasture/fodder seeds using different techniques</p> <p>3.2.5 Store pasture/fodder seeds for future use</p> <p>3.3.1 Apply different techniques to harvest pasture/fodder crops</p>	<p>6.2.1 Restrain laboratory/experimental animals for different operations</p> <p>6.2.3 Control diseases and parasites in laboratory animal unity</p> <p>6.1.1 Identify different laboratory/experimental animals for different purposes</p> <p>6.1.2 Classify laboratory animals according to breeds</p> <p>6.1.3 Classify laboratory /experimental animals according to feeding habits</p> <p>6.3.1 Classify different laboratory animal feed staffs</p> <p>6.3.2 Prepare rations for different classes of laboratory animals</p> <p>6.3.3 Feed different classes of laboratory animals according to their requirements</p> <p>6.4.1 Identify different housing structures for laboratory /experimental animals</p> <p>6.4.2 Construct laboratory animal housing structures</p> <p>6.4.3 Carry out maintenance of housing structures for different classes of laboratory/experimental animals</p>	<p>There is almost similar contents and Credit hours between modules.</p> <p>However, some SEO highlighted in yellow in the AHP curricula are proposed to be dropped in the proposed curricula since they are comparatively not much useful to expected Technicians on Animal Health and Lab Technology.</p>



		<p>3.3.2 Make and store pasture/ fodder (leaf meal) hay using different techniques</p> <p>3.3.3 Make silage using different techniques.</p> <p>3.4.1 Practice different grazing systems</p> <p>3.4.2 Control stocking rate</p> <p>3.4.3 Rehabilitate degraded pasture land for pasture and fodder crops establishment</p> <p>3.5.1 Estimate Stocking rate and carrying capacity of an area.</p> <p>3.5.2 Apply rangeland improvement techniques for forage production, conservation and utilization.</p> <p>3.5.3 Apply agro forestry to improve rangelands</p> <p>3.5.4 Apply principles and methods of grazing management</p> <p>3.5.5 Describe traditional/pastoral rangeland utilization</p>		
		<p><b>Livestock Feeds and Feeding (7 CRH)</b></p> <p>4.3.1 Classify different livestock feedstuffs</p> <p>4.3.2 Mix rations for different classes of livestock</p> <p>4.3.3 Feed different classes of livestock according to feeding standards</p>		
		<p><b>Dairy cattle husbandry (7 CRH)</b></p> <p>2.1.1 Describe dairy farming in Tanzania</p> <p>2.1.2 Manage different classes of dairy cattle</p> <p>2.1.3 Carry out managerial operations</p>		
		<p><b>Beef cattle husbandry (6 CRH)</b></p> <p>2.2.1 Describe the major beef production systems in Tanzania</p> <p>2.2.2 Construct specific structures and facilities for beef cattle management.</p> <p>2.2.3 Perform Grading of beef cattle</p>		

		2.2.4 Carry out managerial operations in beef production.		
		<p><b>Sheep and Goats husbandry (6 CRH)</b></p> <p>2.3.1 Describe different breeds and types of sheep and goats.</p> <p>2.3.2 Explain management practices of sheep and goats.</p> <p>2.3.3 Describe production systems of sheep and goats.</p> <p>2.3.4 Carry out managerial operations in sheep &amp; goats production.</p> <p>2.3.5 Carry out disease control operations</p> <p>2.3.6 Maintain sheep and goats records.</p>		
		<p><b>Poultry and Rabbits husbandry (6 CRH)</b></p> <p>2.4.1 Describe different breeds and types of poultry and rabbits</p> <p>2.4.2 Describe the management of poultry and rabbits.</p> <p>2.4.3 Raise chicks from day old to point of laying and rabbits to marketing weight</p> <p>2.4.4 Carry out management of poultry and rabbits.</p> <p>2.4.5 Carry out hatchery management in poultry</p> <p>2.4.6 Describe the incubation of eggs.</p> <p>2.4.7 Maintain poultry and rabbits records.</p>		
		<p><b>Pig husbandry (6 CRH)</b></p> <p>2.5.1 Describe different breeds and types of pigs</p> <p>2.5.2 Describe the production systems of pigs</p> <p>2.5.3 Manage different classes of pigs</p> <p>2.5.4 Maintain pigs records</p>		

<b>Module</b>	<b>Animal breeding</b>	<b>Introduction to animal breeding</b>		
<b>Credit Hours</b>	<b>07</b>	<b>09</b>		
<b>Sub-enabling outcomes</b>	<p>4.2.1 Explain concept of animal breeding</p> <p>4.2.2 Explain different breeding methods</p> <p>4.2.3 Explain breeding systems</p> <p>4.2.4 Select animals for breeding</p> <p>4.2.5 Manage breeding stock</p> <p>3.1.6 Explain the importance and procedures for herd improvement (natural mating, artificial insemination, MOET, etc.)</p>	<p>4.2.1 Explain concept of animal breeding</p> <p>4.2.2 Explain different breeding methods</p> <p>4.2.3 Explain breeding systems</p> <p>4.2.4 Select animals for breeding</p> <p>4.2.5 Manage breeding stock</p> <p><b>Applied Animal Breeding (7 CRH)</b></p> <p>4.1.1 Explain the importance of Artificial insemination in livestock production</p> <p>4.1.2 Carry out semen collection in different domestic animals</p> <p>4.1.3 Describe the technique of semen preservation</p> <p>4.1.4 Perform artificial insemination</p> <p>4.1.5 Conduct pregnancy diagnosis in domestic animals</p> <p>1.1.6 Explain the importance of herd improvement</p>		<p>Four SEO of this Module highlighted in blue in AHP curricula are Related Tasks (RTs) to be performed under SEO 3.1.6 in the proposed curriculum. They have therefore not included in estimation of new CHs in the proposed curricula.</p> <p>This improvement has eventually led to a decrease of new CHs from 09 to 07.</p>
<b>Module</b>	<b>Veterinary Laboratory Biosafety &amp; Biosecurity</b>		<b>Veterinary Laboratory hygiene and safety</b>	
<b>Credit Hours</b>	<b>10</b>		<b>15</b>	
<b>Sub-enabling outcomes</b>	<p>5.1.1 Describe biosafety and biosecurity in laboratory operations.</p> <p>5.1.2 Describe principles of biosafety and biosecurity in laboratory operations.</p> <p>5.1.3 Use biosafety and biosecurity principles for maintaining hygiene and laboratory security.</p> <p>5.1.4 Explain possible hazards and risks in laboratory operations</p> <p>5.1.5 Use biosafety instruments to minimize exposure to hazards.</p>		<p>2.1.1 Demonstrate personal hygiene and health</p> <p>2.1.2 Clean laboratory apparatus, equipment and premises</p> <p>2.1.3 Sterilize laboratory apparatus, equipment and premises</p> <p>2.2.1 Describe safety rules and regulations of laboratory operations</p> <p>2.2.2 Explain safety rules and regulations of laboratory operations</p> <p>2.2.3 Explain effects of non-compliance to safety rules and regulations in laboratory operations</p> <p>2.3.1 Explain the different causes of laboratory hazards and their management</p>	<p>Three SEO of this Module highlighted in blue in VLT curricula are Related Tasks (RTs) to be performed in the same Module. They have therefore not included in estimation of new CHs in the proposed curricula.</p> <p>This improvement has led to a decrease of CHs from 15 to 10.</p>

			<p>2.3.2 Describe laboratory safety facilities</p> <p>2.3.3 Describe personal laboratory safety facilities</p> <p>2.3.4 Describe the arrangement and use of safety facilities in the laboratory</p> <p>3.1.3 Perform routine cleaning and disinfection of laboratory equipment</p> <p>6.2.2 Maintain hygiene in laboratory animal unit</p>	
<b>Module</b>	<b>Laboratory Instrumentation</b>		<b>Laboratory instrumentation</b>	
<b>Credit Hours</b>	<b>09</b>		<b>13</b>	
<b>Sub-enabling outcomes</b>	<p>5.1.1 Describe the instruments and equipment used in the laboratory</p> <p>5.1.2 Explain the concept of hygiene on cleaning laboratory apparatus, equipment and premises</p> <p>5.1.3 Apply the operational principles of laboratory equipment</p> <p>5.1.4 Use instruction manual to operate laboratory equipment</p> <p>5.1.5 Describe the storage conditions of laboratory equipment.</p> <p>5.1.6 Describe common faults in laboratory equipment.</p>		<p>3.1.1 Identify basic laboratory equipment</p> <p>3.1.2 Explain the use of different laboratory equipment</p> <p>3.3.1 Describe the conditions of keeping various laboratory equipment</p> <p>3.3.3 Store laboratory equipment at appropriate conditions</p> <p>3.4.2 Identify common faults in the laboratory equipment</p> <p>4.1.2 Identify equipment for preparation of different types of media</p> <p><b>Veterinary Laboratory Instrumentation (9 CRH)</b></p> <p>3.1.1 Identify electrical faults in laboratory equipment</p> <p>3.1.2 Describe faults due to mishandling</p> <p>3.1.3 Establish faults due to obsolescence</p> <p>3.2.1 Describe the methods of diagnosing faulty equipment</p> <p>3.2.2 Describe methods for</p>	<p>Ten (10) SEO of this Module highlighted in blue in the VLT curricula are RTs to be performed in the same Module.</p> <p>They have therefore not included in estimation of new CHs in the proposed curricula.</p> <p>This improvement has led to a decrease of CHs from 13 to 9.</p>

			<p>handling faulty equipment</p> <p>3.2.3 Apply different tools to diagnose faults</p> <p>3.3.1 Identify tools for repair of faults</p> <p>3.3.2 Repair faults and / or replace laboratory equipment</p> <p>3.3.3 Test repaired/ replaced equipment and report the results</p> <p>4.3.1 Identify various equipment/facilities needed in the laboratory animal unit.</p> <p>4.3.2 Apply procedures in ordering laboratory equipment/facilities</p>	
<b>Module</b>	<b>Veterinary Laboratory Materials &amp; Reagents</b>		<b>Veterinary laboratory materials and reagents</b>	
<b>Credit Hours</b>	<b>09</b>		<b>15</b>	
<b>Sub-enabling outcomes</b>	<p>5.1.1 Describe common reagents and materials used in the laboratory.</p> <p>5.1.2 Explain principles governing preparations of common reagents, chemicals and materials used in the laboratory.</p> <p>5.1.3 Describe test methods for various materials and reagents made in the laboratory</p>		<p>4.4.1 Identify reagents and materials used in the laboratory.</p> <p>4.4.2 Describe reagents and materials required for different test used in the laboratory</p> <p>4.4.3 Describe storage conditions for reagents and materials</p> <p>4.5.1 Test raw materials and reagents required for laboratory use</p> <p>4.5.2 Describe methods for preparation of different types of chemical reagents.</p> <p>4.5.3 Describe common reagents used in the laboratory</p> <p>4.5.4 Prepare common chemicals and reagent used in the laboratory</p> <p>4.6.1 Describe test methods for various materials, chemicals and reagents</p> <p>4.6.2 Test reagents made in the laboratory</p>	<p>Eleven (11) SEO of this Module highlighted in blue in VLT curricula are RTs to be performed in the same Module.</p> <p>They have therefore not included in estimation of new CHs in the proposed curricula.</p> <p>This improvement has led to a decrease of CHs from 15 to 9.</p>

			<p>4.6.3 Store various reagents, materials and chemicals made in the laboratory</p> <p><b>Veterinary laboratory media (15 CRH)</b></p> <p>4.1.1 Outline the different types of media for micro-organisms' propagation.</p> <p>4.1.3 Describe media for propagation of parasites</p> <p>4.2.1 Test raw materials and reagents required for media preparation</p> <p>4.2.2 Describe methods for preparation of different types media</p> <p>4.2.3 Describe common media used in the laboratory</p> <p>4.2.4 Prepare common media used in the laboratory</p> <p>4.3.1 Describe test methods for various media and reagents</p> <p>4.3.2 Test media made in the laboratory</p> <p>4.3.3 Store various media made in the laboratory</p>	
<b>Module</b>	<b>Veterinary specimen and Sample Management</b>		<b>Veterinary Laboratory specimen and sample handling</b>	
<b>Credit Hours</b>	<b>11</b>		<b>15</b>	
<b>Sub-enabling outcomes</b>	<p>5.1.1 Explain concepts and conditions related to sample collection</p> <p>5.1.2 Describe procedures for collection of samples for (Mycological, Pathological, Bacteriological, Virological, Parasitological, Toxicological and other analytical tests)</p> <p>5.1.3 Demonstrate the collection</p>		<p>5.1.1 Explain types of samples</p> <p>5.1.2 Describe precautions during collection of different samples</p> <p>5.1.3 Describe procedures for collection of samples for mycological, pathological, bacteriological, virological, parasitological and other analytical tests</p> <p>5.2.1 Describe conditions of</p>	<p>Three (3) SEO of this Module highlighted in blue colour in the VLT curricula are RTs to be performed in the same Module.</p> <p>They have therefore not accounted in estimation of new CHs in the</p>

	<p>of different samples for Mycological, Pathological, Bacteriological, Virological, Parasitological, Toxicological for laboratory analysis</p> <p>5.1.4 Demonstrate methods of preserving samples for different tests</p> <p>5.1.5 Describe conditions for packaging and transporting different types of samples</p> <p>5.1.6 Use transportation methods to transfer samples from collection site to laboratory.</p> <p>5.1.7 Utilize custodian techniques for reception, documentation, storage and tracking of the samples in the laboratory.</p> <p>5.1.8 Explain principles for sample acceptance and rejection for laboratory analysis.</p>		<p>collecting samples for mycological, pathological, bacteriological, virological, parasitological and other analytical tests</p> <p>5.2.2 Describe facilities required for collection, preservation and transportation of different types of samples</p> <p>5.2.3 Collect different types of samples</p> <p>5.3.1 Describe facilities required for different samples preservation.</p> <p>5.3.2 Describe different methods of preserving samples for different tests</p> <p>5.3.3 Demonstrate sample preservation methods for mycological, pathological, bacteriological, virological, parasitological and other analytical tests.</p> <p>5.4.1 Describe conditions for transporting different types of samples (time, sites,)</p> <p>5.4.2 Describe facilities required for samples transportation.</p> <p>5.4.3 Demonstrate transportation methods of different types of samples</p>	<p>proposed curricula.</p> <p>This improvement has led to a decrease of CHs from 15 to 11.</p>
<b>Module</b>		<b>Basic workshop Technology and Farm Structures</b>		
<b>Credit Hours</b>		<b>8</b>		
<b>Sub-enabling outcome</b>		<p>5.1.1 Explain basic workshop technology</p> <p>5.1.2 Apply safety measures in workshop operations</p> <p>5.1.3 Use workshop tools for different purposes</p> <p>5.2.1 Identify different farm structures</p> <p>5.2.2 Design structures for different</p>		<p>SEO of this Module highlighted in Gray colour in the AHP curricula are proposed to be dropped in the proposed curricula since they are comparatively</p>

		classes of livestock 5.2.3 Select site for different farm structures 5.2.4 Construct structures for different classes of livestock 5.2.5 Carry out simple maintenance of farm structures 5.2.6 Supply water to the farm using different methods		not very much useful to the expected Technicians on Animal Health and Lab Technolgy.
		<b>Draught Animal Power</b>		
		<b>10</b>		
		5.3.1 Identify different types of draught animals 5.3.2 Train draught animals using different methods 5.3.3 Describe operations performed by draught animals in the farm		
<b>Module</b>	<b>Early morning and late evening practical</b>	<b>Early morning and late evening practical</b>	<b>Early morning and late evening practical</b>	
<b>Credit hours</b>	<b>3</b>	<b>3</b>	<b>3</b>	
<b>Total CHs</b>	<b>130</b>			



<b>NTA LEVEL 5</b>				
<b>Curriculum</b>	<b>ANIMAL HEALTH &amp; VET. LAB. TECHNOLOGY</b>	<b>ANIMAL HEALTH AND PRODUCTION</b>	<b>VETERINARY LABORATORY TECHNOLOGY</b>	<b>Remarks on adjustment of Credit Hours</b>
<b>Module</b>	<b>Veterinary Microbiology</b>	<b>Veterinary Microbiology</b>	<b>Veterinary Microbiology</b>	
<b>Credit Hours</b>	<b>10</b>	<b>08</b>	<b>12</b>	
<b>Sub-enabling outcomes</b>	2.2.1 Apply basic principles of Virology to recognize viruses of veterinary importance 2.2.2 Apply basic principles of mycology to recognize fungi of veterinary importance 2.2.3 Describe concepts of immunology in veterinary microbiology 2.2.4 Apply vaccine and vaccination regulations to handle animal vaccines 2.2.4 Describe vaccines in relation to immunology	2.1.1 Describe bacteria according to their morphological characteristics and biochemical properties 2.1.2 Perform inoculation 2.1.3 Classify viruses on basis of their nucleic acid contents and structure of their capsid 2.1.4 Describe common serological tests 2.1.5 Describe the morphology and general characteristics of fungi 2.1.6 Classify pathogenic fungi based on their predilection sites 2.2.1 Handle disinfectants 2.2.2 Classify types of immunity according to the mechanism of action 2.2.3 Administer vaccines/chemo prophylactics for control of specific animal diseases and keep records. 2.2.4 Describe handling, storage and disposal of vaccines 2.2.5 Apply bio-security measures to control infectious diseases 17	5.2.1 Classify microorganisms of veterinary importance 5.2.2 Describe characteristics of microorganisms of veterinary importance 5.2.3 Identify preservatives and preserve microorganisms of veterinary importance 5.2.4 Classify and describe types of immunity 5.2.5 Describe handling, storage and disposal of vaccines and other biologicals 5.3.1 Identify culture media used for laboratory diagnosis 5.3.2 Describe methods for culturing of microorganisms. 5.3.3 Prepare and incubate culture media 5.3.4 Identify colonies for subculture 5.3.5 Subculture colonies for isolation 6.3.1 Describe basic laboratory tests for isolating microorganisms	Some Module Contents/ Sub-enabling outcomes (SEO) of the existing Animal Health & Production (AHP) and Veterinary Laboratory Technology (VLT) curricula have been moved to the Microbiology Module of NTA Levels 4 & 6 in the proposed curricula, as follows: 2.1.6 Classify pathogenic fungi based on their predilection sites (AHP) 5.3.1 Identify culture media used for laboratory diagnosis (VLT) 5.3.2 Describe methods for culturing microorganisms. 5.3.3 Prepare and incubate culture media (VLT) - 5.3.4 Identify colonies for subculture (VLT) 5.3.5 Subculture colonies for isolation (VLT) 6.3.1 Describe basic laboratory tests for isolating microorganisms (VLT) - 2.2.4 Describe handling, storage and disposal of vaccines (AHP).  Reallocation of these module contents or SEO has enabled a slight reduction of CHs from 12 to 10
<b>Module</b>	<b>Veterinary Parasitology</b>	<b>Veterinary Parasitology</b>	<b>Veterinary Parasitology</b>	

<b>Credit Hours</b>	<b>10</b>	<b>08</b>	<b>12</b>	
<b>Sub-enabling outcomes</b>	<p>2.1.1 Use concepts of veterinary parasitology to describe parasite host relationship of veterinary importance</p> <p>2.1.2 Use concepts of entomology to categorize insects and arachnids of veterinary importance</p> <p>2.1.3 Use concepts of helminthology to describe worms of veterinary importance</p> <p>2.1.4 Use concepts of protozoology to describe intracellular parasites of veterinary importance</p> <p>2.1.5 Use parasitological techniques to diagnose parasitic diseases</p> <p>2.1.6 Use parasite control strategies to manage parasites of veterinary importance</p> <p>2.1.7 Use preservation methods to preserve parasitological specimens</p>	<p>2.3.1 Classify common ectoparasites and endoparasites</p> <p>2.3.2 Describe general characteristics of protozoa according to transmission, modes of reproduction and life cycle</p> <p>2.3.3 Collect faecal sample for diagnosis of worms</p> <p>2.3.4 Collect skin scraping for examination of mange mites</p> <p>2.3.5 Collect blood and lymph sample for identification of parasites.</p> <p>2.3.6 Describe control measures of parasites of veterinary importance</p> <p>2.3.7 Preserve parasitological specimens using different methods</p>	<p>5.1.1 Classify parasites of veterinary importance</p> <p>5.1.2 Describe characteristics of parasites of veterinary importance</p> <p>5.1.3 Identify preservatives and preserve parasites of veterinary importance</p> <p>6.3.2 Describe basic laboratory tests for identifying parasites</p>	<p>Some SEO of this Module which appear in the AHP and VLT curricula are covered in the same Module under NTA Level 4, in the proposed curricula, as follows:</p> <p>2.3.1 Classify common ectoparasites and endoparasites (AHP)</p> <p>5.1.1 Classify parasites of veterinary importance (VLT)</p> <p>This rearrangement has led to a slight decrease of CHs of this Module from 12 in VLT to 10 in the proposed curricula.</p>
<b>Module</b>	<b>Livestock Diseases, Diagnosis and Control Techniques</b>	<b>Livestock Diseases</b>	<b>Disease Diagnostic and Control Techniques</b>	
<b>Credit Hours</b>	<b>12</b>	<b>10</b>	<b>09</b>	
<b>Sub-enabling outcomes</b>	<p>3.1.1 Explain causes of diseases</p> <p>3.1.2 Describe clinical signs of livestock diseases</p> <p>3.1.3 Describe common bacterial diseases of livestock</p>	<p>1.1.1 Describe general and detailed clinical examination of different livestock</p> <p>1.1.2 Explain causes of diseases</p> <p>1.1.3 Describe clinical signs of livestock diseases</p> <p>1.1.4 Describe the procedure of</p>	<p>6.3.4 Perform basic laboratory tests for identifying parasites and microorganisms</p> <p>6.4.1 Differentiate various laboratory tests for disease diagnosis</p> <p>6.4.2 Carry out laboratory tests for disease diagnosis</p>	<p>Some SEO (6.3.4, 6.4.1 &amp; 6.4.2) in VLT curricula have been covered in the Veterinary Medicine Module under NTA Level 6 in the proposed curricula.</p> <p>The remaining SEO of VLT have</p>

	<p>3.1.4. Describe common viral diseases of livestock</p> <p>3.1.5 Describe common protozoan and rickettsia Diseases of livestock</p> <p>3.1.6 Describe common mycotic diseases of livestock</p> <p>3.1.7 Describe common metabolic and poisoning in livestock.</p> <p>3.1.8 Use clinical examination procedures to diagnose diseases in livestock</p>	<p>conducting disease diagnosis</p> <p>1.1.5 Conduct disease diagnosis</p> <p>1.2.1 Describe common bacterial diseases</p> <p>1.2.2 Describe common viral diseases</p> <p>1.2.3 Describe common protozoan and rickettsia diseases</p> <p>1.2.4 Describe common mycotic diseases</p> <p>1.2.5 Describe common metabolic, skin conditions and poisoning in livestock.</p>	<p>6.4.3 Summarize the results of the laboratory tests for disease diagnosis</p> <p>2.2.1 Interpret and report laboratory results</p>	<p>been mixed with SEO of AHP, thus leading to an increase of three CHs in the proposed Curricula.</p>
<b>Module</b>	<b>Elementary Pharmacology</b>	<b>Elementary Pharmacology</b>		
<b>Credit Hours</b>	<b>10</b>	<b>08</b>		
<b>Sub-enabling outcomes</b>	<p>3.2.1 Explain basic principles of pharmacotherapeutics for treatment of disease and condition</p> <p>3.2.2 Demonstrate the use of disinfectants and antiseptics in control of livestock diseases</p> <p>3.2.3 Use pharmacotherapeutics principles to classify veterinary drugs based on their functions</p> <p>3.2.4 Use veterinary laws and regulation to dispense drugs to clients</p> <p>3.2.5 Use enteral route to administer drugs to animal</p> <p>3.2.6 Use parenteral route to administer drugs to</p>	<p>1.3.1 Explain basic principles of pharmacology</p> <p>1.3.2 Classify drugs used for treatment of diseases</p> <p>1.3.3 Describe procedure of dispensing drugs and biological as per professional ethics</p> <p>1.3.4 Explain concepts related to vaccines.</p> <p>1.3.5 Administer various drugs and biological to treat and control livestock diseases</p>		<p>Four new SEO (i.e., 3.2.5 – 3.2.8) have been added to this Module in the proposed curricula.</p> <p>This improvement has led to an increase of CHs from 8 to 10.</p>

	animals 3.2.7 Use topical route to administer drugs to animal 3.2.8 Use inhalation route administer drugs to animal			
<b>Module</b>	<b>Veterinary Regulations and Animal Welfare</b>	<b>Animal Health Practice Facilities &amp; Veterinary Regulations</b>	<b>Animal Nutrition, Improvement &amp; Welfare</b>	
<b>Credit Hours</b>	<b>10</b>	<b>08</b>	<b>12</b>	
<b>Sub-enabling outcomes</b>	<p>3.3.1 Explain laws and regulations governing the practice of veterinary medicine and Livestock management.</p> <p>3.3.2 Explain various categories of veterinary practice facilities and zoo-sanitary inspectorate facilities and services</p> <p>3.3.3 Use principles of professional conducts to report veterinary services and violation of veterinary regulations.</p> <p>5.1.1 Explain animal welfare standards related to veterinary practices</p> <p>5.1.2 Apply animal welfare regulations to house livestock according to specifications</p> <p>5.1.3 Apply animal handling methods in transporting and slaughtering of animals.</p> <p>5.1.4 Use rules and regulations in monitoring and enforcing animal</p>	<p>1.4.2 Explain various categories of veterinary practice facilities</p> <p>1.4.3 Monitor and report veterinary services</p> <p>1.4.4 Report disease incidence and violation of veterinary regulations.</p> <p>1.4.5 Establish Zoo sanitary facilities and services</p> <p><b>Animal welfare (5 CRH)</b></p> <p>2.6.1 Explain welfare standards.</p> <p>2.6.2 House livestock according to recommended specifications</p> <p>2.6.3 Apply proper methods to handle, transport and slaughter animals according to laid down regulations.</p> <p>2.6.4 Monitor the enforcement of welfare standards</p>	<p>4.1.1 Describe feed nutrients</p> <p>4.1.2 Formulate rations for different classes of animals</p> <p>4.1.3 Determine the amount of feed required by different classes of animals</p> <p>4.1.4 Improve nutritive value of feeds for laboratory animals.</p> <p>4.1.5 Correct nutritional deficiencies in laboratory animals</p> <p>4.2.1 Carry out genetic improvement of laboratory animals.</p> <p>4.2.2 Apply welfare standards to different classes of laboratory animals</p> <p>4.2.3 Carry out Supervision in disease control operations</p> <p><b>Veterinary Laboratory jurisprudence (6 CRH)</b></p> <p>1.3.1 Explain sections in the Veterinary Act No 16 of 2003 and its subsequent regulations/amendments that regulate laboratory services</p> <p>1.3.2 Explain sections in The Animal Diseases Act No 17 of 2003 and its subsequent regulations/amendments that regulate laboratory services</p> <p>1.3.3 Explain sections in The Food</p>	<p>Some SEO of this Module in the VLT curricula have been moved to the General Management of Farm and Laboratory Animals Module in NTA Level 4 of the proposed curricula, as follows:</p> <p>4.1.1 Describe feed nutrients</p> <p>4.1.2 Formulate rations for different classes of animals</p> <p>Determine the amount of feed required by different classes of animals</p> <p>4.2.1 Carry out genetic improvement of laboratory animals.</p> <p>This worth reallocation of SEO has led to a slight decrease of CHs from 12 to 10</p>

	welfare standards		<p>Drugs and Cosmetics Act No 1 of 2003 and its subsequent regulations/amendments that regulate laboratory services</p> <p>1.3.4 Explain sections in The Animal Welfare Act No. 19 of 2008 that regulate laboratory services</p> <p>1.3.5 Explain sections in The Grazing Land and Animal Feed Resources Act (under preparation) that regulate laboratory services</p> <p>1.3.6 Apply relevant laws in supervising and carrying out laboratory activities</p> <p>3.3.1 Explain the Procurement Act No. 21 of 2004</p> <p>3.3.2 Explain Institutional Financial Memoranda and regulations</p> <p>3.3.3 Apply procurement laws and regulations in ordering laboratory supplies</p> <p>5.3.2 Apply laboratory ethical procedures</p>	
<b>Module</b>	<b>Livestock products and by-products hygiene and inspection</b>	<b>Meat hygiene and inspection</b>		
<b>Credit Hours</b>	<b>14</b>	<b>10</b>		
<b>Sub-enabling outcomes</b>	<p>4.1.1 Explain the concept of hygiene of animal products and by products.</p> <p>4.1.2 Describe safety and quality of animal products and by products</p> <p>4.1.3 Explain types of animal products and by products according to intended use</p> <p>4.2.1 Explain factors affecting quality and of livestock products to</p>	<p>3.4.1 Describe abattoir and slaughter slab</p> <p>3.4.2 Explain principles of hygiene and sanitation in slaughter house</p> <p>3.4.3 Carry out pre slaughter care to slaughter stock</p> <p>3.4.4 Conduct slaughtering of food animals</p> <p>3.4.5 Carry out meat inspection</p> <p>3.5.1 Explain the importance of hide and skin in the national economy</p> <p>3.5.2 Describe qualities of hide/</p>		<p>Some SEO (3.1.1 – 3.2.1) of the Livestock Products &amp; By-products Module in the NTA Levels 4 &amp; 6 under AHP curricula have been incorporated in the Livestock Products and By-products Hygiene and Inspection Module, in the proposed curricula.</p> <p>There is repetition of SEO 3.2.1 and 3.2.2 in the AHP curricula.</p> <p>This improvement has enabled</p>

	<p>reduce spoilage</p> <p>4.2.2 Use animal diseases regulations to identify premises involved in handling and processing of livestock products for human consumption</p> <p>4.2.3 Apply sampling techniques to collect samples from animal products and by products for laboratory analysis</p> <p>4.3.1 Describe concept related to hygiene of abattoir and slaughter slab.</p> <p>4.3.2 Explain principles of hygiene and sanitation in slaughter facilities.</p> <p>4.3.3 Apply pre-slaughter care inspection to ensure quality and safe meat</p> <p>4.3.4 Apply humane slaughtering methods to slaughter food animals</p> <p>4.3.5 Apply meat hygiene and inspection procedures to approve meat for human consumption</p>	<p>skins</p> <p>3.5.3 Grade hide and skins</p> <p><b>Livestock products (08 CRH)</b></p> <p>3.1.1 Explain the importance of livestock products</p> <p>3.1.2 Explain factors affecting quality and quantity of livestock products</p> <p>3.1.3 Identify premises involved in handling and processing of livestock products in Tanzania.</p> <p>3.1.4 Explain the challenges in livestock products industry</p> <p>3.2.1 Explain the principles of hygiene in handling milk</p> <p>3.2.2 Describe the procedure for handling milk</p> <p>3.2.3 Describe qualities of good milk</p> <p>3.2.4 Conduct grading of milk</p> <p>3.2.5 Apply methods of storage of milk</p> <p>3.3.1 Explain the principles of hygiene in handling poultry and fish</p> <p>3.3.2 Describe the procedure for handling poultry and fish</p> <p>3.3.3 Describe qualities of good poultry and fish</p> <p>3.3.4 Conduct grading of poultry and fish</p> <p>3.3.5 Apply methods of storage of poultry and fish</p> <p>3.4.6 Describe the procedure for handling meat</p> <p>3.4.7 Conduct grading of meat</p> <p>3.4.8 Apply methods of storage of meat</p>		<p>adjustment of CHs to 14 in the proposed curricula.</p>
<b>Module</b>	<b>Veterinary Public Health</b>	<b>Veterinary Public Health</b>		

<b>Credit Hours</b>	<b>07</b>	<b>05</b>		
<b>Sub-enabling outcomes</b>	<p>4.4.1 Describe concepts of veterinary public health related to hazards in food of animal origin</p> <p>4.4.2 Describe zoonotic, emerging and re-emerging diseases of public health importance</p> <p>4.4.3 Describe principles of Hazard Analysis Critical Control Points (HACCP) in food chain</p> <p>4.4.4 Use principles of HACCP in food chain to prevent potential biological hazards to human</p> <p>4.4.5 Describe food borne diseases of animal origin of public health importance</p> <p>4.4.6 Apply One Health Approach to control zoonosis</p> <p>4.4.7 Apply Good Hygienic Practices to dispose contaminated animal feeds</p> <p>4.4.8 Apply Good Hygienic Practices to control animal feed contamination</p>	<p>2.5.1 Describe the hygiene of poultry, eggs, rabbit, pork and fish products</p> <p>2.5.2. Carry out the inspection of poultry, eggs, rabbit, pork and fish</p> <p>2.5.3 Describe the concept of one health and traceability (HACCP analysis)</p> <p>2.5.4 Describe common zoonotic, emerging and re-emerging diseases</p>		<p>Four new SEO (4.4.5 – 4.4.8) have been added to this Module in the proposed curricula.</p> <p>This improvement has led to an increase of CHs from 05 to 07</p>
<b>Module</b>	<b>Elementary Surgery</b>	<b>Elementary surgery</b>		
<b>Credit Hours</b>	<b>11</b>	<b>08</b>		
<b>Sub-enabling outcomes</b>	<p>5.2.1 Describe the concept related to veterinary surgery in domestic animals</p> <p>5.2.2 Describe pre-operative and post-</p>	<p>4.1.1 Outline types of wounds and abscess</p> <p>4.1.2 Prepare patient before surgery</p> <p>4.1.3 Manage different types of wounds and abscess</p>		

	<p>operative procedures 5.2.3 Use pre-surgical planning techniques to prepare animals, materials and personnel for surgical procedures 5.2.4 Use techniques of drug administration to administer local anesthetic and tranquilizers in livestock 5.2.6 Apply surgical procedures and guidelines to perform post-operative care of surgical cases 5.3.1 Describe minor surgical cases in veterinary surgical operations 5.3.2 Describe management procedures for minor surgical cases 5.3.3 Use suturing techniques in managing surgical cases 5.2.4 Use surgical techniques to perform minor operative cases in livestock</p>	<p>4.1.4 Identify ideal premises for surgical procedure as per regulations 4.2.1 Identify surgical cases 4.2.2 Describe the procedure for managing different surgical cases 4.2.3 Describe Post - operative care of surgical cases 4.3.1 Identify animals for surgical cases 4.3.2 Describe the procedure for managing different surgical cases 4.3.3 Perform minor surgical cases in respective livestock</p> <p><b>Veterinary Surgery &amp; Theriogenology (6 CRH)</b> 3.1.1 Describe the sterilization and disinfection procedures in surgical operations 3.1.2 Describe procedures for local anaesthetic and tranquilizers in veterinary operations 3.1.3 Describe suture and suture materials as applied in veterinary practices 3.1.4 Carryout minor surgical operations (choke, bloat and hernia) 3.2.1 Outline the process of euthanasia in animals. 3.2.2 Explain the importance of euthanasia in domestic animals 3.2.3 Perform euthanasia/euphemisms in animals 3.3.1 Describe reproductive hormones and their functions in animals. 3.3.2 Describe reproductive disorders and diseases in animals</p>		<p>Some SEO of this Module under AHP curricula have been moved to the Veterinary Surgery &amp; Theriogenology Module in NTA Level 6, in the proposed curricula, as follows:</p> <p>3.3.1 Describe reproductive hormones and their functions in animals. 3.3.2 Describe reproductive disorders and diseases in animals 3.3.3 Describe reproductive infertility in animals</p> <p>Reallocation of SEO has led to an adjustment of CHs to 11.</p>
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		3.3.3 Describe reproductive infertility in animals		
<b>Module</b>	<b>Livestock Enterprise Establishment and management</b>	<b>Livestock Enterprise Establishment and Management</b>		
<b>Credit Hours</b>	<b>11</b>	<b>06</b>		
<b>Sub-enabling outcomes</b>	<p>6.2.1 Use principles of economics and entrepreneurship to conduct feasibility study of livestock enterprises</p> <p>6.2.2 Employ entrepreneurial approaches to establish a livestock enterprise</p> <p>6.2.3 Apply business management strategies to operate livestock enterprises</p> <p>6.3.1 Describe marketing strategies in laboratory services and livestock products and by-products</p> <p>6.3.2 Apply survey techniques to conduct market survey in laboratory services and livestock products and by-products</p> <p>6.3.3 Use customer care strategies to improve markets of laboratory services and livestock products and by-products</p>	<p>6.5.1 Conduct feasibility study of a livestock enterprise</p> <p>6.5.2 Prepare business financial analysis</p> <p>6.5.3 Establish a livestock enterprise</p> <p>6.5.4 Supervise business operations.</p> <p>6.5.5 Evaluate business operations</p> <p><b>Principles of Production Economics and Marketing (06 CRH)</b></p> <p>6.6.1 Explain the basic concepts of production economics and marketing</p> <p>6.6.2 Determine the relationship of combining two inputs for optimum production</p> <p>6.6.3 Determine the relationship of combining two products for optimum production.</p> <p>6.6.4 Determine level of diminishing returns</p> <p>6.7.1 Calculate production costs</p> <p>6.7.2 Calculate production revenue</p> <p>6.7.3 Apply cost and revenue functions to determine the point of maximum profit</p> <p>6.8.1 Conduct market survey</p> <p>6.8.2 Prepare market plan</p> <p>6.8.3 Provide customer care</p> <p>6.8.4 Increase product value</p>		<p>The Module Contents are similar between the two curricula, and most Module Contents highlighted in blue i.e., 6.7.1, 6.7.2, and 6.8.1 – 6.8.5 in the AHP curricula are Related Tasks (RTs) to be performed in the same Module.</p> <p>These RTs were therefore not included during reallocation of credit hours of this Module in the proposed curricula.</p> <p>These changes have led to an adjustment of CHs to 11.</p>

		6.8.5 Organise market networks.		
<b>Module</b>	<b>Introduction to Biostatistics and Research Methodology</b>	<b>Introduction to Biostatistics and Research Methodology</b>	<b>Introduction to Biostatistics and Livestock Research Methodology</b>	
<b>Credit Hours</b>	<b>09</b>	<b>07</b>	<b>09</b>	
<b>Sub-enabling outcomes</b>	6.1.1 Explain basic concepts related to research and biostatistics 6.1.2 Use principles of research writing to develop a research proposal 6.1.3 Apply data collection methods to collect research data 6.1.4 Employ biostatistics methods to process livestock research data 6.1.5 Employ biostatistics methods to analyze livestock research data 6.1.6 Apply principles of research and communication to write report and present research findings	6.1.1 Explain basic concepts related to biostatistics 6.1.2 Explain data presentation methods 6.1.3 Describe statistical measures 6.1.4 Describe livestock experimentation methods 6.2.1 Identify research areas in livestock health and production 6.2.2 Prepare research proposals 6.2.3 Prepare data collecting tools 6.2.4 Collect data 6.2.5 Compile data 6.2.6 Analyse livestock production data 6.2.7 Store livestock production data 6.2.8 Write research report	2.4.1 Explain basic concepts related to biostatistics 2.4.2 Explain data presentation methods 2.4.3 Describe statistical measures 2.4.4 Describe livestock experimentation methods 2.5.1 Identify research areas in livestock health and production 2.5.2 Prepare research proposals 2.5.3 Prepare data collecting tools 2.5.4 Collect data 2.5.5 Compile data 2.5.6 Analyse livestock production data 2.5.7 Store livestock production data 2.5.8 Write research report	Most SEO i.e., 2.5.4 – 2.5.8 of this Module in the VLT curricula are RTs.  They were therefore not included during reallocation of credit hours of this Module in the proposed curricula.  However, these changes have not affected the CHs of the proposed curricula
<b>Module</b>	<b>Veterinary Laboratory Records Management</b>		<b>Veterinary Laboratory Records</b>	
<b>Credit Hours</b>	<b>06</b>		<b>06</b>	
<b>Sub-enabling outcomes</b>	1.1.1 Explain concept related to veterinary laboratory records 1.1.2 Describe principles of record keeping in veterinary laboratory operations 1.1.3 Utilize record keeping techniques to keep Laboratory equipment, instrument		1.2.1 Explain importance of keeping laboratory records 1.2.2 Collect laboratory animal records 1.2.3 Collect Laboratory equipment instrument and chemical records 1.2.4 Apply different methods to maintain laboratory records 1.3.1 Identify expired chemicals and reagents 1.3.2 Explain techniques for handling	Similar Module Contents and Credit Hours between the two curricula

	and chemical records for reference 1.3.5 Utilize inventory techniques to isolate expired chemicals and reagents from usable ones 1.3.4 Explain techniques for handling of expired chemicals and reagents 1.1.4 Use record keeping methods to maintain laboratory records		of expired chemicals and reagents 1.3.3 Maintain records of expired chemicals and reagents 4.3.3 Keep records of animal unit equipment / facilities	
<b>Module</b>	<b>Operation and maintenance of laboratory equipment</b>	<b>Farm Machinery, Implements and Equipment</b>	<b>Operation and maintenance of laboratory equipment</b>	
<b>Credit Hours</b>	<b>13</b>	<b>06</b>	<b>13</b>	
<b>Sub-enabling outcomes</b>	1.2.1 Describe the methods of diagnosing faults in lab equipment 1.2.2 Use instrumentation techniques to determine electrical faults in laboratory equipment. 1.2.3 Use laboratory inspection method to inspect faults due to mishandling 1.2.4 Utilize biosafety measures to inspect faults in laboratory equipment due to obsolescence. 1.2.5 Apply methods and tools for handling faulty equipment. 1.3.1 Describe equipment and tools for repairing faults in laboratory. 1.3.2 Utilize maintenance techniques for laboratory	5.1.1 Design structures for different classes of livestock 5.1.2 Select site for different farm structures 5.1.3 Construct structures for different classes of livestock 5.1.4 Maintain farm structure for different classes of livestock 5.2.1 Explain different types of farm machineries, implements and equipment 5.2.2 Describe tractors and tractor systems 5.2.3 Describe engine components and systems 5.2.4 Describe functions of farm machineries, implements and equipment 5.3.1 Perform maintenance of farm machinery, implements and equipment as per manufacturers' manuals 5.3.2 Adjust farm machinery,	3.1.4 Carry out minor installation of laboratory equipment 3.2.1 Describe the operation of various laboratory equipment 3.2.2 Interpret instruction manuals of various equipment in the laboratory before use 3.2.3 Demonstrate operation of various laboratory equipment 3.3.2 Interpret warning signs on laboratory equipment 3.4.1 Differentiate between normal and abnormal functioning of laboratory equipment 3.4.3 Demonstrate minor rectifications of common faults in laboratory equipment <b>Veterinary Laboratory Instrumentation (9 CRH)</b> 3.1.1 Identify electrical faults in laboratory equipment 3.1.2 Describe faults due to mishandling	Most SEO of this Module in AHP curricula are not much useful to the expected Technician on Animal Health and Lab Technologies. They are therefore proposed to be dropped from this Module in the proposed curricula.  Some Module Contents or SEO e.g., 3.1.1 – 4.3.2 of this Module in the VLT are RTs. They were therefore not included during the review of new credit hours of this Module in the proposed curricula.  However, there are no changes in CHs of this Module in the proposed curricula

	<p>equipment to maintain safety and accuracy laboratory procedure</p> <p>1.3.3 Use laboratory procedures to test repaired or replaced equipment.</p> <p>1.3.4 Demonstrate operation of various laboratory equipment</p>	<p>implements and equipment for various farm operations</p> <p>5.3.3 Drive a tractor and operate other farm machineries.</p> <p>5.3.4 Carry out storage of farm machineries, implements and equipment's</p>	<p>3.1.3 Establish faults due to obsolescence</p> <p>3.2.1 Describe the methods of diagnosing faulty equipment</p> <p>3.2.2 Describe methods for handling faulty equipment</p> <p>3.2.3 Apply different tools to diagnose faults</p> <p>3.3.1 Identify tools for repair of faults</p> <p>3.3.2 Repair faults and / or replace laboratory equipment</p> <p>3.3.3 Test repaired/ replaced equipment and report the results</p> <p>4.3.1 Identify various equipment/facilities needed in the laboratory animal unit.</p> <p>4.3.2 Apply procedures in ordering laboratory equipment/facilities</p>	
<b>Module</b>	<b>Outreach Programme</b>	<b>Outreach Programme</b>	<b>Outreach Programme</b>	
<b>Credit hours</b>	<b>3</b>	<b>3</b>	<b>3</b>	
<b>Module</b>	<b>Entrepreneurship Project</b>	<b>Entrepreneurship Project</b>	<b>Entrepreneurship Project</b>	
<b>Credit hours</b>	<b>4</b>	<b>4</b>	<b>4</b>	
<b>TOTAL CHs</b>	<b>130</b>			

## NTA LEVEL 6

<b>NTA LEVEL 6</b>				
<b>Curriculum</b>	<b>ANIMAL HEALTH &amp; VET. LAB. TECHNOLOGY</b>	<b>ANIMAL HEALTH AND PRODUCTION</b>	<b>VETERINARY LABORATORY TECHNOLOGY</b>	<b>Remarks on Adjustment of Credit Hours</b>
<b>Module</b>	<b>Veterinary Medicine</b>	<b>Veterinary Medicine</b>		
<b>Credit Hours</b>	<b>9</b>	<b>9</b>		
<b>Sub enabling</b>	2.1 Apply knowledge and skills of veterinary medicine and epidemiology to treat and control animal diseases and conditions for improving animal health 2.2 Apply knowledge and skills of molecular biology in diagnosis of livestock diseases 2.3 Employ microbiological skills to detect different microbes of veterinary importance 2.4 Apply laboratory diagnostic tests skills to detect livestock diseases.	2.4.1 Describe common animal diseases with emphasis on epidemiology and pathogenesis 2.4.2 Carryout treatment, control and prevention of animal diseases and conditions in the field. 2.4.3 Report disease incidences to veterinary authority		Similar Module Contents and Credit Hours between proposed and existing curricula.
<b>Module</b>	<b>Elementary Developmental Anatomy</b>	<b>Developmental Anatomy of Domesticated Animals</b>		
<b>Credit Hours</b>	<b>9</b>	<b>9</b>		
<b>Sub enabling</b>	1.1.1 Describe cell division in animal embryo development 1.1.2 Use principles of histology to describe animal body tissues and their functions (revisit level 4) 1.1.3 Explain principles of gametogenesis and fertilization in relation to embryo development 1.1.4 Use the concept of cell division to describe cleavage stages of an embryo 1.1.5 Explain principles of gastrulation in formation of germ disc 1.1.6 Use the concept of embryo development to describe the process of embryo and somite folding 1.1.7 Describe the interaction between an embryo and the dam 1.1.8 Describe the concept of	1.1.1 Describe the biology of animal cell 1.1.2 Describe animal cell division 1.1.3 Describe body tissues 1.1.4 Describe prenatal development stages in animals		Similar Module Contents and Credit Hours between proposed and existing curricula.

	teratology in relation to embryo development			
<b>Module</b>	<b>Veterinary Pharmacology and Toxicology</b>	<b>Veterinary Pharmacology and Toxicology</b>		
<b>Credit Hours</b>	<b>10</b>	<b>8</b>		
<b>Sub enabling</b>	<p>1.3.1 Classify different drugs according to their modes of action, function and toxicity</p> <p>1.3.2 Describe the metabolism of drugs and biologicals in animals</p> <p>1.3.3 Manage ectoparasites in animals</p> <p>1.3.4 Administer different drugs and biologicals</p> <p>1.4.1 Explain basic principles of toxicology</p> <p>1.4.2 Classify types of toxins</p> <p>1.4.3 Manage toxic reactions in farm animals</p> <p>5.1.1 Use toxicological principles to describe basic concepts related to toxicants and toxicity in animals</p> <p>5.1.2 Use toxicological principles to classify toxicants and toxicity in animals</p> <p>5.1.3 Apply principles of Therapy of toxicities to manage the adverse effects of drugs and intoxication in animals</p> <p>5.1.1 Apply principles of pharmacology and toxicology classify pesticides of veterinary importance</p> <p>5.1.2 Apply principles of pharmacology to determine the recommended acaricide concentrations in dip tanks and spray races.</p>	<p>1.3.1 Classify different drugs according to their modes of action, function and toxicity</p> <p>1.3.2 Describe the metabolism of drugs and biologicals in animals</p> <p>1.3.3 Manage ectoparasites in animals</p> <p>1.3.4 Administer different drugs and biologicals</p> <p>1.4.1 Explain basic principles of toxicology</p> <p>1.4.2 Classify types of toxins</p> <p>1.4.3 Manage toxic reactions in farm animals</p>		<p>More SEO have been added to this Module to improve the proposed curricula.</p> <p>This improvement has led to an increase of CHs from 8 in the AHP to 10 in the proposed curricula.</p>
<b>Module</b>	<b>Laboratory Quality Management System</b>		<b>Veterinary laboratory management</b>	
<b>Credit Hours</b>	<b>12</b>		<b>12</b>	

<p><b>Sub enabling</b></p>	<p>4.1.1 Describe the concepts of quality management system  4.1.2 Use quality management standards in laboratory personnel management  4.1.3 Apply quality management standards in customer service  4.2.1 Apply quality management techniques in Inventory of laboratory equipment and supplies  4.2.2 Use laboratory quality management techniques in laboratory safety  4.2.3 Apply laboratory quality standards in equipment management  4.3.1 Use the quality management system to maintain laboratory documents and records  4.3.2 Apply laboratory quality control standards to control laboratory processes  4.3.3 Describe external and internal laboratory quality assessment</p>		<p>3.4.2 Conduct instrument servicing and calibration  5.1.1 Describe documentation of laboratory procedures and test results  5.1.3 Describe laboratory quality management  5.2.4 Handling of laboratory hazardous  5.3.1 Document laboratory procedures and test results materials and animals  5.3.3 Apply laboratory quality management</p> <p><b>Veterinary laboratory practices (12 CRH)</b>  3.1.1 Identify and describe laboratory work schedule  3.1.2 Implement work schedule  3.1.3 Evaluate implementation of laboratory work schedule  3.4.1 Keep Inventory of laboratory equipment and supplies  3.4.3 Replenish consumables and replace worn-out equipment  3.4.4 Maintain proper storage of laboratory equipment and supplies  3.4.5 Manage laboratory records  5.1.2 Describe laboratory ethics procedures  5.2.1 Describe and use First Aid kits  5.2.2 Describe and use fire extinguishers  5.2.3 Describe and use Personal Protection Equipment (PPE)</p>	<p>Two SEO of this Module highlighted in green colour in the VLT curricula have been moved to the Lab. Instrumentation and Basic Computer Module in NTA Level 4.</p> <p>One SEO of this Module highlighted in yellow colour in the VLT curricula have been moved to the Veterinary Laboratory Biosafety &amp; Biosecurity Module in NTA Level 4.</p> <p>Seven SEO of this Module highlighted in blue in the VLT curricula are RTs to be performed in the same Module. They were not accounted in estimation of new CHs in the proposed curricula.</p> <p>These improvements have no effects on the CHs of this Module in the proposed curricula</p>
<p><b>Module</b></p>	<p><b>Veterinary Microbiology Diagnostic</b></p>	<p><b>Veterinary Microbiology</b></p>	<p><b>Veterinary laboratory</b></p>	

	<b>Techniques</b>		<b>diagnostic techniques</b>	
<b>Credit Hours</b>	<b>15</b>	<b>8</b>	<b>15</b>	
<b>Sub enabling</b>	<p>2.1.1 Describe bacteria according to their morphological characteristics and biochemical properties</p> <p>2.1.2 Perform inoculation</p> <p>2.1.3 Classify viruses on basis of their nucleic acid contents and structure of their capsid</p> <p>2.1.4 Describe common serological tests</p> <p>2.1.5 Describe the morphology and general characteristics of fungi</p> <p>2.1.6 Classify pathogenic fungi based on their predilection sites</p>	<p>2.1.1 Describe bacteria according to their morphological characteristics and biochemical properties</p> <p>2.1.2 Perform inoculation</p> <p>2.1.3 Classify viruses on basis of their nucleic acid contents and structure of their capsid</p> <p>2.1.4 Describe common serological tests</p> <p>2.1.5 Describe the morphology and general characteristics of fungi</p> <p>2.1.6 Classify pathogenic fungi based on their predilection sites</p> <p>2.2.1 Handle disinfectants</p> <p>2.2.2 Classify types of immunity according to the mechanism of action</p> <p>2.2.3 Administer vaccines/chemo prophylactics for control of specific animal diseases and keep records.</p> <p>2.2.4 Describe handling, storage and disposal of vaccines</p> <p>2.2.5 Apply bio-security measures to control infectious diseases</p>	<p>1.4.1 Describe and perform Complement Fixation Test</p> <p>1.4.2 Describe and perform Direct/Indirect Fluorescent Antibody Test</p> <p>1.4.3 Describe and perform Agar Gels Immunodiffusion (AGID) Test</p> <p>1.4.5 Describe and perform Hemagglutination (HA) test and Hemagglutination Inhibition (HI) test</p> <p>1.5.1 Describe and perform Enzyme linked Immunoabsorbent Assay (ELISA)</p> <p>3.2.1 Explain rules of writing laboratory SOPs</p> <p>3.2.2 Describe laboratory SOPs</p> <p>3.2.3 Describe laboratory bench-side procedures</p> <p><b>Disease Diagnostic and Control Techniques (9 CRH)</b></p> <p>6.3.4 Perform basic laboratory tests for identifying parasites and microorganisms</p> <p>6.4.1 Differentiate various laboratory tests for disease diagnosis</p> <p>6.4.2 Carry out laboratory tests for disease diagnosis</p> <p>6.4.3 Summarize the results of the laboratory tests for disease diagnosis</p> <p>2.2.1 Interpret and report</p>	<p>Five SEO of this Module highlighted in green colour in AHP curricula have been moved to the Veterinary Microbiology Module in NTA Levels 4 &amp; 5 in the proposed curricula.</p> <p>More SEO of this Module in the VLT curricula have been covered in the Microbiology Module of NTA Level 4 with 11 CHs and NTA Level 5 with 10 CHs.</p> <p>This Module in NTA Level 6 is therefore, intended to cover mostly SEO related to laboratory aspects.</p> <p>Two SEO i.e., 6.3.4 and 6.4.2 of the Disease Diagnostic and Control Techniques Module in VLT curricula have already been addressed in SEO 1.4.1 to 1.4.5 and 1.5.1 under Veterinary Laboratory Diagnostic Techniques Module, similarly in the VLT curricula.</p> <p>All these changes have no effects on the total CHs allocated to this</p>



			laboratory results	Module in the proposed curricula
<b>Module</b>	<b>Veterinary Parasitology Diagnostic Techniques</b>	<b>Veterinary Parasitology</b>	<b>Disease Diagnostic and Control Techniques</b>	
<b>Credit Hours</b>	<b>9</b>	<b>8</b>	<b>9</b>	
<b>Sub enabling</b>	<p>2.3.1 Classify common ectoparasites and endoparasites</p> <p>2.3.2 Describe general characteristics of protozoa according to transmission, modes of reproduction and life cycle</p> <p>2.3.3 Collect faecal sample for diagnosis of worms</p> <p>2.3.4 Collect skin scraping for examination of mange mites</p> <p>2.3.5 Collect blood and lymph sample for identification of parasites.</p> <p>2.3.6 Describe control measures of parasites of veterinary importance</p> <p>2.3.7 Preserve parasitological specimens using different methods</p>	<p>2.3.1 Classify common ectoparasites and endoparasites</p> <p>2.3.2 Describe general characteristics of protozoa according to transmission, modes of reproduction and life cycle</p> <p>2.3.3 Collect faecal sample for diagnosis of worms</p> <p>2.3.4 Collect skin scraping for examination of mange mites</p> <p>2.3.5 Collect blood and lymph sample for identification of parasites.</p> <p>2.3.6 Describe control measures of parasites of veterinary importance</p> <p>2.3.7 Preserve parasitological specimens using different methods</p>	<p>6.3.4 Perform basic laboratory tests for identifying parasites and microorganisms</p> <p>6.4.1 Differentiate various laboratory tests for disease diagnosis</p> <p>6.4.2 Carry out laboratory tests for disease diagnosis</p> <p>6.4.3 Summarize the results of the laboratory tests for disease diagnosis</p> <p>2.2.1 Interpret and report laboratory results</p>	<p>Some module contents of this Module in both AHP and VLT have been covered in Parasitology Modules in NTA Level 4 with 10 CHs and NTA Level 5 with 10 CHs.</p> <p>Therefore, Module Contents of this Module in NTA Level 6 in the proposed curricula is intended to cover mostly diagnostic aspects</p> <p>There is no effect on the CHs in the proposed curricula</p>
<b>Module</b>	<b>Veterinary Pathology</b>	<b>Veterinary Pathology</b>		
<b>Credit Hours</b>	<b>8</b>	<b>7</b>		
<b>Sub enabling</b>	<p>1.1.1 Use macroscopic and microscopic methods to describe pathological changes of respiratory system</p> <p>1.1.2 Use macroscopic and microscopic methods to describe pathological changes of digestive system</p> <p>1.1.3 Use macroscopic and microscopic methods to describe pathological changes of cutaneous system</p> <p>1.1.4 Use macroscopic and microscopic methods to describe pathological changes of urinary system</p>	<p>1.2.1 Describe branches of pathology</p> <p>1.2.2 Describe histopathological and macroscopic features of various lesions</p> <p>1.2.3 Examine different pathological changes in body systems</p>		<p>Two SEO of this Module highlighted in green in AHP curricula have been moved to the General Pathology Module in NTA Level 4 of the proposed curricula.</p> <p>However, more SEO with more useful contents have been added to this Module in the proposed curricula.</p>

	<p>1.1.5 Use macroscopic and microscopic methods to describe pathological changes in reproductive system</p> <p>1.1.6 Use macroscopic and microscopic methods to describe pathological changes in musculoskeletal system</p> <p>1.1.7 Use macroscopic and microscopic methods to describe pathological changes in nervous system</p>			These improvements have led to an increase of CHs from 7 in AHP curricula to 8 in the proposed curricula.
<b>Module</b>	<b>Principles of Histopathology and biotechniques</b>	<b>Veterinary Pathology</b>	<b>Principles of veterinary histopathology and biotechniques</b>	
<b>Credit Hours</b>	<b>12</b>	<b>7</b>	<b>12</b>	
<b>Sub enabling</b>	<p>1.3.1 Use histopathological techniques in fixation of tissue specimens for histopathology</p> <p>1.3.2 Use principles of histopathology in dehydration and clearing of fixed histopathological tissues</p> <p>1.3.3 Use principles of histopathology in infiltration and impregnation of histopathological tissues</p> <p>1.3.4 Use principles of histopathology in embedding impregnated histopathological tissues</p> <p>1.3.5 Use principles of histopathology in sectioning of embedded histopathological tissues</p> <p>1.3.6 Use principles of histopathology in staining of histopathological tissue sections</p>	<p>1.2.1 Describe branches of pathology</p> <p>1.2.2 Describe histopathological and macroscopic features of various lesions</p> <p>1.2.3 Examine different pathological changes in body systems</p>	<p>1.1.1 Describe principles of veterinary histopathology and clinical pathology</p> <p>1.1.2 Identify instruments, equipment, chemicals and reagents used in taking, preserving and transporting Histopathological and clinical pathological samples</p> <p>1.1.4 Apply principles of veterinary clinical pathology in taking, preserving and analysing samples</p> <p><b>Principles of veterinary clinical pathology and haematology (12 CRH)</b></p> <p>1.1.3 Apply principles of veterinary histopathology in taking, preserving and analysing samples</p> <p>1.4.4 Describe and perform Histopathological tests</p>	<p>SEO of this Module highlighted in green in both AHP and VLT curricula have been moved to General Pathology Module in NTA Level 4 and Clinical Pathology Module in NTA Level 6 of the proposed curricula.</p> <p>One SEO i.e., 1.1.2 of this Module in the VLT curricula is a Related Task to be performed in the same Module. It was therefore not included during estimation of new CHs in the proposed curricula.</p> <p>These adjustments have led to 12 CHs in the proposed curricula.</p>
<b>Module</b>	<b>Veterinary Clinical Pathology</b>		<b>Principles of veterinary</b>	

			<b>histopathology and biotechniques</b>	
<b>Credit Hours</b>	<b>6</b>		<b>12</b>	
<b>Sub enabling</b>	1.4.1 Describe concepts related to veterinary clinical pathology 1.4.2 Use haematological techniques in analysis of blood cells 1.4.3 Use principles of clinical chemistry in analysis of body fluids 1.4.4 Use principles of hematology to detect abnormalities of blood cells 1.4.5 Use principles of clinical pathology to perform urine analysis		1.1.1 Describe principles of veterinary histopathology and clinical pathology 1.1.2 Identify instruments, equipment, chemicals and reagents used in taking, preserving and transporting Histopathological and clinical pathological samples 1.1.4 Apply principles of veterinary clinical pathology in taking, preserving and analysing samples	Two SEO i.e., 1.1.1 and 1.1.2 of this Module highlighted in green under VLT curricula have been covered fully in Histopathology Module in the same NTA Level in the proposed curricula.  This reallocation has led to an adjustment of CHs to 6 in the proposed curricula.
<b>Module</b>	<b>Basic Molecular Biology</b>		<b>Introduction to Molecular biology</b>	
<b>Credit Hours</b>	<b>8</b>		<b>12</b>	
<b>Sub enabling</b>	2.1.1 Use the concept of molecular biology to describe nucleic acid structure and functions 2.1.2 Use molecular biology technique to demonstrate extraction of nucleic acid 2.1.3 Apply molecular diagnostic technique to perform gel electrophoresis, reverse transcriptase and real time polymerase chain reaction 2.1.4 Employ molecular techniques to perform analysis and interpretation of PCR products		1.2.1 Describe ultra-cellular structure and functions 1.2.2 Describe RNA/DNA structure 1.2.3 Explain RNA/DNA replication 1.2.4 Conduct DNA/RNA tests 1.5.2 Describe and perform Polymerase Chain Reaction (PCR) tests	Most SEO or Module Content details are in line with their Related Tasks some of which are beyond the scope of this NTA Level coverage.  Under this Module the technicians are expected to be highlighted or introduced to the basic concepts of Molecular Biology Module in the proposed curricula. Therefore, CHs have been readjusted to 8.
<b>Module</b>	<b>Veterinary Theriogenology and Obstetrics</b>	<b>Veterinary Surgery &amp; Theriogenology</b>		
<b>Credit Hours</b>	<b>08</b>	<b>06</b>		
<b>Sub enabling</b>	2.1.1 Use concepts of theriogenology to manage reproductive cycles in	3.1.1 Describe the sterilization and disinfection procedures in surgical		SEO of this Module highlighted in green in

	<p>livestock</p> <p>2.1.2 Use pregnancy diagnosis methods to detect gestation stages and related complications in livestock</p> <p>2.1.3 Describe parturition process and related complications in livestock</p> <p>2.1.4 Use obstetric techniques to manage parturition complications in livestock</p> <p>2.1.5 Apply postpartum care to manage dam and new-born</p> <p>2.1.6 Describe postpartum complications in livestock</p> <p>2.1.7 Use obstetric techniques to manage postpartum complications in livestock</p> <p>2.1.8 Apply principles of herd management to improve livestock productivity</p> <p>2.1.9 Use the principle of obstetric in relation to reproductive disorders and infertility</p>	<p>operations</p> <p>3.1.2 Describe procedures for local anaesthetic and tranquilizers in veterinary operations</p> <p>3.1.3 Describe suture and suture materials as applied in veterinary practices</p> <p>3.1.4 Carryout minor surgical operations (choke, bloat and hernia)</p> <p>3.2.1 Outline the process of euthanasia in animals.</p> <p>3.2.2 Explain the importance of euthanasia in domestic animals</p> <p>3.2.3 Perform euthanasia/euphemisms in animals</p> <p>3.3.1 Describe reproductive hormones and their functions in animals.</p> <p>3.3.2 Describe reproductive disorders and diseases in animals</p> <p>3.3.3 Describe reproductive infertility in animals</p> <p><b>Elementary reproduction and obstetrics (8 CRH)</b></p> <p>5.1.1 Outline reproductive hormones and their functions.</p> <p>5.1.2 Describe fertilization and development of conceptus</p> <p>5.1.3 Describe Oestrus cycle of different livestock</p> <p>5.1.4 Describe procedure of pregnancy diagnosis and precautions</p> <p>5.2.1 Explain preparations before parturition</p> <p>5.2.2 Assist different livestock at parturition</p> <p>5.2.3 Outline post-partum care of new-born and dam</p> <p>5.3.1 Describe postpartum</p>		<p>the AHP Curricula have been covered adequately in Veterinary Surgery Modules under NTA Levels 5 &amp; 6 of the proposed curricula.</p> <p>On the other hand, new SEO have been added to this Module in relation to the obstetrics in the proposed curricular.</p> <p>There was no effect on CHs.</p>
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		<p>complications</p> <p>5.3.2 Diagnose postpartum complications</p> <p>5.3.3 Manage postpartum complications</p>		
<b>Module</b>	<b>Livestock Extension Methods and Techniques</b>	<b>Livestock Extension Methods and Techniques</b>	<b>Veterinary Laboratory Information &amp; Communication Technology</b>	
<b>Credit Hours</b>	<b>6</b>	<b>07</b>	<b>6</b>	
<b>Sub enabling</b>	<p>3.1.1 Describe concepts related to extension methods</p> <p>3.1.2 Describe individual extension methods for dissemination of livestock technologies and resolve farmers conflicts</p> <p>3.1.3 Describe group extension methods for dissemination of livestock technologies and resolve farmers conflicts</p> <p>3.1.4 Describe mass extension methods for dissemination of livestock technologies and resolve farmers conflicts</p> <p>3.1.1 Apply participatory extension approaches to resolve farmers conflicts</p> <p>3.1.2 Apply training and visit extension approach to disseminate livestock technologies and resolve farmers conflicts</p> <p>3.1.3 Manage group conflicts</p> <p>3.1.1 Describe extension approaches related to dissemination of livestock technologies and farmers conflict resolution</p> <p>3.1.2 Apply participatory extension approaches to organize farmers' trainings and meetings</p> <p>3.1.3 Apply participatory extension approaches to resolve farmers conflicts</p>	<p>6.3.1 Describe participatory livestock extension approaches</p> <p>6.3.2 Carry out demonstration of new technologies.</p> <p>6.3.3 Organize farmer field school groups</p> <p>6.3.4 Apply adult learning principles in livestock extension</p> <p>6.3.5 Prepare extension programme plan and calendar of work</p> <p>6.4.1 Organize and conduct meetings of farmers</p> <p>6.4.2 Apply mass communication techniques in extension</p> <p>6.4.3 Prepare official letters.</p> <p>6.4.4 Manage group conflicts.</p>	<p>2.1.1 Apply listening skills in attending clients</p> <p>2.1.2 Identify client problems</p> <p>2.1.3 Respond to clients' problems/ complaints concerning laboratory results</p> <p>2.2.2 Write report using established procedures and format</p> <p>2.2.3 Submit report to supervisor</p> <p>2.3.1 Enter data into computer for analysis</p> <p>2.3.2 Analyse data using data processing software</p> <p>2.3.3 Use internet to communicate</p> <p><b>Basic training methodology (10 CRH)</b></p> <p>4.1.1 Assess training needs and resources</p> <p>4.1.2 Identify target group</p> <p>4.1.3 Set objectives of training</p> <p>4.2.4 Establish training costs</p> <p>4.2.1 Prepare training materials</p> <p>4.2.2 Identify resource person(s)</p> <p>4.2.3 Select training methods</p> <p>4.3.1 Identify training</p> <p>4.3.3 Mobilize training resources site</p>	<p>All SEO of this Module highlighted in green colour in the VLT curricula been moved to the Basic Computer Application Module under NTA Level 4 and Introduction to Biostatistics and Research Methodology Module under NTA Level 5 in the proposed curricula.</p> <p>SEO of Basic Training Methodology Module highlighted in blue colour under the VLT curricula are RTs to be performed in the same Module. They were therefore not accounted during estimation of new CHs in the proposed curricula.</p> <p>This rearrangement has not disturbed the allocated CHs.</p>

			<p>4.3.4 Conduct training programmes</p> <p>4.4.1 Develop evaluation tools</p> <p>4.4.2 Collect data</p> <p>4.4.3 Analyze data</p> <p>4.4.4 Prepare Evaluation report</p>	
			<p><b>Laboratory information technology (13 CRH)</b></p> <p>1.1.1 Demonstrate individual methods for communication of laboratory information</p> <p>1.1.2 Describe group methods for communication of laboratory information</p> <p>1.1.3 Explain mass methods for communication of laboratory information</p> <p>1.1.4 Apply communication skills to disseminate laboratory technology</p> <p>1.2.1 Differentiate between computer hard ware and soft ware</p> <p>1.2.2 Operate computer</p> <p>1.2.3 Apply word processing programmes to communicate</p> <p>1.3.1 Document daily laboratory activities</p> <p>1.3.2 Compile weekly, monthly and annual laboratory activities</p> <p>1.3.3 Report laboratory results to supervisors</p>	

			1.3.4 Report Expired chemicals and reagents to supervisors 3.1.5 Report the broken equipment in the laboratory 6.2.4 Keep records of laboratory animal units.	
<b>Module</b>	<b>Biochemistry and Animal Nutrition</b>	<b>Biochemistry</b>	<b>Feed chemistry and feeding</b>	
<b>Credit Hours</b>	<b>11</b>	<b>06</b>	<b>12</b>	
<b>Sub enabling</b>	6.1.1 Describe the chemistry of feed nutrients in animal feeds 6.1.2 Describe the digestive enzymes in animal body 6.1.3 Describe the metabolism of feed nutrients in the animal body 6.1.4 Apply feed analysis techniques to determine nutritional quality of feed stuff 6.2.1 Describe concepts related to animal nutrition 6.2.2 Apply Pearson Square method to formulate livestock rations 6.2.3 Apply animal nutrition strategies to improve nutritive value of animal feeds 6.3.1 Use laboratory methods used to assess toxins in animal feeds 6.3.2 Employ microbiological techniques to assess microorganisms in animal feeds 6.3.3 Apply Good Hygienic Practices to dispose contaminated animal feeds 6.3.4 Apply Good Hygienic Practices to control animal feed contamination	4.2.1 Describe the chemistry of feed nutrients and enzymes 4.2.2 Carry out feed test experiment 4.2.3 Describe the metabolism of feed nutrients in the animal body	2.1.1 Describe chemistry of feed nutrients and enzymes 2.1.2 Describe the metabolism of feed nutrients in the animal body 2.1.3 Test different livestock feed nutrients 2.2.1 Conduct proximate analysis 2.2.2 Carry out feed analysis using Van Soest Method 2.2.3 Perform evaluation tests of animal feeds 2.3.1 Explain feed adulteration / contamination 2.3.2 Describe methods of controlling feed adulteration / contamination 2.3.3 Explain handling/ disposal procedure of adulterated feeds 2.3.4 Carry out feed adulteration or contamination tests	All SEO of this Module highlighted in blue colour under the VLT curricula are RTs to be performed in the same Module.  They were therefore not accounted during estimation of new CHs in the proposed curricula, thus allowing readjustment of CHs from to 11 in the proposed curricula.
<b>Module</b>		<b>Processing of Livestock Products and By Products</b>		
<b>Credit Hours</b>		<b>8</b>		
<b>Sub enabling</b>		4.4.1 Process milk and milk products 4.4.2 Process meat and meat products 4.4.3 Prepare packing/transporting material and labels		All SEO highlighted in Gray colour under AHP curricula are proposed to be dropped in the proposed curricula since

		4.4.4 Prepare bone, meat and blood meal 4.5.1 Prepare hides and skins for pre-tanning 4.5.2 Describe tanning process of hides and skin 1.5.3 Carry out grading, packing and store tanned leather or hides and skin		they comparatively not very much useful to the Expected Technician on Animal Health Lab Technician.
<b>Module</b>	<b>Outreach Programme</b>	<b>Outreach Programme</b>	<b>Outreach Programme</b>	
<b>Credit hours</b>	<b>3</b>	<b>3</b>	<b>3</b>	
<b>Module</b>	<b>Special Project</b>	<b>Special Project</b>	<b>Special Project</b>	
<b>Credit hours</b>	<b>4</b>	<b>4</b>	<b>4</b>	
<b>TOTAL CHs</b>	<b>130</b>			

**Remarks:**

SEO – Sub-enabling Outcomes

RTs – Related Tasks

VLT – Veterinary and Laboratory Technology Curricular

AHP – Animal Health and Production Curricula